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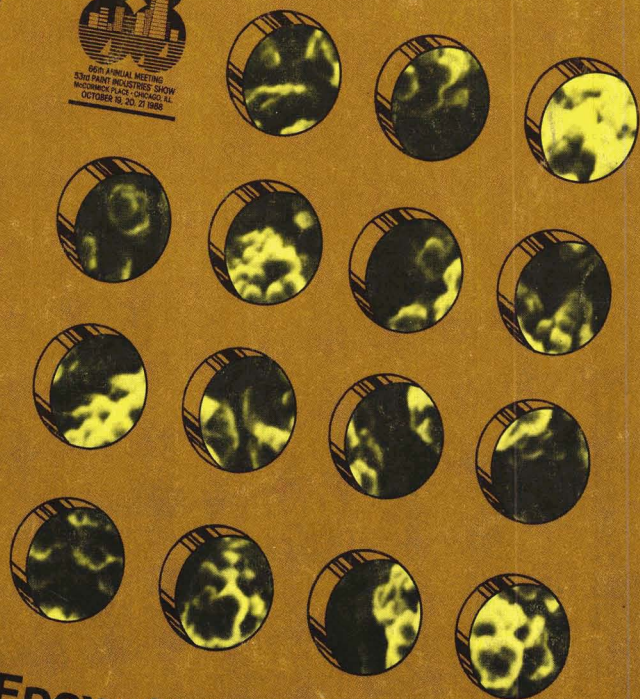
**JOURNAL OF
COATINGS
TECHNOLOGY**

JCTAX 60 (763) 1-84 (1988)

August 1988



66th ANNUAL MEETING
53RD PAINT INDUSTRIES SHOW
McCORMICK PLACE, CHICAGO, IL
OCTOBER 10, 20, 27 1988



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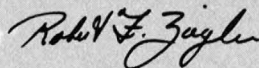
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As the eminent jurist Oliver Wendell Holmes once said, "I think that as life is action and passion, it is required of a person to share the passion and action of their time at the peril of being judged not to have lived."

Too many competent people sit in the shadows and let others do the work. Make yourself known, but hurry—positions are limited.



Robert F. Ziegler
Executive Vice President

Abstracts of Papers in This Issue

EPOXY POWDER COATINGS FOR CONFORMAL COATING AND CORROSION PROTECTION OF COPPER—R.D. Granata, P. Deck, and H. Leidheiser, Jr.

Journal of Coatings Technology, 60, No. 763, 41 (Aug. 1988)

Epoxy powder coatings were utilized to form thin, highly resistive, low-defect-density coatings on copper. Substrates having protrusions or sharp edges required greater coating thickness to achieve the same defect density. The following properties of the coatings were studied: adherence, wettability, flow characteristics at cure temperature, stress, resistance of the cured coating to aggressive environments, and the delamination tendency in the presence of an applied cathodic potential. The electrical properties were determined using electrochemical impedance spectroscopy, the application of a constant DC potential, and the application of a cyclic, increasing DC potential. The conformal properties of a substrate/coating system can be well characterized by these techniques, and the techniques serve a useful role in predicting corrosion-related failures.

NEW DEVELOPMENTS IN WEATHER RESISTANT POWDER COATINGS—M. Hoppe

Journal of Coatings Technology, 60, No. 763, 53 (Aug. 1988)

A disadvantage found when conventional weather resistant powder coatings are compared to liquid coatings is their relatively poor flow properties. The flow of thermoset powder coatings depends on a number of factors, including the selection of suitable pigments and fillers, pigment concentration, additives such as flow agents, bake schedule, reactivity and structure of the resinous components, melt viscosity, and the viscosity profile during crosslinking. This paper reports about recently developed carboxyl terminated triglycidyl isocyanurate (TGIC) cured polyesters which result in powder coatings with remarkably improved flow properties due to the polyester's molecular structure and functionality and the viscosity profile during the curing process. These improvements have been reached without any prolongation of the gel time and without compromising the weathering resistance of the film. Such new powder coatings completely crosslink at 160°C within 15 minutes yielding films with excellent mechanical properties.

1988 Schedule of Special Paint Show Issues

1988 Paint Industries Show • McCormick Place, Chicago • October 19, 20, 21

SEPTEMBER—Featured are the Preliminary Program of Technical Sessions, floor plan of show exhibitors, registration forms, housing forms and hotel information, as well as general show information.

OCTOBER—This special Annual Meeting and Paint Show Issue, which is distributed at the show in addition to our regular circulation, contains Abstracts of Papers to be presented; the Program of Technical Sessions; floor plan of show exhibitors; a list of exhibitors and their booth numbers, classified by product/service; an alphabetical list of exhibitors and their booth numbers; and general show information.

DECEMBER—This Annual Meeting and Paint Show Wrap-up Issue features articles on all exhibitors, with emphasis on products and special booth features; photo displays of award-winning booths; as well as a complete review of important Annual Meeting and Paint Show happenings.

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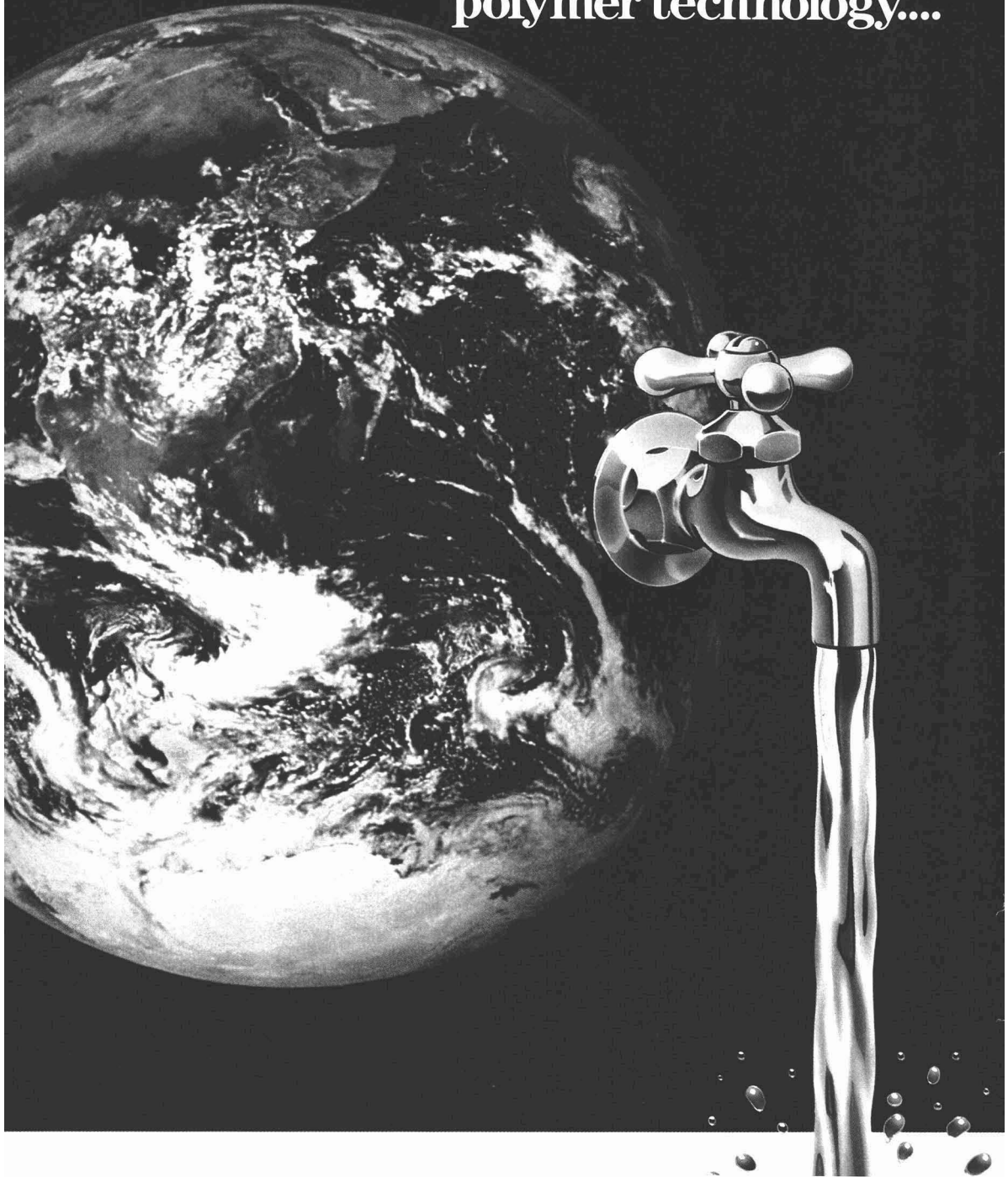
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John C. Ballard, of Louisville, and Kurt F. Weitz, of Toronto, Are Nominated to Federation Officer Positions for 1988-89

John C. Ballard, Vice President, Research and Development, Kurfees Coatings, Inc., Louisville, KY, has been nominated for the position of President-Elect of the Federation of Societies for Coatings Technology. Mr. Ballard, currently Treasurer of the Federation, is a member of the Executive Committee and sits on the Board of Directors. He served as an at-large-member on the Board of Directors from 1978 to 1980. Mr. Ballard also is a member of the Finance and Mattiello Lecture Committees, an Ex Officio member of the Professional Development Committee, and Secretary-Treasurer of the Coatings Indus-

try of Toronto and has served the coatings industry for 31 years.

sity of Toronto and has served the coatings industry for 31 years.

PRESIDENT

The current President-Elect, James E. Geiger, founder and President of Sun Coatings, Inc., Largo, FL; President of Chemex Chemicals & Coatings Co., Inc., Tampa, FL; and President and Chairman of the Board of Penn Paints, Inc., Sanford, FL, will assume the Presidency at the close of the 1988 Annual Meeting, October 21, in Chicago, IL.

Mr. Geiger served as Treasurer of the Federation (1986-87), is a member of the Executive Committee, and sits on the Board of Directors. Currently, he is Chairman of the Office Building Committee and a member of the Finance Committee. Mr. Geiger served as a member-at-large on the Board of Directors from 1984 to 1986 and was the Annual Meeting Host Committee Chairman in 1986. He also was a member of the Educational, Professional Development, and Investment Committees, and Secretary-Treasurer of the Coatings Industry Education Fund in 1987. Mr. Geiger is a Past-President of the Southern Society (1984-85) and served as Chairman of the Society's Finance and Nominating Committees. He graduated from Northern Illinois University and is a member of the University of Southern Mississippi Industrial Advisory Committee. Mr. Geiger has been in the coatings industry for 30 years.

Executive Committee

Society Representative Members:

Thomas E. Hill, Manager—Technical Service Department, Pratt & Lambert, Inc., Buffalo, NY, has been nominated for a three-year term. Mr. Hill is a member of the Executive Committee and has been the Western New York Society Representative to the Board of Directors since 1983. He is a member of the Finance and Paint Show Exhibits Awards Committees. Mr. Hill received his technical education from West Virginia University and his business education from the State University of New York at Buffalo. He has been in the coatings industry for 20 years.



J.C. Ballard



K.F. Weitz

try Education Fund. He was Chairman of the Federation's Paint Show Exhibits Awards Committee from 1985 to 1987 and was a member of the Annual Meeting Program Committee. Mr. Ballard, Past-President of the Louisville Society (1976-77), is a graduate of the University of Louisville and has been in the coatings industry for 31 years.

TREASURER

Nominated for the position of Treasurer for the Federation is Kurt F. Weitz, Manager—Technical Support, Indusmin, Division of Falconbridge Limited, Toronto, Ont., Canada. Mr. Weitz has served on the Executive Committee since 1985 and has been the Toronto Society Representative to the Board of Directors since 1981. In addition, he served on the Roon Award Committee for six years and was a member of the Finance Committee. Mr. Weitz is a Past-President of the Toronto Society (1974-75). He graduated from the Univer-



R.M. Hille



J.J. Oates

Richard M. Hille, Marketing Manager, General Paint & Chemical Co., Division of Cotter & Co., Cary, IL, has been nominated to serve a one-year term to fill the unexpired term of Mr. Weitz. Mr. Hille was an at-large-member on the Board of Directors from 1985 to 1987 and currently is the Chicago Society Representative on the Board. He is the Chairman of the 1988 Annual Meeting Program Committee and serves on the Finance and Professional Development Committees. Mr. Hille was Chairman of the Annual Meeting Host Committee in 1984 and the Manufacturing Committee from 1985 to 1987. He was President of the Chicago Society (1980-81) and was active on the Society's Technical, Educational, and Manufacturing Commit-



J.E. Geiger



T.E. Hill

OTHER NOMINATIONS

The Nominating Committee also submitted the names of the candidates for Execu-

(Continued on page 14)

Federation Offices Nominations for 1988-89

(Continued from page 12)

tees. Mr. Hille graduated from the University of Kansas in 1968 and has been in the coatings industry for 20 years.

Board of Directors

Past-President Member—(Two-year term):

John J. Oates, retired from Troy Chemical Corp., Newark, NJ, in 1988, and is a Past-President of the Federation (1977-78) and the New York Society (1961-62). Mr. Oates is a member of the Planning, Educational, and Paint Show Exhibits' Awards Committees. In addition, he served on the Board of Directors and was Chairman of the By-Laws, Annual Meeting Host, and Annual Meeting Program Committees. Mr. Oates was the New York Society Council Representative from 1972 to 1974 and received the Society's PaVaC and Roy Kienle Awards. A graduate of the City College of New York, he has been in the coatings industry for 37 years.

Members-at-Large—(Two-year terms):

George R. Pilcher, Corporate Technical Director, Hanna Chemical Coatings Corp.,

a subsidiary of Reliance Universal, Inc., Columbus, OH. Mr. Pilcher has been a member of the Professional Development Committee since 1985 and Chairman since 1986. He is Vice-Chairman of the 1988 Annual Meeting Program Committee, a member of the A.F. Voss/*American Paint & Coatings Journal* Awards Committee,



G.R. Pilcher



P. Shaw

and a Trustee of the Coatings Industry Education Fund. Mr. Pilcher was Chairman of the CDIC Society Educational Committee and was active on the Technical Commit-

tee. He presented the keynote address at the 1988 Washington Paint Technical Group's 28th Annual Symposium. A founding chairman of the ACS Roy W. Tess Award in coatings, Mr. Pilcher graduated from the College of Wooster and has served the coatings industry for 18 years.

