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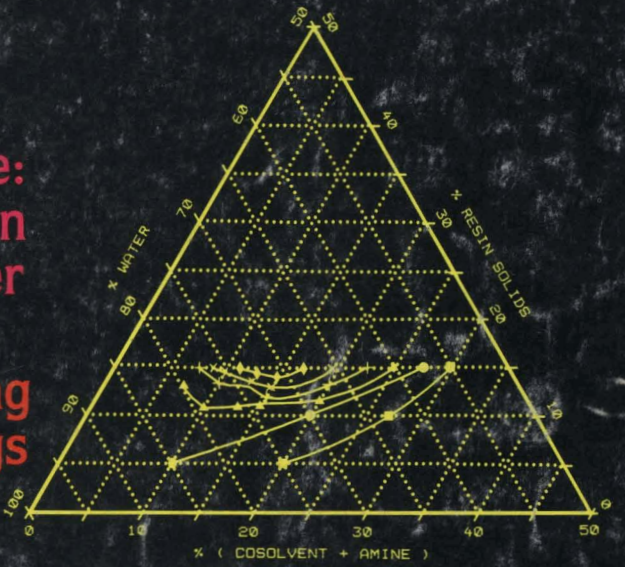
January 1987

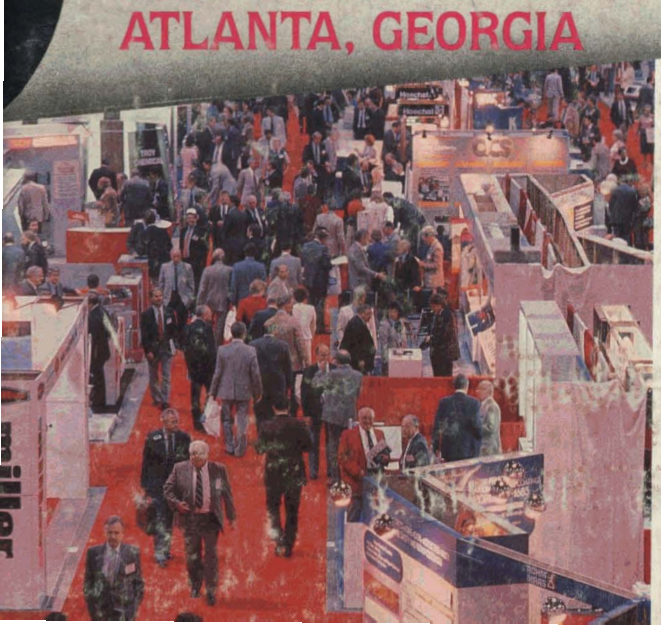
JOURNAL OF COATINGS TECHNOLOGY

First Prize: 1986 Roon Award Winner

Control of Foaming n Water-Borne Coatings



1986 CONVENTION WRAP-UP ATLANTA, GEORGIA

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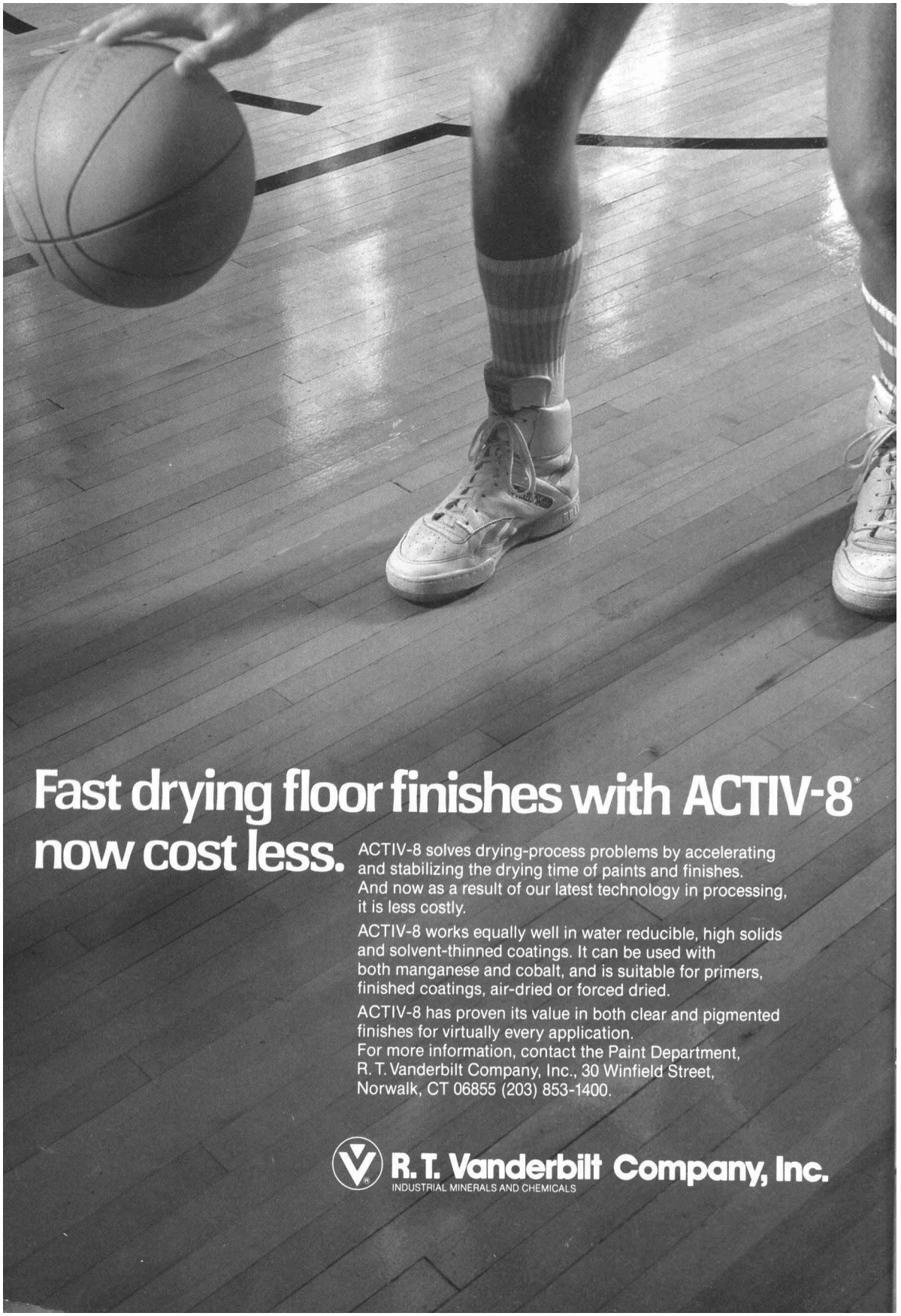

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JANUARY 1987

jct JOURNAL OF COATINGS TECHNOLOGY

VOLUME 59 NUMBER 744

Technical Articles

Federation News

Departments

SOCIETY OF NATIONAL ASSOCIATION PUBLICATIONS

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Comment

The Roon Awards—An Invitation to Compete

Among the featured articles in this issue is the winning entry in the 1986 Roon Awards competition.

Established in 1957 by the late Leo Roon, well-known figure in the coatings industry for many years, the Awards are for the best technical papers at each FSCT Annual Meeting, and are supported by funds provided through the Roon Foundation and administered by the Federation's Coatings Industry Education Fund.

Over the years, the competition has attracted papers by some of the top technical personnel in the industry, whose work has done much to advance the knowledge of coatings science. In addition to the satisfaction that comes from making a contribution to the industry, and deriving professional prestige for themselves and their organizations, winners in the competition also share more tangible rewards—a total of $4,000 in prize money.

Entries in the 1987 competition are now being accepted (see page 12), and prospective authors are invited to notify the Roon Awards Committee Chairman of their intent to compete (Gary Gardner, Tnemec Co., Inc., P.O. Box 1749, Kansas City, MO 64141). *Deadline for notification is March 1.*

Why not consider some of the work you've done recently as an entry in this year's competition? You will benefit professionally and personally, and the industry will gain the knowledge that your research provides.

Thomas A. Kocis,
Contributing Editor

ห้องสมุดกรมวิทยาศาสตร์บริการ

CIBA-GEIGY epoxy resins and the winning battle against VOC's.

Now, for the first time, you can formulate low-solvent or solvent-free coatings with an epoxy phenol novolac resin.

It's common knowledge that epoxy phenol novolac resins possess outstanding resistance to elevated temperatures as well as to chemicals.

Yet, due to their extremely viscous nature, employing these resins in coatings formulations has required solvent levels as high as 50% by volume. Quite naturally, this has severely limited their use.

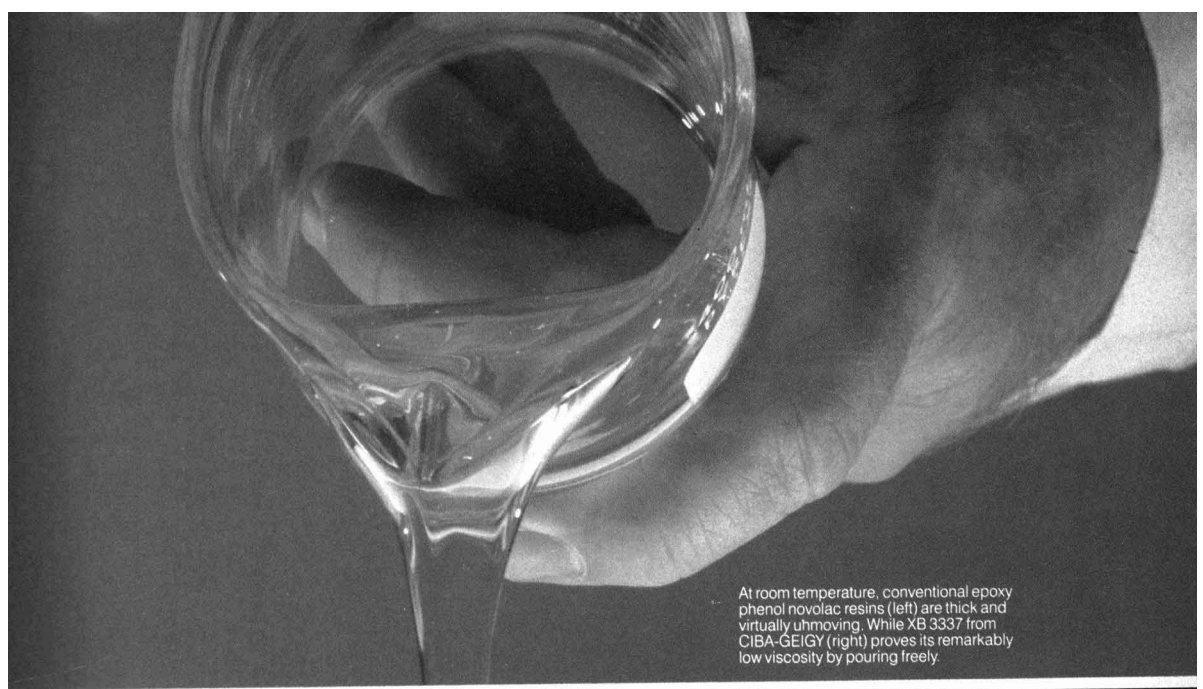
A technological award-winner.

Today, however, there's a new epoxy phenol novolac from CIBA-GEIGY that's a veritable breakthrough. This resin is so unique and so much less viscous than its predecessors it's received an IR-100 award as one of the most significant technological developments of the year.

A break with the past.

Called XB 3337, the uniqueness of this extraordinary resin lies in the fact that it possesses three to as much as thirty times lower viscosity than previous commercial EPN resins.

Used with appropriate curing agents, XB 3337 can be



At room temperature, conventional epoxy phenol novolac resins (left) are thick and virtually unmoving. While XB 3337 from CIBA-GEIGY (right) proves its remarkably low viscosity by pouring freely.

formulated without high levels of environmentally objectionable solvents—thereby extending the significant advantages of multifunctional epoxy phenol novolac resins to applications that can most benefit from them. These include chemical processing plants, pipelines, marine structures, pulp and paper mills, refineries, food and beverage processing plants.

Resin XB 3337: typical properties

Visual Appearance	Clear
Color, Gardner	6 max.
Viscosity at 25°C, cP	30,000 to 50,000
Epoxy Value, eq/100g	0.54-0.58
Weight per Epoxide	173-185
Hydrolyzable Chlorine, %	0.12 max.
Total Chlorine, %	0.4 max.
Pounds per gallon, lb.	10
Volatile content, %	0.1 max.

High performance with environmental safety.

With the typical properties shown below, XB 3337 is recommended for solvent-free and high solids coatings for ambient temperatures and high temperature service—thereby setting a whole new standard for epoxy phenol novolac resins.

Among its many advantages: low viscosity as compared to other EPN resins; higher functionality than bisphenol A epoxy resins: excellent chemical, heat and solvent resistance; good mechanical properties. In addition, XB 3337 is also compatible in all proportions with liquid bisphenol A and bisphenol F epoxy resins—providing still other possibilities for formulating solventless and high solids coatings.

To learn more, please call Laura Poulos at 800-431-1900 (in New York, 914-347-4700). Or write Plastics Department, CIBA-GEIGY Corporation, Three Skyline Drive, Hawthorne, New York 10532.

CIBA–GEIGY

Abstracts of Papers in This Issue

CONTROL OF FOAMING IN WATER-BORNE COATINGS—P. Kuschnir, R.R. Eley, and F.L. Floyd

Journal of Coatings Technology, 59, No. 744, 75 (Jan. 1987)

Although great strides have been made in the past decade in the technology of film properties of water-borne coatings, their tendency to foam during manufacture and application remains a chronic problem. The present work shows that the foaming behavior of water-borne systems is strongly dependent on the location on a phase diagram, with a region of minimum foaming being identified. Although foaming is a surface phenomenon, bulk viscosity is shown to be the strongest single factor controlling foaming. All other factors are secondary in nature, with defoamers acting only on these secondary factors. The use of conventional defoamers for foam control has little effect unless the system is first formulated to the proper composition region.

BINDERS FOR HIGHER-SOLIDS COATINGS. PART I: SYNTHESIS OF MODEL ALKYD RESINS—S.L. Kangas and F.N. Jones

Journal of Coatings Technology, 59, No. 744, 89 (Jan. 1987)

Model alkyd resins were synthesized by esterifying phthalic anhydride, triols, and a fatty acid with dicyclohexylcarbodiimide (DCC) at 25°C in pyridine with catalytic amounts of p-toluenesulfonic acid (p-TSA). Reference alkyds were prepared by conventional esterification of the same formulations at 220°C. The products were characterized by infrared (IR) spectroscopy and by size exclusion chromatography (SEC). Model alkyds generally have lower $\bar{M}_n$ and $\bar{M}_w/\bar{M}_n$ than their conventional counterparts. The results indicate that the mild-temperature process is irreversible and is essentially free of side reactions. Thus, it appears useful for reproducibly synthesizing model alkyd resins of predictable structure.

Substituting trimethylolpropane (TMP) for glycerol significantly reduces $\bar{M}_n$ and $\bar{M}_w/\bar{M}_n$ of alkyds prepared by a conventional process. Longer processing times are required. The results suggest that the –OH groups of TMP are less reactive than those of glycerol. This substitution is expected to reduce resin viscosity.

BINDERS FOR HIGHER-SOLIDS COATINGS. PART II: PROPERTIES OF MODEL ALKYD RESINS—S.L. Kangas and F.N. Jones

Journal of Coatings Technology, 59, No. 744, 99 (Jan. 1987)

Properties of the model and conventional alkyd resins prepared as described in the preceding paper were studied. Solution viscosities of model alkyds were lower than those of comparable alkyds prepared by a conventional, high-temperature process. Air dry coatings formulated from model alkyds dry faster than those based on conventional alkyds, but they have, on balance, inferior film physical properties. T_g's of films prepared from model alkyds show a greater dependence on $\bar{M}_n$ than their conventional counterparts. The observed property differences are attributable to the different molecular weights and molecular weight distributions of model and conventional alkyds.

Substitution of TMP for glycerol in conventional alkyds was shown in the preceding paper to reduce $\bar{M}_w/\bar{M}_n$. As expected, this substitution reduces viscosity. However, it results in inferior impact resistance.

It is probably not feasible to make high quality, higher-solids, air dry coatings simply by manipulating the molecular weights of soluble alkyd resins. Only modest increases (roughly 2-10%) of application solids appear possible, and measures that increase solids harm properties.

PROGRAM FOR COMPUTING CASSON PARAMETERS FROM BROOKFIELD VISCOSITY USING IBM PERSONAL COMPUTER—J. Rybicky

Journal of Coatings Technology, 59, No. 744, 105 (Jan. 1987)

A program is presented that computes the Casson plot and parameters from Brookfield viscosity measurements. The program runs on the IBM PC AT computer equipped with an Enhanced Graphic Display and a printer. It computes, displays, and prints Casson's parameters, namely the infinite shear viscosity, yield point, and levelling viscosity, after Brookfield viscosity values for individual rpm values are entered. The agreement of experimental findings with the theory is assessed numerically by the standard deviation and graphically by a simultaneous display of the experimental points and the best-fit Casson line for the points. Each sub-routine of the program is clearly identified and described so that it can be modified eventually for other computers.

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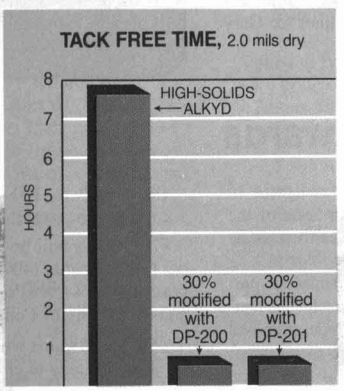

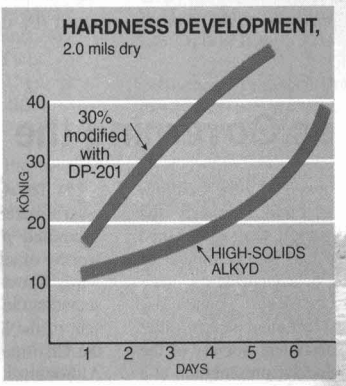

Manuscript Entries Invited for 1987 Roon Awards Competition: Authors of Winning Papers Will Share $4,000 in Cash Prizes

Prospective authors are invited to submit manuscript entries in the 1987 Roon Awards competition, and are reminded that they must advise of intent to compete by March 1. The announcement was made by Gary Gardner of Tnemec Co., Inc., Chairman of the Roon Awards Committee of the Federation.

A total of $4,000 in cash prizes will be awarded for the top papers submitted for presentation at the 1987 Federation Annual Meeting, to be held October 5-7 at the Convention Center, Dallas, Texas.

The Awards, sponsored by the Coatings Industry Education Fund (formerly the Paint Research Institute), were established in 1957 by the late Leo Roon, founder of Nuodex Products Co., and are supported by funds provided through the Roon Foundation. They are presented to the winning authors at the Federation Annual Meeting each year. (A listing of Roon Award winners from 1957-1986 follows.)

Papers submitted in the competition must: (1) Describe original work not previously published or presented; (2) Be directly related to the protective coatings industry; (3) Be of such a caliber that they reflect a step forward in real scientific contribution to the coatings industry; and (4) Be accompanied by clearance for publication.

Papers to be considered for the competition are those by individuals associated with the organic coatings industry, including raw material suppliers and educators.

Those wishing to enter the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract (by the March 1 deadline) to: Gary Gardner, Tnemec Co., Inc., P.O. Box 1749, Kansas City, MO 64141.

Winners of the 1986 Roon Awards Competition

FIRST PRIZE—"Control of Foaming in Water-Borne Coatings"—Pamela Kuschnir, Richard R. Eley, and F. Louis Floyd, SCM Pigments, Strongsville, OH.

SECOND PRIZE—"Binders for High-Solids Coatings, Part I and Part II"—Steven L. Kangas and Frank N. Jones, North Dakota State University, Fargo, ND.

Principles Governing the Roon Awards

The Awards, sponsored by the Coatings Industry Education Fund (formerly the Paint Research Institute), were established in 1957 by the late Leo Roon, founder of Nuodex Products Co. Supported by funds provided through the Roon Foundation, they are for the best technical papers (other than those by a Constituent Society of the Federation) submitted for presentation at a Federation Annual Meeting.

Papers to be considered for the competition will be those by individuals associated with the organic coatings industry, including raw material suppliers and educational institutions.

The principles governing the awards are as follows:

(1) The papers will be of such caliber that they will reflect a step forward in real scientific contribution to the coatings industries. The papers shall describe original work which has not been previously published or presented.

(2) Papers must be directly related to the protective coatings industry.

(3) None of the work shall originate from, be guided by, or be any part of, a Coatings Technology Society. These awards shall in no way detract from the cooperative efforts of Societies' Technical Committees and their convention papers.

(4) An Awards Committee, appointed by the President of the Federation, will judge the entries.

(5) The Committee is not obligated to award prizes if in its opinion none of the submitted papers are of a caliber to be worthy of such recognition.

(6) The submitted papers may be presented at the Annual Meeting with the consent of the President of the Federation and the Chairman of the Program Committee. Although it is the intent of the Roon Awards that winning papers will be presented at the Annual Meeting, papers accepted for presentation and papers awarded prizes are separate and distinct. An invitation from the Program Committee to present his/her paper should not be construed by any author as an indication that the Roon Committee has awarded the paper a prize.

(7) Winning papers will be published in the JOURNAL OF COATINGS TECHNOLOGY, which has prior rights to publication of all submitted papers.

(8) The papers shall be concise and informative discussions of up to approximately 6,000 words. Papers greatly exceeding this length should be divided into more than one paper. Multiple entries in the competition from a single author are acceptable. It is requested that manuscripts be prepared in accordance with JOURNAL OF COATINGS TECHNOLOGY style, as outlined in the Guide for Authors. Copies are available from the Federation office in Philadelphia upon request.

(9) A 150 to 200 word abstract shall accompany the paper.

(10) Papers will be rated with emphasis on: (a) Originality (40%); (b) Scientific Importance (20%); (c) Practical Value (20%); and (d) Quality of Composition (20%).

(11) The Awards will be open to anyone involved in study or engaged in work related to the protective coatings industries, including paint, varnish and lacquer manufacturers, raw material suppliers, research laboratories and universities. (The Committee, however, will not accept papers which involve raw material sales promotion or are self-serving in regard to exploiting a proprietary product.)

(12) The Committee may award any number of prizes, the total of which is not to exceed $4,000.

(13) All papers must be accompanied by company or educational institutional clearance for publication.

(14) Those planning to submit a paper in 1987 must advise the Chairman (Mr. Gary Gardner, Tnemec Co., Inc., P.O. Box 1749, Kansas City, MO 64141) by March 1. He must have 10 publication manuscripts by May 1.

(15) The 1987 Awards and accompanying engraved plaques will be presented during the Annual Meeting in Dallas, TX, October 5-7.

Roon Award Winners

1986

FIRST PRIZE: "Control of Foaming in Water-Borne Coatings"—Pamela Kuschnir, Richard R. Eley, and F. Louis Floyd, SCM Pigments, Strongsville, OH.

SECOND PRIZE: "Binders for High-Solids Coatings, Part I and Part II"—Steven L. Kangas and Frank N. Jones, North Dakota State University, Fargo, ND.

1985

FIRST PRIZE: "The Effect of α-Methyl Groups on Room Temperature Crosslinking in Acrylic Polymers Containing MAGME Monomers"—Howard R. Lucas, American Cyanamid Co., Stamford, CT.

SECOND PRIZE (tie): "An Investigation of Microencapsulated Fungicides for Use in Exterior Trade Sales Paints"—Gerry K. Noren, Mary F. Clifton, and Alex H. Migdal, DeSoto, Inc., Des Plaines, IL.

"The Role of Azeotropy in Speeding Up Water/Solvent Evaporation in Humid Air"—Albert L. Rocklin, Shell Development Co., Houston, TX.

1984

FIRST PRIZE: "Dependent Scattering Theory: A New Approach to Predicting Scattering in Paints"—Susan Fitzwater and John W. Hook III, Rohm and Haas Co., Spring House, PA.

SECOND PRIZE (tie): "Dispersion of (Magnetic) Pigment Powders in Organic Liquids"—H.F. Huisman, PD Magnetics B.V., Oosterhout, The Netherlands.

"An Analysis and Prediction of Roller Spatter from Latex Paints"—Debora F. Massouda, University of Delaware, Newark, DE.

1983

FIRST PRIZE: "The Transformation of Liquid to Amorphous Solid: Effect of Reaction Mechanism on the Time to Vitrify for Linear and Network Polymerization"—Marc T. Anonhime and John K. Gillham, Princeton University, Princeton, NJ.

SECOND PRIZE: "Protection of Mildewcides and Fungicides from Ultraviolet Light Induced Photo-Oxidation"—Peter D. Gabriele and Robert A. Iannucci, CIBA-GEIGY Corp., Ardsley, NY.

THIRD PRIZE: "Pigment Volume Concentrations and Interpretation of the Oil Absorption of Pigments"—H.F. Huisman, PD Magnetics B.V., Oosterhout, The Netherlands.

1982

FIRST PRIZE: "Comparative Solvent Evaporation Mechanisms for Conventional and High-Solids Coatings"—William H. Ellis, Chevron Research Co., El Segundo, CA.

SECOND PRIZE: "Popping of Water Soluble Baking Enamels"—Zeno W. Wicks, Jr., North Dakota State University, Fargo, ND, and Ben C. Watson, Sherwin-Williams Co., Chicago, IL.

THIRD PRIZE: "Predictive Model for Cracking of Latex Paints Applied to Exterior Wood Surfaces"—F. Louis Floyd, Glidden Ctgs. & Resins Div., SCM Corp., Strongsville, OH.

FOURTH PRIZE (tie): "Presence and Effects of Anaerobic Bacteria in Water-Based Paints"—Robert A. Opperman, Cosan Chemical Corp., Carlstadt, NJ.

"Interrelationships between Pigment Surface Energies and Pigment Dispersions in Polymer Solutions"—G. Dale Cheever and J.C. Ulichy, General Motors Research Laboratories, Warren, MI.

1981

FIRST PRIZE: "Factors Affecting Metal Marking"—Dr. Leslie A. Simpson, BTP Tioxide Ltd., Cleveland, England.

1980

FIRST PRIZE: "Kinetic Parameter Considerations for Maximizing Stability and Minimizing Cure Temperature of Thermosetting Coatings. Sulfonium Salts as Latent Thermal Initiators for Cationic Polymerization"—S.P. Pappas, North Dakota State University, Fargo, ND, and Loren W. Hill, Monsanto Co., Indian Orchard, MA.

SECOND PRIZE: "A Computer Method for Predicting Evaporation of Multicomponent Aqueous Solvent Blends at Any Humidity"—Albert L. Rocklin, Shell Development Co., Houston, TX, and David C. Bonner, Shell Oil Co., Houston, TX.

THIRD PRIZE: "Primary Amine Zwitterion Copolymers"—Zeno W. Wicks, Jr. and Chiew-Wah Koay, North Dakota State University, Fargo, ND.

FOURTH PRIZE: "Synthesis of Blocked MDI Adducts, Their DSC Evaluation and Effect of Pigmentation"—Taki J. Anagnostou, Wyandotte Paint Products, Inc., Troy, MI, and E. Jaul, Union Carbide Corp., S. Charleston, WV.

1979

FIRST PRIZE: "Transfer and Leveling Process and Rheological Design in Water-Borne Reverse Roll Coatings Systems"—T. Matsuda and W.H. Brendley, Jr., Rohm and Haas Co., Spring House, PA.

SECOND PRIZE: "Plastic Pigment—A Novel Approach to Microvoid Hiding"—Alexander Ramig, Jr. and F. Louis Floyd, Glidden Ctgs. & Resins Div., SCM Corp., Strongsville, OH.

THIRD PRIZE: "Polyphosphazenes as New Coating Binders"—A.K. Chattopadhyay, R.L. Hinrichs, and S.H. Rose, DeSoto, Inc., Des Plaines, IL.

1978

FIRST PRIZE: "Cathode Reactions and Metal Dissolution in Cationic Electrodeposition"—D.G. Anderson, E.J. Murphy, and J. Tucci, III, DeSoto Inc., Des Plaines, IL.

SECOND PRIZE: "Effect of Humidity and Other Ambient Conditions on Evaporation of Ternary Aqueous Solvent Blends"—Albert L. Rocklin, Shell Development Co., Houston, TX.

THIRD PRIZE (tie): "Rheological Properties of Styrene/Acrylic Polymers"—H.P. Schreiber and G. Thibault, Ecole Polytechnique, Montreal PQ, Canada.

"Single Grade Rutile TiO_2 Concept for Interior Latex Trade Sales Systems"—Calvin C. Tatman, Glidden Chemical/Metallurgical Div., SCM Corp., Baltimore, MD.

1977

FIRST PRIZE: "Application of Critical Relative Humidity and Evaporation Analog of Azeotropy to the Drying of Water-Borne Coatings"—Paul W. Dillon, Union Carbide Corp., Tarrytown, NY.

SECOND PRIZE: "Comparison of Tensile and Morphological Properties with Abrasion Resistance of Urethane Films"—Robert M. Evans and Joseph Fogel, Tremco, Inc., Cleveland, OH.

THIRD PRIZE: "Radical Anion Quenching by Emulsion Polymer Components"—Vincent D. McGinniss and Ann F. Kah, Glidden Ctgs. & Resins Div., SCM Corp., Cleveland, OH.

FOURTH PRIZE: "Reactions of Diethyl Malonate Blocked Cyclohexyl Isocyanate"—Zeno Wicks, Jr. and Barry W. Kostyk, North Dakota State University, Fargo, ND.

1976

FIRST PRIZE: "Photostabilization of Coatings. Studies on Resonance Energy Transfer"—E.L. Breskman and S.P. Pappas, North Dakota State University, Fargo, ND.

SECOND PRIZE: "Evaporation Phenomena: Precise Comparison of Solvent Evaporation Rates from Different Substrates"—A.L. Rocklin, Shell Development Co., Houston, TX.

THIRD PRIZE: "Surface Chemistry of Pigment-Vehicle Systems"—C.A. Kumins, Tremco, Inc., Cleveland, OH.

FOURTH PRIZE: "Computer Simulation to Optimize Paint Packaging"—D.L. Gebauer and J.N. Wiborg, PPG Industries, Inc., Pittsburgh, PA.

1975

FIRST PRIZE: "Photochemistry of Pigments—Studies on UV Curing and Energy Transfer"—S.P. Pappas and Walter Kuhhirt, North Dakota State University, Fargo, ND.

SECOND PRIZE: "Calculation and Absorption of UV Radiation by Photosensitizers in Pigmented Ultraviolet Curing Coatings"—Zeno Wicks, Jr. and Walter Kuhhirt, North Dakota State University, Fargo, ND.

THIRD PRIZE: "Water and Solvent Evaporation from Latex and Latex Paint Films"—D.A. Sullivan, Shell Development Co., Houston, TX.

FOURTH PRIZE: "Interaction of Trizaine-Crosslinked Acrylic Films and Detergent Solutions"—D.G. Anderson and Edward J. Murphy, DeSoto, Inc., Des Plaines, IL.

1974

FIRST PRIZE: "Photo-Chemistry of Pigments—Studies on the Mechanism of Chalking"—S.P. Pappas and R.M. Fischer, Jr., North Dakota State University, Fargo, ND.

SECOND PRIZE: "Role of Critical Coating Thickness in Electrostatic Power Deposition"—George F. Hardy, Celanese Research Co., Summit, NJ.

THIRD PRIZE: "Application of Acid/Base Concept Describing the Interaction between Pigments, Binders, and Solvents"—Palle Sorensen, Koge Chemical Works, Koge, Denmark.

FOURTH PRIZE: "Hydrolysis of Water-Dispersible Resins"—E.T. Turpin, Glidden-Durkee Div., SCM Corp., Strongsville, OH.

1973

FIRST PRIZE: "Kubelka-Munk Scattering and Absorption Coefficients for Use with Glossy Opaque Objects"—P.S. Mudgett and L.W. Richards, Cabot Corp., Billerica, MA.

SECOND PRIZE: "Effect of Particle Crowding on the Scattering Power of TiO_2 Pigments"—D.F. Tunstall and M.J. Hird, Tioxide International Ltd., Stockton-on-Tees, England.

THIRD PRIZE: "Comparative Kinetics of Ultraviolet Curable Coatings Systems"—V.D. McGinniss and D.M. Dusek, Glidden-Durkee Div., SCM Corp., Strongsville, OH.

FOURTH PRIZE: "Reaching an Objective in Oil Absorption Measurements"—T.K. Hay, Sherwin-Williams Research Center, Chicago, IL.

1972

FIRST PRIZE: "CPVC Calculations"—G.P. Bierwagen, Sherwin-Williams Co., Chicago, IL.

SECOND PRIZE: "Synthesis of Extracellular Cellulases in Aqueous Emulsion Coatings by Pseudomonads"—Harvey Winters, Fairleigh Dickinson University, Teaneck, NJ.

THIRD PRIZE: "Microscope Method for Examination of Pigment Dispersions"—Hubert J. Golden, PPG Industries, Inc., Barberton, OH.

1971

FIRST PRIZE: "Theoretical Computation of Light Scattering Power: Comparison between TiO_2 and Air Bubbles"—William D. Ross, E.I. DuPont de Nemours & Co., Wilmington, DE.

SECOND PRIZE: "Determination of Mercury at the Parts-per-Billion Level"—James K. Duffer, DeSoto, Inc., Des Plaines, IL.

THIRD PRIZE: "Quantitative Measures of Leveling"—James S. Dodge, Sherwin-Williams Co., Chicago, IL.

FOURTH PRIZE: "Precise Control of Solvent Blend Composition During Evaporation"—William H. Ellis and Phillip L. Goff, Chevron Research Co., Richmond, CA.

1970

FIRST PRIZE: "Flocculation of Phthalocyanine Blue—Fact or Fiction"—Dr. William Carr, CIBA-GEIGY Ltd., Manchester, England.

SECOND PRIZE: "Ultrastructure of Coalesced Latex Film and Its Influence on the Optical Properties of Practical Coatings"—James W. Herr and Robin A. Withers, Dow Chemical Co., Walnut Creek, CA.

THIRD PRIZE: "Corrosion and the Electrodeposition Process"—Clayton A. May, Shell Development Co., Emeryville, CA.

FOURTH PRIZE: "Mechanism of Paint Chipping"—Howard S. Bender, General Motors Research Labs., Warren, MI.

1969

FIRST PRIZE: "Hiding Power from Transmission Measurements—Theory and Practice"—Richard J. Bruehlman and William D. Ross, E.I. DuPont de Nemours & Co., Inc., Wilmington, DE.

SECOND PRIZE: "Electrodeposition of Maleic Adduct of a Polymeric Polyol-Oleic Acid Ester: Mechanism and Some Basic Studies"—Drs. Alfred E. Rheineck and A.M. Usmani, North Dakota State University, Fargo, ND.

THIRD PRIZE: "Structures of Wet and Dry Latex Emulsion Paints"—Dr. H.A. Wildt, E.I. DuPont de Nemours & Co., Inc., Wilmington, DE.

FOURTH PRIZE: "Paint Adhesion on a Scribed Surface—The PASS Test"—Jack Stone, Ford Motor Co., Detroit, MI.

1968

FIRST PRIZE: "Optical Behavior of Iron Oxide Pigments"—Valentino Buttignol, PPG Industries, Inc., Springdale, PA.

SECOND PRIZE: "Dissolution of the Anode During the Electrodeposition of Surface Coatings"—C.A. May and George Smith, Shell Development Co., Emeryville, CA.

THIRD PRIZE: "An Introduction to High Resolution Nuclear Magnetic Resonance Spectroscopy and its Applications to Coatings Chemistry"—Leonard C. Afremow, DeSoto Inc., Des Plaines, IL.

FOURTH PRIZE: "The Use of Kovats Retention Indices and Response Factors for the Qualitative and Quantitative Analysis of Coatings Solvents"—Dennis G. Anderson, DeSoto Inc., Des Plaines, IL.

FIFTH PRIZE: "New Coatings Based on Drying Oil Aldehydes and Hydroxyl Bearing Resins"—Dr. Alfred E. Rheineck and P.R. Sampath, North Dakota State University, Fargo, ND.

SIXTH PRIZE: "Gelation Prediction and Related Concepts"—Joseph Bernardo, Interchemical Corp., Clifton, NJ, and Dr. Paul Bruins, Polytechnic Institute, Brooklyn, NY.

1967

FIRST PRIZE: "Measuring and Minimizing the Variability in Evaluation Outdoor Exposure Results"—P.B. Mitton and R.L. Church, National Lead Co., South Amboy, NJ.

SECOND PRIZE: "Scattering and Absorption of Light by Carbon Black"—H.C. Donoiam and A.I. Medalia, Cabot Corp., Billerica, MA.

THIRD PRIZE: "Computers, Chemists and Costs"—T.J. Sheerin and R.M. Briber, General Electric Co., Chelsea, MA.

FOURTH PRIZE: "A New Look at Sulphide Staining"—E.M. Watson, Cosan Chemical Corp., Clifton, NJ.

FIFTH PRIZE: "Graphic Analysis of Resin Solubilities"—J.P. Tess, The Flood Co., Hudson, OH.

SIXTH PRIZE: "An Automatic Titrator for Alkyd Resin Acid Number Analysis"—F.H. Zimmerli, Rohm and Haas Co., Philadelphia, PA.

1966

FIRST PRIZE: "The Evaporation of Non-Hydrogen Bonding Solvents from Resin Films"—Gordon M. Sletmoe, Shell Development Co., Emeryville, CA.

SECOND PRIZE: "A New Method for the Viscosity Measurement of Paint in the Settling, Sagging, Leveling, and Penetration Shear Rate Range of .001 to 1.0 Reciprocal Seconds Using a Cone/Plate Spring Relaxation Technique"—Temple C. Patton, Baker Castor Oil Co., Bayonne, NJ.

THIRD PRIZE: "Thermosetting Acrylic Emulsions: A Novel Method for Estimating Crosslink Density in Polymeric Films"—Sheldon N. Lewis, Rohm and Haas Co., Spring House, PA.

FOURTH PRIZE: "Evaluating TiO_2–Colorant Interaction by Measurement of Scattering Coefficients"—Parker B. Mitton and Alexander J. Madi, National Lead Co., Sayerville, NJ.

FIFTH PRIZE: "Formation and Growth of Zinc Phosphate Coatings"—G. Dale Cheever, General Motors Research Laboratories, Warren, MI.

SIXTH PRIZE: "Color, Strength and Dispersibility of Pigments by the Sherwin-Williams Miniature Sand Mill"—B.R. Orwig, Sherwin-Williams Co., Chicago, IL.

1965

FIRST PRIZE: "Long-Range Effects of Polymer Pigment Interaction in the Solid State"—Charles A. Kumins, Interchemical Corp., Clifton, NJ.

SECOND PRIZE: "The Effect of Water on the Adhesion of Surface Coatings"—Peter Walker, Atomic Weapons Research Establishment, Aldermaston, Berkshire, England.

THIRD PRIZE: "Encapsulated Corrosion Inhibitive Primer"—A. Stanley Dalton, Air Force Materials Laboratory, Wright-Patterson Air Force Base, OH.

FOURTH PRIZE: "The Influence of Polarity Upon the Solubility Parameter Concept"—J.L. Gardon, Rohm and Haas Co., Spring House, PA.

FIFTH PRIZE: "High Resolution Spectra of Inorganic Pigments and Extenders in the Mid-Infrared Region from 1500 cm^{-1} to 200 cm^{-1}"—Leonard C. Afremow and John T. Vandeberg, DeSoto Chemical Coatings, Inc., Chicago, IL.

SIXTH PRIZE: "Practical Applications of Rheology in the Paint Industry"—Harvey L. Beeferman and Dennis A. Bergren, DeSoto Chemical Coatings, Inc., Chicago, IL.

1964

FIRST PRIZE: "Factors Controlling Latex Paint Rheology and Their Measurement"—Robert W. Kreider, General Tire & Rubber Co., Akron, OH.

SECOND PRIZE: "A Rheological Study of High Speed Pigment Dispersion"—Harold E. Weisberg, Mineral Pigments Corp., Muirkirk, MD.

THIRD PRIZE: "A Photographic Technique for the Macroscopic Objective Evaluation of the Degree of Film Leveling"—E. Lloyd Kelley, Rohm and Haas Co., Philadelphia, PA.

FOURTH PRIZE: "Role of the Adsorbed Resin Layer in the Dispersion of Pigmented Alkyd Systems"—E.C. Rothstein, Keuffel & Esser Co., Hoboken, NJ.

FIFTH PRIZE (tie): "Mechanism of Bubble Entrapment in Sprayed

Coatings"—Guy C. Bell, Jr., E.I. DuPont de Nemours & Co., Inc., Philadelphia, PA.

"The Free Volume Interpretation of Plasticizing Effectiveness and Diffusion of Solvents and Plasticizers in High Polymers"—Charles M. Hansen, Danish Varnish and Paint Industry, Copenhagen, Denmark.

1963

Class "A" Competition

FIRST PRIZE: "Rapid Pigment Volume Concentration Determination"—Jack E. Bissey, Rinshed-Mason Co., Anaheim, CA.

SECOND PRIZE: "Correlation of a Ball Mill Abrasion Test with Mechanical Properties of Concrete and Polymers"—Robert M. Evans and Francis E. Reed, The Master Mechanics Co., Cleveland, OH.

THIRD PRIZE: "Analysis of Alkyds by Nuclear Magnetic Resonance"—Carl J. Opp, Interchemical Corp., Cincinnati, OH.

Open Competition

FIRST PRIZE: "A Method for Measuring Solvent Release Using Radiotracers"—R.E. Murdock and William J. Wirkus, Shell Chemical Co., Union, NJ.

SECOND PRIZE: "Continuous Ultra-Sonic Rheography in High Speed Dispersions"—Harold E. Weisberg, Mineral Pigments Corp., Muirkirk, MD.

THIRD PRIZE: "A Critical Review of the Factors that Control the Quantity and Quality of a Three-Roll Mill Paint Grind"—Temple C. Patton, Baker Castor Oil Co., Bayonne, NJ.

1962

Open Competition

FIRST PRIZE: "Dispersion Flocculation Phenomena and the Dielectric Constant"—Dr. Harold E. Weisberg, Mineral Pigments Corp., Muirkirk, MD.

SECOND PRIZE: "Caution Required in Absolute Color Measurement with Colorimeters"—Dr. Fred W. Billmeyer, Jr., E.I. DuPont de Nemours & Co., Wilmington, DE.

THIRD PRIZE: "Analysis for Pigment Volume Concentration"—H.E. Ashton, National Research Council, Div. of Building Research, Ottawa, Canada.

1961

Class "A" Competition

FIRST PRIZE: "The Glass Transition in Coating Formulations"—Harry Burrell, Interchemical Corp., Cincinnati, OH.

Open Competition

FIRST PRIZE: "Surface Analysis and Adhesion"—W.T.M. Johnson, DuPont Co., Philadelphia, PA.

SECOND PRIZE: "The Viscosity Reduction Power of the Xylenes"—Arthur M. Thompson, Jr., Esso Research & Engineering Co., Linden, NJ.

THIRD PRIZE: "Quantification of the Hydrogen Bonding Parameter"—E.P. Libermann, DuPont Co., Wilmington, DE.

1960

Open Competition

FIRST PRIZE: "Molybdate Pigments: New Corrosion Inhibitors"—Helmuth O. Schoen and Benson G. Brand, Battelle Memorial Institute, Columbus, OH.

SECOND PRIZE: "A Unique Alkyd Constant for Designing and Assessing Alkyd Formulations"—Temple C. Patton, Baker Castor Oil Co., Bayonne, NJ.

1959

Class "A" Competition

FIRST PRIZE: "Trail of the Fugitive Mahogany Varnish Stain"—Dr. Leroy D. Soff, Dutch Masters Paint & Varnish Co., Brooklyn, NY.

SECOND PRIZE: "Powdered Insulating Finishes"—I.N. Elbling, Westinghouse Electric Corp., Pittsburgh, PA.

Open Competition

FIRST PRIZE: "Efflorescence and Chalking on Painted Masonry Surfaces"—Gerould Allyn, Rohm and Haas Co., Philadelphia, PA.

SECOND PRIZE: "The Influence of Cold Rolled Steel Surfaces on Paint Performance and Paint Testing"—George W. Grossman, Jr., Q-Panel Co., Cleveland, OH.

THIRD PRIZE: "Organic Coatings and Impressed Currents"—Dr. D.F. Koenecke, Esso Research & Engineering Co., Enjay Labs., Linden, NJ.

1958

Open Competition

FIRST PRIZE: "The Solvent Properties of Olefins from Petroleum"—W.W. Reynolds and H. Low, Shell Oil Co., Wood River, IL.

SECOND PRIZE: "The Influence of Solvent Composition on the Flow Properties of Paint"—E.C. Larson and W.W. Reynolds, Shell Oil Co., Wood River, IL.

THIRD PRIZE: "Pigment Optical Behavior—Evaluation on a Physical Basis"—P.B. Mitton and L.S. White, National Lead Co., Sayreville, NJ.

1957

Class "A" Competition

FIRST PRIZE: "A Solvent Formulating Chart"—Harry Burrell, Interchemical Corp., Cincinnati, OH.

SECOND PRIZE: "Chemistry and Theory of Polyurethane Coatings"—Harry E. Pansing, Ander Chemical Co., Cincinnati, OH.

Open Competition

FIRST PRIZE: "Effect of Solvent Properties on the Viscosity of Alkyd Resin Solutions"—W.W. Reynolds and H. Gebhart, Jr., Shell Oil Co., Wood River, IL.

SECOND PRIZE: "Use of Hexylene Glycol and other Solvents in Styrene-Butadiene Latex Paint"—Roy W. Tess and Robert D. Schmitz, Shell Development Co., Emeryville, CA.

THIRD PRIZE (tie): "Correction Factors Applied to the Carothers Equation for Condensation Polymerization"—R.F. Carmody, Socony Paint Products Co., Metuchen, NJ.

"A Mathematical Analysis of the Precision in Determining Hiding Power"—Parker B. Milton, National Lead Co., South Amboy, NJ.

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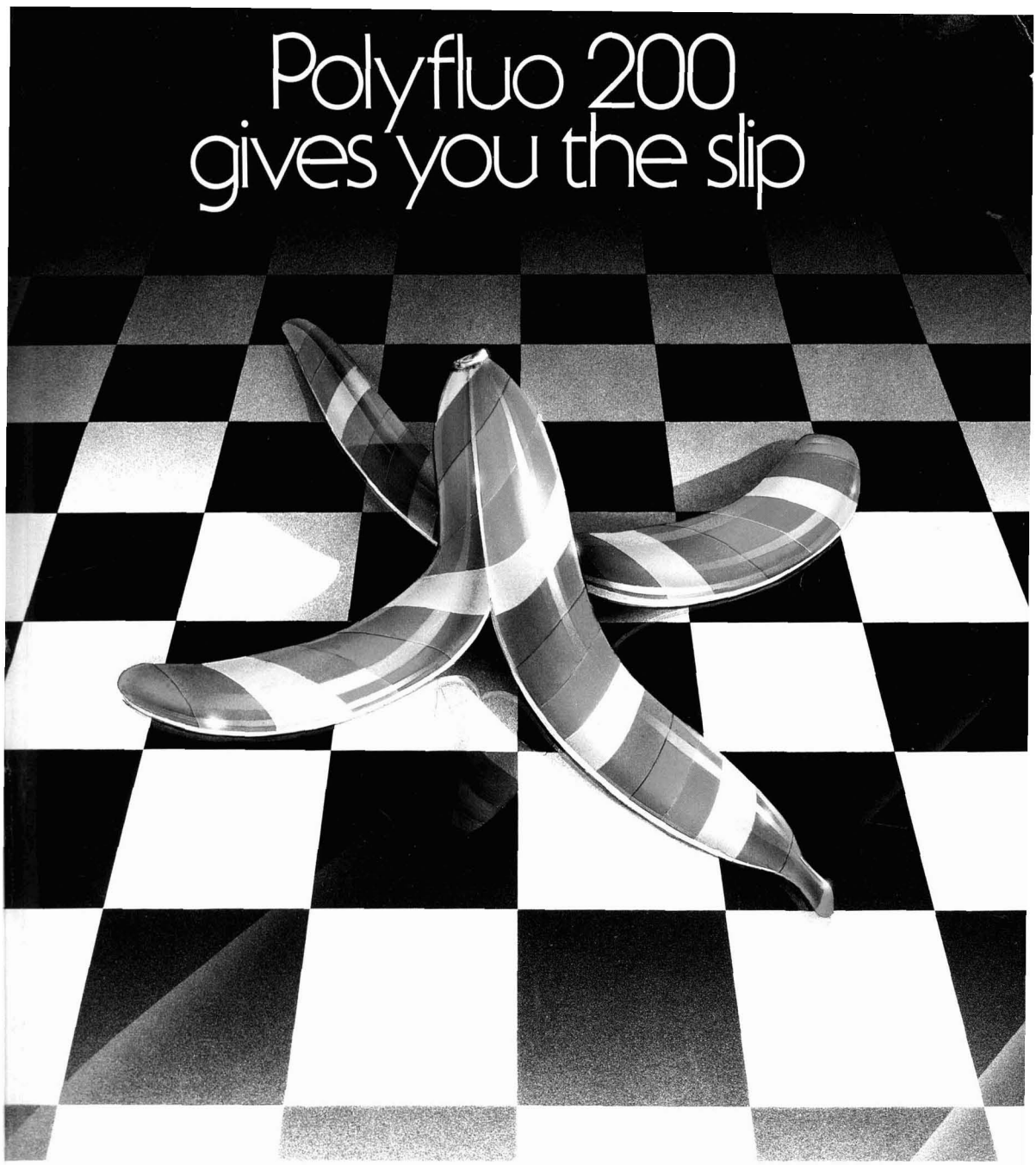

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FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

FSCT Annual Meeting and Paint Industries' Show Review

COMPLIANCE AND QUALITY: RECOGNIZING THE OPPORTUNITIES

64th Annual Meeting & 51st Paint Industries' Show
FSCT 1986

GEORGIA WORLD CONGRESS CENTER
ATLANTA, GEORGIA NOVEMBER 5-7

1986 Annual Meeting and Paint Show Draws Over 6700 Registrants to Atlanta

The Federation Annual Meeting and Paint Industries' Show returned to Atlanta on October 5-7, and attracted a total of 6,719 registrants to the Georgia World Congress Center. The turnout was the second highest in AM&PS history (surpassed only by the 7,475 registration in 1984 in Chicago), and was significantly higher than for the previous event in the Peachtree City (1980), when registration totaled 5,133.

Attendees were treated to a full program of technical presentations keyed to the theme, "Compliance and Quality: Recognizing the Opportunities," as well as the exhibits of 242 raw material and equipment manufacturers, and service suppliers who took part in the largest-ever Paint Show (57,750 n sq ft). They also enjoyed the opportunity for business socializing with their coatings industry peers, including more than 500 representatives from Canada, Latin America, Europe, Australia, and the Orient.

An upbeat mood for the event was set at the Opening Session, when motivational speaker Lee Sherman Dreyfus, former Governor of Wisconsin, delivered a dynamic Keynote Address. The subsequent technical presentations, developed by Percy Pierce and his Program Committee, covered a wide range of coatings topics, both theoretical and practical, and were well attended throughout, with several attracting standing-room-only crowds. As usual, a number of spirited question-and-answer periods punctuated the paper presentations.

Capping the program was the Mattiello Memorial Lecture, delivered by Dr. Zeno W. Wicks, Jr., Professor Emeritus, Polymers and Coatings Dept., North Dakota State University, who spoke on "Free Volume and the Coatings Formulator."

Meanwhile, in the exhibit hall, supplier companies displayed the latest in their lineup of products, equipment, and services. Traffic was heavy all three days, as registrants made repeated trips through the aisles to make sure they took in all the attractions.

Attendees were impressed by the number of exhibits, the quality of the displays, and the availability of knowledgeable and helpful technical personnel in the booths. Exhibitors, for their part, were generally enthusiastic about the number and quality of the registrants and the interest they displayed.

At the Awards Luncheon on Friday, November 7, approximately 450 registrants were on hand to honor the various prize winners (see accompanying Awards story) and to enjoy the humorous offbeat reminiscences of sports journalist Heywood Hale Broun.

By all accounts, the 1986 Annual Meeting and Paint Show was an outstanding success, and the Federation is indebted to the many members of the Southern Society who served on the Host Committee under the direction of Chairman Jim Geiger. Special thanks also are due Lynn Geiger and the members of her Committee for their work on behalf of the Spouses' program.

The Federation extends its deep appreciation to them and to all who contributed their time, talents, and efforts to make the event a memorable one.

1987 Annual Meeting and Paint Industries' Show Scheduled for October 5-7 in Dallas, TX

The 65th Annual Meeting and 52nd Paint Industries' Show of the Federation of Societies for Coatings Technology will be held at the Convention Center in Dallas, October 5, 6, 7, 1987.

Chairman of the Program Committee is William A. Wentworth, of Jones-Blair Co., Dallas.

Members of the Dallas Society, under the General Chairmanship of William F. Holmes, of DeSoto, Inc., Garland, TX, will serve on the Host Committee.

John Ballard, of Kurfees Coatings, Inc., Louisville, KY, will be Chairman of the Paint Show Committee.

With the traditional ribbon cutting ceremony, the 51st Annual Paint Industries' Show was opened. Shown left to right: Treasurer-Designate James E. Geiger and wife, Lynn; Karen Dorris and President-Elect Carlos Dorris; Executive Vice-President Frank J. Borrelle; Mary Mirick; Rose Borrelle; President William Mirick; Fran Pawsey; and Treasurer Deryk Pawsey

Neil S. Estrada, FSCT Past-President, Receives 1986 George Baugh Heckel Award

Other Annual Meeting Awards Presented

Neil S. Estrada, retired Vice-President and General Manager of the Pacific Central Division of Reichhold Chemicals, Inc., and a Past-President of the Federation, was honored with the 1986 FSCT George Baugh Heckel Award for his outstanding service to the Federation.

The award was presented during the Federation's Annual Meeting on November 7 in Atlanta.

The award plaque is presented each year to the individual whose contributions to the general advancement of the Federation's interest and prestige have been outstanding.

Neil S. Estrada, a native Californian, received the B.S. in Chemistry and M.A. in Education Degrees from the University of California (1938 and 1939) and the M.S. in Meteorology from the California Institute of Technology (1944).

His first position was with the National Bureau of Standards in San Francisco. In 1943, after five years with NBS, he was commissioned an Ensign in the U.S. Naval Reserve. He qualified as a Weather Officer, Naval Air Service, and spent considerable time with the Sino-American Cooperative Organization, U.S. Navy, in Chungking and Shanghai, China. He held the rank of Lieutenant at the time of his discharge in January 1946.

His introduction into the coatings industry came shortly thereafter when he joined the F.W. Dunne Co. as a paint formulator.

Mr. Estrada became associated with Reichhold Chemicals, Inc. in 1950 and was promoted successively to Technical Director in 1958; Plant Manager in 1970; General Manager, Pacific Central Div., in 1972; and Vice-President and General Manager of the PC Div. in 1974. He retired in 1982.

A continuing activity during his career at Reichhold was the authorship and presentation of technical papers on a variety of subjects, such as alkyds, emulsions, coatings, and plastics. They were presented over a period of 25 years to the Federation of Societies for Coatings Technology, local Coatings Technology Societies, National Association of Corrosion Engineers, Society of the Plastics Industry, and the Oil and Colour Chemists Association Australia.

In his early years of membership with the Golden Gate Coatings Society, Mr. Estrada taught the evening Paint Technology Course for six years and was Chairman of the Technical Committee for five years. He was elected to the Presidency in 1968 and was the GG Representative to the Federation Board from 1971-74.

His service to the Coatings Federation began in 1966 with a three-year Chairmanship of the Specifications Committee, which he helped to establish. He then was Chairman of the Environmental Control Committee for two years.

Mr. Estrada moved through the Federation Chairs and was Treasurer in 1975, President-Elect in 1976, and President in 1977. During his Presidency, the Mexico Society was admitted into the Federation.

He served as a Trustee of the Paint Research Institute from 1971-75 and is the current Chairman of the Trustees of PRI's successor organization, the Coatings Industry Education Fund.

He was a Federation Board member for nine years and served on the Executive Committee for five years. During the late 70's he was very instrumental in the reorganization of the Federation.

He continues to be very active in Federation matters and has been Chairman of the Investment Committee since 1981 and Chairman of the Planning Committee since 1985.

During his membership with the Golden Gate Paint and Coatings Association he was instrumental in efforts influencing air quality regulations leading to Rule 66 and Regulation 3, as well as CARB regulations. He received the Industry Statesman Award of the National Paint and Coatings Association in 1980.

Neil and Lily Estrada live in Los Altos Hills, CA. They have four children and five grandchildren.

Award Chairman Percy Pierce (left) presents the 1986 George Baugh Heckel Award to Neil Estrada

Distinguished Service Award

This award was presented to William Mirick, of the C-D-I-C Society, in grateful recognition of his valuable contributions to the progress of the Federation while serving as President of the Federation in 1985-86. Mr. Mirick is employed with Battelle Columbus Labs, Columbus, OH.

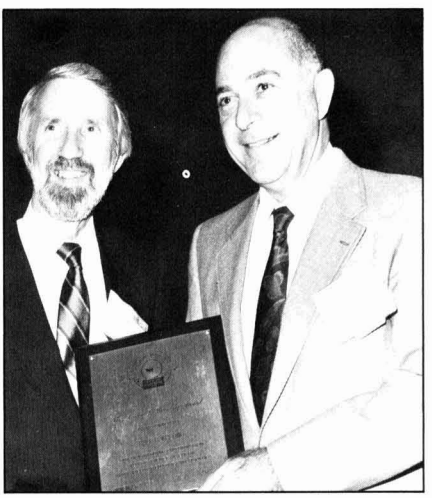
Roon Foundation Awards

These awards, established by the late Leo Roon, and administered by the Coatings Industry Education Fund (formerly Paint Research Institute), are for the best technical papers entered in the competition and submitted for presentation at the Federation's Annual Meeting by individuals associated with the organic coatings industry.

First Prize ($2,000)—"Control of Foaming in Water-Borne Coatings"—Pamela Kuschnir, Richard R. Eley, and F. Louis Floyd, Glidden Coatings & Resins, D.P. Joyce Research Center, Strongsville, OH.

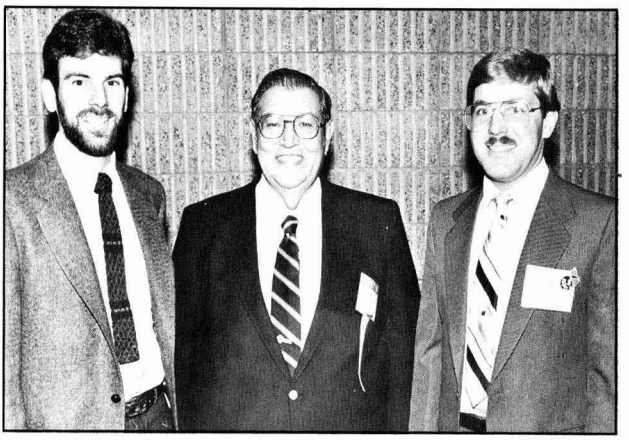
Distinguished Service Award is presented by President-Elect Carlos Dorris (left) to President Mirick

Mr. Mirick (right) congratulates Zeno W. Wicks, Jr. on his Mattiello Lecture, "Free Volume and the Coatings Formulator"



Rolf Kuehni (left) accepts the Armin J. Bruning Award for his contributions to the science of color from Ralph Stanziola, chairman of the Award Committee

Roon Awards Chairman Phil Harbaugh (left) is shown with: Pamela Kuschnir (First Prize) for her paper, co-authored with Richard R. Eley and F. Louis Floyd; and Steven L. Kangas, for his Second Prize-winning paper, co-authored with Dr. Frank N. Jones



Winners of the Alfred L. Hendry Awards, John W. Catino (left) and Dennis J. Gaber (right) are congratulated by Educational Committee Chairman, Joseph Vasta

SECOND PRIZE ($1,000)—"Binders for Higher-Solids Coatings—Synthesis and Properties of Model Alkyd Resins"—Steven L. Kangas and Frank N. Jones, of the Polymers and Coatings Dept., North Dakota State University, Fargo, ND.

Armin J. Bruning Award

This award, established in 1962 in honor of color science pioneer Armin "Joe" Bruning, was presented to Rolf G. Kuehni for his "outstanding contributions to the science of color in the field of coatings technology."

Mr. Kuehni, Manager of Technical Marketing, Textile Service Center, Mobay Corp., Rockhill, SC, has long been active in the field of color. He has written two books on color formulation and color science, and has published over 40 papers on color technology.

Of particular importance has been Mr. Kuehni's work in industrial color difference evaluations, and the development of methods to determine color tolerances. He was instrumental in the development of SAE Recommended Practice J1545 for determining measured color differences for automotive parts and materials.

Alfred L. Hendry Awards

These awards of $1,000 each, sponsored by a grant from the Southern Society of the FSCT, are for the best student papers (graduate or undergraduate) submitted for competition.

"Determination of the Activation Energy of Cathodic Delamination as a Function of Alkali Metal Cation"—John W. Catino, Jr., Center for Surface and Coatings Research, Lehigh University, Bethlehem, PA.

"Evaluation of Photoinitiator Performance"—Dennis J. Gaber, Eastern Michigan University, Ypsilanti, MI.

Ernest T. Trigg Awards

These awards are for the Secretaries of Constituent Societies of the Federation who furnish to the JOURNAL OF COATINGS TECHNOLOGY the most interesting reports of Society meetings and discussions following the presentation of papers at those meetings.

FIRST PRIZE ($100)—Joan B. Lamberg (Horton-Earl Co.), Secretary of the Northwestern Society.

SECOND PRIZE ($50)—Mark Troutman (Bradley Paint Co.), Secretary of the Pittsburgh Society.

MMA Awards

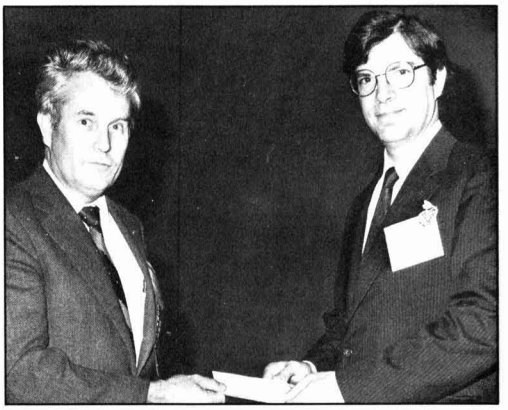
Established in 1975 by Material Marketing Associates, these cash awards and plaques are for notable achievement by Constituent Societies of the Federation other than for Society papers presented at the Federation Annual Meeting.

Class B Competition ($350) was won by the Golden Gate Society for its technical activities in the determination of volatile organic compounds in solvent and waterborne coatings.

Class C Competition ($350) was won by the Piedmont Society for its sponsorship of an accredited academic polymers course at the University of North Carolina.

Don Mazzone, chairman of the Trigg Awards (left), is shown with winners of 1986 awards for the most interesting reports of Society meetings. Joan Lamberg, Secretary of Northwestern Society, was awarded First Prize and Don Boyd, accepting for Mark Troutman, Secretary of the Pittsburgh Society, won Second Prize

Mr. Mirick presents Lewis P. Larson (right) with a plaque commemorating his election to Federation Honorary Membership



A.F. Voss/*American Paint & Coatings Journal* Award is presented by awards chairman Lloyd Haanstra (left) to Richard Schreiber, of Detroit Society

Materials Marketing Associates (MMA) Awards were presented to the Golden Gate and Piedmont Societies. Shown from left to right: Art Benton, Robert T. Miller (Golden Gate); Steve Lasine (Piedmont); and award chairman Felix Liberti

Pres. Mirick Presented Medallion from People's Republic

A token of friendship from the Peoples' Republic of China was given to President William Mirick at the Federation's Annual Business Meeting, held on November 7, in Atlanta. A bronze medallion, sent jointly by the China Association of Science and Technology (CAST) and the Chinese Coatings National Industrial Association, was intended as a goodwill gesture to the coatings industry of the United States.

Jack E. Benham, Vice-President and Technical Director of Commercial Coatings Corp., Miami, presented the medallion which had been given to him recently by the members of CAST when Mr. Benham was a visiting guest lecturer at a paint factory at Beijing, in the People's Republic. Mr. Benham's China visit was an exchange event between the People's Republic and the U.S. arranged by CAST and the American Institute of Chemists, of which Mr. Benham is a member.

According to Mr. Benham, the Chinese facility included an alkyd plant, an emulsion plant, and an architectural coatings plant. The commune on which the facility was located included a nursery school, transportation department, engineering facilities, and 2600 Chinese who lived and worked there.

Jack Benham (right) presents medallion to Mr. Mirick

Class C Competition ($350) was won by the Piedmont Society for its sponsorship of an accredited academic polymers course at the University of North Carolina.

Federation Honorary Membership

Lewis P. Larson, of the C-D-I-C Society, was elected to Honorary Membership in the Federation at the Board of Directors Meeting, November 4, in Atlanta.

Mr. Larson, a 50-year member of the FSCT, is a former member of the Board, and the Liaison, American Paint Journal Awards, and Public Relations Committees.

A 1930 graduate of North Dakota State University, Mr. Larson began his coatings career with American Zinc Sales Co., Columbus, OH, and following 41 years with the firm, retired to conduct the Paint Short Courses at the University of Missouri-Rolla.

Nuodex/Hüls Receives Citation at 1986 Paint Industries' Show in Atlanta

Nuodex/Hüls, Inc., Piscataway, NJ, was cited recently for having been an exhibitor for 50 years in the Paint Industries' Show.

A plaque commemorating the occasion was presented to Nuodex by the Federation during the 51st Paint Show, held November 5-7 at the Georgia World Congress Center in Atlanta.

Nuodex/Hüls joins three other exhibiting companies in participating for 50 or more years in the Paint Show. Honored at last year's event were: Columbian Chemicals Co., Rohm and Haas Co., and Union Carbide Corp.

Mr. Borrelle (left) presents Barry Lewis, of Nuodex, with the 50-year plaque

A.F. Voss/American Paint & Coatings Journal Awards

These cash awards are presented by the *American Paint & Coatings Journal* for the most constructive papers by Constituent Societies of the Federation in connection with the research, development, manufacture, or application of the industry's products, or of the raw materials entering into their fabrication.

First Prize ($200)—"Urethane Acrylic Interpenetrating Polymer Networks (IPNs) for Coating Applications"—Detroit Society (P.I. Kordomenos, Chairman, Technical Committee).

Society Speakers Awards

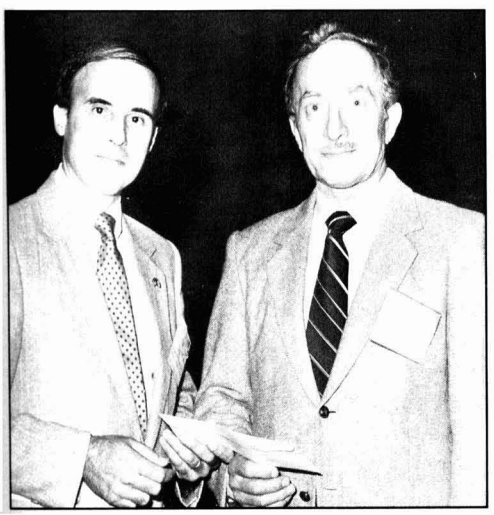
These awards are presented to individual members of the Societies who present Society papers at the Annual Meeting in the best form and manner.

First Prize ($100)—Rose A. Ryntz (DuPont Mt. Clemens Coatings, Inc.), Detroit Society.

Second Prize ($50)—Richard W. Braunshausen, Jr. (The Enterprise Companies), Chicago Society.

Golden Impeller Award

This award, offered by Morehouse Industries, Inc., for outstanding achievement in dispersion technology, was presented at the Annual Meeting to Earl E. Baumhart, of Coatings Engineering & Systems Co., Kansas City, MO.



Awards Chairman John Lanning presents Program Speaker Award to Harry Majcher, of Detroit Society

Earl E. Baumhart (left) accepts the Golden Impeller Award for outstanding achievement in dispersion technology from Dale Morehouse

Speakers from the Manufacturing Committee Seminar presented "Productive Alternatives for Improving Materials Control"

ICCATCI

A luncheon for visiting members of the International Committee to Coordinate Activities of Technical Groups in the Coatings Industry (ICCATCI) is sponsored each year by the Federation of Societies for Coatings Technology (FSCT) at its Annual Meeting and Paint Show.

ICCATCI is composed of: FSCT; Federation of Associations of Technicians in the Paint, Varnish, Lacquer, and Printing Ink Industries of Continental Europe (FATIPEC); Oil and Colour Chemists' Association (OCCA); Oil and Colour Chemists' Association—Australia (OCCAA); Japan Society of Colour Material (JSCM); and Federation of Scandinavian Paint and Varnish Technologists (FSPVT).

Present at the luncheon held during the 1986 Annual Meeting and Paint Show in Atlanta, November 6, were: Standing (left to right): Past-President A. Clarke Boyce (FSCT); Past-President Jacques Roire (FATIPEC); Annik Chauvel, Editor of Double Liaison (FATIPEC); Past-President Ted Saultry (OCCAA); President-Elect Carlos E. Dorris (FSCT); Chairman of Liaison Committee Shigezo Tochihara (JSCM); Treasurer-Elect James E. Geiger (FSCT); Past-President Terryl Johnson (FSCT); Treasurer Deryk R. Pawsey (FSCT); and Executive Vice-President Frank J. Borrelle (FSCT). Seated: Vice-President Isao Kumano (JSCM); President Ian Pike (OCCAA); President Amleto Poluzzi (FATIPEC); President William Mirick (FSCT); President Arya Saloranta (FSPVT); and Council Member David Clayton (OCCA).

FSCT 50-YEAR MEMBERS

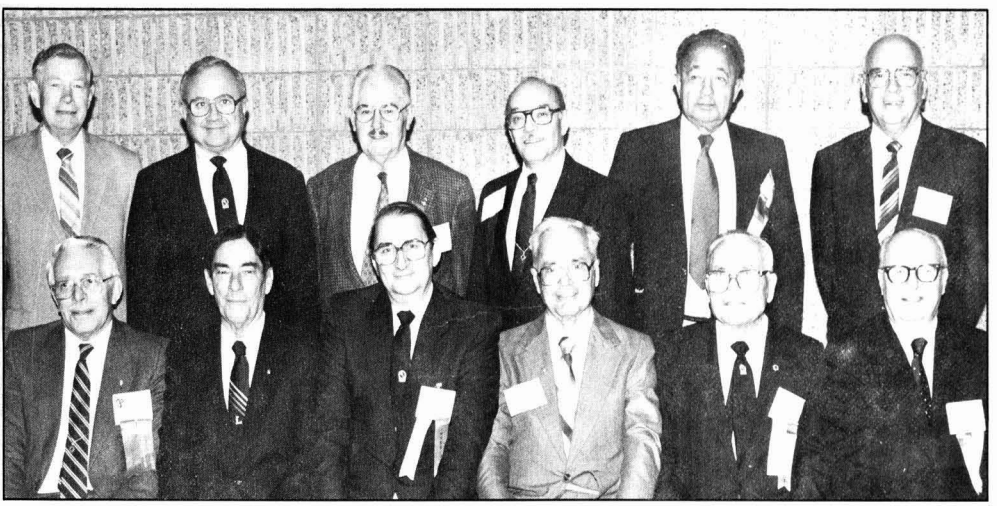
At the Annual Awards Luncheon of the FSCT held during the Annual Meeting on November 7, a special group of Federation members were honored. In attendance with their spouses at the luncheon were members of the Federation's 50-Year Club.

They include: Joseph Cantor, Elmhurst, NY; Michael Catena, Tampa, FL; Kenneth A. Earhart, Allentown, PA; Carl L. Engelhardt, Largo, FL; Mrs. Alma Gooel, Detroit, MI; Bert Gooel, Detroit; Richard O. Innes, New York, NY; Lewis P. Larson, Columbus, OH; Charles H. Levine, Brooklyn, NY; Sidney B. Levinson, Cranbury, NJ; Arthur I. Nortman, Brooklyn, NY; Loren B. Odell, Houston, TX; Edmund Peterson, Pueblo, CO; Carroll M. Scholle, Chicago, IL; Elias Singer, Newark, NJ; and Edward Wanderman, Brooklyn, NY

64th Annual Meeting & 51st Paint Industries' Show
FSCT 1986
Georgia World Congress Center
• Atlanta •
November 5, 6, 7, 1986

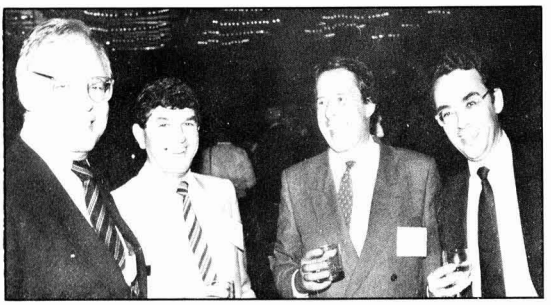
During the FSCT Business Meeting on November 7, Mr. Mirick presented the Presidential Gavel to Mr. Dorris

Members of the Executive Committee for 1986-87 are (standing, left to right): Past-President Mirick; Kurt Weitz; Dan Toombs; Saul Spindel. Seated, Treasurer James Geiger; President Carlos Dorris; and President-Elect Deryk Pawsey



Federation Past-Presidents attending the Annual Meeting included (standing, left to right): Terryl Johnson (1983-84); Joseph A. Bauer (1984-85); Eugene Ott (1960-61); Howard Jerome (1981-82); Neil Estrada (1976-77); and John Oates (1977-78). Seated: A. Clarke Boyce (1982-83); J.C. Leslie (1974-75); William Mirick (1985-86); Raymond C. Adams (1959-60); Mike Malaga (1973-74); Carroll Scholle (1965-66)

OVERSEAS VISITORS RECEPTION



CIBA-GEIGY Corp.; Daniel Products Co.; Erichsen Instruments, Inc.; Johnson Wax; Poly-Resyn, Inc.; and REECO were recipients of the C. Homer Flynn Awards at the 1986 Paint Industries' Show.

These awards are presented for outstanding exhibits in the Show on the basis of technical excellence, educational value, attractiveness, and novelty. The awards are divided into three categories: Raw Materials Suppliers (single, double, 3-5, and 6-plus booth exhibits), Equipment Manufacturers, and Service Industries.

The prizes (engraved plaques) were awarded as follows:

RAW MATERIAL SUPPLIERS:

Single-Booth Exhibit—Poly-Resyn, West Dundee, IL (2 years in Show).

Double-Booth Exhibit—CIBA-GEIGY Corp., Hawthorne, NY (1 year).

Three-to-Five Booth Exhibit—Daniel Products Co., Jersey City, NJ (30 years).

Six-or-More Booth Exhibit—Johnson Wax, Racine, WI (5 years).

EQUIPMENT MANUFACTURER—Erichsen Instruments, Inc., Akron, OH (1 year).

SERVICE INDUSTRIES—REECO, Morris Plains, NJ (2 years).

Paint Show Committee Chairman John Ballard (right) is congratulating winners of the C. Homer Flynn Awards for outstanding exhibits. Winners (left to right) are: Bob Schruers (Poly-Resyn); Laura Poulos (CIBA-GEIGY); Mike Frantz (Daniel Products); John Rizzo (Johnson Wax); Norm Wisler (REECO); and Bjorn Erichsen (Erichsen Instruments)

1986 WINNERS

RAW MATERIALS SUPPLIERS


DANIEL PRODUCTS COMPANY
Pigment Dispersions
DISPERSE-AYD
PIGMENT DISPERSING AGENTS
TINT-AYD
PIGMENT DISPERSIONS
TINT-AYD "ST"
PIGMENT DISPERSION
NEW
DISPERSE-AYD 15
DANIEL PRODUCTS COMPANY


JONCRYL
Johnson
wax
CHEMICALS
1886
1986
100

EQUIPMENT MANUFACTURERS

SERVICE INDUSTRIES

1986 Paint Show Exhibits

The 1986 Paint Industries' Show of the Federation of Societies for Coatings Technology was held at the World Congress Center, Atlanta, GA, on November 5-7. The 242 exhibitors took part in the largest-ever Paint Show (57750 nsq ft).