Patricia Shaw, Technical Director, Davlin Paint Co., Berkeley, CA. Ms. Shaw has been a member of the A.F. Voss/*American Paint & Coatings Journal* Awards Committee since 1986 and currently is serving as Chairman. She was President of the Golden Gate Society (1986-87) and acted as Chairman of the Technical and 20th Biennial Western Coatings Symposium & Show Committees. In addition, Ms. Shaw was Chairman of the Los Angeles Society Technical Committee (1981-82). She received the Golden Gate Distinguished Service Award in 1985. Ms. Shaw is a graduate of the University of California and has been in the coatings industry for 14 years.

(Adrian Adkins, of Golden Gate Society, a nominee for Board Member-at-Large, has relinquished the nomination due to employment conflicts. Thereupon, the Committee nominated Ms. Shaw, of Golden Gate Society, for the position).

Plan to Attend the FSCT Annual Luncheon

Friday, October 21
at the
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Featuring Speaker
Dick Flavin
of
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During Annual Meeting

"Wood Substrates" Seminar Papers Still Available

Papers presented at the seminar on "Coatings for Wood Substrates," sponsored by the Federation of Societies for Coatings Technology, in Seattle, WA, on May 1-2, 1987 are available in limited quantities. The package contains 10 of the presentations given at the seminar.

Cost of the complete set of seminar papers is \$75. To order, contact Ms. Meryl Cohen, FSCT, 1315 Walnut St., Suite 832, Philadelphia, PA 19107. (215) 545-1506.

FSCT Communicates Via New Facsimile Machine

Due to the ever increasing need for speed and accuracy of communications, the Federation has acquired a facsimile machine (FAX). The FAX telephone number is (215) 545-7703. As an additional convenience, the unit will be in operation 24 hours a day.



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Dick Flavin, Social Satirist and Political Humorist, To Speak at FSCT Annual Luncheon in Chicago

The Federation is pleased to announce that Dick Flavin, of NBC's "Sunday Today" show, will speak at the FSCT Annual Luncheon to be held during the Annual Meeting and Paint Industries' Show, October 19-21, in Chicago.

In addition to his appearances for NBC, Mr. Flavin appears and writes special material for the Boston Pops Orchestra, and contributes humorous essays to such publications as *USA Today*. Before joining NBC, he was seen for many years on Boston's WBZ-TV, and was for four years a regular commentator on the Cable News Network. The recipient of seven Emmys, Dick Flavin entertains audiences with his off-beat observations on politics, government, and the human condition. He has taught courses on politics and satire at Harvard University's Kennedy Institute of Politics and at Brandeis University. Mr. Flavin's light-hearted yet biting commentary targets presidents, captains of industry, and other assorted "sacred cows."

The Luncheon will be held on Friday, October 21, at McCormick Center Hotel. Awards to be presented at the Luncheon will include the George Baugh Heckel Award to the individual whose contributions to the general advancement of the Federation's interests and prestige has been outstanding, Roon Foundation Awards, and the Paint Show Awards for the best exhibits in the Show.

Technical Program Theme and Highlights

The theme of the Federation's Annual Meeting is "Performance and Compliance: The Challenge Intensifies." This theme underscores the impact of regulatory restrictions on the coatings industry, which must respond to the dual challenges of producing quality products while meeting increasingly restrictive compliance standards. Programming, which will be held at McCormick Place—North Hall, will focus on such areas as corrosion protection, aerosol coatings, "high tech" coatings research, and major regulatory issues affecting coatings formulation and manufacture.

Program Committee Chairman Richard Hille, of General Paint & Chemical Co., Gary, IL, and his committee have developed a schedule of presentations which will cover timely issues, including:

- Mattiello Memorial Lecture—"Microgels—Intramolecularly Crosslinked

Macromolecules—Potent Components of Organic Coating," by Prof. Dr. Werner Funke, of the University of Stuttgart

- Corrosion Seminar—"Regulation and Its Effect on Corrosion Protection"
- Manufacturing Seminar—"Productivity Measurement in Coatings Manufacture"
- Roon Award Competition Papers
- Constituent Society Papers

Serving on the Program Committee are: George R. Pilcher (Vice-Chairman), Hanna Chemical Corp., Columbus, OH; Adrian Adkins, Olympic Homecare Products Co., Pleasanton, CA; Jay Austin, Halox Pigments Corp., Hammond, IN; Gary Gardner, Tnemec Co., Inc., N. Kansas City, MO; Richard J. Himics, Daniel Products Co., Jersey City, NJ; Gus W. Leep, Seymour of Sycamore, Inc., Sycamore, IL; and Joseph P. Walton, Jamestown Paint & Varnish Co., Jamestown, PA.

Paint Industries' Show

To be held in conjunction with the 66th Annual Meeting, the Paint Show will feature the products and services of over 234 suppliers to the coatings industry. Setting the record for exhibit space, the Paint Show will offer over 69,000 net square feet of booth space to attendees.

Currently, all available exhibit space is contracted, and over 7000 industry personnel are expected to attend. Exhibit hours will be 11:00 to 5:30 on Wednesday, Octo-

ber 19; 9:00 to 5:30 on Thursday, October 20; and 9:00 to 3:00 on Friday, October 21.

Hotels and Reservations

Federation headquarters will be the Chicago Hilton. Other cooperating hotels will be: Hyatt Regency Chicago; The Congress; Palmer House; Essex Inn; Best Western Inn; Days Inn; and McCormick Center Hotel. All housing will be processed by the Chicago Convention Bureau, which will accept only the official housing form furnished by the Federation.

Special Air Fares

United Airlines and Delta Air Lines, in cooperation with the FSCT, are offering a special discount fare which affords passengers a 40% minimum savings off their round trip, undiscounted day coach fares for travel to the Annual Meeting on the airlines' domestic systems. The discount from Canada is 35%.

To take advantage of the United Airlines discount, you must (1) travel between October 16-24, 1988; (2) phone 1-800-521-4041 for reservations. Immediately reference the FSCT file number: 8002D. The special fares are available only through this number.

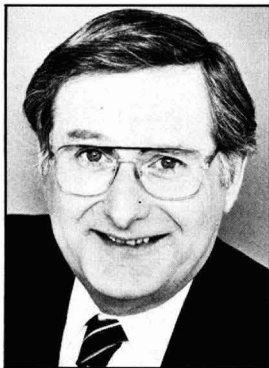
For those traveling on Delta Air Lines, the discount will be given if you: (1) travel between October 14-23, 1988; (2) purchase tickets as least seven days in advance; (3) phone 1-800-241-6760 for reservations. Immediately reference the FSCT file number: U0235. The special fares are available only through this number. For Delta Frequent Flyers, triple mileage is available if tickets are purchased with an American Express card.

Discounts on either airline are good for both direct and connecting flights to Chicago. If you use travel agents, have them place your reservation through the toll-free number to obtain the same fare advantages. Both Delta and United have a variety of other promotion fares, some of which may represent even greater savings. When you phone for reservations, ask for the best discount applicable to your itinerary.

Spouses Activities

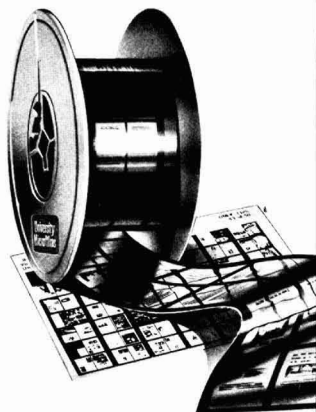
The Spouses Program of Activities will begin on Wednesday, October 19, with a

(Continued on page 16.)



Dick Flavin

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"Coatings Defects" Seminar Papers Now Available

Papers presented at the 1988 FSCT Spring Seminar on "Coatings Defects: Their Prevention and Cure," held May 17-18 in Orlando, FL, are available (as a set) in limited quantities.

Included is a copy of "Coatings Film Defects," from the Federation Series on Coatings Technology, authored by Percy E. Pierce and Clifford K. Schoff, PPG Industries, Inc., Allison Park, PA

The set of papers contains the following presentations from the Seminar:

"Fourier Transform Infrared Spectroscopic Studies of Coatings Defects"—Daniel J. Skrovanek, PPG Industries, Inc., Allison Park, PA

"Color Non-Uniformity as a Coating Defect—Prevention and Cure"—Marvin J. Schnall, Troy Chemical Corp., Newark, NJ

"Coating Problems and Solutions Associated with Particle Size Reduction"—Richard J. Himics and Ramon E. Pineiro, Daniel Products Co., Jersey City, NJ

"Surface Chemistry of Surfactants Used to Prevent Surface Coatings Defects"—Christie Hsu, Witco Corp., Houston, TX

"Silicones Can Cause or Overcome Many Coatings Defects"—Robert Vash, Byk Chemie USA, Inc., Mantua, OH

"Coatings Defects as They Pertain to Wood Coatings"—Donald W. Waltrip, Reliance Universal, Inc., Louisville, KY

"Defects in Coatings and Polymers Caused by Microorganisms"—William B. Woods, Hüls America, Inc., Piscataway, NJ



"Appliance Coatings: Defects and Their Prevention"—Thomas J. Miranda, Whirlpool Corp., Benton Harbor, MI

"Factors Influencing Surface Appearance in Powder Coatings"—Joseph S. Puglisi, CIBA-GEIGY Corp., Ardsley, NY

"Radiation Curable Coatings—Defects and Possible Solutions"—Morris A. Johnson, Interez, Inc., Louisville, KY

Cost of the complete set of seminar papers is \$75. To order, contact Ms. Meryl Cohen, FSCT, 1315 Walnut St., Suite 832, Philadelphia, PA 19107 (215) 545-1506.

Dick Flavin to Speak at FSCT Luncheon; Annual Meeting & Paint Show Highlights

(Continued from page 15)

get-acquainted wine and cheese social in the Williford Room of the Chicago Hilton.

On Thursday, the spouses will tour the University of Chicago with a visit to the Museum of Science and Industry. The group will be treated to a private organ recital at the University's Rockefeller Chapel.

Luncheon will be served at the Ambassador West Hotel's elegant Guildhall. Following lunch, the attendees will be entertained by "Four Hits and a Miss," featuring close harmonies of swing era music infused with a very original comic spirit.

Host Committee

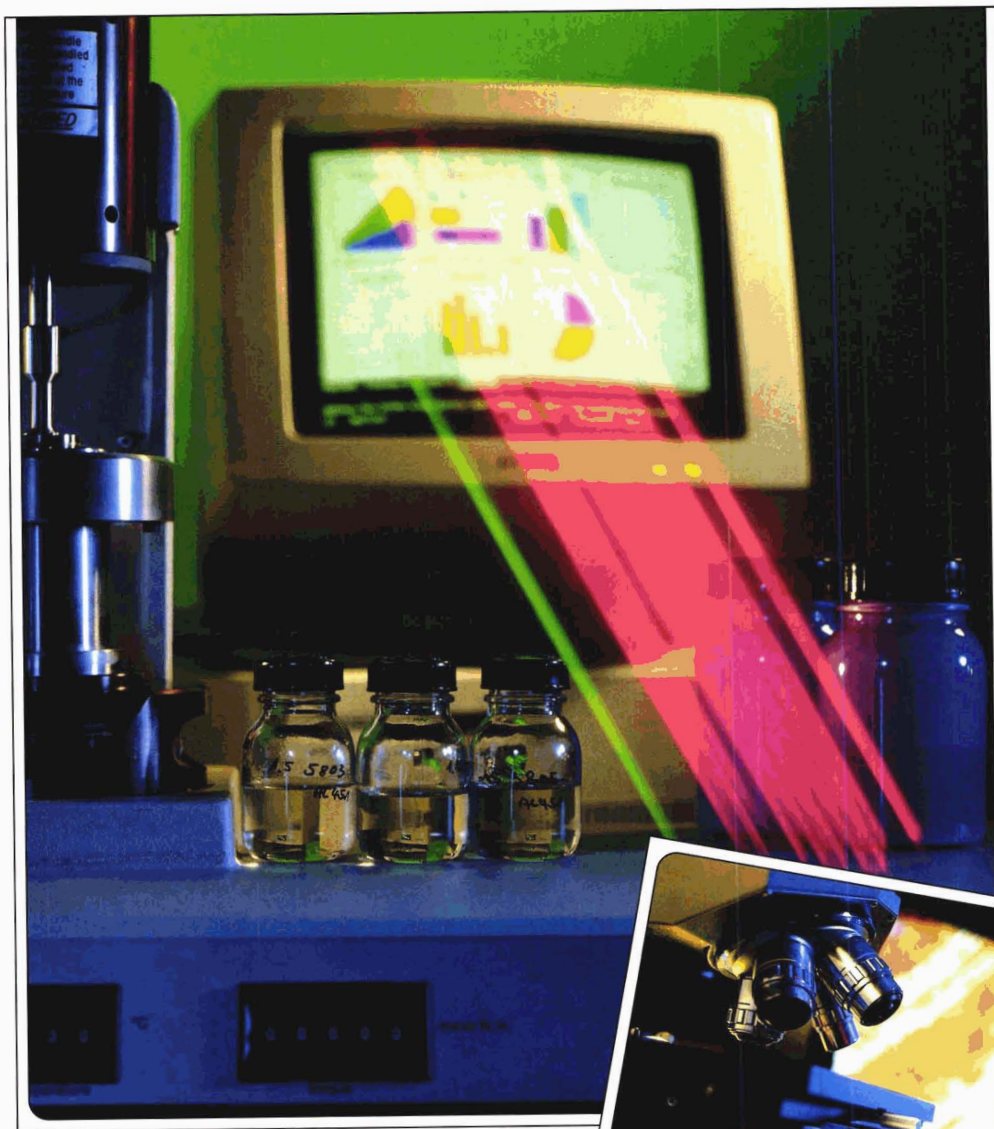
Co-chairmen of the 1988 Annual Meeting Host Committee are Audrey LeNoble, of Emco Chemical Distributors, Inc. and Rudolph Albrecht, of Ace Paint Div., Ace

Hardware Corp. Assisting them are the following subcommittee chairmen: Information Services—Thomas Drucker, Graham Paints & Varnish Co., Inc.; Registration—Thomas Yates, of United Coatings Inc.; Program—Natu Patel, Ace Paint Div.; Federation Booth—Victor Willis, Ace Paint Div.; and Spouses' Program—Audrey LeNoble, EMCO Chemical Distributors.

NPCA to Meet Same Week

The National Paint & Coatings Association will hold its annual meeting on October 17-19, at the Palmer House in Chicago. Persons wearing the NPCA registration badge and who sign up at a special FSCT registration desk will be admitted to the Paint Show on Wednesday only, with the compliments of the Federation.