As a continuing service to JCT readers, we present (in the following pages) a description of the products and services which highlighted the exhibits of exhibitor companies. These are reprinted exactly as published in the Federation's "Paint Show Program," which was given to all registrants at the Convention.

Any requests for information from the exhibitor companies should be sent to the JCT office (1315 Walnut St., Philadelphia, PA 19107). All inquiries will be forwarded.—*Ed.*

ACETO CORP.
Flushing, NY 11368

The company is offering a wide range of chemicals for the coatings industry. These include zinc oxide, organotin compounds, anti-skinning agents, electrostatic spray-paint additives, UV photoinitiators, Aziridine-based chemicals, and a rust-conversion concentrate.

ADVANCED COATING TECHNOLOGIES, INC.
Hillsdale, MI 49242

Testing services and paint test panels—Learn what's new in automotive testing. Total phosphate and painted panel preparation for testing is automotive approved. Available testing services include cycle corrosion (scab & APGE), humidity, salt spray adhesion, gravelometer, steel paintability, DOI, gloss, surface roughness, blistering compatibility studies.

ADVANCED SOFTWARE DESIGNS CO.
St. Louis, MO 63017

Demonstrations of the SNAP Manufacturing Control System are given. A comprehensive software package for control of manufacturing and accounting functions for paint, ink, resin, chemical or other formula-based manufacturers, it includes modules for formulation, batch tickets, MSDSs, labeling, and accounting functions.

AIR PRODUCTS AND CHEMICALS, INC.
Allentown, PA 18105

Emphasized is the company's broad line of SURFYNOL® nonionic surfactants. Live demonstrations show benefits. Also featured are a line of vinyl acrylic and vinyl acetate-ethylene emulsions, a new caulking compound emulsion, and a line of spray-dried liquid latex powders.

ALCAN POWDERS AND PIGMENTS
Elizabeth, NJ 07207

The exhibit features new specialty aluminum paste and flake pigments for the coatings industry. Technical and marketing specialists are available to discuss product applications and specific end-use requirements.

C.M. AMBROSE CO.
Redmond, WA 98052

See the latest in filling and sealing equipment—Ambrose new computerized volumetric/weight fillers and completely automated filling lines.

AMERICAN CYANAMID CO.
Wayne, NJ 07470

Cyanamid displays information on a wide range of crosslinking agents for coatings including methylated and butylated, and introduces a new urethane line. Also featured are a new MAGME monomer (formaldehyde free—room temperature cure); polymer additives (UV stabilizers, antioxidants); and a range of surfactants and specialty monomers.

AMERICAN HOECHST CORP.
Coventry, RI 02816

The pigments department exhibits (1) new pigments for industrial and high performance coatings (2) a display comparing organic yellows for trade sales paint and (3) their new expanded technical service for the paint industry featuring color matching by phone.

ANALECT INSTRUMENTS
Utica, NY 13502

Analect Instruments exhibits advanced instrumentation for the measurement, composition, and control of coatings. Analect offers systems for laboratories, QC/QA environments as well as off-line batch analysis and on-line process control.

ANGUS CHEMICAL CO.
Northbrook, IL 60062

The many benefits of AMP-95™ are highlighted by ANGUS Chemical Co. In a recent industry study, latex paint users shared their specific results and the reasons why they use AMP-95. Experienced technical representatives answer your questions on how you can incorporate AMP-95 into your paint formulations.

ANKER LABELERS CORP.
Mt. Laurel, NJ 08054

The new, fully automatic Pail Labeler applies plain paper labels to tapered or straight sided pails and maintains label orientation with respect to the pail. Pails, full or empty, of various sizes and materials can be labeled at up to 25 per minute. Labels up to 25 inches long.

APPLIED COLOR SYSTEMS, INC.
Princeton, NJ 08540

A new generation spectrophotometer, the SPECTRO-SENSOR III is demonstrated with ACS 3300 multi-user computer color-matching system and with ACS 1800 ATE, an IBM-based single user system. Also featured are the ACS PAINTMAKER for in-store color matching and the ACS 10000 Automatic Colorant Dispenser.

ARCO CHEMICAL CO.
Philadelphia, PA 19102

Featured is the broad range of high-performance oxygenated and functional chemicals that the company offers the coatings industry. Highlighted are low-toxicity ARCOSOLV® PG ethers and acetates, propylene glycols, stripper solvents and SMA®, Poly BD®, and UV-cured resins. Both marketing and technical representatives are present.

ARIES SOFTWARE CORP.
Louisville, KY 40222

On display are multi and single user IBM computers featuring the Aries ChemPAC System. ChemPAC is a completely integrated computer software system, which includes formula management, formula analysis, sales and margin analysis, MSDS, labeling, production, order entry, and inventory and accounting software.

ARMSTRONG CONTAINERS, INC.
Westchester, IL 60153

Featured is a wide variety of metal and plastic packaging for the paint industry—all size metal friction cans, one and two gallon plastic pails, aerosols, and aerosol overcaps.

ASHLAND CHEMICAL CO.
Industrial Chemicals & Solvents Div.
Columbus, OH 43216

Featured is an extensive line of solvents, exempt solvents and specialty chemicals for the coatings industry. Products are available for local delivery from over 70 locations nationwide. Ashland also offers other unique services like chemical waste disposal and computerized solvent reformulation.

ASTM
Philadelphia, PA 19103

ASTM Committee D01 on Paint and Related Coatings and Materials: An overview of the committee and its prize standards.

ATLAS ELECTRIC DEVICES CO.
Chicago, IL 60613

The Atlas Family of Companies exhibits the new Ci65 Xenon Arc Weather-Ometer, the new SF Series Corrosive Fog Exposure System, and Custom Scientific's flammability and impact testers. South Florida Test Service personnel are available to discuss natural and accelerated materials testing programs.

AZS CORP.
Atlanta, GA 30318

With renewed emphasis on quality assurance and compliance with government regulations, AZS Corp. highlights its broad line of epoxy curatives, urethane chemicals and water-based polymers for the coatings and adhesives industry. Custom synthesis capabilities are also displayed.

B&P ENVIRONMENTAL RESOURCES, INC.
Ridgewood, NJ 07451

B&P is a one-stop hazardous waste management company offering complete services, including incineration of the "F" constituents scheduled for banning from landfills on Nov. 8, 1986. B&P maintains a complete lab utilizing state-of-the-art instrumentation, including GCMS for accurate and expeditious sample analysis.

B. A. G. CORP.
Dallas, TX 75218

This exhibit includes flexible, intermediate bulk containers known as "Super Sacks"®. Used for shipping and storing dry, flowable solids, it is available in sizes from 6-85 cu ft capacities. Auxiliary equipment for loading and handling is also available.

BASF CORP.
Chemicals Div.
Parsippany, NJ 07054

BASF features coloristic organic and inorganic pigments, dyes and aqueous dispersions for architectural, industrial and transportation needs. In addition, colorless corrosion-inhibiting pigments for stringent marine coatings and polyethylene dispersions for automotive and coil coatings are available. Join us and play our "COLOR WHEEL" of Fortune.

LOUIS P. BATSON INCORPORATED
Greenville, SC 29608

In conjunction with Original Hanau, Batson is exhibiting the Suntest Accelerated Weatherfastness Tester, which provides fast and reliable information on material changes caused by sunlight. The Suntest is ideal for routine production tests, inspection of incoming goods or pretests of new materials.

BELTRON CORP.
Red Bank, NJ 07701

Exhibits include a working filling machine dispensing punch. This machine demonstrates the concept of ultrasonic liquid level sensing used in all our filling equipment. Shown is a rotary filling machine with exceptionally high fill rates for all viscosity material and an "F" style machine for filling small mouth opening containers.

BEROL CHEMICALS, INC.
Westport, CT 06880

The exhibit features the chemically unique Bermocoll line of thickeners. Visit us and find out why Bermocoll is more than just a thickener! Also featured is Inorphil® Mineral Fiber, a safe replacement for asbestos.

BLACKMER PUMP DIV.
Dover Corp.
Grand Rapids, MI 49509

Blackmer exhibits their full line of rotary positive displacement sliding-vane pumps specifically designed to handle emulsions, pastes, resins, oils and solvents. Capacities range from 2 to 500 gpm, with differential pressures up to 150 psi.

BOISE CASCADE CORRUGATED CONTAINER DIV.
Nampa, ID 83651

On display is the "Liquibulk" 330 gallon bulk liquid disposable container for shipping of non-hazardous liquids.

C.W. BRABENDER INSTRUMENTS, INC.
South Hackensack, NJ 07606

Viscosity measurement is extremely important in the coatings business. C.W. Brabender offers a wide range of instruments such as: Rheotron; Viscotron; Visco-Corder; Cyclovisco-E; and Convimeter. Various viscometers are on display.

BRAIN POWER INC./BPI
Miami, FL 33155

Featured are BPI's new computerized-design, double-action, stirring impellers, mandrels and various sizes of ultrasonic units for lab and plant.

BRINKMANN INSTRUMENTS
Westbury, NY 11590

Sartorius Electronic Balances and Scales are featured. Model 1493 MP8 has uniquely designed display mounted above the weighing pan. Ideally positioned for compounding, formulating, and angled for viewing, this eye level digital display lets you accurately and quickly fill to the target weight. Capacity of 6100 g; readability of 0.1 g.

BROCKWAY STANDARD, INC.
Atlanta, GA 30338

The exhibit features the star of one-gallon plastic paint cans: "PLASTITE"™. Over 25,000,000 Plastites have been sold—making it the most widely used plastic can for water-based paints.

BROOKFIELD ENGINEERING LABS., INC.
Stoughton, MA 02072

A complete line of instrumentation for measurement of viscosity and consistency featuring the new Brookfield Calculating Digital Display Viscometer which displays percent scale, viscosity (centipoise) and shear stress. Models are supplied with two voltage outputs for recording and an RS232C serial output for connection to a recorder, printer or data logger/computer.

BTL SPECIALTY RESINS CORP.
Warren, NJ 07060

Exhibit includes phenolic resins for metal coatings and drum coatings. These baking resins are FDA approved and supplied in lump, crushed, and liquid forms. Also shown are various resins for adhesives and sealants.

BUCKMAN LABORATORIES, INC.
Memphis, TN 38108

The latest in wood preservatives, corrosion inhibitive pigments, and pigment dispersants are on display. Test panels show the superior performance of both wood preservatives and corrosion inhibitors. Technical representatives will answer questions and supply current literature on Buckman products.

BULK LIFT INTERNATIONAL, INC.
Carpentersville, IL 60110

A leading producer of bulk bags in the United States, Bulk Lift presents a complete line of woven polypropylene semi-bulk bags for handling capacities from 1,000 to 8,000 pounds of dry flowable material. Included also is information on filling and emptying equipment.

BURGESS PIGMENT CO.
Sandersville, GA

With expansions both in flash calcination and conventional calcined clay, Burgess Pigment Co. increases its commitment to specify functional products as well as commodity grades. Panels demonstrate the ability of OPTIWHITE and OPTIWHITE P to extend TiO_2 in interior and exterior paint, upwards of 75 lbs. New grades of calcined and hydrous clays and surface-treated versions are presented.

BYK-CHEMIE USA
Wallingford, CT 06492

Featured are the new generation of silicone additives, the heat resistant Byk-310 and the anti-graffiti Byk-370. Additional displays show improved pigment wetting with Disperbyk 160 and Disperbyk 163; anti-sag properties of Anti Terra 204 and Anti Terra 207; and improved leveling of Byk-358. Defoamers shown are Byk-077, and the non-silicone Byk-051, Byk-052 and Byk-053. New instruments are a Goniospectrophotometer, Byk-O-Stor/Gradient Oven combination, and the Color Gloss with software program for color matching.

CABOT CORP.
CAB-O-SIL Div.
Tuscola, IL 61953

Highlighted is CAB-O-SIL® fumed silica—an effective rheology control agent—offering paint and coatings formulators a unique product which controls viscosity, prevents sagging and anti-settling of heavy pigments. CAB-O-SIL® TS-720 hydrophobic fumed silica for use in epoxy, urethane and high solid coatings systems is also featured.

CALGON CORP.
Pittsburgh, PA 15230

Featured are TEKTAMER 38 A.D. and BIOCHEK 240, preservatives with an excellent toxicological profile and a high degree of efficacy. Representatives are available to help with your specific biocide problems.

CANADA TALC LIMITED
Marmora, Ontario, Canada K0K 2M0

Canada Talc Limited introduces its Martal Talc products which offer a very high brightness, platy-prismatic, economical filler-pigment. Also available is the fine quality line of Cantal products, offering high brightness, platy, natural talc fillers in a range of Hegman fineness—products designed to meet the needs of the paint chemist.

CARGILL, INC.
Minneapolis, MN 55440

Cargill gives you the jump in technology with new performance all stars in high-solids and water-reducible coatings. Our new resins for low VOC architectural coatings, one component urethane systems and corrosion-resistant water-reducible enamels enable you to formulate for performance. Let our booth representatives show you how to jump ahead with our new technology.

CASCHEM, INC.
Bayonne, NJ 07002

Caspol® 1715 polyol for high-solids, high-performance polyurethane coatings for maintenance, marine and transportation coatings applications is presented with optimized starting formulations. New technical bulletins and panels coated with optimized formulations using Caspol 1715 vs. control formulations are featured.

CEM CORP.
Indian Trail, NC 28079

CEM Corp., a leader in the development of laboratory equipment utilizing a unique microwave technology, features a rapid solids analyzer which measures percent solids in 3-4 minutes for water-borne systems and 5-10 minutes for most solvent-borne systems. Also shown, a general-purpose laboratory system for rapid drying.

CHEMICAL AND ENGINEERING NEWS
American Chemical Society
Washington, DC 20036

The display features *Chemical and Engineering News*, a chemical newsweekly and the official publication of the American Chemical Society. On display is C&EN's fourth annual Paint Coatings Product Report. Also highlighted is the ACS's annual chemical guide, Chemcyclopedia.

CHEMICAL WEEK
New York, NY 10020

This exhibit representing McGraw Hill, features copies of current issues of *Chemical Week*, the special coatings report issue.

CHICAGO BOILER CO.
Chicago, IL 60614

The exhibit features the latest horizontal and vertical small media milling equipment used in the paint industry. On display is various size laboratory and production equipment. In addition, the company's new line of in-line dispensers is exhibited.

CIBA-GEIGY CORP.
Plastics Dept.
Hawthorne, NY 10532

Featured are CIBA-GEIGY epoxy resins and hardeners for the low VOC solution. The display showcases the company's broad range of resins and hardeners that can be used in the formulation of coatings possessing low solvent levels.

CL INDUSTRIES, INC.
Georgetown, IL 61846

Three new product developments are introduced: 1) realtime computerized process control and statistical quality control for batch or continuous chemical operation, small or large; 2) specialty chemicals for coatings (epoxies, phenolics, sulphonic acids); and 3) safebase polymer aggregate pump bases and containment curbing with built-in alarm systems to prevent discharge into the environment.

CLAWSON TANK CO.
Clarkston, MI 48016

Featured are DOT Jumbo™ Bins and Drums made in stainless steel, carbon steel, aluminum, and polyethylene and our new Sta-Bright finish for the interior and exterior of the stainless steel container. In addition, the Haz Tank™ secondary containment-type underground storage tank with computerized leak monitoring and constant surveillance panel is displayed.

COATINGS MAGAZINE
Oakville, Ontario, Canada L6K 3G5

Coatings Magazine is the only publication in Canada serving the paint and coatings manufacturing and raw materials/equipment areas. Its national circulation in Canada also includes major industrial end users of coatings products.

COLOR CORP. OF AMERICA
Rockford, IL 61101

Color Corp. has sales and technical people available to discuss all aspects of colorants and color systems for trade sales, industrial maintenance, and industrial coatings.

COLORGEN, INC.
Billerica, MA 01821

The advanced, second generation color-matching system—Colorgen DCM-1100—is on display with examples of accurate matches and it is available for "hands-on" trial.

COLUMBIAN CHEMICALS CO.
Atlanta, GA 30339

Columbian Chemicals, an exhibitor for over 50 years, presents its complete line of Mapico synthetic iron oxides and Raven carbon blacks for use in coatings. Highlighted is their application to high-solids systems and conductive and water-based coatings.

COMMERCIAL FILTERS
Lebanon, IN 46052

On display is a variety of filter housings used throughout the paint and coatings industry. Also featured is a wide selection of filter media (cartridges), including the Fulflo® resin-bonded cartridges, the Fulflo pleated cellulosic cartridge, and the new Fulflo Advantage™ pleated microfiber cartridge.

CONSOLIDATED PACKAGING MACHINERY
Alden, NY 14004

Information on high-speed, rotary piston fillers for paints, stains, and related products (we used to be Pfaudler). Simple, accurate, proven concepts. Ask us about our latest developments.

CONTINENTAL FIBRE DRUM, INC.
Marietta, GA 30067

On display are the company's fibre drums for water-based paints and powder coatings. Included are the new Liquipak® drums with linings of LDPE and aluminum foil for high moisture content products. Modified copolymer linings and polyester laminates are also featured.

COOK RESINS & ADDITIVES
Kansas City, MO 64141

Cook's additives which control many problems including craters, orange peel, and pin holes are featured along with microgels which help control sag, "picture framing," and metal orientation. Literature is available on water-reducible, high-solids and melamine/urea resins.

COSAN CHEMICAL CORP.
Carlstadt, NJ 07072

The exhibit features new organic bactericides for in-can preservation. These products offer a broad spectrum of activity against gram positive and gram negative organisms. Personnel are available to discuss the firm's complete line of bactericides, fungicides, specialty chemicals, driers and catalysts.

COULTER ELECTRONICS, INC.
Hialeah, FL 33010

Coulter is showing two of its latest particle size analyzers covering the size range of 0.003μm-1200μm. In addition, the new DELSA, an electrophoretic mobility distribution and zeta potential analyzer is featured.

CRAY VALLEY PRODUCTS, INC.
East Rutherford, NJ 07073

Three types of products are exhibited: the Crayvallac additives for rheology control; the Lancowax additives for control of gloss, slip, abrasion and water absorption; and the Super Gelkyds thixotropic alkyds.

CROSFIELD CHEMICALS, INC.
Pittsburgh, PA 15275

Crosfield, a member of the Unilever Group of companies, is introducing to the U.S. coating industry a range of flatting agents based on both gel and precipitated technology. Crosfield silicas are manufactured to exact production standards to ensure high consistency and optimum performance.

CUNO INDUSTRIAL PRODUCTS
Meriden, CT 06450

Featured is the newly introduced BETAPURE™ a clean depth type filter cartridge constructed of a unique bicomponent fiber. An improved version of the Micro-Klean® cartridge, Micro-Klean® III, offering longer life is also shown along with appropriate filter housing designs.

CUSTOM FIBERS INTERNATIONAL
Los Angeles, CA 90001

CFI plants in Virginia, Kansas and California manufacture various types of CF FIBERS to replace asbestos; as partial replacement for fumed/precipitated silica; to improve sag and flow resistance. Complete technical and lab assistance with sampling provided.

CUSTOM METALCRAFT, INC.
Springfield, MO 65808

Our exhibit displays one standard 370 gallon stainless steel Transtore tank, one 370 gallon stainless steel Transtore tank with self draining bottom, sanitary construction, one 74 cubic feet aluminum side door bin, a spare parts display board and a variety of descriptive process equipment literature.

DANIEL PRODUCTS CO.
Jersey City, NJ 07304

New: Disperse-Ayd 15 modified acrylic dispersing vehicle for manufacturing stable pigment dispersions compatible with most solvent-thinned coatings. Also featured, Disperse-Ayds for most vehicle systems; Tint-Ayd pigment dispersions for all tinting needs; Slip-Ayd polyethylene and wax dispersions and Dapro specialty additives.

DATACOLOR
Charlotte, NC 28103

The new Datacolor 3890 Dual-Beam Spectrophotometer is featured along with the new portable Datacolor Multi-Channel Spectrophotometer, the COCOS Laboratory Colorimetry Quality Control System, and the new Pigmenta family of modular Multi-Tasking Color Control Systems.

DATALOGIX FORMULA SYSTEMS, INC.
Northbrook, IL 60062

Available to run on many brands of hardware, our Comprehensive Process Software package includes all phases of production, inventory control, costing, regulatory compliance, and accounting/business functions.

DAY-GLO COLOR CORP.
Cleveland, OH 44103

Day-Glo, subsidiary of Nalco Chemical Co., concentrates on the theme of "Additives for High Performance in Coatings." The exhibit highlights Nalco® antifoams, dispersants, and flocculants. Also highlighted are Day-Glo® custom pigment dispersions, aerosol concentrates, and fluorescent pigments.

DEDOES INDUSTRIES, INC.
Walled Lake, MI 48088

Featured is the Dedoes, economical, 55 gallon paint mixer.

DEGUSSA CORP.
Teterboro, NJ 07608

Featured are flatting agents OK412 for clear and pigmented coatings; HK188 for coil coatings; and TS100 for high efficiency. Also shown are Aerosil 200 for thixotropy and anti-settling of pigments; Aerosil R972 for corrosion-resistant coatings; channel-type Carbon Black FW200 for automotive coatings; and Special Black 100 a trouble shooter for flooding and floating problems in gray coatings.

UNIVERSITY OF DETROIT
Detroit, MI 48221

The exhibit offers information concerning undergraduate and graduate programs in polymer science and coatings. Contracted research opportunities in polymers and coatings are highlighted.

DIAGRAPH CORP.
Earth City, MO 63045

Diagraph Corp. is presenting a system for printing labels to comply with "Right to Know" legislation, the Problem Solver™. The Telemark family of noncontact ink-jet marking systems is also featured.

DIAMOND SHAMROCK CHEMICALS CO.
Morristown, NJ 07960

Highlighted are the new rheology modifiers and the Capcure® series of epoxy hardeners that include both amine and mercaptan technology. These also serve as sole hardeners, accelerators or co-curing agents. Also on exhibit are Nopcocide® N-96 fungicide and Nopcosperse® N-44 pigment dispersant as well as many other performance chemicals.

DISTI, INC.
New York, NY 10012

Disti exhibits the ROBUS tank washer (cleans containers and tanks) and the M-60 and DW 100 solvent recovery unit.

DOMINION COLOUR CO.
Div. of Reed, Inc.
Toronto, Ontario, Canada M8W 4X9

Displayed is a broad range of inorganic and organic colour pigments. Highlights include new high-speed "stir-in" Chrome yellow and Molybdate orange pigments, also SO_3 resistant and low-soluble lead grades. Technical personnel in attendance.

DOW CHEMICAL USA
Midland, MI 48574

CHLOROTHENE® SM compliance solvent, epoxy resins, bisphenols, hydroxyalkyl acrylate monomers, DOWANOL® glycol ethers, acetone, vinyl toluene, and styrene monomer are featured.

DOW CORNING CORP.
Midland, MI 48686

Technical and sales representatives are available to help formulators and manufacturers learn more about the company's complete line of silicone paint additives, resins and intermediates. New technology is highlighted.

DRAISWERKE, INC.
Allendale, NJ 07401

Perl mill technology is at the heart of the exhibit. The firm's mills incorporate either a perforated or pinned-disk agitator and are generally 80-90% filled with small grinding beads. Continuous perl mill systems are available. The Drais Star Disperser for low to medium viscosity materials is also presented.

DREW INDUSTRIAL DIV.
Ashland Chemical Co.
Boonton, NJ 07005

Drew provides quality additive products, such as defoamers, dispersants, biocides and specialty surfactants, under a statistical process control system to meet the high standards prescribed by the paint and coatings industry.

DSA CONSULTING, INC.
Mission, KS 66222

A computer is on site to demonstrate the five major computer programs offered by DSA Consulting, Inc. These programs function as an "Electronic Technician" for control of color, gloss (extenders), dispersion, pigmented viscosities, and formula bulking which includes a solvent analysis.

DSET LABORATORIES, INC.
Phoenix, AZ 85029

DSET displays its full line of outdoor weathering services including an improved and updated version of the EMMAQUA® Test Method and the new CTH Glas Trac™ exposure system. In addition, information is available on the firm's new Specialty Coatings Research and Development Laboratory.

DU PONT CO.
DBE Solvents
Wilmington, DE 19898

DBE solvent is a high-performance, low toxicity, low-cost, high boiling-point dibasic ester that improves adhesion and flexibility and reduces solvent popping to keep film open. Proven applications are in can, coil and sheet coatings as well as in appliance, wire and automotive finishes.

DU PONT CO.
Specialty Resins
Wilmington, DE 19898

Featured is a range of resin resources including Elvacite® solid bead resins, which dissolve faster and have unsurpassed efficiency and new Elvacite® solution resins, for higher solids at lower viscosities; Elvacite® AB Dispersants, for difficult dispersion problems; Elvcron® functionalized solution resins; and Partnership Programs to put Du Pont advanced technology to work for you.

EASTERN MICHIGAN UNIVERSITY
Ypsilanti, MI 48197

Featured is educational information describing programs leading to B.S. and M.S. degrees in polymers and coatings and coatings process technology.

EASTMAN CHEMICAL PRODUCTS, INC.
Kingsport, TN 37662

Featured are Ektapro® EEP new active retarder solvent; Eastacel® cellulosic resins for fast, dry, high-solids coatings; Eastman® Ketones for low VOC high-solids coatings; chlorinated polyolefins, adhesion promoters for primers and coatings; CAB for urethane wood finishes; and resin intermediates for high-performance, polyester coating resins.

EBONEX CORP.
Melvindale, MI 48122

Exhibit features specialty bone blacks, and items produced using cosmic black pigment.

EIGER MACHINERY, INC.
Bensenville, IL 60106

Introduced is a new series of high efficiency, continuous throughput production horizontal bead mills. Available with either a screen or rotating gap media separator. The industry standard small sample "Mini" mills include a new 750ml unit designed primarily for the paint industry.

ELEKTRO-PHYSIK USA
Arlington Hts, IL 60005

Elektro-Physik USA is exhibiting their complete line of instruments to measure coatings on ferrous and nonferrous substrates. Among the gauges displayed are the Mikrotest "Banana-Type" mechanical gauge; low-cost digital gauges, and a complete new line of equipment.

ELMAR INDUSTRIES, INC.
Depew, NY 14043

High speed rotary piston fillers for gallons, quarts, pints, ½ pints, or aerosol cans of paints and stains, both latex and solvent based, are on display. Latex paints can be filled at speeds up to 180 GPM using the RPE-514G Elmar Filler with guaranteed accuracy of ± ½ fluid ounce.

EM INDUSTRIES
Pigment Div.
Hawthorne, NY 10532

The exhibit showcases the expanded Afflair® line of pearl and high-lustre titanated mica pigments. Afflair® pigments are of growing importance in state-of-the-art automotive and related finishes where high weather resistance is required.

ENGELHARD CORP.
Iselin, NJ 08830

The firm exhibits the cost effective use of kaolin extenders to reduce TiO_2 levels in a variety of coatings with particular emphasis on choices of calcined kaolins. New technical bulletins on these themes are offered.

EPWORTH MFG. CO., INC.
South Haven, MI 49090

The patented X-ENTRI small media mill is displayed. It features lower energy consumption and higher thru-puts than conventional vertical or horizontal mills. The time proven SWMill is displayed, along with all types of grinding media.

ERICHSEN INSTRUMENTS, INC.
Akron, OH 44310

Erichsen, a manufacturer of testing equipment for the coatings industry, features a salt spray test chamber, a portable colorimeter, glossmeters, film applicators, adhesion testers, a wet and dry UV chamber, a scrub resistance tester, and test charts and panels.

EXXON CORP.
Houston, TX 77001

The company, a major supplier of hydrocarbon and oxygenated solvents designed expressly for the coatings industry, features a new line of Exxate® solvents for electrostatic spray, high solids coatings, urethane and latex systems. High-purity hydrocarbon solvents include ISOPAR® isoparaffins with low surface tensions, NORPAR® normal paraffins with selective solvency and EXXSOL® dearomatized aliphatics.

FAWCETT CO., INC.
Richfield, OH 44286

Displayed is the firm's complete line of air-driven and electric-driven mixers and accessories to fit all your mixing and stirring applications. Also shown is a new portable paint tank agitator for your production mixing applications.

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY
Philadelphia, PA 19107

Featured is a display of Federation publications and educational and training aids including the first three booklets in the *new* FSCT Series on Coatings Technology, the *Journal of Coatings Technology*, "An Infrared Spectroscopy Atlas for the Coatings Industry," "Paint/Coatings Dictionary," and FSCT slide/tape training programs. Information on upcoming Federation-sponsored Seminars is available. The 1987 Paint Industries' Show floor plan is on display and applications for exhibit space are available.

FILLITE USA INC.
Huntington, WV 25702

Featured is the complete line of Fillite hollow and solid ceramic microspheres. They are versatile extenders which provide lower density, higher filler loading/lower viscosities, thermal insulation, and lower raw material costs. Featured are "Metaspheres," metal coated ceramic microspheres, in aluminum, zinc, copper and silver.

FILTER SPECIALISTS, INC.
Michigan City, IN 46360

A full line of liquid bag filters, in-line strainers, filter bags and accessories for the process industry are shown. Introduced are new "Polywound" filter cartridges and cartridge housings. Technical personnel are in attendance to discuss applications and processes.

FILTERITE
Timonium, MD 21093

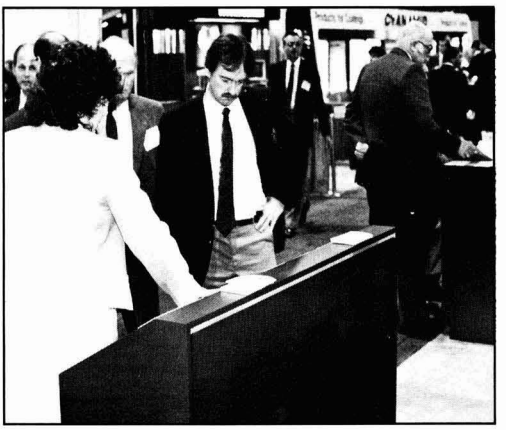
On display are several products from our broad line of filter cartridges and housings. Hi-V II™ resin bonded cartridges, Duo-Fine® pleated media cartridges and the OMF Readi-Clean housings are featured. Sales and application engineers are available to discuss your filtration application.

FRYMA, INC.
Edison, NJ 08817

Displayed is the Coball Mill, a unique concept in fine grinding and dispersing, giving easy and fast clean-up and maintenance, low grinding chamber volume and excellent heat exchange capabilities. Also featured are vacuum deaerators, colloid mills and scraped surface heat exchangers.

H.B. FULLER CO.
St. Paul, MN 55126

The exhibit features H.B. Fuller's series of vinyl-acrylic, acrylic and styrene-acrylate latex polymers for paints and industrial coatings. Technical information and starting formulas are available.



GEORGIA KAOLIN CO., INC.
Union, NJ 07083

The company's complete line of calcined, delaminated, and hydrated aluminum silicates are featured. Cost effective functional TiO$_2$ extenders are also on display.

GLOBE TRADING CO.
Detroit, MI 48207

Established in 1942, the firm distributes the U.S. Stoneware line of ball and jar mills, grinding media, drum tumblers and rollers. They are reps for Glen Mills Inc. Their turbula mixer has many advantages over conventional types. Sells rebuilt equipment for paint and chemical industries.

GOODYEAR CHEMICAL DIVISION
Akron, OH 44316

The company features the new product Pliolite WR-D. Pliolite WR-D is a water system that offers all the advantages of low odor, water cleanability and good adhesion. Pliolite distributors are also featured as are the well-established Pliolite solution resins utilized in the masonry market.

GORMAN-RUPP CO.
Mansfield, OH 44901

Gorman-Rupp displays several pumps for a wide variety of industrial applications. Featured are rotary gear pumps along with a rotary gear demonstration unit.

W.R. GRACE & CO.
Davison Chemical Div.
Baltimore, MD 21203

Introduced is a brand new, superior, nontoxic, anti-corrosion pigment—Shieldex®.

GREFCO DICALITE & DICAPERL
Torrance, CA 90509

Grefco's sales, marketing, and technical staff is on hand to present and discuss the company's full line of DICAPERL lightweight functional fillers and Dicalite functional fillers and extenders.

HAAKE BUCHLER INSTRUMENTS, INC.
Saddle Brook, NJ 07662

Haake Buchler Instruments, Inc. displays their line of ROTOVISCO rotational viscometers widely used for measuring the rheological flow properties of paint. This viscosity/flow data yields information concerning yield point, thixotrophy, structure, breakdown and recovery, and elasticity.

HALOX PIGMENTS
Pittsburgh, PA 15220

Featuring lead-free and chromate-free pigments for anti-corrosion coatings and tannin stain blocking. High solids, low VOC applications are stressed for 1986.

HARSHAW/FILTROL PARTNERSHIP
Cleveland, OH 44124

Sample our full palette of colors for architectural, OEM, and special purpose coatings as well as our spectrum of inorganic and organic dry colors and aqueous, resin, and universal dispersions. Discover our environmental test cabinets for salt-fog, humidity, and multi-gas tests, available in a variety of sizes, including custom designed walk-in chambers. New digital readouts available.

HENKEL CORP.
Organic Products Div.
Ambler, PA 19002

Featured are specialty additives for use in industrial paints. Flow modifiers, anti-settling agents, rheological modifiers, pigment dispersants and corrosion inhibitors are graphically demonstrated with actual panels and transparencies. Specialty Perenol® additives for powder coatings are introduced.

HERCULES INCORPORATED
Wilmington, DE 19894

Exhibit features nitrocellulose versatility in conventional and hot-spray, low VOC, water-borne and cross-linkable lacquers; improved transfer efficiency; formulations data. Also prominent, the rheology control agents Natrosol®, Natrosol B, and new Natrosol Plus hydroxyethylcellulose. Highlighted: Parlon® chlorinated rubber, Pentrex® resins, Pamolyn® and Pamak® fatty acids, Klucel® hydroxypropylcellulose, Hercoflat® texturing agent, ethylcellulose, EHEC, pentaerythritol polyols including PE 200 for intumescent paints.

HEUBACH INC.
Newark, NJ 07114

The display illustrates the company's complete pigment color and corrosion inhibiting pigments, including DALAMAR® organic yellows and "Watchung" reds, greens and blues. Special attention is given to low dust chrome yellow and moly orange, low dust zinc chromate, new phthalo blues, and Heucophos® ZBZ.

HILTON DAVIS CHEMICAL CO.
Cincinnati, OH 45222

"The Color Formulary"—new application information is illustrated for the firm's line of colorants. Featured are new "Color Formulation Guidelines" for water-borne stains, aerosols, water-borne industrial coatings, wood finishes, product finishes and architectural coatings. Technical personnel available for consultation.

HITOX CORP. OF AMERICA
Corpus Christi, TX 78403

The exhibit shows HITOX buff TiO_2, BARTEX barytes, and the Deep Red Iron Oxide. Literature is available and company representatives are on hand to answer questions and discuss coatings applications.

HOCKMEYER EQUIPMENT CORP.
Harrison, NJ 07029

Featured is a RioBeer Container Cleaning System. Hockmeyer's line of high-speed Dispersers, concentric-shaft and dual-shaft mixers are also exhibited.

HORIZON CHEMICAL
Div. of A. E. Staley Mfg.
Decatur, IL 62526

Exhibit presents information on methyl glucoside, a tetra-functional polyol for use in urethane oils, reactive diluents, polyesters and alkyds, reactive cellulosics for radiation-curable coatings and solution acrylic resins; and a protective colloid for latex systems.

J.M. HUBER CORP.
Havre de Grace, MD 21078

The Clay Div. is featuring calcined clays, acid washed clays and specialty hydrous clays. The Calcium Carbonate Div. features new fine and ultra-fine particle size calcium carbonate extenders. The Chemicals Div. features new use literature on ZEOTHIX®—flatting and thickening. Data available on ZEOTHIX 177 and ZEOTHIX 265.

HUNGARIAN ALUMINIUM CORP.
Budapest, Hungary 1818

HUNTER ASSOCIATES LABORATORY, INC.
Reston, VA 22090

HunterLab instruments measure color and appearance for quality control, R&D, and other applications. Introduced are two spectrocolorimeters: The UltraScan® and the new LabScan II both interfaced with an IBM computer. These systems can be successfully used to measure color of drawdowns, masstones, and painted surfaces.

ICI AMERICAS INC.
Wilmington, DE 19897

New products featured include DENSIL® A paint film fungicide; HYPERMER® resins for water stain resistance; and LUMIFLON® fluoropolymer resins for high-performance coatings. Also featured are SOLSPERSE® hyperdispersants and HALOFLEX® resins.

IDEAL MFG & SALES CORP.
Madison, WI 53704

Displayed is the new SA-150 semi-automatic volume filler/sealer featuring the all new Ideal volume pump assembly with infinite volume adjustment. Come see the new look 30-M automatic filler/sealer plus additional equipment on display to fill your needs.

ILLINOIS MINERALS CO.
Cairo, IL 62914

The booth highlights different phases of mining and processing, as well as pictures of plant and office. Semi bulk bagging is featured.

INDUSMIN INC.
Columbus, OH 43214

A new product, Minspar 7, makes its first appearance. Minspar 7 is a water-washed feldspathic extender offering low viscosity, inertness and low water-soluble salts for excellent touch-up. The entire Minspar series of extenders from North Carolina and the Minex series are also featured.

INDUSTRIAL FINISHING MAGAZINE
Wheaton, IL 60188

The October issue of *Industrial Finishing*, the magazine for coatings manufacturing and application, is distributed and subscription qualification forms are available. Business and editorial staff are present.

INOLEX CHEMICAL CO.
Philadelphia, PA 19148

Featured are high-performance polyesters for coil coatings, can coatings, high-solid resins, polyurethane polyols, and water-reducible systems. Also shown are surfactants and emulsifiers.

INTEREZ, INC.
(formerly Celanese Specialty Resins)
Louisville, KY 40243

Featured are resins for the high-performance coatings industry with emphasis on water-borne epoxies and acrylics, UV/EB resins, and high solids. Information and technical data are available.

ITASCO INDUSTRIES DIV.
I.W.I., Inc.
Summit, IL 60501

The ITASCO Division is exhibiting its new 375 gallon stainless steel bulk liquid portable shipping tank. WELLCO Products Division features its new high-impact tank cleaning spray nozzles.

JOHNSON WAX
Racine, WI 53403

The Johnson Wax exhibit is a relaxing conference center featuring audio/visual presentations of their line of acrylic emulsions, resins, polyols, and additives for VOC-compliant and two-component coatings.

KENRICH PETROCHEMICALS, INC.
Bayonne, NJ 07002

Featured are Ken-React titanate and zirconate coupling agents; Kenplast ES-2 (cumylphenyl acetate), a nonmutagenic epoxy-reactive diluent; new neoalkoxy (second generation) titanates; and Kenflex A and Kenplast G plasticizers. An edition of the Reference Manual with new data and extensive patent survey is available to qualified attendees.

KENT STATE UNIVERSITY
Chemistry Dept.
Kent, OH 44240

The coatings education program within the department of chemistry is featured. The continuing education offerings, the degree programs for the BS and Ph.D., research activities performed by undergraduate and graduate students, and the scholarships available for coating students are presented.

KINETIC DISPERSION CORP.
Scarborough, ME 04074

The exhibit features a model of a 1,000 gallon KADY Mill and various configurations of the well known KADY dispersion head to handle today's coatings.

KING INDUSTRIES, INC.
Norwalk, CT 06852

Exhibit features NACURE® acid and blocked catalysts, K-FLEX® polyester polyols, K-CRYL® acrylic oligomers, and DISLON® additives for non-aqueous coatings.

KISS PACKAGING PRODUCTS
Dallas, TX 75229

This display features the LF-2000 Semi-Automatic Liquid Filling Machine. Capable of handling any pumpable liquid, the LF-2000 combines a microprocessor-timer with a unique indexing table to fill up to 120 CPM. The unique design is a portable stand alone model that can be used in place or moved easily.

KTA-TATOR, INC.
Pittsburgh, PA 15275

Featured are coating inspection instruments for ambient conditions, surface cleanliness/profile, wet and dry film thickness, adhesion, pinhole testing and microscopes. Also highlighted are the coatings consulting, failure analysis, lab testing, training, and contract management services for engineered maintenance painting.

LETICA CORP.
Rochester, MI 48063

Letica Corp. features its one-gallon plastic paint can with peel-off lid, accompanied by its line of 1- through 6-gallon tapered industrial shipping containers.

LIQUID CONTROLS CORP.
North Chicago, IL 60064

Featured is a line of positive displacement meters and accessories including electronic batching systems. The unique rotary abutment principle permits measurement of liquids with viscosities up to 2,000,000 SSU with low rpm and minimum product shear. On display is an M-7 100 gpm, 150 psi meter and a flowing demonstrator model with see-through covers and glass tubing to display the LC metering principle.

LogiCom
Moline, IL 61265

CLaM, the Coatings Lab and Manufacturing software system, is presented for hands-on evaluation. Comprehensive lab, production, inventory, and pricing features are combined in an integrated relational data base system.

THE LUBRIZOL CORP.
Diversified Products Group
Wickliffe, OH 44092

The display features Ircogel® 905, a liquid rheology control additive now in a new light color. This unique product enhances automotive and appliance finishes, from pristine white to pigmented hues. Included are application examples for urethane and high-solids coatings.

MACBETH
Div. of Kollmorgen Corp.
Newburgh, NY 12550

Demonstrated is the firm's new "P.O.P.-Eye" point-of-purchase computerized paint-matching system. Also featured are Eagle-Eye remote on-line color measurement system, Optimatch color formulation system, Series 1500/Plus and Compact Color-Eye, SpectraLight color-matching booth and Munsell Color physical standards and companion products.

MAGNESIUM ELEKTRON INC.
Flemington, NJ 08822

Information on the company's range of zirconium chemical cross-linkers for the coatings industry is available. Improvements in adhesion, heat resistance, and water/solvent resistance are experienced as a result of their use.

MANCHEM INC.
Princeton, NJ 08540

Featured are aluminum organics as solutions to coatings problems. In addition to MANALOX® water repellents, MANOMET® dispersants, MANOSEC® driers, ALUSEC® cross-linkers, and MANALOX® rheological agents are displayed. Also, the firm is introducing its BORESTER® wood preservatives, and EASISPERSE® stir-in milori blue pigments.

MANVILLE
Filtration & Minerals
Denver, CO 80217

Efficient, low-cost flatting agents and extender pigments can help improve your formulation's performance and costs. Featured is CELITE—the hallmark of consistency and service to the paint industry for more than 55 years—supported by a worldwide distributor network specializing in coatings.

MARCO SCIENTIFIC, INC.
Sunnyvale, CA 94087

The company exhibits particle size analyzers covering the range of 0.01 to 600 microns. These include the Granulometer Models 715 and 850, Joyce Loebl DCF and related computer graphic options. Also exhibited is an advanced Image Analysis System based on the IBM PC.

THE McCLOSKEY CORP.
Philadelphia, PA 19136

The exhibit features the latest development of alkyd, copolymer, polyurethane, silicone alkyd, varnish, PVA emulsion, acrylic, high-solid products manufactured at three locations . . . Los Angeles, Philadelphia and Portland, OR.

McWHORTER, INC.
Carpentersville, IL 60110

Highlighted are several new, low VOC resins for both air-dried and baked industrial finishes. New air-dry products with extremely fast dry times and excellent durability at less than 3.5 VOC are presented. High solids baking resins with excellent film integrity and low VOC are also featured.

THE MEARL CORP.
New York, NY 10017

Exhibited is a line of Mearlin Pearl Luster Pigments in exterior and regular grades for coating applications as well as mica products.

METTLER INSTRUMENT CORP.
Hightstown, NJ 08520

Analytical and precision balances for all applications that require accurate, quick, and reproducible results are displayed. Laboratory fluid density measuring equipment for testing of incoming raw material and finished goods quality control is featured. All models can be connected to computers.

MICRO POWDERS, INC.
Scarsdale, NY 10583

Special finely-micronized waxes for imparting improved properties to all types of paints and coatings are featured. On display is Polyfluo 200 and MPP-635; specially designed products to improve mar and abrasion resistance in paints and coatings.

MICROMERITICS INSTRUMENTS CORP.
Norcross, GA 30093-1877

Exhibit includes automatic and manual instruments for powder technology including surface area analysis by the B.E.T. method (static and dynamic), pore size distribution by gas adsorption or mercury porosimetry, particle size analyzers, and pycnometers.

MID-STATES ENG. & MFG., INC.
Milton, IA 52570

Highlighted is Liqua-tainer, the safe, economical method for handling and storage of bulk liquids. Constructed of both mild and stainless steel, they have a capacity of 178 to 644 gallons. These tanks are stackable and are available with DOT specification 57.

MILLER PAINT EQUIPMENT
Addison, IL 60302

Featured in the exhibit is the Accutinter Fluid Dispenser, paint shakers, high-speed gyromixers, and manual dispensers.

MILTON ROY CO.
Diano Color Products
Rochester, NY 14625

Featured are the COLOR SCAN and new COLOR GRAPH™ color spectrophotometers, plus new color-matching and IBM-based quality control systems. Accurate enough for research—reliable enough for production, the systems are still the least expensive true double-beam systems available.

MINERAL PIGMENTS CORP.
Beltsville, MD 20705

Technical literature and assistance on our complete line of synthetic iron oxides, heat stable tans/browns, burnt/raw siennas and umbers, and full line of anticorrosive pigments. We're also featuring the best popcorn in Atlanta.

MiniFIBERS, INC.
Johnson City, TN 37615-9220

The company displays its entire line of SHORT STUFF® polyethylene fibers and introduces its new MINI FLUFF® fibers for use in high-temperature applications. The technical staff demonstrates how these engineered fibers are widely used in reinforcing, bridging, and thickening of coatings. New ideas on suggested uses are offered, complete with practical starting formulations.

MINOLTA CORP.
Ramsey, NJ 07446

The exhibit features the CR series of tristimulus color difference meters and the firm's new data processor. These are the most compact and lightweight tristimulus color difference meters on the market.

UNIVERSITY OF MISSOURI-ROLLA
Rolla, MO 65401

Featured is a display of the activities of the University of Missouri-Rolla. These include the paint and coatings short course program and outline—Basic Composition, Paint Formulation, Physical Testing, Estimating, Polymer Chemistry, and Modern Instrumentation. Student resumes are available for your examination for potential employment.

MITECH CORP.
Willoughby, OH 44094

Featured is the Carri-Med Controlled Stress Rheometer System, which measures the flow, creep and dynamic properties of gels and fluids.

MOBAY CORP.
Pittsburgh, PA 15205

The exhibit highlights applications of the company's urethane resins for camouflage coatings, product finishes, transportation and maintenance coatings; synthetic iron oxide pigments in trade sales; and organic pigments for automotive paints. The company will also feature new product developments in its broad product line.

MODERN PAINT AND COATINGS
Atlanta, GA 30328

Complimentary copies of the October Show Issue are being distributed at the booth. The Paint Red Book, the only directory in the coatings field, is on display, as are technical books of other publishers available from Communication Channels, Inc.

MOREHOUSE INDUSTRIES, INC.
Fullerton, CA 92633

Exhibit contains Model SRP-1 new solvent recovery system, Model HMS/T1 horizontal media mill (1 liter vessel capacity), and the new HVO sand mills.

MOZEL INCORPORATED
St. Louis, MO 63110

MESSAGE CENTER, located on level two, east concourse. Message may be left or received during show hours by telephoning **(404) 222-6120.**

MYERS ENGINEERING
Bell, CA 90201

On display is a dual-shaft, high-speed disperser with two impellers in each shaft that pass over each other in opposite directions. Disperses so fine sandmilling often is not needed. Shafts spread apart for easier loading with less dust. Also displayed is a laboratory-sized disperser. Factory engineers on-hand to answer technical questions.

NATIONAL ASSOC. OF CORROSION ENGINEERS
Houston, TX 77084

Information on the use and performance of protective coatings in corrosive environments is featured. The display includes books on corrosion and its control in a wide range of industries.

NATIONAL PAINT & COATINGS ASSOCIATION
Washington, DC 20005

On display are the services of the National Paint & Coatings Association including publications and information on government relations, public relations and industry affairs. These services provide support to those involved in paint technology.

NETZSCH INCORPORATED
Exton, PA 19341

Come talk to our technical staff about our newest grinding and dispersion equipment including the enclosed horizontal and vertical small media mills and computerized systems. Applications include a myriad of coatings, pharmaceuticals, minerals and chemicals.

NEUPAK, INC.
Minnetonka, MN 55345

Neupak exhibits a range of single bag filter units, and air-operated diaphragm and transfer pump units. Also exhibited are working models of Neupak's High Speed (200PM) Rotary Lid Placer, plus a new High Speed Filler electronically controlled with digital read out for management statistics and fault finding assistance.

NEVILLE CHEMICAL CO.
Pittsburgh, PA 15225

The company's wide range of petroleum hydrocarbon resins, Cumar coumarone indene resins, Unichlor chlorinated paraffins and Syntase ultraviolet light absorbers are featured. Technical information on use in coatings and coating systems is available. Technical representatives staff the exhibit.

NL CHEMICALS, INC.
Hightstown, NJ 08520

New BENTONE® SD-3 rheological additive, a high efficiency organoclay based on hectorite clay, is featured. New resins featured include low VOC SPENKEL® aromatic polyurethane system; AROPLAZ® 6760-X-84 high-solids, polyester resin; higher solids SPENLITE® aliphatic urethane resins; AROPLAZ® 6234-G4-85 high-solids baking alkyd; and KELSOL® 3950-B2G-70 water-borne phenolic-modified alkyds resin.

NORTH DAKOTA STATE UNIVERSITY
Fargo, ND 58105

Educational and research activities are featured; 1987 short courses are described. Booth is staffed by alumni, faculty, and students.

NUODEX INC.
A Hüls Co.
Piscataway, NJ 08854

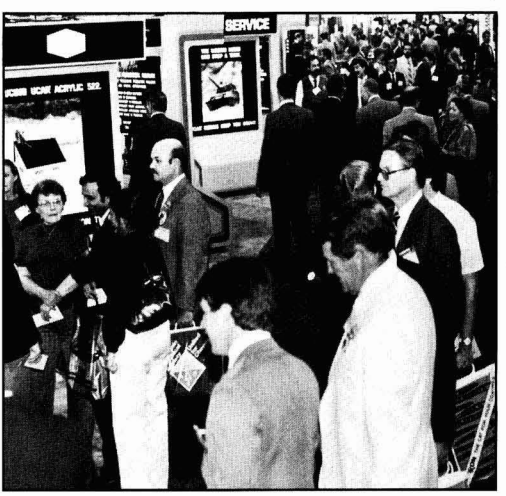
Featured are Nuodex color systems (both industrial and trade sales), high-solids colorant dispersions, aliphatic isocyanates (IPDI/TMDI), aliphatic epoxy coating systems (IPD/TMD), and a comprehensive line of additives including driers, thickening agents, fungicides, preservatives and special resins to improve adhesion and gloss.

NYCO
Willsboro, NY 12996

Featured is the 10 WOLLASTOKUP® fine particle size wollastonite product line, chemically modified to provide better dispersion, adhesion, and corrosion resistance to a broad range of high-performance coatings. Test results and formulary are available. Also featured is NYAD® G, a high aspect ratio wollastonite product for asphalt-based coatings.

O'BRIEN INDUSTRIAL
San Francisco, CA 94124

In addition to a machine on display, a video presentation shows the compact, Mobile Can Filler and Combination Closer. Rate: 18 1's or 9 5's/minute. Factory people are present to answer questions.



OTTAWA SILICA CO.
Ottawa, IL 61350

Kaolin clays and silicas are displayed with samples available. SNOW•TEX® calcined kaolins are featured along with hydrous kaolins, Sil-Co-Sil® ground silicas, whole-grain silicas for texture and wear-resistant coatings, sand mill media and ASTM Testing Sands.

P.A. INDUSTRIES
Chattanooga, TN 37409

Featured are Extendospheres® Metalite™ Zinc, a proven, cost-effective partial replacement for zinc dust; and Extendospheres® Metalite™ Silver, cost-effective versus nickel or copper for EMI/RFI conductive coatings and satellite receiving dishes. Also displayed are three grades of Extendospheres® for hi-mil protective coatings.

PACIFIC MICRO SOFTWARE ENGINEERING
Bell, CA 90201

Highlighted is BatchMaster PLUS a new computer software for the coatings manufacturer that tracks all phases of production from purchasing to finished goods. It determines costs, performs lab calculations, and prints Material Safety Data Sheets and labels. It's designed for the IBM PC or compatible microcomputers.

PACIFIC SCIENTIFIC CO.
Gardner/Neotec Div.
Silver Spring, MD 20910

Full range of color, appearance, and physical testing instrumentation including colorimeters and spectrophotometers for the paint and coatings industry. The company's exhibit features demonstrations of their new 45°/0° Array Spectrophotometer—The Color Machine.

PAINT & COATINGS INDUSTRY MAGAZINE
Canoga Park, CA 91303

Courtesy copies of the September/October issue of *Paint & Coatings Industry Magazine* are available. Courtesy 1-year subscriptions for all qualified personnel may be ordered free of any charges during the show.

PARALLAX COMPUTER CORP.
Princeton, NJ 08540

The exhibit features computer software specifically designed for the paint industry, including production inventory control and all accounting software demonstrated as an integrated package, plus formula modeling and MSDS producing software for IBM PC and compatibles.

PENNSYLVANIA GLASS SAND CORP.
Floridin Co.
Berkeley Springs, WV 25411

Exhibit features the benefits of using MIN-U-SIL® (micron-sized silica) and SUPERSIL® (custom-ground silica) as filler extenders and MIN-U-GEL® 400 (colloidal attapulgite) as a thixotropic stabilizing and flow control agent.

PERMUTHANE INC.
Peabody, MA 01960

Color dispersions are highlighted through the use of photographs of products, equipment, and quality control techniques.

PFAUDLER CO.
Rochester, NY 14692

Featured is solvent recovery using the Pfaudler wiped film evaporator system which is prepackaged and skid mounted in sizes from 40 gallons per hour to 500 gallons per hour.

PFIZER, INC.
Pigments Div.
Easton, PA 18042

Participating in their 34th Paint Show, Pfizer features a working display of the paint manufacturing process using Pferrisperse® Iron Oxide Slurry. In addition, the display includes the Pferritan line of heat-stable pigments, camouflage grade chromium oxides, distributor locations, and synthetic and natural iron oxides. Phil Pfizer, our robot, along with other personnel are on hand to review this information.

PHILLIPS 66 CO./CATALYST RESOURCES, INC.
Bartlesville, OK 74004

Phillips performance-proven products for coatings applications are featured, including high purity hydrocarbon solvents and propellants. Chemical intermediates for use as chain transfer agents are also exhibited. Catalyst Resources displays their line of Aztec® initiators.

PLASTICAN, INC.
Leominster, MA 01453

A full line of plastic containers, including an exclusive straight-sided one gallon paint can and decorated containers and closures up to six and one half gallons with various fitments is displayed.

POLY-RESYN, INC.
West Dundee, IL 60118

Poly-Resyn exhibits a complete line of rheological additives for solvent-based coatings.

POLYVINYL CHEMICALS INC.
Wilmington, MA 01887

New polymers, facilities, and applications are featured. Of special significance: meeting automotive exterior quality with a water-borne urethane; speeding the dry time of water-reducible alkyds; preventing hardboard edge swell; finishing a gym floor in one day.

PPG INDUSTRIES, INC.
Chemicals Group
Pittsburgh, PA 15272

Lo-Vel® flatting agents for coil coatings, metal furniture finish, aluminum extrusion coatings, and high-solids coatings are featured. Hi-Sil® T-600 synthetic thickener and thixotrope is exhibited.

PREMIER MILL CORP.
New York, NY 10010

Dispersing and grinding machines featuring production-sized horizontal mill with new fast/easy opening chamber plus high energy agitators for high viscosity products are shown. New ovoid style small media (below 1 mm) retention mechanism are exhibited for the first time.

PROGRESSIVE RECOVERY, INC.
Columbia, IL 62236

Model SC: Six models to recover from 5 GPH to 31 GPH are featured. Perfect unit for the medium-to-large operations. SC offers highest BTU rating and heat transfer surface while maintaining low watt density transfer gradients. The greater the thermal input and transfer surface, the greater the output rate. An automatic fill option allows continuous operation.

Q-PANEL CO.
Cleveland, OH 44145

On display is the Q-U-V, the world's most widely used weathering tester. The Q-U-V uses fluorescent UV lamps and condensing humidity to reproduce the damaging effects of sunlight, rain, and dew. The Q-U-V gives fast, economical tests in conformance with ASTM G-53. A choice of UV lamps allows for excellent correlation with outdoor weathering.

QUANTACHROME CORP.
Syosset, NY 11791

Featured is particle technology instrumentation including a particle size analyzer, automated BET surface area analyzers, mercury intrusion porosimeters, and pychnometers.

RAABE CORP.
Milwaukee, WI 53223

Formulators of exact match touch-up paints, the firm custom fills aerosol, bulk, and brush-in-cap touch-up bottles. Introduced is their new 52,000 sq. ft. packaging facility.

RECYCLENE PRODUCTS, INC.
South San Francisco, CA 94080

Featured are solvent recovery systems for on-site and in-house installations.

RED DEVIL, INC.
Union, NJ 07083

Introduced is the firm's new 700 series colorant dispenser designed with a unique horizontal pump; their new 5050 Hi Speed Five Gallon Paint Mixer and new line of industrial colorant dispensers featuring the 1000 series and Auto Tint 8000. Product brochures and information are available.

REECO
Morris Plains, NJ 07950

Displayed is the RE-THERM® thermal oxidation (incineration) system, a most unique, cost and energy efficient pollution control system for the elimination of VOC and odors.

REICHHOLD CHEMICALS, INC.
White Plains, NY 10603

Exhibited are current developments in high-solids alkyds, chain-stopped alkyds, water-reducible alkyds and epoxy resins for use in the production of high performance coatings. In addition, the latest developments in emulsion polymer technology covering roof mastics, architectural and acrylic finishes, caulks and sealants are displayed.

RHEOMETRICS, INC.
Piscataway, NJ 08854

An operational Rheometrics Fluids Spectrometer (RFS-8400) is displayed. Numerous tests used for solving common coating problems through the use of rheology are demonstrated and explained.

RHONE-POULENC, INC.
Monmouth Junction, NJ 08852

Featured are aliphatic diisocyanate resins for light, stable, nonyellowing, high-performance coatings.

ROHM AND HAAS CO.
Philadelphia, PA 19105

Performance characteristics of acrylic vehicles, both aqueous and solvent-borne, and coatings additives are demonstrated to those interested in trade sales paints, industrial finishes, prefinished siding, and marine and maintenance coatings.

ROPER PUMP CO.
Commerce, CA 30529

On display are air-operated double diaphragm pumps, rotary gear pumps and progressing cavity pumps.

ROSEDALE PRODUCTS, INC.
Ann Arbor, MI 48106

Featured are wire screen products, duplex filters and strainers and high capacity strainers, and filter bags.

RUSSELL FINEX, INC.
Mt. Vernon, NY 10550

The versatile Russell Finex vibratory strainer, Model A16350, together with accessories are on display.

SANDOZ CHEMICALS CORP.
Charlotte, NC 28205

Displayed are light stabilizers and UV absorbers for use in automotive and industrial coatings. In particular, Sanduvor 3046 and 3050 are featured. Savynil dyes as used in flamboyant coatings are also shown.

SANYO-KOKUSAKU PULP CO., LTD.
Tokyo, Japan 100

Sanyo-Kokusaku Pulp's chemical division is showing chlorinated polyolefins for plastics paints and primers for plastics moldings, i.e., car bumpers and electronics. Also shown, chlorinated polyolefins as concrete protecting sealers for improvement of adhesion and water proofing.

SCHOLD MACHINE CO.
St. Petersburg, FL 33702

The VMD 500 30 hp H.D. Coatings Disperser for 500 gal. vessels, VHS 200 3 hp H.D. Lab/Pilot Production Disperser, and VHS 300 10 hp High-Speed Disperser with rotor stator (cutting head attachment) are featured.

SEMI-BULK SYSTEMS, INC.
St. Louis, MO 63114

Featured is the AIR-PALLET® System for safe, dust-free powder handling under completely closed conditions. Highlighted displays include the re-usable Air-Pallet Container; ejector-mixer for unloading and pre-slurrying pigments and fillers; and all components for gravity and pneumatic discharge.

SEMicro CORP.
Rockville, MD 20855

Equipment to test the pull-off strength of coatings is displayed. The PATTI (Pneumatic Adhesion Tensile Testing Instrument) and PATTI-Jr. are self-aligning, portable, pneumatically operated, and automatic. This apparatus is designed to remove operator bias inherent to hand-cranked systems. All models meet ASTM D4541 specifications.

SERAC, INC.
Addison, IL 60101

A rotary, fill-by-weight, 6 station paint filler is featured. The filler demonstrates the firm's laminar flow nozzle technology designed for thin solvents and stains as well as thick paints, without drips. The filler is capable of running up to 50 cpm.

SHAMROCK CHEMICALS CORP.
Newark, NJ 07114

Meet the tribologists—specialists in the control of friction and wear! The company provides a wide range of stir-in powder products, primarily utilizing polyethylene and PTFE in grinds to suit your application. Products are designed to provide wear, mar, scuff and abrasion resistance, and other properties.

SHELL CHEMICAL CO.
Houston, TX 77001

A container and specific parts demonstrating benefits/features of EPON® resins, along with photographs of the expanded Argo, IL manufacturing facility and the Deer Park, TX plant are highlighted. Also featured is Shell's 1-800-TEC-EPON direct line for distributor customers with technical resins problems.

SHERWIN-WILLIAMS CHEMICALS
Coffeyville, KS 67337

MOLY-WHITE® corrosion-inhibiting pigments are featured. These white, environmentally-safe pigments are available in lower cost modifications specifically designed for both solvent and water-based coatings. New easy dispersing products are presented.

SILBERLINE MFG. CO., INC.
Lansford, PA 18232

Silberline recently acquired the Alcoa Aluminum Pigment and Flake Div. For consistantly high quality and top value—remember these names: Sparkle Silver®, EternaBrite®, Hydro Paste®, "Doctor Paste," and "Glitter Paste." Come meet the innovative leader—only Silberline offers more!

SOUTHERN CLAY PRODUCTS, INC.
An ECCA Co.
Atlanta, GA 30342

Featured is the Claytone series of rheological control additives for solvent paint systems. New is Claytone AF, a self-dispersing organoclay for paint.

UNIVERSITY OF SOUTHERN MISSISSIPPI
Hattiesburg, MS 39406

The USM exhibit offers information concerning undergraduate and graduate programs in polymer science. Emphasis is given to the preparation of undergraduate students for employment in the coatings industry. Coatings research by the Polymer Science Department is also highlighted.

SPARTAN COLOR CORP.
Houston, TX 77087

For small batch manufacture and tinting, the widely-compatible Spartacryl-PM industrial color concentrates in PM acetate are featured. Also featured are masstone and tint level displays of the broad palette of colors available in the Spartacryl-PM Color System.

STEEL STRUCTURES PAINTING COUNCIL
Pittsburgh, PA 15213

SSPC, a society for coatings professionals, demonstrates how it serves formulators and users of anti-corrosion coatings through publications, research, videotapes, and the monthly *Journal of Protective Coatings & Linings*.

SUGA TEST INSTRUMENTS CO., LTD.
Tokyo, Japan

Highlighted are the firm's Standard Dewcycle Sunshine Super Long Life Weather Meter (Model WEL-SUN-DC-B.EM), Super Fade Meter (Model FAL-SP), combined Cyclic Corrosion Test Instrument (Model ISO-3S-CY), S and M Colour Computer (Model SM-4-2), and the Handy Colour Tester (Model H-CT).

SUN CHEMICAL CORP.
Cincinnati, OH 45242

Visitors to the Sun Chemical Corp. booth are treated to a display of organic pigments available for all current coatings applications. The theme is "A Sun for all Seasons—a Product for All Applications." As customary, a full range of product literature is available covering both the Pigments Div. and the Dispersions Div. products.

SYLVACHEM CORP.
Jacksonville, FL 32217

Featuring epoxy curing agents.

TAMMSCO, INC.
Tamms, IL 62988

Tammsco offers microcrystalline and crystalline silicas in a wide variety of particle sizes to best fit your needs for a quality filler.

TEGO CHEMIE SERVICE GMBH
c/o Goldschmidt Chemical
Hopewell, VA 23860

The firm introduces its new heat-resistant phenyl methyl silicone resin emulsion, Silikophen® P 40/W, in addition to their solvent-borne silicone and silicone polyester resins. Also highlighted is a complete line of additives with special emphasis on a new mar and slip additive, Tego® Glide 410, and a new defoamer for water-based systems, Tego Foamex 7447.

THIELE ENGINEERING CO.
Minneapolis, MN 55435

Thiele's new high-speed piston pumps are featured on a twin-head fully-automatic paint filler with a lid placer and lid press for half-pint to one-gallon paint cans. Videos available on other filling equipment.

TOKHEIM CORP.
Process Controls Div.
Fort Wayne, IN 46801

Highlighted are receiving systems—fuels, solvents, etc. with electronic temperature compensation; batching and blending systems with electronic registration systems and solenoid valves for high viscosity products; batch controllers with solenoid valves for high viscosity products; and master meter proving system with electronic registration.

TOYO ALUMINIUM K.K.
Osaka, 541, Japan

Over 90% of Japanese metallic cars are painted by aluminium pigment produced by the company. Featured is a display of the latest metallic colors for automotives. Color catalogues and company brochures are available. Toyo Aluminium K.K. has the answer to tomorrow's styling challenges.

TROY CHEMICAL CORP., INC.
Newark, NJ 07105

Low toxicity Troysan Polyphase for latex house paints and wood preservative stains is featured along with several proprietary additives to improve your coatings formulation: Troythix PSA 1 for anti-settling, Troysol 98C pigment dispersion, Troysol AFL for bubble release, Troythix A for anti-sagging, and Troysol Q148 for improved adhesion in polyesters.

UNION CARBIDE CORP.
Danbury, CT 06817

Featured are materials for industrial finishes and trade paints, with special emphasis on the expanded line of UCAR Solvents for new and conventional coatings applications; UCAR Resins for superior high-performance coatings; and the cost/performance advantages of UCAR Acrylics for trade paints and UCAR Latexes for industrial and weather barrier coatings. Also featured are the firm's line of TONE products (a caprolactone-based line of polyols, monomers, and diluents), and cycloaliphatic epoxides for radiation- and thermal-cured coatings. The Captain's 21st Putting Contest is being held.

UNION PROCESS INC.
Akron, OH 44313

Featured is a complete line of fine grinding and dispersing equipment. Included are attritors in batch, continuous and circulation systems, with new and improved features, as well as the Rotomill (a horizontal small media mill) and the HSF batch bead mill.

UNITED CATALYSTS INC.
Louisville, KY 40232

United Catalysts Inc.'s complete line of rheological additives is featured. Super dispersible, self-activating organoclays are the newest additions to the product line. As always, United Catalysts Inc.'s quality and consistency is a major theme.

U.S. TESTING LABORATORIES
Hoboken, NJ 07030

UNIVERSAL COLOR DISPERSIONS
Lansing, IL 60438

Featured are acrylic lacquer resins, Universal acrylic dispersion for solvent and water-thinned coatings, and a new solvent-free dispersion line.

UNOCAL CHEMICALS DIV.
Schaumburg, IL 60195

The exhibit is designed to demonstrate UNOCAL's commitment as a quality supplier of solvents, chemicals, and polymer emulsions to the paint industry. Come by and see our new additions.

R. T. VANDERBILT CO., INC.
Norwalk, CT 06855

An expanded line of mineral and chemical additives for the paint industry is featured. Technical advice for all products is highlighted.

VIKING PUMP-HOUDAILLE, INC.
Cedar Falls, IA 50613

Viking displays a wide range of positive displacement rotary pumps for abrasive liquids. Featured is the Series 4625 abrasive liquid pump that is four times more efficient than air-operated diaphragm pumps.

VIRGINIA CHEMICALS, INC.
Portsmouth, VA 23704

This exhibit features the use of XAMA®-2 and XAMA®-7 polyfunctional aziridines as crosslinkers, wet adhesion promoters and modifiers for coating systems. Information is available on CORCAT® polyethylenimines and CORFAX™ alkylpolyethylenimine.

VORTI-SIV
Div. of M & M Machine, Inc.
Salem, OH 44460

Displayed for our 40th year of participation in the annual Paint and Coatings Show are two completely enclosed hi-speed sieving and straining machines. Both VORTI-SIV models RBF-15 (15" screen diameter) and RBF-3 (30" screen diameter) gyrate at a fixed or variable motor speed up to 3500 RPM. All models are standard explosion proof throughout and available in screen diameters of 15", 22", 30", and 36".

WACKER CHEMICAL CO.
Henley and Co., Inc., New York, NY 10017
Stauffer-Wacker Silicones Corp., Adrian, MI 48221

HDK N-20, standard grade of hydrophilic fumed silica for thixotropy and anti-settling of pigments and fillers, as well as HDK H-15 and HDK H-20, hydrophobic grades for corrosion resistant coatings and printing inks are featured. Silicone intermediates; resins, pure or cold blended; paint additives; and masonry water repellents are highlighted.

WARREN RUPP-HOUDAILLE, INC.
Mansfield, OH 44901

Featured are operating displays of SandPIPER double-diaphragm air-powered pumps, with clear plastic piping and circulating balls demonstrating pumps' ability to pump pipe-size solids without clogging. Another display pumps heavily viscous material.

WASHTECH SYSTEMS, INC.
Riverside, CA 92503

Featured are portable tank washing systems. Tanks for storage and mixing are highlighted along with tank accessories. Tanks meet DOT specification 57.

WILDEN PUMP & ENGINEERING CO.
Colton, CA 92324

Shown are Wilden's air-operated double-diaphragm pumps, designed to handle very thin material applications to very thick sludges. Five models are available: the M-1 for flows to 14 gpm; M-2 for flows to 37 gpm; M-4 for flows to 73 gpm; the M-8 for flows to 155 gpm and the M-15 for flows up to 230 gpm.

WITCO CORP.
New York, NY 10022

The Organics Div. features its series of Witcobond® aqueous urethane dispersions, both anionic and cationic types, used as coating bases and binders for protective finishes. The Sonneborn Div. demonstrates the performance of protective maintenance coatings based on its SACI® 8000 overbased calcium sulfonate corrosion inhibitor concentrates.

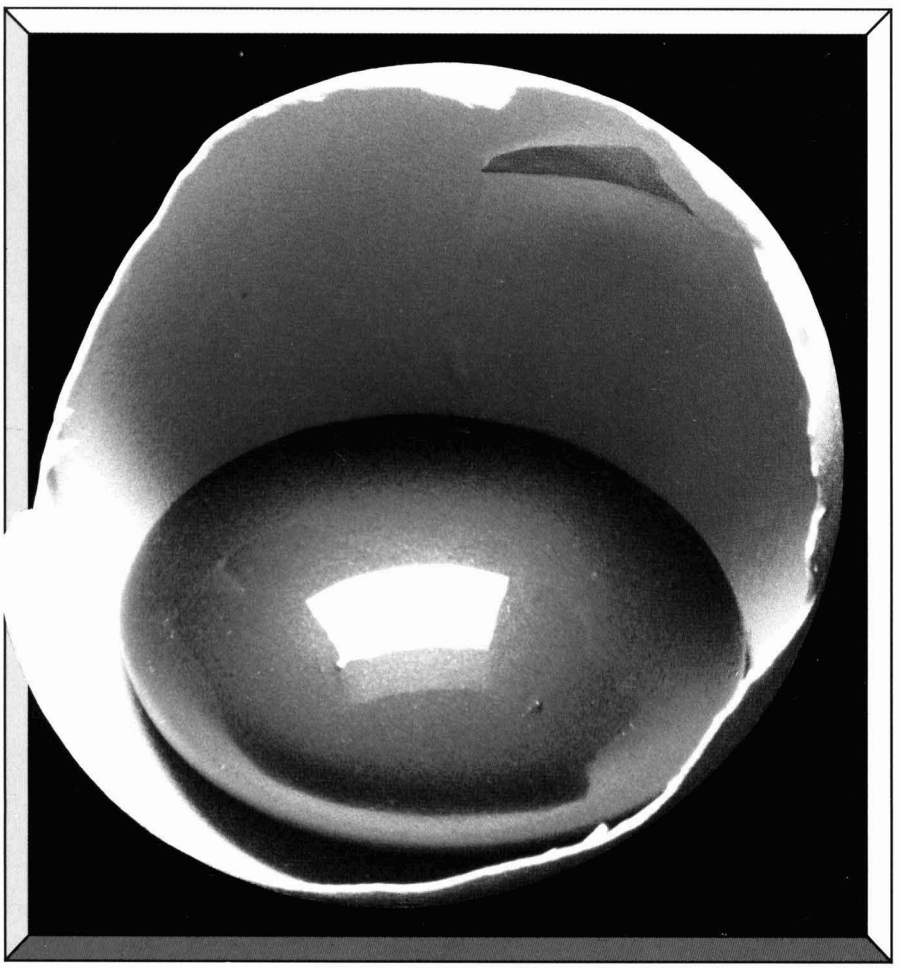
ZEELAN INDUSTRIES, INC.
St. Paul, MN 55191

This exhibit features Zeelan's line of ceramic microspheres including fine particle size, high-strength ZEEOSPHERES® and new, white-colored, low-density Z-LIGHT SPHERES™ and their use to increase solids, reduce viscosity and weight per gallon, and enhance such properties as chemical, corrosion and abrasion resistance.

PIGMENT heubach INNOVATIONS

HEUCOPHTHAL® BLUE • BT-698-D

RED SHADE • NC/NF



HEUBACH INC.
HEUBACH AVENUE
NEWARK, NEW JERSEY 07114

FOR SAMPLES AND TECHNICAL DATA, PLEASE CALL:
1-800-HEUBACH

Study Predicts Extender/Filler Consumption to Reach 3.4 Million Tons by 1990

In 1985, the paint, adhesive, and sealant industries consumed over 2.8 million tons of extender and filler minerals, according to a recently completed study by C. H. Kline & Co. Ground calcium carbonate was the primary product used and accounted for almost 1.2 million tons, or over 41% of all the minerals used in paint, adhesives, and sealants. Titanium dioxide ranked second with 570,000 tons, followed by kaolin at 360,000 tons.

The current study is the second volume in a three-year series of reports evaluating five major end-markets. In the current volume, the major focus is on consumption of extender and filler minerals in paint, adhesives, and sealants. Additionally, estimates are also given for consumption by the paper, plastic, and rubber industries for these products. Combined, these industries consumed an estimated 7.2 million tons of industrial minerals in 1985, bringing the total market to 10 million tons, valued at almost $2.7 billion. Kaolin and calcium carbonate were consumed in the largest volume while titanium dioxide ranked first on a value basis.

Annual growth of nearly 5% is expected in these markets through 1990, with higher growth for certain specialty products including mica and wollastonite. In adhesives and sealants, calcium carbonate, talc, and mica are expected to show good growth due to use in joint compounds which have a strong market outlook. The fastest growing minerals in paint are expected to be silica products because of strong growth in powder coatings and greater use in architectural paints. Total consumption of extender and filler minerals by the paint, adhesive, and sealant industries in 1990 is forecast to reach 3.4 million tons.