The results are there to see



Test procedures which are revealing are necessary if paint production and application methods are to be simulated under conditions that are as "lifelike" as possible. At considerable testing expense, all the effects that could conceivably arise in the use of additives are identified and examined.

Our Quality Assurance Policy enables us to achieve the ultimate standards. With the aid of modern test instruments – many of which were developed by ourselves – we can monitor events and measure results.

BYK Chemie
Additives + Instruments

Defoamers for organic coatings

	Non polar ←				→ Polar
Binders	Long oil alkyds Air drying alkyds/acrylics	Medium oil alkyds Air drying acrylic copolymers	Short oil alkyds Chlorinated rubber	2-component urethane PVC-copolymers Polyester/alkyd-melamine Acrylic/melamine	Nitrocellulose
Byk®-051/052/053					
Byk®-065					
Byk®-070					
Byk®-077					
Byk®-080					
Byk®-141					

Defoamers for aqueous systems

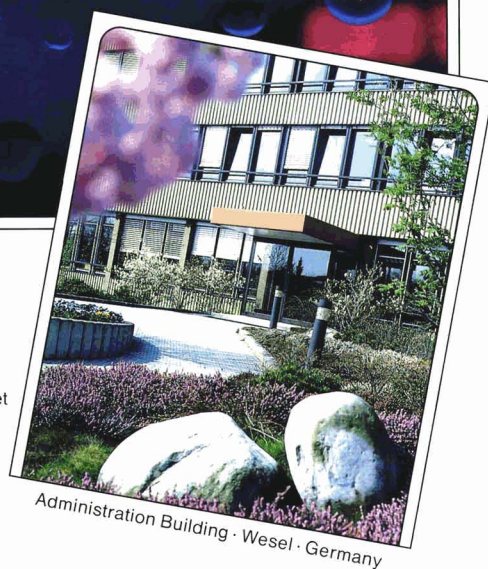
Application fields	Interior emulsions Plasters	Exterior emulsion paints High quality interior paints	Gloss-/Semi-gloss-emulsion paints Industrial emulsions	Emulsion lacquers	Stains
Byk®-031					
Byk®-033					
Byk®-035					
Byk®-020					
Byk®-080					

This summary contains important information. Should you have any questions, don't hesitate to call your local BYK-Chemie Technical Representative or our Wallingford, Connecticut office.

Inclusions of air in the form of bubbles and foam are undesirable during production and application of paints. Therefore, BYK-Chemie's R & D has come up with defoamers for water and solvent paints in a wide range of polarities.

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Wallingford · Connecticut 06492 - 7651
Tel. 2 03-2 65 20 86 · Tx. 6 43 378 · Tfax 02 03-2 84 91 58

BYK Chemie
Additives + Instruments



Regulatory UPDATE

AUGUST 1988

This digest of current regulatory activity pertinent to the coatings industry is published to inform readers of actions which could affect them and their firms, and is designed to provide sufficient data to enable those interested to seek additional information. Material is supplied by Roy F. Weston, Inc., Washington, D.C.

Titanium Dioxide Deleted from Community Right-to-Know List—EPA has issued a final rule deleting titanium dioxide from the list of toxic chemicals published under section 313 of the Emergency Planning and Community Right-to-Know Act [part of the Superfund Amendments and Reauthorization Act of 1986 (SARA)]. See 53 Federal Register 23108 (June 20, 1988).

Paints and coatings are responsible for 50% of the total consumption of titanium dioxide. Miscellaneous uses such as coated fabrics, ceramics, elastomers, floor coverings, and printing inks make up another 11% of the demand.

Section 313 of the Emergency Planning and Community Right-to-Know Act requires owners and operators of certain facilities that manufacture, process, or otherwise use a listed toxic chemical at certain threshold quantities to annually report their releases of such chemicals to the environment. EPA's action to delete titanium dioxide resulted from three petitions that claimed the substance failed to meet any of the criteria required for listing. As a result of the immediately effective final rule, titanium dioxide was not among the listed chemicals facilities were obliged to report on by July 1, 1988.

For further information, contact Renee Rico, Petition Coordinator, Emergency Planning and Community Right-to-Know Hotline, Mail Stop WH-562A, U.S. EPA, 401 M Street, S.W., Washington, D.C. 20460, (800) 535-0202 or, in Washington, D.C. or Alaska, call (202) 479-2449.

Zinc Oxide Among Chemicals Set for Toxicology Study—The Chemical Evaluation Committee of the Department of Health and Human Services' National Toxicology Program (NTP) has recommended toxicology studies for zinc oxide and seven other chemicals. The other chemicals are diphenylamine, Firemaster 680, isobutane, methacrylonitrile, phenylpropanolamine, hydrochloride, and trichloromelamine. No testing was recommended for beta-cadinene. All nine chemicals had been previously nominated for testing.

The Evaluation Committee recommended carcinogenicity testing for zinc oxide. Among the tests recommended for the other chemicals are carcinogenicity, reproductive effects, chemical disposition, and subchronic studies. See 53 Federal Register 23806 (June 24, 1988).

NTP is requesting comments on the testing recommendations. NTP is also seeking information on modes of production; current production levels and occupational exposure potential; uses and resulting exposure level; toxicological testing in the private sector; and results of toxicological studies of structurally related compounds. Comments and data will be reviewed by the NTP technical staff and forwarded to the NTP Board of Scientific Counselors for use in their evaluation of the nominated chemicals. See 46 Federal Register 21828 (Apr. 14, 1981).

Comments were due July 25, 1988. To obtain further information, contact Dr. Victor A. Fung, Chemical Selection Coordinator, National Toxicology Program, Room 2B55, Building 31, National Institute of Health, Bethesda, MD 20892, (301) 496-3511. Comments received after the deadline will be accepted and used where possible.

National Advisory Council for Technology Transfer Formed at EPA—EPA has established a National Advisory Council for Environmental Technology Transfer to advise on technology transfer issues associated with the management of environmental problems and to institutionalize communication among all levels of government, the business community, the academic community, and the international environmental community. The membership of the Advisory Council will be drawn from business and industry; the academic, educational, and training communities; governmental organizations; and, environmental organizations. See 53 Federal Register 23681 (June 23, 1988).

EPA is seeking nominations for membership on the Advisory Committee. Any interested person or organization may submit the names of qualified persons. Suggestions for membership candidates should be identified by name, occupation, organization, position, address, and telephone number. Candidates will be asked to submit a resume of their background, experience, and qualifications and other relevant information as part of the consideration process. Suggestions for committee membership should be submitted by July 25, 1988.

For further information, contact R. Thomas Parker, U.S. EPA Agencywide Technology Transfer Staff (A-101-F6), Room 605, Fairchild Building, 499 South Capital Street, S.W., Washington, D.C. 20460, (202) 475-9741.

The *Regulatory Update* is made available as a service to FSCT members, to assist them in making independent inquiries about matters of particular interest to them. Although all reasonable steps have been taken to ensure the reliability of the *Regulatory Update*, the FSCT cannot guarantee its completeness or accuracy.

OSHA Extends Schedule for Air Contaminant Standard Changes

—As a result of requests to extend the comment period on a rule affecting exposure limits for 420 substances, the Occupational Safety and Health Administration (OSHA) has extended the schedule for receipt of comments and informal rulemaking hearings. See 53 Federal Register 24956 (July 1, 1988). The proposed rule would reduce the permissible exposure limits for approximately 100 substances now listed in the "Z-tables"; set permissible exposure limits for 205 substances not currently regulated by OSHA; add or change short-term exposure limits for 70 substances; and, set skin, short term, or ceiling limits for others. See 53 Federal Register 20960 (June 7, 1988). The proposed amendments would affect the existing air contaminant standards found in tables Z-1, Z-2, and Z-3 in 29 CFR 1910.1000 and add a new table: Z-4. Among the substances affected by the proposed rule are acetone, naphthalene, propylene oxide, toluene, and vinyl acetate.

Comments were due by July 25, 1988, at Docket Officer, Docket No. H-020, Room N-3670, U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, (202) 523-7894. Testimony and documentary evidence were due by July 25, 1988, to Mr. Tom Hall, OSHA Division of Consumer Affairs, Docket No. H-020, Room N-3647, U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, (202) 523-8615. The informal rulemaking hearing is scheduled to begin on July 28, 1988 and continue through August 12, 1988 or earlier if all testimony is complete. August 19, 1988 is targeted as the deadline for post hearing evidence and September 2, 1988 for post hearing briefs.

For further information, contact James F. Foster, Director, Office of Information and Consumer Affairs, OSHA, Room N-3649, U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, (202) 523-1851.

Carcinogenesis Studies Available for Solvent Ingredients

—The Department of Health and Human Services' National Toxicology Program (NTP) has released three technical reports describing carcinogenesis and toxicology studies of a widely used industrial solvent, a chemical used in the manufacture of lacquers and wood stains, and a chemical used in chlorinated hydrocarbon solvents. The reports describe studies of 2-amino-5-nitrophenol, 1,2-epoxybutane, and trichloroethylene. See 53 Federal Register 25213 (July 5, 1988).

2-Amino-5-nitrophenol is used in the manufacture of C.I. Solvent Red 8, an azo dye for synthetic resins, lacquers, and wood stains. The study produced some evidence of carcinogenic activity. Questions and comments concerning the Technical Report "Toxicology and Carcinogenesis Studies of 2-Amino-5-Nitrophenol in F344/N Rats and B6C3F₁ Mice (Gavage Studies) (TR334)," should be directed to Dr. R. Irwin at the address provided below, or telephone (919) 541-3340. Copies of the report are available from the NTP Public Information Office (MD B2-04), at the address provided below.

Epoxybutane is used primarily as a stabilizer in chlorinated hydrocarbon solvents (e.g., 1,1,1-trichloroethane, trichloroethylene, and dichloromethane). The two year inhalation studies produced clear evidence of carcinogenic activity. Questions and comments concerning the Technical Report "Toxicology and Carcinogenesis Studies of 1,2-

Epoxybutane in F344/N Rats and B6C3F₁ Mice (Inhalation Studies) (TR329)," should be directed to Dr. June Dunnick at the address provided below, or telephone (919) 541-4811. Copies of the report are available from the NTP Public Information Office (MD B2-04), at the address provided below.

Trichloroethylene is an industrial solvent. Due to chemically induced toxicity, reduced survival, and deficiencies in the conduct of the studies, HHS concluded that the study's value as an indicator of carcinogenic activity was limited. Questions and comments concerning the report "Toxicology and Carcinogenesis Studies of Trichloroethylene in Four Strains of Rats (ACI, August, Marshall, Osborne-Mendel) (Gavage Studies) (TR273)," should be directed to Dr. R. Chhabra at the address provided below, or telephone (919) 541-3386. Copies of the report are available from the NTP Public Information Office (MD B2-04), at the address provided below.

The NTP address for questions, comments, or to obtain copies of the reports is: P.O. Box 12233, Research Triangle Park, NC 27709, (919) 541-3991.

EPA Publishes View on Surface Impoundment Retrofit Requirement

—Existing hazardous waste surface impoundments that have not been retrofitted to meet certain minimum technological requirements and have not received an exemption from the requirements must not receive hazardous waste on November 8, 1988 or thereafter and must be closed in accordance with EPA closure requirements. The closure requirement will remain in full force until EPA finalizes amendments to the closure regulations that will allow continued receipt of nonhazardous wastes if certain conditions and requirements are met. See 53 Federal Register 20738 (June 6, 1988). The proposed amendments will not affect the requirement for surface impoundments to cease the receipt of hazardous waste by November 8, 1988.

The requirement to halt receipt of hazardous waste and begin closure applies to all surface impoundments that had or should have had interim status on November 8, 1984. This includes units that have continued to operate under interim status; facilities that failed to qualify for interim status; and units that subsequently lost interim status. The requirement also applies to surface impoundments that became subject to the Resource Conservation and Recovery Act (RCRA) after November 8, 1984.

EPA's interpretation of section 3005 (j) (i) of RCRA (halting hazardous waste receipt and mandating closure) was published to explain how EPA viewed the interaction of that section's requirements with those of section 3004 (o) (1)(A) which provide for minimum technological requirements. See 53 Federal Register 24717 (June 30, 1988). These minimum technological requirements include installation of two or more liners, a leachate collection system between the liners, and groundwater monitoring for each unit.

For general information, contact the RCRA Hotline, Office of Solid Waste (WH-562), U.S. EPA, 401 M Street, S.W., Washington, D.C. 20460, (800) 424-9346 or, in Washington, D.C., (202) 382-3000. For information on the effect of these requirements on a specific facility, contact the appropriate EPA regional office.

CPSC Denies Petition to Ban Methylene Chloride Products—The U.S. Consumer Product Safety Commission (CPSC) has denied a petition to ban products containing methylene chloride. The petition, filed by the Consumer Federation of America, requested that the CPSC commence a proceeding under section 2(q) (1) (B) of the Federal Hazardous Substances Act to ban products containing methylene chloride. See 53 Federal Register 22264 (June 14, 1988).

For additional information or copies of the letter of denial, contact Sheldon D. Butts, Office of the Secretary, 5401 Westbard Avenue, Bethesda, MD 20207, (301) 492-6800.

Drug Enforcement Bill Regulates Acetone, MEK, Toluene Transactions—A bill approved by the U.S. House Judiciary Committee, intended to halt the diversion of chemicals to illicit drug manufacture, would authorize the Attorney General to promulgate regulations that would affect the distribution, receipt, sale, impact, or export of chemicals listed as essential to illicit drug manufacture. Among the listed essential chemicals are acetone, 2-butanone (methyl ethyl ketone), and toluene.

The bill, H.R. 4916, introduced by House Crime Subcommittee Chairman, William J. Huges (D-NJ), would have the Attorney General set a threshold amount for the regulation of essential chemical transactions. Transactions in essential chemicals would be subject to a prior notice requirement. Certain suspicious transactions would be prohibited unless approved by the Attorney General. Exceptions are provided for transactions with certain "regular" customers; for transactions in chemical mixtures; and in listed chemicals contained in lawfully marketed drugs. Other chemicals listed as essential chemicals include acetic anhydride, benzyl chloride, ethyl ether, hydriodic acid, and potassium permanganate.

The bill approved by the House Judiciary Committee, H.R. 4916, includes provisions developed from those of an earlier chemical diversion bill, H.R. 2585. In addition to the chemical diversion provisions, the Committee bill includes provisions on the seizure of assets in drug enforcement actions and other drug law enforcement provisions.