The dominant factor impacting consumption of minerals in adhesives, and sealants is the level of new home construction. In most cases the level of mineral use by each end product is fairly stable. Therefore, higher mineral consumption normally only results from unit increases. Given the fact almost 65% of all mineral use in adhesives and sealants is in joint compounds, construction activity exerts a major influence on these end markets. As a result, ground calcium carbonate and attapulgite are expected to outperform the industry average because of their heavy use in joint compounds. Fumed silica is also expected to grow at a high rate in adhesives and sealants as a rheology control agent.

The paint industry consumes a diverse package of extender and filler minerals. While most products, including titanium dioxide, fumed silica, and bentonite help modify specific physical properties of the final coating, some, including calcium carbonate, water-washed kaolin, and talc are primarily used as low-cost fillers. The minerals which are forecast to experience the best growth in paint are the silicas. Ground silica should find greater use in architectural paints, while fumed silica and silica gel should benefit from the high growth rates expected for high solids and powder coatings in the OEM market.

Extender and filler minerals as classified in the Kline analysis, are comprised of four major mineral groups; kaolin, calcium carbonate, silica, and talc plus various other individual minerals, including alumina hydrate, barytes, diatomite, mica, precipitated silicates, titanium dioxide and wollastonite. Kaolin products, while primarily used in paper, also find use as a opacifying agent in paints and to provide strength in rubber. Calcium carbonate products are used in adhesives and sealants, paint, plastics, and carpet backing, primarily to reduce the cost of each product, but also to add brightness and various other properties depending on the application. Silica products, including fumed, gel, ground, and precipitated silica are used in paint, plastics, rubber and adhesives and sealants. In paints they primarily serve as flattening agents whereas in plastics and rubber they primarily serve as fillers. Talc products and the other minerals listed earlier find various applications depending on each mineral's specific properties.

There are many suppliers of industrial minerals for extender and filler applications. However, a few sizable firms account for the majority of the market. Excluding titanium dioxide, the 10 major suppliers of extender and filler minerals in 1985 accounted for $756 million in sales, or 64% of the total value of all sales. The remaining 36% was supplied by over 38 additional firms. Expansion plans are in progress at many firms ensuring that adequate supply will be available for most of the extender and filler minerals through the end of the decade. In fact, in many instances, excess capacity is expected which should help ensure strong price competition. Healthy growth expectations in most markets should continue to attract newcomers and promote acquisitions in this attractive segment of the industrial minerals business.

Extender and Filler Minerals 1986 is the second volume of the second series of reports which analyzes current and projected trends in the consumption of industrial minerals for extender and filler applications. The current report is based on interviews with personnel at 146 paint, adhesive, and sealant companies, mineral suppliers, trade associations, and government agencies. Future editions will examine trends in the plastics, rubber, and paper industries.

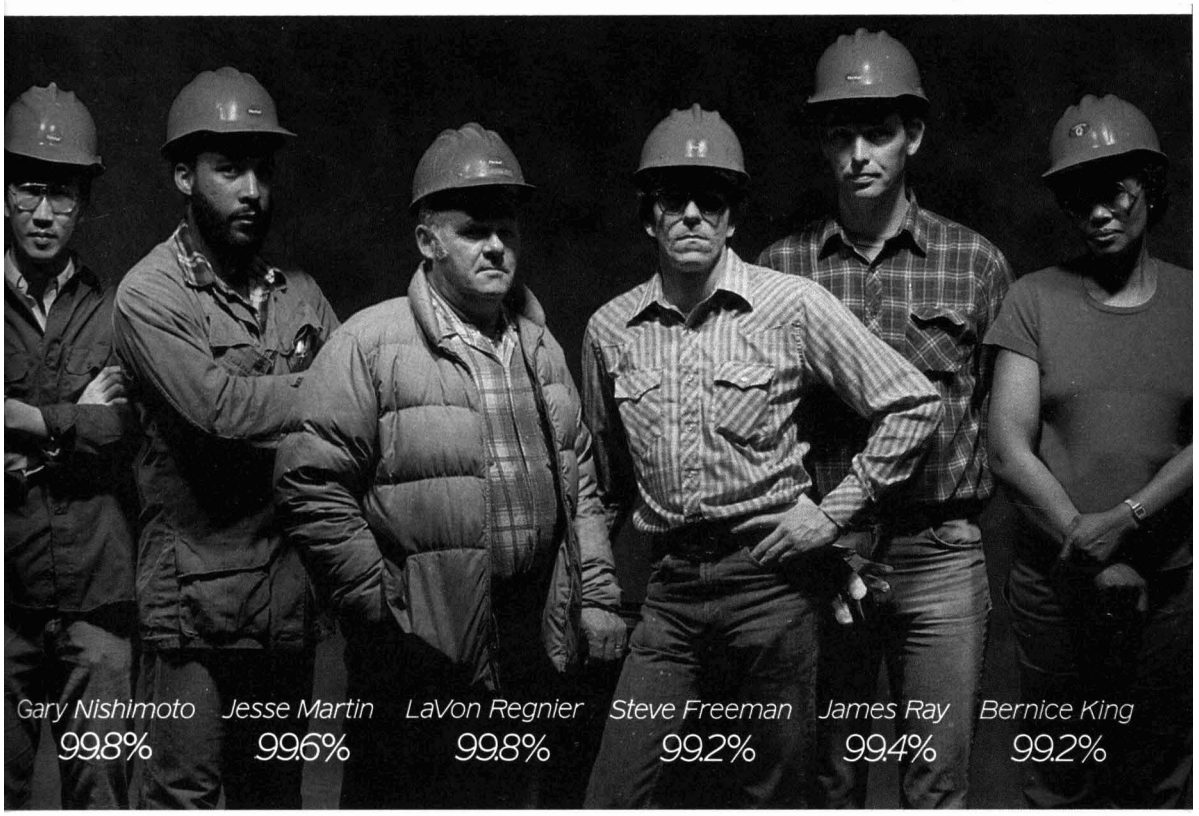
Information on how to subscribe to the second volume and complete details on the entire three-year service are available from Charles H. Kline & Co., Inc., 330 Passaic Ave., Fairfield, NJ 07006, or Kline SA, Rue Froissart 89, Btc 8, B-1040, Brussels, Belgium.

E.C.C. America Merges with Sylacauga Calcium Prod.

E.C.C. America, Atlanta, GA, has merged with Moretti-Harrah Marble Co., known in the industry as Sylacauga Calcium Products. The Sylacauga, Alabama-based plant, in operation since 1944, produces calcium carbonate extender and filler pigments. The plant will be operated as a subsidiary of E.C.C. America.

E.C.C. America is the parent company of Anglo-American Clays Corp., producers of kaolin clays and calcium carbonates as coating and filler pigments for the paper industry and Southern Clay Products, Inc., producers of rheological control additives for the paint, coatings, plastics, and oil field industries, and talc and ball clay for the ceramics and general industrial markets.

OUR PEOPLE ARE WORKING UNTIL THEY REACH 100.



It's not that our people have dedicated the rest of their lives to us. But they have dedicated themselves to producing 100% quality epoxy curing agents and acrylic resins, which can only mean good things for our customers.

You see, we started a quality program at our Kankakee plant in 1982. Since then, quality has gone from being a good idea to a virtual obsession with every one of our employees. And rework has dropped to an incredible 0.2%.

We've done it with teams of management and hourly employees who work together to recognize and promote quality procedures and the production of quality products.

We select and reward a quality employee of the month as well as a quality employee of the year. And each year we have a Zero Defects day when we recommit ourselves to the pursuit of quality.

Learn more about the Henkel quality story. Write the Polymers Division at 5325 South 9th Avenue, La Grange, Illinois 60525. Or call 1-800-328-4631.

Maybe people working to reach 100 should be working for you.

Henkel

Paul Dague Honored with NPCA's Heckel Award

Paul D. Dague, President and Chief Executive Officer of the Jones-Blair Co., Dallas, TX, was named the recipient of the 1986 George Baugh Heckel Award by the National Paint and Coatings Association.

The award was presented at the Association's 99th annual meeting in Atlanta on November 3, 1986. The Heckel Award, the highest honor given by the NPCA, is presented in recognition of outstanding contributions to the paint and coatings industry. It commemorates the late George Baugh Heckel, founder of *Paint Industry* magazine and an active member of NPCA and other industry organizations.

Mr. Dague was honored for his contribution in the area of education, specifically education about product safety to paint and coatings users.

A member of the NPCA Board of Directors, Mr. Dague was among the first to recognize a need for the paint and coatings industry to deal with the health issue involving deliberate inhalation of solvent-containing products. His concern was a major factor in the formation of the Solvent Abuse Foundation for Education (SAFE), a mechanism for the industry to support educational programs aimed at eradicating substance abuse.

Mr. Dague also represents the paint industry as a member of the Texas Governor's Task Force on Inhalant Abuse.

Glidden Signs Agreement with Macpherson Industrial

The Glidden Co., Cleveland, OH, and Macpherson Industrial Coatings Limited, London, England, have signed a long-term licensing agreement enabling Glidden to manufacture in-mold plastic coatings. Glidden, a coatings manufacturer, will produce in-mold coatings for reaction injection molded (RIM) parts that offer resistance to ultraviolet degradation, weathering, and chemicals, including solvents.

Glidden, recently acquired by Imperial Chemical Industries PLC, is a part of the ICI Paints World Group. Macpherson produces general industrial surface coatings in the United Kingdom.

ARCO and Air Products Form Development Program

ARCO Chemical Co., Philadelphia, PA, and Air Products and Chemicals, Inc., Allentown, PA, have formed a joint development program for technology to produce propylene oxide/carbon dioxide and other polyalkylene carbonate polymers.

ARCO Chemical, a division of Atlantic Richfield Co., produces propylene oxide. Air Products is an international supplier of industrial gases and chemicals.

Grinding/Dispersion Lab Built by Netzsch Inc.

Netzsch Inc., Exton, PA, has built a specially designed 1200 sq ft grinding and dispersion laboratory. The lab is designed to help customers solve processing problems and provide Netzsch engineers with processing data used in developing equipment and process recommendations.

The customer demonstration and testing facility is equipped with technological grinding and dispersion equipment. In addition, the laboratory is available for seminars on equipment operation and maintenance.

IESC Volunteer Hegman Returns from Sri Lanka

International Executive Service Corps (IESC) volunteer Bernard J. Hegman recently returned from Colombo, Sri Lanka, where he assisted Colombo Paints Ltd., to improve the quality of its paints and to develop new formulations.

The Dayton, OH, resident is a retired plant manager from Sherwin-Williams who was recruited by the IESC, a not-for-profit organization. The IESC is comprised of American business men and women devoted to providing managerial and technical assistance to private enterprises in developing countries. IESC has completed more than 10,000 projects in 84 countries during the past 22 years.

For information on serving as an IESC volunteer, write W.J. Lippincott, Vice-President Recruiting, IESC, P.O. Box 10005, Stamford, CT 06904.

65th Annual Meeting & 52nd Paint Industries' Show
Dallas Convention Center • Dallas, Texas
Monday, Tuesday & Wednesday • Oct. 5, 6, 7, 1987

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

Fall 1986 Board of Directors Meeting

Thirty-six members and 24 guests attended the Fall Meeting of the Board of Directors of the Federation of Societies for Coatings Technology on November 4, 1986, in Atlanta, GA.

The following were in attendance:

Officers

President ..... William Mirick
President-Elect ..... Carlos Dorris
Treasurer ..... Deryk R. Pawsey

Society Representatives

Baltimore ..... Joseph Giusto
Birmingham ..... S. John Mitchell
Chicago ..... John Vandeberg
C-D-I-C ..... Lloyd Reindl
Cleveland ..... Fred G. Schwab
Dallas ..... William Wentworth
Detroit ..... Gary Van DeStreek
Golden Gate ..... Barry Adler
Houston ..... Donald Montgomery
Kansas City ..... Norman Hon
Los Angeles ..... Jan P. Van Zelm
Louisville ..... Howard Ramsay
Mexico ..... Antonio Pina
Montreal ..... Horace Philipp
New England ..... Daniel Toombs
New York ..... Saul Spindel
Northwestern ..... Richard L. Fricker
Pacific Northwest ..... Carlton R. Huntington
Philadelphia ..... Carl W. Fuller
Piedmont ..... James N. Albright
Pittsburgh ..... Raymond Uhlig
Rocky Mountain ..... James E. Peterson
St. Louis ..... John Folkerts
Southern ..... Berger Justen
Toronto ..... Kurt F. Weitz
Western New York ..... Thomas Hill

Other Members

Joseph A. Bauer ..... Louisville
Richard M. Hille ..... Chicago
James E. Geiger ..... Southern
J. Richard Keifer ..... Philadelphia
J. C. Leslie ..... Kansas City
John A. Lanning ..... Louisville
Michael W. Malaga ..... Cleveland

Guests

Manuel Gutierrez, President, Mexico Paint & Ink Manufacturers Association.

Ian D. Pike, President, Oil and Colour Chemists' Association-Australia.

Amleto Poluzzi, President, Federation of Associations of Technicians in the Paint, Varnish, Lacquer, and Printing Ink Industries of Continental Europe (FATIPEC).

Arja Saloranta, President, Federation of Scandinavian Paint and Varnish Technologists.

The following Past-Presidents of the Federation: A. Clarke Boyce, Neil S. Estrada, Milton A. Glaser, Howard Jerome, Terryl F. Johnson, James A. McCormick, John J. Oates, Eugene H. Ott, Carroll M. Scholle, and Clyde L. Smith. (Board members Joseph A. Bauer, J.C. Leslie, and Michael W. Malaga are also Past-Presidents.)

Federation Committee Chairmen: Jay Austin (Delegate to NACE & SSPC); Alex Chasan (Corrosion); F. Louis Floyd (Professional Development); Percy E. Pierce (Program); Joseph

A. Vasta (Educational); and Robert E. Minucciani, who represented Environmental Control.

Royal A. Brown, Federation Technical Advisor.

Don Boyd (Pittsburgh Society); Henry Kirsch (President, Los Angeles Society); and Bob Thomas (Cleveland Society).

Staff

Frank J. Borrelle, Executive Vice-President; Thomas A. Kocis, Director of Field Services; and Robert F. Ziegler, Editor of the *Journal of Coatings Technology*, and Executive Secretary.

The minutes of the May 16, 1986 meeting of the Board of Directors were approved as published in the August 1986 issue of the *Journal of Coatings Technology*.

Reports of Officers And Staff

PRESIDENT MIRICK

This year the Federation reached a new milestone of membership, over 7,000. Again the Paint Industries' Show has grown and will occupy approximately 58,000 net square feet.

At the request of the New York Society, your Federation will sponsor group insurance programs as an additional benefit to its members. Information about these programs has been distributed.

My year as President of the Federation has been outstanding, due in a large part to the warm hospitality of all the Societies visited during the year. Mary and I were privileged to visit the Southern Society in Savannah, the Southwestern Paint Convention in Houston, the Pacific Northwest Society Symposium in Portland, the joint St. Louis-Kansas City Societies' meeting in the Ozarks, the Birmingham Club in England, the XVIII FATIPEC Congress in Venice, Italy, and the Mexican Association of Paint Manufacturers in Acapulco. We have met so many new friends and have seen such interesting and different places, we'll be spending a good part of the winter organizing our pictures and souvenirs.

Guests included (from left): First row: Past-Presidents John Oates, Howard Jerome, and Terryl F. Johnson. Second row: Educational Committee Chairman Joseph Vasta and Co-Publisher of the *American Paint Journal* Abel Banov

My thanks go to the members of the Executive Committee, the Board of Directors, Committee Chairmen, and members for their support and help in making this another great year for the Federation.

And, of course, I thank the Federation Staff for their usual first class assistance and cooperation throughout the year. These dedicated people really make things run smoothly. Without them, your Federation would not be where it is today.

WILLIAM MIRICK,
President

PRESIDENT-ELECT DORRIS

Activity for the President-Elect has been minimal during the summer months which has given me time to plan for the coming year. I have used the time to review committees and appoint Committee Chairmen. I am looking forward to working with this great group of dedicated people.

No visits to local Societies since the spring Board of Directors meeting, but I did meet with the FSCT Environmental Control Committee in Louisville and the JPICC meeting in Washington, D.C. Karen and I represented the Federation at the Canadian Paint and Coatings Association in Quebec City.

This past year has been exciting and I am looking forward with enthusiasm and dedication to the new year. I know, with the help of our excellent FSCT staff and the dedication of our members, we will make 1987 a great year.

CARLOS E. DORRIS,
President-Elect

TREASURER PAWSEY

Since my last report at the Board Meeting in May I have attended the Professional Development Committee meeting in Chicago and the Executive and Host Committee meetings in Atlanta.

The Professional Development Committee has now finalized plans for their second project, an introductory short course on Statistical Process Control at four different locations. Provision has already been made in the budget to fund this innovative venture.

Federation finances are completely in line with budgetary expectations. With this year's Paint Show virtually assured of being another record-breaking event, we should once again end our financial year well on the right side of the ledger.

As I now conclude my term of office, I wish to thank the Federation Staff for their invaluable help and guidance during the year. It has been an enjoyable experience to serve as Treasurer for the Federation.

DERYK R. PAWSEY,
Treasurer

EXECUTIVE VICE-PRESIDENT BORRELLE

Increasing committee activities share the spotlight this year with another successful Annual Meeting and Paint Show. We commend and thank our Committee Chairpersons for their dedicated and effective efforts.

THE BUDGET

As the eight-month financial report indicates, all but a few of the income and expense accounts are in line with the

$1,925,000 budget at this time. The Federation will have another good year.

Publications

JCT: We are feeling the pinch in advertising revenues, which have fallen this year in both consumer and trade magazines. Through August, the JCT is off 17% in ad pages.

Total pages published this year through October are 948, compared to 1,034 a year ago. Although the supply of technical paper manuscripts continues to be good, authors are taking more and more time to revise manuscripts.

Comments have been favorable re the poly bags in which the JCT is now mailed.

The distribution of the JCT is currently 9,564 (U.S.—6,889, Canada—869; and other countries—1,806). Last year, it was 9,447.

We extend our thanks to the Publications Committee (Dr. Thomas J. Miranda, Chairman) and the Editorial Review Board for their good services.

Series Units: Four have been published (Radiation Cured Coatings, Film Formation, Introduction to Polymers and Resins, and Solvents). The approved manuscript of the fifth—Coil Coatings—has been received. Several other manuscripts are near completion.

We offer our thanks and appreciation to the Editors, Drs. Thomas J. Miranda and Darlene Brezinski.

Year Book: All copies will be bound with plastic spiral comb, beginning with the 1987 edition.

Other Publications: The Infrared Book, Dictionary, and Pictorial Standards Manual move steadily out of inventory.

Other Services

Color-Matching Aptitude Test Set: About 100 sets remain from the 400 (1978 edition) which were produced in 1981. The "Correlation of Results" paper by the Birmingham Club in the August JCT was most welcome as it clarified test scores, as well as presenting a new interpretation of them. The paper also helped to boost sales of the CAT.

Federation Membership

Membership attained a new level this year—7,000. Since the *Year Book* was published, 305 (182 Active, 114 Associate, 3 Retired, 6 Educator) members have been added to the rolls. Societies with the greatest membership activity were: Mexico, New York, Los Angeles, Detroit, Piedmont, Cleveland, and Birmingham.

Annual Meeting and Paint Show

This year's Paint Show is another record-breaker in net square feet. There will be 242 exhibitors in 57,850 nsf. In 1985, it was 247/55,800.

The Show continues to attract new exhibitors: 55 in 1985 and 28 this year. Forty-three exhibitors have been in the Show from 25-49 years. Four are 50-year participants—Nuodex joining that class this year.

Percy Pierce and his Program Committee have arranged a great collection of papers and seminars under the theme—"Compliance and Quality—Recognizing the Opportunities."

The reputation of the AM&PS as an international event grows steadily and we expect a record attendance from overseas this year.

Spring Weeks

The Federation's third Spring Week (Pittsburgh, May 13-16) was another success. Attendance at the Seminar (Special Purpose Coatings) was 101. Thirty-one attended the Society Officers Meeting and 64 were present at the Board Meeting.

FSCT Treasurer-Elect James E. Geiger

The Federation and the Pacific Northwest Society will present Spring Week from April 28-May 2 at the Westin Hotel in Seattle. The Seminar—Coatings for Wood Substrates—is being arranged by Technical Advisor Roy Brown and Emil Iraola, of PNW. Registration forms will be published in the JCT.

SACC

The Symposium on Automotive Color Control in June was a great success with an attendance of 454 for that week-long event. The Federation was pleased to have co-sponsored SACC along with the Detroit Colour Council and the Manufacturers Council on Color and Appearance.

Exhibits

The Federation exhibited at the NACE Show in Houston, March 1986. In 1987, we will exhibit at the SSPC meeting in January (New Orleans) and at the West Coast Societies Symposium and Show in February (Monterey).

Insurance Program for Members

A promotion piece outlining Federation-sponsored insurance programs for members will be available at the Federation exhibit in the Paint Show. The first sign-up brochure to be mailed to members will be Hospital Cash. That will be followed in due course by the other three (Disability Income, Group Term Life Insurance, Accidental Death & Dismemberment). One point to keep in mind—an individual must be a member to participate on a continuing basis. When membership stops, so does eligibility.

ASTM D-1

In the spirit of friendship and cooperation, the Federation office hosted a meeting of ASTM D-1 Executive Committee—for the first time—on October 1-2. We were pleased to have extended the hospitality of the Federation to that group.

Officer/Staff Visits

Officer/Staff visits since April have been to Pacific Northwest, Western New York, Joint St. Louis-Kansas City, and Birmingham. The Federation was also represented at the Joint Paint Industry Coordinating Committee meeting in D.C. (May), the Canadian Paint and Coatings Association meeting in Quebec City (September), and the XVIIIth Congress of FATIPEC in Venice, Italy (September).

FSCT President William Mirick (left) and President-Elect Carlos E. Dorris

Committee Activities

Federation committees have been very active this year. It was a pleasure for staff to have coordinated their activities, in cooperation with the Chairpersons.

Staff

Members of staff are: Sam Amicone, Audrey Boozer, Meryl Cohen, Rosemary Falvey, Victoria Graves, Tom Kocis, Dottie Kwiatkowski, Lorraine Ledford, Linda Madden, Mike McHale, Mary Sorbello, Patricia Viola, Kathy Wikiera, and Bob Ziegler. (Kate Ferko, Assistant to the Treasurer, retired on June 30). Mr. McHale joined staff in February and succeeded Ms. Ferko upon her retirement. Mr. Amicone came aboard in September as an Associate Editor of the JCT.

I extend my sincere thanks and appreciation to them for their dedication and effective teamwork during the year.

Outgoing Administration

For the staff, sincere thanks to President Bill Mirick, the other Officers, Executive, and Board members, and Committee Chairpersons for their cooperative spirit and progressive activities. It was a pleasure for us to have worked with them.

Frank J. Borrelle,
Executive Vice-President

DIRECTOR OF FIELD SERVICES KOCIS

Committee Liaison

Corrosion—Committee met at headquarters office on May 9. Proposal was approved to sponsor a Survey of Accelerated Test Methods for Anti-Corrosive Coating Performance. This project, which would require Federation funding, has the potential for providing substantial meaningful data for industry and could be completed in a reasonably short time frame.

To stimulate prospective authors to submit quality papers on corrosion-related topics for publication in JCT, Committee proposes establishing a Federation cash award for best paper in this category. Developing plans for sponsoring presentation(s) on corrosion topics at Annual Meeting each year.

Educational—Steering Committee met on June 24 at Eastern Michigan University, Ypsilanti, MI. Discussions focused on approval of revised procedures for applications for FSCT scholarship funding and development of a career promotion program to acquaint students with opportunities in the coatings industry. Committee members had the opportunity to tour the campus, chat with students and faculty, and generally become better acquainted with the school and its needs, and to better assess the effectiveness of Federation scholarship grants to EMU. While visiting the coatings laboratory, Committee had chance to "rap" with group of area high school chemistry teachers who were being instructed in some of the basics of coatings technology and learning what the industry has to offer qualified, technically trained graduates.

Environmental Control—Committee met with Society Environmental Control Committee Chairmen in Louisville, September 17, to discuss development of effective procedures for collecting information on environmental control and regulatory activities which impact on the coatings industry, for distribution to the membership in a timely fashion. Twelve Societies were represented.

Attendees expressed some concern re extent of Federation involvement in environmental/regulatory matters and possible duplication of NPCA efforts in this area, but were supportive of an information retrieval and distribution program.

Discussions concluded that this activity may best be carried out by the Federation staff, rather than by member volunteers, because of the scope of the effort, which would include identifying and monitoring key issues at the federal, state, and local level, with a periodic overview and update, and maintaining close relationships with other organizations, on a continuing basis. This would include working closely with NPCA.

Technical Advisory—Meeting of TAC with Society Technical Committee Chairmen was held September 23-24, in Louisville; representatives of 16 Societies attended. Focus of discussions was Society projects underway and planned, and suggestions for work that might be undertaken.

Also included was discussion on how information contained in Society papers not accepted for publication in JCT could be accessed; it is felt that there is much valuable data contained in this body of work, which should be available to the membership, and that some mechanism should be developed to publish this in the *Journal* (perhaps as an expanded abstract). TAC will undertake to determine how this can best be handled.

A feature of the meeting was a tour of the nearby General Electric Co. Coatings and Materials Application Laboratories; attendees found much of interest re coatings applications for appliances, as well as some of the very sophisticated technical developments in use at the plant. These were further explored in a post-dinner presentation by the GE lab manager.

Although attendees were unanimous in their support of the concept and value of the meeting, they expressed disappoint-

Deryk Pawsey, Treasurer, (left) and Frank J. Borrelle, Executive Vice-President

Society Representatives (left to right): Gary Van DeStreek (Detroit) and William Wentworth (Dallas)

ment that more Societies were not represented, to share in the exchange of ideas.

Program—All arrangements have been completed for the 1986 Annual Meeting technical program, and a full complement of presentations will be offered on a variety of coatings topics. An excellent lineup of speakers will address various aspects of the theme, "Compliance and Quality: Recognizing the Opportunities," from both the theoretical and practical viewpoint.

Program arrangements, meanwhile, are underway for the 1987 AM. Committee has been selected and will hold organizational meeting in conjunction with the '86 event, to discuss development of a theme and proposed topics for presentation next year in Dallas.

Manufacturing—Committee-sponsored seminar at Annual Meeting will have as its topic, "Productive Alternatives for Improving Materials Control." Various concepts will each be addressed from two perspectives: in theory, by an equipment supplier; and in practice, by a current user.

Steering Committee members and Society Manufacturing Committee Chairmen will tour Engelhard/Freeport Kaolin mining facilities (outside Atlanta), in conjunction with the AM.

Providing assistance to Morehouse Industries, in recommending candidates for "Golden Impeller Award," presented at Annual Meeting Manufacturing Seminar for distinguished achievement in coatings manufacture, particularly in the field of dispersion.

Pursuing feasibility of compiling articles on manufacturing topics, selected from industry periodicals, and made available to those interested; publications being contacted to determine appropriate clearance considerations.

Symposium on Automotive Color Control (SACC)

This event, held June 3-6 in Southfield, MI, and sponsored by the Federation, in conjunction with the Detroit Colour Council and Manufacturers Council on Color and Appearance, was designed to acquaint participants with the new Society of Automotive Engineers Recommended Practice J1545 for determining color match acceptability of automotive components.

"J1545" is the culmination of work carried out by an industry-wide committee formed by the Detroit Colour Council; it specifies the procedures, instruments, and documentary standards to be used for color difference measurement of colored parts and materials supplied for the manufacture of highway vehicles.

The Symposium combined general sessions and workshops with "hands-on" equipment demonstrations, which offered opportunity for registrants to measure provided samples and determine correlation of the various instruments. Programming was specifically directed to coatings, soft trim (textiles), and plastics, with each addressed in separate, two-day overlapping segments.

Total attendance was 454, which included 401 regular registrants (coatings, 162; soft trim, 132; plastics, 107), 32 exhibitors, and 21 program participants and guests. The turnout was above expectations, so SACC was financially more rewarding than projected. Surplus was shared: 75% for FSCT, 25% for Detroit Colour Council. The DCC portion recognizes their work in developing the Recommended Practice and the concept of the Symposium; Federation shares for its handling of the planning, promotion, registration, and on-site meeting needs, as well as for providing seed money to cover advance expenses.

Interest was high throughout, and the event was extremely well received by those participating.

Miscellaneous

Continue assisting Advisory Board in development of booklets for new Series on Coatings Technology . . . . . Annual update of "Talks Available to Constituent Societies" was completed and distributed; listing for 1986-87 meeting season contains record number of 93 presentations . . . . . Staff support being provided for publicity, registering, and on-site arrangements for the Professional Development Committee-sponsored regional seminars on Statistical Process Control, to be held in March . . . . . Staff support also provided for activities of Memorial, Roon, AP&CJ, and MMA Awards Committees . . . . . Attended Golden Gate Society manufacturing seminar on VOC Demonstration/Determination, and liaison meetings with forest products industry representatives.

Thomas A. Kocis,
Director of Field Services

TECHNICAL ADVISOR BROWN

Seminar
"Coatings for Wood Substrates"
Seattle, WA, May 1-2, 1987

The fifth Annual Technical Seminar will be held in Seattle in cooperation with the Pacific Northwest Society. Since the Northwest is "wood country," our subject will be, *"Coatings for Wood Substrates."* We plan to explore the problems involved in coating all types of wood and wood products.

Wood has been, and continues to be, a popular choice of both builder and homeowner. Combining the unique properties of durability, utility, and beauty, plus the fact that it is a renewable resource, makes wood a premier building material. The suppliers of the various solid woods and wood products such as

Board Members-at-Large (from left): Richard M. Hille and John A. Lanning

hardboard, plywood, etc., are interested in this seminar and will furnish several of the speakers.

Problems encountered in staining and painting the following wood substrates and the correct coating systems to use will be discussed: Redwood, Cedar, Plywood, Hardboard, and other solid wood substrates. Other presentations will deal with coating wood furniture, painting preservative-treated woods, mildew growth on painted wood surfaces, and coatings research at the Forest Products Laboratory (U.S. Dept. of Agriculture). Several "Open Forum" sessions will permit attendees to obtain answers to their specific problems.

Federation Proficiency Testing Program

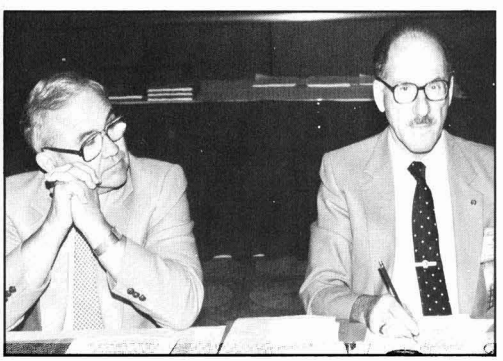
This program is well into its third year of successful operation. Several new Federal agency laboratories have joined the program. Some different tests have been added as well as different coatings for testing. Test results from various laboratories indicate that many labs still have considerable difficulty in conducting certain ASTM test methods. The ability of many labs to achieve reproducible test results on the same coating is not good. Tests which require the determination of Water Content and VOC have caused many problems, as have those tests which require the preparation of panels from wet samples, such as Gloss, Abrasion Resistance, etc.

With many State EPA agencies adopting regulations which will require the control of volatile organic content (VOC) in coatings, it now becomes essential that all paint manufacturing company laboratories be able to determine VOC in their products by analysis. The Federation program offers an excellent way to determine how well your lab can perform the ASTM Test Method D-3960 in comparison with many other laboratories throughout the United States. ASTM has just recently agreed to distribute the Federation 1986-87 Test Brochure to ASTM D-1 (Paint) Committee members.

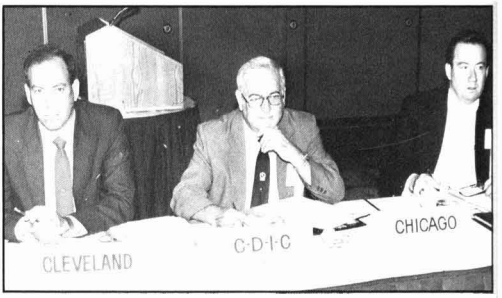
This is an important program and all Technical Directors should seriously consider enrolling their laboratories. Brochures which describe the program may be obtained from Federation Headquarters.

Paint Industry Liaison with the Forest Products Industry

Plans for the formation of a joint committee with the wood industry are progressing well. A meeting of Federation representatives with members of the wood industry was held at the Headquarters of the National Forest Products Assn. in Washington, D.C. in August. The first formal meeting of the joint committee is scheduled for the Spring of 1987 in Madison, WI where the Forest Products Laboratory is located.



Immediate Past-President Joseph A. Bauer (left) and Montreal Society Representative Horace Philipp



From left: Cleveland Society Past-President Robert Thomas; CDIC Representative Lloyd Reindl; and Chicago Representative John Vandeberg

Plans of the joint committee call for discussion of technical problems encountered in the staining and coating of wood and wood products. It is the objective of the group to educate each other in the products of the two industries and to recommend solutions to the problems that exist. We also hope to guide the Forest Products Laboratory (USDA) in conducting more effective research in the painting and staining of wood substrates.

Mildew Research

The cooperative effort of several Society Technical Committees in exposing paint panels to determine mildew growth is essentially finished. Exposure panels have deteriorated to the point where it is not possible to compare mildew growth. The poor exterior durability of the experimental paints made from an emulsion polymer to which penta chlorophenol had been chemically attached, was not too unexpected. This represented a "first shot" at manufacturing such a polymer and indicates the need for additional research. The research work was important, however, in that several Societies reported less mildew growth on the "active polymer" paints than on the "control," and in some cases, less than on commercial mildew-resistant paints. These results occurred after about 2½ years of exposure of the panels.

The Southern Society Technical Committee is continuing the research by attempting to manufacture a stable emulsion polymer from the original acrylate monomer to which PCP had been chemically combined. Once this has been successfully accomplished, we again hope to make experimental paints and expose panels throughout the country.

Federation Committees

I have been involved in the meetings and activities of the following Federation committees: Technical Advisory, Education, Manufacturing, Professional Development, Corrosion, and Environmental. The work of these groups continues to be of considerable value to the paint and coatings industry.

Royal A. Brown,
Technical Advisor

By-Laws

ADOPTED

The following amendment to Standing Rule Article SRVIII B. was approved.

WHEREAS the current Standing Rules do not specify the procedure for approval of awards to be presented at the Annual Meeting, be it

RESOLVED that Standing Rule Article SRVIII B., duties of Federation Committees, be amended by adding the following statement under the section titled ANNUAL MEETING AWARDS:

"All proposals for awards shall be submitted to the Federation Executive Committee for approval."

Review of Actions Of Executive Committee

One of the duties of the Board of Directors is to approve or disapprove the actions of the Executive Committee.

The actions of the Executive Committee are presented in three sections in this report: May 16, 1986; September 4, 1986; and November 3, 1986.

MAY 16, 1986

That the registration fees for Spring Week 1987 be $110 for members (dinner-dance included) and $125 for non-members (no dinner-dance).

That four initial steps be taken toward the Board of Directors charge that staff coordinate the dissemination of information and developments re coatings industry environmental and hazardous waste matters.

They were approved by the Board.

SEPTEMBER 4, 1986

That the duties of the Educational and Professional Development Committees be revised, as agreed upon by the Chairmen.

That Federation participation in the joint FSCT/National Forest Products Association Committee remain, for the present, under the aegis of the Technical Advisory Committee.

That the four annual Statements of Policy regarding: Technical Editor of the JCT; First Quarter 1987 Budget; Reimbursement of transportation expenses; and Payment of travel expenses be approved.

That, in view of the unanticipated travel expenses, the Southern Society reconsider the provisions of the Alfred Hendry Award and report back to the Executive and Planning Committees.

That the price of the new Series on Coatings Technology be $4.00 each for quantity purchases by Societies and educational institutions.

That M/M Carlos Dorris and M/M Frank Borrelle represent the Federation at meetings in England, June 1987.

Board Members (left to right): John Folkerts (St. Louis); Berger Justen (Southern); and Kurt F. Weitz (Toronto)

Representing the Pittsburgh Society was Raymond Uhlig; representing Rocky Mountain was James E. Peterson

That the advertising rates for the Paint Show Program Book and the Federation Year Book be increased by 10% for 1987.

That a proposal for use of the new Series Units for a commercial computer training program be respectfully denied.

They were approved by the Board.

NOVEMBER 3, 1986

The Executive Committee met in special session on this day to review the environmental issues which have been discussed and acted upon at previous Board and Executive Committee meetings.

The following resolution was adopted unanimously by the Executive and presented to the Board by Executive member Saul Spindel:

"WHEREAS the resolution regarding the establishment of staff support for issues relating to the environmental is too open ended, and

"WHEREAS in order for the Federation of Societies for Coatings Technology to provide adequate staff support for environmental issues, it would require a major modification in staffing patterns, responsibilities, and budget, and

"WHEREAS the National Paint and Coatings Association presently expends a budget in excess of 2.5 million dollars and employs about 25 persons, both professional staff and support staff dedicated to address environmental and related issues, therefore

"BE IT RESOLVED that the motion passed by the Board of Directors in May 1986 relating to staff support for environmental issues be rescinded and, that the Federation membership, both through its staff office and its Societies, be urged to do the following:

"(1) Stimulate Society Environmental Committees to a significant level of increased activity.

"(2) Establish liaison with NPCA Environmental and related committees on a Society basis.

"(3) Develop increased committee participation on the Federation Environmental Control Committee and also improved communication among Federation members through establishment of an Environmental Update Newsletter to be issued from Federation Headquarters to Societies regarding the state of current affairs as they pertain to legislative and regulatory issues, and that adequate funding be provided."

Considerable discussion followed, involving several members of the Board, and Mr. Minucciani, who spoke for the Federation's Environmental Control Committee. The general reaction to the resolution was favorable and it was approved by the Board.

Board Meeting guests (from left): Past-President A. Clarke Boyce; Program Committee Chairman Percy Pierce; Pittsburgh Society member Don Boyd; FSCT Technical Advisor Royal A. Brown; Past-President Neil S. Estrada

Elections

The following slate of candidates for Federation Office (1986-87) was presented by the Nominating Committee (Chairman Joseph A. Bauer) at the Spring 1986 meeting.

President-Elect: Deryk R. Pawsey, of Pacific Northwest Society (Rohm and Haas Canada, Inc.). One-year term. He is currently Treasurer.

Treasurer: James E. Geiger, of Southern Society (Sun Coatings, Inc.). One-year term.

Executive Committee: Kurt F. Weitz, of Toronto Society (Indusmin, Div. of Falconbridge). Three-year term.

Board of Directors (Members-at-Large): Ronald R. Brown, of Southern Society (Unocal Chemicals Div.); Lloyd Haanstra, of Los Angeles Society (Guardsman Chemicals). Two-year terms each.

Board of Directors (Past-President Member): Terryl F. Johnson, of Kansas City Society (Cook Paint & Varnish Co.). Two-year term.

VOTING

The slate, as presented by the Nominating Committee, was elected by unanimous vote.

Coatings Industry Education Fund

The objectives of the CIEF, as reported in the 1986 *Year Book,* remain those of the defunct PRI and as such are misleading. The Stockholders will be asked to change the CIEF objectives in the manner discussed at the Spring Board meeting. The proposed new objectives are as follows: (1) To advance the knowledge and application of the technology of coatings and (2) To aid in the dissemination of the results of such activities through scientific publications and lectures.

The current policy of nominating (by the Federation President, a procedure that should be made official—By-Laws Committee note) the incoming Federation Treasurer and the Chairmen of the Planning, Education, Technical Advisory and Professional Advisory Committees should be formalized by action of the Stockholders and the CIEF By-Laws so modified. Serving as a CIEF Trustee should be specified as a duty of the Treasurer and the Chairmen of the three committees. The By-Laws Committee is requested to prepare necessary changes in the Federation and CIEF By-Laws.

A matching grant of up to $1,000 has been made to the Pittsburgh Society for partial funding of its grant program to local schools, colleges and universities. This program may be of interest to other Societies, especially if the initial analysis of the Professional Development Committee Survey is confirmed that 88% of respondents thought "supporting cooperative programs/projects with local universities" to be a useful approach.

The CIEF Trustees will be asked to consider using CIEF funds for grants to schools with coatings curricula to provide needed equipment. The position of the CIEF with respect to possible conflict with Professional Development and Educational Committees' activities will need to be considered. Future funding of CIEF is a matter of concern, as the refunding of the Roon Fund in 1989 will in all probability result in lower interest income.

Finally, the definition of future continuing activities of the CIEF remains an urgent priority.

NEIL ESTRADA,
President

Mr. Boyd, Chairman of the Educational Committee of the Pittsburgh Society, addressed the Board and outlined the Society's scholarship program to students in the smaller colleges and universities in the Pittsburgh area. The average size of each grant would be $300-$400.

After the recess of the Board meeting, the Board (the Stockholders of CIEF) elected the following Trustees for the coming year: Neil S. Estrada, FSCT Past-President and Chairman of the Investment Committee; Joseph A. Vasta, Chairman of the Educational Committee; James E. Geiger, incoming FSCT Treasurer; George R. Pilcher, Chairman of the Professional Development Committee; and Jan A. Grodzinski, Chairman of the Technical Advisory Committee.

During the Stockholders meeting, the revised objectives for CIEF were proposed by Mr. Estrada. They are similar to the former PRI objectives, but with certain words deleted ( ):

(1) To advance the knowledge and application of the (chemical, physical, and mathematical sciences relating to the) technology of coatings (by supporting research at colleges and universities through the granting of fellowships).

(2) To aid in the dissemination of the results of such (research and education) activities (to the public) through scientific publications and lectures.

The new objectives were approved by the Stockholders, subject to the approval also of CIEF legal counsel.

Later in the day, the Trustees elected Mr. Estrada, President; Mr. Vasta, Vice-President; and Mr. Geiger, Treasurer, for 1986-87.

New Business

CORROSION COMMITTEE SURVEY

The incoming Corrosion Committee Chairman, Jay Austin, discussed the proposed Committee "Survey of Accelerated Test Methods for Anticorrosive Coating Performance" to be conducted by the Steel Structures Painting Council. The findings will be presented at the 1987 Annual Meeting in Dallas, and also made available in suitable form for publication in the JCT.

After responding to several questions from members and guests, Mr. Austin requested approval of the survey at the cost of $15,674.

(The Board referred the request to the Executive Committee for decision)

EDUCATIONAL COMMITTEE VIDEO TAPE

Joseph A. Vasta, Chairman of the Educational Committee, reviewed his committee's plans to produce a 15-minute video tape to promote careers in the coatings industry. He requested funding of $21,000–25,000 to produce the tape and $1,500 to write the script.

(The Board referred the request to the Executive Committee for decision)

FEDERATION HONORARY MEMBERSHIP FOR LEWIS LARSON

Lewis P. Larson, of the CDIC Society, a 50-year member of the Federation and former member of the Board of Directors, was proposed by the Society for Federation Honorary Membership. As specified in Standing Rules II, the Secretaries of each Society and the Board of Directors were advised of the nomination.

The Board elected Mr. Larson a Federation Honorary Member.

TRANSPORTATION EXPENSES

Board Member William A. Wentworth requested that the Federation reimburse transportation expenses of Board members to the Board meeting held during the Annual Meeting. (Federation policy provides for reimbursement of transportation expenses to the Spring Meeting only).

(The Board referred this matter to the Executive Committee for decision.)

Committee Reports

CORROSION

The spring meeting of this committee was held in May at Federation headquarters with almost the entire membership attending.

Complete interest was reaffirmed in pursuing the projects previously discussed, and to concentrate on the major one, which consisted of soliciting bids to establish a "Survey of Accelerated Test Methods for Anti-Corrosive Performance of Coatings on Steel." As a result of this committee decision, several responsible organizations prominent in the field of corrosion protection and corrosion research were contacted with requests to submit bids, timetables of accomplishing stated objectives, and a reasonably detailed plan of accomplishment. All respondents, save one, replied in detail at the requested time, and all responses were transmitted by the Chairman to each member of the committee for study. Each member was also asked to provide a positive recommendation as to which bid was to be accepted and why. The answers were collated by the Chairman for submission to the President of the Federation and subsequent resolution by the Executive Committee and Board.

Since a requirement of the bid proposal was a detailed presentation on the findings at the 1987 Annual Meeting in Dallas, arrangements have been made with the Program Chairman to provide for a significant time slot at that meeting for a major presentation by the Corrosion Committee.

Prior to this meeting, a proposal is going forth to the President of the Federation to set in motion a mechanism whereby papers in the JOURNAL OF COATINGS TECHNOLOGY, addressing themselves admirably to matters in the field of corrosion, can receive recognition, and a cash award, which would be established on a permanent basis by the Federation, and administered by the Corrosion Committee.

Good contacts have been maintained with the Steel Structures Painting Council, the National Association of Corrosion Engineers, and the International Standards Organization.

ALEXANDER A. CHASAN,
Chairman

EDUCATIONAL

Requests for scholarships were approved and the following educational institutions received the following for '86-'87 fiscal period:

North Dakota State University	$6000
Kent State University	$3000
University of Detroit	$4000
Eastern Michigan State	$6000
University of Southern Mississippi	$6000
University of Missouri-Rolla	$6000

This committee has developed a new scholarship request form. The purpose is to gather accurate and detailed information to improve our basis of approval and to provide "tracking" data on the effectiveness of the scholarships in meeting the desired objectives of this valuable Federation activity.

The forms are available to any institution meeting our qualification standards. Direct mailings to those organizations who have participated in this program are in progress.

We plan to continue our visitations to those academic institutions, who are participants in our scholarships program, in conjunction with scheduled committee meetings. In this manner, we accomplish economically two important activities. During the past year, we visited Eastern Michigan University with John Gordon as campus host. It was a great learning experience for the committee, and convinced us that these visits are worthwhile for the knowledge gained in understanding the academic problems, as well as the opportunity to express the concerns and needs of the Federation.

The annual meeting of the FSCT Educational Steering Committee/Society Educational Committee Chairpersons was held in Atlanta, on April 22, 1986. Reports by the Society Chairpersons were well done and informative, as many excellent ideas and concepts were shared. The Societies individually have accom-

Society Representatives Donald Montgomery (Houston) and Barry Adler (Golden Gate)

From left: Representatives Carl W. Fuller (Philadelphia) and James N. Albright (Piedmont)

plished much in promoting coatings technology education in their regions. Published reports of each Societies' educational activities were distributed to meeting participants to take back with them to their respective Societies.

The need for an updated videotape and/or slides on "Career Opportunities in the Coating Industry" is pressing.

My office has received phone calls from many job recruiters looking for coating technologists. Frankly, I informed them that the "manpower well" is going dry for a number of reasons. It is vital to this Federation, and for the health of the coatings industry, to get the message out to the high school juniors and science teachers that there are many career opportunities in our industry. It is a vital and growing industry (based on earned dollars). Therefore, our committee has actively met with and discussed with various video makers the cost of services to make a video and/or slide presentation. We have located a full service company who can accomplish this task for a reasonable sum of money. The company, Angeli Film & Videotape, Inc., in Delaware, has made many documentary and training tapes, and has filmed for CNN news and PBS.

Rough initial cost will be $21–25,000 for a 15-minute tape. The precise cost will be obtained when the script is developed. The script cost will be approximately $1,500. When approval is given, a third of the total cost will be required, and the balance will be paid in a step-wise manner. We are requesting funding for the full estimated amount at this time.

JOSEPH A. VASTA,
Chairman

ENVIRONMENTAL CONTROL

Since May 1986, this Committee has published in either the JOURNAL OF COATINGS TECHNOLOGY or the *American Paint Journal* (or both), the following information: Coping With Government Regulations; Revision of the Stayed Provisions of the Premanufacturing Notice Rule Under Section 5 of T.S.C.A.; EPA Says Certain Glycol Ethers Pose Unreasonable Risk to Health; and New T.S.C.A. Chemical Inventory Published.

At its May 16 meeting, the Federation Board of Directors approved a Golden Gate/Los Angeles recommendation that the Federation direct either a new or current staff member to coordinate dissemination of information and developments in environmental matters to the Societies and to the Federation membership. Such a collection, filtration, and distribution from a variety of sources is, as you well know, a formidable task.

In the July 1986 issue of the *JCT*, Executive Vice-President Frank Borrelle stressed the need for Societies to form a network which would summarize the key issues and up-to-date developments (at the local, state and Federal level) and which could be forwarded to a central source—the Federation office. The material would be screened by the Federation's Environmental Control Committee and released to Society committees by mail and to the membership in the *JCT*. Two Societies responded with letters of support.

The Federation sponsored the first meeting of the Environmental Control Committee with Society Chairmen on September 17, in Louisville. Unfortunately, this writer could not attend due to serious injury at work.

The Louisville meeting was successfully chaired by Bob Minucciani (Golden Gate), a member of the Federation Committee. Twelve of the 26 Societies were represented: Baltimore, C-D-I-C, Cleveland, Golden Gate, Houston, Kansas City, Los Angeles, New England, Northwestern, Pacific Northwest, Philadelphia, and Western New York. Federation President-Elect Carlos Dorris attended as did staff representatives Bob Ziegler and Tom Kocis, along with Technical Advisor Roy Brown. Also attending (at my invitation) were the NPCA's Ray Connor and Chuck Reitter, Editor of the *APJ*.

The initial discussions were primarily philosophical, with the various representatives commenting on the problems of dealing with the many regulatory requirements. While there was some concern about duplicating NPCA efforts, attendees were supportive of the proposal for the Federation to collect and distribute information on environmental/regulatory developments. The New York Society, however, wrote a letter (read at the meeting) which expressed reservations of its Board of Directors, and urged that any action in this area be undertaken in conjunction with the NPCA.

Subsequent discussions focused on accessing and distributing information. Accessing information would include: liaison with other groups (NPCA, Air Pollution Control Association, CMA); subscription to data retrieval service, as well as governmental publications; attending regulatory hearings; and input from networking volunteers.

To assure the information is distributed to FSCT members who have a "need to know," it was suggested that each Society be responsible for compiling an "active" mailing list of two people at each company represented in their membership. These people would be initial recipients of important notifications (such as alert bulletins or letters, perhaps electronic messages). This could be followed by publication in a "newsletter" and/or in *JCT* for distribution to a wider audience.

This possible activity is perceived as being one which can only be carried out successfully if it is a staff function, rather than one which depends upon volunteer efforts. It would include identifying and monitoring key issues at the Federal, state, and local level, with periodic overview and update on those issues, and maintaining an ongoing and close relationship with other organizations to keep abreast of developments.

As I am sure you already know, there are no easy answers to the problem at hand. I would, however, suggest that the key to success in this arena is the total commitment and cooperation by our membership. You have my support for any direction the Board of Directors chooses to pursue.

JOYCE SPECHT-ST. CLAIR,
Chairperson

INTER-SOCIETY COLOR COUNCIL (ISCC)

The Inter-Society Color Council (ISCC) is an organization of societies and individuals who work to propagate understanding of color.

The ISCC was founded in 1931 to advance knowledge of color as it relates to art, science, and industry. Each of these fields enriches the other, furthering the general objective of

color education. Membership is of two classes. Delegates are appointed to represent ISCC member-bodies. The latter are organizations basically involved with art, architecture, ceramics, chemistry, dentistry, fashion, gems, illumination, pigment manufacture, photography, postage stamps, and other fields. There is a larger and growing number of individual members.

The Council is governed by a nine-member Board of Directors under a Constitution and By-Laws. The officers are President, President-Elect, Secretary, Treasurer, and Past-President. A newsletter is published six times a year.

The main objectives of ISCC are carried out by the project committees, working on their assigned tasks. Topics presently under study include artists' materials, color of living tissue, image technology, indices of metamerism, strength of colorants, color differences, human response to color, and education.

ISCC meets annually in the spring for committee reports, seminars on special topics, workshops, and lectures. Awards may be given to those who have made outstanding contributions to color. In addition to the annual meetings, special topics may be discussed at three-day conferences at Colonial Williamsburg, Va. Subjects dealt with in recent years include optimum color reproduction, color and lighting, self-luminous displays, color past and present, and the restoration and preservation of art.

In 1976, the Council joined with the Colour Group of Great Britain and the Canadian Society for Color and later with the Color Science Society of Japan to endorse the journal, *COLOR Research and Application* published by John Wiley & Son, Inc. Issued bimonthly, it provides wide coverage of the field in its articles, industrial notes, book reviews, and other features. Members of ISCC and its member-bodies may subscribe at a substantial cost reduction from its regular price.

During the past year the ISCC lost several giants in the development of the Science of Color:

Dorothy Nickerson. She was the first member of the ISCC and following that, gave 64 years of intense interest and dedication to the field of Color. The ISCC Service Award has been renamed in her honor.

Franc Grum, Director of the Munsell Color Science Lab at R.I.T. He was the recipient of the 1985 Godlove Award.

Gunter Wyszecki, an international figure in the field of color. He was President of the C.I.E. and Director of the National Research Council of Canada, which he helped found.

Other colleagues and world class citizens lost to the color community were: Sylvester Guth, Past President of C.I.E.; Robert Hoban, Past Director of ISCC; Charles Jerome, Past President of ISCC; and Yale Foreman, Publication Committee member.

The Macbeth Award is awarded every two years for contributions to the field of color made, preferably, in the last ten years. This year's award was presented to Max Saltzman, an Honorary Member of the Council, for his important contribution to the field of color science and as co-author of "Principles of Color Technology."

The Nickerson Service Award was presented to George Gardner, an Honorary Member and 45-year veteran, for his service as Assistant Secretary from 1952-1970, unofficial Program Chairman for many years, and as a Director from 1970-1972.

Ruth Johnston-Feller, long time member of the ISCC and the FSCT, presented the 1985 Joseph J. Mattiello Memorial Lecture at the FSCT Annual Meeting in October, 1985. The lecture focused on Mrs. Johnston-Feller's recent work on the evaluation and quantification of colorant fading. *[See May 1986 JCT—Ed.]*

We thank all the participants of the 1985 SCAI Conference for submitting their papers for publication in the JCT.

JACQUELINE K. WELKER,
FSCT-ISCC Liaison

Board members include (left to right): Jan P. Van Zelm (Los *Angeles) and Norman Hon (Kansas City)*

MANUFACTURING

The Manufacturing Committee will host a seminar at the 1986 Annual Meeting. "Productive Alternatives for Improving Materials Control" will feature ten speakers. During the program, Morehouse Industries will present the Golden Impeller Award to an outstanding coatings manufacturing professional, recommended by the committee.

Having received Executive Committee approval, the committee is studying the feasibility of establishing a periodical re-print subscription service, to create the first singular coatings manufacturing educational reference source. Thus far, we have established that the major periodicals serving the coatings industry are receptive to providing selected article re-prints at modest cost, to be distributed to subscribing Society members. The Manufacturing Committee now intends to establish the level of interest among manufacturing members, and to establish budgetary parameters.

The Manufacturing Committee will continue to pursue projects and communication mechanisms to serve the needs of the manufacturing professionals within the FSCT. The committee's commitment to this objective has been confirmed, with its entire membership having pledged to continue service into the coming year. This continuity and enthusiasm coupled with the outstanding support and assistance always afforded by the FSCT Staff, assures the Manufacturing Committee continued productivity.

RICHARD M. HILLE,
Chairman

MEMBERSHIP SERVICES

With the beginning of another academic year, it is sad to see the lack of positive response from universities who were requested to furnish registration lists of their coatings courses. Needless to say, these are the areas for further membership prospects and continued efforts will be exerted with help from the nearest Society Membership Chairmen.

The appearance of an increasing number of combination dues/questionnaire statements from Societies is a step in the right direction for getting feed-back from members with regards to their interests and organizational long-range planning. Such information could be of future value to this committee.

Limited (7) interchange of newsletters by Societies should be broadened to supplement the Guidebooks of Symposia, etc., and Talks Available lists currently being circulated.

The involvement and dedication of local Society Membership Chairmen (where losses in membership occurred) will be needed to turn around into gains. This committee is offering its assistance to help where necessary to ensure success.

The Chairman extends his appreciation to the Executive Vice-President and Staff for their prompt and kind cooperation to all requests.

HORACE S. PHILIPP,
Chairman

PROFESSIONAL DEVELOPMENT

At the end of our second year of existence (first full year), I am happy to report that our potential has been converted to actual results. We have conducted one of the most successful surveys of membership in memory, and have organized and scheduled our first short course on Statistical Process Control.

Membership Survey: We obtained a 55% response to our survey, an outstanding result in an era when 5-10% is considered acceptable. This told us that our membership is interested in what we're doing, and are willing to support our efforts. A simplistic profile of the results is:

(1) Our membership is predominantly in the "Active" classification, is employed in technical activities, supervises others, is over 40 years old, and has over 15 years' experience.

(2) The education level is predominantly B.S., with additional training in coatings and management. Our membership desires additional short courses in New Developments in our industry, and training in basic and applied coatings technology. A local or regional location is strongly preferred for such activities.

(3) Our membership is predominantly employed by manufacturers of coatings, with over $10 million in sales in the national or international arena.

(4) Overwhelming support was indicated for joint university-local Society cooperative programs.

Short Course on Statistical Process Control: After an extensive search and screening process, we have chosen Dr. Peter J. Hunt, of Productivity Management Consultants, to teach this, our first short course. The opening sessions will take place during March 1987, in four locations: Atlanta, Philadelphia, Chicago, and Los Angeles. Future sessions will be planned, based on the degree of success at these initial sessions.

Each session will be two days in length, will cost $150 (non-members @ $225), and is designed to introduce our membership to the concept of SPC and give them enough depth so that they can judge the value of such a program for their own companies. Attendance will be limited to 50 per session.

Future: I have elected to retire from the committee at the conclusion of my term in 1986. In the future, the reins will be in the capable hands of George Pilcher who I am confident will continue our tradition of focusing on key professional development issues and taking considered action to implement programs. The committee is made up of committed, candid, and hard-working members. You can look forward to more contributions from them in the future.

F. LOUIS FLOYD,
Chairman

Using an overhead projector, Mr. Floyd showed several bar graphs illustrating the points made in his report about the membership survey. Some of the profiles reported were: Membership Classification, Job Function, Job Function vs Age, Highest Degree Earned, Education vs Age, Educational Level, Continuing Education, Management Training, Age, and Years in Coatings Industry. All of the graphs will be included in the summary report which will be published in the JCT.

PROGRAM

A meeting of the 1986 Annual Meeting Program Committee was held on November 22, 1985. The theme for the Annual Meeting, "Compliance and Quality: Recognizing the Opportunities," was developed along with plans for program subject matter to support the theme.

Through the efforts of the Program Committee, the able support of Tom Kocis, and the cooperation of the Roon and Manufacturing Committees, the preliminary program for the Annual Meeting was published in the September *JCT*.

There will be 36 scientific and technical presentations including the Mattiello Lecture. Four Roon Awards papers are in the program. The Golden Gate, Detroit and Chicago Societies are presenting papers. Three overseas papers presented on behalf of FATIPEC, OCCA, and SLF are noteworthy contributions to the program.

The scientific and technical parts of the program fit well into our annual meeting theme. The following symposia and seminars make up the program: Water-Based Coatings Symposium, Scientific Symposium, Powder Coatings Symposium, Manufacturing Committee Seminar on Productive Alternatives for Improving Materials Control, Color Symposium, Solvent-Based Coatings Symposium, Pigments and Dispersion, Approaches to Quality, and Mattiello Lecture.

Each of these sessions offers presentations of interest to our membership and cover current developments and issues in their respective areas. The powder coatings symposium which is new this year offers our membership an opportunity for an overview of one of the fastest growing market areas in the field of coatings.

I would also like to thank the Mattiello and Host Committees for their contributions to the success of our program.

Finally, my thanks to the members of the Program, Host, Mattiello, and Roon Committees, Tom Kocis, and the Federation staff for their support in putting together the Annual Meeting Program.

PERCY E. PIERCE,
Chairman

PUBLICATIONS

The Publications Committee met in early spring and the results of that meeting were reported to the Board in May. Major concerns now include:

(1) Meeting review deadlines.

(2) Manuscript supply which is low.

(3) Publication of the new Series on Coatings Technology which, to date, are four published and two ready for publication. There are a few titles which require authors. The Advisory Board has been helpful in suggesting authors.

(4) Review board membership will be reviewed for next year and appropriate additions will be made.

THOMAS J. MIRANDA,
Chairman

S. John Mitchell (left) represented Birmingham Society; Joseph Giusto represented Baltimore

TECHNICAL ADVISORY

The TAC has been involved in two major undertakings: (1) Establish liaison with the National Forest Products Association and (2) Meet with the Chairmen of Society Technical Committees.

Liaison with NFPA

Representatives of both groups met and agreed to form a joint committee to provide technical input on problems related to wood. There will be 10 members from each group plus staff participation. NPCA will be invited to appoint a staff member.

The primary goals are:

(1) Technology assessment relating to wood, coatings and construction methods in order to optimize performance of coated wood.

(2) Identify technical needs and stimulate research to overcome performance problems.

(3) Develop practical construction, application, and maintenance information to assure maximum satisfaction with the wood/paint (stain) system.

(4) Recommend research studies to be carried out by the Forest Products Laboratories.

Meeting with Society Chairmen

The TAC met with representatives of 16 Societies in Louisville, on September 23-24. The primary thrust of the discussions was on Society projects that were both planned and in progress. A consistent lively interchange during these discussions provided each Chairman an opportunity to develop additional ideas as to how to improve or expand upon the program(s) being considered.

Discussions were also held on how to provide access for others for information on Technical Committee work that is not published in the *JCT*. There was virtual unanimous agreement that all data developed, even negative data, are potentially valuable and could influence future activities of other (or the same) Society. A mechanism needs to be developed to get this information into the *JCT* and the TAC agreed to undertake development of a plan and a process.

A highlight of the meeting was a tour of the General Electric Co. Coatings and Materials Application Laboratories. There was considerable interest in the observation of the appliance coating line as well as some of the highly sophisticated technical developments being employed by G.E. As a culmination to the visit, Dr. Nancy Keck, Laboratory Manager, made a post-dinner presentation providing an overview of appliance coating technology.

Conclusion

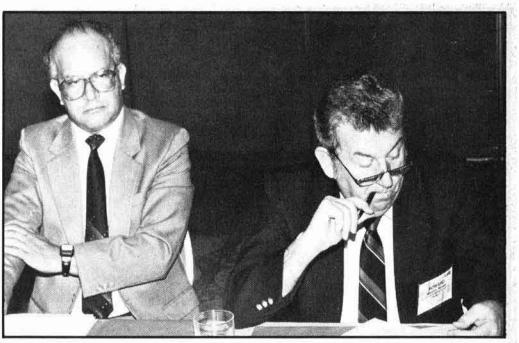
This is my final report as Chairman of the TAC. It has been an honor and a privilege to have had this opportunity to serve the Federation and to work with and get to know so many fine, cooperative, hard-working, capable people.

To all of the Society Technical Committee Chairpersons, who have been the backbone of our annual meetings, thank you and I wish them well in future activities.

To my fellow TAC members, Bud Jenkins, Colin Penny, Richard Max, Gerry Noren, thank you for all their help and input.

To my successor and long-time member of the TAC, Jan Grodzinski, thank you and much success in this new responsibility. He brings the talent and enthusiasm to the task that will assure the furtherance of the activities and goals of the TAC.

To Roy Brown, Federation Technical Advisor, thanks for all his help, ideas, and especially for the contacts and thoughts in the development of the field trips the TAC has taken these past three years, as well as his help in the establishment of our liaison with the NFPA.



Society Representatives Antonio Pina (left) from the Mexico Society and Howard Ramsay from the Louisville Society

To Bob Ziegler, Executive Secretary, thanks for providing space in the *JCT* for Society Technical Committee activities. The fact that little advantage was taken of his offer is not the fault of his efforts. The photos he took of our meetings enhanced the report.

And, finally, to Tom Kocis, Director of Field Services, I say thank you, thank you, thank you. He is like the resinous polymer in a protective coating—the medium that holds everything together and the most important ingredient by far. Had he not provided the guidance, we probably would have failed like a cracking, peeling, and flaking paint. Had he not done all of the background work, the TAC, this Chairman, and the Federation would have been much the poorer. He did his job not merely as an employee of the Federation but as one who is truly dedicated to the furtherance of its goals and objectives.

To anyone who I may have inadvertently forgotten to acknowledge, thank you.

Saul Spindel,
Chairman

TECHNICAL INFORMATION SYSTEMS

The Technical Information Systems Committee has developed a scheme for a "computerized subject index" to the Journal of Coatings Technology and has prepared such a "computerized subject index" for the 1986 issues of the JCT.

The committee will prepare such an index for 1987 issues of JCT as well as for back issues of JCT (as many as are needed to provide a good data base for answering reference questions).

Helen Skowronska,
Chairman

DELEGATE TO NPCA SCIENTIFIC COMMITTEE

The NPCA Scientific Committee met in Washington, D.C. on October 15, 1986. The meeting was devoted primarily to discussions relating to updating the membership on regulatory and legislative matters, including reports by members who serve as advisors in various areas, as well as NPCA staff who reported on their areas of specialization.

The following is a synopsis of the reports presented:

Air Quality

Federal activities—EPA is considering a four-step program to control emissions:

(1) More consistent implementation and more vigorous enforcement of existing regulations.

(2) Develop new categories of "Reasonably Available Control Technology" (RACT) for architectural, auto body, and wood furniture finishes.

(3) Require that states that cannot meet the 12/31/87 regulations for air quality submit a plan for compliance, including "creative new control measures."

(4) A sustained Progress Program to deal with the worst non-compliant areas, requiring states to use state of the art technology to improve air quality.

Additionally, because four areas in California will not be able to meet air standards in the foreseeable future, EPA has published a Federal Register advance notice, announcing a requirement for a Reasonable Extra Effort Program (REEP). This mandates that plans be submitted by each locality to audit and control emissions from smaller sources as well as those not currently under Federal guidelines. Though this action only impacts the four California areas, it is possible that EPA will use this same technique to impact on other non-attainment areas nationally as the 1987 deadline approaches.

State activities—California: EPA has sued eight firms for violating the Miscellaneous Metal Parts and Products Rule.

South Coast has proposed a delay of implementation of Rule 1107 (Metal Parts) but EPA is challenging their right to do this. South Coast has also proposed regulations to regulate emissions from plastic, rubber and glass coatings, and adhesives. They also propose that the VOC be listed on the label of all coatings supplied in one quart or larger containers.

EPA has granted an extension until 3/1/87 allowing non-flat architectural coatings to use 380 grams per litre of VOC. EPA has warned that, after that date, it can issue citations of $25,000. per day for all non-compliant, non-flat coatings.

Michigan: Has proposed a regulation limiting emissions for plastic coatings. The regulation includes a statement that only compliant coatings may be specified for parts, regardless of where they are painted, to prevent loss of business from the state.

New York: Nothing new but EPA action expected soon.

New Jersey: Adopted regulation for control of emissions from wood furniture coatings.

Labeling

Target Organ Labeling requires that a label must specify the hazard of the chemical when known. Thus "harmful if inhaled" is not appropriate if the chemical is known to cause lung damage. Rather, "causes lung damage if inhaled" is more appropriate. OSHA is attempting to enforce this directive and has issued a number of citations for non-compliance. NPCA is working on a recommended format to label for acute hazards and the target organs most affected. NPCA expects to publish a supplement to the Labeling Guide in 1987 and anticipates inclusion of target organ labeling information.

ANSI Z-129.1, Precautionary Labeling of Hazardous Industrial Chemicals, is being revised to include chronic labeling guidance (the current standard only includes acute). When this new revision is completed, it is expected in fall 1986, NPCA will revise its Labeling Guide accordingly.

Consumer Product Safety Commission—CPSC will require the following labeling after August 10, 1987:

Extremely flammable—Flash at or below 20°F.

Flammable—Above 20°F to 100°F.

Combustible—100°F to and including 150°F.

Setaflash (ASTM D-3828-81) is the preferred method of test.

California—The regulation requiring listing of VOC content on all paints sold in quarts or more (see Air Quality report above) poses complex labeling problems for companies that distribute nationally inasmuch as it is difficult to target labels for Southern California. If this proposed rule is enacted, it may ultimately result in the labeling of all coatings with regard to VOC content.

Occupational Health/Product Safety

Hazard Communication—OSHA ruled in May, 1986 that HMIS was incomplete and thus unacceptable. This action was reversed by OSHA in July 1986. However because labels do not specify target organs, the labeling features are in question (See Labeling above).

Solvent Toxicity Research—NPCA will participate in a study on the neuro effects of solvents among a number of industry groups. Recent German data indicates that the findings of the Scandinavian study may be in question.

Combustion Toxicity—New York has regulated this property. CPSC is considering same. Research, performed under an NPCA contract, is nearing completion.

Mortality Study—An update of the 1976 study is being considered.

Toxic Substances

TSCA reauthorization hearings probably won't begin until spring.

EPA has issued Significant New Use Restriction (SNUR) for several existing chemicals including methyl N-butyl ketone.

The final rule on reporting health and safety studies on 290 chemicals is extended to 10 years. A majority of large volume coating products are included in this number.

The TSCA inventory is being updated for the majority of large volume products.

Test rules have been finalized for: Chlorinated benzene, 1-1 Dichloropropane, and Bisphenol A.

EPA is developing a Comprehensive Assessment Information Rule (CAIR) about the handling, production disposition, and use of various chemicals. The initial step is a questionnaire.

EPA is developing regulatory action on: Methylene chloride and 2-Nitropropane.

Laboratory Exposure to Toxic Substances

Comments on a proposed rule to control laboratory exposures have been received and are being reviewed. The proposal requires that labs do the following:

(1) Write a chemical hygiene plan.

(2) Train employees on HMIS, use of protective equipment, and emergency procedures.

(3) Develop program for handling of carcinogens.

(4) Maintain record of health effects.

It is anticipated that there will be a 1-3 years phase in period after promulgation of the final rule.

Waste Disposal

Federal regulation to restrict disposal of solvent containing waste into landfill goes into effect on November 8, 1986.

Hazardous Waste Tank Rules

(1) New tanks must have secondary containment.

(2) Existing tanks must be retrofitted for secondary containment by the time they are 15 years old.

Household Waste Restrictions

(1) California has a plan to regulate household (consumer) solvent waste including paint. A board has been appointed to develop implementation plan.

(2) Washington (State) has passed a similar law. Regulations are in preparation.

(3) The National Council of State Legislators, a federal advisory group, is developing a video on the problem of household solvent waste and will use same to inform legislators about the issue.

In addition to legislative and regulatory subjects, the following topics were discussed:

(1) *Raw Material Index*—Resin section is being reviewed prior to being reprinted.

(2) *ASTM*—This organization plans to run a workshop on "How to Analyze for VOC" in spring 1987. It is expected to be a "hands on" workshop.

(3) *Federation*—A report was made on the activities of the Professional Development and Corrosion Committees, Coatings Industry Education Fund, Federation—NFPA Joint Committee, Spring Week 1987, the FSCT Insurance Program and the new Series on Coatings Technology.

(4) Ted Rieth, representing the American Hardboard Association, spoke on hardboard. The following are some highlights of his presentation.

a. The type of wood used in hardboard is usually indigenous to the area the plant is located in.

b. Hardboard consists of: Wood—95%; Resin—(Phenol-formaldehyde)—1½-4%; and Sizing—(Petroleum wax) 1-3%.

c. Hardboard is the most widely used substrate for exterior siding of new homes.

d. One Masonite Corp. plant uses 3 million pounds of wood per day to produce interior and exterior hardboard.

e. Exterior siding, when primed, is generally painted with either a thermoplastic or a thermoset acrylic coating. When topcoated, thermoset acrylic is the most common coating.

SAUL SPINDEL,
Delegate

DELEGATE TO SSPC AND NACE

SSPC

In 1986, the Steel Structures Painting Council held its 36th Annual Meeting and Symposium in Atlanta. Approximately 500 persons attended.

The highlights were the announcement of Charles Peshek as successor to John Murphy as President of SSPC and the formal approval of the revised ByLaws, establishing a 16-member Board of Governors to give increased representation to the SSPC constituency.

During the course of the meeting, 25 technical advisory committee sessions were held. Committee members deliberated about methods of improved performance, surface preparation, coatings materials, application, inspection, and safety. At two special technical seminars, 13 presentations were heard covering the topics of Protective Linings and Research.

At the Annual Awards Banquet, the following were presented: John D. Keane Award of Merit—Charles Munger; Certificate of Recognition—Forrest Couch; Outstanding Paper Award—Marshall Seavey; and Certificate of Appreciation—Jack Mobley.

The theme of the symposium was "Techniques for Long-Term Protection of Steel Structures." Four hundred persons heard 18 papers dealing with management, economics, and good technical practice in pursuing the goal of maintaining long-term protection of Steel.

Seventy-five suppliers exhibited materials, equipment, and services for protective coatings and linings work.

The 1987 Annual Meeting and Symposium is planned for New Orleans. The topic for the symposium will be "Impact of Regulations and Litigations on Protective Coatings."

NACE

In March 1986, the National Association of Corrosion Engineers held its Annual Conference and Corrosion Show in Houston.

A symposium was sponsored by Group Committee T-6 on Protective Coatings and Linings. The theme of the symposium was "Coating Work Economics." Twelve papers covering the topic of coatings economics were presented.

Group committee T-6 was also active with the following committee meetings: Coating and Lining Materials for Immersion Service (T-6A), Electroless Nickel Coatings (T-6A-53), Surface Preparation for Protective Coatings (T-6G), Coating Materials for Atmospheric Service (T-6H), Coatings for Concrete Surfaces in Atmospheric Exposure (T-6H-39), Evaluation of Conversion Coatings (T-6H-44), and Quality Assurance of Protective Coating Materials and Their Application (T-6Q).

At the banquet the following presentations were made: Whitney Award—Robert Rapp (Ohio State University); and Speller Award—Robert Miller (Lockheed-Georgia Co.).

The 1987 Annual Conference and Corrosion Show is scheduled for San Francisco.

JAY AUSTIN,
Delegate

Society Reports

Baltimore

Monthly meeting technical programs presented by Technical, Manufacturing, and Educational Committees ... Mitchell Dudnikov, of Genstar Stone Products Co., received Society's Herman Shuger Memorial Award. Merit Citations presented to seven society members ... Updated and re-wrote Constitution By-Laws and Standing Rules.

Birmingham

Membership is 192; 10% increase over 1985 ... Record audience of 146 attended "Labeling Legislation Theory and Practice" lecture. Average attendance at lectures is 90 ... "Correlation of Results from Color-Matching Aptitude Test Scores" paper presented at 1985 St. Louis Annual Meeting. The paper was published in the August 1986 JCT ... Sales of FSCT publications continues to increase.

C-D-I-C

"Two speaker" program at all meetings. Educational speakers presented noncoating related subjects ... Society approved nomination of Lew Larson as Federation Honorary Member.

Chicago

Membership at 860, average monthly attendance is 125 ... Joint Education Committee with Chicago PCA remains active. Made available $2,000 of scholarship funds each to North Dakota State University, Eastern Michigan University, and University of Southern Mississippi. A $1,000 Grant-in-Aid scholarship was awarded. The Science Fair Award was presented. Supports and endorses new Masters in Coatings Technology program at DePaul University. Efforts continue towards establishing Bachelor Degree in Coatings Technology at Elmhurst College. Conducted well-attended Management Development Seminar ... Technical Committee pursuing projects in Renewable Resources, Biomer Testing, Oven vs Shelf Stability, and Corrosion ... Manufacturing Committee presented successful seminar, March 25-26, with 100 attending.

Cleveland

Membership increased over 1985 . . . Toured the analytical, solid state electronics and polymer microdevice laboratories at Western Reserve University . . . Held joint meeting with Cleveland PCA . . . 29th Annual Symposium, "Advances in Coatings Technology," was held in four sessions . . . Under joint

sponsorship with CPCA, awarded two cash prizes in Student Paper Competition for college juniors and seniors. Cash awards presented to two high school and two junior high school students in Science Fair competition . . . Society Award of Merit presented to Jim Benduhn, of Dar Tech, Inc., and the Dr. Frank Selden Award for distinguished service presented to Fred Schwab, of Coatings Research Group, Inc.