Contact the Crime Subcommittee of the House Judiciary Committee at 207 Cannon House Office Building, Washington, D.C. 20515, (202) 225-1695.

EPA Receives Diethylenetriamine Test Data—EPA has announced the receipt of test data on diethylenetriamine (DETA) which is used for production of wet-strength resins, epoxy-curing agents, surfactants, and corrosion inhibitors. The submission describes a 90-day (subchronic) dietary toxicity study with the dihydrochloride salt of DETA in albino rats. See 53 Federal Register 25008 (July 1, 1988).

The data were submitted pursuant to a final test rule under the Toxic Substances Control Act (TSCA). EPA has initiated its review and evaluation process but was unable to provide any determination as to the submission's completeness at the time of the Federal Register notice.

For further information, contact Michael M. Stahl, Acting Director, TSCA Assistance Office (TS-799), Office of Toxic Substances, Room EB-44, U.S. EPA, 401 M Street, S.W., Washington, D.C. 20460, (202) 554-1404.

Science Advisory Board to Discuss Non-Polar Organic Contaminants—The Sediment Criteria Subcommittee of the Environmental Effects, Transport, and Fate Committee of EPA's Science Advisory Board will hold an open meeting concerning the approach used in the derivation of sediment quality criteria for non-polar organic contaminants. The objective of the meeting is to inform the Subcommittee of EPA activities concerning contaminated sediment so the Subcommittee can provide broad based oversight to EPA's criteria setting approach as it is being developed. Issues to be discussed include the extent of sediment contamination nationally; case studies of regions and Superfund sites; methods for setting criteria (e.g., screening level concentrations, the apparent effects threshold method, and the equilibrium partitioning method); research planned and underway; and the regulatory applications of sediment quality criteria.

The meeting is open to the public and will be held on August 8-9, 1988 at EPA Region 8, 999—18th Street, Denver, CO 80202-2405. To attend, to submit written comments, or for further information, contact Janis C. Kurtz, Executive Secretary (A-101F), Science Advisory Board, U.S. EPA, 401 M Street, S.W., Washington, D.C. 20460, (202) 382-2552. Persons wishing to make a statement before the Subcommittee should contact Ms. Kurtz by August 1, 1988.

Clean Air Act Amendments Still Stalled as Proposals Proliferate—Consideration of Clean Air Act amendments is still stalled in the House of Representatives Health and Environment Subcommittee over plans to reduce ozone emissions. A group of nine Democratic members of the Subcommittee's parent Committee on Energy and Commerce have developed legislative text suitable for use as a substitute to Subcommittee Chairman Henry Waxman's (D-CA) bill, H.R. 3054.

The "Group of Nine" proposal directs EPA to establish requirements that will reduce volatile organic compound (VOC) emissions from commercial and consumer solvents, architectural coatings, traffic coatings, and military specification coatings. The proposal also directs EPA to issue Control Technique Guidelines for seven unspecified categories of stationary VOC sources.

In response to the "Group of Nine" proposal, Waxman has prepared an ozone reduction proposal. The new Waxman bill is an alternative to the "Group of Nine" proposal and to Waxman's own bill, H.R. 3054, which was being used as the vehicle for considering Clean Air Act ozone control amendments. The Waxman alternative contains provisions for reducing emissions from commercial and consumer solvents, architectural coatings, traffic coatings, and military specification coatings. The proposal also includes provisions similar to the "Group of Nine" proposal on Control Technique Guidelines.

Yet another ozone proposal has been prepared by full Committee member Jack Fields (R-TX). The Fields proposal, described as a bipartisan effort, focuses on the ozone attainment program deadlines and mobile source issues that have kept Waxman and full Committee Chairman John Dingell (D-MI) at odds over an approach to ozone controls. The Fields bill does not include provisions specific to solvents or coatings. It does call for EPA review and development of Control Technique Guidelines.

SUMMARY CALENDAR OF REGULATORY ACTIONS

July 25, 1988	Comments due on zinc oxide and seven other chemicals nominated by NTP for toxicological studies. (See this issue.)
July 25, 1988	Nominations due to EPA on candidates for the National Advisory Council for Environmental Technology Transfer. (See this issue.)
July 25, 1988	Comments due to OSHA on air contaminant standards changes. (See this issue.)
August 1, 1988	Notice of intent to make a statement on sediment quality criteria for non-polar organic contaminants due to EPA Science Advisory Board Sediment Criteria Subcommittee. (See this issue.)
August 8-9, 1988	Meeting of Sediment Criteria Subcommittee of EPA's Science Advisory Board on derivation of sediment quality criteria for non-polar organic contaminants. (See this issue.)
August 19, 1988	Post hearing evidence due for OSHA air contaminants standards hearing. (See this issue.)
September 2, 1988	Post hearing briefs due for OSHA on contaminant standards hearing. (See this issue.)
September 14, 1988	CPSC policy on labeling household products takes effect with respect to products packaged after this date. (See February issue.)

**FSCT 1988 ANNUAL MEETING AND PAINT INDUSTRIES' SHOW
McCORMICK PLACE, CHICAGO, ILLINOIS
WEDNESDAY, THURSDAY, AND FRIDAY, OCTOBER 19, 20, 21**



APPLICATION FOR HOTEL ACCOMMODATIONS

**Mail FSCT
To: c/o Chicago Convention & Visitors Bureau
McCormick Place-on-the-Lake
Chicago, IL 60616**

Please indicate below the type of accommodations desired and choice of hotels. (Refer to the hotel map and rates and codes on opposite page). All reservations will be processed by the Chicago Convention and Visitors Housing Bureau. Hotel assignments will be made in accordance with prevailing availability. You will receive an acknowledgment of your reservation from the Housing Bureau. This is not the hotel confirmation. That will come to you directly from the hotel to which you have been assigned. Additions/changes/cancellations—prior to September 19—must be submitted in writing to the Housing Bureau at the above address.

TYPE OF ACCOMMODATION	NUMBER	RATE REQUESTED
Single (1 person)		
Double (2 persons)		
Twin (2 persons)		
Suite (parlor and 1 bedroom)		
Suite (parlor and 2 bedrooms)		

CHOICE OF HOTELS
1st
2nd
3rd
4th

HOTEL CODE

1.	<input type="text"/>	<input type="text"/>	<input type="text"/>
2.	<input type="text"/>	<input type="text"/>	<input type="text"/>
3.	<input type="text"/>	<input type="text"/>	<input type="text"/>
4.	<input type="text"/>	<input type="text"/>	<input type="text"/>

NAMES OF ROOM OCCUPANTS AND DATES OF ARRIVAL/DEPARTURE

Type of Room	Name	Dates	
		Arrive	Depart

Please Type Additional Reservations on a Separate Sheet and Attach to This Form

SEND CONFIRMATION FOR ALL RESERVATIONS TO:

Name _____ Telephone _____

Company _____

Address _____

City, State, Zip _____

Country _____

Name of Credit Card and # _____ Exp. Date _____ Signature _____

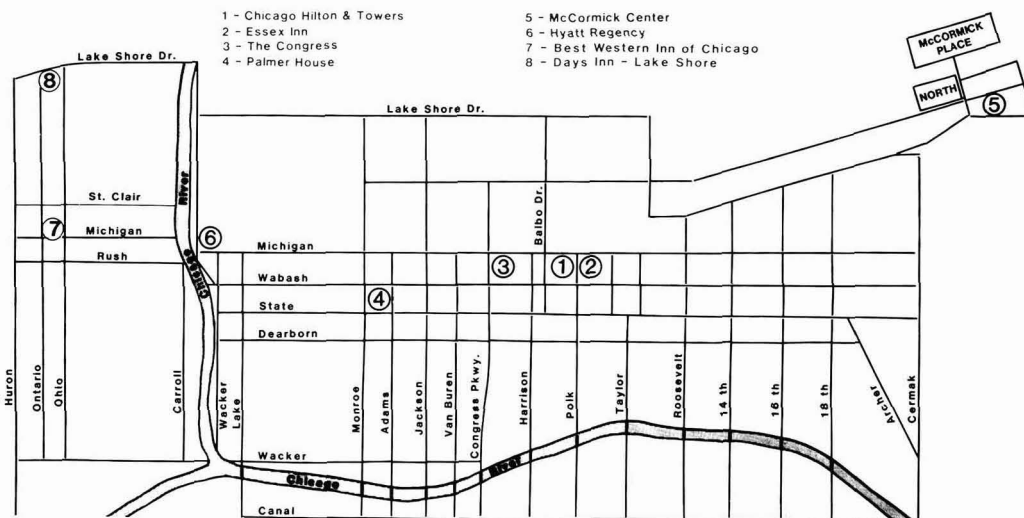
Note: Requests for accommodations at either the Chicago Hilton or McCormick Center will be limited to 10 rooms per company. A parlor counts as one room.

HOTEL ROOM AND SUITE RATES

Map No.	Hotel Code	Hotel	Singles	Doubles/Twins	Suites	
(1)	111	Chicago Hilton	110-125-140 155-170	135-150-165 180-195	380-545 510-720	1 BR 2 BR
(1)	119	Chicago Hilton Towers	175-190	200-215	390-870	
(2)	106	Essex Inn	68-74-78	78-84-88	150-250	
(3)	115	Congress	70-80	85-95	150-350 225-425	1 BR 2 BR
(4)	112	Palmer House & Towers	100-115 130-145	120-135 150-165	260 & Up 515 & Up	1 BR 2 BR
(5)	110	McCormick Center	99-145	119-165	325-950	
(6)	113	Hyatt Regency	130	155	325-625 450-850	1 BR 2 BR
(7)	220	Best Western Inn of Chicago	85-90	90	205-375	
(8)	213	Days Inn-Lake Shore	89	99		

Note: Rates subject to 12.1% tax

Requests for accommodations at the Chicago Hilton and/or the McCormick Center will be limited to 10 rooms per company. A parlor counts as one room. Please read your confirmation from the hotel carefully. If a deposit is required, please mail check directly to the hotel.



1988 ADVANCE REGISTRATION

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

1315 Walnut St., Philadelphia, PA 19107

C	Office Use Only
U	Date received _____
U	Amount \$ _____
V	Check No. _____

Please fill out this form and mail with a check in the correct amount (made payable to the FSCT) to the Federation address shown above. All checks must be payable in U.S. Funds. Any that are not will be returned. DEADLINE DATE FOR ADVANCE REGISTRATION IS SEPTEMBER 19. NONE WILL BE ACCEPTED AFTER THAT DATE.

A \$10.00 charge will be made for cancellations received prior to September 19. No refunds will be made after that date.

INDUSTRY REGISTRATION FEES:

A **MEMBER** \$50.00

Please name the Federation Society in which you are a paid-up member:

Federation Constituent Society

B **NON-MEMBER** \$65.00

G **SPECIAL FEE FOR RETIRED MEMBERS** \$25.00

Federation Constituent Society

INFORMATION FOR REGISTRATION BADGE:

NICKNAME

FIRST NAME

LAST NAME

BUSINESS AFFILIATION

STREET

CITY

STATE (U.S. only)

MAILING ZONE

COUNTRY (OTHER THAN U.S.)

BUSINESS CLASSIFICATION DATA FOR THE ABOVE REGISTRANT:

YOUR COMPANY (CHECK ONE BLOCK)

AA Manufacturers of Paints, Varnishes, Lacquers, Printing Inks, Sealants

DD Sales Agent for Raw Materials and Equipment

EE Government Agency

BB Manufacturers of Raw Materials

FF Research Testing Consulting

GG Educational Institution Library

CC Manufacturers of Equipment and Containers

HH Paint Consumer

JJ Other

YOUR POSITION (CHECK ONE BLOCK)

KK Management Administration

PP Technical Sales Service

LL Manufacturing and Engineering

QQ Sales and Marketing

MM Quality Control

RR Consultant

NN Research and Development

SS Educator/Student/Librarian

TT Other

SPOUSES REGISTRATION AND INFORMATION FOR REGISTRATION BADGE:

D **SPOUSE** \$35.00

NICKNAME

NAME

ADDRESS

CITY

STATE

MAILING ZONE

COUNTRY (OTHER THAN U.S.)

SPECIAL FEE FOR THE SPOUSES OF RETIRED MEMBERS ONLY:

H \$25.00

TICKETS FOR FEDERATION LUNCHEON, FRIDAY, OCTOBER 21 (@ \$20.00)

Z **NUMBER REQUIRED:** _____
\$20.00 EACH.