Dallas

"Statistical Quality Control" seminar presented on May 8 with 55 attendees . . . Technical Committee actively pursuing "The Relationship Between Rheology Profiles of a Latex Paint and the Emulsion Used in the Paint" project . . . Ray Pierrehumbert's article on "Factors Affecting Application and Marketability of Water-Borne Industrial Enamels" was published in *American Paint Journal* . . . Held joint meeting with Dallas PCA . . . Membership increased 14% over 1985 . . . Southwestern Paint Convention, April 9-11, sponsored jointly with Houston Society, was a resounding success . . . By-Laws amended . . . Educational needs survey form distributed to members.

Golden Gate

Manufacturing Committee presented a conference in conjunction with the Bay Area Air Quality Municipal District, with 120 attending . . . Awarded two scholarships . . . Maintaining very close ties with the local association and the Los Angeles Society and Southern California PCA on environmental issues.

Houston

Southwestern Paint Convention, April 9-11, an outstanding success with attendance slightly over 200 . . . Two scholarships totaling $1,000 were awarded . . . Membership is 179.

Kansas City

Held a joint meeting with St. Louis Society . . . Donation presented to University of Missouri-Rolla.

Los Angeles

Membership at 629 . . . "Managing Manufacturing Cost" seminar held in April, with 59 attending . . . Environmental Committee working very closely with Environmental Legislative and Regulatory Advocacy Program of the California PCA . . . Copies of current yearbook are available to Federation Board members upon request . . . Technical Committees active in projects for presentation at future Annual Meetings . . . Scholarship Committee awarded nine scholarships . . . Education Committee conducted the Paint Technology Course with 30 students graduating . . . Library Committee donated several technical volumes and 21 tapes to City of Commerce Library . . . Three Outstanding Service Awards presented. Honorary membership awarded to John Gordon. Fifteen 25-year pins presented.

Louisville

Membership increased to 196 . . . Educational Committee continued courses on surface coatings technology . . . Technical Committee working on project to determine critical pigment volume concentration . . . Hosted annual FSCT Technical Committee meeting featuring a plant tour at General Electric Appliance Park . . . FSCT Environmental Control Committee meeting hosted September 17.

Montreal

Held joint meetings with NACA and QPIA . . . Mini-symposium on techniques of formulations was well attended . . . Technical Committee presented "The Influence of Rheology Modifiers on the Performance Characteristics of Latex Paints" paper at the 1985 Annual Meeting, winning the A.F. Voss/AP&CJ Award. Committee continuing work on color acceptance . . . Long Range Planning Committee completed a booklet on the activities and history of the Society . . . Membership increased by 14% . . . Average attendance at meetings is 25% of membership.

New England

The highlight of the year was the two-day symposium, "Launching the New Revolution—Compliance for the 21st Century," with 100 members attending day one and 125 members attending day two . . . Educational Committee presented awards to two University of Lowell students for papers relating to the coatings industry.

Northwestern

Attendance at meetings ranged from 51 to 83 . . . Seminar "Color—Its Interactions and Effects" had 116 attendees at the afternoon session . . . Presented $1,000 scholarship fund to NDSU . . . Technical Committee projects include "To Determine Why Measured VOC Differs from Theoretical Values" and "Water Vapor Transmission."

Pacific Northwest

The 39th Annual Meeting and Symposium held in Portland was a success with over 260 attending . . . Vancouver section held the Paint Technology course at BCIT. Joint Puget Sound and Portland sections held a successful seminar on "Quality Painting with Proper Recommendation". . . British Columbia section is working on video presentation covering safety.

Piedmont

Education Committee sponsored mini-symposium on "Quality Management." Voted to pay Federation membership for one professor in the chemistry department of the six local colleges and universities. Working on accredited course "Organic Chemistry of Coatings" at the University of North Carolina at Greensboro . . . Retired professor Dr. E.O. Cummings received the Annual Outstanding Service Award.

Pittsburgh

Educational Committee talked to district colleges about the paint industry and the role of chemists in the industry. Established grants program to smaller colleges helping pay for undergraduate and graduate research expenses. Indiana University of Pennsylvania received the first grant. Successfully petitioned the Federation Board for matching funds through CIEF . . . Hosted the Spring Federation Meetings.

Toronto

Technical symposium held in February well attended. The 20-year-old technical symposia, a co-operative effort with the Montreal Society, was terminated.

Western New York

Amended the By-Laws creating the position of permanent Secretary. Mark Markoff currently holds the position . . . Meeting attendance averaged 44, 45% of membership . . . Toured Pratt & Lambert's Buffalo plant as part of Manufacturing Night . . . Education Committee awarded $800 in scholarships.

In Memoriam

We report with deep regret the passing of the following members during the past year

Chicago

THOMAS O'CONNOR—Great Lakes Solvents
GEORGE WRYESINSKI—The Enterprise Cos.

C-D-I-C

FRED G. CLOPPERT, SR.—Retired (Wilson Paint Co.)
WALTER L. DEBRULER—Retired (Wilson Paint Co.)

Cleveland

FRANK H. SMART—Chem-Materials Co., Inc.

Dallas

FRED L. COUCH—Retired (Sherwin-Williams Co.)

Detroit

RICHARD W. PARTUSCH—Retired (Valspar Corp.)

Golden Gate

THOMAS FLETCHER—Harrisons & Crosfield Pacific
RICHARD LIEBER—Transwestern
FRANK LIEBOLD—Retired (Sherwin-Williams Co.) Society Past-Pres.

Los Angeles

RON DAY—The W.W. Henry Co.
LARRY GOODMANSON—Retired (Frederick's Hansen Paint Co.)
WILBER S. JOHNSON—Retired (The Manville Corp.)
RONALD J. SCHUBERT—Ameritone Paint Corp.

New York

MILTON KLEIN—Retired (Pergament Home Centers)

Northwestern

GEORGE D. HOUGH, JR.—Retired (North Star Varnish Co.) Society Past-Pres.
WILLIAM N. THOMPSON—Retired (Stewart Paint Mfg. Co.) Society Past-Pres.

Pacific Northwest

WILLIAM BIDDLE—Retired (General Paint Corp.)
DON LAUGHLIN—Retired (Simpson Research & U.S. Forest Products Laboratory)
RON WEST—Preservative Paint & Chemical Processors

Philadelphia

RICHARD DENT—M.A. Bruder & Sons, Inc.
EMORY G.A. FLEMING—Retired (The McCloskey Corp.)
HAROLD B. GOUGH—Retired (Finnaren & Haley, Inc.) Federation Past-Pres., Society Past-Pres. and Society Honorary Member
RICHARD A. KER—Retired (C.J. Osborne Chemicals)

Southern

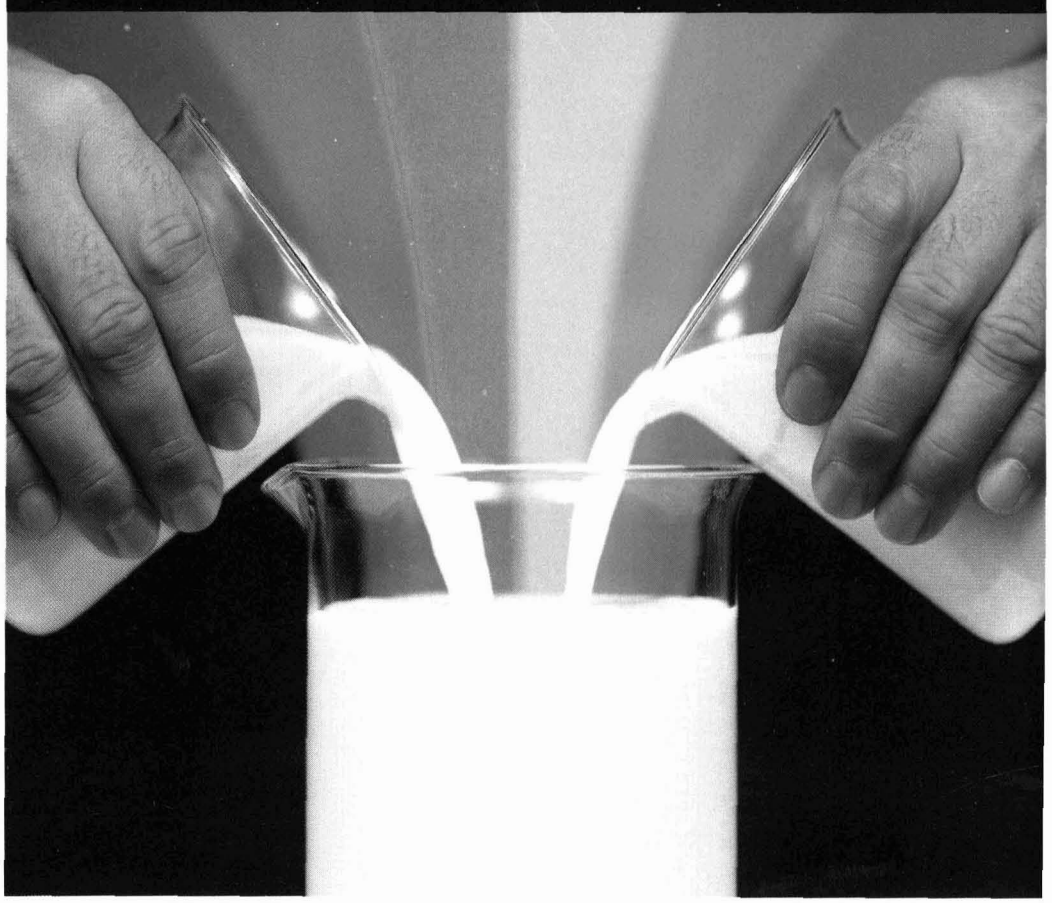
EDWARD BORDEWEICH—Amity Lacquer & Paint Co.
JOSEPH A. LIMARDO—Burks, Inc.
ALFRED WYSYNSKI—Burks, Inc./Mat Chemicals

Western New York

NICHOLAS BUMBAR—Pratt & Lambert, Inc.
DON KRESSIN—Spencer Kellogg Products/NL Industries, Inc.; Society Past-Pres.

A. CLARKE BOYCE,
Chairman, Memorial Committee

Witcobond urethane dispersions for high performance coatings, binders and adhesives.



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These versatile products are ideal for use in a wide range of applications, including coating on rigid and flexible foam, fiberglass and textile coatings and binders, floor coatings, sealers and polishes, as well as coatings on engineering plastics and polyester film.

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Organics Division.

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Witco

JOURNAL OF COATINGS TECHNOLOGY

GUIDE FOR AUTHORS

GENERAL

The JOURNAL OF COATINGS TECHNOLOGY is published monthly by the Federation of Societies for Coatings Technology for its membership of approximately 7,000 in 26 Constituent Societies in the United States, Canada, Great Britain, and Mexico. The JOURNAL is devoted to the advancement of knowledge in the science and technology of surface coatings, the materials comprising such coatings, and their use and performance.

The Editors invite the submission not only of regular research papers, but also *Open Forum* comments on subjects of relevant interest, and *Letters to the Editor.* All manuscripts will be assumed to be original work and to have been unpublished elsewhere; not under consideration for such publication; not copyrighted; and to have been submitted for appropriate clearance by the organization with which the author is affiliated if such clearance is necessary. Authors are obligated to reveal any exceptions to these conditions at the time a manuscript is submitted.

The JOURNAL OF COATINGS TECHNOLOGY has first right to the publication of papers presented at the Annual Meeting of the Federation and at local or regional meetings or symposia of the Constituent Societies. ***Papers in which proprietary products or processes are promoted for commercial purposes are specifically non-acceptable for publication.***

SUBMISSION OF MANUSCRIPTS . . .

. . . for the Journal

Technical Papers: Four complete copies should be sent to the Editor, JOURNAL OF COATINGS TECHNOLOGY, 1315 Walnut St., Philadelphia, PA 19107.

If a submitted paper consists of the text of a presentation made previously to a monthly or special meeting of a Society for Coatings Technology, or to another technical group, the name of the organization and the date of the presentation should be given. If someone other than the author of the paper made the presentation, this information, too, should be noted. Papers presented to associations other than the Federation must be released by written communication before they can be considered for publication in the JOURNAL OF COATINGS TECHNOLOGY.

Papers originally composed for oral presentation may have to be revised or rewritten by the author to conform to the style suitable for written publication.

Open Forum: Three complete copies should be sent to the Open Forum Editor, at the address listed above.

The same general rules as given for technical papers should be followed in the preparation of an Open Forum manuscript. However, the subject may be informally approached. Topics may be nontechnical in nature, dealing with any aspect of the coatings industry.

Letter to the Editor: The JOURNAL will consider for publication all correspondence relevant to the coatings industry and to the contents of the JOURNAL. When a letter concerns an article appearing in the JOURNAL, the original author is usually given an opportunity to reply.

. . . by Constituent Societies For Annual Meeting Presentation

Ten complete copies of the manuscript are required for committee review. The set of copies should be addressed to the Editor at the address listed above.

. . . for Roon Foundation Award Competition

Ten complete copies of the manuscript are required, and should be submitted to the Chairman of the 1987 Roon Awards Committee, Gary Gardner, Tnemec Co., Inc., P.O. Box 1749, Kansas City, MO 64141. (For complete details, see "Roon Awards" section of the JOURNAL for January 1987.)

MANUSCRIPT PREPARATION

In general, authors are advised to use the "Handbook for Authors" published by the American Chemical Society as a guide to the preparation of manuscripts (ACS, 1155 Sixteenth St., Washington, D.C. 20036). Another excellent reference work is "How to Write and Publish a Scientific Paper" by Robert A. Day (ISI Press, 3501 Market St., University City Science Center, Philadelphia, PA 19104).

Manuscripts should be typed with double spacing on one side of 8½ × 11 inch (22 × 28 cm) paper, with at least one-inch (2.5 cm) margins on all four sides. All paragraphs should be indented five spaces, and all pages should be numbered at the top center, or upper right corner.

Title

The title should be as brief and informative as possible. Selection of titles that are key word-indexable is a helpful and recommended practice.

Authors' Biographies and Photographs

Give complete names, company or institutional affiliations, and brief biographical sketches of all authors. If available, submit a 5 × 7 inch (13 × 18 cm) black-and-white photograph with glossy or smooth high sheen surface, for each author. See later section on photographs for further details.

Abstracts

A 75–100 word abstract must be part of the manuscript, and should be a concise description of the key findings or teachings of the work described in the paper. The abstract should not repeat the title or include reference numbers, nor should it duplicate the Conclusion or Summary.

Text

The headings and sub-headings in this Guide illustrate their use to divide the text into sections to improve readability for comprehension, and to break up typographical monotony; they may be used as a model for preparation of the text of a manuscript for publication. The text should *not* be presented as an alphanumeric outline.

Only as much review as is necessary should be given to provide an introduction to the subject; the main burden for extensive background should be placed on the list of references.

Standard scientific and technical terminology should be used to convey clear and unambiguous meaning, but the use of technical jargon or slang should be avoided. Authors should bear in mind that the JOURNAL has an international audience, for many of whom English is a second, not native, language. Use of regional idioms or colloquialisms should be avoided. The use of obscure abbreviations is also discouraged. When appropriate, abbreviations should be made in parenthesis immediately following first mention of the term in the text, and then used alone whenever necessary.

Recent issues of the JOURNAL should be consulted for desired style and technical level.

Metric System

Metric system units should be used wherever applicable with the equivalent English units shown afterwords in parentheses. The ASTM Metric Practice Guide, E 380-72 (American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103) is a convenient reference.

Tables, Graphs, and Drawings

Tables, rather than descriptive text, should be used only when they are genuinely helpful. They should be proportioned in accordance with the height and width limitations of the JOURNAL'S pages. Each table should be typed on a separate sheet, rather than included in the text, and appended to the manuscript. Each table should be numbered and have a descriptive caption. Tables should be referenced in the text (e.g., "See Table 1").

In numerical data in tables, numbers less than one should have a zero before the decimal point.

Graphs should be on good quality white or non-photographic blue-lined 8½ × 11 inch paper. Each graph should be drawn on a separate sheet, numbered, and the captions listed on a *copy* of the original graph. Graph captions and legends should also be typed on a separate sheet for typesetting.

Graphs should not be used if they merely duplicate the data given in tables, or vice versa.

Drawings should conform to the guidelines given for Graphs and should be proportioned to fit the height-to-width ratio of the JOURNAL'S pages and columns.

Photographs

All photographs should be sharp, clear, black-and-white prints no larger than 8 × 10 inches in size. Photos should be clearly labeled on the reverse side, taking care not to mar the image.

Color prints and slides are unacceptable.

When illustrations are secured from an outside source, the source must be identified and the Editor assured that permission to reprint has been granted.

Nomenclature

Whenever possible, generic names should be used in preference to trade names. When trade names must be used to avoid ambiguity, and the name is a registered trademark, the symbol R, in a circle or parentheses, should be given immediately following, and the manufacturer listed as a footnote. In general, trade names should be used only in footnotes or in an appendix, rather than in the text.

If special nomenclature is used, include a nomenclature table giving definitions and dimensions for all terms.

Nomenclature of chemical compounds should conform to the style of *Chemical Abstracts* and the IUPAC rules.

Equations

These must be typed, or written clearly, with equations numbered sequentially in parentheses to the right. If Greek letters are used, write out their names in the manuscript margin at the first point of use. Place superscripts[a] and subscripts$_b$ accurately. Avoid the use of superscripts in a manner that can lead to their interpretation as exponents.

Summary

The paper should be concluded with a summary which is intelligible without reference to the main text. The summary may be more complete than the abstract, listing conclusions drawn from the text. A well written summary can serve to inspire the busy reader to turn back to the paper, to read it thoroughly.

Acknowledgment

If used, it should follow the summary.

References

These should be listed in the numerical order in which they are cited in the text, and should be placed at the end of the manuscript. Names of authors may or may not be shown in the text with reference numbers. If possible, include titles of articles referenced in the literature. The following are examples of acceptable reference citations for periodicals[1,2,3] and books[4]:

(1) Pascal, R.H. and Reig, F.L., "Pigment Colors and Surfactant Selection," *Official* DIGEST, *36,* No. 475 (Part I), 839 (1964).

(2) Davidson, H.R., "Use and Misuse of Computers in Color Control," JOURNAL OF COATINGS TECHNOLOGY, *54,* No. 691, 55 (1982).

(3) Stephen H.G., "Hydrogen Bonding—Key to Dispersion?," *J. Oil & Colour Chemists' Assoc., 65,* No. 5, 191 (1982).

(4) Patton, T. (Ed.), "Pigment Handbook," Vol. I, John Wiley & Sons, Inc., New York, 1973.

OTHER INFORMATION

Galley proofs will be sent to the author for checking about six weeks prior to publication.

Offprints may be purchased in quantities of 100 or more. Authors will receive price quotations. Each author will receive a complimentary copy of the JOURNAL issue in which his or her paper was published.

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THIS PAPER WAS AWARDED FIRST PRIZE IN THE 1986 ROON AWARDS COMPETITION

Control of Foaming in Water-Borne Coatings

Pamela Kuschnir, Richard R. Eley, and F. Louis Floyd
The Glidden Company*

Although great strides have been made in the past decade in the technology of film properties of water-borne coatings, their tendency to foam during manufacture and application remains a chronic problem. The present work shows that the foaming behavior of water-borne systems is strongly dependent on the location on a phase diagram, with a region of minimum foaming being identified. Although foaming is a surface phenomenon, bulk viscosity is shown to be the strongest single factor controlling foaming. All other factors are secondary in nature, with defoamers acting only on these secondary factors. The use of conventional defoamers for foam control has little effect unless the system is first formulated to the proper composition region.

INTRODUCTION

Foam is a dispersion of a gas in a liquid. It can be viewed as agglomerations of bubbles (which emphasizes the gas) or as structures composed of thin liquid films (which emphasizes the liquid portion). The ability of the thin liquid films forming the walls of the foam bubbles (foam lamellae) to resist rupture determines foam stability. Given time, foam lamellae will thin to the point where they rupture spontaneously. Foam stabilizing mechanisms function to resist this thinning process.

Foams have measurable lifetimes for one or more of the following reasons:[1]

HYDRODYNAMIC EFFECTS (DRAINAGE):

(1) The bulk viscosity of the liquids is so high that every motion, including those necessary for rupture of the film lamellae, is greatly retarded.

(2) The surface viscosity (shear or dilational) is so high that drainage and surface deformations prior to bubble rupture are both retarded. Gelled surface layers typically lead to very stable foams. Since evaporation from the surface is much faster than from the bulk, compositions and viscosities at the surface can be significantly different from the bulk solution.

MARANGONI EFFECTS (HEALING):

(3) Marangoni flow is the flow of a liquid surface due to local differences in surface tension, and is opposite in direction to the hydrodynamic flow.

SOLUBILITY:[2,3]

(4) Inherent solubility and/or the presence of a conjugate defoamer phase determines foam stability. Foaming is at a maximum near a phase boundary (maximum surface activity). "Conjugate solution defoaming" refers to two-phase systems where the disperse phase acts as a spreading defoamer on the foaming continuous phase.

The purpose of this study was to define the relative importance and/or interrelationship of the various factors controlling foam stability. We have measured bulk viscosity, static surface tension, dynamic surface tension from which surface dilational elasticity and viscosity were derived (Marangoni effects), and system solubility. There was no capability in our labs to measure surface shear viscosity.

Commercial Reference Point

Several different commercial flowcoat/dipcoat formulas were selected as references for analysis to determine appropriate compositional ranges for study. Our approach was to prepare and evaluate paint and varnish* samples which closely reflected the range of compositions seen in

Presented at the 64th Annual Meeting of the Federation of Societies for Coatings Technology, in Atlanta, GA, on Nov. 5, 1986.
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*Varnish: paint minus pigments; highlights resin behavior.
Paint: full commercial formula, including all ingredients.

Table 1—Commercial Paint Reference Points

Formula	Varnish Analysis				Paint Specifications		
	% Resin	% Cosolvent + Amine	% Water	% EN	pH	VOC	PVC
A	23.1	12.8	64.1	113	8.8-9.1	2.78	14
B	19.2	9.4	71.4	100	8.7-9.1	2.39	17
C	20.7	8.9	70.4	150	9.0-9.4	2.15	6
D	17.6	9.1	73.3	122	8.6-9.3	2.27	15
E	18.2	8.9	72.9	123	8.5-9.0	2.33	14
F	18.7	9.8	71.5	118	8.8-9.2	2.35	13
G	16.8	7.2	76.0	141	8.7-9.2	2.02	17

the commercial formulas. *Table* 1 describes these compositions. All these formulas are relatively low in cosolvent (VOC 2.02-2.39, one formula at 2.78). Melamine levels vary from 20-50% of the resin solids, cosolvent is mainly butoxyethylene glycol (BC), and neutralizing amine is used at 112-150% extent neutralization (% EN). Conventional formulating practice for adjusting the paint application solids (%NV/viscosity relationships) calls for formulating to a composition where viscosity is coincidentally strongly controlled by pH (% EN).

Table 2 details the defoamer usage in the seven commercial formulas. Although these paints are very similar, three of them have very high levels of defoamers at 15-23% defoamer on resin NV, compared to the other four paints at 7-10%. The higher levels appear to be required for those paints containing higher levels of resin (*Figure* 1). *Figure* 2 shows that a greater number of defoamers (four or five compared to three) are required at a higher pH (higher % EN). In several of these formulas, amine additions are used to control application viscosity. Analysis of the commercial formulas suggests that higher levels of amine and higher levels of resin may be contributing to foam control problems for some paints. It is obvious from both the number and the total volume of defoamers that control of foaming is a problem.

The approach of our work was to develop property/composition/solubility relationships for water-borne products and correlate these to foaming/defoaming.

We determined the inherent foaming ability of the resin formulated at compositions representative of the commercial paint formulas. Effects of resin solubility, level of neutralization, melamine level, and cosolvent level were then determined on the varnish "inherent foaming" ability. The effect of cosolvent and amine type will be the subject of a later paper. Various commercial defoamers were also evaluated over a wide range of compositions. Statistical analysis was used to analyze the data for relative importance of the various factors controlling foaming.

From this knowledge base, we developed formulation guidelines to aid in analyzing foaming problems and designing solutions for some of the current formulation and application foaming/defoaming problems.

Table 2—Defoamer Usage in Commercial Paints

Formula	No. of Defoamers Used	% Defoamer on Resin NV	Paint Composition as Varnish	
			% Resin NV	% Cosolvent + Amine
A	3	18	23.1	12.8
B	4	23	19.2	9.4
C	4	15	20.7	8.9
D	5	11	17.6	9.1
E	3	8	18.2	8.9
F	4	9	18.7	9.8
G	3	10	16.8	7.2

EXPERIMENTAL

Varnish Sample Preparation

The resin selected for study is an acid functional acrylic polymer, used in flowcoat/dipcoat formulas, which is crosslinked with melamine. It is supplied as an emulsion at 62% NV in butyl Cellosolve®/water at 60% EN with DMEA (dimethyl ethanol amine).

The majority of work in this project was performed on varnishes. Previous work in our labs has shown that order-of-addition is very important in preserving resin solubility in water-borne resin systems. To minimize any such effects, all varnish solutions were prepared individually with the following order-of-addition: resin, cosolvent, neutralizing amine, and the deionized water. Each resin diluent was added in small increments (approx. 20% of the base resin weight) and thoroughly mixed in before subsequent additions. Hand stirring was preferred for the initial mixing. Final varnishes were mechanically stirred for 10 minutes while covered, and then allowed to deaerate overnight before experimental measurements were made.

Since the resin is very viscous at room temperature, it was heated to 130°F prior to cosolvent and amine additions. Water dilutions were done with preheated water (~150°F). No effort was made to heat the mixing varnish solution other than using preheated resin and water. Varnish temperature was ~90°F when completed.

Defoamers were added as 50% butyl Cellosolve cosolvent solutions to the resin/cosolvent/amine composition prior to water addition.

Melamine additions were made to the final completed varnish (~90°F), since reaction with resin was minimized by this later addition. FTIR analysis of precipitates

Cellosolve is a registered tradename of Union Carbide Corp.

formed at low cosolvent and low % extent neutralization confirmed this procedure.

Varnish Physical Properties

Varnish samples were evaluated for Wells-Brookfield Cone and Plate (WBCP) bulk low shear viscosity, surface tension, pH, and foaming within one week of preparation. All samples evaluated by WBCP were temperature equilibrated to 25°C under constant low shear for five minutes before viscosity readings were taken. Dynamic surface tension measurements were made within three weeks of preparation with most samples being tested in less than two weeks.

Foam Testing

Since the approach in this project was to evaluate innate foaming ability of various water-borne compositions rather than merely the effect of different defoamers on one or two compositions, a test was developed to obtain the entire defoaming curve rather than a particular foam height at a given time.

A standard volume of varnish (125 mL) was stirred in a graduated cylinder (500 mL plastic cylinder cut off to 300 mL) with a Brookfield counter-rotating mixer at full speed for one minute. The stirrer was removed immediately, and foam height was followed as a function of time for the next six hours or until the sample defoamed, whichever came first.

Foam heights were taken initially, 1 min, 5 min, 15 min, and then every 15 min, for the first 2 hr, and every 0.5 hr thereafter. The area under the foam height-time curve was obtained by numerical integration, and was then normalized to the initial foam height, to give an Average Foam Lifetime (AFL), after Bikerman.[4] An advantage of this method of treatment is that the entire defoaming curve is taken into account, while the normalization to initial foam volume allows us to evaluate "foam stability" independent of "foaming ability."

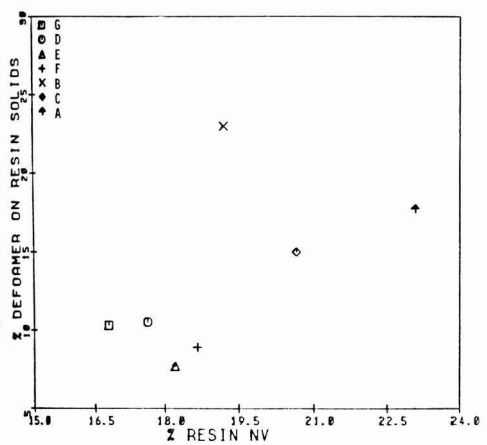

Figure 1—Defoamer level in reference paints vs resin level

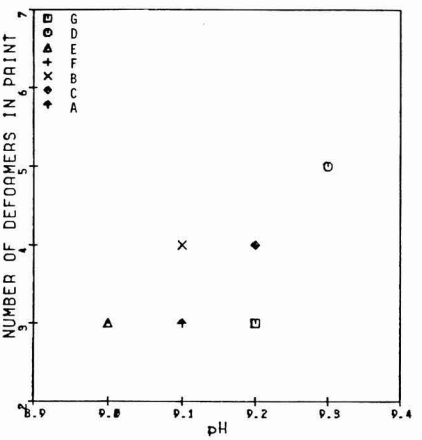

Figure 2—Number of defoamers in reference paints vs paint pH

A qualitative description of various AFL behaviors would be as follows:

AFL (min)	Inherent Defoaming
10	Excellent
30	Good
60	Fair
100	Poor
150	Very Poor

Dynamic Surface Measurements

The surface viscoelastic properties of all the samples were evaluated on a dynamic surface tensiometer, constructed in-house by R. Eley, et al.[5]

In this experiment, a variation in surface area is caused and the resulting variation in surface tension is measured. The principal quantity derived from the experiment is the surface dilational modulus. This modulus is a complex quantity and can be separated into viscous (surface dilational viscosity) and elastic (surface dilational elasticity) components by measuring the phase angle. Some correlations of foam stability to the surface dilational elasticity and phase angle have been noted in our work.

RESULTS AND DISCUSSION

Phase Relationships

Although no work has been reported in the coating literature on the relationship of foaming to position on a phase map, intriguing work has been reported in the biochemical literature.

The concept that foaming is related to phase behavior of ordered systems has been discussed by Ross and Nishioka.[6,7] They found that foaming approaches a maximum as one approaches a phase boundary, typically one related to solubility. The increase in foam stability was seen to be due to increased adsorption of one component at the air-liquid interface as a phase boundary is ap-

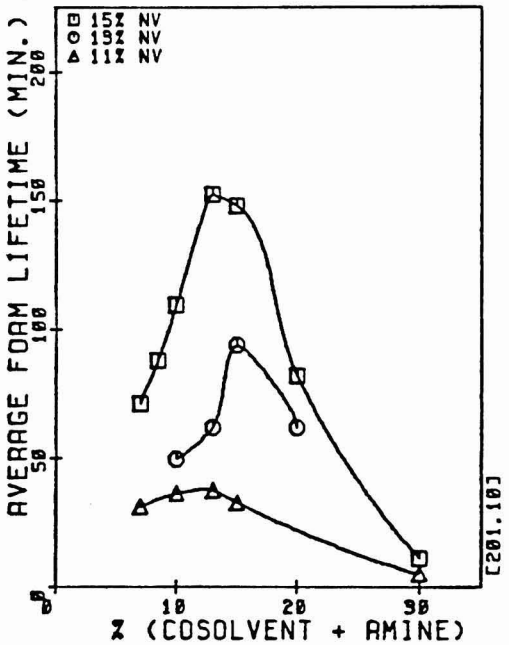

Figure 3—Effect of composition on average foam lifetime (100% EN)

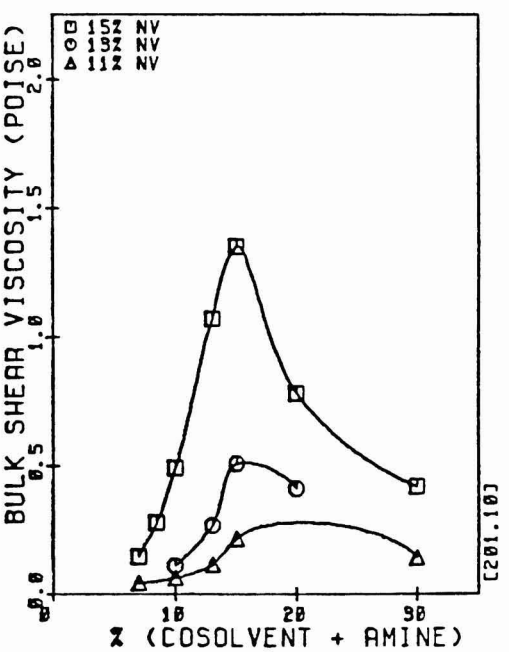

Figure 4—Effect of composition on bulk shear viscosity (100% EN)

proached. Adsorption was seen as a precursor to phase separation, the interface offering a locus for segregation of molecules prior to separation into a discrete bulk phase. An excellent theoretical justification for this concept has been offered by Nishioka, Lacy, and Facemire.[8]

The concept that water-borne resins (water/cosolvent "solutions") are actually ordered systems on the micellar level has been discussed by Hill, Wicks, and coworkers at North Dakota State University.[9-13] They followed the analogy reported in the biochemical literature for lipids, bile salts, and other materials in micellar solutions. A useful compendium of the latter is the ACS Advances in Chemistry Series No. 63.[14]

Our work deals with resinous materials in water/cosolvent "solutions," in which we feel that the key to understanding foaming (and consequently developing problem-solving approaches) is to view foaming as a function of solubility of the film-forming resin, following the above-cited leads. In this context, the effects of % EN, cosolvent level, crosslinker levels, and such, can all be described as changing the system's solubility and thus foaming tendency.

Effect of Paint Composition

This approach to characterizing foaming in water-borne resin systems called for generating property/composition maps for the following physical properties: inherent foaming/defoaming, bulk viscosity, surface tension, pH, and dynamic surface tension measurements. Varnish sample compositions were chosen to bracket the % NV and % cosolvent levels, as well as pH ranges, of the seven commercial formulas. Samples were prepared to give both high and low foaming systems.

COSOLVENT LEVEL: *Figure* 3 shows the variation in measured average foam lifetime as a function of butyl Cellosolve level in the water-borne varnishes (100% EN). For a given % NV level, foaming is very low at high cosolvent levels (very soluble systems), then increases as the cosolvent level decreases, passing through a maximum, and then decreases with further decreases in cosolvent. Note that bulk viscosity parallels the changes in AFL with composition (*Figure* 4). For the resin levels represented in commercial formulas, inherent foaming ranges from a high of AFL = 152 min (at 15% NV, 13% cosolvent) to a low of AFL = 31 min (at 11% NV, 7% cosolvent). *The foaming maximum is interpreted to mean a change in system solubility or phase has occurred.*

Figure 5 shows the average foam lifetimes represented as isaphroic lines (equal foaming contour lines) for the entire composition range evaluated. Both the foaming maximum and wide range of inherent foaming ability had not been anticipated in the area of the composition map representing commercial activity.

MELAMINE: The effect of melamine on the inherent foaming of water-borne varnishes was evaluated at 75/25 resin/melamine. (Melamine levels in commercial paints vary from 20-50% of the resin NV.) For equal % resin NV samples (*Figure* 6), *the major effect of melamine was*

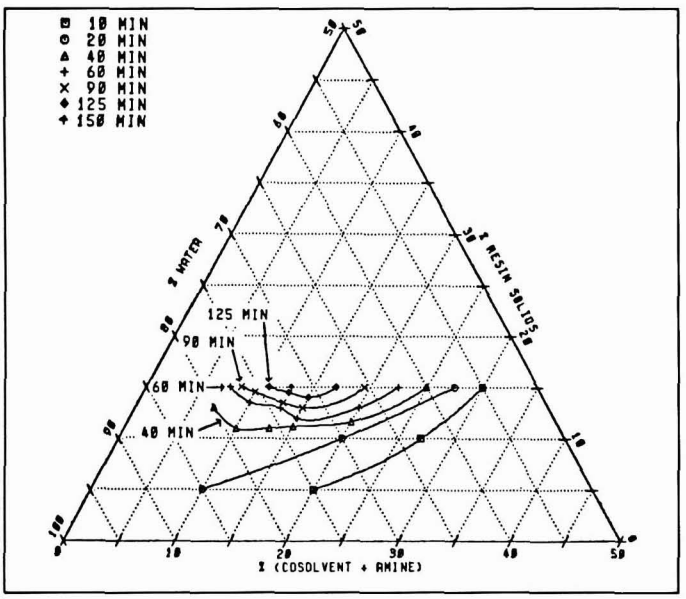

Figure 5—Composition map of average foam lifetime (100% EN)

to lower the average foam lifetime significantly. This is attributed to the much lower bulk shear viscosity due to the lower level of resin in the sample (15% NV resin/melamine has 11% NV from resin and 4% from melamine).

Figure 7 shows the effect of melamine on AFL in the narrow composition range where commercial paints are formulated (7-13% cosolvent). Comparison of *Figure* 5 to *Figure* 7 shows that the addition of melamine shifts the foaming maximum to higher % NV. Superimposed on this AFL composition map are the composition loci of the seven commercial paints. Paints having inherently low foaming compositions (60-90 min AFL) have defoamers present at ~10% on resin NV, while paints having inherently higher foaming compositions (>125 min AFL) have defoamers present at much higher levels, 15-23% on resin NV.

EXTENT OF NEUTRALIZATION: When increased % extent neutralization resulted in increased bulk viscosity, average foam lifetime increased. Varnishes were evaluated at two levels of neutralization, 100% and 120% EN, over a broad cosolvent range (7-30%) and appropriate NV range (10-15%). *Figures* 8 and 9 illustrate that *when increased % extent neutralization increased bulk viscosity, then average foam lifetime increased*. This only happened in the low cosolvent areas near the foaming maximum, and was interpreted to mean that increasing % EN increased resin solubility. Such a strong dependence of AFL on % EN in one narrow area of the composition map, with very little to no dependence in an immediately adjacent area, had not been expected.

The effect of varying % EN was then extended to resin/melamine systems at low cosolvent levels. *Figure* 10 shows the effect of 80%, 100%, and 120% EN on the 90 min AFL contour. Superimposed on this map are the loci of the seven commercial paints. The lower % EN encompassed a greater number of commercial paints in the

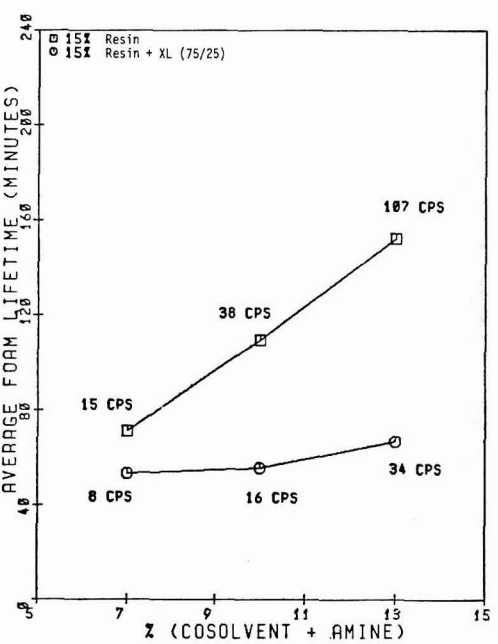

Figure 6—Effect of melamine on AFL

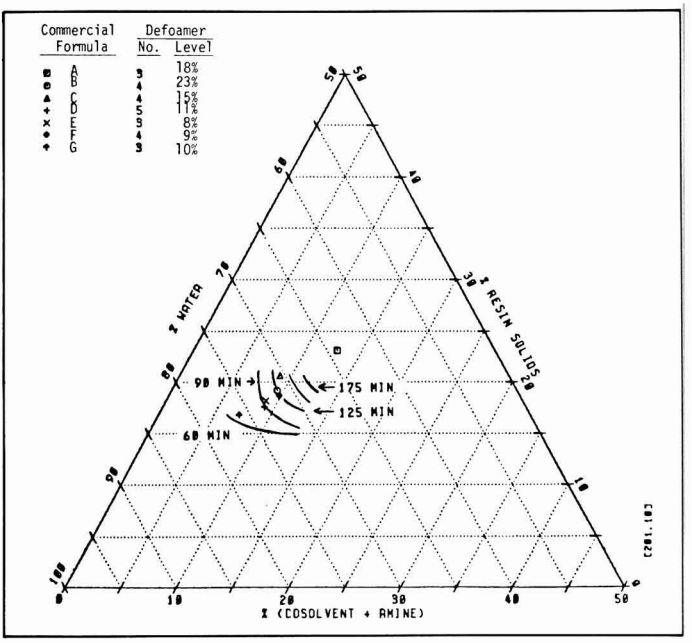

Figure 7—Resin/melamine composition map of AFL (100% EN)

inherently lower foaming area of the composition map. *The formulating practice of controlling viscosity/% NV relationships by adjusting pH clearly has the potential for aggravating foaming problems in these coatings.*

RESIN SOLUBILITY: The relation of foaming behavior to system solubility has been reported by S. Ross[2,3] for binary and ternary systems, and Bikerman for surface active materials.[15] Foaming approaches a maximum as

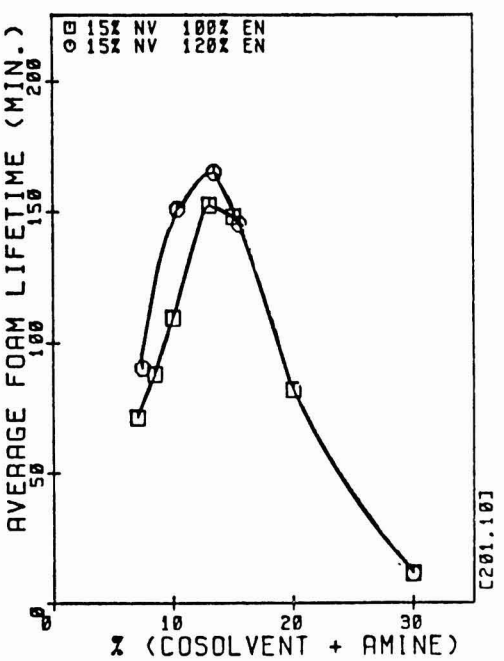

Figure 8—Effect of % extent neutralization on AFL

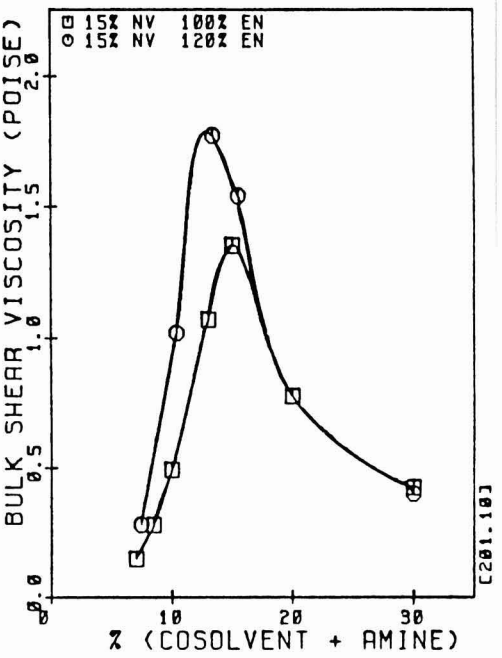

Figure 9—Effect of % extent neutralization on bulk shear viscosity

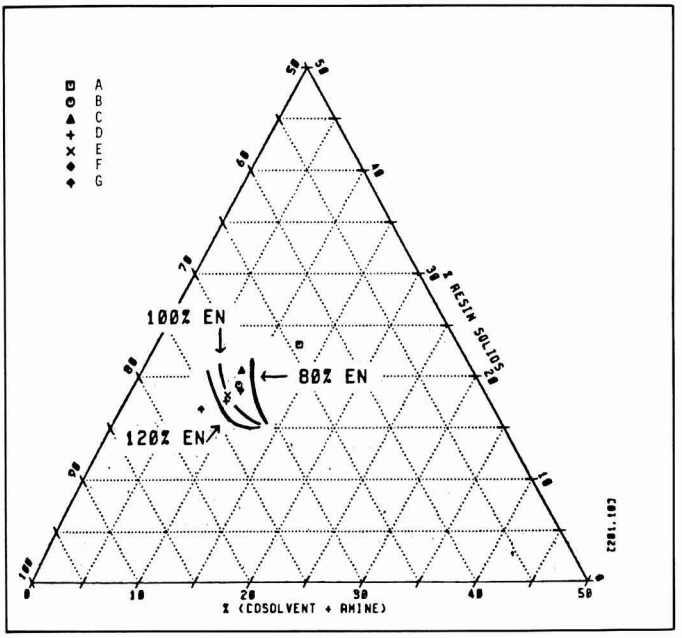

Figure 10—Effect of % extent neutralization on 90 min AFL composition map resin + melamine

solubility limits are appoached, and then decreases dramatically as the system becomes insoluble (or changes phase).

For our resin system, passage through foaming maximum was paralleled by viscosity maximum, and also accompanied by an abrupt change in the phase angle (as measured by dynamic surface tension experiments). When the foaming maximum is approached from the "soluble" side, the phase angle, which is 70-80°, begins to decrease at the foaming maximum and then drops precipitously thereafter to 20-30°. We believe the phase angle gives an independent, direct measurement of system solubility.

Foaming in the acrylic resin system correlates very strongly to the combined variables of bulk viscosity and resin solubility (as measured by the phase angle).

Foaming data for all systems were co-plotted for systems of equal solubility (based on phase angle). In all cases, the phase angle separated the data into regimes of compatibility, within which very high correlations of foaming to bulk viscosity were consistently seen (r = .88-.96). High correlations of elasticity to foaming were only seen for phase angles >50°.

SUMMARY OF COMPOSITION EFFECTS: Foaming behavior of water-borne paint systems is strongly dependent on composition:

(1) The resin itself is the agent responsible for foaming.

(2) A region of minimum foaming has been identified.

(3) Low cosolvent systems defoam better.

(4) Low % extent neutralization gives better defoaming.

(5) At equal composition (% NV and % cosolvent), addition of melamine reduces both bulk viscosity and foaming.

(6) Increasing % extent neutralization causes increased foaming where bulk viscosity is strongly dependent on % extent neutralization.

(7) Borderlines between phases are particularly bad for foaming.

Approximately one-half of the commercial paint formulas were formulated at compositions where phase behavior changes abruptly with very small changes in % EN and cosolvent level, which can lead to dramatic changes in inherent foaming ability. Defoaming such compositions is difficult, as shown by both the number and the level of defoamers in these paints.

EFFECT OF DEFOAMERS: There are six compounds used as defoamers in the commercial reference paints, with

Table 3—Defoamers Used in Varnish Formulas

Defoamer	Manufacturer's Description	No. of Commercial Paints Using
U	Silicone/silica antifoam in mineral oil	6/7
V	2, 4, 7, 9-tetramethyl-5-decyn-4, 7-diol	6/7
W	Silicone-free organic solvent defoamer for aqueous coatings	4/7
X	Sodium dioctyl sulfosuccinate	4/7
Y	Like U, with added esters for self-emulsification into water	4/7
Z	Non-silicone antifoam	2/7

Table 4—Effect of Defoamers on Foaming in Varnishes

15% NV/10% (C + A) Composition

Defoamer	Average Foam Lifetime Fresh (Min)	Average Foam Lifetime Aged[a] (Min)	Defoaming Efficiency[b] (Fresh)
None ..... —	112.5	—	—
2.0% X	92.1	144.0	18.2%
2.0% ..... W	82.8	74.0	26.4%
0.5% V	73.9	74.2	34.3%
2.0% V	58.8	52.2	47.8%
5.0% V	45.7	44.5	59.4%
2.0% ..... U	30.5	35.0	73.0%

10% NV/10% (C + A) Composition

Defoamer	Average Foam Lifetime Fresh (Min)	Average Foam Lifetime Aged[a] (Min)	Defoaming Efficiency[b] (Fresh)
None ..... —	34.2	—	—
2.0% X	31.8	32.0	7.2%
2.0% ..... W	29.8	29.8	12.9%
0.5% V	26.8	25.9	21.7%
2.0% V	21.0	21.0	38.6%
5.0% V	14.2	22.8	58.6%
2.0% ..... U	18.0	24.3	47.5%

(a) Samples aged seven months at room temperature.

(b) Defoaming Efficiency $= \frac{[\text{AFL (w/o def)} - \text{AFL (w/def)}]}{\text{AFL (init)}} \times 100$

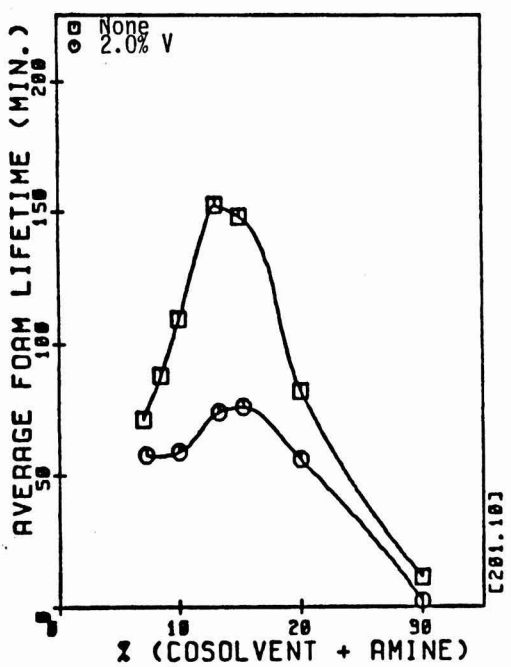

Figure 11—Effect of 2.0% V on AFL of 100% EN resin

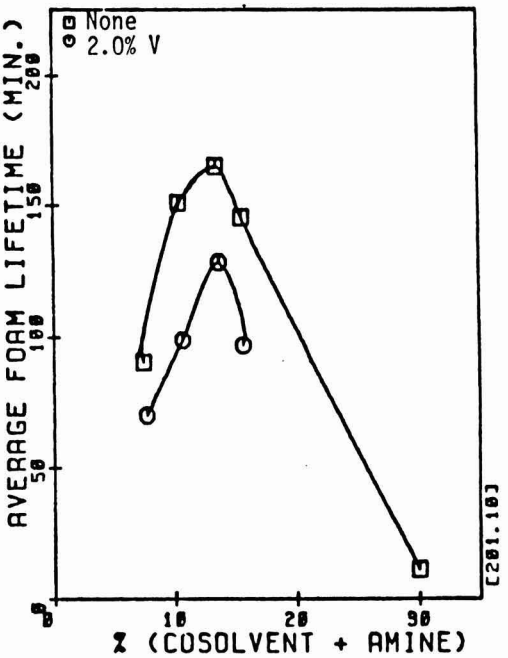

Figure 12—Effect of 2.0% V on AFL of 120% EN resin

anywhere from three to five different defoamers being present in any one paint. *Table* 3 lists these defoamers. Four of the most commonly used defoamers were evaluated singly for defoaming efficiency at the 2.0% level on resin NV. The 2.0% level of defoamer corresponds to actual defoamer use in paints, where three to five defoamers used at 1.0-4.0% levels apiece can lead to paint systems with anywhere from 10-20% total level of defoamer. The first three defoamers in *Table* 3 had been selected for evaluation due to frequency-of-use and favorable formulation comments. X was evaluated due to frequency-of-use and conflicting reports of effectiveness.

Table 4 shows the defoaming effectiveness of these defoamers for two varnish compositions representative of commercial coatings (15% and 10% NV at 10% C + A). The same order of defoamer activity was observed for both inherently high- and low-foaming systems: U(VERY GOOD) > V(GOOD) > W(FAIR) > X(NO EFFECT). It is obvious from the table that it is much better to defoam an inherently low-foaming system. We did not consider X to be an effective defoamer in our tests.

Table 5—Defoaming Effectiveness of 2.0% V in 15% NV Resin Varnishes

Cosolvent Level	Defoaming Efficiency 100% EN	Defoaming Efficiency 120% EN
7.0%	19.4%	22.4%
10.0%	37.5%	34.3%
13.0%	51.4%	22.1%
15.0%	48.6%	33.4%
20.0%	32.0%	—

Table 6 — Effect of 2.0% V on Average Foam Lifetime of Resin vs Resin/Melamine at 100% EN

	Average Foam Lifetime 15% NV Resin			Average Foam Lifetime 15% NV Resin/Melamine (75/25)		
% (C + A)	No Defoamer	2.0% Defoamer	% Defoamed	No Defoamer	2.0% Defoamer	% Defoamed
7.0%	71.3	57.5	19.3%	53.3	42.8	19.8%
10.0%	109.5	68.4	37.5%	55.6	38.2	31.3%
13.0%	152.3	74.0	51.4%	66.9	39.2	41.3%

PERSISTENCE: Defoamer persistence evaluations were run on the defoamer-containing varnishes which had aged seven months at room temperature (*Table* 4). All samples (except one) showed essentially no change in defoaming ability within the experimental error of the AFL test. However, one sample with borderline solubility and containing X showed a significant increase in AFL of 56% (92-144 min), while sample bulk viscosity also increased significantly (+39%). X is known to form liquid crystal structures in certain water/cosolvent mixtures, and this may be part of the cause for increased foam stability in this sample.

EFFECTIVENESS OF DEFOAMER VS PAINT COMPOSITION: V was evaluated at the 2.0% level over a wide composition range. *Figures* 11 and 12 and *Table* 5 represent the same data. They summarize the effect of % EN on defoaming effectiveness of V in 15% NV resin varnish samples. The foaming maximum represents borderline solubility and hence increased foaminess due to increased surface activity. Increasing the % EN increases the resin solubility at a borderline solubility area. V acts as a defoamer at both % EN's. *In borderline solubility areas (high inherent foaming), V is much more effective at 100% EN than at 120% EN* (*Table* 5). In low cosolvent areas (low inherent foaming), V has about equal effectiveness as a defoamer, with 100% EN systems still defoaming better than 120% EN.

V evaluations were extended to other % NV and % (C+A) levels. In all cases, 100% EN samples defoamed better than 120% EN samples. In those cases where borderline solubility was evident on changing % EN, V was more efficient at 100% EN.

Addition of melamine caused essentially no change in the defoamer effectiveness of V in low cosolvent systems at 100% EN (*Table* 6), even though net AFL's were lower due to the lower viscosity of resin/melamine systems compared to resin alone.

SUMMARY OF DEFOAMER EVALUATIONS: For maximum effectiveness, defoamers should be used in inherently low-foaming coatings systems. Defoamers function better at lower % extent neutralization. Defoamers showed no loss in activity in varnishes aged seven months at room temperature.

Phase Behavior vs Foaming

Water-reducible resin/amine/cosolvent/water systems are exceedingly complex. The polymer exists as micelles in solution, and these micelles can exhibit many different phases (*Figure* 13).[16] We can think of these micellar phases as being characterized by different patterns of "order" and "disorder." The amount of micellar order determines the rheology (*Table* 7). The observed patterns of order/disorder are determined by the system's composition.[17]

Figure 14 illustrates phase relationships for Na Octoate, decanol, and water, which we are considering as a useful analogy to amine-neutralized-carboxylate resin, alcoholic cosolvent, and water systems.[18] In the figure, one-phase areas of either high or low order (high or low viscosity, resp.), are separated from one another by two-phase areas. The rheology of the two-phase areas is proportional to the relative amounts of the individual one-phase areas and their inherent rheologies. (Three-phase areas can also be present, according to phase rules.) At or near a phase boundary, very small changes in composition such as % NV, % EN, cosolvent level, etc., can appear as significant changes in rheology. Formulating too close to a phase boundary can appear empirically as non-reproducible results. Order-of-addition can influence

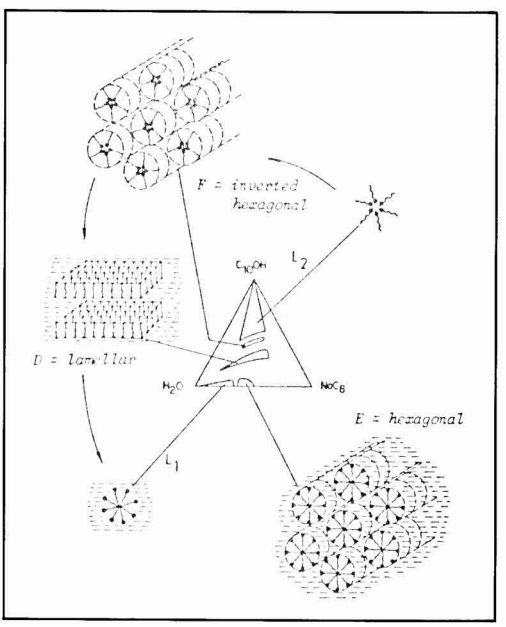

Figure 13—Normal and reversed micelles and different liquid crystalline structures in a system of water-surface active substance-amphiphilic substance. L_1 and L_2 are micellar solutions, E, D, and F are liquid crystals, with hexagonal I, lamellar, and hexagonal II structures, respectively. (Reproduced courtesy of *J. Amer. Oil. Chem. Soc.*)[16]

Table 7 — Amount of Order Determines the Rheology

LOW ORDER — ONE PHASE
L_1 MICELLAR SOLUTIONS IN WATER
L_2 MICELLAR SOLUTIONS IN ORGANIC

HIGH ORDER — ONE PHASE
E HEXAGONAL PHASE IN WATER
F HEXAGONAL PHASE IN ORGANIC
D LAMELLAR PHASE

ORDER — TWO PHASE
PROPORTIONAL TO RELATIVE AMOUNTS OF ONE PHASE SYSTEMS PRESENT, AND THEIR INHERENT ORDER.

the time it takes for a system to reach phase equilibration, and, in some cases, actually influence which phase appears. Temperature also significantly affects the phase map, and not all phases are affected equally by changes in temperature in terms of composition range and existence.

Previous work in our laboratory had shown the existence of phases analogous to *Figure* 14.[19] Dramatic viscosity changes with decreasing cosolvent levels had preceded resin insolubility. At certain % NV/% cosolvent levels, liquid crystalline phases were evident prior to gross resin insolubility (lamellar phase D on *Figure* 14). The following coatings' properties were correlated to the resin's location on a rheology/composition map: viscosity, viscosity stability, flow and leveling, sag resistance, overall appearance, and quality of pigment dispersion.

In the present work, with an inherently more soluble resin, no visual signs of insolubility were evident (such as opaqueness and/or resin precipitation). However, dramatic viscosity changes and foaming maxima occurred, even when the resin solutions remained optically clear down to cosolvent levels as low as 4%. Stiff gels (hexagonal liquid crystalline phase E on *Figure* 14) were evident at compositions near the low-cosolvent "paint-making" area. *Analogy to other W/R systems and foaming behavior now suggests that the acrylic resin is at or near a phase change on the composition map for some of the commercial paints.*

Significant abrupt changes in application properties have been correlated to phase changes due to "minor" composition changes and/or temperature changes.

Property/Composition Diagrams

Property/composition maps have been generated for the resin and resin/melamine systems. Properties mapped included average foam lifetime, bulk viscosity, surface tension, system solubility (as measured by phase angle), and surface dilational viscoelastic properties (*Figure* 15). During the course of this project, we have identified three primary variables controlling foam (bulk viscosity, solubility as measured by phase angle, and surface dilational elasticity), none of which were adequate singly as a predictive tool for foaming/defoaming. *Figure* 15 illustrates the complexity of the data. Single variable correlations from linear regression analysis are listed in *Table* 8. *Bulk viscosity is the strongest single factor controlling foaming.*

Multiple linear regression analysis was run on the 138 data sets, weighted for location on a composition map to generate information about possible predictive models. These data sets represented insoluble and soluble resin systems, with and without melamine, with and without defoamers, at varied % EN with either DMEA or TEA. Data for each composition map point had been run in duplicate, at the minimum. A few data sets were dropped

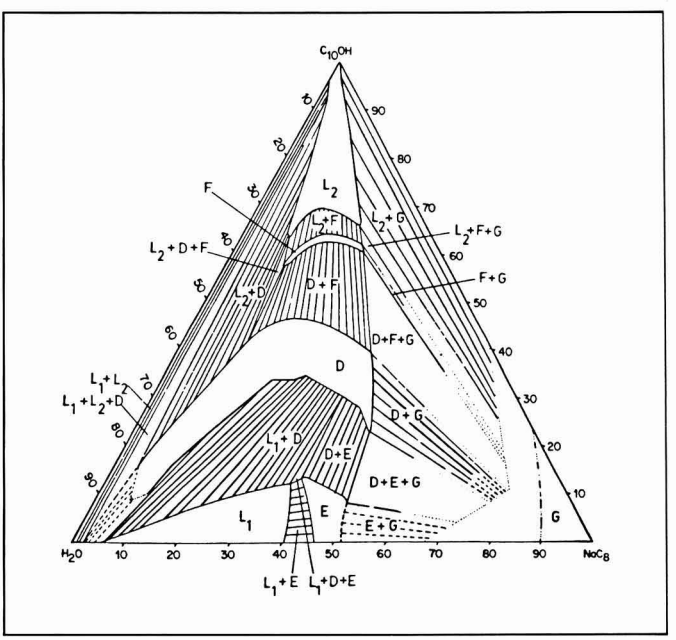

Figure 14—Sodium octanoate-decanol-water diagram of Ekwall, et al. (1975), as recently revised by Friman, et al. (1982). L = liquid, E = hexagonal liquid crystal, D = lamellar liquid crystal, F = inverted hexagonal liquid crystal[14]

from analysis when bulk viscosity was > 3 poise, since these had a very poor fit to the linear regression.

Foaming correlated very strongly to a combination of bulk viscosity and phase angle (solubility) (R = .82; 99.9% confidence) over the entire composition map. This is a significant improvement over correlation to bulk viscosity alone (R = .71). Since the phase angle variable had been previously identified as an independent measure of solubility, its numerical value was used to quantify solubility for these particular samples. Correlation was very low for surface dilational elasticity (R = .28) (*Table* 9).

Since paints are formulated at specific compositions (rather than over the entire map), two composition points representative of the seven commercial paint formulas were evaluated in detail for foaming/defoaming with added defoamers (*Table* 9). The only variable to change on addition of defoamer was the surface dilation modulus (from which the dilational elasticity and viscosity are derived). Foaming/defoaming correlated most strongly with the surface dilational elasticity (rather than the mod-

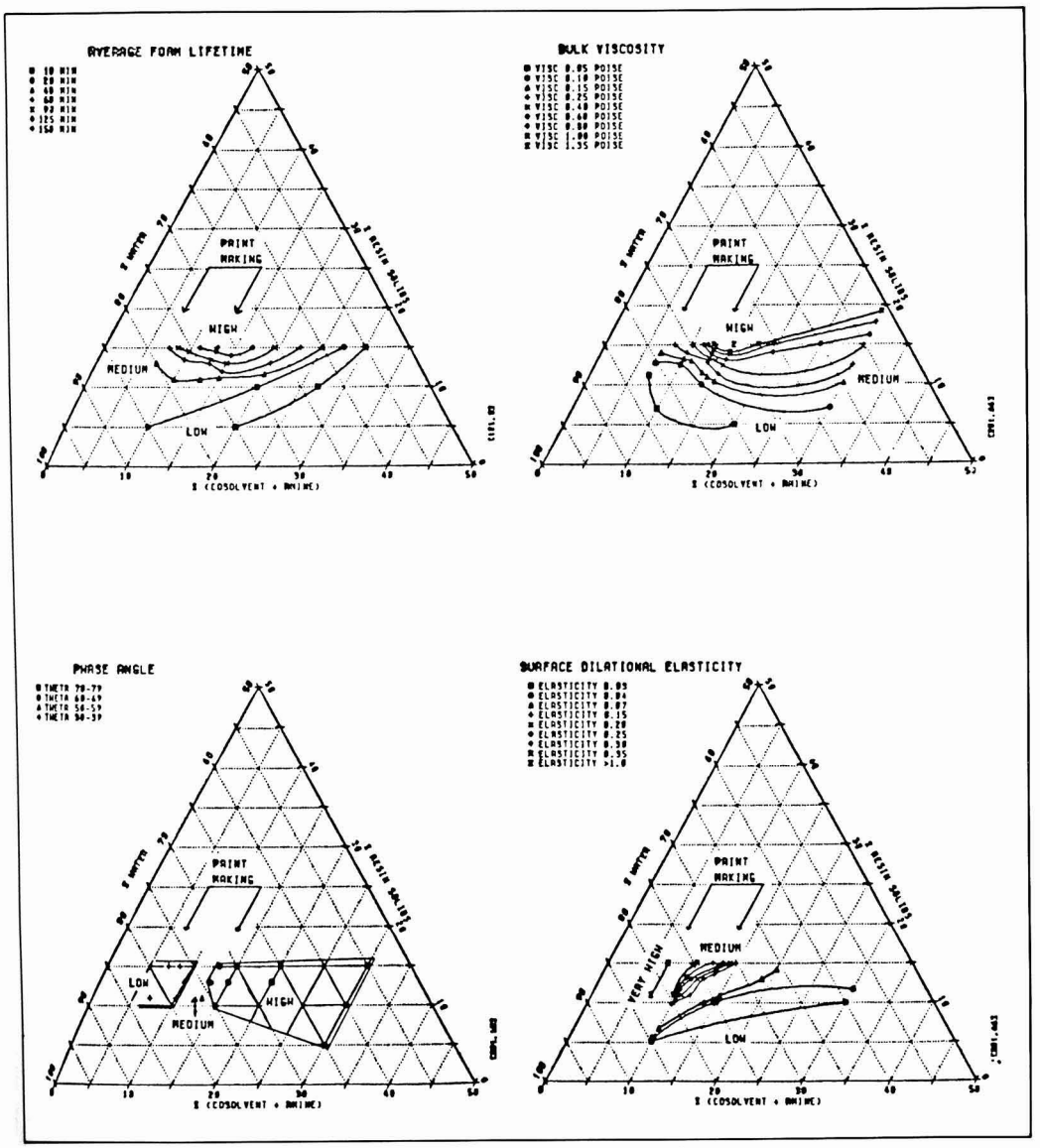

Figure 15—Property/composition maps of acrylic varnishes, 100% EN

Table 8 — Single Variable Correlations for Foaming/Defoaming All Cases — Weighted for Location on Composition Map

	AFL	BV	AST	θ	DSE	DSV	DSM
AFL	1.000	0.706	0.405	0.008	0.284	0.640	0.461
BV		1.000	−.073	0.515	−.051	0.545	0.222
AST			1.000	−.700	0.808	0.575	0.757
θ				1.000	−.619	−.103	−.426
DSE					1.000	0.743	0.954
DSV						1.000	0.906
DSM							1.000

AFL = Average Foam Lifetime
BV = Bulk Viscosity
AST = Apparent Surface Tension (static)
θ = Theta (phase angle)
DSE = Dilational Surface Elasticity
DSV = Dilational Surface Viscosity
DSM = Dilational Surface Modulus (dynamic surface tension)
(DSE and DSV are derived from the DSM)

ulus or viscosity). *Bulk viscosity characteristics of single composition point samples were essentially constant.*

At the single composition point of 10% NV and 10% (C+A), system solubility was reproducible for replicate samples. Under conditions of controlled solubility, surface dilational elasticity strongly controlled foaming/defoaming (R = .81; 99.6% confidence).

Samples at the 15% NV and 10% (C+A) composition point are at a borderline soluble area where it is very difficult to produce the "same" solubility for replicate samples. As with the 10% NV/10% (C+A) samples, surface dilational elasticity strongly controls foaming/defoaming at this single composition point (R = .76; 99.9% confidence) and bulk viscosity does not (R = .36; 79.2% confidence). However, bulk viscosity/phase angle (solubility) are even more significant (R = .86; 99.9% confidence). This is due to the importance of solubility in governing inherent foaming/defoaming properties, upon which the defoamer acts. At a composition point where solubility is borderline and difficult to reproduce (even under controlled laboratory conditions), foaming becomes extremely difficult to predict and even harder to control.

A given product formulation will usually occupy a relatively small region of composition space (e.g., a single composition point) and therefore, the surface dilational elasticity is likely to dominate its foaming behavior. It is especially useful in evaluating defoamers. However, surface dilational elasticity must be used with caution when comparing either two widely differing compositions, or two compositions in a narrow range where "minor" formulation changes have changed the system's solubility, and hence bulk viscosity.

Summary of Factors Controlling Foaming

(1) Bulk viscosity is the strongest single factor controlling inherent foaming.

(2) Solubility (phase behavior) controls bulk viscosity.

(3) Surface dilational elasticity as a factor controlling foaming is observable only in the design space where bulk viscosity and solubility are essentially constant.

(4) Defoamers act only on secondary factors, such as surface dilational elasticity.

FORMULATION RECOMMENDATIONS

Foaming is a very sensitive measure of system solubility. It is at a maximum near resin solubility (phase) changes. *Defoaming a coating system near a foaming maximum is very impractical.* Formulators should take advantage of the inherently "low-foaming" composition

Table 9 — Dependence of Average Foam Lifetime on Most Significant Independent Variables

ALL CASES, WEIGHTED FOR LOCATION ON COMPOSITION MAP, EXCLUDING THOSE SAMPLES WITH BULK VISCOSITY > 3 POISE

Independent Variables			Statistics			
Visc.	Theta	SDE	R	Signif.	F Value	DF
X			.7062	.0000	129.34	130
		X	.2839	.0010	11.40	130
X	X		.8190	.0000	131.36	129

SINGLE COMPOSITION POINT (15% NV AND 10% (C+A))[a]

Independent Variables			Statistics			
Visc.	Theta	SDE	R	Signif.	F Value	DF
X			.3585	.2080	1.8	12
		X	.7639	.0015	16.8	12
X	X		.8555	.0007	15.0	11

SINGLE COMPOSITION POINT (10% NV AND 10% (C+A))[b]

Independent Variables			Statistics			
Visc.	Theta	SDE	R	Signif.	F Value	DF
X			.3185	.3697	0.9	8
		X	.8104	.0045	15.3	8
X	X		.5662	.2585	1.6	7

(a) This particular composition is borderline soluble. It is very difficult to produce the "same" solubility for replicate samples. Thus, the phase angle variable (theta) contributes significantly to the correlation.

(b) This particular composition has reproducible solubility for replicate samples.

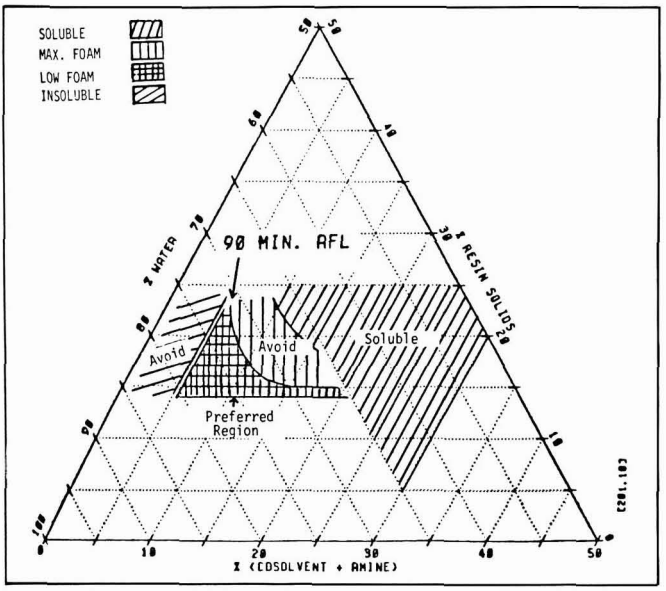

Figure 16—Inherent foaming/composition map of acrylic/melamine systems as a formulation guideline

map areas when formulating paints and solving foaming problems. *Figure* 16 illustrates the following formulation recommendations. As always, there are property tradeoffs which the formulator must balance, but which the following recommendations attempt to minimize:

(1) Formulate to inherently "low-foaming" composition map areas.

(2) Avoid compositions where viscosity is strongly dependent on % extent neutralization, since this response indicates borderline resin solubility, and hence more foaming.

(3) Formulate to 100-110% EN where possible. Verify that final paint pH specifications truly reflect the 100-110% EN level.

(a) <100% EN leads to resin/melamine reaction at room temperature, with precipitation when cosolvent levels are <10%.

(b) >110% EN leads to hydrolysis of resin (even acrylics) with loss of resin reactive sites. In composition areas where there is a strong pH/viscosity response, paints will also show viscosity instability with time.

(c) Defoamers function better at 100% EN.

(4) Control application viscosity by varying % NV and resin/melamine ratios rather than % EN.

(5) Evaluate defoamers *only* after a system composition with inherent lower foaming has been identified.

ACKNOWLEDGMENTS

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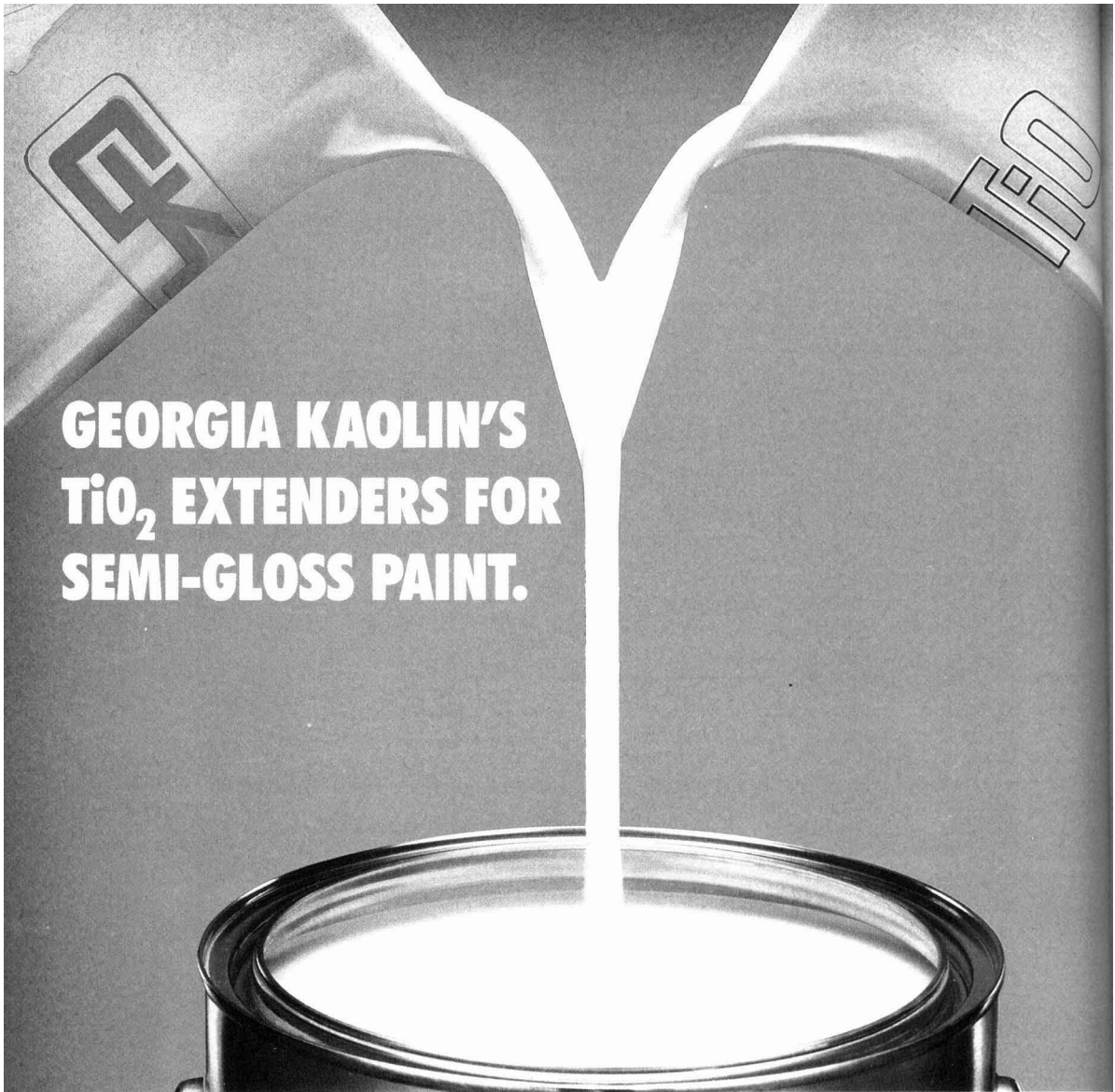

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Binders for Higher-Solids Coatings Part I: Synthesis of Model Alkyd Resins

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Model alkyd resins were synthesized by esterifying phthalic anhydride, triols, and a fatty acid with dicyclohexylcarbodiimide (DCC) at 25°C in pyridine with catalytic amounts of p-toluenesulfonic acid (p-TSA). Reference alkyds were prepared by conventional esterification of the same formulations at 220°C. The products were characterized by infrared (IR) spectroscopy and by size exclusion chromatography (SEC). Model alkyds generally have lower $\bar{M}_n$ and $\bar{M}_w/\bar{M}_n$ than their conventional counterparts. The results indicate that the mild-temperature process is irreversible and is essentially free of side reactions. Thus, it appears useful for reproducibly synthesizing model alkyd resins of predictable structure.

Substituting trimethylolpropane (TMP) for glycerol significantly reduces $\bar{M}_n$ and $\bar{M}_w/\bar{M}_n$ of alkyds prepared by a conventional process. Longer processing times are required. The results suggest that the –OH groups of TMP are less reactive than those of glycerol. This substitution is expected to reduce resin viscosity.

INTRODUCTION

Technology to make one-package, higher-solids coatings that perform well but do not require baking is one of the major challenges facing coatings researchers. This paper and the one that follows report the initial results of a long-range research program in this area.

Alkyd resins are an obvious starting point for such a program. Coatings based on alkyds retain a large share of the market because of their economy, versatility, ease of application, and unique ability to crosslink with air. Alkyds have been somewhat neglected by researchers in recent years, perhaps because of projections that they will be supplanted by newer types of binders and perhaps because of their complexity. We believe that research on alkyds is timely. It seems clear that they will be widely used for decades, and contemporary polymer research methods are capable of yielding insights into these complex materials.

Alkyd resins are difficult to study because they are extremely heterogeneous materials. They are produced by direct esterification at temperatures above 200°C, conditions under which side reactions such as etherification and coupling of fatty acid chains through their double bonds are unavoidable.[1,2] As a result, alkyds are complex mixtures of unreacted monomers, oligomers, polymers and, often, suspended gel particles.[3,4]

A second difficulty in studying alkyds is that they are hard to reproduce. Small changes in process conditions can substantially change resin and coating properties.[5]

The first goal of this program was to circumvent these difficulties. We sought a method for synthesizing model alkyd resins that would minimize side reactions and would reproducibly yield relatively homogeneous products. Part I of this series of papers describes how this goal has largely been achieved, and Part II will describe properties of the products.

Synthesis of Model Alkyd Resins at Room Temperature

The synthetic method chosen for this study was pioneered by Holmberg and Johansson.[6] It uses an esterification method well known to organic chemists[7] and recently adapted for polymer synthesis.[6,8] The method involves reaction of carboxylic acids (or anhydrides) and alcohols with dicyclohexylcarbodiimide (DCC) in the presence of pyridine or 4-dialkylaminopyridines (*Figure* 1). DCC both promotes ester formation and takes up water, form-

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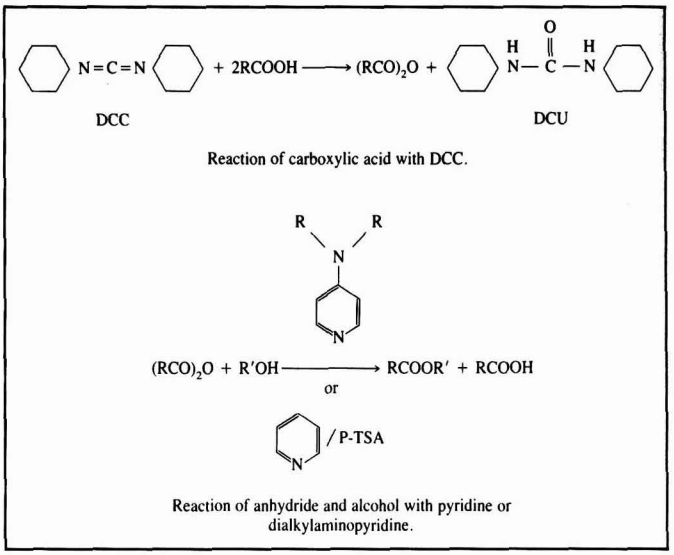

Figure 1—Reaction of carboxylic acid and alcohol with DCC and pyridine or dialkylaminopyridine

ing dicyclohexylurea (DCU). After preliminary studies of various esterification procedures, pyridine was chosen as solvent for this work. Catalytic amounts of p-toluenesulfonic acid (p-TSA) were added to suppress side reactions (see Discussion section).

Alkyds of each composition studied were prepared by the conventional, high-temperature process for comparison with model alkyds.

Size exclusion chromatography (SEC) [often called gel permeation chromatography] was the principal method used for characterizing the products. It is used to indirectly estimate number and weight average molecular weights ($\bar{M}_n$ and $\bar{M}_w$, respectively). The ratio $\bar{M}_w/\bar{M}_n$ measured by SEC is defined as the polydispersity index (PDI), a convenient indicator of the breadth of the molecular weight distribution. While the absolute accuracy of $\bar{M}_w$ and $\bar{M}_n$ determined by SEC is questionable, the method is considered fairly reliable for comparing similar compositions.

EXPERIMENTAL DETAILS

Materials

Phthalic anhydride, glycerol, trimethylolpropane, pyridine, and DCC, (all from Aldrich) were the purest grades available and were used as received. Pamolyn 200 fatty acid (Hercules) is stated to be 78% linoleic acid and 22% oleic acid and to have an iodine number of 162. Its equivalent weight was found by titration to be 288.

Formulations

Three series of model alkyds were formulated from Pamolyn 200, phthalic anhydride, and glycerol or TMP. Compositions of model alkyds in these series are shown in *Tables* 1 and 2.

Series 1 model alkyds were formulated at fixed oil lengths and variable excess OH levels. Oil lengths were 52% for alkyds containing glycerol and 47% for those containing TMP so that comparable alkyds would have the same mole ratios of fatty acid, diacid, and triol. The excess OH contents were 7.4, 14.6, 21.7, and 28.7%.

Series 2 model alkyds were formulated at variable oil lengths and a fixed excess OH level of 18%. The oil lengths were 45, 50, 55, and 60% for alkyds based on glycerol and 40, 45, 50, and 55% for alkyds based on TMP. These oil lengths were chosen to span a similar range of monomer mole ratios. A 45% oil length glycerol-based alkyd has the same mole ratios of monomers as the 40% oil length TMP-based model alkyd, etc.

Series 3 model alkyds were formulated with oil length fixed at 50% and excess OH (glycerol) content fixed at 18%, but the extent of reaction was varied by changing the amount of DCC used.

Procedure for Synthesis of Model Alkyd Resins

Synthesis of model alkyds is exemplified by the procedure for a 52% oil length, 7% excess OH model Series 1 alkyd: A solution of Pamolyn 200 (10.34 g, 0.036 mol), phthalic anhydride (7.41 g, 0.050 mol), glycerol (4.48 g, 0.049 mol), and p-TSA (0.9 g, 5 mol% based on DCC) in pyridine (100 mL) was placed in a 250-mL round bottom flask. The flask was placed in a water bath at room temperature to moderate the mildly exothermic reaction and stirred with a magnetic stirrer. Solid DCC (18.10 g, 0.088 mol, a 2% excess) was added to the stirred solution, and the flask was stoppered. The DCC dissolved quickly and a precipitate (identified as DCU by mp and IR) began forming in about one minute. The mixture was

stirred for 24 hr. The DCU was filtered and 50 mL of CH_2Cl_2 were added to the filtrate. The filtrate was washed with three 200-mL portions of 1M HCl and with 100 mL of H_2O. The CH_2Cl_2 solution was dried over $MgSO_4$, filtered and evaporated *in vacuo*. The resinous residue was dissolved in a mixture of 100 mL of pentane and 25 mL of ethyl acetate. The solution was cooled to −5 °C overnight and filtered to remove traces of precipitated DCU. Solvent was evaporated *in vacuo* using a rotary evaporated to yield about 18 g of light yellow resin which was stored under an inert atmosphere.

All model alkyds were synthesized by similar procedures. Yields averaged about 90%. Filter paper was used to filter Series 1 model alkyds and medium-porosity sintered glass funnels were used for Series 2. The latter more effectively removed traces of insoluble material.

The percent nitrogen of representative model alkyds was determined to ascertain that unwanted nitrogen-containing materials were not incorporated. Typical results: Series 1 alkyds (0.06-0.15% N; Series 2 alkyds: ≤0.01% N (below the limits of detection). The nitrogen detected in the Series 1 model alkyds is attributed to the presence of finely divided DCU that was not completely removed by filtration through filter paper.

Procedure for Cooking Conventional Alkyd Resins

Alkyds were prepared by a conventional procedure as exemplified by preparation of a Series 2, 60%-oil length alkyd: Pamolyn 200 (59.93 g, 0.208 mol), phthalic anhydride (29.62 g, 0.200 mol), glycerol (22.03 g, 0.239 mol), and xylene (8 g) were placed in a 500-mL 3-neck round bottom flask equipped with a Dean-Stark trap, a cold water condenser, a heating mantle, a thermometer, an N_2 inlet, and a mechanical stirrer. The mixture was heated under N_2 flow (approximately 5 mL/min) to 220 °C (±3 °C) during 30 min. The temperature was maintained, xylene was refluxed, and water was removed until an acid number of approximately 12 was attained. The resin was allowed to cool to about 80 °C and poured into a glass bottle. It was stored under N_2.

All conventional alkyds were made by similar procedures.

Table 1—Alkyd Formulations—Series 1

Alkyd[a]	Fatty Acid g (mol)	Phth Anhy g (mol)	TMP g (mol)	Glycerol g (mol)	$-H_2O$ (Theo) g (mol)	Grams (Theo)
G-7-C	51.68 (0.179)	37.03 (0.250)	—	22.38 (0.243)	7.72	103.37
G-15-C	53.29 (0.185)	37.03 (0.250)	—	24.09 (0.262)	7.82	106.59
G-22-C	54.90 (0.191)	37.03 (0.250)	—	25.80 (0.280)	7.93	109.80
G-29-C	45.20 (0.157)	29.62 (0.200)	—	22.01 (0.239)	6.43	90.40
G-7-M	10.34 (0.036)	7.41 (0.050)	—	4.48 (0.049)	1.54	20.68
G-15-M	10.66 (0.037)	7.41 (0.050)	—	4.82 (0.052)	1.56	21.33
G-22-M	10.98 (0.038)	7.41 (0.050)	—	5.16 (0.056)	1.59	21.96
G-29-M	12.56 (0.044)	8.23 (0.056)	—	6.11 (0.066)	1.78	25.12
T-7-C	51.68 (0.179)	37.03 (0.250)	32.62 (0.243)	—	7.72	113.61
T-15-C	42.63 (0.148)	29.62 (0.200)	28.08 (0.209)	—	6.26	94.07
T-22-C	43.92 (0.152)	29.62 (0.200)	30.07 (0.224)	—	6.34	97.27
T-29-C	45.20 (0.157)	29.62 (0.200)	32.07 (0.239)	—	6.43	100.46
T-7-M	10.34 (0.036)	7.41 (0.050)	6.52 (0.048)	—	1.54	22.73
T-15-M	10.66 (0.037)	7.41 (0.050)	7.02 (0.052)	—	1.56	23.53
T-22-M	10.98 (0.038)	7.41 (0.050)	7.52 (0.056)	—	1.59	24.32
T-29-M	12.56 (0.044)	8.23 (0.056)	8.90 (0.067)	—	1.78	27.92

(a) Alkyd designation—Series 1: triol (gly or TMP)—% excess OH—process (conventional or model). For example: G-7-C: glycerol, 7% excess OH, conventional process.

Table 2—Alkyd Formulations—Series 2

Alkyd[a]	Fatty Acid g (mol)	Phth Anhy g (mol)	TMP g (mol)	Glycerol g (mol)	$-H_2O$ (Theo) g (mol)	Grams (Theo)
G-60-C	59.93 (0.208)	29.62 (0.200)	—	22.03 (0.239)	7.34	104.24
G-55-C	60.68 (0.211)	37.03 (0.250)	—	25.74 (0.280)	8.29	115.16
G-50-C	49.45 (0.172)	37.03 (0.250)	—	24.33 (0.264)	7.59	103.22
G-45-C	46.08 (0.160)	42.32 (0.286)	—	26.49 (0.288)	8.02	106.87
G-60-M	14.98 (0.052)	7.41 (0.050)	—	5.51 (0.060)	1.84	26.06
G-55-M	12.14 (0.042)	7.41 (0.050)	—	5.15 (0.056)	1.66	23.03
G-50-M	12.36 (0.043)	9.26 (0.062)	—	6.08 (0.066)	1.90	25.81
G-45-M	10.75 (0.037)	9.88 (0.067)	—	6.18 (0.067)	1.87	24.94
T-55-C	59.93 (0.208)	29.62 (0.200)	32.10 (0.239)	—	7.34	114.31
T-50-C	48.54 (0.168)	29.62 (0.200)	30.01 (0.224)	—	6.63	101.54
T-45-C	43.96 (0.153)	32.92 (0.222)	31.52 (0.235)	—	6.75	101.65
T-40-C	40.32 (0.140)	37.03 (0.250)	33.78 (0.252)	—	7.02	104.11
T-55-M	13.03 (0.045)	6.44 (0.043)	6.98 (0.052)	—	1.60	24.85
T-50-M	12.14 (0.042)	7.41 (0.050)	7.50 (0.056)	—	1.66	25.38
T-45-M	9.89 (0.034)	7.41 (0.050)	7.09 (0.053)	—	1.52	22.87
T-40-M	8.96 (0.031)	8.23 (0.056)	7.51 (0.056)	—	1.56	23.41

(a) Alkyd designation—Series 2: triol—% oil length—process, for example: T-55-M; TMP, 55% oil length, model alkyd.

Relative Rates of Etherification of Polyols

A mixture of 56 g of glycerol and 0.57 g (0.25 mol %) of 2-N, N-dimethylammonium ethyl benzoate tosylate (acid catalyst) was heated in an inert atmosphere with stirring at 215 °C for 4 hr. TMP was subjected to the same conditions. The extent of etherification was estimated by comparing OH numbers of the materials before and after this treatment.

Resin Characterization

$\bar{M}_n$ and $\bar{M}_w$ were determined by SEC using a Waters Model 510 pump, a Model R401 differential refractometer detector, a Model 730 data module, and four columns in series: 10^3, 10^2, 500, and 100 Å.THF was used as the eluting solvent; flow rate was 1.0 mL/min. Polystyrene reference standards were used.

Table 3—Reaction Times, Acid Numbers, and Molecular Weight Data of Conventional and Model Alkyds

Alkyd[a]	Reaction Time (hr)	Acid Number	$\bar{M}_n$	$\bar{M}_w$	PDI
Series 1					
G-7-C	5.5	11.4	3700	43220	11.7
G-15-C	3.0	11.9	3080	13140	4.3
G-22-C	2.3	11.3	2410	7320	3.0
G-29-C	1.7	11.3	2000	4860	2.4
G-7-M	—	4.6	2680	7880	2.9
G-15-M	—	7.6	2020	5120	2.5
G-22-M	—	11.9	1390	3480	2.5
G-29-M	—	8.1	1330	3030	2.3
T-7-C	12.7	10.8	3340	22850	6.8
T-15-C	6.2	11.7	2410	8780	3.6
T-22-C	4.5	11.0	1720	5370	3.1
T-29-C	4.0	10.9	1460	3770	2.6
T-7-M	—	3.3	2680	7590	2.8
T-15-M	—	8.7	1790	4460	2.5
T-22-M	—	12.8	1490	3700	2.5
T-29-M	—	12.2	1260	2970	2.4
Series 2					
G-45-C	2.5	10.8	2990	32820	11.0
G-50-C	2.5	11.5	2670	12350	4.6
G-55-C	2.3	9.5	2370	7340	3.1
G-60-C	2.2	11.0	1900	4240	2.2
G-45-M	—	4.9	2650	5530	2.1
G-50-M	—	5.1	2410	4610	1.9
G-55-M	—	4.8	2190	3950	1.8
G-60-M	—	4.2	2020	3270	1.6
T-40-C	5.0	10.6	2710	11430	4.2
T-45-C	4.0	10.9	2300	6120	2.7
T-50-C	5.2	10.6	2070	4490	2.2
T-55-C	4.0	11.1	1760	3250	1.8
T-40-M	—	10.3	2130	4800	2.2
T-45-M	—	8.5	2040	4250	2.1
T-50-M	—	8.0	1880	3440	1.8
T-55-M	—	9.4	1680	2740	1.6

(a) Designation—Series 1: Triol—% excess OH—process
Series 2: Triol—oil length—process.

Table 4—Etherification of Triol; 215°C for 4 Hr in the Presence of 0.25% Acid Catalyst

	OH # (exp)	OH # (theo)	% Reaction
TMP	1123	1254	10.5
Glycerol	1434	1828	21.6

Infrared spectra were obtained using a Perkin Elmer Model 137 Spectrophotometer.

OH numbers were determined by the imidazole-catalyzed esterification with pyromellitic dianhydride method.[9]

RESULTS AND DISCUSSION

Reaction times, acid numbers, and molecular weight data for the Series 1 and 2 alkyds made in this study are shown in *Table* 3. Results of etherification rate studies are shown in *Table* 4. The molecular weight data and extents of reaction of the Series 3 alkyds are shown in *Table* 5.

DCC-Promoted Esterification Reaction

Carbodiimides have many uses in organic and biochemical syntheses.[10] The direct esterification of organic acids (or anhydrides) with alcohols in the presence of DCC and a pyridine derivative have been reported.[11,12] A proposed mechanism[13,14] is shown in *Figure* 2. The first step is protonation of DCC to form I, followed by rapid formation of relatively unstable 0-acylisourea intermediate II. II will either be protonated to form intermediate III or will undergo an 0→N acyl shift to give stable N-acylurea IV. Protonated intermediate III can form the desired product V and DCU. The catalytic reaction of pyridine with anhydrides and alcohols is thought to involve cationic intermediate VI. VI then undergoes attack by the alcohol to give the ester and regenerated catalyst.

While use of an acid catalyst (p-TSA) in a basic solvent (pyridine) may seem illogical, its benefit can be rationalized in terms of the above mechanism. The acid suppresses the 0→N acyl shift reaction by protonating intermediate II, presumably the strongest base present. The result is formation of the desired intermediate III and suppression of the undesired 0→N acyl shift reaction that gives N-acylurea IV. Complete suppression of the latter reaction is necessary to avoid contamination of the model alkyd with N-acylurea residues.

DCC-Promoted vs High Temperature Esterification Processes

The main objective of this study was to develop a reproducible method for preparing model alkyd resins that would be free of side reactions. It is not possible to categorically prove the absence of side reactions, but all available evidence indicates that the objective has been met. This evidence can be summarized as follows:

(1) DCC-promoted esterification in pyridine with p-TSA has previously been shown to produce virtually pure oligoesters when relatively simple combinations of

monomers, e.g. phthalic anhydride/neopentyl glycerol, are used.[8] DCC-promoted esterification appears to be irreversible at 25°C. If so, it is expected to be more reproducible than processes in which transesterification can occur after ester bonds have formed.

(2) Nitrogen content of Series 2 model alkyds is below the limits of detection of elemental analysis, about 0.01%, indicating that formation of undesired N-acylurea is almost completely suppressed. The traces of nitrogen, approximately 0.1%, detected in Series 1 alkyds are attributed to inefficient removal of DCU by filtration through filter paper.

(3) IR spectra of all model alkyds were essentially superimposable on those of their high-temperature counterparts, indicating that the main structural features are the same. Examples are shown in *Figures* 3 and 4. Peaks attributable to side reactions in the spectra of high-tem-

Table 5—SEC Results—Series 3. 50% Oil Length Alkyd (18% Excess OH). Prepared to Various Extents of Reaction-Model and Conventional Process

Sample #	Acid #	% Conversion	$\bar{M}_n$	$\bar{M}_w$	PDI
Conventional Alkyd					
1	57.5	84.3	1390	1920	1.4
2	32.2	91.2	2010	3480	1.7
3	18.5	94.9	2590	6530	2.5
4	12.2	96.6	3050	10550	3.4
5	5.9	98.4	3520	22130	6.3
6	3.4	99.1	3950	38980	9.9
Model Alkyd					
1	48.2	86.8	950	1290	1.4
2	34.4	90.6	1240	1910	1.5
3	19.5	94.6	1680	2920	1.7
4	12.5	96.6	1970	3570	1.8
5	5.1	98.6	2260	4260	1.9
6	2.6	99.3	2380	4630	1.9

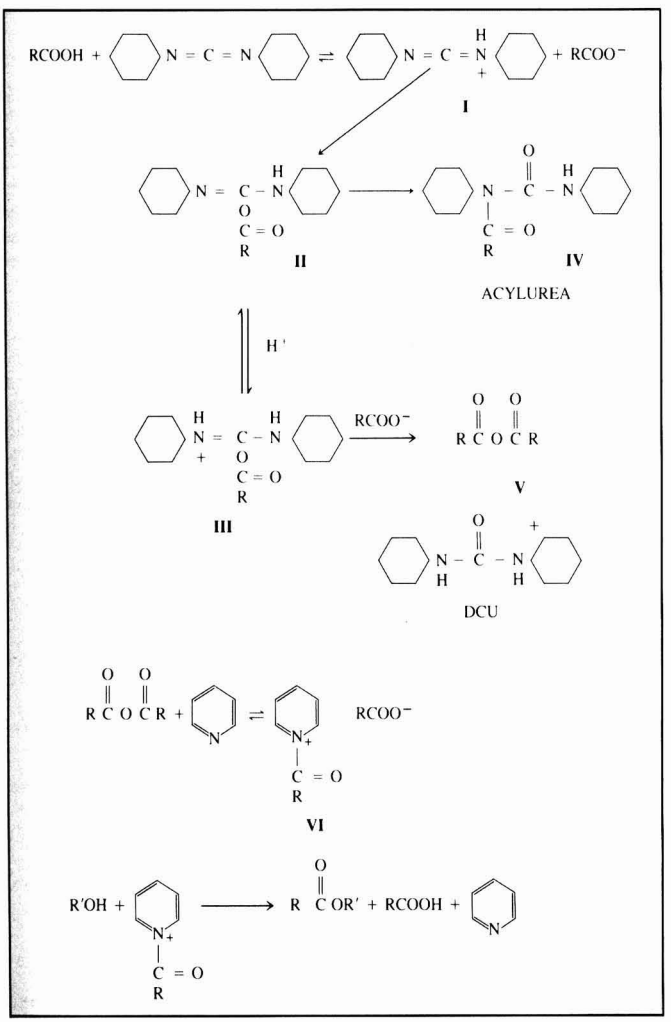

Figure 2—Proposed mechanism for the reactions of DCC, carboxylic acid, anhydride, and alcohol in pyridine

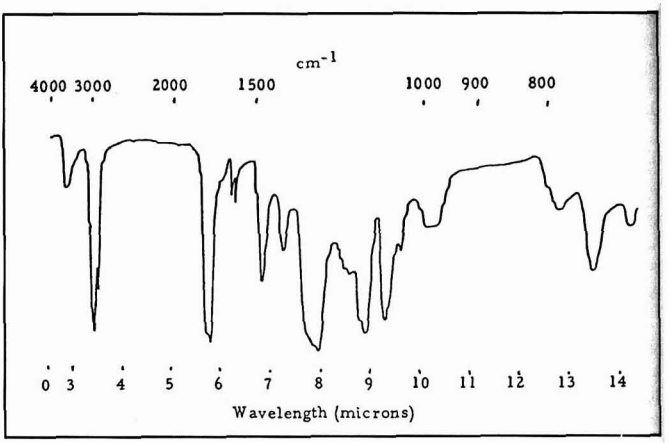

Figure 3—IR Spectrum—TMP based model alkyd; 50% oil length, 18% excess OH—Series 2

perature products could not be distinguished with the relatively low resolution instrument used.

(4) IR spectra further confirm the absence of undesired N-acylureas. Strong peaks at about 1525 and 1650 cm^{-1} associated with such species are not detectable in the spectra of the products.

(5) SEC data are consistent with the picture that fewer side reactions occur in the DCC-promoted process than at conventional temperatures. For example, plots of $\bar{M}_n$ vs % excess OH and oil length for Series 1 and 2 alkyds (*Figures* 5 and 6) show that $\bar{M}_n$ of the conventional alkyds is consistently higher at a given level of excess OH and oil length (except at high oil lengths). The higher $\bar{M}_n$'s are attributable to side reactions, such as etherification and dimerization of fatty acid chains that occur during conventional processing.

(6) Plots of polydispersity index (PDI) vs excess OH for Series 1 (*Figure* 7) and vs oil length for Series 2 (*Figure* 8) reveal that PDI's of conventional alkyds are higher, especially at low excess OH and at low oil length. This observation indicates that side reactions that increase PDI in the conventional process are suppressed in the low-temperature process. Side reactions that could increase PDI include etherification of polyols and coupling of fatty acid chains.

(7) Characteristics of partly polymerized Series 3 alkyds also suggest that side reactions are suppressed in the mild temperature process. Plots of acid number vs $\bar{M}_n$ and of acid number vs PDI (*Figure* 9) show that $\bar{M}_n$ and PDI of conventional alkyds are higher than that of the model alkyds at any given extent of reaction. PDI of the model alkyds is a nearly linear function of $\bar{M}_n$ over the range of values studied while PDI of the high-temperature alkyd becomes non-linear as acid number falls below about 20. Theoretically PDI should rise rapidly as the gel point is approached in both cases.[15] An interpretation of *Figure* 9 is that conventional alkyds approach the gel point at lower conversions than model alkyds because high-temperature side reactions decrease the theoretical gel point. The fairly linear increase of PDI during model alkyd processing strongly suggests that side reactions that would lower the gel point and increase PDI are minimal.

It appears that side reactions play at most a minor role in the mild-temperature process and that esterification is

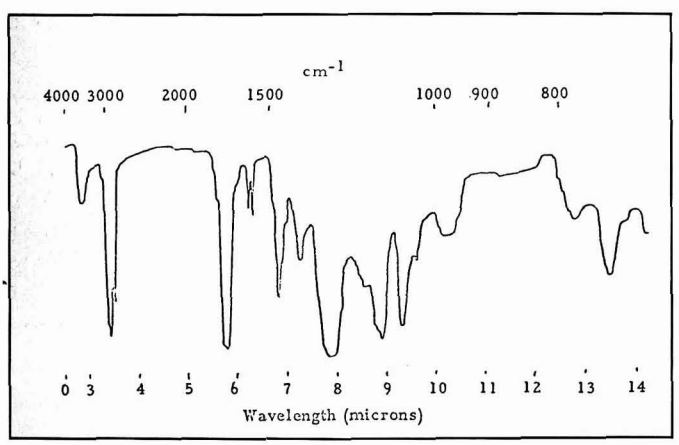

Figure 4—IR Spectrum—TMP based conventional alkyd; 50% oil length, 18% excess OH—Series 2

the only reaction that occurs appreciably. If so, the structures of the molecules present in the model alkyds would be determined only by kinetic factors, that is, by the relative rates of the various esterification reactions that occur.

If this picture is correct, it would be feasible to quantitatively predict the distribution of structures present in model alkyds by assuming relative rates of each esterification reaction and modeling the process on a computer. Structure/property correlations would become possible. Such studies are beyond the scope of the present investigation.

While DCC-promoted esterification is a convenient laboratory-scale procedure, its utility is probably limited to preparation of model materials for experimental use and perhaps for preparation of specialized materials. Its shortcomings as a production method are:

(1) Use of pyridine as a solvent requires that the model alkyd must be isolated by a series of filtration, concentration, and washing steps. These steps are effective because all by-products are either insoluble in common solvents (DCU), soluble in water, or volatile, but they would be costly in high-volume production.

(2) A mole of DCC is required for every mole of acid or anhydride esterified. DCC is costly, and economical production by this process would only be possible if an economical way is found to recycle by-product DCU.

(3) As previously shown,[8] yields in DCC promoted esterification are reduced by presence of moisture. In the laboratory, this problem is easily overcome by using a small excess of DCC.

Glycerol vs TMP in High Solids Alkyd Resins

It was observed in this study that glycerol and TMP behave quite differently in conventional alkyd manufacturing; the differences have significant practical implications.

In every case studied here, TMP-based conventional alkyds required about twice as long to reach the target degree of polymerization than their glycerol-based counterparts. A similar observation was reported previously.[16] Further, glycerol-based alkyds consistently had higher $\bar{M}_n$, $\bar{M}_w$, and PDI than comparable TMP-based alkyds.

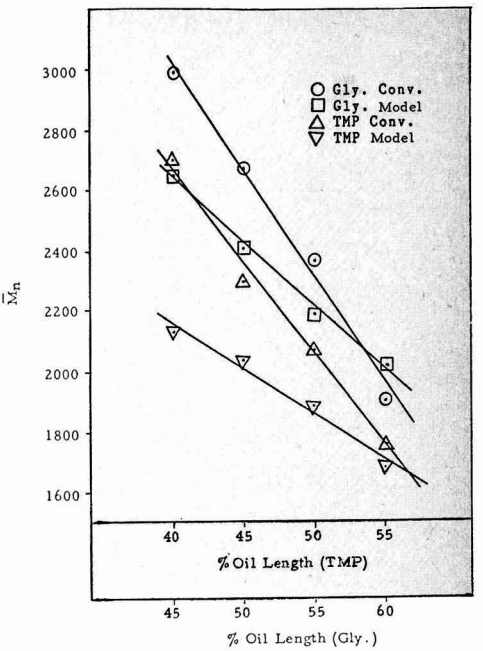

Figure 6—Plot of oil length vs $\bar{M}_n$ of the Series 2 alkyds

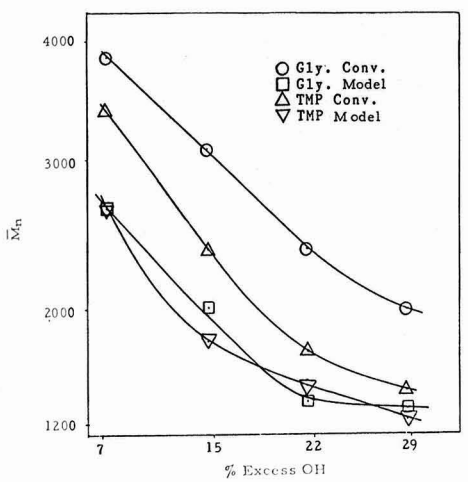

Figure 5—Plot of % excess OH vs $\bar{M}_n$ of the Series 1 alkyds

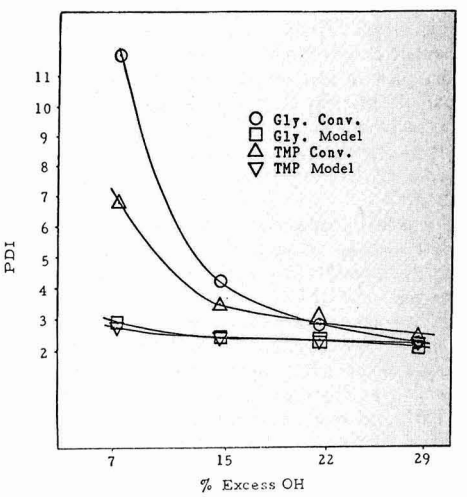

Figure 7—Plot of % excess OH vs PDI of the Series 1 alkyds

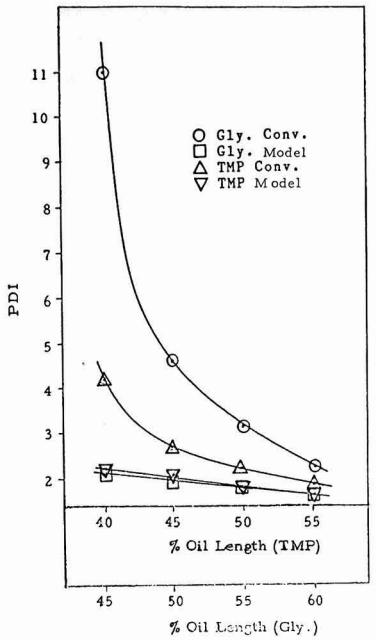

Figure 8—Plot of oil length vs PDI of the Series 2 alkyds

One might have expected TMP-based alkyds to require shorter cook times than comparable glycerol-based alkyds because all three −OH groups of TMP are primary while glycerol has two primary and one secondary −OH groups. However, the observed long cook times with TMP indicate that the hydroxymethyl primary −OH groups of TMP esterify more slowly than the secondary −OH group of glycerol, presumably because of steric hindrance associated with the neopentyl-like structure of TMP.

The decisive factor governing cook times is probably the relative rates at which the third −OH groups of the triols react. It appears reasonable that the third −OH group of TMP may be more hindered by the presence of three bulky groups (two ester groups and one ethyl group on the neopentyl carbon) than the third −OH group of glycerol diester by the two bulky groups on the secondary carbon.

A tentative explanation of the observed lower $\bar{M}_n$ of TMP-based conventional alkyds is based on the assumptions that etherification is one of the principal side reactions that raises $\bar{M}_n$ of glycerol alkyds and that TMP etherifies more slowly than glycerol. Etherification increases $\bar{M}_n$ by reducing excess OH and increasing the average functionality of the formulation. In a single experiment, we observed that acid catalyzed etherification of TMP was much slower than the same reaction of glycerol (*Table* 4), supporting the tentative explanation. The difference can be attributed to greater steric hindrance of all −OH groups in TMP than of the −OH groups of glycerol.

The lower PDI of TMP-based alkyds are also attributable to steric hindrance. If the third −OH group of TMP is less reactive than the third −OH group of glycerol, it is reasonable to assume that the fraction of triol residues in which all three −OH groups have reacted in the final product may be lower for TMP than for glycerol. If so, the TMP alkyds would have less branching and, in theory,[15] lower PDI.

Similar trends are not observed in comparing glycerol and TMP-based model alkyds. The 25°C process yields glycerol and TMP-based Series 1 model alkyds having similar $\bar{M}_n$'s and PDI's. The fact that $\bar{M}_n$'s of the glycerol-based Series 2 model alkyds are higher than those of the corresponding TMP-based model alkyds can be explained by the lower acid numbers of the glycerol-based model alkyds. The PDI's of given glycerol and TMP-based Series 2 model alkyds are essentially the same. One would expect glycerol and TMP-based model alkyds prepared to the same extent of reaction to possess similar $\bar{M}_n$'s and PDI's because: (1) etherification is eliminated and (2) steric differences of the OH's may be a less significant factor. It is known that the DCC process efficiently esterifies sterically hindered alcohols at temperatures as low as −25°C.

The practical consequence is that TMP might be a better choice than glycerol for synthesis of alkyds in cases where reduced PDI is critical. This is often the situation in designing resins for high solids coatings. It will be shown in the subsequent paper that modest reductions in viscosity can be achieved by substituting TMP for gly-

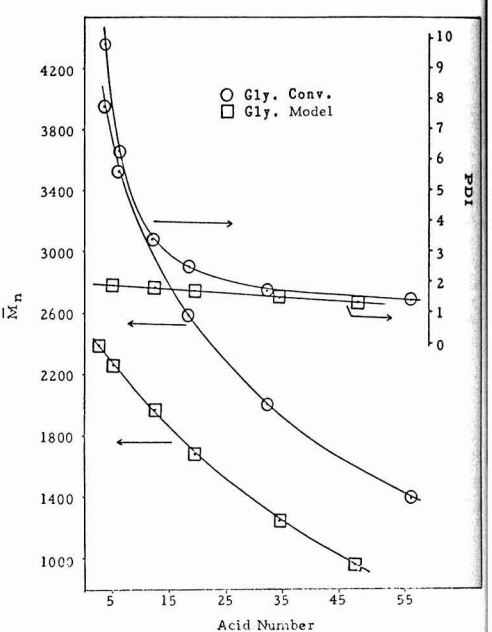

Figure 9—Plot of acid number vs $\bar{M}_n$ and PDI for various extents of reaction of a 50% oil length, 18% excess OH (gly) alkyd

cerol. However, in the particular cases studied, certain film properties suffered.

CONCLUSION

A mild-temperature, DCC-promoted esterification process for making alkyd resins, originally pioneered by Holmberg and Johansson,[6] was refined and used to synthesize a variety of model alkyd resins. Alkyd resins of the same composition were prepared using a conventional process at 220°C. All products were characterized by infrared spectroscopy and by size exclusion chromatography.

Model alkyds prepared by the DCC-promoted process generally had lower $\bar{M}_n$ and $\bar{M}_w/\bar{M}_n$ than the corresponding resins prepared by the conventional process. The differences are magnified as excess OH or oil length is decreased and as degree of polymerization is increased. No evidence of side-reactions was detected in the model alkyds by IR. The results fit a pattern indicating that the mild-temperature process is reproducible and is virtually free of side reactions.

While large-scale production using the mild-temperature process would be costly, this process appears very useful for preparing model materials for study and, possibly, for production of high-value specialties.

Substituting trimethylolpropane for glycerol substantially reduces $\bar{M}_n$ and PDI of alkyds prepared by a conventional process. This reduction is probably explained by the relatively low reactivities of the $-$OH groups of TMP. This substitution is predicted to reduce viscosity.

ACKNOWLEDGEMENT

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Binders for Higher-Solids Coatings Part II: Properties of Model Alkyd Resins

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Properties of the model and conventional alkyd resins prepared as described in the preceding paper were studied. Solution viscosities of model alkyds were lower than those of comparable alkyds prepared by a conventional, high-temperature process. Air dry coatings formulated from model alkyds dry faster than those based on conventional alkyds, but they have, on balance, inferior film physical properties. T_g's of films prepared from model alkyds show a greater dependence on $\bar{M}_n$ than their conventional counterparts. The observed property differences are attributable to the different molecular weights and molecular weight distributions of model and conventional alkyds.

Substitution of TMP for glycerol in conventional alkyds was shown in the preceding paper to reduce $\bar{M}_w/\bar{M}_n$. As expected, this substitution reduces viscosity. However, it results in inferior impact resistance.

It is probably not feasible to make high quality, higher-solids, air dry coatings simply by manipulating the molecular weights of soluble alkyd resins. Only modest increases (roughly 2-10%) of application solids appear possible, and measures that increase solids harm properties.

INTRODUCTION

This paper describes part of the results of a long-range research program aimed at improved one-package, higher-solids coatings that do not require baking. The preceding paper (Part I of the series) described two synthetic methods by which number average molecular weight ($\bar{M}_n$) and polydispersity index ($\bar{M}_w/\bar{M}_n$) of alkyds can be reduced: (1) Model alkyd resins were synthesized using a mild-temperature esterification procedure and (2) Alkyds were made using a conventional process in which trimethylolpropane (TMP) was substituted for glycerol.

In this paper we report studies of the viscosity of the resins described in Part I and highlight studies of their film forming properties.

EXPERIMENTAL DETAILS

Resin % solids were determined by measuring weight loss caused by heating approximately 0.5 g samples in 7 cm aluminum pans in a convection oven at 150°C for 1 hr.

Resin viscosities were measured at 25°C using an ICI cone and plate viscometer. Viscosities of up to 10 poise were measured at a shear rate of 10,000 s^{-1} with a cone angle of ½°. Viscosities from 10-100 poise were measured at a shear rate of 3,000 s^{-1} and a cone angle of 2°.

Films were cast from 65% alkyd solutions in xylene to which 0.05% Co and 0.15% Zn (wt% metal based on fatty acid) driers had been added. Wet film thickness was approximately 3 mil. Pretreated steel and aluminum alloy panels were used. Films were dried for one week at ambient temperature before testing.

Dry times were "tack-free times," that is, the time after which the films no longer feel tacky when lightly touched.

Differential scanning calorimetry (DSC) utilizing a Dupont Model 990 thermal analyzer was used to determine glass transition temperatures (T_g). Films for DSC analysis were cast on tin coated panels and, after curing for one week, were removed by partially immersing the panels in mercury. T_g's are reported as points corresponding to both onset and midpoint of the endotherm curve of the DSC scan.

T_g's were not discernable in DSC scans of the noncured resins.

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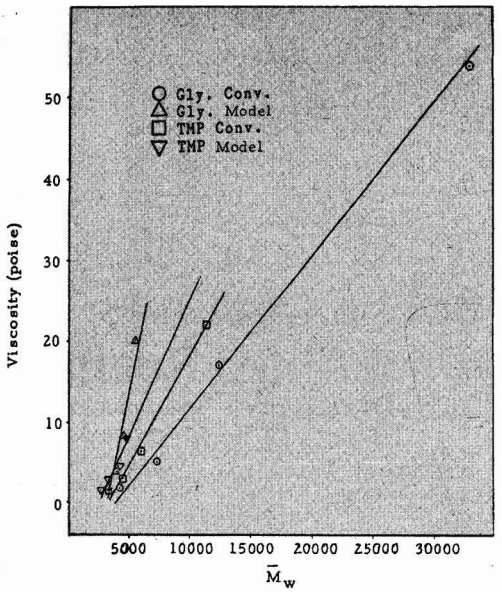

Figure 1—Plot of $\bar{M}_w$ vs viscosity of 70% wt solids solutions of Series 2 alkyds in xylene

Reverse impact resistance was determined using a Gardner impact tester. A steel cylinder with a rounded head is dropped through vertical tube guide onto the coated steel panel. The panel is supported film side down on a steel ring. The tube is calibrated in in-lb. Impact strength is defined as the maximum impact (in-lb) that does not crack or remove any film.

Solvent, acid, and base resistance were tested by placing one or two drops of liquid on the film. After 30 minutes, any remaining liquid was wiped away. Spotting or film damage were rated subjectively.

EXPERIMENTAL RESULTS AND DISCUSSION

Solution Viscosity of Alkyd Resins

For the case of dilute solutions of linear high polymers, empirical equations relating molecular weight distribution to viscosity are well-established.[1] In this case, viscosity is governed by the viscosity average molecular weight, $\bar{M}_v$. $\bar{M}_v$ is often 10-20% below $\bar{M}_w$. Although there is no reason to expect the same relationships to apply to the much different case of concentrated solutions of alkyd resins,[2] qualitatively similar trends have been noted. Resin formulators often observe that the higher molecular weight fractions of alkyds have a disproportionate effect on their solution viscosities, and they sometimes relate $\bar{M}_w$ to viscosity.

Figure 1 shows a plot of $\bar{M}_w$ (data from preceding paper) vs viscosity (data from *Table* 1) of 70% wt% solutions of the Series 2 alkyds. As expected, viscosity increases as $\bar{M}_w$ increases. However, because the absolute values and slopes of the lines are quite different, it is evident that viscosity is not governed solely by $\bar{M}_w$. The plots show that the viscosity of a glycerol-based model alkyd of a given $\bar{M}_w$ would be substantially higher than the viscosity of a glycerol-based conventional alkyd of the same $\bar{M}_w$. The same trend is evident in the case of the TMP-based conventional and model alkyds except at low $\bar{M}_w$.

While these observations could be rationalized in several ways, we tentatively attribute them to differences in the molecular weight distribution of the alkyds made by the two processes. Polydispersity index (PDI) is a convenient indicator of the breadth of this distribution. PDI is defined as $\bar{M}_w/\bar{M}_n$ as measured by SEC. Conventional

Table 1—Tg's of Cured Films and Viscosities of Xylene Solutions

			Viscosity (poise) at % solids; 25°C		
Alkyd[a]	Tg (onset) °C	Tg (mid) °C	60%	70%	80%
Series 1					
G-7-C	14	23	4.4	27	98
G-15-C	12	20	2.1	11	59
G-22-C	10	18	1.2	5.3	28
G-29-C	6	14	1.0	4.5	23
G-7-M	9	19	0.9	4.4	22
G-15-M	5	15	0.6	3.2	14
G-22-M	4	13	0.9	4.1	18
G-29-M	3	12	0.4	2.0	8.8
T-7-C	12	22	2.0	12	49
T-15-C	9	18	1.4	6.9	40
T-22-C	7	15	0.8	3.4	17
T-29-C	5	14	0.8	2.7	16
T-7-M	9	19	0.9	4.1	18
T-15-M	8	17	0.6	2.6	14
T-22-M	5	14	0.8	3.6	15
T-29-M	4	12	0.5	2.4	10
Series 2					
G-45-C	14	24	12	54	280
G-50-C	12	20	2.9	17	88
G-55-C	7	16	1.2	5.1	30
G-60-C	5	13	0.5	1.9	8.2
G-45-M	11	21	3.5	20	110
G-50-M	9	17	1.6	8.3	59
G-55-M	7	14	1.0	3.8	18
G-60-M	1	9	0.5	1.8	7.3
T-40-C	15	24	3.6	22	104
T-45-C	11	19	1.4	6.4	47
T-50-C	7	17	0.8	3.0	17
T-55-C	3	11	0.4	1.6	6.2
T-40-M	13	23	1.8	8.0	59
T-45-M	10	20	1.2	4.7	34
T-50-M	5	13	0.8	2.9	14
T-55-M	3	10	0.5	1.6	6.0

(a) Designation — Series 1: Triol — % excess OH — process
Series 2: Triol — % oil length — process.

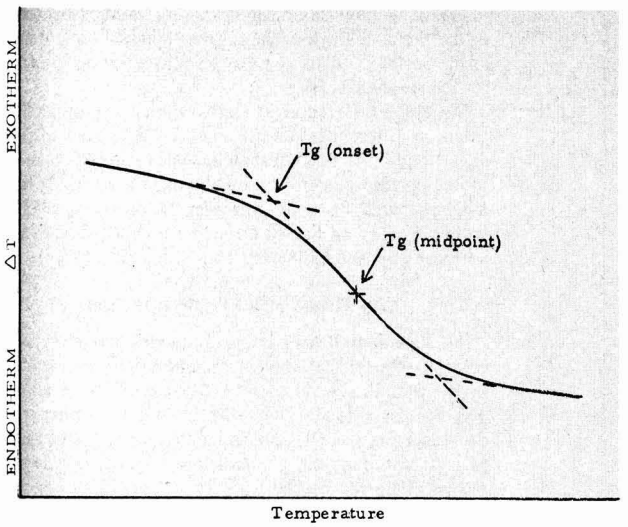

Figure 2—Representative DSC scan of a cured film

alkyds have higher PDIs than comparable model alkyds; therefore, a conventional alkyd must have a lower $\bar{M}_n$ than a model alkyd of the same $\bar{M}_w$. The substantial effect of PDI on viscosity is illustrated by the Series 2 glycerol-based alkyds. The $\bar{M}_n$'s of these conventional and model alkyds are similar for a given oil length (the glycerol-based model alkyds being about 10% lower in $\bar{M}_n$) but the difference in $\bar{M}_w$ (and PDI) of alkyds prepared by the two processes increases significantly with decreasing oil length. Viscosity differences parallel PDI differences.

The TMP-based conventional alkyds have lower viscosities than the corresponding glycerol-based conventional alkyds. This observation is consistent with their lower $\bar{M}_n$'s and PDI's.

Clearly, viscosity can be reduced by reducing $\bar{M}_n$ and $\bar{M}_w$. However, solution viscosity of alkyds depends in some complex way on the molecular weight distribution. In view of the complexity of the molecular weight distributions of conventional alkyds,[3] it is probably not possible to use simple indicators such as $\bar{M}_n$, $\bar{M}_w$, $\bar{M}_v$, or PDI to quantitatively predict viscosity.

Interpolation of the data in *Table* 1 suggests that model alkyd resins could be formulated at application viscosities (1-3 poise) about 2-10% higher wt solids than conventional alkyds. The largest viscosity difference observed for pairs of resins having the same composition was between resins G-7-C (conventional) and G-7-M (model). The former had a viscosity of 4.4 poise at 60% wt solids, and the latter had the same viscosity at 70%. Assuming that the molecular weight distribution of model alkyds approaches the best attainable for viscosity reduction, the data suggest that only modest reduction of VOC (volatile organic content) are possible by molecular weight manipulation alone.

Glass Transition Temperatures (T_g) of Cured Films

Onset and midpoint T_g's of cured films made from the alkyd resins are shown in *Table* 1. The DSC scan from which these data were obtained are exemplified by the scan drawn in *Figure* 2.

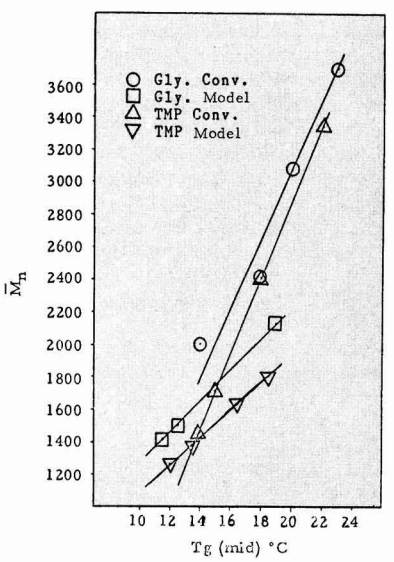

Figure 3—Plot of T_g (midpoint) °C of cured films vs $\bar{M}_n$ of the resin—Series 1

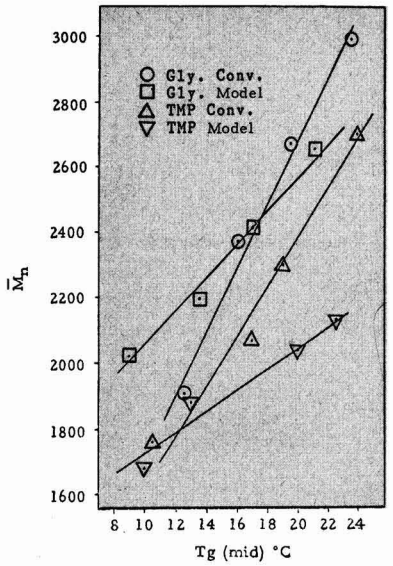

Figure 4—Plot of T_g (midpoint) °C of cured films vs $\bar{M}_n$ of the resin—Series 2

Figure 3 shows plots of T_g (cured film) vs $\bar{M}_n$ (noncured resin) for the Series 1 alkyds. For each of the four sets of alkyds, T_g increases fairly linearly with $\bar{M}_n$. T_g of the model alkyds depends more strongly on $\bar{M}_n$ than T_g of the conventional alkyds, an effect that may be related to differences in PDI of the two types of resins.

Figure 4 shows a plot of T_g (cured) vs $\bar{M}_n$ (noncured) of the Series 2 alkyds. The results show the same trends as the Series 1 alkyds — greater dependence of T_g on $\bar{M}_n$ for the model alkyds.

Structural differences as well as molecular weight distribution differences can influence T_g. As shown in *Figures* 3 and 4, T_g of TMP-based alkyds is higher than T_g of comparable glycerol-based alkyds at a given $\bar{M}_n$. Alkyds prepared by both processes fit this pattern. The higher T_g may be due to an increase in the main chain stiffness imposed by the sterically hindered TMP.

Dry Times and Film Properties

As shown in *Tables* 2 and 3, model alkyds of both series dry faster than the corresponding conventional alkyds. Within a given type (TMP-based conventional, glycerol-based model, etc.) the dry times decrease with decreasing excess OH and oil length and with increasing $\bar{M}_n$. As a group, the glycerol-based model alkyds dry fastest, followed by the TMP-based model alkyds, the glycerol-based conventional alkyds, and the TMP-based conventional alkyds. A possible reason that model alkyds dry faster is that they are more homogeneous.

Film physical properties of most of the model alkyds are inferior to those of their conventional counterparts (*Tables* 2 and 3). Reverse impact of the model alkyds is generally poor, possibly as a result of their lower $\bar{M}_n$. The model alkyds display good solvent, acid, and base resistance but in most cases, the solvent, acid and base resistance of the corresponding conventional alkyds is superior.

Adhesion and flexibility are excellent for both the Series 1 and 2 conventional and model alkyds. The aliphatic fatty acid contributes to the excellent flexibility of alkyd

Table 2—Film Properties—Series 1

Alkyd	Dry Time (hr)	Pencil Hardness	Reverse Impact (in-lb)	H_2O	Resistance to: Xylene	0.1 N HCl	0.1 N NaOH
G-7-C	8	H	80	ex.	ex.	ex.	ex.
G-15-C	7.5	H	80	good	good	good	poor
G-22-C	7.5	HB	40	good	good	good	poor
G-29-C	10	B	50	fair	good	good	poor
G-7-M	4	HB	5	good	good	good	good
G-15-M	4.2	HB	10	good	good	good	poor
G-22-M	5	HB	10	good	good	good	poor
G-29-M	7	6B	80	fair	poor	poor	poor
T-7-C	7	H	65	ex.	ex.	ex.	ex.
T-15-C	8	H	5	good	good	good	poor
T-22-C	11.5	HB	5	good	good	good	poor
T-29-C	13.5	HB	30	good	good	good	poor
T-7-M	4.3	H	5	good	good	good	good
T-15-M	6	HB	65	good	good	good	good
T-22-M	7.5	HB	5	fair	fair	fair	poor
T-29-M	8.5	HB	5	fair	fair	fair	poor

ex. — no spotting; good — slight spotting; fair — spot/soften; poor — dissolved film.

Table 3—Film Properties—Series 2

Alkyd	Dry Time (hr)	Pencil Hardness	Reverse Impact (in-lb)	H_2O	Resistance to: Xylene	0.1 N HCl	0.1 N NaOH
G-45-C	3.2	H	80	ex.	ex.	ex.	ex.
G-50-C	5	H	80	ex.	ex.	ex.	ex.
G-55-C	6	HB	80	ex.	ex.	ex.	fair
G-60-C	6.5	B	80	ex.	ex.	ex.	poor
G-45-M	2	HB	30	ex.	ex.	ex.	good
G-50-M	3	HB	40	ex.	ex.	ex.	poor
G-55-M	4	HB	75	ex.	ex.	ex.	poor
G-60-M	5	B	80	ex.	ex.	ex.	poor
T-40-C	8	HB	5	ex.	ex.	ex.	good
T-45-C	10-18	HB	15	ex.	ex.	ex.	fair
T-50-C	10-18	HB	30	ex.	good	good	poor
T-55-C	10-18	B	80	ex.	good	good	poor
T-40-M	4.7	HB	5	ex.	ex.	ex.	good
T-45-M	4.7	HB	5	ex.	ex.	ex.	poor
T-50-M	5.5	HB	30	ex.	ex.	ex.	poor
T-55-M	6.7	B	65	ex.	ex.	ex.	poor

ex. — no spotting; good — slight spotting; fair — spot/soften; poor — dissolve film.

films. The polar OH groups and the fact that alkyds undergo relatively little shrinkage during curing contribute to their good adhesion.

Kumanotani and co-workers[3] observed that film properties of alkyd/melamine baking enamels improve as the fraction of very high molecular weight material and of colloidal particles increases. Film properties of the air dry alkyds studied here follow a similar trend. It is surmised that the very high molecular weight material often present in conventional alkyds has a significant beneficial effect on film properties.

While the information available from this study and from the published literature is inadequate to draw firm general conclusions, it points toward the conclusion that reductions of alkyd resin $\bar{M}_n$ and PDI are harmful to film properties. If so, measures designed to minimize viscosity by eliminating the high molecular weight fractions formed in conventional alkyd production will probably involve film property tradeoffs. Since the expected solids reductions are estimated to be only 2%-10%, it is doubtful whether any net gain can be expected. It may be significant that the resin pair having the largest favorable difference in viscosity (G-7-C and G-7-M) displays the largest unfavorable difference in film properties.

SUMMARY AND CONCLUSIONS

In the preceding paper it was shown that model alkyd resins having reduced polydispersity indices (PDIs) and presumably more uniform structures can be prepared by mild-temperature esterification. In this paper it was shown that the low-PDI model alkyds have lower solution viscosities than conventional alkyds. As a result, it is estimated that coatings could be formulated from model alkyds at 2%-10% higher wt solids than coatings formulated from conventional alkyds made from the same monomer composition. Coatings formulated from model alkyds dry faster than those based on conventional alkyds. However, they tend to have inferior film properties, especially impact resistance.

The viscosity and film property differences between model and conventional alkyds are attributable to the different molecular weights and molecular weight distributions of model and conventional alkyds.

The overall picture emerging from this and previous studies is that it is possible to reduce viscosity of alkyd resins enough to permit formulation of coatings at up to 10% higher wt solids by reducing $\bar{M}_n$ and PDI. However, certain film physical properties suffer as a result of these changes, and the tradeoffs are often unattractive. We conclude that it is probably not feasible to make high quality, higher-solids, air dry coatings simply by manipulating the molecular weights of alkyd resins. Novel approaches will be necessary to achieve high-solids, one-package coatings that provide good film properties when applied at ambient temperatures. We are investigating possible approaches and will report the results in subsequent papers in this series.

ACKNOWLEDGMENT

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Program for Computing Casson Parameters from Brookfield Viscosity Using IBM Personal Computer

Jaroslav Rybicky
Reichhold Limited*

A program is presented that computes the Casson plot and parameters from Brookfield viscosity measurements. The program runs on the IBM PC AT computer equipped with an Enhanced Graphic Display and a printer. It computes, displays, and prints Casson's parameters, namely the infinite shear viscosity, yield point, and levelling viscosity, after Brookfield viscosity values for individual rpm values are entered. The agreement of experimental findings with the theory is assessed numerically by the standard deviation and graphically by a simultaneous display of the experimental points and the best-fit Casson line for the points. Each sub-routine of the program is clearly identified and described so that it can be modified eventually for other computers.

INTRODUCTION

The sole purpose of this article is to provide for a simple means for the so-called Casson plot and calculation. No attempt is made to explain or justify the Casson theory; readers interested in the latter are encouraged to use the references as indicated.[1-5] Thus, this article will be useful primarily to those experimentors who are familiar with the Casson treatment and are seeking a fast, elegant, and inexpensive way to utilize the Casson theory.

The rheological measurements related to organic coatings and resin solutions are often extended into the Casson treatment which correlates the Brookfield viscosity of a sample for particular shear rates with the sample performance during its storage and application.[1,2] In principle, the Casson equation predicts a straight line with the intercept equal to the square root of the infinite shear viscosity, η_{INF}, and the slope being the square root of the yield value, τ_o, when the square root of viscosity, η, is plotted against the reciprocal of the square root of the shear rate, γ.

$$\eta^{1/2} = \eta_{INF}^{1/2} + \tau_o^{1/2}\,\gamma^{-1/2} \qquad (1)$$

The parameters obtained, such as the infinite shear viscosity and the yield value of a coating, are related to the product performance, such as sag resistance, settling, levelling, flow, physical stability, and others.[3,4]

Equation (1) makes it possible to distinguish between Newtonian and non-Newtonian behavior of coatings by virtue of the following relationships.

$$\eta = N/C \qquad (2)$$

and

$$\gamma = G/C \qquad (3)$$

where N and G are the apparent viscosity and shear rate, respectively, for the Newtonian case, and C is a correlation factor given by equation (4).

$$C = 1/(1 + d\ln N/d\ln G) \qquad (4)$$

Apparently, C equals unity for the Newtonian case.

Despite some limitations of the Casson equation discussed elsewhere,[3] it remains very useful for practical work.

The actual technique for utilization of the Casson equation substitutes rpm of a spindle for the shear rate, according to the following equality.

$$G = \pi\,(\text{rpm})/15 \qquad (5)$$

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Viscosity and Casson Parameters

Sample identification: EXAMPLE

N(0)	RPM	G(0)	N	G	SQR(N)	1/SQR(G)
600	.5	.1047198				
480	1	.2094395	325.4746	.3088750	18.04091	1.799321
400	2.5	.5235987	320.4088	.6536633	17.89997	1.236867
330	5	1.047197	238.4136	1.449477	15.44065	.8306045
280	10	2.094395	213.6289	2.745090	14.61606	.6035618
245	20	4.188790	197.8018	5.188291	14.06420	.4390236
220	50	10.47197	194.1581	11.86576	13.93406	.2903035
209	100	20.94395				

Casson Plot Parameters:

Intercept = sqr(inf shear visc)	= 12.93982
Slope = sqr(yield point)	= 3.145761
Standard deviation	= .6305622
Infinite shear viscosity	= 167.4389
Yield point	= 9.895811
Levelling viscosity	= 1971.131

Figure 1—Example of Program Report

This approximation has been found adequate over the range of shear rates obtainable with the Brookfield viscometer.

COMPUTATION

The algorithm presented here will run in its entirety on the IBM PC AT computer equipped with the Enhanced Graphic Display. The absence of the graphic expansion will still allow the program to run with the exception of the display of Casson plot on the monitor.

When the program is RUN, it first explains its function and instructs the user to enter viscosity reading data for each of the rpm values automatically appearing on the monitor. Blank values are acceptable. When data unacceptable by Casson theory is entered, alarm sound and displayed instructions will prompt the user to correct the entry.

Following data input, the program performs the Casson calculations, evaluates the least square fit to the Casson plot, and displays a menu of five choices: (1) numerical results on screen; (2) numerical results on hard copy; (3) Casson plot on screen; (4) new sample; and (5) end program.

Choice 2 will provide tabulated results in the format illustrated in *Figure* 1. It uses the following notation: N(0) for the Brookfield viscosity in poise; RPM for the rotations per minute of the spindle; G(0) for the Newtonian estimate of the shear rate in sec^{-1} [equation (5)]; N for the absolute viscosity in poise [equation (2)]; G for the shear rate in sec^{-1} [equation (3)]; SQR (N) for the square root of the absolute viscosity; and 1/SQR(G) for the reciprocal of the square root of the shear rate. The Casson plot parameters are self-explanatory with the exception of the levelling viscosity. The latter is determined according to equation (1) for γ equal to 0.01 s^{-1}, and the determination is based on two assumptions: (1) the Casson equation remains valid far below the minimum shear rate obtainable with a Brookfield viscometer, and (2) levelling usually occurs at a shear rate of 0.01 s^{-1}. Should another shear rate be preferred for the calculation of levelling viscosity, program line #1078 can be modified; a numerical result for a new $\gamma^{-1}/2$ would be substituted for the current value of 10.

Choice 1 will display a similar table with ISQR(G) standing for 1/SQR(G), for space reasons.

Choice 3 will display the Casson plot for the data entered, with individual points and a straight line of the best fit. This option provides visual information on the agreement (or disagreement) of the experimental data with the Casson theory.

Options 1, 2, and 3 preserve the data in memory for repeated use. Option 4, on the other hand, destroys old data and clears the memory for the next set of viscosity measurements. Option 5 allows a user to exit the program.

In the program, lines 1800 through 1950 command a printer to provide a hard copy of results. These lines may need some minor modifications for different printers.

ACKNOWLEDGMENTS

The author wishes to thank C. J. Ruzicka and R. P. Hammond for the final touches that polished the program.

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APPENDIX

IBM PC Program Using Brookfield Viscosity to Determine Casson Parameter

```
1 :
3 REM                 casson plot from brookfield viscosity
5 :
30 PI=3.1415925#
90 DIM A$(41),D(3,10)
110 :
120 REM          explanation page
130 :
140 KEY OFF : CLS
150 PRINT"This program will accept Brookfield"
160 PRINT"viscosity data for a series of speeds."
170 PRINT"It will yield infinite shear viscosity,"
180 PRINT"yield point and Casson plot."
200 PRINT:PRINT
210 PRINT"You will be asked to type in viscosity"
220 PRINT"data (in poises) for a series of speeds"
230 PRINT"in rpm."
240 T$="Continue"
300 GOSUB 9900
305 :
306 REM         data entry
307 :
320 PRINT"SAMPLE IDENTIFICATION:";
330 GOSUB 8500
350 PRINT "Please enter VISCOSITY data"
352 PRINT"At least 4  points must be entered"
353 PRINT
355 PRINT" SPEED (rpm)      VISCOSITY (poise)"
360 PRINT
370 PRINT TAB(5)"0.5";:GOSUB 9000:REM   get brookf visc
380 N(1)=NU:SP(1)=.5
390 PRINT TAB(5)"1  ";:GOSUB 9000
400 N(2)=NU:SP(2)=1
410 PRINT TAB(5)"2.5";:GOSUB 9000
420 N(3)=NU:SP(3)=2.5
430 PRINT TAB(5)"5  ";:GOSUB 9000
440 N(4)=NU:SP(4)=5
450 PRINT TAB(4)"10  ";:GOSUB 9000
460 N(5)=NU:SP(5)=10
470 PRINT TAB(4)"20  ";:GOSUB 9000
480 N(6)=NU:SP(6)=20
490 PRINT TAB(4)"50  ";:GOSUB 9000
500 N(7)=NU:SP(7)=50
510 PRINT TAB(3)"100  ";:GOSUB 9000
515 PRINT
520 N(8)=NU:SP(8)=100
530 PRINT"CALCULATIONS IN PROGRESS, PLEASE WAIT"
535 :
536 REM    collect experimental points
540 :
545 I=0
550 FOR J=1 TO 8
555 IF N(J)<>0 THEN I=I+1:N(I)=N(J):SP(I)=SP(J)
560 NEXT J
565 M=I
597 :
598 REM compute corrected viscosity & shear rate
599 :
600 FOR I=1 TO M
610 G(I)=SP(I)*PI/15
```

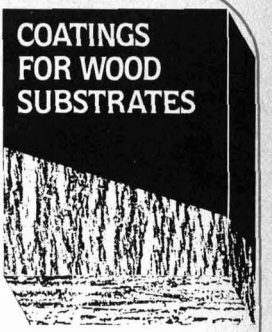
```
1503 CLS
1505 PRINT"Sample Identification: "SN$
1510 PRINT L1$;
1520 PRINT"N(0)  RPM   G(0)   N     G   SQRN  ISQRG"
1530 PRINT L2$;
1535 AA$="        ":PRINT
1540 FOR I=1 TO M
1541 N$=MID$(STR$(N(I))+AA$,2,5)
1542 SP$=LEFT$(STR$(SP(I))+AA$,5)
1543 G$=LEFT$(STR$(G(I))+AA$,6)
1544 V$=LEFT$(STR$(V(I))+AA$,6)
1545 H$=LEFT$(STR$(H(I))+AA$,6)
1546 Y$=LEFT$(STR$(Y(I))+AA$,6)
1547 X$=LEFT$(STR$(X(I))+AA$,6)
1548 IF I=1 THEN PRINT N$SP$G$:GOTO 1560
1549 IF I=M THEN PRINT N$SP$G$:GOTO 1560
1550 IF V(I)=0 THEN PRINT N$SP$G$"  incompatible point":GOTO 1560
1555 PRINT N$SP$G$V$H$Y$X$
1560 NEXT
1570 PRINT L1$
1580 PRINT"        CASSON PLOT PARAMETERS          "
1590 PRINT L2$
1600 PRINT"Intercept=SQR(inf shear visc)="LEFT$(STR$(A)+AA$,9)
1610 PRINT"Slope    =SQR(yield point)   ="LEFT$(STR$(B)+AA$,9)
1611 IF M>4 THEN PRINT"Standard deviation          ="LEFT$(STR$(SD)+AA$,9)
1612 PRINT"Infinite shear viscosity     ="LEFT$(STR$(IV)+AA$,9)
1614 PRINT"Yield point                  ="LEFT$(STR$(YP)+AA$,9)
1616 PRINT"Levelling viscosity          ="LEFT$(STR$(LV)+AA$,9)
1620 T$="return to the Menu"
1630 GOSUB 9900
1650 GOTO 1200
1797 :
1798 REM   numeric results on printer
1799 :
1800 CLS
1810 T$="return to the Menu"
1820 LPRINT CHR$(10)CHR$(10)CHR$(14)"Viscosity and Casson Parameters"
1825 ID$="Sample identification: "
1830 LPRINT CHR$(15)CHR$(10)CHR$(10)ID$SN$:LPRINT
1840 LPRINT "N(0)      RPM        G(0)       N          ";
1850 LPRINT "G         SQR(N)     1/SQR(G)"
1860 LPRINT
1862 AA$="        "
1870 FOR I=1 TO M
1871 N$=MID$(STR$(N(I))+AA$,2,7)
1872 SP$=LEFT$(STR$(SP(I))+AA$,8)
1873 G$=LEFT$(STR$(G(I))+AA$,10)
1874 V$=LEFT$(STR$(V(I))+AA$,10)
1875-H$=LEFT$(STR$(H(I))+AA$,10)
1876 Y$=LEFT$(STR$(Y(I))+AA$,10)
1877 X$=LEFT$(STR$(X(I))+AA$,10)
1878 IF I=1 THEN LPRINT N$SP$G$:GOTO 1900
1879 IF I=M THEN LPRINT N$SP$G$:GOTO 1900
1880 IF V(I)=0 THEN LPRINT N$SP$G$"                incompatible point":GOTO 1900
1890 LPRINT N$SP$G$" "V$" "H$" "Y$" "X$
1900 NEXT
1910 LPRINT CHR$(10)CHR$(10)"                      Casson Plot Parameters:"CHR$(10
)
1920 LPRINT "          Intercept = sqr(inf shear visc) = "LEFT$(STR$(A),9)
1925 LPRINT "          Slope = sqr(yield point)        = "LEFT$(STR$(B),9)
```

```
3670 NEXT J
3680 FOR L=0 TO 1
3690 IF L=K THEN 3710
3700 L(K)=L(K)+M(L,K)
3710 NEXT L
3720 C(I)=C(I)+L(K)*Y(I-1+K)
3730 NEXT K
3740 RETURN
4997 :
4998 REM  data incompatible with casson theory
4999 :
5000 GOSUB 10000
5010 PRINT:PRINT"POINT #"I" IS NOT COMPATIBLE WITH" ;
5020 PRINT" KRIEGER'S TREATMENT!"
5022 PRINT:PRINT:PRINT"PRESS ANY KEY TO CONTINUE"
5025 JK$=INKEY$: IF JK$="" THEN GOTO 5025
5030 V(I)=0:RETURN
8497 :
8498 REM            get number,letter,symbol
8499 :
8500 X=1:SN$=""
8510 A$(X)=INKEY$:IF A$(X)="" THEN 8510
8520 IF A$(X)=CHR$(13) THEN LX=X-1:GOTO 8600
8530 A=ASC(A$(X))
8532 IF X=1 THEN 8536
8533 REM  Q1$="                                          "
8534 REM  Q2$="=========================================="
8535 IF A=20 THEN PRINT :GOTO 8500
8536 IF A>=97 AND A<=122 THEN A=A-32:A$(X)=CHR$(A)
8540 IF A<32 OR A>93 THEN 8510
8550 PRINT A$(X);:X=X+1:IF POS(0)=40 THEN LX=X-2:GOTO 8600
8560 GOTO 8510
8600 FOR X=1 TO LX
8610 SN$=SN$+A$(X)
8620 NEXT
8625 PRINT
8630 RETURN
8997 :
8998 REM           get number
8999 :
9000 X=0:NU=0:FL=0
9010 REM FL=FLAG TO PREVENT REPRINT OF SPACING IN 9065 AFTER A CORRECTION
9020 A$=INKEY$:IF A$="" THEN 9020
9030 IF A$=CHR$(13) THEN 9200
9040 A=ASC(A$)
9042 IF X=0 THEN 9050
9045 REM IF A=20 THEN A%=POS(0)-X:PRINT CHR$(13)TAB(A%)"      ============= ":GO
TO 9000
9050 IF A=8 OR (A>45 AND A<58) THEN 9060 : REM SCREEN INPUT KEYS
9055 GOTO 9020
9060 IF A=47 THEN 9020
9065 IF X=0 AND FL=0 THEN PRINT "             "; : REM PRINT COLUMN SPACING
9070 IF A<>8 THEN 9100 : REM DETERMINE IF A CORRECTION IS BEING MADE
9072 IF X=0 THEN 9020 : REM CANNOT BACKSTEP PAST BEGINNING
9075 PRINT CHR$(29);CHR$(32);CHR$(29); : REM EXECUTE ERASURE OF ERROR CHARACTER
9080 X=X-1:FL=FL+1 :REM RESET X COUNTER TO ACCOUNT FOR CORRECTION SET FLAG
9085 GOTO 9020
9100 PRINT A$;:X=X+1:A(X)=A
9104 IF X=9 THEN GOTO 10150
9110 GOTO 9020
```

```
620 X(I)=LOG(G(I))
630 Y(I)=LOG(N(I))
640 NEXT
650 FOR I=2 TO M-1
660 GOSUB 3500
670 NEXT
810 FOR I=2 TO M-1
815 IF (1+C(I))<=0 THEN GOSUB 5000:GOTO 860
820 V(I)=N(I)*(1+C(I))
830 H(I)=G(I)/(1+C(I))
840 Y(I)=SQR(V(I))
850 X(I)=1/SQR(H(I))
860 NEXT
997 :
998 REM   least square fit to casson plot
999 :
1000 S1=0:S2=0:S3=0:S4=0
1010 FOR I=2 TO M-1
1020 S1=S1+X(I)
1030 S2=S2+X(I)^2
1040 S3=S3+Y(I)
1050 S4=S4+X(I)*Y(I)
1060 NEXT
1062 S1=S1/(M-2):S2=S2/(M-2):S3=S3/(M-2):S4=S4/(M-2)
1064 DE=S1^2-S2
1066 A=(S1*S4-S2*S3)/DE
1068 B=(S1*S3-S4)/DE
1070 DE=0: REM stardard deviation
1071 FOR J=2 TO M-1
1072 D1=Y(J)-A-B*X(J):DE=DE+D1^2
1073 NEXT J
1074 IF M>4 THEN SD=SQR(DE/(M-4))
1076 IV=A^2
1077 YP=B^2
1078 LV=(A+10*B)^2
1197 :
1198 REM         menu on screen
1199 :
1200 JUNK$=INKEY$:IF JUNK$<>"" THEN 1200
1205 CLS:PRINT TAB(16)"M E N U"
1210 T1$="1. Numerical results on screen"
1220 T2$="2. Numerical results on hard copy"
1230 T3$="3. Casson plot on screen"
1235 T4$="4. New sample"
1240 T5$="*****     Hit the corresponding number"
1245 T6$="5. End program"
1250 PRINT T1$:PRINT T2$:PRINT T3$:PRINT T4$:PRINT T6$
1255 PRINT:PRINT:PRINT T5$
1260 A$=INKEY$:IF A$="" THEN 1260
1270 IF ASC(A$)=49 THEN 1500
1280 IF ASC(A$)=50 THEN 1800
1290 IF ASC(A$)=51 THEN 2100
1300 IF ASC(A$)=52 THEN 2400
1305 IF ASC(A$)=53 THEN CLS:SYSTEM
1310 GOTO 1200
1497 :
1498 REM   numeric results on screen
1499 :
1500 L1$="------------------------------------------------"
1502 L2$="------------------------------------------------"
```

```
1930 IF M<=4 THEN 1932
1931 LPRINT "          Standard deviation              = "LEFT$(STR$(SD),9)
1932 LPRINT "          Infinite shear viscosity        = "LEFT$(STR$(IV),9)
1934 LPRINT "          Yield point                     = "LEFT$(STR$(YP),9)
1936 LPRINT "          Levelling viscosity             = "LEFT$(STR$(LV),9)
1940 LPRINT "          ----------------------------------------"CHR$(10)
1950 GOSUB 9900
1970 GOTO 1200
2097 :
2098 REM            plot on screen
2099 :
2100 CLS:SCREEN 1
2105 ON ERROR GOTO 2295
2110 LINE (0,0)-(0,159):LINE (0,159)-(319,159):REM plot axes
2120 MY=Y(M-1):REM find max y
2130 FOR I=2 TO M-2
2140 IF (MY-Y(M-I))<0 THEN MY=Y(M-I)
2150 NEXT
2160 MX=X(M-1):REM find max x
2170 FOR I=2 TO M-2
2180 IF (MX-X(M-I))<0 THEN MX=X(M-I)
2190 NEXT
2200 FY=140/MY:REM define scale
2210 FX=290/MX
2215 FOR I=2 TO M-1:REM plot points
2220 X=FX*X(I):Y=159-FY*Y(I)
2225 DRAW "BM=x;,=y; E2 F2 L4"
2230 NEXT
2240 LINE (0,159-FY*A)-(319,159-(FY*A+B*319*FY/FX)):REM best fit casson line
2250 LOCATE 21,1:PRINT "Sample "SN$
2260 T$="continue"
2270 GOSUB 9900
2280 SCREEN 0,0,0:WIDTH 80
2290 GOTO 1200
2295 PRINT "The plot command only works with a GRAPHICS Adapter": GOTO 2260
2397 :
2398 REM         new sample
2399 :
2400 CLS:PRINT
2410 GOTO 320
3497 :
3498 REM        lagrange derivation
3499 :
3500 FOR J=0 TO 1
3510 L(J)=0
3520 FOR K=0 TO 1
3530 M(J,K)=1
3540 NEXT K
3550 NEXT J
3560 C(I)=0
3570 FOR K=0 TO 1
3580 FOR J=0 TO 1
3590 IF J=K THEN 3670
3600 FOR L=0 TO 1
3610 IF L=K THEN 3660
3620 IF L<>J THEN 3650
3630 M(L,K)=M(L,K)/(X(I-1+K)-X(I-1+J))
3640 GOTO 3660
3650 M(L,K)=M(L,K)*(X(I)-X(J+I-1))/(X(I-1+K)-X(I-1+J))
3660 NEXT L
```

```
9200 LX=X:IF LX=0 THEN NU=0:GOTO 9510
9210 FOR X=1 TO LX
9220 IF A(X)=46 THEN 9400:REM dec point
9230 NEXT
9240 FOR X=1 TO LX
9250 NU(X)=VAL(CHR$(A(X)))*10^(LX-X)
9260 NEXT
9270 FOR X=1 TO LX
9280 NU=NU+NU(X)
9290 NEXT
9300 GOTO 9510
9400 DX=X
9410 FOR X=1 TO DX-1
9420 NU(X)=VAL(CHR$(A(X)))*10^(DX-1-X)
9430 NEXT
9440 FOR X=DX+1 TO LX
9450 NU(X)=VAL(CHR$(A(X)))/10^(X-DX)
9460 NEXT
9470 FOR X=1 TO LX
9475 IF X=DX THEN 9490
9480 NU=NU+NU(X)
9490 NEXT
9500 GOTO 9510
9510 JUNK$=INKEY$:IF JUNK$<>"" THEN 9510
9520 RETURN
9897 :
9898 REM              get return
9899 :
9900 PRINT:PRINT
9910 JUNK$=INKEY$:IF JUNK$<>"" THEN 9900
9920 PRINT"*****     Hit any key to "T$;
9930 A$=INKEY$:IF A$="" THEN 9930
9940 CLS:RETURN
9997 :
9998 REM           sound alarm
9999 :
10000 S=54272!
10010 FOR L=0 TO  5:PRINT CHR$(7);:NEXT
10080 FR=5389
10090 FOR T=1 TO 20
10110 HF=INT(FQ/256):LF=FQ-HF*256
10130 NEXT
10145 RETURN
10147 :
10148 REM    viscosity too high
10149 :
10150 GOSUB 10000
10153 PRINT
10155 PRINT"   Viscosity is too high!!!"
10160 T$="Start from the beginning"
10170 PRINT"HIT ANY KEY TO CONTINUE"
10175 G$=INKEY$:IF G$ ="" THEN 10175
10180 GOSUB 9900
10190 GOTO 320
```



SPRING WEEK '87

Advance Registration and Hotel Reservation Forms

Sponsored by
Federation of Societies for Coatings Technology
and
Pacific Northwest Society for Coatings Technology

April 29–May 2
The Westin Hotel • Seattle, Washington

Featuring
FSCT Seminar on
"Coatings for Wood Substrates"
May 1–2

(See program outline on page 116)

Spring Week Schedule

Wed., April 29 — FSCT Society Officers Meeting
Thur., April 30 — PNW Golf
FSCT Board of Directors Meeting
PNW Evening Social
Fri., May 1 — FSCT Spring Seminar
Sat., May 2 — Seminar until 12:30 pm
PNW Sports Competition
Closing Dinner Dance

United Airlines has been selected as official carrier for Spring Week '87. Discounts will range from 40%-70% off normal round-trip coach fares. To make reservations, phone 1-800-521-4041, and refer to the Federation's account number—7013-D. Be sure to request the lowest fare available.