A CHECK IN THE AMOUNT OF:

\$ _____

IS ENCLOSED

1988 Paint Industries' Show

Current List of Exhibitors

- AccuRate, Inc.
Aceto Corp.
Advanced Coating Technologies, Inc.
Advanced Software Designs
Air Products & Chemicals, Inc.
Alcan-Toyo America, Inc.
Alpine American Corp.
Ambrose Co.
American Cyanamid Co.
Amoco Chemical Co.
Angus Chemical Co.
Applied Color Systems, Inc.
Aqualon Co.
Arco Chemical Co.
Aries Software Corp.
Ashland Chemical Co., IC&S Div.
Atlas Electric Devices Co.
- B&P Environmental Resources, Inc.
B.A.G. Corp.
BASF Corp., Chemicals Div.
T.J. Bell, Inc.
Berol Chemicals, Inc.
Blackmer Pump Div., Dover Resources Co.
Bohlin Reoligi, Inc.
Brinkmann Instruments
Brookfield Engineering Labs., Inc.
Brookhaven Instruments Corp.
BTL Specialty Resins Corp.
Buckman Laboratories, Inc.
Buhler-Miag, Inc.
Bulk Lift International
Burgess Pigment Co.
Byk-Chemie USA
- C.B. Mills
Cabot Corp., Cab-O-Sil Div.
Calgon Corp., Div. of Merck & Co., Inc.
Cardolite Corp.
Cargill, Inc.
CasChem, Inc.
Catalyst Resources, Inc.
CDF Corp.
Chemical & Engineering News
Chemical Week
Chemolimpex, Hungarian Trading Co.
CIBA-GEIGY Corp.
Clawson Tank Co.
CL Industries, Inc.
Coatings Magazine
Colloids, Inc.
Color Corp. of America
Colorgen, Inc.
Columbian Chemicals Co.
Cook Resins & Additives
Cosan Chemical Corp.
Coulter Electronics, Inc.
CPI Purchasing
Cray Valley Products, Inc.
Crosfield Chemicals, Inc.
Cuno Process Filtration Products
Custom Metalcraft Inc.
Cyprus Industrial Minerals Co.
- D/L Laboratories
Daniel Products Co.
Datacolor
DataLogix Formula Systems, Inc.
Day-Glo Color Corp.
Degussa Corp.
University of Detroit
Disti Environmental Systems, Inc.
Dow Chemical USA
Dow Corning Corp.
Draiswerke, Inc.
Drew Industrial
DSA Consulting, Inc.
DSET Laboratories, Inc.
Du Pont Co.
- E.C.C. America
Eagle Zinc Co.
Eastern Michigan University
Eastman Chemical Products, Inc.
Ebonex Corp.
Eiger Machinery Inc.
- Elcometer, Inc.
Elmar Industries, Inc.
EM Industries
Engelhard Corp.
Epworth Manufacturing Co., Inc.
ERDCO Engineering Corp.
Expancel, Nobel Industries Sweden
Exxon Corp.
- Fawcett Co., Inc.
Federation of Societies for Coatings Tech.
Filter Specialists Inc.
Freeman Chemical Corp.
H.B. Fuller Co.
- GAF Chemicals Corp.
Paul N. Gardner Co.
Georgia Kaolin Co., Inc.
Goodyear Chemical Div.
W.R. Grace & Co., Davison Chemical Div.
- Halox Pigments, Div. Hammond Lead Prods
Henkel Corp.
Heubach, Inc.
Hi-Tek Polymers Inc.
Hilton-Davis Co.
Hitox Corp. of America
Hockmeyer Equipment Corp.
Hoechst Celanese Corp.
Horiba Instruments, Inc.
J.M. Huber Corp.
Hüls America Inc.
Hungarian Aluminium Corp.
Hunter Associates Lab., Inc.
- ICI Americas, Inc.
ICI Resins U.S. (Formerly Polyvinyl Chems.)
Ideal Manufacturing & Sales Corp.
Illinois Minerals Co.
Indusmin Inc.
Industrial Finishing Magazine
Itasco Industries Div., I.W.I., Inc.
ITT Marlow Pumps
- J&L Instruments Corp.
S.C. Johnson & Son, Inc.
- Kemira Oy
Kenrich Petrochemicals, Inc.
Kent State University
King Industries, Inc.
Kraft Chemical Co.
KTA-Tator, Inc.
- Labelette Co.
Leeds & Northrup
Liquid Controls Corp.
LogiCom, Inc.
The Lubrizol Corp., Diversified Prod. Group
- 3M
Macheth Div. of Kollmorgen Corp.
Magnesium Elektron, Inc.
Malvern Instruments Inc.
Manchem, Inc.
Manville Corp.
The McCloskey Corp.
McWhorter, Inc.
The Mearl Corp.
Mettler Instruments
Micro Powders, Inc.
Micromeritics Instrument Corp.
Mid-States Eng. & Mfg. Co., Inc.
Miller Paint Equipment, Inc.
Milton Roy Co.
Mineral Pigments Corp., Davis Colors
MiniFIBERS, Inc.
Minolta Corp.
University of Missouri-Rolla
Mitech Corp.
Mixing Equipment Co.
Mobay Chemical Corp.
Modern Paint & Coatings Magazine
Morehouse Industries, Inc.
Mozel Chemical Products Co.
Myers Engineering
- Netzsch Incorporated
Neupak, Inc.
Neville Chemical Co.
New Way Packaging Machinery, Inc.
NL Chemicals, Inc.
North Dakota State University
NYCO
- O'Brien Industrial Equipment
Ontario Research Foundation
ORB Industries, Inc.
- Pacific Anchor Chemical Co.
Pacific Micro Software Engineering
Pacific Scientific Co., Instrument Div.
Packaging Service Co., Inc.
Pfizer Pigments, Inc.
Phillips 66 Co.
Pico Chemical Corp.
Pioneer Packaging Machinery
Poly-Resyn, Inc.
PPG Industries, Inc.
PQ Corp.
Premier Mill Corp.
Progressive Recovery, Inc.
- Q-Panel Co.
- Raabe Corp.
Red Devil, Inc.
Reichhold Chemicals, Inc.
Renzmann Inc.
Reynolds Industries, Inc.
Rhone-Poulenc Inc.
Rohm and Haas Co.
Rosedale Products, Inc.
Russell Finex, Inc.
- Sandoz Chemicals Corp.
Sanyo-Kokusaku Pulp Co., Ltd.
Schold Machine Co.
Semi-Bulk Systems, Inc.
Serac, Inc.
Shamrock Technologies, Inc.
Sheen Instruments Corp.
Shell Chemical Co.
Sherex Polymers, Inc.
Sherwin-Williams Chemicals Co.
Silverline Manufacturing Co., Inc.
Sonoco Fibre Drum, Inc.
South Florida Test Service, Inc.
Spartan Color Corp.
Stone Container Corp., Bag Div.
Sub-Tropical Testing Service
Sun Chemical Corp.
Sylvachem Corp.
- Tammsco, Inc./Unimin Corp.
Tego Chemie Service USA
Texaco Chemical Co.
Thiele Engineering Co.
Tokheim Corp., Process Controls Div.
Troy Chemical Corp.
- U.S. Silica Co.
Unimin Corp./Tammsco, Inc.
Union Carbide Corp.
Union Process, Inc.
United Catalysts, Inc.
Universal Color Dispersions
Unocal Chemicals Div., Unocal Corp.
- R.T. Vanderbilt Co., Inc.
Velsico Chemical Corp.
Viking Pump-Houdaille, Inc.
Vorti-Siv Div. of M&M Machine, Inc.
- Wacker Silicones Corp.
Warren-Rupp-Houdaille, Inc.
Wilden Pump & Engineering Co.
Witco Corp.
- Zeelan Industries, Inc.

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

Spring 1988 Board of Directors Meeting

Thirty-four members and 17 guests attended the Spring Meeting of the Board of Directors of the Federation of Societies for Coatings Technology on May 20, 1988, in Orlando, FL.

The following were in attendance.

Officers

President Deryk R. Pawsey
President-Elect James E. Geiger
Treasurer John C. Ballard

Society Representatives

Baltimore Joseph Giusto
Birmingham Ray Tennant
C-D-I-C Lloyd Reindl
Chicago Richard M. Hille
Dallas Van Falcone
Detroit William Passeno
Golden Gate Barry Adler
Houston Donald Montgomery
Kansas City Norman Hon
Los Angeles Jan P. Van Zelm
Louisville Louis Holtzknecht
Mexico Antonio Pina
Montreal Horace Philipp
New England Maureen Lein
New York Saul Spindel
Northwestern Richard L. Fricker
Pacific Northwest Carlton R. Huntington
Philadelphia Carl W. Fuller
Piedmont James N. Albright
Pittsburgh Raymond Uhlig
St. Louis John Folkerts
Southern Berger G. Justen
Toronto Kurt R. Weitz
Western New York Thomas Hill

Other Members

Ronald R. Brown Southern
Carlos E. Dorris Dallas
L. Lloyd Haanstra Los Angeles
William F. Holmes Dallas
Terryl F. Johnson Kansas City
Joan B. Lamberg Northwestern
James A. McCormick Baltimore

Guests

Raymond Connor, Technical Director of National Paint & Coatings Association.

Federation Past-Presidents Neil Estrada, Howard Jerome, and John Oates. (Mr. Estrada is also Chairman of the Federation's Investment and Planning Committees; Board Members Carlos Dorris, Terry Johnson, and James McCormick are also Past-Presidents.)

Sidney Lauren, Chairman of Federation's Educational Committee. Chuck Reitter, Editor, *American Paint & Coatings Journal*.

The following Society Officers, who attended their meeting the previous day: Roger Blacker (New York); Nicholas Dispensa (Kansas City); Ken Espeut (Southern); Jim Ignatow (Houston); Jim Lore (Pittsburgh); Ilona Nemes-Nemeth (Cleveland); David Penrice (Birmingham); Cuauhtemoc Pereda (Mexico); Craig Schweiger (Rocky Mountain); Ernie Soldavini (Golden Gate); and David Todoroff (Western New York).

Staff

Rosemary Falvey, Director of Meetings & Conventions; Thomas A. Kocis, Director of Field Services; Patricia Viola, Editor, *JOURNAL OF COATINGS TECHNOLOGY*; and Robert F. Ziegler, Executive Vice President.

The report of the Fall 1987 Board of Directors Meeting was approved as published in the December 1987 *JOURNAL OF COATINGS TECHNOLOGY*.

Reports of Officers And Staff

PRESIDENT PAWSEY

The first half of my term of office has literally flown by, in a physical as well as in a figurative sense. Travel, as I had been forewarned, is a time consuming activity for Federation Presidents—especially if you reside on the West Coast. However, the rewards in meeting fellow Federationers and industry co-workers make it worthwhile.

This Federation year is somewhat unique because in addition to a new President, the Federation also has a new Executive Vice President. Fortunately, we both inherited an exceptionally well run, active, and fiscally sound organization from our respective predecessors and this has made the transition of duties relatively easy.



Representing their respective Societies are (left to right): William Passeno (Detroit), Van Falcone (Dallas), and Richard M. Hille (Chicago)

It has been my privilege and pleasure to visit six Society meetings since last October—Golden Gate, New England, Houston-Dallas Southwestern Paint Convention, Northwestern, Southern Annual Meeting, and the Pacific Northwest Symposium.

In January, I attended the annual meetings of our Investment-Finance-Executive Committees. In March, I chaired the annual Joint Paint Industry Coordinating Committee (JPICC) meeting in Philadelphia as this year was the Federation's turn to host this group of four trade associations (FSCT, NPCA, NDPA, and PDCA).

Liaison and relationships with other industry organizations is of prime importance to the success of many Federation endeavors. This is particularly true with respect to the NPCA because many of our members also belong to this association and are active in its affairs. To this end, EVP Bob Ziegler and I were invited to the NPCA's April Suppliers Committee meeting in Saddlebrook. We were given opportunity to explain the workings and activities of the Federation. Ongoing communication and dialogue such as this can only foster better mutual understanding of our respective organizations and enhance our dual abilities to serve the Coatings Industry.

On the international scene, it was my honor to represent the Federation as an invited guest at the Japan Society of Colour Materials (JSCM) 60th Anniversary Conference in Tokyo. Along with the Presidents from the other three major world technical organizations, FATIPEC, OCCA, and SLF, I addressed the delegates at the main session.

Attendance at Society or other trade organization functions is an extremely beneficial experience for Federation Officers. These meetings or conferences provide a forum for discussion that permits the exchange of knowledge, ideas, and experiences relative to our immediate concerns and long term goals. I firmly believe that from my travels I have gained a better understanding of the needs of our Societies and individual members and that these experiences have and will continue to assist me with my responsibilities.

The Federation continues to be a strong and creative organization thanks to all its many dedicated workers at the member and staff levels. Many of our committees are particularly active at this point in time and are achieving noticeable results with their respective projects. The ensuing staff reports detailing the status of current Federation affairs and activities will clearly demonstrate this.

Some of the immediate and continuing concerns facing us are those regarding the technical aspects of environmental regulations, the need to attract new graduates into our industry and our own membership recruitment requirements. With all the resources we can muster together as an organization we can and must succeed in these areas.

My sincere thanks are proffered to all the Societies and individual members for their gracious and generous hospitality during my visits to their meetings. I wish also to express my personal thanks to the Federation Staff and fellow Executive Committee members for their valuable help and support. They not only make my job easy but enjoyable.

DERYK R. PAWSEY,
President

PRESIDENT-ELECT GEIGER

President-Elect activities year-to-date have been to attend the following conventions, meetings, and award presentations.

National Paint & Coatings Association—Lynne and I attended the 100th Anniversary Meeting in Washington, D.C. I presented a plaque from the FSCT commemorating this event to their President. Bob Ziegler and I were guests at their Board of Directors meeting.

St. Louis Society Meeting—With staff, visited and spoke on Society events and activities.

Baltimore Herman Shuger Award Night—Represented the Federation at this event.

Rocky Mountain Society—With staff, visited Society at their monthly meeting and spoke on Federation Activities.

Ad Hoc Building Committee Meeting—Met with committee at Federation Headquarters and reviewed past data and revised real estate survey regarding site selection and cost estimates for proposed Federation Office Building.

Investment Committee, Finance, and Executive Meeting—Participated at Federation Headquarters and Mellon Bank of Philadelphia.

JPICC—Represented Federation at Joint Paint Industries Coordinating Committee. This was hosted by the Federation in Philadelphia.

Southern Society Annual Meeting—Represented the Federation in Charleston at their annual meeting.

Western New York Society—Updated Society on Federation business and activities in progress.

JAMES E. GEIGER,
President-Elect

TREASURER BALLARD

Treasurer activities year-to-date have been to attend the January Investment, Finance, Executive, and CIEF Committee meetings. Also, the *Professional Development Committee Meeting* held in Cleveland, and two Society visits with Detroit and New England and the JPICC meeting in March.

Finance Committee—Estimated income and expense statements for 1987 showed growth for the Federation. The projected 1988 budget shows income slightly less than 1987.

Investment Committee—The Federation's investment portfolio with the Mellon Bank, in light of the 1987 stock market fluctuation, will be adjusted from a presently higher percentage of equities to fixed income. The Investment and Finance Committees' joint recommendation to purchase a building/site for a permanent Federation headquarters in light of the Federation's financial position being strong enough to permit the expenditure of funds. This recommendation, along with the operating budget, will be presented to the Board at the Spring Meeting in Orlando.

Coatings Industry Education Fund—Interest accumulation is satisfactory, and three at-large Trustees were introduced at the January meeting to assist this financially sound committee into an operational posture.

Professional Development Committee—This highly visible Committee has had successful Statistical Process Control seminars in 1987, and based on the overwhelming success, have continued with a plan for 1988—three Level 1, and two Level 2 seminars. Also had a successful SPC seminar in Mexico City in early 1988. Excellent preregistration for the 1988 sessions has assured minimal financial burden on the Federation. The Committee plans a series of "Project Management" seminars aimed at the bench chemist conducted by AMA personnel.

Society Visits—With staff, attended the Pittsburgh Society meeting February 8 and the Detroit Society meeting on February 9 at which the Societies spelled out their proposed activities for 1988 and their financial condition. Both Societies appear to be sound financially, and several methods for improving revenues to the local Societies were discussed with the Executive Committees of both groups.

JPICC Meeting—Joint meeting between the NPCA, FSCT, NDPA, and PDCA held in Philadelphia March 29 and 30. The group discussed cooperation between the associations as a primary objective and the problems which affect all members of the group.