FEDERATION MEMBERS ONLY—ADVANCE REGISTRATION
for
SPRING WEEK ACTIVITIES
and
SEMINAR ON COATINGS FOR WOOD SUBSTRATES

Sponsored by FSCT and PNWSCT

Thursday, Friday, Saturday, April 30–May 2, 1987
Westin Hotel, Seattle, Washington

Please complete all applicable sections of this form. Mail with check in the correct amount to FSCT at address below. All checks must be payable in U.S. Funds.

Fed. Socs. Coatings Tech.
1315 Walnut St.
Philadelphia, PA 19107

No advance registrations will be accepted after **April 10.** After that date, the Seminar registration fee (including Saturday Dinner-Dance) will be $135.00. Other fees remain the same.

Membership status is subject to verification by the FSCT Staff. This form and check will be returned to anyone not currently enrolled as a member of the Federation of Societies for Coatings Technology.

MEMBER REGISTRATION

Name _____ Nickname for Badge _____

Business Affiliation _____ Phone _____

Address _____

City _____ State/Province _____

Mailing Zone _____ Country _____

Name of Federation Society In Which You Are A Member _____

SPOUSE REGISTRATION

Name _____ Nickname for Badge _____

City _____ State/Province _____ Country _____

HOUSING AT WESTIN HOTEL

The confirmation of your reservation will come to you directly from the Westin, located at 1900 Fifth Ave., Seattle, WA 98111. Phone: 206-624-7400. All reservations will be held until 6:00 p.m. None can be guaranteed after April 6, 1987.

Rates: Single or Double ($82.00) Suites: Deluxe P & 1 BR ($350.00)

Check Accommodation Desired: _____ Single _____ Double _____ Suite

Date/Day of Arrival _____ Day/Date of Departure _____

Note: All room rates are subject to a state sales tax of 7.9% and city room tax of 5.0%.

SCHEDULE OF FEES FOR FEDERATION MEMBERS ONLY

Check Events Desired	Events	Fee Per Person	Write-In Amount Below
	Member		
_____	Seminar on "Coatings for Wood Substrates" Friday and Saturday, May 1-2	$110	_____
_____	Dinner-Dance, Saturday, May 2	Included With Above Fee	
_____	Dinner-Social, Thursday, April 30	$ 25	_____
_____	Golf, Thursday, April 30 (includes lunch)	$ 30	_____
	Spouse		
_____	Spouses Activities	$ 50	_____
_____	Dinner-Dance, Saturday, May 2	Included With Above Fee	
_____	Dinner-Social, Thursday, April 30	$ 25	_____
	(Enclose Check in This Amount)	TOTAL FEES	_____

NON-MEMBERS ONLY—ADVANCE REGISTRATION

for

SPRING WEEK ACTIVITIES

and

SEMINAR ON COATINGS FOR WOOD SUBSTRATES

Sponsored by FSCT and PNWSCT

Thursday, Friday, Saturday, April 30–May 2, 1987

Westin Hotel, Seattle, Washington

Please complete all applicable sections of this form. Mail with check in the correct amount to FSCT at address below. All checks must be payable in U.S. Funds.

Fed. Socs. Coatings Tech.
1315 Walnut St.
Philadelphia, PA 19107

No advance registrations will be accepted after **April 10.** After that date, the Seminar registration fee will be $150.00. Other fees remain the same.

NON-MEMBER REGISTRATION

Name _____ Nickname for Badge _____

Business Affiliation _____ Phone _____

Address _____

City _____ State/Province _____

Mailing Zone _____ Country _____

SPOUSE REGISTRATION

Name _____ Nickname for Badge _____

City _____ State/Province _____ Country _____

HOUSING AT WESTIN HOTEL

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Rates: Single or Double ($82.00) Suites: Deluxe P & 1 BR ($350.00)

Check Accommodation Desired: _____ Single _____ Double _____ Suite

Date/Day of Arrival _____ Day/Date of Departure _____

Note: All room rates are subject to a state sales tax of 7.9% and city room tax of 5.0%.

SCHEDULE OF FEES FOR NON-MEMBERS ONLY

Check Events Desired	Events	Fee Per Person	Write-In Amount Below
	Non-Member		
_____	Seminar on "Coatings for Wood Substrates" Friday and Saturday, May 1-2	$125	_____
_____	Dinner-Dance, Saturday, May 2	$ 40	_____
_____	Dinner-Social, Thursday, April 30	$ 25	_____
_____	Golf, Thursday, April 30 (includes lunch)	$ 30	_____
	Spouse		
_____	Spouses Activities	$ 50	_____
_____	Dinner-Dance, Saturday, May 2	Included With Above Fee	
_____	Dinner-Social, Thursday, April 30	$ 25	_____
	(Enclose Check in This Amount)	TOTAL FEES	_____

COATINGS FOR WOOD SUBSTRATES

PROGRAM

"REDWOOD — PROPERTIES, USES, PAINTING AND STAINING RECOMMENDATIONS"
Keith Kersell, Technical Promotion Manager,
The Pacific Lumber Co., San Francisco, CA

"STAINS FOR WOOD SIDING"
Dr. Dale Williamson, Technical Director,
Olympic Home Care Products Co., Seattle, WA

"COATINGS RESEARCH AT THE FOREST PRODUCTS LABORATORY"
Dr. William C. Feist, Project Leader—Wood Surface Chemistry,
U.S. Dept. of Agriculture,
Forest Products Laboratory, Madison, WI

"HARDBOARD SIDING—COMPOSITION AND PROPERTIES. PAINTING RECOMMENDATIONS"
Speaker to be Announced.

"PLYWOOD—PROPERTIES, USES, AND RECOMMENDED PAINTING PROCEDURES"
Richard Carlson, Associate Scientist,
Research and Development Dept.,
American Plywood Assn., Tacoma, WA

"PAINTING HARDBOARD SIDING"
Stan Vout, Technical Manager for Forest Products Coatings,
Valspar Corp., Minneapolis, MN

"TODAY'S COATING SYSTEM FOR THE WOOD FURNITURE INDUSTRY"
Robert S. Bailey, Vice-President and General Manager,
Lilly Industrial Coatings, Inc., Indianapolis, IN

"INVESTIGATION OF LATEX STAIN BLOCKING PRIMERS ON WOOD SUBSTRATES"
Fred Marshall, Vice-President of Manufacturing and Research,
DPI Quality Paints, Inc., Clearwater, FL

"THE MILDEW PROBLEM ON PAINTED WOOD SURFACES"
Michael C. McLaurin, Industry Specialist for Coatings,
Buckman Laboratories, Inc., Memphis, TN

"PRESERVATIVE TREATMENTS FOR WOOD AND COATING TECHNIQUES"
Dr. Alan S. Ross, Manager of Product Development—Protection Products,
Koppers Co., Inc., Monroeville, PA

"THE RESPONSIBILITY OF THE ARCHITECT"
John Griener, AIA,
Seattle, WA

"HOW THE HOME BUILDER CAN HELP TO AVOID PAINT PROBLEMS"
Don Bender,
Bender and Chaffey Co., Seattle, WA

Several Open Forum Sessions will also be featured so that attendees will have an opportunity to question the speakers.

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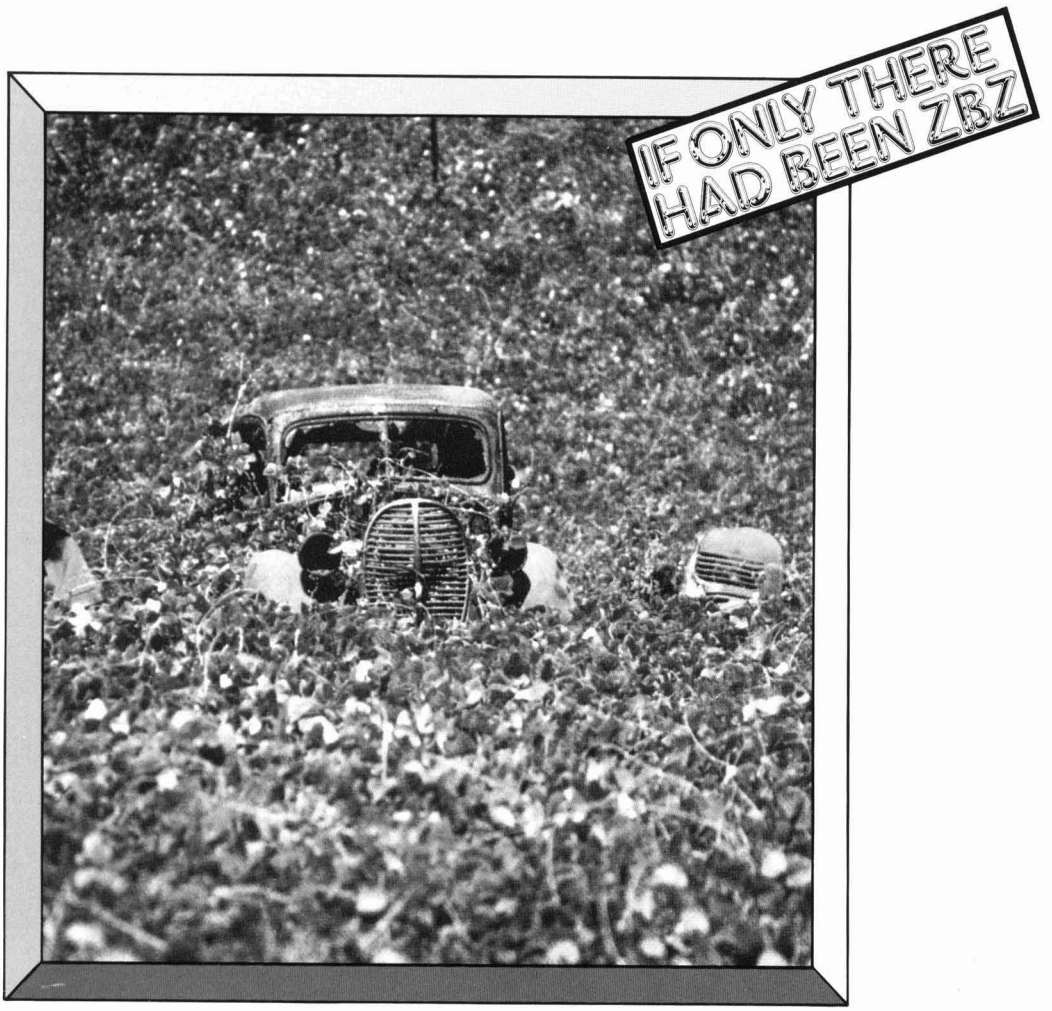

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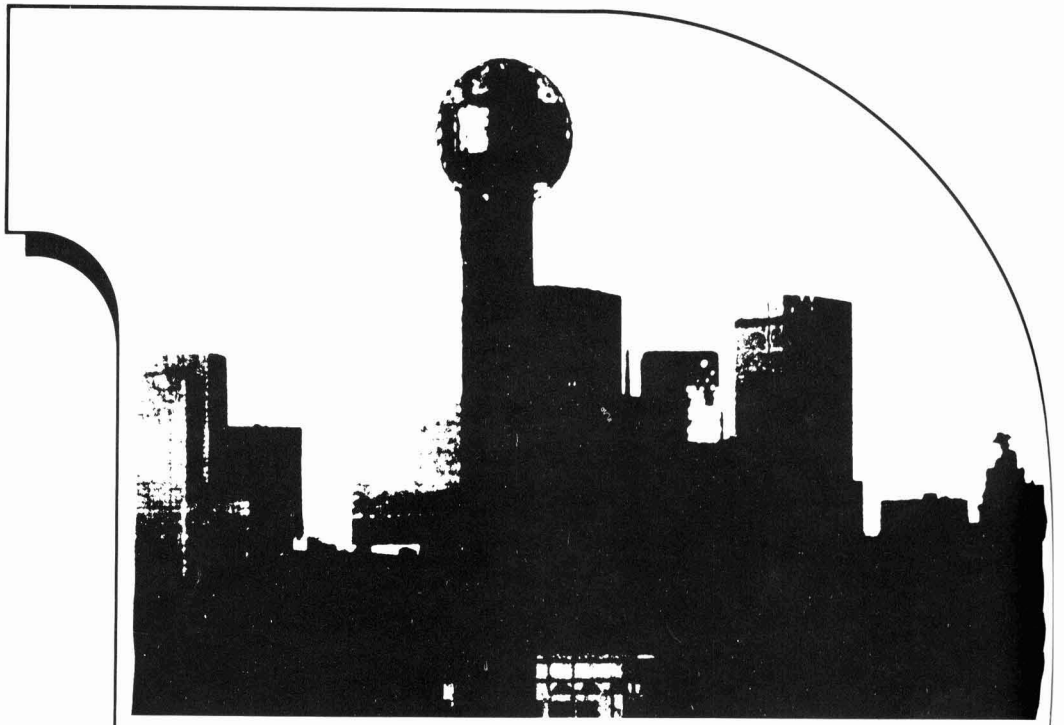
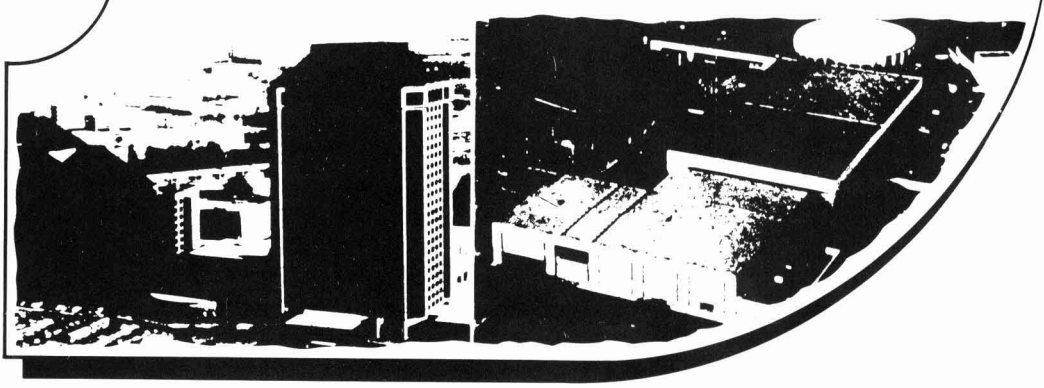


1987 Paint Industries' Show



Dallas Convention Center • Dallas, Texas
Monday, Tuesday, and Wednesday • October 5, 6, 7, 1987
Sponsored by Federation of Societies for Coatings Technology

These subcommittee reports are for the use of the membership of ASTM Committee D-1 in continuing its work and for the interest of readers in the activities of ASTM Committee D-1. The reports are not official actions of ASTM and may not be quoted as representing any action or policy of the American Society for Testing and Materials.

June 1986 Subcommittee Reports of ASTM Committee D-1

The June meeting of ASTM Committee D-1 on Paint and Related Coatings and Materials was held on June 15-18, 1986 at the Galt House in Louisville, KY. In the three and one-half days preceding the final session and general meeting of Committee D-1, 150 members and guests met in 134 scheduled meetings of D-1 subcommittees and working task groups. The present membership of Committee D-1 is 507.

Special Highlights of the meeting included talks by J.M. Carter on the Louisville Slugger, J.S. St. Clair on the FSCT Environmental Committee's activities, H.E. Ashton on use of D 3980 and a software program developed for it, and J.J. Brezinski on VOC Practice D 3960 versus EPA Method 24.

Awards presented included: D-1 Honorary Membership to H.A. Ball and Certificates of Appreciation to D.C. Gleason and S.M. Totty. E.T. Vonderbrink was presented a Certificate at the meeting of Sub. D01.57 in Toronto.

Appointments were made as follows: Sub. D01.27 on Accelerated Tests—F.W. Lutze as Vice-Chairman and Sub. D01.31 on Pigment Specifications—W.J. Hart to replace D.H. Ruddick as Vice-Chairman.

Highlights

The following items of major interest to the coatings industry warrant special emphasis:

Asbestiform Material in Talc—Sub. D01.21 will review the need for a standard to determine this. A report will be given at the January 1987 meeting.

Golden Gate Society Conference on VOC Methods and Procedures—Sub. D01.21.13's report gives details of this important conference which was attended by the group chairman, H. Fujimoto.

Problem of Calibration of Zahn Cups—Sub. D01.24.19 discussed this subject and what might be done about it.

Flocculation—Sub. D01.24.27 seeking methods used by paint companies to test for this phenomenon.

Purchasing of Paints—Sub. D01.41 is reviewing possible actions to take on "Weighted Cost of Active Ingredients" method in D 3927. Also ready to ballot on a new revision of Spec. for Interior Flat Latex Paint.

Water-Repellency of Wood—Sub. D01.42.20, a new task group for the development of a test, hopefully better than TT-W-572b, is seeking cooperators.

Organotin Release Rates in Anti-Fouling Paints—Sub. D01.45.08 working with EPA on problem of TBT release.

Guide for Painting Inspectors—Sub. D01.46.07's revision of guide (for metal substrates) ready for Society ballot. Will now develop guide for non-metal substrates.

Testing Industrial Water-Reducible Coatings—Guide ready for balloting, but subcommittee needs more active members.

Labeling for Chronic Health Hazards—Sub. D01.57 report gives up-to-date details on various state laws on this subject.

Future Meetings

January 25-28, 1987—Tampa, FL (Hyatt Regency).
June 21-24, 1987—Dearborn, MI (Hyatt Regency).
January 24-27, 1988—Clearwater Beach, FL (Holiday Inn).
June 26-29, 1988—Baltimore, MD.

New Standards

New D-1 standards since the January 1986 meetings of D-1 approved by the ASTM Committee on Standards in the months shown: (subcommittee jurisdiction)

APRIL 1986

D4584-86 "Test Method for Measurement of Apparent pH of Electrocoat Baths" (Sub. D0.21)

D4585-86 "Practice for Testing Water Resistance of Coatings Using Controlled Condensation" (Sub. D0.27)

MAY 1986

D4587-86 "Practice for Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light and Water Exposure Apparatus" (Sub. D0.27)

DIVISION 1 ADMINISTRATIVE

SUBCOMMITTEE D01.07 GOVERNMENT CONTACTS

R.J. Martell, Chairman

A.A. Chasan chaired the meeting in the absence of the chairman.

It was announced that revision "C" of FEDERAL-STANDARD-141 has been promulgated and is now an official document. It contains a listing of those federal methods that have been cancelled and superseded by ASTM documents. The standard was issued by the Army at Fort Belvoir, VA, and is available either through the Naval Publications and Forms Center in Philadelphia, or the Federal Supply Service of the General Services Administration in Washington, DC.

Administratively, Region 10, Auburn, WA, of the Federal Supply Service, from where all GSA-FSS buying actions emanate, is being absorbed into Region 9, San Francisco. No personnel moves are being anticipated and paint suppliers to the government should not be affected.

The Army, as the assignee activity for FSC 8010, requested all specifying agencies within the government to submit a plan of implementation regarding compliance to VOC (Volatile Organic Compounds) regulations. The standards of enforcement to be adhered to will be the ones developed by the South Coast Air Quality Management District of California (SCAQMD) with a statutory deadline of December 31, 1987.

Specification activities for FSC 8030, Sealants and Adhesives, have been moved from Kansas City, MO to Auburn, WA.

SUBCOMMITTEE D01.08 ENVIRONMENTAL CONCERNS

J.J. Brezinski, Chairman

Activities of ASTM Environmental Coordinating Committee—A Groundwater Standards Coordinating Task Group (GSCT6) has been formed to coordinate standards activity regarding ground water contamination in Committees D-18, D-19, and D-34.

Formation of a similar task group to coordinate VOC-related standards activities in D-1 and D-22 will be explored.

ASTM VOC Document—The preparation of an ASTM Special Technical Publication (STP) dealing with VOC measurement will be undertaken by the subcommittee with the assistance of Sub. D01.21.

Revision of D 3630, "Standard Practice for Determining Constituents Classified as Hazardous Contained in Protective Coatings"—Proposed changes in the title and content of D 3630 will be prepared by the chairman for review at the next meeting. Regulatory changes over the past few years necessitate such revision.

SUBCOMMITTEE D01.13 CONSUMER AFFAIRS

R. S. Shane, Chairman

The chairman described the advisory nature of the subcommittee. He then discussed the liaison with Committees F-15 and Sub. D01.41. An extensive discussion followed on labeling. A draft standard practice for consumer-oriented labels will be prepared and circulated to Sub. D01.90 and key F-15 people for comment.

SUBCOMMITTEE D01.18 EDITORIAL

S. LeSota Chairman

D01.18.02, Indexing, S. LeSota, Chairman, reviewed the progress on this project and discussed future plans. Good progress is being made; the latest index is much improved. However, this will be an ongoing effort.

It was agreed to press D-1 members to choose key words during the development of a standard and to make sure that the titles of standards contain the most pertinent key words. All future standards will be checked for these key words.

SUBCOMMITTEE D01.94 AWARDS & MEMORIALS

S.B. Levinson, Chairman

Approval was given for the presentation of the Henry A. Gardner Award in June 1987 to Laurance R. Thurman. Awardees were also selected for the Award of Merit, the W.T. Pearce Award, and Certificates of Appreciation.

DIVISION 20 RESEARCH AND GENERAL METHODS

SUBCOMMITTEE D01.20 SAMPLING, STATISTICS, ETC.

H.E. Ashton, Chairman

The chairman reported that the revision to D 3980 to add a footnote on the availability of a software program to analyze results had not received any negative votes or comments, except for some editorial corrections he had submitted. He also noted that the $50 fee covered supply of the current program, the first revision, notices of any subsequent revisions, and that subsequent revisions would be supplied at cost. In view of the time devoted to writing the program, it was agreed that the charge was very reasonable. A notice will be placed in the ASTM Update column, *Standardization News*, when the revision passes Society ballot.

It was reported that the definitions in D 3980 had been reviewed and, in some cases, revised, but in other cases the definition prepared by Sub. D01.20 was considered superior. The revised definitions had been submitted to members prior to the meeting to promote discussion, but the letter ballot for those unable to attend would not close until mid-July. One minor revision raised by the chairman and the deletion of three terms not used in the practice were accepted. If no comments of substance are received, the revision will go to D-1 ballot. In the meantime, the chairman will try to define the last three terms not so far covered.

Most of the meeting was devoted to the Practice for Reporting or Scoring Qualitative Test Results. The chairman reported that the first draft discussed at the January meeting had been sent to the chairman of Sub. D01.25, who had returned a revised copy with favorable comments, and to concurrent ballot, from which ten negative votes (two without reason) had been received. It was agreed to change the term, "perfect," to "excellent" and add an intermediate term, to replace the present Note 1 with one noting that assigning qualifiers is subjective, and provide an explanation of why the scale is weighted towards better performance or minimal effect, as are other methods such as D 610. Two requests to delete the rating of zero were rejected because the 0-10 scale is commonly used. It was also noted that it is ASTM practice to assign higher scores to

more desirable results so that more of a failure such as rusting should not receive a high score. The chairman will attempt to resolve as many disagreements as possible, write to negative voters explaining the position adopted by the subcommittee, and return the revised practice to ballot. It was proposed that attendance at the next meeting should be stimulated by a note in *Standardization News* on the difficulties being experienced in reaching a consensus on some of the qualifying terms.

There was no time to discuss the proposed accreditation practice so the chairman will assemble the results of the letter ballot and circulate to those who have expressed interest.

SUBCOMMITTEE D01.21 CHEMICAL ANALYSIS OF PAINTS AND PAINT MATERIALS

R.W. Scott, Chairman

D01.21.13, Coordination of VOC Standards and Information, H. Fujimoto, Chairman, heard a letter from the chairman who apologized for his absence, explaining that he attended instead a conference and workshop sponsored by the Golden Gate Society for Coatings Technology in San Francisco on the methods and procedures developed for the determination of VOC in coatings by the Bay Area Air Quality Management District (BAAQMD). Since California seems to be the precedent-setting government regulatory body, and with the EPA's "Reasonable Extra Effort Program" (REEP) instituted, it is imporant to ascertain whether the data obtained from the proposed VOC test methods are in "sync" with those ASTM methods cited in U.S.-EPA's Reference Method 24.

In California, he reported, there has been some success in extending VOC regulations on a local level. The present 350 gms VOC allowed in architectural coatings is to be dropped to the new 250 gms VOC level, but the paint manufacturers do not have the technology necessary to meet this more stringent regulation. The ninth EPA District (in San Francisco) is citing both architectural and metal furniture manufacturers and requiring direct negotiations with the EPA to set up target dates. EPA wants the 250 gms of VOC and opposes extending the regulation to 1987.

It appears the reduction in ozone required by the Clean Air Act cannot be reached by 1987. Twenty-two major cities do not have SIP plans to regulate VOC. The ninth EPA Region has instituted a program which insures that any area experiencing difficulty in attaining the ozone standards make measurable progress. This means regulatory bodies must seek out similar regulation, in use, which are available, effective, and technically sound with public input through workshops and public hearing processes. Conflicts are to be resolved at the policy-making levels.

Expansion of the "REEP" program means that the EPA is turning the screws on non-attainment states to meet VOC regulations by looking elsewhere and copying established regulations. This is why California's VOC regulations and test methods are so important.

In California you might hear the new acronym, "PROC," which replaces the term, "VOC." "PROC" stands for "Photochemically Reactive Organic Compounds."

He reported further that pre-1987 will see enhanced enforcement of VOC regulations and that post-1987 also will see enhanced enforcement with more stringent regulations and new guidelines. Nationwide regulations will be placed on wood and architectural coatings. The present ozone regulation level of 0.1 ppm may be dropped to 0.085 ppm, which means less VOC emitted into the air.

He feels that Sub. D01.21 can be of tremendous help to the paint industry if it *would* institute: (1) a technical document discussing the measurements and calculations of VOC using ASTM methods and (2) set up, through Committee D-1 and ASTM Headquarters, regional workshops, which could be co-sponsored by the Federation of Societies for Coatings Technology.

Further details of Fujimoto's report are available in the Sub. D01.21 minutes.

D01.21.22, Analysis of Electrocoat Bath Samples, W.B. Van DerLinde, Chairman, reviewed a new gas chromatographic method submitted by H.D. Swafford for determination of volatiles utilizing an internal standard. It was decided to have a round-robin on the method during the summer, with one revision to the method as submitted. A single bath sample with three solvent levels will comprise the three test samples.

L. Patterson of BASF Inmont will submit a method for the determination of anionic contaminants in electrocoat baths, which will be circulated to the members for consideration at the next meeting.

D01.21.23, Thermoplastic Traffic Marking, J.M. O'Brien, Sr., Chairman. R.W. Scott chaired the meeting in the absence of the chairman. Revision #4 of "Standard Method for Chemical and Gravimetric Analysis of White and Yellow Thermoplastic Markings Containing Lead Chromate and Titanium Dioxide" will be ready for Sub. D01.21 ballot as soon as the precision data have been placed in the method. H.E. Ashton will review the data and set the format according to D 3980. W.V. Moseley, Jr. pointed out that there may be difficulty in extraction of different size beads from the ignited product.

D01.21.46, X-Ray Analysis of Pigment, A.M. Snider, Jr., Chairman, discussed primarily the results of a recent committee ballot of a proposed new standard method, "Determination of the Titanium Dioxide Content in Paint by X-Ray Fluorescence Spectroscopy." A revised draft of the proposed method that incorporated the comments arising from the ballot was presented. The revision meets the objections that had produced one negative vote.

R.A. Licciardello presented to the group the view that an ASTM method is needed for the determination of asbestos in talc by x-ray diffraction. R.W. Scott and A.M. Snider will examine OSHA and NIOSH method to determine if an ASTM method is needed and, if so, will evaluate existing methods for possible round-robin evaluation.

D01.21.53, Trace Levels of Monomers in Paints, H.D. Swafford, Chairman, discussed the resolution of a negative on the Sub. D01.02 letter ballot from T. Rendl of Alltech Associates. The negative was withdrawn by agreeing to include a multi-listing of suppliers of gas chromatographic stationary phases and supports under "Apparatus."

H.E. Ashton agreed to withdraw his negative (at subcommittee level) after agreeing to several editorial changes. Numerous other editorial changes were made as a result of responses to the ballot.

If a sufficient number of collaborators are found, a round-robin will be conducted prior to the January meeting to evaluate a capillary GC method for the determination of unreacted monomers in latexes.

An interest was expressed in evaluating one or more methods for the determination of unreacted (free) isocyanates in coatings. The chairman will distribute copies of two liquid chromatography methods and one GC method to the task group members and interested parties to the January meeting for study and recommendation.

D01.21.56, Revision of D 3960, VOC of Paints and Related Coatings, M.E. Sites, Chairman. R.W. Scott chaired the meeting in the absence of the chairman. The revised standard will be reballoted in July by D-1. After that balloting is completed and the revision is accepted, additional work will be done on the standard to modify it to include applied solids and will be made to conform to the needs of EPA Method 24.

D01.21 New Business—H.D. Swafford will prepare a note on the present scope of Sub. D01.21 which will be distributed to the membership for comment. He will report on this at the January meeting.

Task Group Sub. D01.21.71 will be reactivated to work on a new procedure for a rapid way to determine, on a semi-quantitative basis, the level of lead in a whole

paint. The procedure is Draft British Standard #BS 3900 Part B, "Method for the Detection of Lead and an Indication of the Amount in the Range of 0.01 to 0.1% (M/M) in the Liquid Paint." This procedure was sent to ASTM for review by J.S. Pickering, Committee Secretary, British Standards Institution.

A request for Sub. D01.21 to review the need for an ASTM standard to determine the presence or absence of asbestiform material in talc was presented by R.A. Licciardello of Cypress Minerals. M. Snider will follow up on this request and report his recommendations at the January meeting.

Liaison with ASTM Committees D-34, E-13, and E-15 will continue to be handled by H.D. Swafford.

SUBCOMMITTEE D01.22 HEALTH AND SAFETY

H.A. Wray, Chairman

The new standard "Test Method for Determination of the Solvent Separated Layer from a Viscous Liquid" has been editorially revised to incorporate comments from H.E. Ashton.

The negative vote of H. Fujimoto was ruled persuasive. The method will be changed to place references to the regulations and recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods in a suitable note. The revised method will be submitted to a concurrent Sub. D01.22/D-1 ballot.

D01.22.01 on Precautionary Statements reported that the proposed ASTM Committee D-1 Guide has been changed to make it compatible with the recent Society changes in the "Blue Book," specifically in Section F2, Caveat Statements and Policies in Standards and in Section A13 on Hazards. Because of the various changes, the proposed revised guide will be reballoted at the D-1 level.

Proposed New ASTM Method: Modification of ISO 2431 Paints and Varnishes—Determination of Flow Time by Use of a Flow Cup—As ISO 2431 has been recommended for use in United Nations regulations, the consensus was that incorporation of this procedure into an ASTM format is desirable. H.A. Wray will do this for review by the subcommittee.

SUBCOMMITTEE D01.23 PHYSICAL PROPERTIES OF APPLIED PAINT FILMS

M.P. Morse, Chairman

D01.23.08 on Application of Uniform Films, M.P. Morse, Chairman, reported that D 823, "Preparation of Uniform Films on Test Panels," has been revised to include procedures for applying films by hand spray and by hand-held applicator blades. This revision was approved by Sub. D01.23 ballot. After some suggested changes have been made, it will be submitted to D-1 ballot.

D01.23.10 on Adhesion, H.E Ashton, Chairman, reported that the specification for the pull strength of the tape used in D 3359, "Adhesion by Tape Test," has been changed slightly to accommodate the values now being obtained with present production of Permacel 99 tape. This change is not expected to have any detectable effect on test results. An attempt is being made to locate other tapes that can meet the specifications of the method. Efforts are continuing to develop procedures that will permit the extension of D 3359 to include measurements on thick films.

D01.23.14 on Hardness, Mar, and Abrasion Resistance, M.P. Morse, Chairman, reported that the results obtained in round-robin tests of D 4366, "Hardness by Pendulum Damping Tests," have been analyzed and a precision statement prepared that has been approved by Sub. D01.23 ballot. It will be submitted to D-1 ballot.

A round-robin test has been organized that will investigate the suitability and precision of the Balanced Beam Scrape Tester for measuring the mar resistance of coatings. A special marring tool will be used.

D01.23.15 on Slip Resistance, M.P. Morse, Chairman, has revised D 4518, "Measurement of Static Friction of Coatings," to provide a procedure for measurement of the static friction of coatings having rough surfaces. This revision has been approved by Sub. D01.23 and will be submitted to D-1 ballot.

A round-robin test is being organized to determine the precision of the inclined plane and horizontal-pull procedures used in this method. The coatings will be tested in both wet and dry states.

D01.23.16 on Water Vapor Permeability, M.P. Morse, Chairman, is initiating a round-robin test to establish the precision of the new revision of D 1653, "Water Vapor Permeability of Organic Coating Films." Three paints known to exhibit differences in water vapor permeability will be tested using both dry cup and wet cup procedures.

D01.23.18 on Flexibility, M.P. Morse, Chairman, has drafted a new method, "Mandrel Bend Test of Attached Organic Coatings." This method combines present methods D 522 and D 1737 that measure coating elongation by conical and cylindrical mandrels, respectively. This new method provides procedures for obtaining both elongation and crack resistance values of applied coatings. Some changes were made in the draft at the task group meeting. This draft will be submitted to Sub. D01.23 ballot.

D01.23.20 on Preparation of Free Films, M.P. Morse, Chairman, reported that a draft of a practice for preparing free films of organic coatings has been approved by Sub. D01.23 ballot. The practice provides for alternative procedures for preparing free films. They are (1) tin foil/mercury amalgamation, (2) stripping from FEP sheet substrate, and (3) stripping from silicone-coated paper. Some other suitable substrates for use in stripping films are noted. Some suggested changes have been made to the draft. It will be submitted to D-1 ballot.

SUBCOMMITTEE D01.24 ON PHYSICAL PROPERTIES OF LIQUID PAINTS

C.K. Schoff, Chairman

D01.24.19, Viscosity by Efflux Cups, J. Peters, Chairman, had a joint meeting with the liquid ink task group of Sub. D01.56 on Printing Inks. The main items of discussion were the revisions of D 4212, "Viscosity by Dip Cups," which had been broken into two methods, one for Zahn Cups and one for Shell Cups, and balloted at Sub. D01.23 and D-1 levels. There were four different negatives and several sets of comments covering about a dozen points regarding the methods. The main objections were the breaking of D 4212 into two separate methods, followed by the removal of the calibration section from the Zahn Cup method, the lack of a precision statement that covers inks as well as paints, and the long period of time specified for dipping cups in the test material (5 min).

It was decided that the two items would be withdrawn from balloting and put back together into one standard. Many of the suggestions made during the latest balloting will be incorporated. However, the question of calibration of the Zahn Cups remains open. There was a strong feeling that some sort of means of checking and comparing Zahn Cups is needed, but it was recognized that a given set of calibration equations would fit only a fraction of the cups that exist. Even two sets of equations, one for each of the major cup suppliers (who make different size cups), probably would cover only half or two-thirds of the cups now in use. This is because the cup volumes and orifices have varied so widely

over the years. There even was talk of setting tight standards for cup size and orifices and trying to make standard cups. This showed the frustration and irritation of those who must use the cups.

The revised form of D 4212 will be reballoted at Sub. D01.24 level and reviewed by Sub. D01.56 before being submitted for D-1 ballot. Because of the great problems with the lack of standardization of Zahn Cups and the effect that this has had on the test method and its precision, it was suggested that an article be written for *Standardization News* explaining the situation. This article might be referenced in the revised method.

The new round-robin to collect precision data has not been carried out, but one is planned. Number 2 Zahn Cups will be used to test three paints, three inks, and two standard oils. Cooperators will use their own cups. It was pointed out that Material Safety Data Sheets (MSDS's) for the test specimens also must be sent to each cooperator.

D01.24.20, Rotational Viscometers, C.K. Schoff, Chairman, briefly reviewed the revision of D 2196, "Viscosity by Brookfield Viscometer," which had been on the last D-1 ballot. There were no negatives and only a few comments, mainly editorial. The latter will be incorporated in the revision that will go to Society ballot. D 4287, "High Shear Viscosity by ICI Cone/Plate Viscometer," also was discussed briefly. The Preparation of Apparatus section needs to be revised as there is no explanation for zeroing the instrument.

D01.24.22, Density/Specific Gravity, met to discuss the possibility of combining D 1475, "Density," with D 1963, "Specific Gravity." This has been requested by Sub. D01.32 on Drying Oils, which is responsible for D 1963. Unfortunately, no one from Sub. D01.32 attended. After reviewing both methods, the group felt that it certainly would be possible to combine the methods, but questioned whether the result would be worth the effort. It would take a considerable amount of rewriting and no one was interested in doing it. Unless someone steps forward to do the rewriting, the project will be dropped.

D01.24.26, Electrical Properties of Liquid Paints and Paint Materials (Including Solvents), reviewed the last draft of the proposed method "Measurement of Electrical Resistance of Liquid Paints and Paint Materials by D.C. Meter." A procedure for the Byk instrument has been included in addition to that for the Ransburg meter. There is still no working method because details of instrument and sample preparation, temperature control, etc., have not been included as yet. The next draft should provide a method which can be used as the basis for round-robin tests on a series of solvents. That draft will be circulated to members along with a protocol for the round-robin testing. After both have been revised based on comments received, the first round-robin will proceed, mainly as a test of the method. Although meeting attendance has tended to be very light, a number of paint and solvent people have volunteered to be cooperators.

D01.24.27, Flocculation, C.K. Schoff, Chairman, had its meeting cancelled due to lack of progress on the draft for a "Guide for Identifying Flocculation in Paints." However, flocculation came up after one of the other group meetings and was discussed in some detail. It was suggested that, since there were almost no ASTM methods for the guide to refer to, first consideration should be given to a guide or practice for use of an optical microscope to test for flocculation. It was thought that written methods may already exist at some paint companies and one of these would be a good start. It is expected that a draft of the microscope guide will be ready by the January meeting.

D01.24.28, Evaporation, discussed D 3539, "Evaporation Rates of Volatile Liquids by Shell Thin-Film Evaporometer." The method has been revised for submission to Sub. D01.24 ballot. After reviewing the revision, it was suggested that the method be submitted to concurrent Sub. D01.24/D-1 ballot since relatively few changes (mainly editorial) had been made. It was agreed that future work should involve writing of a more general method to cover both the Shell/FLC instrument and the new Quintel EV-1 evaporometer. The latter is mentioned in the revision of D 3539, but the method was written around the Shell/FLC instrument.

SUBCOMMITTEE D01.26 OPTICAL PROPERTIES

C.J. Sherman, Chairman

D01.26 and its task groups did not meet with D-1 in Louisville because of a conflict with the ISCC meeting in Toronto. One task group, D01.26.02 did meet in Toronto in conjunction with Committee E-12.

D01.26.02, Color Measurement, C.S. McCamy, Chairman, reported on the status of four Standards as follows:

D 1535, "Method for Specifying Color by the Munsell System", is being revised by McCamy to include the table of Munsell Value vs. the absolute luminous reflectance factor instead of MgO as it is presently. Footnote 6 giving the sources of the computer program that converts CIE data to Munsell Notations will be updated and the method submitted for D01.26 ballot.

D 3134, "Practice for Selecting and Defining Color and Gloss Tolerances of Opaque Materials and for Evaluating Conformance", was revised by W.N. Hale to address the negatives of the last balloting. After much discussion, it was decided to ballot at the subcommittee level.

D 1729, "Visual Evaluation of Color Difference of Opaque Materials", was reviewed by McCamy for reapproval. Portions of the method were found to be obsolete and a revision will be submitted for D01.26 ballot.

D 4086, "Practice for Visual Evaluation of Metamerism", received editorial comments in the D-1 ballot for reapproval. The editorial changes were made and the practice submitted for Society ballot.

Other Business—D01.26 will meet with D-1 in January in Tampa, but, in June 1987, there are conflicts with CORM and CIE meetings. Committee E-12 has already decided to meet with CORM and it was suggested that D01.26.02 meet with E-12 again since attendance was very good at Toronto. D01.26's other task groups would, however, meet with D-1.

SUBCOMMITTEE D01.27 ACCELERATED TESTS FOR PROTECTIVE COATINGS

B.L. Williamson, Chairman

D01.27.02, Water Tests, D.M. Grossman, Chairman, reviewed the negative votes on the balloting for the revisions of D 870 (Water Immersion), D 1735 (Water Fog), D 2247 (100% RH), and D 4585 (Controlled Condensation). Negatives were resolved. The groups will investigate a number of comments and suggestions concerning possible revisions.

D01.27.04, Light and Water Exposure Apparatus, L.E. Thieben, Chairman, reported that no negatives had been received as of that date on the Sub. D01.27 balloting of a general revision of D 3361, "Standard Practice for Operating Light- and Water-Exposure Apparatus (Unfiltered Carbon-Arc Type)." If none are received, it will be submitted to D-1 ballot.

A rough draft of a proposed practice for Xenon-Arc accelerated exposure was presented. A five-member group will examine this draft and recommendations will be made at the next meeting.

A review of D 822, "Standard Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc type)," is under-

way with the goal of updating this practice to include various cycles now in use.

D01.27.09, Corrosion, F. Lutze, Chairman, reviewed results obtained to date on a round-robin of cyclic "Scab" corrosion testing. Since much of the testing is still in progress, no firm conclusions could be reached at this time. It is expected that all data will be completed and compiled before the next meeting at which time future action on establishing a standard method will be discussed.

D01.27.10, Accelerated Outdoor Weathering, M.P. Morse, Chairman, reviewed results of the 18-month exposures of a group of automotive paints. These panels had been exposed at four Florida sites. The rank correlation coefficient for both gloss loss and color change is very good and the mean 20° gloss losses and mean delta E color changes are very close regardless of the site. The exposures will be run for an additional six months and then retired for review by the chairman and other interested parties.

DSET has been exposing these same topcoats on EMMA-NTW (night time wetting) using various conditions (summer vs winter exposure, backed vs unbacked panels). Although agreement betwen EMMA-NTW (winter backed or summer unbacked) and 12 months Florida black box was good, further work on time and panel temperature is being done at DSET to improve the correlation and more firmly establish the acceleration factor of EMMA-NTW exposure.

D01.27.14, Filiform Corrosion, B. Williamson, Chairman, discussed various screening tests which had been conducted with the objective of accelerating the formation of filiform corrosion over that obtained with current D 2803 conditions. An additional series of tests will be run using a weaker corrosion resistant metal treatment before any round-robin test is started.

D01.27.16, Chalking, J.S. Robbins, Jr., Chairman will test two "new" chalk testing devices and results will be reported at the next meeting.

D01.27.17, Evaluation of Weathering Effects, A.S. Allen, Chairman, reviewed a negative vote received on the Sub. D01.27 ballot for the revision of D 660, "Evaluating the Degree of Checking of Exterior Paints," which dealt primarily with the difficulty of differentiating the degree and type of the early stages of checking from the illustrations shown in the method. While the group acknowledged that in some cases it is indeed, hard to judge that type of checking when it first starts, the illustrations and rating system in the method were felt to be useful in following the progression of checking. With the exception of some editorial changes suggested by the voter the group felt that the negative vote was not persuasive. The group chairman will contact the voter to explain the reasons for the rejection of his negative vote. The proposed revision will be forwarded to D-1 ballot.

Task Group on D 2246, Testing Finishes on Primed Metallic Surfaces, reviewed a revision of D 2246, which had been withdrawn from ballot pending consideration of comments received on the Sub. D01.04 (85-4) ballot. Several suggestions made will be incorporated into the standard before it is again submitted to D-1 balloting.

SUBCOMMITTEE D01.28 BIODETERIORATION

D.L. Campbell, Chairman

D01.28.01, Package Stability, W.B. Woods, Chairman, reported that the proposed round-robin has been delayed. The chairman distributed a proposed procedure and result sheets used in evaluation. The samples will be sent to the six cooperators (Buckman, SCM, Nuodex, R.T. Vanderbilt).

D01.28.02, Rapid Determination of Enzyme Presence, D.P. Leipold, Chairman, discussed the results of the May 1986 round-robin. It was generally agreed that the correlation between cooperators was good for both the inoculated vinyl-acrylic and acrylic paints. A final round-robin will be run in September 1986 with eight cooperators with objectives of: (1) checking the effect of CMC viscosity on % viscosity retention and (2) generating data for development of a precision statement. Concurrent with the final round-robin, a first draft of a method will be prepared for circulation in December 1986. Results of the final round-robin, statistical analysis of the results, and first draft of a method will be presented at the January 1987 meeting.

D01.28.04, Resistance of Paint Films to Attack by Algae, W.B. Woods, Chairman, discussed the procedure for the suggested round-robin. The unpreserved emulsion paint will be secured by the chairman from Union Carbide. The procedure outlines the use of a UV light for sterilization. The light and exposure conditions were discussed. The final proposed method and materials will be assembled by the chairman and sent to the five cooperators (Buckman, Hercules, Nuodex, SCM, R.T. Vanderbilt).

D01.28.05, Recoating Mildewed Surfaces, D.L. Campbell, Chairman, reported that Draft 7 of the "Guide for Determining the Presence of and Removing Microbial (Fungal or Algal) Growth on Paint and Related Coatings" was approved on the Sub. D0101 (86-1) ballot with no negative votes. Four comments which were received were discussed. Two of the comments were resolved in a manner satisfactory to the voters. One comment was found to be "too restrictive." It was agreed that the recommendations made by R.H. Wakefield would be mailed to Sub. D01.28 members for their comments.

This new standard is now D 4610 and appeared on the July 1986 Society ballot.

Sub. D01.28.05 has been placed on inactive status. Any remaining business of this group will be discussed at the subcommittee meeting.

D01.28—D.L. Campbell reported that the subcommittee has 33 members, a person will be named and be responsible (steward) for each method under the jurisdiction of Sub. D01.28, and that work plans for 1987 were given to each task group chairman.

G03.04 (Biological Deterioration) liaison reported that the soil burial method was under ballot and had received at least one negative.

E35.15 (Antimicrobial Agents) liaison reported that they are planning to prepare a publication of test methods related to microbiology. Campbell will discuss this with Dr. H. Rossmoore and D-1 management.

DIVISION 30 PAINT MATERIALS

SUBCOMMITTEE D01.31 PIGMENT SPECIFICATIONS

C.W. Fuller, Chairman

R. Licciardello of Cypress Minerals Co. brought in a method for measuring asbestiform particles in cosmetic talc from the Cosmetic, Toiletry & Fragrance Association—J-4-1. He asked if a similar test could be established for D 605. This would allow the producer to assure purchasers the talc produced was free of asbestiform particles.

J.S. Reid at AECI Paints, Ltd.—Republic of South Africa, was informed that lithopone spec. D 477 was dropped due to lack of N. American producers. Basic carbonate white lead will be retained on the books.

A letter from J.C. Weaver was read and acknowledged the appointment of W.J.

Hart as Sub. D01.31 Vice-Chairman and outlined a broad range of topics for consideration as future goals. These included recognizing changes in technology of both the producers and users of pigments. In addition, he cited recruitment techniques for new blood, recognition and use of NPIRI and NPCA literature sources for information and updating and recognition of foreign sources relative to the world-wide availability of pigments. He pointed out reasons to review the efforts of Sub. D01.57 and Sub. D01.26 as they relate to pigments in order to keep the standards technically up-to-date.

From brief discussion, it was seen as desirable to provide time at the next meeting to take a step back to review the functions of the subcommittee as a whole—to see if the functional efficiency can be improved, to identify areas of new technology, and to strengthen the subcommittee membership. This would be done at a session separate from the normal standards review.

D 212—Editorial changes suggested by H.E. Ashton will be made. The title will be changed to Chrome Green Pigment.

D 293, Chromium Oxide Green Pigment—The range of particle size analysis (325 mesh retention) reflects the range of those materials on the market. NPCA lists products by specific product number and name. ISO lists are slightly tighter, but in many cases not necessary.

D 256, Toluidine Red Pigment, contains a paste in oil section. This will be dropped.

D 769, Black Synthetic Iron Oxide Pigment—Editorial changes will be made.

SUBCOMMITTEE D01.32 DRYING OILS

P.C. Stievater, Chairman

Two negatives were received on the Sub. D0106 (16-1) letter ballot. The negative by E.J. Parks pointed out that petroleum ether is used in the procedure, but a safety statement for ether is contained in the "Safety Precautions" section, giving the misleading implication that petroleum ether and ether are identical, which they are not. He requested that the safety statement for ether be deleted and that the section on the specific hazards of petroleum ether be amplified.

H.E. Ashton's negative at subcommittee level pointed out that none of the reagents used in the method are so hazardous to a trained chemist to require special precaution statements now that the generic caveat has been added. Other of his comments on a previous ballot (84-3) were also found to be correct and have been put into the method for the next D-1 ballot.

SUBCOMMITTEE D01.33 VARNISH & RESINS, INCLUDING SHELLAC

R.A. Orr, Chairman

D01.33.23, Epoxy Resins, R.A. Orr, Chairman, compared ASTM D 1726 and Dow Method RPM 105-D, both for the determination of hydrolyzable chlorides in epoxy resins. A new combined method will be submitted for D 1726 (due for review this year) with results from the upcoming round-robin comparing both methods. Two samples varying in hydrolyzable chlorides will be used so method preference can be stated in the scope.

A comparison was also made of ASTM D 1652 and Dow Method RPM 101-A, both for the determination of epoxide content of epoxy resins. The ASTM standard uses HBr and titrates to a crystal violet endpoint. The RPM method adds tetraethylammonium bromide to the sample and titration with perchloric acid to a crystal violet endpoint. This method also describes the use of an automatic titrator for percent epoxide. The same samples mentioned above for hydrolyzable chloride titration will be used for this round-robin. Four labs, with a possibility of a fifth, were identified for this round-robin.

D01.33.25, PVC and PVB Resins, J.J. Brezinski, Chairman, approved the following changes in D 4368, "Standard Guide for Testing Poly (vinyl chloride) Resins": (1) reference to D 1303 was removed as this method is no longer on the books and (2) a brief description of Test Method E 442, an alternate procedure for determination of chlorine in organic compounds, was included.

The revised guide will be submitted to concurrent Sub. D01.33/D-1 ballot.

A letter requesting the transfer of D 3680, "Test Method for a Residual Vinyl Chloride Content of PVC Resins, Compounds, and Copolymers by Solution Technique," from Committee D-20 to D-1 was drafted, approved, signed by J.C. Weaver, and sent to the chairman of D-20 with copies to ASTM Headquarters.

Liaison will be established by the task group chairman with Section D-20.15.08 on vinyl chloride monomer and resins.

D01.33.26, Polymer Emulsions, R.A. Orr, Chairman Pro-tem, no longer has a permanent chairman because R. Schiller, former chairman, has changed firms. However, the need for finalization of the "Filter-Retained Solids Content of Latex Vehicles" was expressed by several task group members. The method as revised and the results of the last round-robin were discussed. D. Waldrep will provide an updated method using disposable elements in a Spectrum filter. He may also act as steward of the method until finalized.

R.D. Athey volunteered to act as steward of ASTM D 4143, "Guide for Testing Latex Vehicles."

D01.33.27, Phenolic Resins, H.D. Marshall, Chairman, discussed the Sub. D01.33 methods of phenolic resins. All comments and negatives on the last ballot were accommodated. The methods will be submitted for the next stage of balloting.

Seven other specifications or test methods will be submitted to Sub. D01.33 ballot.

Committee D-11 on Rubber is interested in these methods for use in their Guide for Heat-Reactive Phenolic Resins and for Tackifier Phenolic Resins.

D01.33 Business—Liaisons were established as follows: J.J. Brezinski with D20 on Plastics and H.D. Marshall with D-11 on Rubber.

A discussion was held on possible change of name and scope of Sub. D01.33. The name of Polymers and Resins received support with suggestions adding polymers into the scope. The chairman will poll the entire Sub. D01.33 membership on these suggestions, prior to submitting them to the D01.90 Executive Subcommittee for review.

SUBCOMMITTEE D01.34 NAVAL STORES

C.M. Winchester, Chairman

The late negative by H.E. Ashton, with four pages of comments, on the update of D 3008, "Test Method for Resin Acids in Rosin by Gas Chromatography," has essentially tabled this work. The author of the revision has refused to rewrite the method further. A GC expert experienced in D-1 format is needed.

The subcommittee chairman received six responses to a survey to determine usage of inkometers to evaluate apparent tack of ink vehicles. A varnish supplier will be contacted to obtain four samples for a round-robin. The objective will be to get data for a precision statement so that D 4361, "Test Method for Apparent Tack of Printing Inks by the Inkometer," can be expanded to include ink vehicles. A task group chairman is needed.

D01.34.01, Resin Solutions, C.M. Winchester, Chairman, reported that seven responses were received from manufacturers of inks, resins, or ink vehicles on the survey of procedures for preparing ink resin solutions. None of the responders use the cold cut solution method described in D 1725 as it is too time consuming, i.e.,

requires overnight tumbling. Four laboratories use a hot solution technique with a hot plate similar to that in D 1725, except that no condenser is needed as typical ink oils are high boiling. Four responders use a blender with the heat of mixing providing a short solution time. The task group chairman will draft a proposed blender method and circulate it for comment prior to organizing a round-robin. Cooperators will be Bowers Printing Ink (PPG), Capitol Printing Ink, Hercules, BASF/Inmont, Lawter International, and Westvaco.

D01.34.02, Dilutability, J.W. Daugherty, Chairman, reported that the survey on procedures to determine dilutability of ink resin solutions received 10 responses. The greatest discrepancy in the methods reported was the definition of the endpoint of the titration. The chairman will draft a proposed method clearly defining the endpoint. A round-robin will evaluate the dilutability of two resin solutions prepared by Hercules, one each of a soluble resin in ink oil and an insoluble resin in ARLO. Each solution will be evaluated with Magusol 47 and n.hexane, respectively, the latter solvent representing an aliphatic hydrocarbon less likely to have variations than ink oil. Cooperators will be Bowers Printing Ink, Capitol Printing Ink, Hercules, BASF/Inmont, Lawter International, Neville, Superior Varnish, Union Camp, and Westvaco.

D01.34.03,Gelability, A.N. Scarlatti, Chairman, reported that a survey of ink, resin, and ink vehicle producers will be made in the next month.

SUBCOMMITTEE D01.35 SOLVENTS, PLASTICIZERS AND CHEMICAL INTERMEDIATES

L.R. Thurman, Chairman

D01.35.10, Solvents—Hydrocarbons and Ketones, S.A. Yuhas, Jr., Chairman, discussed a negative vote on D 235, "Specification for Mineral Spirits (Petroleum Spirits and Hydrocarbon Drycleaning Solvents)," objecting to the copper corrosion rating of one maximum for Mineral Spirits. The concern is that D 130, "Method of Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test," is not capable of reproducibility defining a one limit. A more realistic level of 2A maximum was proposed. D 235 will be reballoted in Sub. D01.35 with this proposed change.

A research report for D 1364, "Test Method for Water in Volatile Solvents (Fischer Reagent Titration Method)," has been submitted to ASTM Headquarters. A new precision and bias statement will be prepared for ballot.

D01.35.20, Reactive Monomers—Vinyl Monomers and Aldehydes, T.H. Golson, Chairman, held a general discussion on improving the test method for Dimer in Acrylic Acid. A survey of methods will be made.

D01.35.30, Chemical Intermediates, J.R. Morrison, Chairman, finalized the gas chromatographic method for 2-ethylhexanol. It will be submitted to Sub. D01.35 ballot.

D01.35.40, Plasticizers and Ester Solvents, R.L. Smith, Chairman, reported that the data from the round-robin testing of propylene oxide based ethers and esters by gas chromatography has been received.

D01.35.50, Liaison, L.P. Field, Chairman, reported that the ASTM Standard tracking will be used to review standards which are referenced by Sub. D01.35. When a standard comes due for review, the liaison group will request a copy of any proposed revision for the appropriate subcommittee chairman.

New Business—The new proposed Guide for Precautionary Statements in ASTM D-1 Standards was discussed.

The subcommittee reviewed Draft #1 of the proposed new Standard Guide for Including Government Procurement Requirements into ASTM Standards and the Standard Guideline for ASTM Standard Specification Quality Statements.

DIVISION 40 PAINT PRODUCTS APPLIED ON SITE

SUBCOMMITTEE D01.41 PURCHASE OF PAINTS AND RELATED COATINGS

H.A. Ammlung, Chairman

D01.41.02, D 3927, Standard Guide for State and Institutional Purchasing of Paint, W.V. Moseley, Jr., Chairman, reported that six negatives and two comments were received on the latest draft. In general, it was felt that the incorporation of additional sections on the "Weighted Cost of Active Ingredients Method" made the document too cumbersome and difficult to understand. It was agreed to take three courses of action. The first would be to withdraw the lastest draft and remove the sections on "Weighted Cost of Active Ingredients" for separate action. The second step would be to resubmit the current D 3927-80 with minor changes for reapproval. The third proposal was to delay any further action on the "Weighted Cost of Active Ingredients Method" until June 1987. This would allow time to study the impact of changing technology on the document as now drafted.

D01.41.05, Latex Flat Wall Paint Specification, I.V. Bloom, Chairman, reported that four negatives and three comments were received on the latest draft. Three of the negatives were resolved at the meeting by changes in the draft or withdrawal by the party submitting the request. The fourth negative awaits further input from the writer and should be resolved before the next draft. A revised draft incorporating these changes will be submitted for concurrent Sub. D-01.41/D-1 ballot.

Scope—Chairman Ammlung reported that four negatives were received on the revised draft during subcommittee ballot. Areas of concern were discussed and it was decided to submit a shorter version for subcommittee ballot.

SUBCOMMITTEE D01.42 ARCHITECTURAL PAINTS

R.H. Rowland, Chairman

D01.42.01, Soil and Stain Removal—Mechanical Test, T.J. Sliva, Chairman, discussed the results of an in-house study of three stains on interior latex coatings, comparing the reflectance and E differences between stained washed and unwashed samples, following D 3450 procedure. Conclusion: A round-robin will be set up employing two different flat paints and three stains, reporting E differences, to check the reproducibility of the method.

D01.42.04, Wet Adhesion, did not meet. The chairman tendered his resignation because of business commitments. A new chairman is sought.

D01.42.09, Colorant Acceptance, D.P. Leipold, Chairman, reached a consensus that this is a test for color change upon shear, not a test for color compatibility, color acceptance, or color development. A round-robin with six cooperators will be run prior to the January 1987 meeting. The following changes will be made in the procedure: (1) first coat will be a drawdown, not a brushout and (2) the brushout shear

rate will be standardized by specifying a spreading rate and a spreading time. Finally, a consensus was reached that this test is needed by the paint industry.

D01.42.13, Brushability, D.P. Leipold, Chairman, considered the second draft of a proposed method for ranking brush drag of flat latex paint. It was decided that this shall be a stand-alone method for ranking brush drab by *brush application.*

It was also decided that, based on the round-robin data in May 1986 and December 1985, a method will be written for brush drag of flat latex paints by ICI high shear viscosity. Minor editorial changes will be made in the second draft. The metric conversions given will be "soft" rather than "hard," and the sections on brush conditioning and brush cleaning will be clarified. This will be submitted to Sub. D01.42 ballot prior to the January meeting.

D01.42.17, Roller Spatter, J.F. Price, Chairman, announced that negatives were not received on the recent subcommittee ballot of this method, but three members had comments—C. Tatman, L. Schaeffer, and H.E. Ashton (mostly editorial). The task group worked through the comments, either incorporating them or resolving them. It was agreed that the task group chairman should incorporate the agreed-upon changes and then submit the method to D-1 ballot. (After the meeting L. Schaeffer stated that he had succeeded in obtaining a source to machine the notched spool rollers—B. Waltz of Precision Gauge and Tool.)

Block Resistance, U. Jackson, Chairman, in the absence of the chairman, had a discussion on conditions pertinent to this test procedure. Questions explored included 120° F vs ambient test conditions; 1 vs 7 days' exposure; whether to include alkyd, as well as acrylic and vinyl semi-gloss systems; drying conditions; pressure for test, 2 psi, or other; face-to-face or face-to-back testing; use of a 2 in. sq template for sample sizing or not, and other factors. These ideas will be transmitted to the Sub. D01.42 chairman for his consideration before the next meeting.

D01.42.19, Hiding Power (Wet-to-Dry), L. Schaeffer, Chairman, discussed the results of the first round-robin, which involved only two cooperators, but indicated that a reasonable degree of precision was possible. The samples, all of which were commercial paints, varied widely in the amount of hiding change, and with some of them the loss in hiding on drying seemed quite serious. The discussion generated considerable interest and there were additional volunteers, so that for the next round-robin there should be at least eight cooperators.

D01.42.20, Water-Repellency of Wood, V. Scarborough, Chairman, is a new group in the process of formation. A test procedure has been developed for the testing, hopefully an improvement over TT-W-572b. Anyone interested in this task group topic or wishing to become a cooperator in the forthcoming round-robin is asked to correspond with Victoria Scarborough, Richardson-Vicks, P.O. Box 667, Olive Branch, MS 38654.

SUBCOMMITTEE D01.44 TRAFFIC COATINGS

R.L. Davidson, Chairman

D01.44.01, Thermoplastic, J.M. O'Brien, Chairman, reviewed the results of the recent round-robin on thermoplastics testing. The test included bond strength, reflectance, and chemical analysis. The tests will now be sent out for Sub. D01.44 ballot. It is anticipated that a precision statement will have been generated before the D-1 ballot. An additional test for heat stability as it relates to color is under development.

During the course of the discussion, a question was raised about the need for control tests for pre-formed tape. A review will be made before the next meeting to see what tests are available (possibly the same test used for thermoplastic) and then whether a new task group should be established.

D01.44.02, Traffic Paint, C.M. Winchester, Chairman, reported that the traffic paint methods under the subcommittee's jurisdiction are in good shape.

In the January 1985 meeting, the subcommittee conducted a round-robin with the attendees rating slides of exposed traffic paint stripes on a scale of 0-10. The data has been analyzed by C. Antle of the Pennsylvania Transportation Institute. The objective of this work is to develop new pictorial standards for evaluating durability of traffic stripes.

J.J. Henry of the same institute reported on progress in NCHRP Project 4-16, Cost and Service Life of Traffic Marking Materials.

R.L. Davidson reported on the upcoming FHWA pilot study of the feasibility of a test center for the evaluation of liquid traffic marking materials for use by government groups.

D01.44.03, Night Visibility, J.R. Ritter, Chairman, reported that there is a need for still another round-robin to determine percent rounds (D 1155) and gradation (D 1214) of beads. The samples for this round-robin should be distributed during the fall of 1986.

A discussion was held on the status of portable retro-reflectometers. A new model retro-reflectometer, MIROLUX 12, was demonstrated. This is a low angle instrument at a very favorable price. C.L. Hill, marketing manager for Erichsen Instruments, discussed a new lower weight Erichsen instrument.

SUBCOMMITTEE D01.45 MARINE COATINGS

L.S. Birnbaum, Chairman

D01.45.06, Dynamic Testing, D. Laster, Chairman. T. Dowd, Acting Chairman, announced that he would send copies of Draft 3 of the "Standard Method for Testing of AF Paints Using High Velocity Water" (previously distributed March 31 to Sub. D01.45 members) to attendees who listed their names for him. T. Foster's comments on Draft 3 were forwarded to Dowd covering erosion, polishing, and significant decimal point. The variation of exposure temperatures depending on location was acknowledged and discussed. Dowd agreed to prepare a revised draft, #4, incorporating appropriate meeting comments and any additional comments forwarded to him.

L.S. Birnbaum announced that D. Laster had prepared a smooth copy of a revised draft for the "Standard Method for Marine AF Systems under Hydrodynamic Flow" which had been submitted for concurrent Sub. D01.45/D-1 ballot.

It was also announced that Subcommittee F-25.02 was working on an ASTM specification for anticorrosive and antifouling paints which would probably incorporate some form of dynamic testing for evaluation of these paints.

D01.45.08, Organo-Tin Release Rate, L. Birnbaum, Chairman, briefly reviewed the contents of his letter to Sub. D01.45 members with regard to results of the ballot on Draft #6 and comments received.

He also read his May 30, 1986 letter responding to the EPA letter of May 28, 1986 requesting permission to use working Draft #6 with minor EPA amendments in their Data Call-In Notice to be mailed to registrants of TBT antifoulant paints. This letter approved the use of this document with the following caveats: (1) it is a working document subject to revision, and that further drafts will be prepared and balloted in order to achieve consensus in accordance with ASTM procedures prior to the issuance of an official ASTM standard and (2) recipients of the document should be so advised. EPA subsequently advised that their version would include an "EPA supplement," which was undergoing review.

The chairman, at EPA's request, (EPA representative was unable to attend) announced that EPA was making available to AF Paint registrants, a one-quart sample of a control paint for use in organotin release rate testing. A sample may be obtained by writing to: Wm. H. Carey, Chemist, Analytical Chem Lab/OPTS, Bldg 407, BARC East, Beltsville, MD 20795 (Tel: 301-344-2833). The chairman also advised that EPA was interested in information on tin release rates in fresh water as well as sea water and would appreciate receiving any available data.

The group discussed responses to Draft #6 including the following:

(1) The chairman contacted the three negative voters by phone prior to the meeting concerning their comments. After discussion, they withdrew their negatives, recognizing that a Draft #7 would be sent out for ballot after the June meeting.

(2) Schatzberg reported results of recent studies of 10 AF paints with respect to organotin release using the latest Annapolis method indicating that for many paints, especially "free association" types, 100 ppb concentration would be exceeded in minutes. All showed an initial climb in release rate followed by a subsequent drop—in one instance, maximum release rate was not reached for eight days.

(3) Schatzberg prepared a table comparing results of the Annapolis method with ASTM results (obtained by using the Annapolis data and the Draft #6 calculation formula) showing significant differences. In all cases, higher numbers were obtained for ASTM calculations.

(4) In view of the relatively high rates of release and in view of the need to keep the concentrations in the test tank below 100 micrograms/liter (release rate inhibition occurs at 100 ppb or greater), the simple procedure for emptying the tank and replacing it with clean synthetic seawater is frequently not practical—that a single measurement for determining release rate is invalid—and that if one objective of the method is to characterize the release rate/time curve for the first 10 days, an alternate procedure should be developed for this time period.

(5) Attendees agreed that some modification of the ASTM method, especially for free association type AF's, was necessary to characterize the release rate/time curve for the first 10-15 days. An alternative procedure was proposed using an adsorption cartridge (octadecyl boned to silica) from which the TBT is quantitatively eluted.

(6) A task force consisting of Schatzberg, Longmore, and Blair agreed to convene after the meeting was adjourned to work out details and, if necessary, schedule a task force meeting in July to come up with a Draft #7.

(7) It was also agreed that EPA would be contacted to determine what it wants for the initial part of the test curve in view of the feeling that in terms of environmental hazards, a total cumulative organotin release over the first 10 days might be adequate.

D01.45 Meeting—Since C. Perez, Sub. D01.45.07 chairman was unable to attend (transportation problems), the draft of the alternative method for rating panels to be added to D 3623, which was to be reviewed at this meeting, will be submitted to Sub. D01.45 ballot. D 3623 was scheduled for review in 1986.

The chairman reported that F-25.02.09 on Conversion of Federal and Military Specifications to ASTM Specifications had not made any progress on AC or AF performance specs. He also reported that W. O'Sullivan of Todd Shipyard had forwarded a copy of a Standard Spec. for Polyamide Epoxy Paint (to supersede MIL-P-24441) under a Navy conversion program to D-1 chairman, J.C. Weaver, for comment. Weaver feels that the draft is within the D-1 scope and not F-25.02. He will follow up on this.

SUBCOMMITTEE D01.46 INDUSTRIAL PROTECTIVE PAINTING

K.A. Trimber, Chairman

D01.46.02, Surface Preparation, K.A. Trimber, Chairman, discussed comments received on Draft 2 of a new proposed "Method for Conductimetric Analysis of Water Soluble Ionic Contamination on Blasting Abrasives," which was circulated for subcommittee review prior to the meeting. It was agreed that with some changes, Draft 3 is ready for subcommittee ballot.

D01.46.03, Repainting, R. Wakefield, Chairman, reported that Draft 5 of "Standard Methods for Field Identification of Coatings" had been included in the Fall, 1985 D-1 ballot with negatives resolved at the January, 1986 meeting. The editorially revised document was to be submitted to Society ballot in the spring of 1986, but this was not done. It will now be submitted to Society ballot in the fall of 1986 with publication expected in the spring of 1987.

New work during this meeting involved itemizing the variables that should be included in a proposed method for preparing and evaluating test patches of candidate coating materials over existing systems. Suggestions included the size, number, and location of patches, surface preparation, and application conditions, time of cure prior to testing, and the specific tests that should be run for the evaluation. These will be written into ASTM format and submitted to subcommittee review prior to the next meeting.

D01.46.04, Pull-Off Adhesion, A. Cunningham, Chairman. S.D. Ozenich chaired the meeting for the chairman who was unable to attend. A copy of the recently published D 4541, "Pull-Off Strength of Coatings using Portable Adhesion Testers," developed by this group was circulated. It was noted that the photographs of the two test apparatuses addressed in the appendix of the document were reversed. A letter indicating this error has been sent to D. Savini. It will be corrected in the next printing. In addition, an updated photograph of the Fisher unit will replace the existing one.

The results of the round-robin tests to develop a precision statement for both of the instruments were circulated. In addition, test results using an Instron equipped with standard studs, Elcometer studs, and Fisher studs were also presented. From the data, it appears that the range in results from highest values to lowest values are: Fisher, Instron, and Elcometer. Based on the range of data, the precision statement will be carefully worded so as not to imply that the Instron results can be used to determine accuracy. Rather, the results of each instrument will be presented side-by-side in tabular form. A precision statement will be developed by the end of July and submitted to Sub. D01.46 ballot in the fall.

D01.46.07, Inspection, R.J. Martell, Chairman, held only a brief meeting since the chairman was unable to attend. The latest revision to D 3276, "Standard Guide for Painting Inspectors (Metal Substrates)," had completed subcommittee ballot with results discussed at the January meeting. The revised document was forwarded for the Spring 1986 Society ballot, but it was not included. It will be included in the Fall 1986 ballot. Results will be discussed at the next meeting.

Future work for this group will be the development of a similar paint inspector's guide for the coating of non-metal substrates (e.g., concrete, wood, etc.).

D01.46.10, Condition Assessment, M.E. McKnight, Chairman, discussed comments on Draft 2 of the proposed condition assessment document that had been circulated to subcommittee review prior to the meeting. A decision was made to change the document slightly to include a requirement for an overall visual assessment of the condition of the coatings followed by specific analysis and destructive tests at select, representative sites. After these changes are made, it will be submitted to Sub. D01.46 ballot.

It was proposed that the guide be published separately along with all the reference standards (e.g., D 610 for rust grades, D 714 for blistering, D 1186 for thickness measurement, etc.) in a pocket-size volume so that users will have all of the re-

quired reference documents in one package. This should greatly enhance its use so that an inspector need not purchase three ASTM volumes in order to obtain one or two of the required reference standards.

D01.46.11, Zinc-Rich Coatings, R.H. Wakefield, Chairman. K.A. Trimber chaired the meeting for the chairman who was unable to attend. The proposed revision (Draft 2) of D 2092, "Standard Practices for Preparation of Zinc-Coated (Galvanize) Steel Surfaces for Painting," was submitted for D-1 ballot in the spring of 1986. Four comments and no negatives were received. The comments were discussed and will result in editorial changes. Since the changes are only editorial, the revised copy (Draft 3) will be submitted to Society ballot in the fall.

Comments received on Draft 4 of the proposed "Standard Test Method for Measuring the Degree of Cure of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub" were discussed, resulting in minor changes to the document. The revised document (Draft 4) will be submitted to Sub. D01.46 ballot.

DIVISION 50 PAINTS FOR FACTORY APPLICATION

SUBCOMMITTEE D01.55 FACTORY-APPLIED COATINGS ON PREFORMED PRODUCTS

J.M. Behrle, Acting Chairman

D01.55.01, Coatings for Wood Products, J.M. Behrle, Chairman Pro-tem, reported that Significance and Use statements had been submitted to Headquarters for D 3170, D 2620, D 2091, D 3495, D 1309, and D 1211. These methods will be submitted for concurrent Sub. D01.55/D-1 ballot. Methods D 2571 and D 3023, which are up for review, will be sent to Lilly and Hercules for review and comment. Action is anticipated on these methods at the January 1987 meeting.

D01.55.07, Industrial Water-Reducible Coatings, J.M. Behrle, Chairman Pro-tem, reported that all previous negatives had been incorporated in a revised "Guide for Testing Industrial Water-Reducible Coatings." The guide was reviewed by the subcommittee. It will be submitted to concurrent Sub. D01.55/D-1 ballot.

D01.55—A discussion was held again regarding the small turnout at Sub. D01.55 meetings and the possibility of combining Sub. D01.55 functions with another subcommittee. It was suggested that Sub. D01.55 might appropriately be combined with Subs. D01.52 and D01.53, thus strengthening both of those groups. Further discussion is required.

SUBCOMMITTEE D01.56 PRINTING INKS

J.M. Fetsko, Chairman

D01.56.01, Fineness of Grind, J. Cichon, Chairman, reported that revision of D 1316, "Test for Fineness of Grind of Printing Inks by the NPIRI Grindometer," has been completed and can be submitted for Sub. D01.56 ballot.

D01.56.02, Lightfastness of Prints, J. Daugherty, Chairman, distributed copies of a report by N. Searle, which indicated that HPUV provided the best correlation with south window exposure of the 16 prints studied. It was also reported that the precision statement for the revision of D 3424, "Lightfastness of Printed Matter," can be patterned after that in D 4303, "Lightfastness of Pigments Used in Artists' Paints." Besides the research report which must be prepared for ASTM Headquarters, it was suggested that an article be prepared for the trade press.

D01.56.04, Viscosity of Paste Inks, J.M. Fetsko, Chairman, discussed proposed changes in conjunction with the scheduled five-year review of D 4040, "Viscosity of Printing Inks by the Falling Rod Viscometer." Parameters of non-Newtonianism have been calculated from existing round-robin data and will be sent to J. Cichon for computing repeatability and reproducibility.

D01.56.06, Ink Tack, J.M. Fetsko, Chairman Pro-tem, reviewed proposed revisions to "Apparent Tack of Printing Inks by the Inkometer." Task group members agreed to let novice and experienced technicians in their laboratories gage the relative merits of the original and revised instructions. The group will review the comments prior to the next meeting.

D01.56.09, Tinting Strength, W. Rhodes, Chairman, discussed the proposed new test method, "Relative Color and Strength of Printing Inks by Visual and Instrumental Evaluation." The subcommittee suggested that additions include a description of an ultramarine blue base for visual examination of white printing inks and a note pertaining to effects of consistency on the relative film thickness of tight drawdowns. The problem of conducting an unbiased round-robin by visual evaluation must be addressed.

D01.56.10, Water Pickup of Litho Inks, G. Bien, Chairman, reported that, according to H.E. Ashton, the existing round-robin data are satisfactory for computing only the reproducibility part of the precision statement. Repeatability must be based on data taken on two different days.

D01.56.11, Nonvolatile Content of Printing Inks, B. Blom, Chairman, reported that a new precision statement has been prepared and the test revised to reflect comments received from the first D-1 ballot. The proposed new method will be resubmitted for the next D-1 ballot.

D01.56.12, Viscosity of Liquid Inks, J. Cichon, Chairman, reported that a joint meeting was held with Sub. D01.24.19, "Viscosity by Efflux Cups." C.S. Schoff, Chairman, suggested that, because of negatives, the proposed revision of D 4212 retain both the Zahn and Shell cups. A new round-robin will be conducted which will include calibration with two standard oils, as well as measurement of sample temperature.

D01.56.14 Setting of Heatset Inks, A. Urdea, Chairman, distributed copies of a proposed procedure for evaluating relative setting of inks in the Silvaco Tester. The method will be rewritten in accordance with the latest edition of ASTM's "Blue Book" and will be reviewed by the task group prior to the next meeting.

D01.56.17, Practice for Printing Inks, A. Scarlatti, Chairman, requested a response from task group members who have made an independent search of ASTM methods that are applicable to printing inks.

SUBCOMMITTEE D01.57 ARTISTS' PAINTS

J.T. Luke, Chairman

Sub. D01.57 met at Ryerson Polytechnical Institute, Toronto, Canada on June 15, 1986 so that members could also attend a meeting of the ISCC in that city.

E.T. Vonderbrink was presented with an ASTM D-1 Certificate of Appreciation for his outstanding work as Secretary to Sub. D01.57, as Chairman of Sub. D01.57.09 on Watercolors, and his invaluable technical contribution to all other Sub. D01.57 task groups. The officers of Committee D-1 sent their regrets at not being able to be present since D-1 was meeting concurrently in Louisville, KY.

Chairman Luke reported on the implementation of the four state laws that regulate labeling for chronic health hazards, i.e., California, Oregon, Illinois, and Tennessee. All these laws state that conformance to ASTM D 4236 satisfies the state labeling requirements. California has appropriated funds to enable the State Department of Health Services to establish a list of materials that cannot be purchased by the schools and to establish regulations to be followed by companies not choosing to conform to D 4236. The deadline for publication of the school list has been delayed until January 1987.

In preparing the list that cannot be purchased by schools, California has requested 12 types of information from manufacturers, including: name (generic or chemical), quantity (% composition and total amount present), and Chemical Abstracts Service (CAS) registry number of each ingredient, additive, and impurity. Since this information is already being provided to the Art & Craft Materials Institute (ACMI) and to Poisondex by manufacturers that conform to D 4236, it is hoped that arrangements can be made for the necessary information to be transferred to the state without the individual companies having to supply formulation information three places, and perhaps later to other states.

Chairman Luke commented that it would be less costly to the states to assure themselves of the integrity of the review process in the certification organizations and not try to maintain a current list of all art and craft supplies themselves.

The Oregon Health Division did not get funds for which they applied and have used the list of products that have received the AP or CP Seal from ACMI as an interim list of products that can be purchased for grades K-6 until their own list can be prepared. Companies that are not a member of ACMI have protested. The department has also furnished schools with a general guideline on categories of art materials that children under 12 should not use, with substitutes.

The Illinois Department of Health also must develop a list of materials not to be used in K-6 by July 1987 and have also had difficulty in obtaining funds. The Illinois law specifies that in compiling this list, the findings of certifying organizations shall be considered if the organization uses an independent toxicologist and discloses its standards and procedures.

The chairman was not able to reach the Tennessee Deputy Director, Mary Logan, prior to the meeting and, therefore, did not have a report on the situation there.

Luke also reported that five bills on labeling of art supplies for chronic health hazards are pending in Florida and that there has been movement of various bills in New York and Massachusetts. Some of these bills include D 4236 and some do not.

On the federal level, a bill mandating chronic hazard labeling has been drafted by Marge Oge who works for the EPA, but was on loan to Republican Senator John Chafee's office. The manufacturers and consumers groups that are familiar with the provisions of this bill, believe it is unsatisfactory. It would require companies to send product formulations to EPA for approval of labels and would not pre-empt state legislation. The Coalition for Labeling Art Supplies will meet to decide what course to take relative to national legislation on this issue.

The chairman went over highlights from the Art & Craft Materials Institute joint technical/certification meeting in cooperation with the Pencil Makers Association held on May 30, 1986. Dr. Stopford, toxicologist representing ACMI, has been running solubility tests on cadmium pigments and has found a range of solubilities among pigments from various manufacturers. Certification of cadmium solubility might be necessary. Stopford is also doing testing of cobalt aluminate pigments to determine soluble cobalt levels. With regard to the controversy about methylene chloride, Dr. Stopford will still require labeling and he strongly recommends reformulation to exclude methylene chloride.

Regarding D 4302, some reports of mislabeling and confusion between ASTM and ANSI quality standards have been reported. The ANSI standards apply to school art materials and are not appropriate for materials to be used in professional works of art. The ACMI CP seal presently says, "Meets Performance Standards," but to prevent continuing confusion it will be changed to include the number of the relevant standard.

A few other examples of misuse of information about D 4302 have been reported; however, they seem to be due to misunderstandings. Chairman Luke requested that anyone seeing what seems to be mislabeling to call her attention to it. Hilton Brown suggested that manufacturers be contacted with information about appropriate use of the standard.

Chairman Luke has been approached by Berol and Turner Colour Works, Ltd. with requests that Sub. D01.57 write quality standards for colored pencils and gouache, respectively. She asked if any company represented at the meeting manufactured either colored pencils or gouache and would participate in developing a standard. S. Lynton of Winsor & Newton said his company markets gouache paints and would be interested in participating. Other companies will be contacted and creation of appropriate task groups will be on the agenda for the Planning Meeting in Tampa, FL on Sunday, January 25, 1987.

D01.57.01, Preparation of Samples for Colorimetric Determination, T. Pamer, Chairman, is continuing the work of H. Levison on a method for making hand drawdowns of artists' oil and acrylic paste paints. The problem is to obtain complete hiding in drawdowns of acrylic masstone paints. Satisfactory opacity has been achieved with all acrylics except Hansa Yellow Light by making 10 mil drawdowns using K & S #25 brass hobby metal sheets (0.010 × 4 × 10 inches). Two of these metal sheets were taped down as supports for the drawdown blade runners with a space between them for the paint.

Using this technique, surface irregularities developed with some colors. To prevent the surface problems, it was suggested that a 5 mil drawdown be made and let dry, then make a second 5 mil drawdown over the dry paint by using the 10 mil metal sheets; or by making a second narrower 5 mil drawdown over the first 5 mil drawdown so the drawdown bar runners ride on the dry surface of the first drawdown, resulting in a total thickness of approximately 10 mils. For paints such as Hansa Yellow Light where the 10 mils is not opaque, it was suggested that several separate drawdowns be made and the instrument readings of them be averaged.

It was suggested that this method could be developed as a "Standard Practice," which would be a useful guide, but would not require a precision statement.

D01.57.02, Lightfastness of Pigments, E.T. Vonderbrink, Chairman, reported that revisions of D 4303-85 have just completed Sub. D01.57 and D-1 balloting with no negatives.

Work is proceeding to determine if a period of time in the light is necessary before measurement of lightfastness test specimens when the specimens were stored in the dark for a period of time following exposure, in order to allow recovery from yellowing. To answer this question, oil panels that had been stored in a box four months have been placed in indirect light and measured every two days. After 14 days in the light, consecutive measurements show a delta E of about 2 units, indicating that the samples are close to being stabilized.

In the next step, oil specimens that have been exposed and measured at the Binney & Smith Laboratory will be stored in the dark. Following storage, specimens will be measured again and exposed in controlling daylight fluorescent illumination at 300 ft candles until repeated measurements show no further color change. Use of Blue Wools as controls for the amount of light exposure is also under consideration.

R. Kinmonth cautioned that there can be color changes, other than yellowing, during storage in the dark, or during the recovery period in the light. These are due to secondary chemical effects that take place after sun exposure. The safest procedure is

to measure specimens immediately after exposure, whenever possible, with no dark storage time. Kinmonth and P. Staples have volunteered to participate with Vonderbrink in this next stage of the study.

D01.57.03, Tinting Strength, T. Pamer, Chairman, reviewed a draft of "Test Method for Relative Tinting Strength" for comment. Suggested changes will be made and then it will be sent to F. Billmeyer, R. Burns, and R. Johnston-Feller for comment.

Data was distributed on the use of power factors in the calculations for relative tinting strength of Azo Yellow Medium. After discussion of the data and since the repeatability of the test method is approximately 95%, it was decided the results were good enough without use of the power functions.

D01.57.04, Specification for Artists' Paints, A. Spizzo, Chairman, has two revisions to D 4302-85 that have been balloted with no negatives. The revisions add the word "Alkyd" to the title and add Pigment Red 209 to the approved list. It had been proposed to add "Cobalt Turquoise" as an alternate approved name for Pigment Blue 36, which must be called "Cerulean Blue, Chromium" now. It was decided not to add this name to the list since manufacturers are not prohibited from using any name, as long as the approved name appears under it on the front of the label.

A motion was approved to make the following revisions to D 4302-85: 5.1.1—omit the phrase, "found sufficiently lightfast to be used in quality artists' paints," and 5.2—change "type of emulsion" to "*polymer identification.*"

H. Mueller reported on the results of his study on the solubility of oil and resin-oil films after about four months' drying time. Both types of film proved to be soluble. This presents a problem since it had been hoped that an oil film laid down in the same manner, and on the same substrate, could serve as a control for the amount of solubility allowable in a resin-oil paint. He suggested using instrument analysis to determine the amount of oil or resin-oil paint removed with a specified amount of rubbing. This would be expensive and not available to many people.

It is not practical to let the paint films dry long enough for the oil film to become insoluble and R. Feller warned that it is impossible to get a representative film through accelerated aging.

The point was made that it is not fair to exclude resin-oil paints from D 4302 on the basis of resolubility because this test is not required for oil and acrylic emulsion paints. Some members said that, since sooner or later, all paintings, in whatever media, would need to have a surface coating of varnish removed without destroying the painting, there should be suitable solubility tests devised for each type of vehicle. The acrylic paints remain soluble in most solvents.

It was decided to bypass the solubility test temporarily and include resin-oil paints in the standard by limiting the amount of resin (the ingredient suspected of adding to the solubility of the paint) allowable in the resin-oil paints and continue work on a suitable solubility test and plan to require the same test for oils with a special one for acrylics.

R. Johnston-Feller requested some samples of the resin-oil paints and offered to do some simple solubility tests. H. Mueller and M. Johnson will also work on the problem.

The group reviewed again the revisions to D 4302 that would be necessary to include the resin-oil paints. These were submitted by Mueller for consideration at the January 1986 meeting. Three changes will be made to the draft.

The chairman will write the changes necessary for inclusion of resin-oil paints in D 4302 for the January 1987 meeting. Mueller also will present the results of lightfastness tests on pigments in the resin-oil paints at that meeting.

D01.57.08, Labeling for Toxicity, J.T. Luke, Chairman, reported two possible changes suggested to D 4236. Both are important and will require careful consideration; therefore, no action will be taken until the January meeting. The chairman wants input on these questions before that meeting:

(1) Is the language in the standard clear about how the manufacturer must label when there are several small items marketed in a large container? Does the conformance statement go on all items or only on the container? If one or more, but not all, of the small items requires a warning statement, does the warning go on the item(s), or on the package, or both?

(2) Dr. Stopford uses the same strict health criteria and the same warnings on adult as on children's materials because some adults are ill, old, or mentally handicapped, and therefore are as much at risk as children. Should the statement in 1.3 that limits coverage of the standard to adult materials be dropped?

D01.57.09, Watercolors, E.T. Vonderbrink, Chairman, reported that samples have been received from four of the five manufacturers who volunteered to participate in lightfastness testing. The same three pigments are required from each manufacturer to serve as controls, then watercolors. There will be 95 paints in all. H. Schmincke & Co. volunteered to join the companies participating.

Preliminary data concerning the testing was reported showing that the sun exposures made under glass were spoiled by water condensation. A specimen of Phthalocyanine Blue watercolor faded badly in Florida exposure. There were large differences in appearance and some difference in lightfastness when the same watercolor was drawn down on Whatman filter paper or airbrushed on Whatman watercolor paper. The group agreed to the following:

(1) Drawdowns will be made on Whatman filter paper.

(2) Sun exposure under glass is too extreme for watercolors and will not be used in the upcoming tests. Only indoor daylight fluorescent and Xenon Arc exposure will be used.

(3) Spectrophotometric readings will be taken at completion of approximately every 200 MJ/m^2 of exposure.

D01.57—Chairman Luke asked members to consider whether work toward quality standards for colored pencils, pastels, inks, or gouache paints should be undertaken. In addition to the interest expressed by Berol and Turner Colour Works in standards for colored pencils and gouache, Daniel Smith Inc. and Graphic Chemical and Ink Co. have shown interest in a standard covering artists' inks.

Members agreed to contact companies to see what interest there is in these projects. It was suggested that watercolor and gouache could come under a section in D 4302, or a separate standard, called "Artists' Soluble Aqueous Paints" to distinguish them from the acrylic emulsion paints.

DIVISION 60
PAINT APPLICATION

SUBCOMMITTEE D01.61
PAINT APPLICATION TOOLS

F.B. Burns, Chairman

It was reported that the following proposed subcommittee scope was approved by Sub. D01.61 ballot in September, 1985: "To develop test methods, nomenclature, definitions, and recommended practices (including use) for paint application tools used for on-site application of coatings by contact transfer to a surface."

D01.61.01, Paint Brushes, T.J. Sliva, Chairman, reviewed the current status of the group and presented revised procedures for manual determination of paint brush discharge characteristics. The latter was reviewed and the chairman will incorporate

suggestions in a further revision which will be used for a round-robin test. Six cooperators agreed to participate. The objective is to complete the round-robin so results can be reviewed at the next meeting.

D01.61.02, Paint Rollers, J.F. Price, Chairman, reviewed the revised methods proposed for the next round-robin tests on paint roller discharge capacities and rates. Further revisions will be made by the chairman prior to sending out the next test series. Four cooperators agreed to participate. The chairman also encouraged members to propose new test methods for consideration at the next meeting.

D01.61.03, Pressure-Fed Rollers, E. Martin, Chairman. The chairman was unable to attend. The subcommittee chairman presided. The group reviewed the status, and the consensus was that because of lack of interest, the task group will become inactive.

D01.61.04, Nomenclature and Definitions, R. Dean, Chairman, submitted copies of Thomas Industries' glossary on both brushes and rollers to the members. Each member was asked to review and edit these documents, and propose other definitions as well, and return them to the task group chairman for consolidation and review at the next meeting.

Society Meetings

CDIC ..... OCT.

"Associative Thickeners"

Environmental Committee Chairman Kenneth Pendleton, of K.A. Pendleton Co., requested the names of two contacts from each company in the Society so that mailings on environmental and regulatory issues could be sent to them.

An appeal was made for a Technical Committee Chairman and for people to serve on both the Technical and Environmental Committees.

Educational speaker April Evans, Vice-President of Durrell Paint & Varnish Co., talked on "COLOR AND PAINT AS A SCIENCE AND AN ART."

The technical speaker was Paul Makar, of Nuodex, Inc., Piscataway, NJ. Mr. Makar, a member of the New York Society, discussed "FORMULATING WITH ASSOCIATIVE THICKENERS."

He began his discussion with the early development of latex paints and some of the thickeners used, such as casein, hydroxy ethyl cellulose (HEC), hydroxy propyl ethyl cellulose, xanthum gum, and guar gum.

Mr. Makar stated that there are two general types of thickeners available today—natural and synthetic. The primary natural thickeners are the HEC types or powdered solid materials. The synthetic class is comprised of alkali solubles also sold on a solid basis, and the polyether-polyurethane polymers class, sold with solids ranging from 17.5 to 50%.

He said that synthetic, or associative, thickeners differ from natural thickeners in the thickening mechanism. Associative thickeners thicken through association or bridging of the latex and the pigment, as contrasted to the hydrogen bond formation and gel structure formation through entanglement typical of HEC.

Continuing, Mr. Makar said the advantages of associative thickeners are improved flow and leveling, reduction in roller spatter, high film build, improved gloss, no loss of gloss, scrub resistance, and improved film integrity. Negative attributes include poor color acceptance and development, color float, and sag.

Lastly, Mr. Makar presented data on various thickener types in three commercial formulas. He finished with a discussion of the studies in progress on co-thickening techniques and on natural thickeners used in conjunction with synthetics.

CAROLYN L. TULLY, *Secretary*

CHICAGO ..... OCT.

"Accelerated Weathering"

Education Committee Chairman Theodore J. Fuhs, of General Paint & Chemical Co., announced that the 16-week coating short course will be held at the DePaul University Lincoln Park Campus, beginning in January.

The evening's speaker was Douglas M. Grossman, of the Q-Panel Co., Cleveland, OH. Mr. Grossman, a member of the Cleveland Society, discussed "THE TRUTH ABOUT ACCELERATED WEATHERING: IT'S SIMPLER THAN YOU THINK."

EVANS ANGELOS, *Secretary*

CLEVELAND ..... SEPT.

"Adhesion Science"

Douglas B. Rahrig, of S.C. Johnson & Sons, Inc., Racine, WI, presented the technical talk. Dr. Rahrig, a member of the Chicago Society, spoke on "TOOLS AND RULES OF ADHESION SCIENCE."

Dr. Rahrig began his presentation defining four terms commonly used in adhesion science—adhesion, adhesive, adherend(s), and interface. The ability to define the terms is basic in obtaining an understanding of the complexities of adhesion science, he said.

He then used slides showing the rules of adhesion science, explaining that rules are necessary to begin to enlarge the underlying mysteries of adhesion and to help pave the way to solving problems associated with it.

Dr. Rahrig continued with slides demonstrating the seven theories of adhesion, utilizing actual data, graphs, and examples of the theories. He followed with more slides, which showed adhesion analysis tools, and explained briefly the uses of each.

In conclusion, the speaker emphasized that what is measured, or what is theorized, may not be applicable to all types of practical adhesion problems.

R. EDWARD BISH, *Secretary*

DALLAS ..... OCT.

"High Quality Complying Coatings"

William McCormick, of Nuodex, presented the honorary President's Gavel to

1986-87 OFFICERS OF THE BALTIMORE SOCIETY. Seated (left to right): Society Representative—Joseph Giusto; Secretary—Helen Keegan; and President-Elect—Ed Countryman. Standing (left to right): President—C. Theodore Grumbine and Treasurer—Donald Hilliard

1986-87 EXECUTIVE COMMITTEE MEMBERS OF THE TORONTO SOCIETY. Standing (left to right): Publicity—Vik Rana; Entertainment—Roy Donnelly; Educational—Gerry Colquhoun; Membership—Joe Chernis; Program—Peter Skelton; Entertainment—Scott Harvey; and Long-range Planning—Andy Jones. Seated (left to right): By-Laws—Frank Reckless; Secretary—Larry Ham; President-Elect—Phil Read; President—Gordon Major; Past-President—Ted Stevenson; and Society Representative—Kurt Weitz

President Ashwin V. Parikh, of Coulter Electronics Inc.

Society Representative William A. Wentworth, of Jones-Blair Co., petitioned for any new business to be brought up at the FSCT Board of Directors meeting.

Technical Committee Chairman Richard G. Gohman, of Jones-Blair Co., reported on the technical paper currently being worked on by several members of the Society.

The technical presentation was given by Jacqueline M. Reynolds, of Exxon Chemical Co., Houston, TX. Ms. Reynolds, a member of the Houston Society, presented "Solvents Point the Way to High Quality Complying Coatings."

Explaining that a solvent's basic role in a coating is viscosity reduction, Ms. Reynolds went on to say that, when chosen correctly, its contributions toward compliance include improved application, decreased molecular weight, safer use, and lower emissions.

She explained that a solvent can not only give improved film application, but also better gloss, durability, blush resistance, and less color distortion.

In conclusion, Ms. Reynolds reiterated that solvent selection plays a key role in the search for complying high solids coatings with improved properties.

Bruce W. Alvin, *Secretary*

GOLDEN GATE ..... OCT.

"Preservation of Paint and Latex"

A moment of silence was held in memory of Society Honorary Member Frank A. Leibold who died on September 16. Mr. Leibold, a Past-President of the Society in 1947, also served as Council Representative to the Federation.

A. Gordon Rook, of Nuodex, Inc., Technical Committee Chairman for the Western Coatings Society's 18th Biennial Symposium and Show, February 23-25, 1987, in Monterey, CA, reported that the committee has selected 22 papers and three back-up papers to be presented at the Symposium.

Terry Young, of ICI Americas, spoke on "The Microbiology and Preservation of Paint and Latex."

Mr. Young began by reviewing the terminology and microbiological considerations of aqueous paints and latices. He said the ability of any formulation to support growth of microorganisms will depend upon microbiological susceptibility of its components—polymers, thickeners, surfactants, water, colloids, pigment, and microbiological agents. The most overlooked source of contamination which should be investigated is the water source, including reused water, tap water, water from an ion exchange unit, TiO_2 slurry, and latices.

The speaker then presented the advantages and disadvantages of the classes of biocides available, including mercurials, phenolics, thiadiazine, formaldehyde release, acetaldehyde release, and isothiazolin.

Finally, Mr. Young emphasized that no biocide can take the place of good housekeeping in controlling microbiological contamination.

Q. What class of biocide is suitable as both an in-can preservative of water-borne paints and fungicide in water-based paints for exterior use?

A. Mercurials.

Q. Would geographical location play a part in biocide recommendations?

A. For in-can preservative, there would be no difference, but as an exterior film preservative, geographical location would have to be considered.

Ernest Soldavini, *Secretary*

KANSAS CITY ..... OCT.

"Federal Hazardous Communication Standard"

Society President Steven D. Johnson, of Cook Paint & Varnish Co., recognized all Past-Presidents, and Honorary and/or Retired Members of the Kansas Society in attendance at the meeting. Called to the podium and presented with official Federation ties were: Past-Presidents Steve Bussjaeger, Davis Paint Co., (1984); Terryl F. Johnson, Cook Paint & Varnish Co., (1967), Past-President of the Federation (1983); Jerry P. Hefling, Loctite Corp., (1985); Norman A. Hon, Cook Paint & Varnish Co., (1973); John E. Ormsby, Society Honorary Member, (1972); Barney Pallia, Society Honorary Member, (1968); William J. Fitzpatrick, Cook Paint & Varnish Co., (1979); Melvan L. Boyer, Patco Products Div., (1982); Warren O. Manley, Cook Paint & Varnish Co., (1962); Ray D. Lawson, Southwest Petro-Chem, (1977); John Barr, Retired; and Morey Kyser, Retired.

Society Representative Norman A. Hon read the Federation announcements, including a call for Roon Award papers for the Federation's Annual Meeting in 1987.

Mark Froese, of Farmland Industries, Inc., presented a brief account of the Federation's Technical Committee Chairmen's meeting in Louisville, KY.

Guest speaker was Steve Carmichael, of the Department of Labor—OSHA. Mr. Carmichael gave an audio-visual presentation describing the Federal Hazardous Communication Standard CFR 29, 1910.1200.

The speaker spoke at length on the latest OSHA directives pertaining to the acceptability of HMIS labeling for in-plant hazard communication under the standard.

Roger E. Haines, *Secretary*

LOS ANGELES..... OCT.

Membership Night

A moment of silence was observed for members William Crevershea and Miguel Calette who died recently.

Micheal Gildon, of Guardsman Chemicals, Inc., was presented with a Past-President's Pin and a plaque.

Seminar
on
Statistical Process Control for the Coatings Industry

Regional Presentations
March 1987

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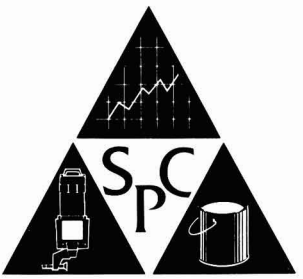

PROGRAM

First Day

Continental Breakfast
(7:30 to 8:45 am)

Morning Session
(9:00 am to Noon)

- Measuring the Cost of Quality
- What Is Statistical Process Control?
- Benefits to Be Obtained from SPC
- Construction of Control Charts

Luncheon
(Noon to 1:30 pm)

Afternoon Session
(1:30 to 4:30 pm)

- Interpreting Control Charts
- Standard Deviation and Other Measures of Variability
- Examination of Production Processes, Both In and Out of Control

Second Day

Continental Breakfast
(7:30 to 8:45 am)

Morning Session
(9:00 am to Noon)

- Comparison of Production Process with Customer Specifications
- Process Capability Analyses
- Introduction to Attribute Charts

Luncheon
(Noon to 1:30 pm)

Afternoon Session
(1:30 to 4:00 pm)

- Automotive Industry's SPC Mandate to Its Suppliers
- Establishing Your SPC Program (Identifying Critical Variables, Designing Your Data Gathering Forms, Assigning Responsibilities for Implementing Your SPC System)

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Note: Reservations must be made at least 30 days in advance of seminar to guarantee room availability and rate.

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Sandra L. Bowden, of McCloskey Corp., and her committee were congratulated for their diligent work on the Society yearbook and its early release.

L. Lloyd Haanstra, of Guardsman Chemicals, Inc., gave the Environmental Report and noted the recent Federation Environmental Control Committee Meeting in Louisville, KY. James D. Hall, of Sinclair Paint Co., attended the meeting.

EL RAP, the legislative committee of the SCPCA, was referred to for its work on recent pending legislation including Rules #1107, 1113, 1145, and 443.1. Mr. Haanstra also brought the attention of the Society to a pamphlet concerning Proposition #65.

President Henry J. Kirsch, of Trans Western Chemicals, Inc., announced there will be a Federation-sponsored seminar on "Coatings for Wood Substrates" held in Seattle, May 1-2. The seminar will cover various wood types, coating types, and problems encountered in the wood coatings industry.

Guest speaker for the evening was Terry Young, of ICI Americas, who presented "THE MICROBIOLOGY AND PRESERVATION OF PAINT AND LATEX."

Q. Which groups of biocides are considered environmentally safe?

A. A biocide, by its nature, is not biodegradable per se, unless it's reduced or changed in concentration. It's there to kill bugs and will do so. If you get a biocide into a sewage-treatment plant with too high a concentration it will kill the bugs that are designed to treat the sewage. However, if the effluent from your plant has a reduced concentration of biocide then most biocides will be biodegradable. Things like mercury ...phenol are not.

Q. How can you detect whether a surfactant has been subject to microbiological attack?

A. Usually that will cause changes in surface tension, in the case of latices it may cause coagulation of the latex. Changes in viscosity may also occur.

PARKER PACE, *Secretary*

LOUISVILLE ..... SEPT.

"Hazard Communication Rule"

Education Committee Chairman Paul Baukema, of Reliance Universal, Inc., reported that 20 students enrolled in Surface Coatings Technology II sponsored by the Society in conjunction with the University of Louisville.

Technical Committee Chairman Stan Harshfield, of Devoe & Raynolds Co. Inc., reported that the committee is in the early stages of a project to compare a computer model for determining CPVC with physical methods. Mr. Harshfield said the committee was conducting a literature search and is enthusiastic about presenting a paper at the Federation's Annual Meeting in 1987.

Paul Brooks, Corporate Manager, Occupational Health and Product Safety Affairs, Reliance Universal, Inc., presented a lecture on the current affairs in the OSHA Hazard Communication Rule.

LOUIS F. HOLZKNECHT, *Secretary*

NEW ENGLAND ..... OCT.

"Rheological Additives"

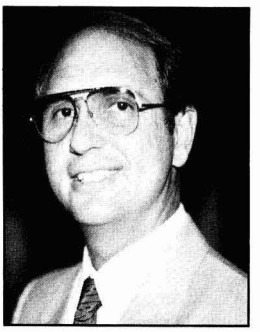
Environmental Committee Chairman Bruce Ocko, of The Truesdale Co., gave an update on legislation in the areas of air pollution, hazard communication, and solid waste. Mr. Ocko also discussed the new OSHA interpretation of the Hazard Communication Standard involving "target organ" warnings on labels.

The evening's presentation was given by Robert H. Dey, of NL Chemicals, Inc., Hightstown, NJ. Mr. Dey spoke on "RHEOLOGICAL ADDITIVES FOR NON-AQUEOUS COATINGS."

The speaker observed that viscosity is the ratio of shear stress to shear rate, and described the relationship of shear rate to coatings properties. He noted that low shear rates are concerned with package stability (settling), sag, and leveling, while high shear rates influence application characteristics.

Mr. Dey pointed out the techniques for optimizing the effectiveness of various rheology modifiers by using proper shear, temperature control, and dwell time. He continued by emphasizing the importance of the order of addition when certain additives are used.

ROGER WOODHULL, *Secretary*



L.A. SOCIETY PRESIDENT for 1986-87 is Henry Kirsch, of Trans Western Chemicals. Mr. Kirsch, who serves as Vice-President of the firm, has been employed by Trans Western since 1981.

NEW YORK ..... SEPT.

"Dispersants in Colorants and Coatings"

Officers installed for 1986-87 include: President—Kenneth J. De Paul, Whittaker, Clark, & Daniels, Inc.; President-Elect—John W. Burlage, Pacific Anchor Chemical; Secretary—David Penichter, D.H. Litter Co., Inc.; and Treasurer—Arthur A. Tracton, Consultant.

Outgoing President Raymond P. Gangi, of International Paint Co., Inc., was presented a Past-President's Pin along with an honorarium.

Michael C. Frantz, of Daniel Products Co., was the evening's speaker. Mr. Frantz's presentation dealt with "COMPOSITE VERSUS SINGLE DISPERSANTS IN COLORANTS AND COATINGS."

The speaker said that the work of Daniel Products goes back 30 years, and was trial and error in nature in trying to find the right combinations to achieve a 95% level of color development in various pigments and vehicles.

JOHN W. BURLAGE, *Secretary*

1986-87 OFFICERS of the Rocky Mountain Society (left to right): Treasurer—J.R. Paul Silva, Kwal Paints, Inc.; Secretary—Jeffrey B. Johnson, Sashco, Inc.; President—Craig B. Hansen, George C. Brandt, Inc.; and Vice-President—Marcy S. Baugh, Consultant

DALLAS SOCIETY OFFICERS FOR 1986-87 include (left to right): Society Representative—William A. Wentworth; Vice-President—Noel L. Harrison; President—Ashwin V. Parikh; Treasurer—Steve Stephens; and Secretary—Bruce Alvin

NORTHWESTERN ..... SEPT.

"Anti-Microbials"

Outgoing Society President, Al Yokubonis, of Celanese Specialty Resins, welcomed the incoming President, Larry Brandenburger, of Valspar Corp.

Technical Committee Chairman Ed Ferlauto, of Valspar Corp., reported on the status of the committee's two projects. Results on the first project "To Determine Why Measured VOC Differs from Theoretical Values" look good so far, he told the membership. He felt it may be possible to have a paper written in 1987.

Society Representative Richard Fricker, of Valspar Corp., reported on the Spring Meeting conducted in Pittsburgh in May and reminded members of the upcoming FSCT Annual Meeting and Paint Industries' Show to be conducted in Atlanta, GA, from November 5-7, 1986.

The technical speaker for the evening was William Woods, of Nuodex, Inc., who discussed "ANTI-MICROBIALS USED IN COATINGS AND PLASTICS."

The use of anti-microbials in coatings and plastics was reviewed by Mr. Woods. He also identified and characterized target microorganisms. In addition, the speaker described nutritional requirements, sources of contamination, and methods of control.

Lastly, Mr. Woods classified commercial anti-microbials according to activity spectrum, chemical type, mechanism of action, and physical form. Methods of evaluating efficacy were also discussed.

Reynolds B. Thomas, Jr., of The Business Lawyers, gave the second presentation. He provided helpful tips on "WILLS, TAX AUDITS, and DUI's."

RICHARD KARLSTAD, *Secretary*

NORTHWESTERN ..... OCT.

"Urethane Coatings"

Technical Committee Chairman Edward C. Ferlauto, of Valspar Corp., reported on the Technical Committee Chairmen's meeting in Louisville, KY.

The evening's first speaker was Paul Hoffman, of Mobay Chemical Co., who spoke on "URETHANE COATINGS, PROPERTIES AND MARKETS."

Mr. Hoffman discussed why urethanes should be used for maintenance coatings, explaining that they can do things that other coatings cannot, and they have good length of service.

He then talked about aromatic and aliphatic urethanes and their properties. Mr. Hoffman noted that these urethanes share many of the same properties including: chemical resistance (both acid and base), corrosion resistance, solvent resistance, hardness, and low-temperature cure. The aromatic urethanes will "chalk" outdoors, but will still retain their film properties.

The speaker said that the advantages of urethanes over epoxies are their low-temperature cure and superior gloss retention. Urethanes also have better gloss retention than silicone-alkyds, against which they sometimes compete.

According to Mr. Hoffman, polyester urethanes are better than acrylic urethanes for solvent resistance because they are more tightly crosslinked.

Urethanes also produce the lowest cost per square foot per year when used as bridge coatings. The preparation cost is less because commercial blast will suffice rather than white-metal blast. Urethanes are also good for refineries and chemical plants.

The second speaker was Art Fry, of 3-M Company, who told "THE STORY OF POST-IT-NOTES."

According to Mr. Fry, this is a story of teamwork and innovation. It began when a colleague of his made a super-weak adhesive which would hardly stick to anything. Mr. Fry first thought of using it on bookmarks. The sticky bookmarks were used for inter-office messages. To get the notice of upper management, samples were given to their secretaries. The first test market failed, but then sampling began and Post-It-Notes became a success.

RICHARD W. KARLSTAD, *Secretary*

PHILADELPHIA ..... OCT.

"Two-Component Acrylic Coatings"

The Technical Committee report was given by William J. Fabiny, of Sermatech International, Inc. He noted that 29 people representing M.A. Bruder & Sons Inc., Lawrence-McFadden Co., Hercules Incorporated, U.S. Oxide, Sermatech, NL Chemicals, Inc., Loos and Dilworth, Inc., Lilly Industrial Coatings, Inc., and Omega Chemical Co. toured the C.J. Osborn Chemical plant on October 2.

J. Richard Kiefer, Jr., of McCloskey Corp., requested members to write their local PA State Representative to urge defeat of the following pending legislative bills: HB-2204, HB-2205, and HB-2206.

Mr. Kiefer advised the Society that Sections 3 and 4 of the Philadelphia Handbook will be redone.

The technical presentation was given by S.W. Chow, of the Union Carbide Corp., Bound Brook, NJ. Dr. Chow discussed "ISOCYANATE-FREE, AMBIENT CURE, TWO-COMPONENT ACRYLIC COATINGS."

The speaker described the current type of ambient cure coatings including: alkyds and modified alkyds, urethanes—both moisture cured and two component, and epoxy-amine cured. She said that the isocyanates used in urethanes are highly toxic and many times cause allergic reactions.

She described, with the use of slides, a new system for crosslinking acrylic based resins with a sorbitol glycidyl ether. Dr. Chow then compared this system to conventional polyol cured urethane acrylics. Dr. Chow concluded her talk by stating that this system is still a developmental product, but that samples are available.

LAWRENCE J. KELLY, *Secretary*

PIEDMONT ..... SEPT.

"Aluminum Pigment"

The following officers were installed for the 1986-87 year: President—Steve Lasine, McCullough & Benton, Inc.; Vice-President—Charles T. Howard, DeSoto, Inc.; Secretary—Barry F. York, Reliance

Universal, Inc.; and Treasurer—Forrest L. Fleming, Reliance Universal, Inc.

Society Representative James N. Albright, Jr., of Lilly Co., reported a notice from the Federation on "An Application of Statistical Process Controls" seminar, March 9-10, 1987, in Atlanta, GA.

Robert Matejka, of Reliance Universal, Inc., will not be able to serve as Education Committee Chairman, due to acceptance of a new post at Reliance. A replacement has not been decided upon.

Anyone interested in forming an environmental sub-committee on material ideas and concerns about waste management and waste disposal should contact James M. Bohannon, Valspar.

Student member Lee Guiney reported that the Technical Committee has approximately 200 words to add to the "Paint/Coatings Dictionary" that are related to the furniture industry.

President Steve Lasine announced that Federation Executive Vice-President Frank J. Borrelle will visit the Society at its March 18 meeting.

The guest speaker was Stephen M. Delich, of Silberline Mfg. Co. Mr. Delich, a member of the Philadelphia Society, spoke about "ALUMINUM PIGMENT—PAST, PRESENT, FUTURE."

Initially, Mr. Delich spoke about the different forms of aluminum pigment produced from bauxite ore. With the aid of a slide presentation, he then explained the properties of leafing and non-leafing aluminum pigments.

The speaker covered solvent selection when using leafing aluminum and provided an explanation of why a leafing pigment deleafed in various systems.

He then detailed the safety aspect for storage, explaining the reaction with water, dusting, and sparks causing extreme combustion.

According to Mr. Delich, aluminum pigments are generally supplied in paste rather than dry, reducing the hazard of using in the dry state. Generally shelf life of pastes are 9 to 12 months in closed containers.

BARRY F. YORK, *Secretary*

PITTSBURGH..... SEPT.

"Polyurethane Coatings"

Society Past-President Joseph L. Mascia, Campbell Chemical Co., introduced the 1986-87 President Anthony J. Isacco II, Puritan Paint & Oil Co. Mr. Isacco reported on the Education Committee's activities. The Federation was given a grant to be used by the Pittsburgh Society for student research projects. The grant will match funds up to $1,000 for a research project in the coatings or polymer area. Eligible students will be from one of the area's smaller colleges. Mr. Isacco asked the membership for help on project proposals and for volunteers to meet with the students working on the projects.

President Isacco announced that the Manufacturing and Environmental Controls Committees need chairmen.

President-Elect Mark Troutman, Bradley Paint Co., introduced the evening's speaker, Dr. Kenneth Abate, H.H. Robertson Co., who presented "POLYURETHANE COATINGS: CHEMISTRY AND APPLICATION."

Dr. Abate began his presentation with a brief history on polyurethanes stating that polyurethane chemistry was documented by the middle of the 19th century but did not reach commercial significance until the work of Otto Bayer and co-workers in the 1930's. Bayer's original work focused on using polyurethanes as fiber substitutes.

According to Dr. Abate, during World War II, urethane development in Germany was directed at using urethanes for synthetic rubbers, adhesives, coatings, and foams. Polyurethane chemistry wasn't developed in the United States until after WW II. After the war Bayer directed his efforts toward polyurethane foam systems and by 1955, flexible foams were being used in most countries.

Next, Dr. Abate touched on basic polyurethane chemistry. An idealized polyurethane reaction is the reaction of an isocyanate with some hydroxyl functional material. Isocyanates are reactive with themselves and almost any hydrogen containing material. Primary hydroxyls react rapidly with isocyanates and the secondary and tertiary hydroxyls react at a less rapid rate. Steric factors are extremely important in determining the reaction rate. Isocyanates also react with water, amines, and urea.

The two main classes of isocyanates in coatings work are aromatic and aliphatic, said Dr. Abate. In general, the aromatic are more reactive but the aliphatic provide more light stable coatings. A wide variety of isocyanates can be prepared with a few raw materials because its functionality, viscosity, and final properties can be varied widely. A polyol can be any type of hydroxy functional material. Properties can be built into the polyol side and by varying the isocyanate a wide variety of properties can be built into a polyurethane.

Dr. Abate went on to state that by varying catalysts, urethanes can be made to cure under specific time and temperature requirements. Urethanes are catalyzed by alcohols and are essentially autocatalytic. Tertiary amines are commonly used as urethane catalysts. The general order of activity for catalysts is Bi, Pb, Sn, Triethylenediamine, strong bases, Fe, Al, Hg, Zn, Alkylamines, Mo, Cu, Mn, Zr, Trialkyl phosphates.

Dr. Abate continued by saying that a coating can provide aesthetics, durability, and various special functions. Urethane coatings can be applied by almost any method including: spraying, brush, dip, electrodeposition, and coil coating.

Q. How do urethane coatings compare to fluorocarbon type coatings?

A. The best weathering properties are usually obtained with a fluoropolymer but are usually deficient in other areas.

Q. How do urethane coatings compare to silicone alkyds for bridge coatings?

A. Urethane coatings should give better performance if formulated properly.

RICHARD G. MARCI, *Secretary*

PITTSBURGH..... OCT.

"Rust and Corrosion"

Allan C. Zoller, of Allan C. Zoller Co., presented the Nuodex Gavel to new President Anthony J. Isacco, Jr., of Puritan Paint & Oil Co. Mr. Isacco presented a departing gift to Past-President Joseph L. Mascia, of Campbell Chemical Co.

Education Committee Chairman Donald Boyd, of PPG Industries, Inc., stated that the committee is looking for people to help with their activities including soliciting small local colleges and universities to award grant money for undergraduate research in the polymer and coatings fields. Volunteers are also needed for career nights at local high schools.

Technical Committee Chairman Richard Trudel, of Valspar Corp., made it known that his committee is also in need of volunteers and ideas for undergraduate technical projects.

Mr. Isacco introduced special guest G.G. Thenora, from the University of Genoa. Mr. Thenora is a materials protection consultant for the Italian branch of PPG Industries, Inc.

Presenting the technical talk was Clive H. Hare, of Clive H. Hare, Inc. Mr. Hare, a member of the New England Society, talked on "RUST AND CORROSION CONTROL COATINGS."

The speaker's presentation dealt specifically with Massachusetts' experiences with non-toxic type bridge coatings and related problems. He stated that over the last ten years thinking has been consolidated on the toxic properties of lead and chromate based paints. Organizations have been trying to eliminate lead and chromium from the coatings they are using.

This general attitude, according to Mr. Hare, has caused a major industry swing away from the use of lead and chromium in primers. They are being replaced with zinc rich and barium inhibitive primers. In new construction, this change is virtually complete.

There is not enough money available to maintain the nation's bridges. The increasing use of deicing salts and more stringent surface preparation procedures for new coatings are further worsening the situation, he stated.

Mr Clive then went on to explain the advantages and disadvantages of various bridge coating systems.

In conclusion, Mr. Clive said as far as maintenance painting is concerned, we must wait until problems with containment and disposal of lead contaminated blast media are solved before any further testing of newer paint systems can resume.

RICHARD G. MARCI, *Secretary*

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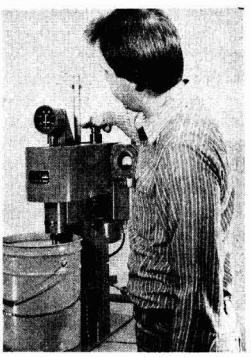

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WESTERN NEW YORK.... SEPT.

"Rheological Additives"

Secretary Mark Markoff introduced the 1986-87 elected officers: President—Michael L. DePietro, Pratt & Lambert, Inc.; Vice-President—Jean L. Luck, Pratt & Lambert, Inc.; Secretary—Marko K. Markoff; Treasurer—Gerald F. Ivancie, Pratt & Lambert, Inc.; and Society Representative—Thomas E. Hill, Pratt & Lambert, Inc.

President Michael L. DePietro announced that $1,100 worth of scholarships had been awarded during the 1984-85 and 1985-86 Society years. To maintain the scholarship fund, a special education account will be set-up based on donations from member companies and an amount from the Society's treasury. Presently, three member companies have donated $150. Other Educational Committee projects will depend on the funds available.

Several members immediately volunteered their services after Technical-Scientific Chairman Alvin Waite of Pratt & Lambert, Inc., asked for people for his committees.

Vice-President and Program Chairperson Jean Luck introduced Robert H. Dey of NL Chemicals who presented a technical talk on "RHEOLOGICAL ADDITIVES FOR NON-AQUEOUS SYSTEMS."

Commenting on the fact that organoclay and organic type additives are the most widely used, and perhaps abused, rheological additives in the coatings industry, Mr. Dey attributed the results to improper selection and incorporation techniques. In a typical solvent based coating, rheological additives protect the dispersed pigments, providing thixotropic viscosity build, sag control, excellent leveling, and control of pigment settling.

Mr. Dey used charts showing proper incorporation techniques for each additive, to optimize their effect and reduce problems. Selecting the proper type of additive for an aromatic, aliphatic, or oxygenated solvent formula is pertinent for maintaining maximum rheological properties and staying clear of problems.

A comparison of rheological properties and a description of the advantages and disadvantages concluded Mr. Dey's technical presentation.

Q. What is optimum point of addition of an organoclay in a mill base using 100% aromatic solvent?

A. Introduce the organoclay in as early as possible in the grind media. In straight aromatic system, need best shear conditions available since aromatics wet fast and gel starts rapidly.

MARKO K. MARKOFF, *Secretary*

Elections

GOLDEN GATE

Active

DELKE, FRANA A.—Tresco Paint Co., San Jose, CA.
HARWELL, JIMMY R.—DeSoto, Inc., Berkeley, CA.
HOLCOMB, ROBERT G.—Frank W. Dunne Co., Emeryville, CA.
HUFFMAN, CONSTANCE W.—Naval Reworks Facility Alameda, Walnut Creek, CA.
MOLITOR, GARY W.—Ryan Paint Manufacturing Co., Oakland, CA.
O'KEEFE, JAMES C.—Pride Paint Mfg. Co., San Mateo, CA.
OLIVAS, KIP—DeSoto, Inc., Berkeley.
PASCHAL, ALVIN W.—Sherwin-Williams Co., Benicia, CA.
SHAFFER, MICHAEL A.—D.J. Simpson Co., S. San Francisco, CA.
WILTSHIRE, VIRGINIA F.—DeSoto, Inc., Berkeley.
WOLFE, VICTOR L.—D.J. Simpson Co., S. San Francisco.

Associate

FIORINI, BRETT A.—Davis Colors, Pleasanton, CA.
JEURIS, CHRISTIAN P.—I.C.I. Americas, Concord, CA.
PINKL, THOMAS J.—Pfizer Pigments, Inc., El Cerrito, CA.
WINGFIELD, ROBERT C.—Dow Chemical Co., Industry, CA.

HOUSTON

Active

ASHMORE, PAUL M.—Benjamin Moore & Co., Houston, TX.
BUSCH, WILLY C.P.—International Paint Co., Houston.
CASTELLANOS, RICHARD M.—Monarch Paint Co., Houston.
CONFER, KENNETH L.—Underwater Tech Corp., Houston.
DESAI, GIRISH—Monarch Paint Co., Houston.
DITTMAR, JOHN A.—TPI Industries, Buda, TX.
INGRAM, THOMAS L.—Ceilcote Co., Houston.
JAMES, FRANK—Mission Offshore Coatings, Houston.
MASSEY, WILLIAM D.—Monarch Paint Co., Houston.
MCGUIGAN, JOHN P.—Valley Solvents & Chemicals, Houston.
MELNAR, DAN—Devoe and Raynolds Co., Inc., Houston.
ORTIZ, ANNE—Ceilcote Co., Houston.
SCHNEIDER, ROBERT G.—Preservo Paint Mfg., Houston.
SMITH, DAVID M.—Superior Sealants, Houston.

Associate

CONROY, PAMILA KAE—R.B. Patterson, Houston, TX.
GRANELLO, GARY A.—Byk Chemie USA, Lancaster, TX.
KOHUT, MARC A.—Southwest Solvents, Houston.
MCCORMICK, WILLIAM K.—Nuodex Inc., Katy, TX.
MEISTER, JOHN S.—Union Carbide Corp., Houston.
SANSUM, ANDREW—ITI Anti Corrosion, Houston.
SILLER, DAVID—Kenrich Petrochem Inc., Sugarland, TX.
WILSON, GORDON D.—NL Chemicals, Inc., El Reno, OK.

KANSAS CITY

Active

EVERETT, DEBBIE H.—Davis Paint Co., Kansas City, MO.
LOWE, GUY R.—Cook Paint & Varnish Co., Kansas City.
SANTAMARIA, VITO W.—Pratt & Lambert, Wichita, KS.
SHEPARD, SANDRA S.—Centri Coatings and Systems Corp., N. Kansas City, MO.
STUETELBERG, MARK J.—Cook Paint & Varnish Co., N. Kansas City.

Associate

CATCHPOLE, DAVID D.—Solvent Supply Co., Riverside, MO.
MOSER, AL M.—Walsh & Associates, Inc., Kansas City, MO.
POWELL, KEN B.—Solvent Supply Co., Riverside, MO.

LOS ANGELES

Active

AYE, YIN Y.—Old Quaker Paint Co., Carson, CA.
BANAYAN, DANIEL—CEM, Woodland Hills, CA.
BEARDALL, CARWIN B.—Pioneer Paint & Varnish Co., Tucson, AZ.
BELANGER, ROLAND—Trail Chemical Corp., El Monte, CA.
BESWICK, JAY—Community Youth Gang Services, Los Angeles, CA.
BORNEO, JOSE CORONADO—Metcon Associates, Inc., Los Alamitos, CA.
CASH, DAVID E.—Day-Glo Color Corp., Cudahy, CA.
CHAVEY, ROBERT G.—Consultant, R.G.C. Co., San Dimas, CA.
DOTAN, PATRICK K.—Arlon Products, Lake Elsinore, CA.
DOWNIE, THOMAS J.—BASF-Inmont, Anaheim, CA.
ENKOJI, SUSUMU—Guardsman Chemicals, Inc., Southgate, CA.
FALCIONI, AL—McCloskey Corp., Los Angeles.
GONZALEZ, MIGUEL C.—Pinturas y Barnices Calette, San Ysidro, CA.
HANKINS, KEITH A.—Engravers Ink Co., Brea, CA.
HATCH, KENT M.—Whittaker Corp., Colton, CA.
HIGA, RAYMOND S.—A C Products, Inc., Placentia, CA.
IVANEC, NESTOR O.—Zolatone Process, Inc., Los Angeles.
LANDER, ART—Hill Bros. Chemical Co., Mission Viejo, CA.
LACEY, ROBERT—Borden Chemical Co., Compton, CA.
LAZARTIC, JIM P.—Whittaker Corp., Colton.
MARTIN, EDWARD J.—Chemical Technology Labs, Inc., Lynwood, CA.
MARTIN, GEMMA M.—Chemical Technology Labs, Inc., Lynwood.
MC DOW, KENNETH R.—Valspar Corp., Azusa, CA.
OAKES, KIRK—Koppers Co., Inc., Vernon, CA.
PARATHARA, THOMAS J.—Dunn-Edwards Corp., Los Angeles.
RASUL, MOHAMMAD M.—W.C. Richards Co. of California, Anaheim.
RODRIGUEZ, MARTE L.—Pinturas y Barnices Calette, San Ysidro.
SCARLATA, DANA L.—Elixir Industries, Gardena, CA.
SELCUK, EMIN V.—Deft, Inc., Irvine, CA.
SHAH, BHUPENDRA M.—Trail Chemical Corp., El Monte, CA.
SHIER, D. SCOTT—Whittaker Corp., Colton.
STONER, ROBERT E.—Cargill, Inc., Lynwood.
SUAREZ, ANGEL M.—American Paint Co., Van Nuys, CA.
TOMBRELLO, JOSEPH A.—Frazee Industries, San Diego, CA.
UWNAUICH, STEVE—Deft, Inc., Irvine.
VUELVAS, TEODORO G.—Pinturas y Barnices Calette, San Ysidro.
ZERBEL, ROBERT L.—Smiland Paint Corp., Los Angeles.

Associate

ADAMS, CHARLES P.—United States Can Co., Anaheim, CA.
AUSMAN, CHRISTY A.—Pacific Micro, Bell, CA.
BARTON, CHRIS A.—Chalon Chemical Corp., Commerce, CA.
BREDE, WALLACE E.—McCloskey Corp., Los Angeles, CA.
BROOKS, GARY L.—Oil Solvent Process, Azusa, CA.
BURCHETT, ANDY—Calif. Chemical Disposal, Wilmington, CA.
CHWIRUT, JAMES A.—W.R. Grace & Co., Concord, CA.
EMIGH, JOHN H., JR.—H.M. Royal, Inc., Downey, CA.
ENGSTROM, E. PAUL—Trans Western Chems., Inc., Commerce.
FINK, MICHAEL A.—Schoofs, Inc., Los Angeles.

GORMAN, RICHARD H.—C.P. Hall Co., Torrance, CA.
HARRISON, VICKI L.—Unocal, La Mirada, CA.
HOWARD, FRED G.—Angeles Chemical Co., Inc., Sante Fe Springs, CA.
HOWELL, STEVE P.—Amer. Envir. Mgmt. Corp., Stanton, CA.
KATZ, BRET A.—D-D Chemical Co., Inc., Northridge, CA.
LEVINE, JEFFREY L.—U.S. Container Corp., Vernon, CA.
MUELLER, JAMES—SCM Pigments Corp., Commerce.
MUGGEE, DAVE—E.T. Horn Co., La Mirada.
PABICH, DAN—Columbian Chemicals Co., Santa Ana, CA.
ROYAL, JOSEPH E.—H.M. Royal, Inc., Downey.
ROZCICHA, ED J.—Manville Sales Corp., Oceanside, CA.
SHUMAN, TODD C.—Cargill, Inc., Lynwood, CA.
SMITH, DON—TCR Industries, Inc., Carson, CA.

Educator/Student

CHAN, GLADYS CHUN-LIN—North Dakota State University, Fargo, ND.

LOUISVILLE

Active

FERRY, DONALD—Valspar Corp., Louisville, KY.
HANKS, ROBERT D., JR.—Blatz Paint Co., Louisville.
HILLARD, RICHARD—Valspar Corp., Louisville.
WALTRIP, DONALD W.—Reliance Universal, Inc., Louisville.

Associate

HARDIN, JOYCE—Superior Solvents, Louisville, KY.
KRATZER, SAM—C.L. Zimmermann Co., Louisville.
PHILLIPS, WILLIAM G.—BASF Chemicals, Appleton, WI.

NEW ENGLAND

Associate

HYDE, TIMOTHY S.—AZS Corp., Haddonfield, NJ.
SOLOMON, JANICE D.—Sannor Industries, Leominster, MA.

NEW YORK

Active

ANDINO, RALPH, JR.—Reliance Universal, Inc., Somerset, NJ.
BOUBOULIS, CONSTANTIN J.—Pan Tech Management Corp., Union, NJ.
GOLDBLATT, PHILIP H.—Benjamin Moore & Co., Newark, NJ.
LUTTS, JEFFREY W.—Diamond Shamrock Chemicals, Morristown, NJ.
NAVARRO, MARIO—Pleko East, Inc., Astoria, NY.
REESE, TARY—Chemray Corp., Kenilworth, NJ.
YUHAS, STEPHEN A., JR.—Solventures, Inc., Fords, NJ.

Associate

MILLER, MARGUERITE J.—Unimin Corp., New Canaan, CT.
MISKEL, JOHN, JR.—Diamond Shamrock Chemicals, Morristown, NJ.
POLLOCK, ROBERT E.—D.B. Becker Inc., Glen Head, NY.
VINCENT, NANCY J.—Diamond Shamrock Chemicals, Morristown.

Retired

PARMENTIER, JAMES E.—Lincroft, NJ.

NORTHWESTERN

Active

GOMEZ, GUSTAVO J.—3M Commercial Graphics, St. Paul, MN.

Associate

BATTLE, WILMA B.—George C. Brandt, Inc., St. Paul, MN.
DU, JOHN W.—Wagner Spray Tech, Minneapolis, MN.
KLEIN, GARY E.—Barrel Reconditioner, Eagan, MN.
WULF, TERRY P.—Barrel Reconditioner, Eagan.

SOUTHERN

Active

BARNES, MAXWELL—The O'Brien Corp., Brunswick, GA.
BOAZ, DONALD P.—Dyco Chemicals & Ctgs., Clearwater, FL.
BOS, MARIEN—Akzo Coatings America, Norcross, GA.
BRATCHER, MICHAEL D.—Crown Metro Inc., Greenville, SC.
BURDETTE, ARTHUR M.—Akzo Coatings America, Norcross.
CROCKETT, DAVID T.—Glidden Coatings, Atlanta, GA.
DERR, DAVID R.—Coronado Paints, Inc., Edgewater, FL.
DIETRICH, BUD—Perma-Chink Systems, Inc., Knoxville, TN.
FLANAGAN, KEN—W.M. Barr & Co., Inc., Memphis, TN.
FUGE, PETER K.—Burk-Hall Paint Co., Memphis.
GARVER, CLYDE M.—Horizon Chemicals, Clearwater.
HILL, EDWARD—Coronado Paints, Inc., New Smyrna Beach, FL.
KEENE, JOHNNY R.—D.P.I. Quality Paints, Clearwater.
KYTASAARI, JOHN F.—Tnemec Company Inc., Norcross.
LAMB, MICHAEL D.—Akzo Coatings America, Norcross.
MARSCHALL, GEORGE—D.P.I. Quality Paints, Clearwater.
MERTINS, KAREN S.—Akzo Coatings America, Norcross.
OVERMAN, GREGG R.—Chapman Chemical Co., Memphis.
PENNISI, ROBERT W.—Xymax Inc., Deerfield Beach, FL.
RADZ, J.T.—Polymetries Inc., Longwood, FL.
REECE, RODNEY R.—Evans Cooperage Co., Harvey, LA.
ROOT, RICHARD A.—Kores Nordic (USA) Corp., Summerville, SC.
SHAH, JITENDRA J.—United Paint Co., Memphis.
VALMORES, PONS P.—Coronado Paints Inc., Edgewater.
SHOOK, STANLEY E.—Industrial Coatings, Birmingham, AL.
STREET, EDWARD D.—Akzo Coatings America, Norcross.
VASSALLO, MIGUEL A.—Vassallo Inc., Lake Wales, FL.
WLODAR, LARRY M.—Akzo Coatings America, Roswell, GA.
WYNDHAM, RONALD—Evans Cooperage, Harvey, LA.

Associate

ARNSON, JON R.—Unocal Chemicals Div., Miami, FL.
ASHBRIDGE, RICHARD D.—Velsicol Chemical Corp., Matthews, NC.
BETROS, EDWARD E.—Mammoth Containers, Orlando, FL.
COOK, GREG—SCM Specialty Chemicals, Marietta, GA.
FOLLETT, CHARLES V.—Pacific Smelting Co., Memphis, TN.
GEHRING, JAMES C.—Chemitec Inc., Oldsmar, FL.
HARMON, DAVID P.—Davies Can Co., Tampa, FL.
HINSON, KAREN B.—Lomas Minerals & Chems., Macon, GA.
HOXIE, JACK G.—Velsicol Chemical Corp., Atlanta, GA.
IRBY, GEORGE S.—Rohm and Haas Co., Atlanta.
KOLMETZ, MARK R.—Letica Corp., Lanett, AL.
MARSCHALL, JOHN—Gulf Coast Chemical Corp., Tampa.
MCMAHON, JOHN P.—Majemac Enterprises, Inc., Clearwater.
POMP, PAUL R.—Gulf Coast Chemical Corp., Tampa.
RIGBY, CHARLIE S.—Velsicol Chemical Corp., Atlanta.
SWIERENGA, KENNETH W.—Tampa Printing Co., Tampa.
TEGEN, TIMOTHY N.—Unocal Chemicals Div., Charlotte, NC.
WALTER, RANDALL F.—Gulf Coast Chemical Corp., Tampa.
ZAVODNY, RONALD L.—Unocal Chemicals Div., Charlotte.
ZEGELBONE, JACK—Tropical Asphalt, Hallandale, FL.

Educator/Student

DANTIKI, SUDHAKAR—University of Southern Mississippi, Hattiesburg, MS.
GEORGE, SCOTT E.—University of Southern Mississippi, Hattiesburg.
GOFF, LESLIE J.—University of Southern Mississippi, Hattiesburg.

Retired

ADAMS, RAYMOND C.—Montgomery, AL.

Future Society Meetings

Baltimore

(Jan. 15)—Federation Night. "Tools and Rules of Adhesion Science"—Douglas B. Rahrig, S.C. Johnson & Son, Inc.

Birmingham

(Feb. 5)—"Epoxy-Curing Agents"—W. Burrell, Anchor Chemicals Ltd.

(Mar. 5)—"Determination of Short and Long Term Protection Offered by Chromate-Free Anti-Corrosion Paints"—Mr. Nitsche, BASF Stuttgart.

(Apr. 2)—Memorial Lecture for E.A. Bevan "Amino Resin Development"—R. Barrett, B.I.P. Chemicals Ltd.

Chicago

(Feb. 2)—"When the OSHA Inspector Calls, Be Prepared by Establishing Procedures"—Hobart G. Miller, Label. "On Site Recovery and EPA Compliance"—Fred Slock, Progressive Recovery, Inc.

(Mar. 2)—"How Close Is Close Enough"—Terry Downes, Applied Color Systems, Inc. "Effective Filtration of Industrial Coatings"—Carney Likens, Commercial Filters.

(Apr. 6)—"New Insights into the Chemistry of Silicones for the Coatings Industry"—speaker from Byk Chemie USA. "High Solids Urethane Coatings"—Bernard Taub, Spencer Kellogg Products, NL Chemicals/NL Industries, Inc.

Golden Gate

(Jan. 19)—"Effective Filtration of Industrial Coatings"—Carney Likens, Commercial Filters.

(Mar. 16)—"New Developments in High Solids Coatings"—Richard Johnson, Cargill, Inc.

(Apr. 13)—"Vinyl Rheology Modified Systems"—Rick Caudwell, Reichhold Chemicals, Inc.

(May 18)—"Advantages of Predispersed Polyethylenes and Waxes in High Performance Coatings"—Elio Cohen, Daniel Products Co.

Los Angeles

(Mar. 11)—"New Developments in High Solids Coatings"—Richard Johnson, Cargill, Inc.

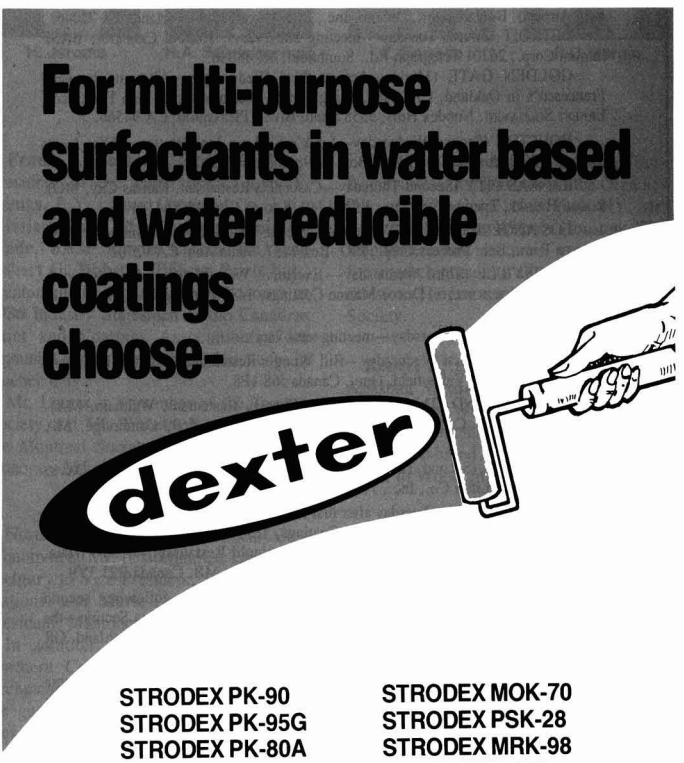
(Apr. 8)—"Vinyl Rheology Modified Systems"—Rick Caudwell, Reichhold Chemicals, Inc.

(May 13)—"Advantages of Predispersed Polyethylenes and Waxes in High Performance Coatings"—Elio Cohen, Daniel Products Co.

New England

(Jan. 15)—"Environmental Update"—Robert Nelson, NPCA.

(Feb. 19)—"Waterborne Rheological Additives"—Speaker from Rohm and Haas Co.



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Constituent Society Meetings and Secretaries

BALTIMORE (Third Thursday—Martin's Market Square, Towson, MD). HELEN KEEGAN, Valspar Corp., 1401 Severn St., Baltimore, MD 21230. Virginia Section—Fourth Wednesday, Ramada Inn-East, Williamsburg, VA.

BIRMINGHAM (First Thursday—Strathallan Hotel, Birmingham, England). D.M. HEATH, Holden Surface Ctgs. Ltd., Bordesley Green Rd., Birmingham B9 4TQ England.

CHICAGO (First Monday—meetings alternate between Como Inn in Chicago and Sharko's West in Villa Park). EVANS ANGELOS, Kraft Chemical Co., 1975 N. Hawthorne Ave., Melrose Park, IL 60160.

CDIC (Second Monday—Sept., Jan., Apr., June in Columbus; Oct., Dec., Mar., May in Cincinnati; and Nov., Feb. in Dayton). CAROLYN TULLY, Sun Chemical Corp., 4526 Chickering Ave., Cincinnati, OH 45232.

CLEVELAND (Third Tuesday—meeting sites vary). R. EDWARD BISH, Jamestown Paint & Varnish Co., 108 Main St., Jamestown, PA 16134.

DALLAS (Thursday following second Wednesday—Executive Inn. Near Lovefield Airport). BRUCE ALVIN, DeSoto, Inc., P.O. Box 461268, Garland, TX 75046.

DETROIT (Fourth Tuesday—meeting sites vary). JOANNE CEDERNA, BASF Inmont Corp., 26701 Telegraph Rd., Southfield, MI 48086.

GOLDEN GATE (Monday before third Wednesday—Alternate between Francesco's in Oakland, CA and Leaning Tower Restaurant in S. San Francisco). ERNEST SOLDAVINI, Nuodex Huls, 5555 Sunol Blvd., Pleasanton, CA 94566.

HOUSTON (Second Wednesday—Look's Sir-Loin Inn, Houston, TX). JAMES TUSING, PPG Industries, Inc., P.O. Box 1329, Houston, TX 77251.

KANSAS CITY (Second Thursday—Cascone's Restaurant, Kansas City, MO). ROGER HAINES, Tnemec Co., Inc., P.O. 1749, Kansas City, MO 64141.

LOS ANGELES (Second Wednesday—Steven's Steak House, Commerce, CA). PARKER PACE, Behr Process Corp., P.O. Box 1287, Santa Ana, CA 92702.

LOUISVILLE (Third Wednesday—Executive West Motor Hotel, Louisville, KY). LOUIS HOLZKNECHT, Devoe Marine Coatings, 1437 Portland Ave., Louisville, KY 40203.

MEXICO (Fourth Thursday—meeting sites vary).

MONTREAL (First Wednesday—Bill Wong's Restaurant). R. FERRIS, Canbro Ltd., 29 E. Park St., Valleyfield, Que., Canada J6S 1P8.

NEW ENGLAND (Third Thursday—LeChateau Restaurant, Waltham, MA). ROGER WOODHULL, California Products Corp., P.O. Box 569, Cambridge, MA 02139.

NEW YORK (Second Tuesday—Landmark II, East Rutherford, NJ). DAVID PENICHTER, D.H. Litter Co., Inc., 116 E. 16th St., New York, NY 10003.

NORTHWESTERN (Tuesday after first Monday—Jax Cafe, Minneapolis, MN). RICHARD KARLSTAD, Ceramic Industrial Coatings, 325 Hwy. #52-South, Osseo, MN 55396. WINNIPEG SECTION (Third Tuesday, Marigold Restaurant)—NEIL WEBB, Phillips Paint Products Ltd., 95 Paquin Rd., Winnipeg, MB, Canada R2J 3V9.

PACIFIC NORTHWEST (Portland Section—Tuesday following second Wednesday; Seattle Section—the day after Portland; British Columbia Section—the day after Seattle). JOHN DALLER, McCloskey Corp., 4155 N.W. Yeon, Portland, OR 97210.

PHILADELPHIA (Second Thursday—Williamson's, GSB Bldg., Philadelphia, PA). LAWRENCE J. KELLY, Peltz-Rowley Chemicals, 5700 Tacony St., Philadelphia, PA 19135.

PIEDMONT (Third Wednesday—Howard Johnson's, Brentwood Exit of I-85, High Point, NC). BARRY YORK, Reliance Universal, Inc., P.O. Box 2124, High Point, NC 27261.

PITTSBURGH (First Monday—Montemurro's, Sharpsburg, PA). RICHARD G. MARCI, Royston Laboratories, 128 First St., Pittsburgh, PA 15238.

ROCKY MOUNTAIN (Monday following first Wednesday—Bernard's Arvada, CO). JEFFREY B. JOHNSON, Sashco, Inc., 1395 S. Acoma, Denver, CO 80223.

ST. LOUIS (Third Tuesday—Salad Bowl). ROBERT L. WAGNON, Mozel Chemical Products Co., 4003 Park Ave., St. Louis, MO 63110.

SOUTHERN (Gulf Coast Section—Third Thursday; Central Florida Section—Third Thursday after first Monday; Atlanta Section—Third Thursday; Memphis Section bi-monthly on Second Tuesday; Miami Section—Tuesday prior to Central Florida Section—R. SCOTT MCKENZIE, Southern Coatings & Chemicals, P.O. Box 2688, Sumter, SC 29150.

TORONTO (Second Monday—Cambridge Motor Hotel). LARRY HAM, Stochem Inc., 5200 Dixie Rd., Suite 201, Mississauga, Ont., Canada L4W 1E4.

WESTERN NEW YORK (Third Tuesday—meeting sites vary). MARKO K. MARKOFF, 182 Farmingdale Rd., Cheektowaga, NY 14225.

(Mar. 19)—"INVESTIGATIVE TECHNIQUES USING PAINT"—Speaker from Federal Bureau of Investigation.

(Apr. 16)—"HEALTH ASPECTS OF ISOCYANATES"—Paul Ziegler, Mobay Chemical Corp.

New York

(Feb. 26)—JOINT MEETING WITH NYPCA. "LEGISLATIVE UPDATE."

(Mar. 10)—"HARDENERS FOR EPOXY COATINGS"—John Sinclair, Pacific Anchor Chemical.

(Apr. 7)—"UPDATE ON POWDER COATINGS"—Sid Harris, Consultant.

(May 12)—PAST-PRESIDENTS' NIGHT. PAVAC AWARDS PRESENTATION.

Northwestern

(Feb. 3)—"FORMULATING WITH ASSOCIATIVE THICKENERS"—Paul Makar, Nuodex Huls.

(Mar. 3)—Annual Symposium.

Pacific Northwest Portland, Seattle, and Vancouver Sections

(Jan. 20-22)—"EFFECTIVE FILTRATION OF INDUSTRIAL COATINGS"—Carney Likens, Commercial Filters.

(Mar. 17-19)—"NEW DEVELOPMENTS IN HIGH SOLIDS COATINGS"—Richard Johnson, Cargill, Inc.

(Apr. 14-16)—"VINYL RHEOLOGY MODIFIED SYSTEMS"—Rick Caudwell, Reichhold Chemicals, Inc.

(May 19-21)—"ADVANTAGES OF PREDISPERSED POLYETHYLENES AND WAXES IN HIGH PERFORMANCE COATINGS"—Elio Cohen, Daniel Products Co.

Philadelphia

(Jan. 21)—JOINT MEETING WITH PPCA. "NEW TAX REFORM LAWS"—Speaker from Internal Revenue Service.

(Feb. 12)—FEDERATION NIGHT. "NEW INSIGHT INTO CHEMISTRY OF SILICONE FOR THE COATINGS INDUSTRY"—Speaker from Byk-Chemie U.S.A.

(Mar. 12)—EDUCATORS' NIGHT. "EMPLOYMENT OPPORTUNITIES IN THE COATINGS INDUSTRY"—Speakers to be announced.

Piedmont

(Jan. 21)—"APPLICATION OF JEFFAMINE® COATINGS IN THE INDUSTRY"—W.C. Crawford, Texaco Chemical Co.

(Mar. 18)—FEDERATION NIGHT.

(Apr. 15)—"CAREER ENHANCEMENT"—Richard Fayssoux, Jr., Eastman Chemical Products, Inc.

(May 20)—"CURRENT DISPERSION MILLING METHOD"—Armin Szatmary, Premier Mill Corp.

(June 17)—"AN INTRODUCTION TO APPEARANCE ANALYSIS"—Richard W. Harold, Hunter Associates Laboratory, Inc.

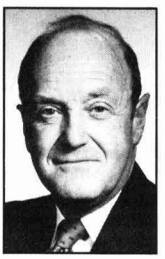
People

Howard Jerome, a Past-President of the Federation, has been named President of the newly-formed Mozel Equipment Co., St. Louis, MO.

Mr. Jerome retired from Spatz Paint, Inc., St. Louis, on June 30, 1986, following a coatings industry career which began in 1947. Prior to Spatz, he had been associated with E. & F. King Co., Celanese Corp., Tennessee Products & Chemicals, Waterlac Co., and Morris Paint Co.

He was President of the Federation in 1981-82. Mr. Jerome is currently Treasurer of the St. Louis Society and an Honorary Member of the New England Society.

H. Jerome



H.A. Schneiderman

F. Borrelle

P.D. Berger

The White House announced that **Howard A. Schneiderman,** Senior Vice-President, Research and Development, and Chief Scientist, Monsanto Co., St. Louis, MO, has been nominated by the President to be a member of the National Science Board.