JOHN C. BALLARD,
Treasurer

EXECUTIVE VICE PRESIDENT ZIEGLER

1987 FINANCIAL STATEMENT

The final, audited report of income and expenditures for 1987 showed a total income of \$2,383,159 and expense of \$2,147,670. The Statement has been sent to the Board.

1988 BUDGET

The Executive and Finance Committees have approved the 1988 budget, which for the fourth year is above the \$2 million mark. The allocations, as budgeted are:

Income: Publications—36.3%; Annual Meeting & Paint Show—50.8%; Membership Dues—2.1%; Educational Activities—4.8%; and Miscellaneous—6.0%.

Expense: Federation Office/Administration—36.2%; Publications—26.6%; Annual Meeting & Paint Show—18.9%; Educational Activities—8.9%; Officer/Board Committees—8.9%; and Miscellaneous—0.5%.

PUBLICATIONS

JCT: Total pages published in 1987 were 1,228 compared to 1,120 in 1986. Despite a downturn in advertising during the first half of the year, a turn-around by year's end was evidenced by an 8% increase over 1986 advertising.

Year Book: The 1988 edition was mailed on time. We thank the Societies for the cooperation in providing rosters in a timely manner.

Series Units: A total of nine units have been published since the new series was introduced in 1986; five in the past year. Titles published so far are: Film Formation; Radiation Cured Coatings; Introduction to Polymers and Resins; Solvents; Coil Coatings; Corrosion Protection by Coatings; Mechanical Properties of Coatings; Automotive Coatings; Coating Film Defects. Three additional units have been approved and will be published this year: Application of Paints and Coatings; Organic Pigments; and Inorganic Pigments.

Our thanks to Series Editors Drs. Thomas Miranda and Darlene Brezinski, for their efforts in producing the New Series.

MEMBERSHIP

Although the 1988 Year Book shows a decline in membership from 7,254 in 1987 to 7,107 in 1988, due mostly from consolida-

tion of companies, recent applications boosted total membership to over 7,200 again. Overall, Societies with the highest percentage gains were Dallas (18%), Louisville (11%), and Piedmont (11%). Broken down by size of Society, the winning increases were made by Northwestern (7.5%), Piedmont (11%), and Dallas (18%).

ANNUAL MEETING AND PAINT SHOW

The 1987 AM&PS was another great success. Total registration was 7,180—the third largest ever (7,475 in Chicago, 1984; 7,240 in Atlanta, 1986). The Paint Show set a new record for exhibit space with 256 exhibitors in 63,730 net sq ft. In 1986 it was 242 exhibitors in 57,850 nsf.

Plans for the 1988 AM&PS are far along, and the Paint Show will again set a new record for exhibit space—69,425 nsf. All booth space was reserved by early February—the earliest in FSCT history.

COMMITTEE LIAISON

Staff continues to work closely with all committees, and in particular: Corrosion, Educational, Finance, Investment, Manufacturing, Planning, Annual Meeting Program, Professional Development, Publications, and Technical Advisory.

Following the success of the Statistical Process Control Seminar Series in 1987, the Professional Development Committee will sponsor the Project Management Seminar Series this summer (in San Francisco, Chicago, Philadelphia, and Orlando during May and June). The SPC Seminar Series was repeated with great success in Chicago, Cleveland, and Philadelphia this spring, and featured a second-level course. As in 1987, the course instructor was Dr. Peter Hunt.

SPRING WEEK

The fifth "Spring Week" of the Federation will be held May 17-20 in Orlando. Topic of the Seminar is "Coatings Defects: Their Causes and Prevention." Our thanks go to Joe Vona, Program Coordinator, for developing an outstanding series of presentations, and to Eastman Chemical Products Co. for hosting the reception for the Board of Directors for the third year.

TECHNICAL ADVISOR

Due to ill health, Roy Brown, FSCT Technical Advisor since 1982, resigned his position in November. We sincerely appreciate the work Roy has done to provide technical input to the Federation's many programs. His efforts have been uniformly successful. We wish him well in his recuperative period.



Berger G. Justen, of Southern; Kurt R. Weitz, of Toronto; and Thomas Hill, of Western New York

OFFICER/STAFF VISITS

Visits so far this administrative year, have been made to the monthly meetings of: Detroit, Golden Gate, Louisville (with CDIC Officers attending), New England, New York, Northwestern, Pittsburgh, Rocky Mountain, St. Louis, and Western New York. Also to the Southwestern Paint Convention, in Houston, the Southern Society Annual Meeting, in Charleston, SC, and the Pacific Northwest Society Symposium, in Vancouver.

The Federation was also represented at the Annual Awards Dinner of Baltimore Society, the Spring meeting of the NPCA Industry Suppliers Committee, in Tampa, the 60th Annual Meeting of the Japan Society for Colour Material, in Tokyo, and the Annual Meeting of Scandinavian Paint Federation, in Helsinki.

INSURANCE PROGRAM

Programs instituted so far, Hospital Indemnity and Group Life, have elicited small response from membership, with 9 and 10 participants, respectively. The administrator of the program is quite disappointed in the number of participants and expects, in time, that the insurer, CIGNA, will terminate the plan due to lack of participation.

STAFF

Although normally reported on in the Fall Report to the Board, I would like to thank the members of the Staff for their support and cooperation during the period of transition. They are: Sam Amicone, Audrey Boozer, Meryl Cohen, Rosemary Falvey, Victoria Graves, Tom Kocis, Dorothy Kwiatkowski, Lorraine Ledford, Linda Madden, Charles Schmidt, Mary Sorbello, Patricia Viola, and Kathleen Wikiera.

Charlie Schmidt, Assistant Treasurer, joined the Staff in December, and I thank him for his efforts in bringing the computer accounting programs on-line.

ROBERT F. ZIEGLER,
Executive Vice President

DIRECTOR OF FIELD SERVICES KOCIS

SEMINARS ON STATISTICAL PROCESS CONTROL FOR COATINGS

Another round of SPC seminars was held in March under the auspices of the Professional Development Committee, as a follow-up to the highly successful 1987 series.



Society Representative for Kansas City Society, Norman Hon; Representative for Houston, Donald Montgomery; and Representative for Golden Gate, Barry Adler

Level I (introductory), a repeat of last year's two-day seminar, was held in Philadelphia, Chicago, and Cleveland. A three-day Level II (intermediate) seminar was held at Philadelphia and Chicago immediately following the Level I presentations there. Again conducted by Dr. Peter Hunt, President of Productivity Management Consultants, the five seminars attracted a total of 245 registrants (116 members; 129 non-members).

The events were again very well received, with attendees expressing very positive and enthusiastic comments about Dr. Hunt's in-depth knowledge of the application of SPC to the paint making operation, as well as his manner of presentation and his ready availability for one-on-one discussions before and after sessions. Staff was again pleased to accommodate promotion, registration, housing, and on-site needs for the seminars.

(Dr. Hunt also conducted the Level I seminar in Mexico, March 4-5, on behalf of the Mexico Society. That event was equally well received by the 59 registrants who attended.)

COMMITTEE LIAISON

Corrosion—Committee met at Federation headquarters office on February 23. Procedures were developed for implementing Committee-sponsored award for best corrosion-related paper published in JCT each year; review sub-committee was formed to recommend papers for 1988 competition.

Speakers have been selected for full-day Committee-sponsored symposium on "Regulation and Its Effect on Corrosion Control" for presentation at 1988 AM.

Planning is underway for proposed session at 1989 AM on "New Approaches to Corrosion Evaluation."

Awaiting submission of formal report from Steel Structures Painting Council on "A Survey of Accelerated Test Methods for Anti-Corrosive Coatings Performance." Results of the survey were presented at 1987 AM; modified report is planned for publication in JCT.

Manufacturing—Committee held initial meeting under new Chairman in Chicago on March 2. Committee-sponsored seminar on "Productivity Measurement for Profitability in Coatings Manufacturing" will be presented at 1988 AM. Industry speakers will discuss measurement mechanisms currently in use, as well as new approaches. Tour of two Chicago-area coatings facilities is planned for Tuesday, October 18, in conjunction with 1988 AM; attendance would be limited to Committee members and Society Manufacturing Committee members.

Topic of "Managing for Quality and Excellence" was chosen for manufacturing seminar at 1989 AM.

Collection of articles to be reprinted for "Coatings Manufacturing Digest" is being compiled by Committee members. Digest is anticipated for completion in time for display at 1988 AM.

Program—Planning for 1988 AM programming began at organizational meeting of Committee held last October at Dallas Convention; follow-up discussions were held at subsequent meeting in Chicago on November 11.

The program schedule for this year's Annual Meeting will offer a full complement of presentations keyed to the theme, "Performance and Compliance: The Challenge Intensifies." Programming will focus on such areas as corrosion protection, aerosol coatings, "high tech" coatings research, and major regulatory issues affecting coatings formulation and manufacture.

Environmental—Committee-sponsored "Regulatory Update" newsletter began monthly publication in JCT in January. Advance copies of this digest of current regulatory developments impacting the coatings industry are distributed to key Federation/Society personnel to provide an early alert about matters of particular interest to them.

Educational—Reorganized Committee held initial meeting in Cleveland on April 26. Key discussion item was developing recommended procedures for presentation of career promotion video-

tape, "The Choice," to student groups. To assist in this effort, Committee members will each visit several high schools in their areas, to present the videotape, and distribute critique sheet to survey student reaction. This input will be reviewed and subsequently distributed to Society Educational Committee Chairmen (along with a suggested outline to follow when visiting schools to present the videotape) at meeting planned for this summer.

More vigorous promotion effort is being studied to encourage greater student interest/participation in Southern Society A.L. Hendry Award competition.

Annual update of "Guide to Coatings Courses" was published in January.

Technical Advisory—Committee met with Society Technical Committee Chairmen on November 17-18 in Detroit. Discussion focused on Society projects underway and work that might be undertaken. Special presentation by TAC members, Anatomy of a Successful Society Technical Project, emphasized key elements in getting projects underway and carrying them through to successful conclusion. A meeting highlight was a visit to nearby Wayne assembly plant of Ford Motor Co. to view their coatings operation; in a post-dinner presentation, a Ford staff scientist discussed various aspects of coatings-related research currently being conducted by the firm.

Compilation of reports on Society Technical Committee work appears in May JCT.

Professional Development—Committee met on November 9-10, in Cleveland, and February 8-9, in Atlanta. Arrangements have been completed for regional presentations (Chicago, San Francisco, Orlando, and Philadelphia) of seminar on Project Management for the Coatings Chemist. Speaker selected will develop presentation for specific coatings industry application, and visited several paint plants in Chicago area for first-hand input.

Committee sponsoring session at 1988 AM which will feature presentations on "cutting edge" research and technology for coatings.

Topic selected for next seminar/workshop offering is analytical techniques, which will focus on practical applications to everyday problems.

Joint Coatings/Forest Products—Committee met at U.S. Forest Products Laboratory in Madison, WI, on April 4. Developed priority list of research projects for undertaking by Forest Products Lab: prevention of extractive bleeding; finish application for smooth and saw-textured surfaces; and mildew resistance of coated wood substrates.

MISCELLANEOUS

Staff support provided for publicity, programming, and on-site arrangements for Spring seminar on "Coatings Defects: Their Prevention and Cure." . . . Liaison and support also provided for activities of Inter-Society Color Council, Roon Awards, AP&CJ Awards, and MMA Awards Committees . . . Continuing to assist Advisory Board in development of booklets in new Series on Coatings Technology . . . Annual update of "Talks Available to Constituent Societies" being readied for publication.

THOMAS A. KOCIS,
Director of Field Services

Coatings Industry Education Fund

The Trustees of the CIEF met on Thursday, January 28, 1988 at the Federation offices in Philadelphia. Present were Trustees John Ballard, Neil Estrada, Loren Hill, Sid Lauren, Colin Penny, George Pilcher, and FSCT Executive Vice President Bob Ziegler.



FSCT Past-President Carlos E. Dorris; Executive Vice President Robert F. Ziegler; and President Deryk R. Pawsey

Absent was Trustee John Hall. Joseph Koleske had resigned as a Trustee upon his retirement earlier in the year.

Work continues on revision of the CIEF By-Laws and a draft will be circulated to the Trustees for approval in time for review by the By-Laws Committee prior to the Spring Meeting in Orlando. The approved version will be presented to the CIEF Stockholders for approval at that time.

At the 1987 Dallas Meeting, the Stockholders asked the enlarged Board of Trustees to re-evaluate the proposal to fund Professorships at qualified universities. This subject was discussed at length by the Trustees and it was agreed to request the Executive Committee to reconsider the proposal. Sid Lauren and Loren Hill will work on details of the proposal to be submitted to the Executive Committee. Income from the Federation investment funds (even if the purchase of a site proceeds) is adequate to fund an initial professorship. Additional funds can be solicited from industry and Federation Societies. Such a program meets the objectives of the CIEF and would also serve the Federation objective "to promote educational activities."

No formal request for FSCT/CIEF support financially for the NSF-sponsored Cooperative Industry/University Research Center had been received at the time of our meeting. The expressed opinion of the Trustees was that FSCT/CIEF financial support could not be provided because research results would be restricted to industry sponsors.

The Executive Committee had referred the Planning Committee's recommendation on a Memorial Fund to the CIEF for consideration. The untimely death of Trustee Joe Vasta has resulted in some 48 contributions to the CIEF (approximately \$1800) in his memory.

George Pilcher will meet with Mrs. Vasta, who has shown interest in establishing a scholarship in Joe's memory, to investigate further funding. The CIEF can contribute a limited amount also, but a nominal grant from the FSCT would insure such a plan.

It was noted that the Board of Trustees neglected to elect officers for 1988 at their regular meeting of October 5 in Dallas. A special meeting of the three Trustees who were present at that time (Vasta, Estrada, Geiger), who constituted a quorum, was held that evening and voted to continue the current officers in their same positions. After discussion, the Trustees agreed to confirm the officers so selected, with George Pilcher dissenting.

NEIL S. ESTRADA,
President, CIEF Trustees

[At the Board meeting, Mr. Estrada advised that Mr. Vasta's former employer, E.I. du Pont de Nemours & Co., Inc., Wilmington, DE, recently contributed \$10,000 to the Vasta Fund.]

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 of October 7, 1987 and January 29, 1988 were included with the minutes mailed previously to Board members. The actions of May 19, 1988 were read to the Board. All actions were approved by the Board at this meeting of May 20.]

OCTOBER 7, 1987

That staff contact the Federation's real estate consultant to provide information updating the 1982 report regarding the cost and availability of real estate in the Philadelphia area.

That \$104,850 be appropriated to Federation Committees (67700) in 1987-88; \$20,000 to the Educational Committee (75000); and \$15,000 to the Professional Development Committee (68000).

That the following staff appointments be approved: Patricia Viola as Editor of the JOURNAL OF COATINGS TECHNOLOGY; Kathleen Wikiera as Assistant Editor; and Victoria Graves as Coordinator of Meetings and Conventions.

That staff salaries for 1988 be set at \$396,400.

JANUARY 29, 1988

That the estimated statement of income and expense for 1987 be approved. (Income—\$2,323,400; Expense—\$2,140,400).

That the Executive and Investment Committees both separately and jointly agree that the Federation's financial position is strong enough to permit the necessary expenditure of funds to purchase a building/site for the Federation headquarters office up to a given dollar amount.

That, based on guidance from professional sources, the Executive Committee and Staff agree that, at this point in time, it would be a good and financially expedient move for the Federation to purchase property.

That the Materials Marketing Associates and the *American Paint and Coatings Journal* be respectfully requested to increase the amount of their Annual Meeting awards to \$1,500 and \$1,000, respectively.

That the Federation respectfully decline the invitation to participate in the National Science Foundation Coatings Research Center.

That the registration fees for the Professional Development Committee-sponsored seminar on "Project Management" be set at \$225 for members; \$375 for non-members.

That the nomination of Elder C. Larson to Federation Honorary Membership be approved and referred back to the Houston Society for membership vote.

That the nomination of Michael W. Malaga to Federation Honorary Membership be approved and referred back to the Cleveland Society for membership vote.

That the Federation Staff use its own discretion in the expansion of the headquarters computer facilities.

That the Federation discontinue production of the Color-matching Aptitude Test Set.

That the recommendations of the Investment and Finance Committees be approved, along with the Operating Budget for 1988: Income—\$2,230,300; Expense—\$2,226,050.

MAY 19, 1988

That the Birmingham Club's request for reimbursement of the Club's Representative's travel expenses to the Fall Meeting of the Board be respectfully denied.

That the Planning Committee study the need for a Federation Technical Advisor.

That the By-Laws Committee be requested to amend the Duties of the Planning Committee, deleting duty #1, "Make plans for the personnel requirements of the Federation," and revising the sentence, "The Planning Committee shall report to the Executive Committee and shall meet twice a year, at the time of the Spring and Fall Board Meetings" to delete the italicized passage.

Society Business

Mexico Society

Society Representative Antonio Pina reported on the very successful seminar on Statistical Process Control for Coatings held by the Society, in conjunction with the Professional Development Committee, near Mexico City, March 4-5.

At its Spring 1987 meeting, the Board approved a subsidy up to \$2,000 to the Society to cover expected losses from the seminar. Mr. Pina reported that, happily, this subsidy will not be required. In fact, seminar income exceeded expenses by \$2,152.

Mr. Pina expressed both the Society's gratitude to the Board for its assistance, and its hope that similar events can be held by the Society in the future.

Pacific Northwest

Society Representative Carlton Huntington reported on the Society's successful Annual Symposium, held in Vancouver, April 28-30. Attendance was 278.

Mr. Huntington announced the availability of the Society-produced video on "Safety in Coatings Manufacture." The video, produced by the Vancouver Section, details the various safety hazards associated with coatings manufacture. It is available from the Society, and will be publicized by the Federation.

New England

Society Representative Maureen Lein reported on the Society's Coatings Tech Expo, held in Boxborough, MA, May 11-12. With over 350 attendees and all exhibit space used, the event was a great success.

Ms. Lein also brought to the Board's attention the increasing difficulty of procuring liability insurance by the Society. She requested information from Societies which have successfully gained liability insurance.

[The New York Society offered to provide liability insurance information. This was subsequently received and will be distributed to the Societies.]

Report of Ad Hoc Committee On FSCT Office/Building

[The following report of the Ad Hoc Building Committee was sent to all Board members and Society Presidents on February 23. In addition, copies of the October 4, 1987 report and the 1982 report showing "buy vs build" comparisons were forwarded.]

The Executive Committee and Investment Committee agreed at the January meeting in Philadelphia, that the financial position of the Federation was sufficient to allow purchase of an office building.

The Executive Committee agrees that now would be a good and financially proper time for the purchase of office property.

H. Bruce Thompson, Jr. and Associates, Inc. a Real Estate Appraisal and Counseling firm, has compiled an office market

survey covering Philadelphia Western Suburbs, Airport, and Center City areas.

In general, suburb costs for a 10,000 square foot building either purchased or constructed would range from \$900,000 to \$1,500,000.

In Center City, within our size parameter, buildings are difficult to obtain unless a Condominium is considered. Prices range from \$1,200,000 to \$1,750,000. Remodeling would probably also be necessary on any existing building purchased.

The 1988 Annual Budget is \$2,200,000. Holding 35% in contingency reserve, \$770,000, would leave \$830,000 available for a "Building Fund." (\$1,600,000 - \$770,000 = \$830,000).

Keep in mind that mortgage funds are available to the Federation and it would probably be a prudent move to use such funds.

The 1989 annual rent at our current building will be approximately \$100,000. This will escalate at 4% per year during the five year lease period, to \$120,000, should we elect to lease rather than purchase.

Please discuss purchase of an office building with your respective Societies and be in a position to vote on whether or not the Federation should pursue this venture. It has been recommended that this vote be a recorded vote of only Societies and that an affirmative vote from 20 of the 26 Societies be required for passage. This is a big step and one of the most important decisions the Federation Board of Directors will have to make. *Please come prepared.*

JAMES E. GEIGER,
Chairman

Mr. Geiger and former Chairman, Deryk Pawsey, re-capped the Committee's activities for the Board, and noted the Executive Committee's position as being in favor of a permanent headquarters site.

Mr. Justen made the following motion: "That the Federation should proceed, in principle, to purchase or build an office building for its headquarters, and that approval be given to the Executive Committee to develop specific acquisition details for Board approval." Seconded by Mr. Passeno.

In discussion, the following points were brought before the Board:

- (1) *A study should be made to determine the effects of such an acquisition on the Federation's income and expense statement.*
- (2) *Consideration should be given as to how such an acquisition may effect prospective funding of CIEF projects.*
- (3) *Because of its status, there will be no tax advantage to the Federation in owning its headquarters.*
- (4) *Does the purchase of property meet with current Federation objectives?*
- (5) *To obviate all questions regarding the legality of the vote, all Board members should participate rather than just the Society Representatives as proposed by the October 4, 1987 Committee report approved by the Board in Dallas. (This was agreed to by consensus, and all members voted on the motion.)*

The vote, recorded by member, was made, with the motion approved 33 to 1 (St. Louis voting negative), with two abstentions (Messrs. Johnson and Holmes). Both Cleveland and Rocky Mountain Societies voted by proxy.

Mr. Pawsey dismissed the Ad Hoc Committee with his thanks, and announced the formation of a new Ad Hoc Building Committee with the charge to develop building and site specifications and acquisition details for Board approval.

Mr. McCormick moved that the Chairman of the committee be the 1988-89 President (Mr. Geiger), that the 1987-88 President (Mr. Pawsey) occupy the Past-President position on the committee, and that the remainder of the committee be designated as determined by the Chairman, with emphasis on Federation Past-Presidents. Seconded by Mr. Adler, and approved.

By-Laws

ADOPTED

Nominating Committee Report

(The following amendment to By-Laws Article IV, A(2) was approved at its second reading.)

Commentary

By-Laws Article IV, A(2) states that the report of the Nominating Committee shall be announced at the Spring Board of Directors meeting. It also provides for nominations for any elective office from the floor by any Society Representative at the Spring Board meeting, or by petition signed by 25 Voting Members and submitted to the Federation Office in time for publication in the August JCT (June 15).

Based on a review last Fall of the By-Laws, the By-Laws Committee concluded that announcement of the proposed slate of officers *before* rather than *during* the Spring Board meeting would be preferred. This would allow the Society Representatives sufficient time to duly consider the nominees and discuss the proposed slate with their Society Board of Directors. Therefore, the following amendment is recommended.

Be it RESOLVED that the first sentence of By-Laws Article IV, A(2) be revised to read:

BY-LAWS ARTICLE IV

A. NOMINATIONS

(2) The report of the Nominating Committee shall be mailed to the Board of Directors at least 30 days before their Spring meeting.

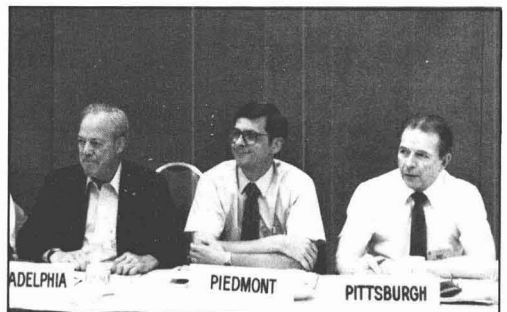
Nominations

The Nominating Committee placed the following persons in nomination for office with terms to become effective October 21, 1988:

President-Elect: John C. Ballard, of Louisville Society (Kurpees Coatings, Inc.). One-year term. He is currently Treasurer.

Treasurer: Kurt F. Weitz, of Toronto Society (Indusmin Div., Falconbridge). One-year term.

Executive Committee: Thomas Hill, of Western New York Society (Pratt & Lambert, Inc.). Three-year term; Richard Hille, of Chicago Society (General Paint & Chemical Co.). One-year term (to fulfill the term of Treasurer-Nominee Kurt Weitz).



Representing their respective Societies are: Carl W. Fuller (Philadelphia), James N. Albright (Piedmont), and Raymond Uhlig (Pittsburgh)



Membership Committee Chairman Horace Philipp (second from right) awarded Certificates of Appreciation for best percentage of increase in Society membership. Accepting for their respective Societies were Van Falcone (Dallas), James N. Albright (Piedmont), and Joan B. Lamberg (Northwestern)

Board of Directors (Members-at-Large): Adrian Adkins, of Golden Gate Society (Clorox); George R. Pilcher, of CDIC Society (Hanna Chemical Coatings Co.). Two to be elected; two-year terms each.

(Mr. Adkins, nominee for Board Member-at-Large, has relinquished the nomination due to employment conflicts. Thereupon, the Committee nominated Ms. Patricia Shaw, of the Golden Gate Society, for the position.)

Board of Directors (Past-President Member): John J. Oates, of New York Society (Troy Chemical Corp.). Two-year term. There were no nominations from the floor.

Elections will take place during the Board of Directors Meeting on October 18, 1988, in Chicago.

Members of the Nominating Committee are: Past-President Ter-ryl F. Johnson, and Society Representatives James N. Albright, Jr., Donald R. Montgomery, and Raymond C. Uhlig.

CARLOS E. DORRIS,
Chairman

New Business

PAINT INDUSTRIES' SHOW

Member-at-Large Joan Lamberg noted that since our organiza-tion is named the Federation of Societies for *Coatings* Technol-ogy, and our monthly publication is the *Journal of Coatings Technology*, that, in keeping with our image and the image of the industry, consideration be given to rename the Paint Industries' Show to the *Coatings Industries' Show*.

[The Board referred the request to the Executive Committee for consideration.]

AWARD CERTIFICATES TO SOCIETY MEMBERSHIP CHAIRMEN

Federation Membership Services Chairman Horace Philipp pre-sented Certificates of Appreciation to Representatives of the Northwestern, Piedmont, and Dallas Societies for their exemplary increases in membership during the past year. The Northwestern Society increased its membership by 7.5%, Piedmont by 11%, and Dallas by 17.6%.

Committee Reports

ANNUAL MEETING PROGRAM

The organizational meeting of the 1988 Annual Meeting Pro-gram Committee was held on November 11, 1987 and included in its membership four current FSCT committee chairmen. The

Chairmen of the Professional Development, Corrosion, Manufac-turing and Roon Awards Committees, through their respective committees, are significant contributors to the quantity and quality of programming at this year's Annual Meeting.

Reinforcing this year's timely theme, "Performance and Com-pliance: The Challenge Intensifies," will be a full day session on The Effects of Regulation upon Corrosion Control (Corrosion Committee), a half-day session on Advanced Topics in Coatings Research (Professional Development Committee), a half-day ses-sion on Productivity Measurement (Manufacturing Committee), as well as a large selection of quality coatings research work that has been submitted for Roon competition.

Directly addressing this year's theme, will be a half-day update/overview on toxic materials regulation. Of special focus, will be California's enacted Safe Drinking Water and Toxic Enforcement Act, Target Organ Labeling, and similar "Right-to-Know" regu-lations. A second themed session undertaken directly by the Com-mittee, is in an area that has been largely overlooked in Annual Meeting programming—Aerosol Coatings. Expert presentations will address in depth, the technical idiosyncracies of aerosol coat-ings, including product formulation, container technology, appli-cation of SPC, and safety issues.

A general "call for papers" has netted over a dozen quality studies of the nature that have allowed the planning of three half-day sessions focusing in on automotive coatings, VOC compliant resin technology, and advancements in epoxy resin technology. Between these papers, and those being considered for the Roon competition, submissions from *eight different universities* will most likely be appearing on our fall program agenda.

With the addition of expected Society and overseas papers, our 1988 Annual Meeting Technical Program is quickly taking shape, and will most certainly be of the variety and quality that has become a standard of excellence and source of pride for the Federation.

RICHARD M. HILLE,
Chairman

EDUCATIONAL

Sidney Lauren, new Chairman of the Committee, made a verbal report: Copies of "The Choice" video have been distributed to all Societies and Sections which have requested it. In addition, the video was shown at the recent meeting of the NPCA Scientific Committee. The committee's reaction to the video was very favor-able, and the committee suggested that a second video promoting the coatings industry to college students be produced. The Educa-tional Committee will consider the suggestion.

Among the committee's priorities will be the active promotion of the Alfred L. Hendry Awards. Societies will be solicited to promote the awards locally.



FSCT President-Elect James E. Geiger (Southern), Treasurer John C. Ballard (Louisville), and Mr. Philipp (Montreal)



Maureen Lein (New England), Saul Spindel (New York), and Richard L. Fricker (Northwestern)

ENVIRONMENTAL CONTROL

The Committee has approved the Executive Committee recommendation to change the name to "Environmental Affairs" Committee, to more closely identify the scope of its activities and areas of responsibility.

Committee members are pleased with the "Regulatory Update" newsletter, which began publication in the *JCT* in January.