The Board is the policy-making body of the National Science Foundation. The Foundation sponsors government research in all areas of science and advises the President.

Dr. Schneiderman's nomination is subject to Senate confirmation.

George J. Dippold has been elected Executive Vice-President and Chief Operating Officer for Industrial Minerals and Chemicals, Whittaker, Clark & Daniels, Inc., S. Plainfield, NJ.

Mr. Dippold joined WCD Inc., in 1949 in a laboratory capacity. He attended the New Jersey College of Engineering and is a veteran of the U.S. Navy Medical Corps in World War II. He is active in various associations and is a Past-President of the New York Society.

In other moves at Whittaker, Clark & Daniels, **William S. Hopson** was appointed Vice-President—Sales and **Roger P. Blacker** was named Eastern Regional Sales Manager. Mr. Hopson is a member of the Chicago Society and Mr. Blacker is a member of the New York Society.

William C. Spangenburg, a Past-President of the Pittsburgh Society for Coatings Technology, has been elected Chairman of ASTM Committee C-21 on Ceramic Whitewares and Related Products. He is Division Vice-President of Halox Pigments, Hammond Lead Products, Pittsburgh, PA.

Frank J. Borrelle, Executive Vice-President of the Federation; **Lloyd V. Lomas,** L.V. Lomas Chemical Co. Ltd., Mississauga, Ont., Canada; **Jack G. Wade,** BASF Inmont Canada Inc.; and **Robert C. Tibbetts,** Tibbetts Paints Ltd., Trenton, N.S., Canada, were honored as 1986 Industry Statesmen at the Canadian Paint and Coatings Association's 74th Annual Convention awards luncheon in Quebec City.

Mr. Lomas is a member of the Toronto Society and Mr. Tibbetts is a member of the Montreal Society. Mr. Borrelle is an Honorary Member of the Houston Society.

Northern Coatings & Chemical Co., Menominee, MI, has promoted **Lawrence Melgary** to Vice-President, Sales and Operations, and **Mark La Valley** to Vice-President, Manufacturing.

In addition, **Nick Osting** has joined Northern Coatings & Chemical Co. as Technical Director with responsibilities for the general and specialty industrial coatings research and development.

Mr. Melgary is a member of the Detroit Society and Mr. Osting is a member of the Chicago Society.

Robert A. Miller has been named President of Day Mixing Co., Cincinnati, OH. Mr. Miller had been Vice-President of Marketing for the firm.

The A.E. Staley Mfg. Co., Decatur, IL, has named **David W. Martyn** Manager of Process Development in the Research and Development Dept. of its Horizon Chemical division. Mr. Martyn is responsible for process scale-up as well as mini-plant, pilot, and market development plant operations.

Paul D. Berger has been appointed Surfactants Research Director for the Organics Div. of Witco Corp., New York, NY. Mr. Berger is based at Witco's Houston, TX, laboratories and assumes responsibilities for research related to all surfactants of the division. He is a member of the Houston Society.

Robert L. Crespo has been appointed Assistant Treasurer of Witco Corp. Mr. Crespo joined Witco in 1962 and has held a series of financial positions with the company. He is based at Witco's administrative center in Woodcliff, NJ.

Randi Levine has been appointed Sales Representative for the West Coast region by the Pigments Div. of Degussa Corp., Teterboro, NJ.

Taki Anagnostou has been appointed Professor and Program Coordinator of Polymers and Coatings at Eastern Michigan University, Ypsilanti, MI. He replaces **Dr. John Graham** who will direct the new EMU Coatings Research Institute.

Dr. Anagnostou received his Ph.D. Degree from North Dakota State University under the guidance of the late **Dr. A.E. Rheineck.** He has more than 25 years experience in the coatings industry, most recently as Vice-President of Quality Assurance with Akzo Coatings of America.

In 1969, he was appointed Adjunct Professor at the University of Detroit, at which time he established the coatings program. He continued to teach these courses as part of the evening curriculum until recently, when he resigned to join the Eastern Michigan program.

A member of the Detroit Society, Dr. Anagnostou currently serves on the Editorial Review Board of the JOURNAL OF COATINGS TECHNOLOGY.

Milton A. Glaser Receives 'Pregel Award' From New York Academy of Sciences

The New York Academy of Sciences has honored **Milton A. Glaser**, Vice-President, Research and Development Emeritus, Midland Div., Dexter Corp., Waukegan, IL, with the Boris Pregel Award for Applied Science and Technology at the Academy's 169th annual meeting in New York City.

Mr. Glaser, a Past-President of the Federation and the Paint Research Institute, was cited by the Academy for "his major contributions in developing innovative coatings for metals and other substrates with newly-available chemicals and polymers."

The developments for which Mr. Glaser was honored include: the first high-temperature-resistant coatings based on silicone polymers, the first highly weatherable silicone copolymer enamels applied to exterior building surfaces, highly durable spar varnishes for exterior use; a variety of alkyd, phenolic, polyester and polyurethane polymers and copolymers; and flexible, taste-free, chemical-resistant coatings for metal cans and closures which meet the stringent Food and Drug Administration's standards for use with food and beverages.

Mr. Glaser joined Dexter-Midland as Technical Director and served as Vice-President of Research and Development for 29 years until his retirement in 1978. The company honored Mr. Glaser in 1981 by dedicating its new research facilities as the Milton A. Glaser Research Laboratories.

Active in both academic research institutions and commercial manufacturing facilities, Mr. Glaser is well-known for the "Glaser Innovation Index" which evaluates the chances for success of industrial projects both before they are researched and developed and during subsequent stages of the project through to manufacture and marketing.

He has been honored with the Outstanding Service Award from the Chicago Society, the Federation's George Baugh Heckel Award, and the Distinguished Service Award from the Chicago Technical Society's Council. He also presented the Mattiello Lecture on "Innovation in Organic Coatings" at the 1974 FSCT Annual Meeting.

A member of fifteen scientific organizations, including the Federation, ACS, and ASTM, Mr. Glaser is the author of more than 40 publications and several U.S. and foreign patents and serves as a consultant specializing in research management for many companies in the coatings industry. He currently is a member of the Federation's Planning Committee.

Mr. Glaser holds a BS Degree in Chemical Engineering from Tufts University, and has done graduate work at both the University of Chicago and Northwestern University. He also is a registered professional engineer in the state of Illinois.

The O'Brien Corp., S. San Francisco, CA, named **Russel D. Robison, Jr.,** Vice-President, Operations, in South Bend, IN, and **John Morley,** National Professional Finishes Manager.

Mr. Robison has been with the O'Brien Corp. for 15 years and also will occupy the post of Senior Administrative Manager. He has experience in technical, quality, and operations positions.

Mr. Morley joined the company in 1976 and is former Manager of a Fuller-O'Brien paint store. In his new position, he is responsible for overseeing product development and marketing of the professional finishes line.

David J. Phillips has been appointed President of Alcolac, Inc., Baltimore, MD. Prior to joining Alcolac, Mr. Phillips was General Manager of the Houdry Div. of Air Products.

Ball Chemical, Glenshaw, PA, has announced that **Gary Renfro,** of Fairway Corp., Houston, TX, has been named Sales Agent for the Southwest, which includes the states of Texas, Louisiana, and Oklahoma.

Georgia Kaolin Co., Combustion Engineering Inc., Union, NJ, has named **William L. Hartley** Executive Vice-President. Previously, Mr. Hartley was Vice-President—Operations, Lands, and Exploration.

The CEM Corp., Indian Trail, NC, has appointed **Lee B. Gilman** Marketing Manager. Dr. Gilman is responsible for developing and implementing marketing strategy, coordinating advertising and promotion, and managing technical support for CEM instrumentation.

Mary Lu Hickey has been named Midwestern Regional Sales Manager, Coatings and Additives, by Hercules Incorporated, Wilmington, DE. Ms. Hickey has held several sales positions since joining Hercules in 1976. She will be headquartered in Naperville, IL.

Hercules Incorporated has appointed **David A. Needham** Vice-President of Marketing Services and Director of Marketing Resins. In this capacity, he will be responsible for sales and marketing of organic resins, for optimizing the profitability of U.S. resins sales, and assisting in the development of worldwide marketing plans.

The Clay Division of J.M. Huber Co., Macon, GA, has appointed **Jacob "Jake" Ferro** to the position of General Operations Manager. He will oversee all operations, including quality control, production, computer systems, purchasing, and safety at the division's five plants.

In addition, the firm has promoted **John S. Whatley** to Senior Section Leader (Pilot Plant). Mr. Whatley joined the J.M. Huber Corp. in 1968, and has served as a Project Engineer, Maintenance Engineer, Assistant General Superintendent, and Pilot Plant Manager.

Alan Schoeder has been appointed Aerospace Account Manager by DeSoto, Inc., Des Plaines, IL. Mr. Schoeder will be responsible for all new aerospace coatings sales in Arizona and the San Diego, CA, area.

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1987 Water-Borne and Higher-Solids Symposium Slated for Feb. 25-27, in New Orleans, LA

The Water-Borne and Higher-Solids Coatings Symposium, cosponsored by the Southern Society for Coatings Technology and the Department of Polymer Science at University of Southern Mississippi, will be held in New Orleans, LA, from February 25-27, 1987. The symposium will focus on the chemistry, formulations, and new developments in water-borne and higher-solids coatings.

The symposium program includes the following:

WEDNESDAY, FEB. 25

"Overview of Particle Size Distribution Characterization Methods"—T. Provder, The Glidden Company

"Thermal Cure of (Meth)acrylate Functional Coatings"—B.K. Christmas, R.R. Kemmerer and F.K. Willard, Interez, Inc.

"Characterization of Solutions and Aqueous Dispersions of Epoxy/Amidoamine Resins"—S.B.A. Qaderi, M.C. Paputa Peck, and D.R. Bauer, Ford Motor Co.

"Organic Compatible Silicone Pressure Sensitive Emulsion Adhesives"—D.F. Merrill, General Electric Co.

"Effect of Oligomer Structural Variables on the Physical Properties of UV-Cured Coatings"—J.M. Zimmerman, G.K. Noren, and J.J. Krajewski, DeSoto, Inc.

"New Electron Beam Process Takes Advantage of 100% Solids Chemistry"—J. Weisman and T. Tripp, Energy Sciences

"Rust Conversion Coatings"—P.J. DesLauriers, Pennzoil Products Co.

"Evaluation of Coalescents for Industrial Latexes"—D.H. Guthrie, Dow Chemical USA

"Predicting Cosolvent Efficiency for Coalescing Latex Films"—L.S. Smith, Rohm and Haas

"Waterborne Epoxy Based Resins for Coating Application Over Marginally Treated Surfaces"—J. Fanslow, A. Heitkamp, and R. Schmidt, Cargill Research Laboratories

"Morphology of Films Dried from Latexes Containing Water-Soluble Polymers: Dynamic Mechanical Properties"—K.M. O'Connor and E.B. Orler, S.C. Johnson & Son, Inc.

"Water-Borne Coating Systems for Metal Beverage Container Ends"—P.J. Palackdharry, Dexter Corp.

THURSDAY, FEB. 26

"Crosslink Density of High Solids Thermoset Coatings"—L.W. Hill and K. Kozlowski, Monsanto Polymer Products Co.

"Film Properties of Higher-Solids Polyester/Melamine Enamels Made from Monodisperse Oligoesters"—F.N. Jones and D.D-L Lu, North Dakota State University

"New Solvents for High Solids Coatings"—C.W. Glancy, Union Carbide Corp.

"Supercritical Fluid Processing of Polymers Used in High Solids Paint and Coatings"—K.M. Scholsky, S.C. Johnson and Son, Inc.

"High Solids Polyesters and Reactive Diluents for Lower VOC Industrial Coatings"—J.D. Downs, A.E. Staley Manufacturing Company

"Flow Behavior in High Solids Coatings"—C. Schoff, PPG Industries

"Development and Characterization of High Solids Magnetic Dispersions and Coatings"—J.W. Gooch, Georgia Tech Research Institute

"Determination of Cure Conditions for High Solids Alkyd and Polyester Coatings by Dynamic Mechanical Analysis (DMA)"—K.K. Beckman, C.D. Green, J.G. Lamberton, B.K. Winters, and L.D. White, Reichhold Chemicals, Inc.

"Application of Zirconium Compounds in Surface Coatings"—P.J. Moles, Magnesium Elektron Ltd.

"Stabilization of Maintenance Coatings"—A. Mar and P. Schirmann, CIBA-GEIGY Corp.

"Isoparaffins Impart Beneficial Properties to Coatings Through Low Surface Tension"—R.E. Moran and J.T. DiPiazza, Exxon

"Rheological Measurements as a Guide to Additive Performance"—M.J. Schnall, Troy Chemical Corp.

"Organoclay Rheological Additives for Latex Paint"—S.C. Tso and G. Beall, United Catalysts Inc.

FRIDAY, FEB. 27

"Recent Developments in Urethane Chemistry and Technology"—K.C. Frisch, University of Detroit

"Solution Kinetics of the Water-Toluene Diisocyanate Reaction"—D. Ihms and J. Stoffer, University of Missouri-Rolla, and D.F. Schneider and C. McClain, Carboline Co.

"Innovative Room Temperature Thermosetting Water-Borne Urethane Polymer Systems"—A. Tyskwicz and J. Tsirovasiles, Sanncor Industries, Inc.

"Low Temperature Blocked Isocyanates"—S.F. Thames, University of Southern Mississippi

"Catalysis in Aliphatic Isocyanate-Alcohol Reactions"—E.P. Squiller and J.W. Rosthauser, Mobay Corp.

"Effect of Resin Formulation on the Performance Properties of High Solids Polyurethane Business Machine Coatings"—M. Brauer and C.N. Blomquist

"Acrylic-Urethane Coatings"—G.G. Parekh, American Cyanamid Co.

For further information, contact Dr. Gordon L. Nelson, Box 10076, Southern Station, Department of Polymer Science, University of Southern Mississippi, Hattiesburg, MS 39406

Daniel Products Offers Pigment Dispersions Primer

Daniel Products Co., founded by Frederick K. Daniel, has assembled a collection of papers including theoretical and practical applications of Mr. Daniel's Flow Point method, as well as his pioneering work on rheological, colloidal, physical, engineering, and economical aspects of the manufacture of liquid coatings and inks.

The collection of papers has been bound into a single volume entitled *Pigment Dispersion, A Primer for Paint and Ink Manufacture* and is available to institutions of higher education offering courses in coatings technology.

Mr. Daniels, a member of the New York Society, has made important contributions to the theories and practices of pigment dispersion. His earliest and best-known development is the Flow Point method for determining the optimum mill base composition for ball and pebble mills.

Universities desiring a copy of this reference work should contact Daniel Products Co., 400 Claremont Ave., Jersey City, NJ 07304.

"Risky Business—Technology of Our Times" Is Theme of Symco '87 Coatings Symposium

The Chicago Society for Coatings Technology and the Chicago Paint and Coatings Association will co-sponsor the 16th Symco Coatings Symposium, April 7-8, at Knickers Restaurant, Des Plaines, IL.

The symposium, designed primarily for research, technical service, and quality control personnel, will be broadly divided into two areas, Trade Sales on April 7, and Industrial Coatings on April 8. Each program will focus on technical subjects, but will include presentations touching on the impact of economic and environmental concerns on the coatings industry.

On April 7, Glen Sechen of the Illinois State's Attorney office will be the keynote speaker. Mr. Sechen heads the Environmental Litigation Group and will address the subject of product liability.

Trade sales topics to be discussed include: color sampling, organic pigment technology, surfactants and surface phenomena, encapsulated fungicide, and enhanced performance of low cost latex paints.

Ada Nielson, an independent Marketing Consultant who has a long-time association with the Chicago coatings community, will open April 8's schedule with a presentation on future trends in sales and marketing of industrial coatings.

Other topics include: extender pigments for high-solids coatings, polyethylenes and waxes in high performance coatings, aqueous polyurethane dispersions, and properties of coupling agents.

Symco '87 will continue the traditional "Meet the Speakers" program, with attendees having a chance to talk to the presenters informally after the days' programming.

Bill Gleason, sportswriter for the Chicago Sun-Times, will give an informal presentation on April 8.

For further details, contact Bill Fotis, The Enterprise Cos., 1191 S. Wheeling Rd., Wheeling, IL 60090.

Kent State Univ. Schedules '87 Coatings Short Courses

Kent State University will present three short courses next spring designed for polymer and coatings specialists on cure, adhesion, and dispersion of coatings and polymers. The programs are sponsored by the Rheology and Coatings Division of the Chemistry Dept.

The courses are scheduled as follows: "Thermal/Mechanical Properties and Cure Characterization of Coatings and Polymers"—April 27-May 1; "Adhesion Principles and Practice for Coatings and Polymer Scientists"—May 11-15; and "Dispersion of Pigments and Resins in Fluid Media"—June 1-5.

For more information on these courses, contact C :rl J. Knauss, Kent State University, Chemistry Dept., Kent, OH 44242.

ISCC "Appearance" Conference, Feb. 8-11 to Honor Richard S. Hunter

The Inter-Society Color Council will sponsor a conference on "Appearance," February 8-11, 1987, at Colonial Williamsburg, VA. The program will feature two and one-half days of invited and contributed papers presenting a balanced coverage of appearance evaluation principles and specific applications.

The conference will honor Richard S. Hunter for his extensive contributions to appearance science and focus on the geometric aspects of appearance, relating human response to the directional and spatial distributions of light intensity. Subjects to be covered include: gloss, appearance measurement techniques, metallics, pearlescence, and translucency.

The meeting program consists of four invited papers intended to review major principles or to highlight important research areas and 11 contributed papers primarily concerned with current research programs and applications. Invited speakers and their topics are:

"Geometric Attributes of Appearance"—C.S. McCamy, Kollmorgen.

"Gloss Psychophysics"—W. Czepluch, Bundesanstalt für Materialprufung.

"Take a Moment to Specify Appearance Measurements"—V.H. Venable, Hunter Lab.

"Gonio-reflectometry"—W. Erb, Physikalish Technische Bundesanstalt.

For more information, write to the General Chairman, Dr. D.H. Alman, DuPont Co., P.O. Box 2802, Troy, MI 48007.

Powder & Bulk Solids Conference Slated for May 11-14

The 1987 Powder & Bulk Solids Conference/Exhibition will take place at the O'Hare Exposition Center, Rosemont, IL, May 11-14. Exhibitors from France, Japan, the United Kingdom, and West Germany are among the more than 250 companies that have reserved exhibit space.

The conference/exhibition is the only major event in North America devoted exclusively to the handling and processing of materials in powder and bulk solid form.

The conference will cover solids handling, powder properties, behavior and characterization, processing, processing control and automation, as well as several new topics on the management aspects of the technology.

For information about the conference and exhibition, write to Show Manager, Powder & Bulk Solids Conference/Exhibition, Cahners Exposition Group, 1350 E. Touhy Ave., P.O. Box 5060, Des Plaines, IL 60017-5060.

Adhesion Society Announces Final Program

The Adhesion Society has announced the final program for its 10th Annual Meeting to be held in Williamsburg, VA, February 22-27, 1987. The International Meeting of the Adhesion Society will feature papers and posters from many of the world's leading adhesion scientists and technologists.

In addition to the technical session, the Society's popular short course, "Adhesion—Fundamentals and Practices" will be presented on February 21-22.

For more information, contact Prof. Lawrence T. Drzal, Composite Materials & Structures Center, Michigan State Univ., East Lansing, MI 48824-1226.

Emulsion Course at Lehigh Univ., June 1-5

The course "Advances in Emulsion Polymerization and Latex Technology" will be offered at Lehigh University, June 1-5, 1987. The 18th annual one-week short course is designed for engineers, chemists, scientists, and managers who are actively involved in emulsion work and those who wish to develop expertise in the area.

The course is an in-depth study of the synthesis and properties of high polymer latexes. The subjects will include a balance of theory and applications as well as a balance between chemical and physical problems. Lectures will be given by leading academic and industrial workers.

The course fee is $650 for the entire week or $170 per day for any part.

For further information, contact Dr. Mohamed S. El-Aasser, Dept. of Chemical Engineering, Sinclair Lab #7, Lehigh Univ., Bethlehem, PA 18015.

Literature

Vacuum Dissolver

A new laboratory dual shaft vacuum dissolver is the subject of recently released literature. The new model is designed for processing two to five gallons of viscous material and reportedly provides 2 hp on the high speed shaft and 1 hp on the low speed shaft. For more information on Model 2J-14, write Morehouse Industries, Inc., P.O. Box 3620, 1600 W. Commonwealth Ave., Fullerton, CA 92632.

Cavity Pumps

Cavity pumps with an open throat suction housing for flow of viscous materials into the pumping element are described in literature. The pumps are designed with an auger feed that moves material from the open throat to the pumping elements. Also, they reportedly have an output capacity from 0-1400 gpm and pressure capabilities up to 1000 psi. For more information on the Nemo® NES and NESP pumps, contact Netzsch Inc., 119 Pickering Way, Exton, PA 19341-1393.

Tank Manhole Gaskets

Dura-seal tank manhole gaskets are the subject of a recently released product bulletin. The gaskets are designed to stop tank leaking when used to seal cover manholes on tote tanks, liqua-bins, and other types of bulk liquid portable shipping tanks. For more information, write Wellco Industries, Tank Parts Div., P.O. Box 381, Summit, IL 60501.

Safety Program

A brochure describes a revised safety training program designed to teach basic safety skills. The new program includes eight how-to videotapes, rewritten self-study workbooks, administrator's and leader's guides, and promotional materials to build and maintain awareness. For a copy of the Safety Training Observation Program brochure, contact DuPont Co., Safety Services, Barley Mill, P19-1210, Wilmington, DE 19898.

Car Finish Corrosion

For information on newly developed automotive paint formulations designed to end off corrosion, contact Akzo Coatings America Inc., 650 Stephenson Highway, Troy, MI 48083.

Colorants

Three new colorants have been introduced in recently released literature. Two of the dispersions are designed for tinting solvent or water-thinned air dry coatings that do not require good exterior lightfastness. The other dispersant reportedly is compatible with most solvent-thinned coatings. Additional technical information is available from Daniel Products Co., 400 Claremont Ave., Jersey City, NJ 07304.

Lithographic Chemical Systems

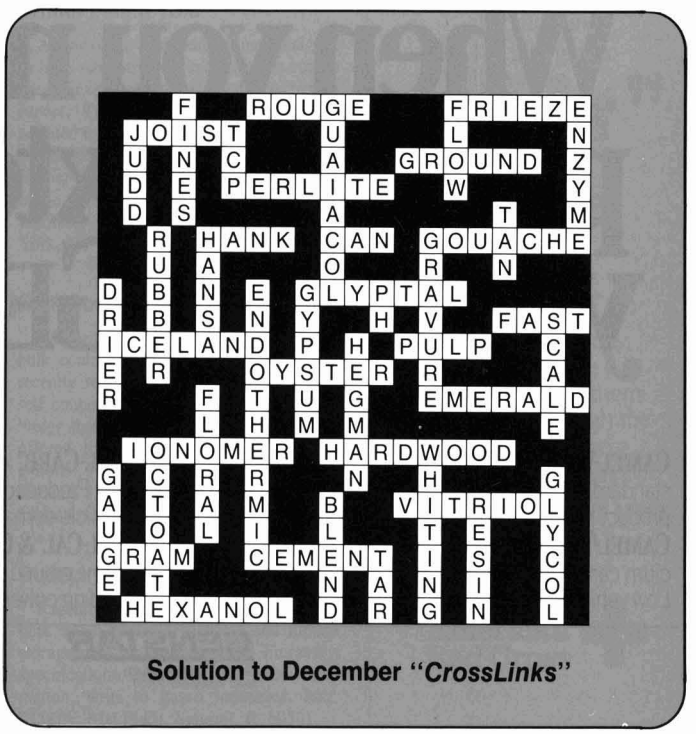
A new brochure highlights a company's capabilities for the development and manufacture of advanced lithographic chemical systems for IC fabrication—from research and development through testing and production. Also described are state-of-the-art capabilities for production, quality control, and special packaging for all products. For a copy of the brochure, contact the Microelectronics Group, Dynamit Nobel Chemicals, 2570 Pearl Buck Rd., Bristol, PA 19007.

Spectrocolorimeter

A spectrocolorimeter available with either an IBM personal computer or the Epson Equity I has been introduced in literature. The menu-driven software is designed to meet requirements in a variety of industries. The spectrocolorimeter reportedly provides color measurement data at a lower cost and is designed for routine quality control procedures. More information on the ColorQuest spectrocolorimeter is available from HunterLab, 11495 Sunset Hills Rd., Reston, VA 22090.

Raw Material Use

Use of a raw material for the synthesis of light-stable and weather-resistant polyurethanes in both new and traditional applications is the focus of newly published information. The chemical has a variety of applications ranging from coating systems for automobiles to solid rocket fuel binders. For more information on isophorone diisocyanate, contact Nuodex Inc., A Hüls Company, Box 365, Piscataway, NJ 08854.



Solution to December "*CrossLinks*"

Powder Coatings Video

A 10-minute video, designed to provide an introduction to powder coatings, is now available. The video covers: types and properties of powder coatings; application equipment; and the powder coating process. The video presentation is available in one-half inch VHS or BETA and three-fourths U-matic formats. To obtain a copy of "Powder Coatings: High Quality Coatings," send $90 for the first tape and $45 for all subsequent tapes along with a letter indicating tape format and number of tapes to Greg Bocchi, Executive Director, Powder Coating Institute, 1800 Diagonal Rd., Suite 600, Alexandria, VA 22314.

Filter Cartridge

A six-page brochure describes the construction of fiber glass filter cartridges, lists the nine grades available, and compares them to micron-rated cartridges. The products are designed to improve filtration rate and throughput. For a free copy of "Manville High Performance Fiber Glass Filter Cartridges" (UT-19), write to Manville Service Center, 1601 23rd St., Denver, CO 80216.

Zinc Oxide

A 116-page illustrated manual covering how zinc oxide's properties can be exploited in a spectrum of industrial applications has been published. The manual is written for specifiers, chemists, design engineers, researchers, and others interested in the performance of chemical compounds. Single copies of "Zinc Oxide: Properties and Applications" can be obtained free of charge by writing: ZnO Manual, Zinc Institute Inc., 292 Madison Ave., New York, NY 10017.

Solvent

Newly published information focuses on a solvent that, according to recent test results, provides VOC compliance for air-dry epoxy resin coatings. A VOC content of less than four pounds per gallon reportedly was achieved in epoxy resin systems which use either amine or polyamide curing agents and the solvent. The solvent is used in automotive, appliance, electronic, and household products plastics. More information on Chlorothene® SM solvent is available from the Dow Chemical Co., Chemicals & Metals Dept., 2020 Bldg., Midland, MI 48674.

Polyurethane Laminating Adhesives

Two new polyurethane resins designed for use as laminating adhesives are described in recently released literature. These dispersions reportedly contain no surfactants, have small particle size, and are anionic so they can be blended with non ionic or anionic polymer systems to alter properties. For additional information or to request a sample of Helastic WC 6997 or WC 6998, contact Jim Goldsmith, Wilmington Chemical Corp., P.O. Box 66, Pyles Lane, Wilmington, DE 19899.

Eliminating Tube Piercing Problems

Information is now available on a self-contained unit used for depositing preformed gradients. The unit is designed to allow the user to deposit or remove samples within 0.004 inches of the gradient surface. For more information on the Auto Densi-Flow IIC, contact Loretta Scheel or Mary Greenway, HBI, Haake Buchler Instruments, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662.

When you need a pigment extender, you need GENSTAR.

CAMEL-WITE® & CAMEL-WITE SLURRY.® The industry standard. Exceptionally white, fine particle size, wet-ground product produced from high-grade calcite limestone.

CAMEL-TEX.® Fine ground general purpose grade of calcium carbonate produced from extremely white Calcite. Low vehicle demand, rapid dispersibility.

CAMEL-CARB.® A quality extender that's economically priced. Produced from white Calcite. Provides uniform low vehicle demand, good color, high brightness.

CAMEL-CAL® & CAMEL-CAL SLURRY.® New from Genstar. Ultra-fine ground calcite limestone with extender efficiency and hiding power of precipitated calcium carbonate.

GENSTAR

Genstar Stone Products
Hunt Valley, Md. 21031

Propylene Carbonate

Information is now available on the commercialized production of propylene carbonate and the development and patent of a system for applying Arconate™ Propylene Carbonate to isocyanate-based binders used in the manufacture of reconstituted wood products. For complete product data and a Material Safety Data Sheet, write to Marketing Communications Department, ARCO Chemical Co., 1500 Market St., Philadelphia, PA 19102.

Masonry Coatings

A six-page report discussing independent performance tests of commercial masonry coating biocides is available. The report documents the characteristics of Amical® industrial biocide and overviews a recent survey and testing of 147 European, Japanese, and American paint biocides. For a free copy of the masonry coatings test report, or information, contact Dr. Mitchell Friedman, Abbott Laboratories, North Chicago, IL 60064.

Dispersion Mill

A brochure illustrating and describing a patented, advanced closed system, continuous process dispersion mill is available. The brochure describes and diagrams the basic operation of the mill. Additional information and a copy of the brochure on the Emco X-Entri Mill are available from The Epworth Manufacturing Co., Inc., 1400 Kalamazoo St., South Haven, MI 49090.

Fraction Collector

Literature has been sent out on a portable fraction collector that requires less than one square foot of space and weighs less than 15 pounds. The unit has a battery powered back-up system which preserves the time and/or drop count stored in memory during a move, or in the event of a power interruption. For more information on the LC100, contact Loretta Scheel or Mary Greenway at HBI, Haake Buchler Instruments, Inc., 244 Saddle River Rd., NJ 07662.

Light Stabilizer for Lacquer

A new UV absorber for the 2-hydroxybenzophenone type is described in a new product bulletin. The product is designed for clear lacquers and glazes for interior and exterior applications on wood, metal, and plastic coatings. Technical data and samples are obtainable from Sandoz Huningue S.A., Avenue de Bale, BP 20, F-68330 HUNINGUE.

Revolving Stator

A revolving stator designed to reduce consumption by up to 60% is the subject of recently issued literature. The stator reportedly circulates the batch many times through the mixing head, reducing the process time. For more information on the Rotostat design, write to EMI Inc., P.O. Box 912, Clinton, CT 06413.

Handheld Measuring Units

Literature introducing two new handheld measuring units is available. Designed uses include quality assurance, maintenance, and inspection of paint, platings, plastic, rubber, and enamel. Additional information on the Deltascope® MP and the Isoscope® MP can be obtained from Fischer Technology, Inc., 750 Marshall Phelps Rd., Windsor, CT 06095.

Colorant Dispenser

Literature announcing a new industrial heavy duty colorant dispenser has been released. This dispenser is available with 12 or 16 canisters and can be used with other systems and industrial colorants on the market. Further details on the 1000 Series Rotary Manual Colorant Dispensers are available from Red Devil, Inc., 2400 Vauxhall Rd., P.O. Box 194, Union, NJ 07083-1933.

Primer Filling Void

A zinc oxide-iron oxide primer designed to fill a steel structure maintenance void is the topic of a recently released news bureau report. The primer has been officially adopted by the Commonwealth of Virginia as its standard maintenance primer. For further information on the zinc oxide-iron oxide primers, contact Hugh Morrow, Zinc Institute, Inc., 292 Madison Ave., New York, NY 10017.

Bulk Container Agitator

An agitator designed specifically for bulk container applications is detailed in recently released literature. The units are self contained and premounted on a rigid bridge that spans the tank. Six models are offered for containers from 50 to 275 gallons. For more information, write for Catalog 8300, EMI, Inc., PO Box 912, Clinton, CT 06413.

Bulk Liquid Shipping Tanks

Recently released literature describes bulk liquid portable shipping and inplant storage tanks. For complete literature, specifications, drawings, and price information, write to Itasco Industries, Inc., 7738 W. 61st Place, Summit, IL 60501.

TWELVE IMPECCABLE EXCUSES FOR NOT GIVING BLOOD.

"1. I think I have lumbago.
2. I'm type Z negative.
3. I'm on the grapefruit diet.
4. I gave six months ago.
5. I just got back from Monaco.
6. The lines are thirteen blocks long.
7. My mother won't let me.
8. I didn't sign up.
9. I'm going out of town.
10. Asthma runs in my family.
11. I forgot to eat this morning.
12. I'm allergic to flowering magnolia."

Each one's a doozy, but we're hoping you won't use any of them. Give blood through the American Red Cross. Please, don't chicken out.

EXCUSES DON'T SAVE LIVES. BLOOD DOES.

American Red Cross

Letters to the Editor

Quality and Cost-Effectiveness of Titanium Dioxide Elaborated

To the Editor:

I compliment Mr. Fred B. Stieg on his excellent article, "Hiding Power and the Cost-Effectiveness of Titanium Dioxide" published in the August JCT (*58*, No. 739, 61, 1986).

In his comparison of two alkyd enamels (*Table* 1 in his article), Mr. Stieg shows that, although an enamel may contain more titanium dioxide pigment, it can be cheaper per gallon and still offer the same hiding power. The cost reduction is due to the use of more solvent; the resin content in the vehicle is reduced from 45.8% to 36.3%. This not only results in a considerably increased VOC but also in a 17% reduction of the thickness of the dry coat of paint. In many instances, this reduction of the film thickness may be considered too much of a sacrifice, resulting in loss of build and loss of service-life.

For a given grade of treated titanium dioxide pigment (density = 4.0, relative cost of 23/L), the determination of its scattering power at various levels of pigment volume concentration (PVC) offers the data needed for the construction of the graphs in *Figures* 1 and 2.[1]

Using this pigment in enamels, based on a long oil alkyd resin (density = 1.05, relative cost 7/L) dissolved in mineral spirits (density = 0.76, relative cost = 1/L), the following calculation can be made:

Fourteen PVC enamel gives a 40 μm dry coat. On 100 m^2 of surface, 2.44 kg of pigment are needed (*Figure* 2) or 2440: 4 = 610 cm^3 of pigment and 4000 cm^3 of dry coat to achieve the 40 μm of coating thickness. Consequently, 4000-610 = 3390 cm^3 of resin have to be added to the 610 cm^3 of pigment. In that dry coat, however, the actual PVC will be (610:4000) × 100 = 15.25%. For levels of PVC of departure, ranging from 6-30%, and for dry coating thicknesses, ranging from 30-59 μm, such calculations were made and their results are presented in *Figure* 3.

Figure 3 indicates which coating thickness can be achieved with each PVC level to give opacity and which coating thickness will be excessive. For example, the 9% PVC enamel will give opacity in the coat with 59 μm thickness. The 11.3% PVC enamel gives opacity with 50 μm thickness; 13.2% PVC enamel gives opacity with 45 μm thickness. The 16.4% PVC enamel gives opacity with 40 μm thickness; 21.6% PVC enamel gives opacity with 35 μm thickness; and 30.0% PVC enamel gives opacity with 31 μm thickness.

At each of these PVC levels, coats thinner than indicated will not provide hiding; coats thicker than indicated will waste titanium dioxide pigment. Of course, it is the task of the formulator to install in the enamel the rheological properties which will enable the applicator to apply the coating thickness appropriate to the PVC of the enamel.

Figure 4 illustrates this relationship for the range of practical PVC levels; a PVC lower than 11.3% necessitates a coat thicker than 50 μm which could lead to various paint film defects such as wrinkling, while PVC levels higher than 22% could lead to quicker loss of gloss on exterior exposure. When producing the enamels at increasing levels of PVC, (*Figure* 5), the titanium dioxide pigment content increases and the resin content decreases. To also maintain appropriate rheological properties, the solvent content has to increase slightly. *Figure* 6 illustrates the consequences of the changing composition on the cost. Since the titanium dioxide pigment is the most expensive product by volume in the enamels, an increase in its content would result in a cost increase per volume of paint. The cost per unit of painted surface, however, will decrease with increasing PVC.

Table 1 relists the data for the PVC levels which proved to be important in this context (*Figure* 3). It shows with increasing PVC of the titanium dioxide pigment, the increasing cost of a volume of paint and the decreasing cost of a coated surface unit. It also shows the "snake in the grass" on that surface; the film thickness again falls off and the cost per unit of thickness again increases. These considerations point out that there are many sides to cost-effectiveness. Selling a can of paint, buying a can of paint, or buying a coated surface may meet cost-effectiveness from many different angles and quality consciousness should be taken into account — especially on the buying side of the paint.

Manufacturers of titanium dioxide pigments, like everyone else in the trade, realize that their products are relatively expensive on the relevant volume basis. They should, and actually do, try to maximize the hiding power of their pigments, although modern titanium dioxide pigments in this respect do not lag behind in their theoretical potential very much and a few percent may be gained. The cost of the paints discussed here consists of about 7.5% of solvent costs. The solvent is only a means of transport; in the end it is lost and does not contribute to the final cost of paint. Its elimination would reduce paint costs, either on the basis of coated surface or amount of paint necessary to do a job, to an extent beyond reach of either further improvements of titanium dioxide pigments or of changes in formulation. It would be a delight to have disposal of a resin which does not require any solvent to make the paint and which dries to suit modern man's pace.

Table 1—Finishing of 100m^2 of Surface with Hiding Coats of Enamel at Various Levels of PVC in Various Film Thicknesses

PVC	11.3	13.2	16.4	21.6
Kg of pigment required (from *Figure* 2)	2.27	2.39	2.61	3.03
Cm^3 of pigment required	566.25	597.50	652.50	757.50
Cm^3 of resin to give PVC	4444.81	3929.00	3326.20	2749.40
Cm^3 of solvent needed (from *Figure* 5)	3511.25	3328.10	3093.00	2890.10
Cm^3 of enamel	8522.31	7854.60	7071.70	6397.00
Cm^3 of non-volatiles	5011.06	4526.50	3978.70	3506.90
Resulting thickness in micrometers	50.1	45.3	39.8	35.1
Rel. cost of paint/100m^2	47.64	44.57	41.38	39.56
Rel. cost of paint/ltr.	5.59	5.67	5.85	6.18
Rel. cost/100m^2/10 micrometers	9.51	9.84	10.40	11.27

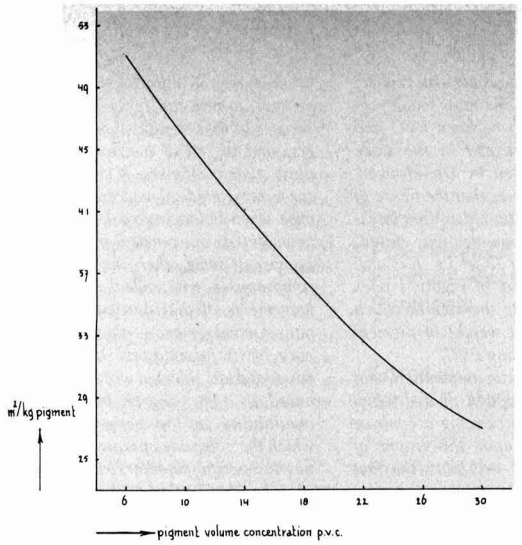


Figure 1—Efficiency of the titanium dioxide pigment for the contrast ratio 0.98

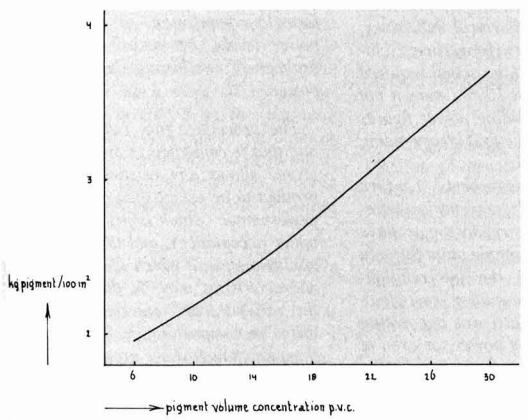


Figure 2—Quantity of titanium dioxide pigment required to achieve the contrast ratio 0.98 on 100m² surface

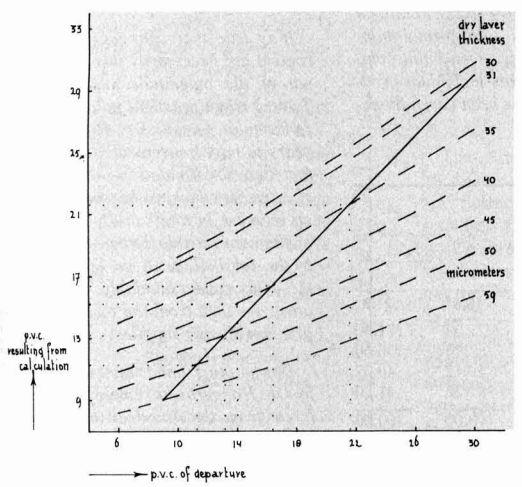


Figure 3—PVC and layer thickness relations

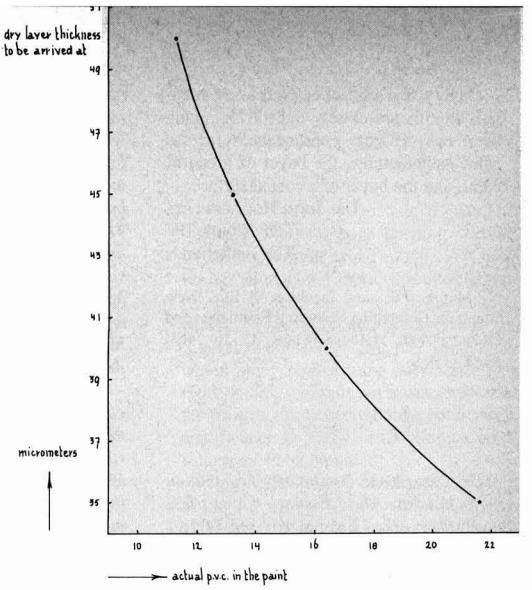


Figure 4—Actual PVC of titanium dioxide in the dry coat of paint and the required thickness of the coat of paint

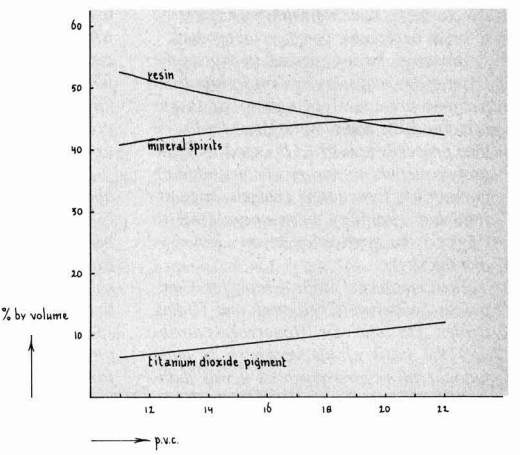


Figure 5—Volumetric composition of the enamels

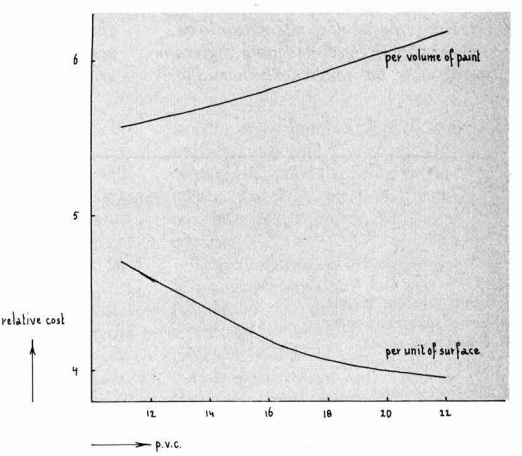


Figure 6—Relative costs of paint and painted surface in relation to the PVC

Quality and cost-effectiveness of titanium dioxide are closely linked. Unlinking them has different consequences for the paint manufacturer, the buyer of a can of paint, and the buyer of a coated surface.

DR. JOHN HOOGERBEETS
TDF Tiofine BV
The Netherlands

(1) Mitton, P.B. and Jacobsen, A.E., "New Graph for Computing Scattering Coefficient and Hiding Power," Official Digest, *35*, No. 464, 871# (1963).

* * *

Dr. Hoogerbeets' scholarly explanation as to just why Alkyd Enamel #2 was less costly than Alkyd Enamel #1 (see Table *1 in my article) should appear somewhat unnecessary to anyone who read the accompanying explanation to the effect that they had been presented for the sole purpose of illustrating two basic principles of cost-effectiveness, and that neither was inferred to be an acceptable commercial product.*

However, having elected to expose the error of my ways, as evident to him from his own pre-conceived notions as to acceptable PVC and film-thickness levels, he then proceeds to instruct his readers in the proper method to ensure adequate hiding power when formulating enamels, suggesting that rheology be manipulated to "force" the application of an ideal dry-film thickness.

The reference ("New Graph for Computing Scattering Coefficient and Hiding Power") to which Dr. Hoogerbeets attributes the basis of his approach is quite familiar to me, inasmuch as it was authored by two of my co-workers in the Titanium Pigment Corp. over 20 years ago. The graphs could, in fact, be used in the same manner as my hiding power equation, if the experimental determination of scattering efficient was reasonably accurate — which Dr. Hoogerbeets' does not appear to be.

Since Dr. Hoogerbeets' data is given in metric units, this would not be immediately apparent to the average American reader, but reference to the Kronos Guide, *in which the relationship between PVC and hiding power is illustrated in the same units as those employed by Dr. Hoogerbeets'* Figure *1, discloses that the figure of 41 m^2/kg, upon which the ideal film thickness for a 14 PVC enamel was based, should in fact be about 32 m^2/kg. It is also apparent that the curve of* Figure *1 does not agree in respect to the rate at which hiding power per unit weight of pigment decreases with increasing PVC.*

Dr. Hoogerbeets' basic assumption, that coatings should be applied at a dry-film thickness capable of producing a contrast ratio of 0.98 (based upon the graphs of Mitton and Jacobsen) overlooks the fact that this contrast ratio refers to performance over a black-and-white test substrate. Paintable surfaces in the real world do not (fortunately) commonly present such extremes of contrast to be obscured. It has been argued on several occasions that 0.93 contrast ratio would be more representative of practical architectural substrates, which suggests that Dr. Hoogerbeets' calculations would exceed the actual required film thickness by about 100%, were it not for the fact that his hiding power figures are excessively high, the first error tending to minimize the second.

In view of Dr. Hoogerbeets' concern about my alkyd enamels, it seems just barely possible that other readers may have been led by my use of simple paint formula examples, illustrating the interrelationships involved in determining cost-effectiveness, to assume that I was advocating specific levels of hiding power, or even of pigmentation. Nothing could be further from the truth, and if such an impression should exist anywhere else, I hasten to correct it.

Long practical experience with the American trade sales paint industry has led me to recognize that there is essentially no such thing as an ideal paint formulation. The product mix of any given paint company is made up of many individual products, each of which has been carefully developed, by a laborious trial-and-error process, to best satisfy the needs and preferences of that specific company's customers, and to sell at a price acceptable to those same customers. If competitive pressures have made it necessary to compromise when balancing cost and quality, or to emphasize one particular property at the expense of some other, the nature of those compromises will reflect the considered judgements of that particular paint company's management — aided by the experience of its formulators. In addition, the raw materials selected will have been influenced to some degree by both relative availability in the geographic area in which the company operates, and by loyalties to specific suppliers. For these many reasons, the similarly labeled products of different paint manufacturers will differ in composition, performance, and price.

The article under discussion did not concern itself, therefore, with any theoretical conceptions (or misconceptions) as to ideal formula composition, or of ideal hiding power levels, but rather with the basic problem of minimizing the cost of hiding power.

The procedure that I have advocated, and that is embodied in my computer program, allows any existing manufactured product to be established as a standard of performance (which is justified by its customer acceptance), and then identifies the minimum cost at which these performance characteristics may be duplicated, using the original raw materials. The adjustments in composition required to achieve this minimum cost are programmed to take place in a manner that retains hiding power, tinctorial strength, gloss, angular sheen, and dry-film porosity (as evidenced by stain-removal and high dry-hiding) at the levels previously established by preference — only the cost is significantly affected.

It is true that changes in total solids content are necessarily involved (although not of the magnitude suggested by my Table *1 when practical paint products are re-formulated), but Dr. Hoogerbeets appears to have conveniently overlooked the fact that re-formulation for greater cost-effectiveness may just as frequently require an increase in total solids, at the expense of titanium dioxide content, as illustrated by the Acrylic Latex Semi-Gloss in my article. This, understandably, is not a very attractive idea from the point of view of a titanium dioxide supplier.*

On the other hand, the market supplied by Dr. Hoogerbeets' employer is very different from the American market. Chalk-resistant pigments sell at a premium price in Europe, but they are employed in Dutch architectural enamels in an effort to retain gloss for a longer period of time than the average American retains the same house.

Table 2

	PVC			
	11.3	**13.2**	**16.4**	**21.6**
Lbs of titanium dioxide	221.30	221.30	221.30	221.30
Lbs of spacing extender	0.00	26.10	67.70	136.60
Gal of resin solids	52.16	51.00	49.12	46.07
Gal of mineral spirits	41.20	41.20	41.20	41.20
Gal total volume	100.00	100.00	100.00	100.00
HP/gal (sq ft @ 0.98 CR)	380	380	380	380
Cost/gal	$6.32	$6.26	$6.15	$5.99
% solids/volume	58.8	58.8	58.8	58.8

Alkyd enamels are applied to surfaces that an American do-it-yourself-er would paint with a latex semi-gloss (with considerably less effort, and no VOC problem), and those painted surfaces are washed more frequently, and re-painted less frequently, than in this country. Paint re-sales in the Netherlands therefore may well be related more to long-term service life than to ease of application, initial appearance, and cost. My article, however, was addressed to the American paint formulator, who might question — as I do — the relative importance to the American consumer of a film-thickness difference that can not be detected at the time of application.

It is difficult, however, to follow Dr. Hoogerbeets' demonstration of his own theories in the examples provided in his Table *1, since each formulation possesses a different total volume, and each must be applied at a different spreading rate to achieve the ideal dry-film thickness that he advocates. If the same ratios of volumetric cost (23:7:1) are employed to estimate raw-material costs (based upon a price of 78¢ per pound for titanium dioxide), quite different, and much more consistent, results may be produced by the step-wise replacement of increments of resin solids with equal volumes of a low oil-absorption, enamel-grade spacing extender costing 2.2 on Dr. Hoogerbeets' scale of values (*Table *2).*

The initial 11.3 PVC formulation of this series is identical with Dr. Hoogerbeets' 11.3 PVC formulation in his Table *1, but the remainder of the series will all produce the same hiding power, and the same dry-film thickness, at the same spreading rate, and total raw-material cost decreases as the PVC is raised. By way of contrast, Dr. Hoogerbeets' 21.6 PVC formulation would cost $6.99/gal (a full $1 more), and have to be applied at a 7% higher spreading rate to achieve the same dry-film thickness. It would, however, contain 78% more titanium dioxide.*

To the several different points of view in respect to cost-effectiveness that were alluded to by Dr. Hoogerbeets, one should obviously add those of the academic community (in general) and of titanium dioxide pigment suppliers. The former tends to be somewhat disdainful of profit as a motive for re-formulation, while the latter may be biased as to how it (the profit) might best be distributed.

Fred Stieg,
PigmenTech Consulting
Jekyll Island, GA

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Journal of Coatings Technology,
1315 Walnut St., Suite 832,
Philadelphia, PA 19107.

Book Review

RING-OPENING POLYMERIZATION: Kinetics, Mechanisms, and Synthesis

Edited by
James E. McGrath

Published by
American Chemical Society
Washington, D.C. (1985)
398 pages, $74.95

Reviewed by
Josepn V. Koleske
Union Carbide Corp.
South Charleston, WV

Ring-Opening Polymerization is a collection of papers presented at the 187th Meeting of the American Chemical Society held in St. Louis, MO, during April 1984. The book is an up-to-date compilation of recent ring-opening polymerization studies and will prove valuable to both academic and industrial investigators who are neophytes or experts in the technology.

The twenty-two page opening chapter, which was written by the editor, is an interesting, educational introduction to the topic, and it sets the stage for the ensuing papers. This introduction describes the general chemistry of and mechanisms by which many ring-opening polymerizations proceed. It also points out characteristics of the resulting polymers and the commercial significance of many of the various products that can be prepared.

Ring-opening polymerizations proceed through a variety of mechanisms/catalysts including anionic, cationic, organometallic, and free radical. The various chapters deal with utilization of these procedures to polymerize alkylene oxides, ethers, vinyl ethers, lactones, lactams, siloxanes, oxazolines, and N-carboxy-anhydrides. Included in the book are chapters that deal with novel cationic ultraviolet light and free radical initiation polymerization.

Although ring-opening polymerizations provide many present-day commercial products, such as intermediates for urethane foams and elastomers and water-soluble polymers used in the cosmetic and pharmaceutical industries, the future for development of new products and for research to provide further understanding remains bright. Thus, this book will be a useful guide to those who have an interest in exploiting this exciting chemistry.

CALL FOR PAPERS

Division of Polymeric Materials: Science and Engineering
American Chemical Society
Aug. 30-Sept. 4, 1987 **New Orleans, LA**

The American Chemical Society's Division of Polymeric Materials: Science and Engineering will sponsor a symposium on "Coatings for Use in the Transportation Industry," as part of the ACS national meeting in New Orleans, Aug. 30-Sept. 4.

Organized by David Bauer, of Ford Motor Co., the symposium will encompass all aspects of coatings used in the transportation industry including new materials (high solids, water-borne, basecoat-clearcoat, etc.), coatings for novel substrates, application techniques and coatings processes, methods for coating evaluation (corrosion performance, durability, etc.), and methods for trouble-shooting and quality control.

Those interested in submitting papers must present a probable title by February 1. A standard ACS abstract and a five-page PMSE preprint will be due on April 1.

For more information, contact David R. Bauer, Research Staff E-3198, Ford Motor Co., P.O. Box 2053, Dearborn, MI 48121.

Coming Events

FEDERATION MEETINGS

For information on FSCT meetings, contact FSCT, 1315 Walnut St., Philadelphia, PA 19107 (215-545-1506).

1987

(March)—Seminar on Statistical Process Control. Sponsored by FSCT Professional Development Committee. Scheduled by region: March 2-3—Marriott Hotel, Chicago O'Hare Airport, Chicago, IL; March 9-10—Atlanta Marriott (downtown), Atlanta, GA; March 16-17—Marriott, Philadelphia Airport, Philadelphia, PA; and March 30-31—Marriott, Torrance, CA.

(Apr. 29-May 2)—Combined Federation Spring Week and Pacific Northwest Society Symposium. The Westin Hotel, Seattle, WA. FSCT Society Officers Meeting on April 29; FSCT Board of Directors Meeting on April 30; Seminar on May 1-2. Concludes with a dinner dance on May 2.

(Oct. 5-7)—65th Annual Meeting and 52nd Paint Industries' Show. Convention Center, Dallas, TX.

1988

(Oct. 19-21)—66th Annual Meeting and 53rd Paint Industries' Show. McCormick Place, Chicago, IL.

SPECIAL SOCIETY MEETINGS

1987

(Jan. 14-May 13)—Coating Technology course sponsored by the Chicago Society and The Chicago Paint and Coatings Association, Chicago, IL. (Greg McWright, USG Corp., 700 N. Highway 45, Libertyville, IL 60048).

(Feb. 23-25)—Southern Society 14th Annual Water-Borne and Higher-Solids Coatings Symposium. New Orleans, LA. (Dr. Gordon L. Nelson, Chairman, Department of Polymer Science, University of Southern Mississippi, Southern Station Box 10076, Hattiesburg, MS 39406-0076).

(Feb. 23-25)—Western Coatings Societies' Symposium and Show, Monterey Convention Center, Monterey, CA. (Barry Adler, Royell, Inc., 1150 Hamilton Ct., Menlo Park, CA 94025).

(Apr. 1-3)—Southern Society. Annual Meeting. Dutch Inn, Lake Buena Vista, FL. (C. Lewis Davis, 802 Black Duck Dr., Port Orange, FL 32019).

(Apr. 7)—Detroit Society. 12th Annual Focus Conference, Management Education Center, Troy, MI. (Bohdan Melnyk, 26727 Newport, Warren, MI 48089).

(Apr. 7-8)—Chicago Society's Symco '87 "Risky Business: Technology of Our Times." Knickers, Des Plaines, IL. (William Fotis, The Enterprise Cos., 1191 S. Wheeling Rd., Wheeling, IL 60090).

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"FORMULATING AND TESTING COATINGS FOR PLASTICS"

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Detroit Society for Coatings Technology

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- High Solids
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- Performance Parameters
- Application Techniques

Those wishing to participate are urged to submit a letter of intent including a tentative title of paper as soon as possible, and an abstract of about 200 words by January 31, 1987.

Abstracts on any subjects related to coating plastics would be welcome. Please forward all communications to: The Detroit Society for Coatings Technology, 26727 Newport, Warren, MI 48089. Telephone (313) 252-8998.

(Apr. 29-May 2)—Combined Federation Spring Week and Pacific Northwest Society Symposium. The Westin Hotel, Seattle, WA. April 29—FSCT Society Officers Meeting; April 30—FSCT Board of Directors Meeting; PNW Golf; PNW Evening Activities; May 1—Seminar; May 2—Seminar continued; PNW Sports Competition; Dinner Dance.

(June 12-13)—Joint meeting of St. Louis and Kansas City Societies. Holiday Inn, Lake of Ozarks. (A.E. Zanardi, Thermal Science, Inc., 2200 Cassens Dr., Fenton, MO 63026).

1988

(Apr. 13-15)—Southern Society. Annual Meeting. Charleston, SC. (Scott McKenzie, Southern Coatings Co., P.O. Box 160, Sumter, SC 29150).

(Apr. 28-30)—Pacific Northwest Society. Annual Symposium. Vancouver, B.C., Canada. (Yvon Poitras, General Paint Corp., 950 Raymur Ave., Vancouver, B.C., Canada V6A 3L5).

1989

(Mar. 13-15)—Western Coatings Societies Symposium and Show. Disneyland Hotel, Anaheim, CA. (Andy Ellis, NL Industries, Inc., 200 N. Berry St., Brea, CA 92621).

OTHER ORGANIZATIONS

1987

(Jan. 15-16)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Toldeo, OH. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Jan. 19-22)—Annual Meeting, Technical Symposium and Coatings Technology Exposition of Steel Structures Painting Council. Fairmont Hotel, New Orleans, LA. (James G. Busse, SSPC, 4400 Fifth Ave., Pittsburgh, PA 15213).

(Jan. 22-23)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Bloomington, MN. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Feb. 2-3)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Chicago, IL. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Feb. 4-6)—"Formula" Forum on Chemical Specialties sponsored by the Societe Francaise de Chimie, Nice. (Societe Francaise de Chimie, Departement Congres, 250 rue Saint Jacques 75005 Paris, France).

(Feb. 8-11)—Inter-Society Color Council. Williamsburg Conference on "Geometric Aspects of Appearance." The Lodge, Colonial Williamsburg, VA. (Dr. D.H. Alman, Du Pont Co., P.O. Box 2802, Troy, MI 48007).

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(Feb. 17-19)—"Coatings Failure Analysis" course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (William Corbett, KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Feb. 21-27)—"Adhesion—Fundamentals and Practice" course and 10th Annual Meeting of the Adhesion Society, Williamsburg, VA. (Prof. Lawrence T. Drzal, Composite Materials & Structures Center, Michigan St. Univ., East Lansing, MI 48824-1226).

(Feb. 26-27)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Dalas, TX. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Mar. 3-5)—"Coating Inspection of Industrial Facilities" course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (William Corbett, KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Mar. 9-10)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Los Angeles, CA. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Mar. 9-13)—CORROSION/87. National Association of Corrosion Engineers. Moscone Center, San Francisco, CA. (NACE, P.O. Box 218340, Houston, TX 77218).

(Mar. 17-19)—Powder Coatings '87. G-MEX Exhibition Center, Manchester, England. (Mervyn W.K. Little, Specialist Exhibitions Ltd., Grantleigh House, 14-32 High St., Croydon, Surrey CRO 1YA, England).

(Mar. 20-25)—The International Paint Industry & Anti-Corrosion Technology Exhibition, Beijing, People's Republic of China. (Sino Trade Promotions, 15A Wing Cheong Commercial Bldg., 19-25 Jervois St., Central, Hong Kong).

(Mar. 26-29)—Colour 87—the International Exhibition for Painting Techniques and Colour Application. Cologne, Germany. (Koln Messe, Postbox 210760, D-5000 Cologne 21, Germany).

(Mar. 30-Apr. 1)—Annual Meeting of the Zinc Institute and the Lead Industries Association, Fairmont Hotel, San Francisco, CA. (Annual Meeting, ZI/LIA, 292 Madison Ave., New York, NY 10017).

(Apr. 5-7)—Inter-Society Colour Council. Annual Meeting. "Industrial Problems in Color Science." Barclay Hotel, Philadelphia, PA. (Dr. A. Rodrigues, Du Pont Co., 945 Stephenson Hwy., Troy, MI 48084).

(Apr. 5-10)—ACS, Div. of Polymeric Materials: Science & Engineering, Anaheim, CA. (T. Davidson, Ethican, Inc., Route 22, Somersville, NJ 08876).

(Apr. 6-7)—27th Annual Symposium of the Washington Paint Technical Group. Sponsored by the National Paint & Coatings Association. Marriott Twin Bridges Hotel, Washington, DC. (Ken Zacharias, NPCA, 1500 Rhode Island Ave., N.W., Washington, DC 20005).

(Apr. 6-7)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Grand Rapids, MI. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Apr. 7-9)—"Bridge and Highway Structures Coatings Inspection" course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (William Corbett, KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Apr. 9-10)—"The Fundamentals of Color" seminar sponsored by Macbeth, a division of Kollmorgen, Corp. Neenah, WI. (Jeanne Dolon or Karen Degnan, Macbeth, Little Britain Rd., P.O. Box 230, Newburgh, NY 12550-0382).

(Apr. 21-23)—"Coatings Specifiers" course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (William Corbett, KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Apr. 27-May 1)—"Thermal/Mechanical Properties and Cure Characterization of Coatings and Polymers" Course. Sponsored by Kent State University, Kent, OH. (Dr. Carl J. Knauss, Kent State University, Chemistry Dept., Kent, OH 44242).

(Apr. 29-May 1)—26th Annual Marine and Offshore Coatings Conference. Sponsored by the National Paint & Coatings Association. New Orleans Hilton Hotel, New Orleans, LA. (Ken Zacharias, NPCA, 1500 Rhode Island Ave., N.W., Washington, DC 20005).

(May 11-14)—Powder & Bulk Solids Conference/Exhibition, O'Hare Exposition Center, Rosemont, IL. (Show Manager, Powder & Bulk Solids Conference/Exhibition, Cahners Exposition Groups, 1350 E. Touhy Ave., P.O. Box 5060, Des Plaines, IL 60017-5060).

(May 11-15)—"Adhesion Principles and Practice for Coatings and Polymer Scientists" Course. Sponsored by Kent State University, kent, OH. (Dr. Carl J. Knauss, Kent State University, Chemistry Dept., Kent, OH 44242).

(May 12-14)—HAZTECH Canada Exhibition and Conference. Toronto International Centre, Mississauga, Ontario. (Beverly Gibson, Exhibition Management Company, 6143 S. Willow Dr., Suite 100, Englewood, CO 80111).

(May 18-21)—Surface Coating '87. Chemical Coaters Association. Milwaukee, WI. (CCA, Box 241, Wheaton, IL 60189).

(May 28-31)—Cormaint Asia '87. Conference on Coatings and Corrosion Protection. Jakarta Fair Grounds, Jakarta, Indonesia. Cosponsored by National Association of Corrosion Engineers. (IIR Exhibitions Pte Ltd., 89 Short St., Singapore 0718).

(May 31-June 5)—Sixth International Meeting on Radiation Processing. Skyline and Holiday Inn Hotels, Ottawa, Ont., Canada. (Mrs. E. Golding, International Meeting on Radiation Processing, P.O. Box 13533, Kanata, Ont., Canada K2K 1X6).

CALL FOR PAPERS

12th World Congress on Metal Finishing
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Palais des Congres
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The Association Francaise des Ingénieurs et Techniciens de l'Electrolyse et des Traitements de Surface invites papers to be presented at their congress and exhibition—"Interfinish 88."

Experts will be presenting 100 papers on their work and comparing their respective experiences in their relation with the industrialists. In addition, two $500 prizes will be awarded to the speakers delivering the best papers about organic coatings and pulsed or alternating current coatings. The best presentation in terms of the quality of visual aids used, originality, and performance will also receive a $500 award.

Suggested topics include: techniques, structure and properties of substrates and coatings—control and normalization, applications, evolution and tendencies, equipment, research and development, teaching and training, special topics, trouble shooting, and last-minute developments.

A 250 word abstract, written in French or English, of the proposed paper must be forwarded to SEPIC (Interfinish), 17 rue d'Uzes, 75002 Paris, France, no later than June 30, 1987.

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(June 1-5)—"Advances in Emulsion Polymerization and Latex Technology" short course, Lehigh Univ., Bethlehem, PA. (Dr. Mohammed S. El-Aasser, Dept. of Chemical Engineering, Sinclair Lab #7, Lehigh Univ., Bethlehem, PA 18015).

(June 1-5)—"Dispersion of Pigments and Resins in Fluid Media" Course. Sponsored by Kent State University, Kent, OH. (Dr. Carl J. Knauss, Kent State University, Chemistry Dept., Kent, OH 44242).

(June 14-17)—Dry Color Manufacturers' Association Annual Meeting, The Greenbrier, White Sulpher Springs, WV. (Lynn Goodwin, P.O. Box 20839, Alexandria, VA 22320-1839)

(June 17-19)—"Chemically Modified Surfaces" Conference co-sponsored by Colorado State University and Dow Corning Corp. Holiday Inn, Fort Collins, CO. (Ward T. Collins, Mail Stop C41C00, Dow Corning Corp., Midland, MI 48686-0994).

(June 17-20)—Oil and Colour Chemists' Association Biennial Conference. Eastbourne, England. (Mr. R.H. Hamblin, Director & Secretary, OCCA, Priory House, 967 Harrow Rd., Wembley, Middlesex HA0 2SF, England).

(June 22-24)—Fourth Annual International Bridge Conference. Sponsored by the Engineers' Society of Western Pennsylvania. Hilton Hotel, Pittsburgh, PA. (International Bridge Conference, c/o Engineers' Society of Western Pennsylvania, 530 William Penn Place, Pittsburgh, PA 15219).

(August 6-9)—Oil and Colour Chemists' Association Australia. 29th Annual Convention. Wrest Point Convention Center, Hobart, Tasmania, Australia. (OCCAA, 6 Wilson Ave., Felixstow, South Australia, 5090 Australia).

(July 13-16)—SUR/FIN '87 Chicago—International Conference & Exhibit of Electroplating and Surface Finishing. McCormick Place, Chicago, IL. (AESF, 12644 Research Parkway, Orlando, FL 32826).

(July 22-26)—Oil and Colour Chemists' Association, New Zealand Div. 25th Jubilee Convention. "Timber—Its Protection and Decoration." Rotorua, New Zealand. (Convention Coordinator, OCCA New Zealand, P.O. Box 5192, Auckland, New Zealand).

(Aug. 23-28)—"Copolymerization" Symposium. Sponsored by the Polymer Div. of the Royal Australian Chemical Institute and the Div. of Polymer Chemistry of the ACS. Sydney, Australia. (Prof. D. Tyrell, Polymer Science & Engineering, Univ. of Massachusetts, Amherst, MA 01003).

(Sept. 13-18)—"Mechanisms and Measurement of Water Vapor and Liquid Water through Materials" Symposium co-sponsored by ASTM Committees C-16, D-1, D-8, D-10, D-20, and F-2. Philadelphia, PA. (ASTM, 1916 Race St., Philadelphia, PA 19103).

(Sept. 15-18)—XVIIth Congress of AFTPV (French Association of Paint and Varnish Technicians) and Eurocoat. Nice, France. (J. Roire, 5, Rue Etex, 75018 Paris, France).

(Sept. 20-23)—Canadian Paint and Coatings Association. 75th Annual Convention. Four Seasons Hotel, Vancouver, B.C. (CPCA, 515 St. Catherine St. W., Montreal, Que., H3B 1B4 Canada).

(Oct. 14-16)—SURTEC '87 Berlin. International Congress Center, Berlin. (Gabriela Thal, 1625 K St., N.W., Suite 500, Washington DC 20006).

(Oct. 22-23)—60th Anniversary Conference of Japan Society of Colour Material, Tokyo, Japan. (Japan Society of Colour Material, 9-12, 2-chrome, Iwamoto-cho, Chiyoda-ku, Tokyo 101, Japan).

(Nov. 7-11)—10th International Congress on Metallic Corrosion sponsored by Central Electrochemical Research Institute on behalf of International Corrosion Council. Madras, India. (Dr. V.I. Vasu, Chairman, ICMC Organizing Committee, Director CERI, Karaikudi 623006, Tamil Nadu, India).

1988

(Apr. 5-7)—Electrocoat '88. Drawbridge Inn and Convention Center, Ft. Mitchell, KY. (Products Finishing, 6600 Clough Pike, Cincinnati, OH 45244).

(June 13-17)—International Conference on Composite Interfaces II. Case Western Reserve University, Cleveland, OH. (Professor H. Ishida, General Chairman, ICCI-II, Dept. of Macromolecular Science, Case Western Reserve University, 10900 Euclid Ave., Cleveland, OH 44106-1727).

(June 15-16)—Surfex '88. Oil and Colour Chemists' Association. Harrogate International Conference Center, Yorkshire, England. (R.H. Hamblin, OCCA, Priory House, 967 Harrow Rd., Wembley, Middlesex HA0 2SF England).

(Sept. 18-25)—XIXth Congress of FATIPEC. Aachen, Germany. (C. Bourgery, FATIPEC Secretary General, 76 Blvd. Pereire, 75017 Paris, France).

(Oct. 18-21)—12th World Congress on Metal Finishing, INTERFINISH 88. Palais des Congres, Paris, France. (SEPIC INTERFINISH, 17 rue d'Uzes, 75002 Paris, France).

Advertisers Index

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'Humbug' from Hillman

Welcome to the first of 1987's nonsense from "Humbug." Our first order of business is to empty our treasure trove of Howard Jerome's philosophical observations for 1986 before the trove starts to mildew, viz:

- Important letters which contain no errors will develop errors in the mail.
- Anyone can do any amount of work, provided it isn't the work he—or she—is supposed to be doing.
- If it wasn't for the last minute, nothing would get done.
- When you don't know what to do, walk fast and look worried.
- No one gets sick on Wednesdays.
- Once a job is fouled up, anything done to improve it makes it worse.
- Getting the job done is no excuse for not following the rules.
- Following the rules won't get the job done.
- When bosses talk about improving productivity, they are never talking about themselves.
- The boss is always right.

That other guy from Valspar, Dick Batchelor, who is also Past-President of the Houston Society, writes bemoaning OUR good fortune of fallen oil prices. Dick asked if I knew the difference between a Texas oil tycoon and a pigeon.

As a reliable straight man, I replied, "No, Dick, what is the difference between etc., etc."

Answer: "A pigeon can still make a deposit on a Mercedes."

As if that isn't enough, Dick lays this story on the Texas A&M Aggies. It doesn't take much thinking to come to the conclusion that he is not an A&M alumnus. Here it is, verbatim:

A few weeks ago, two Aggies were running late for class and as they zoomed into the parking lot, they jumped out of their new car and slammed the doors.

The passenger Aggie said, "Hold it, we left our books in the car."

The driver answered, "Worse than that, I locked the keys inside."

Passenger Aggie: "No problem, we'll use a coat hanger."

Driver Aggie: "No, that will never work, we'll get a locksmith."

A big argument ensued, with each one insisting on his solution. After ten minutes of arguing and brawling in the parking lot, passenger Aggie shouts, "Hold it a minute, we've got to settle this soon."

Driver Aggie: "Why, soon?"

Passenger Aggie: "It's starting to rain and we left the top down."

If there are any loyal Aggies among our readers—well—I want you to know that, personally, I don't believe a word of it. You know where to find Dick.

Whoever it is who reads the *Philadelphia Daily News* to Frank Borrelle, found the following in Dave Racher's column.

Occasionally, there are good reasons for judges not to impose immediate jail sentences on convicted criminals. For example:

"Defendant to remain free until wife completes prison sentence," said a judge to a man who insisted that his imprisonment would "leave my kids to our crazy relatives."

However, most pleas for deferred sentences are seen as delaying tactics and are ignored. Some examples:

"I can't go to prison now," said one defendant. "My two girlfriends are about to have babies and I've got to be with them."

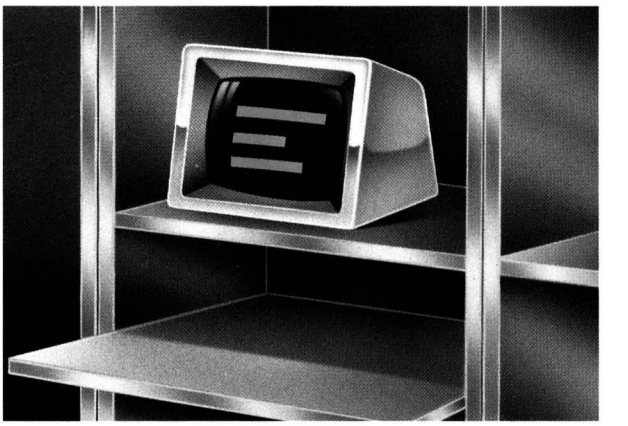
Another man, convicted of drug sales, asked for time to "complete one last deal."

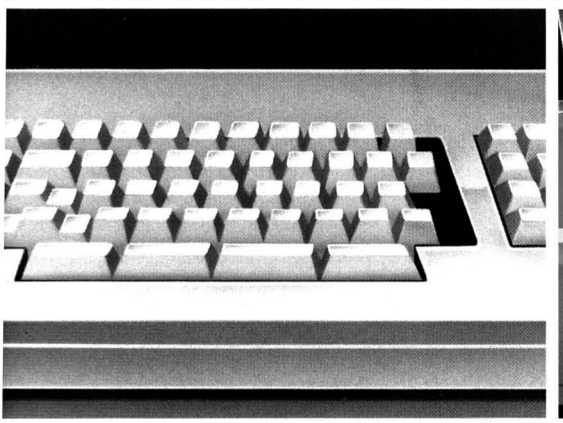
"Don't send me to jail until the guys I testified against get out," said an admitted holdup man. "Can you imagine me having dinner with them up there?"

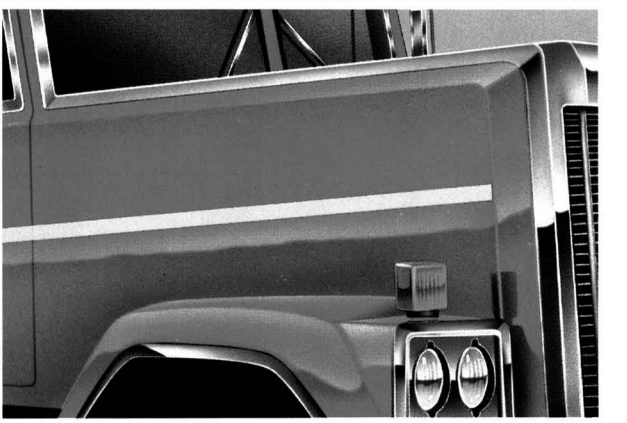
After pleading guilty to burglary, a man told the court he was "willing to do my time, but not now, because I'm engaged to be married and my future mother-in-law will kill me if the wedding is off."

—Herb Hillman
Humbug's Nest
P.O. Box 135
Whitingham, VT 05361

Are Your Urethane Finishes TOUGH ENOUGH?







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Water Coil and Metal Deco Solvent		●	●	●		●	●	●	●	●		●	●
Air Dry		●	●	●	●	●	●	●	●	●			●
Wood Lacquers			●	●		●	●	●	●	●		●	
Powder Coatings		●				●						●	●
Flexible Packaging			●			●		●	●	●	●	●	
Automotive Topcoats						●		●	●	●	●		
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Rigid Packaging			●	●			●	●	●	●	●	●	
Architectural Paint						●					●		

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