Overall, the material published in the "Regulatory Update" is consistent with that envisioned by the Committee.

The following are suggested to improve the service:

- (1) Expand coverage, which now focuses on national (U.S.) regulatory developments, to reflect the growing activity at the state level, beyond California (e.g., Arizona, New York, Texas).
- (2) Include coverage of regulatory activity in Canada.
- (3) Earlier notification of impending regulations, to provide further lead time to prepare for hearings, implementation, etc.

ROBERT E. MINUCCIANI,
Chairman

INTER-SOCIETY COLOR COUNCIL

The Committee will propose to the Executive Committee that the Federation sponsor a Symposium on Color and Appearance Instrumentation (SCAI) to be held in the Spring of 1990.

The Committee will meet in Baltimore on May 9, 1988, to start working on the details.

RALPH STANZIOLA,
Chairman

MANUFACTURING

The Manufacturing Committee met briefly in Dallas following the Annual Meeting and Show to begin planning for 1988 and to fill open Committee positions. The full Committee held its annual spring meeting on March 2, 1988 in Chicago. We had an excellent turnout and actively covered an extensive agenda.

We reviewed/critiqued our Committee's presentation in Dallas aided by the audience response cards passed out at the seminar. A computer analysis of the responses and of topics of future interest was conducted by former Committee member, Robb Hogg.

Based on previous audience responses, we had picked a topic for this year's seminar at the Annual Meeting in Chicago. The topic for the Manufacturing Committee's 1988 presentation will be "Productivity Measurement in Coatings Manufacturing." The format decided upon was to have three speakers cover this topic from both the academic standpoint and from a review of actual

case studies in our industry. Since we had no response to our formal "call for papers," our Committee members are working on a slate of speakers for the seminar.

After reviewing a number of qualified candidates for the Morehouse Industries "Golden Impeller Award," we unanimously decided upon a person we felt was well deserving of this award. We forwarded our recommendation to Mr. Dale Morehouse and are awaiting his response.

The Manufacturing Committee is also planning a plant tour in conjunction with the 1988 Annual Meeting and Show. The tentative tour will be of General Paint & Chemicals' Blackhawk facility and Rustoleum's Chicago facility on Tuesday, October 18, 1988.

We are still working on the Coatings Manufacturing Digest and hope to be in a position to publish the first edition in time for this Fall's activities in Chicago. A request for an extension of previously allotted funds for this project had been forwarded.

The Manufacturing Committee is dedicated to improving operations throughout the industry and in aiding local Societies in whatever way possible. We have very eager and capable Committee members, we have the full cooperation of the FSCT Staff, and we are committed to doing everything possible to meet our responsibilities.

JOSEPH P. WALTON,
Chairman

MEMBERSHIP SERVICES

In order "to encourage and assist the Constituent Societies," the latest list of NPCA members was examined and the names of those companies not represented in the Federation distributed to the nearest Societies for follow-up action.

The method of eligibility for awarding Certificates of Appreciation was modified by adopting the categories of sizes used for the MMA Awards. Latest figures of Constituent Society Memberships were used in compiling the results. From the three categories, the Societies with the largest per cent increases in membership are:

Category 1—Northwestern	(+7.5%)
Category 2—Piedmont	(+11.0%)
Category 3—Dallas	(+17.6%)

Honorable mentions should go to the following Societies:

Category 1—Cleveland	(+4.3%)
Category 2—Louisville	(+10.6%)
Montreal	(+9.4%)
Category 3—Western New York	(+7.4%)

Since the dissemination of names of non-members registrants at the 1987 AM & PS to the Societies, only six replies have been received. Continued efforts by members of this Committee in the geographic segregation of names of non-FSCT attendees at symposia and seminars sponsored by the Federation, Societies, and



Federation Past-President Terry Johnson (Kansas City) joins William Holmes (Dallas) and Ms. Lamberg



Birmingham Representative Raymond Tennant, Baltimore Representative Joseph Giusto, and Mr. Dorris

academia can only be effective if pursued by Society Membership Chairpersons.

HORACE S. PHILIPP,
Chairman

PROFESSIONAL DEVELOPMENT

Since the last Board of Directors' meeting, the Professional Development Committee has met twice: on 9-10 November in Cleveland, and on 8-9 February in Atlanta. Highlights of our current and projected activities include:

Repeat sessions of the SPC Level I workshops were held as follows: 4-5 March in Mexico City; 14-15 March in Philadelphia; 21-22 March in Chicago; and 28-29 March in Cleveland. All sessions were sold-out, and we needed to raise the maximum attendance levels to accommodate the high interest in these workshops.

The first set of SPC Level II workshops in Philadelphia on 16-18 March, and Chicago on 23-25 March. Both sessions were sold-out.

Tom Kocis will prepare and distribute a follow-up survey for attendees at both Level I and II, similar to what was done in 1987.

We had a very successful first outing at the Annual Meeting and Paint Show with a seminar entitled "Tools for Professional Success in the Coatings Industry." Attendance averaged 175, and transcriptions of the talks have been used to prepare an article, written by Dr. Richard Himics and Gretchen McKay, for submission to JCT.

A new series of workshops were scheduled for 1988, entitled "Project Management for the Coatings Chemist." These will be presented by Mr. Stanley Portny, in affiliation with AMA, and will be specifically tailored to the coatings industry. Due to the specific request of the Golden Gate Society, locations were expanded to include the West Coast, and the finalized schedule is as follows: Chicago, 9-10 May; San Francisco, 6-7 June; Orlando, 13-14 June; and Philadelphia, 20-21 June.

This seminar/workshop will be similar in design to the SPC series, and will be aimed at helping the bench chemist and his immediate supervisor manage a multiplicity of small and medium-range projects. Fees will be \$225 for members and \$375 for non-members, for the two-day course. "Overflow" dates have been scheduled in the event that we are over-subscribed, as happened with SPC Level I last year.

A symposium will be presented at the Annual Meeting and Paint Show in Chicago, which will deal with "cutting edge" concepts within our Industry. This will be developed and chaired by Dr.

Richard Himics, and will be presented with content and quality uppermost in mind; we do not necessarily anticipate large attendance figures.

The Chairman of the Committee wrote an editorial on our purpose and progress for the November 1987 issue of JCT.

For the Committee's next major project area (tentatively scheduled for 1989), we are investigating a lecture seminar, followed by publication in book form, in the area of practical analytical resources, and their usefulness to the coatings industry. This would be aimed at the typical coatings chemist, not the analytical specialist, in an effort to assist him in determining where to turn when he has a practical problem that can be solved through an analytical technique. Our working title is "Modern Analytical Resources: The Paint Chemist's Ally."

The committee is pleased by the progress we are making, and the helpful suggestions which we have received. We encourage everyone to let us know what they want in the way of future projects; we are listening and we value your suggestions.

GEORGE R. PILCHER,
Chairman

[At the Board meeting, Mr. Hille, a member of the Committee, reported on the Committee's meeting the previous day. He advised that the Committee has accepted the invitation to develop its Analytical Resources Seminar for presentation at the FSCT Spring Seminar in Los Angeles, May 16-17, 1989.]

PUBLICATIONS

A meeting of the Publications Committee was held in Detroit on March 23, 1987.

The following were discussed:

Membership on the Editorial Review Board. A number of replacements were announced to bring the Board up to the level needed for handling manuscripts.

Technical paper supply is low. A number of steps will be taken to improve this including contacts to potential authors, symposium participants, and solicitations by Committee members.

Society Papers. The quality of technical papers from the Societies have improved. We plan to give them more recognition.

Roon Awards. We plan to recommend that the Roon Chairman be in office for two years so that continuity can be established.

JCT Features. These were reviewed. The staff was complimented on the cover art and the general appearance of the JCT. "Humbug," "Regulatory Update," and "CrossLink" features continue to be popular.

Federation Monographs. There are nine in print and three expected shortly. Followup with authors is ongoing.

Dr. Darlene Brezinski reported that the Infrared Book is being rewritten.

The Chairman expressed his appreciation to the members of the Staff, the Editorial Review Board, and the Publications Committee for their continued support.

THOMAS J. MIRANDA,
Chairman

TECHNICAL ADVISORY

The Technical Advisory Committee and the individual Society Technical Committee representatives attended a meeting in Detroit, November 17-18th, 1988. Present were Technical Advisory Committee members John Hall (Chairman), John Flack, and Gerry Noren, together with Tom Kocis, FSCT Director of Field Services and Pat Viola, Editor of JOURNAL OF COATINGS TECHNOLOGY, and representatives from 18 Societies. Guests in attendance were Jay Austin, Chairman of the FSCT Corrosion Committee, and Charles Leete, President, Collaborative Testing Services, Inc.

The technical activities of the member Societies over the last ten years were contrasted in some detail. The important parameters seemed to be the role of key individuals (e.g., the Chairman), the commitment of certain paint companies/suppliers, rather than the actual size of the Society or its Technical Committees. The role of the Federation both in recognizing the contribution of individuals at the Annual Meeting, and widely publicizing the final article in the JCT, were also felt to be extremely important.

The meeting then continued with the usual reports from the individual Society representatives and a tour of the Ford Motor Company's Wayne Assembly Plant. An amusing post-dinner presentation was given by Dr. John Gerlock, Staff Scientist at Ford's Scientific Research Laboratories who discussed various aspects of coatings related research currently being conducted there. Charles Leete also gave a presentation during the course of the two-day meeting on the FSCT-sponsored Laboratories Proficiency Testing Program: Interpreting Interlaboratory Test Results.

At the Dallas Paint Show a total of six Society papers were presented (Dallas, Golden Gate, Montreal, Northwestern, Philadelphia, and Southern), the highest since 1983. The A.F. Voss/*American Paint & Coatings Journal* Awards were given to the Montreal, Southern, and Northwestern Societies.

J. E. HALL,
Chairman

TECHNICAL INFORMATION SYSTEMS

The Committee compiled the Subject Index to the 1987 JOURNAL OF COATINGS TECHNOLOGY (JCT), published in the December 1987 issue of the JCT.

Currently the Committee is preparing a similar index for the 1988 issues of JCT.

HELEN SKOWRONSKA,
Chairman

NEXT MEETING

The next meeting of the Federation Board of Directors will be held on Tuesday, October 18, 1988, 9:00 a.m., at the Chicago Hilton Hotel, Chicago, IL.

Hazardous Waste Cleanup Costs, Production Examined in Study, Survey Conducted for CMA

A new study conducted for the Chemical Manufacturers Association (CMA), Washington, D.C., indicates that the chemical industry's costs for cleaning up inactive waste sites and continuing releases from its solid waste management units could increase dramatically in the future.

The study, conducted by the consulting firm Engineering Science, defines a range of potential cleanup costs under the federal Superfund waste-site cleanup program and costs to the chemical industry for the corrective action program of the Resource Conservation and Recovery Act (RCRA).

Cleanups under the most stringent interpretations of the Superfund Amendments and Reauthorization Act (SARA) could increase Superfund cleanup costs as much as six-fold. The industry's costs under the RCRA corrective action program—if the U.S. Environmental Protection Agency (EPA) applied the most stringent SARA-type requirements and remedies to all solid waste management units requiring investigations and remediation—could be 6.5 times higher than costs under the program without applying SARA-type standards.

The study's Superfund analysis shows that, based on 536 existing Superfund sites that could be immediately impacted by SARA, the most rigid cleanup scenarios could cost the nation \$27 billion more than its costs under the existing National Contingency Plan, which establishes rules for

cleaning up sites on EPA's National Priority List.

If the number of sites on EPA's priority list grows to 2,000 within the next four years—EPA is expected to add 1,600-2,000 sites in that time—Superfund cleanup costs could increase as much as \$111-\$133 billion. That projection does not include the potential costs of cleaning up federal facilities.

An alternative remedy—incinerating "hot spots," containing some waste on the site and treating groundwater—could save as much as \$79 billion in cleanup costs. That type of remedy, applied where it is protective of human health and the environment, allows some waste to remain in place if that waste is rendered immobile or less toxic.

The study's analysis of the RCRA corrective action program's impact on the chemical industry took into account the fact that EPA is currently preparing its corrective action rule. In that rule, the agency is expected to maintain some consistency between the RCRA and Superfund programs.

Based on two data bases that identify the need for remediation at 5,900 and 5,300 chemical industry solid waste management units, respectively, estimated costs prior to implementation of SARA-type cleanups range from \$6.6 billion to \$11.1 billion. According to the study, should EPA apply

the most stringent remedies—extensive incineration and groundwater treatment and monitoring—chemical industry costs could range from \$39 billion to \$65 billion. In contrast, use of remedies that reduce the mobility, toxicity, and volume of waste would likely range from \$16 billion to \$27 billion—a 2.5-fold increase over earlier costs.

The RCRA study was only for the chemical industry; other industries costs are not included. The total industry cost for the corrective action program could equal the cost of the Superfund program.

The study concludes that any of the post-SARA remediation scenarios that were analyzed would be protective of human health, as defined by EPA.

Hazardous Waste Survey

The sixth annual CMA Hazardous Waste Survey of U.S. chemical plants found that the 221 facilities studied during the time period 1981-86 reduced their generation of solid hazardous waste by 56%. The survey, conducted by the environmental consulting firm Tischler/Kocurek, found that plants also reduced the volume of hazardous wastewater generated during the six-year time period by nearly 10%.

The total number of plants studied in the latest survey was 529. Facilities in the survey included plants operated by 33 of the 50 largest domestic chemical producers. The survey analyzed the hazardous waste management practices of all 529 chemical plants reporting in 1986, as well as trends among the 221 chemical facilities reporting for the years 1981-86.

The 529 plants surveyed produced 220.5 million tons of hazardous waste. Most of that volume—98% (or 216.2 million tons)—was wastewater which was treated to clean water standards and discharged under federal permits.

The remaining 2% (or 4.3 million tons) was solid hazardous waste. The survey found that 70% of this was recycled—five times as much as was landfilled. The other 30% was either treated or disposed of by incineration (40%), landfilled (22.3%), put into surface impoundments (22.2%), injected underground (1.7%), or treated and disposed of by other methods (13.8%).

The amount of hazardous waste landfilled has decreased 65% since 1981. Trends show an increase in incineration from 13.3% to total volume in 1981 to 43.3% in 1986.

Union Carbide and GE Reach Silicone Agreement; Elocar Co. to Build Polymer Powder Facility

An agreement was reached on May 18 to combine the silicone businesses of Union Carbide Corp., Danbury, CT, and General Electric Co., Fairfield, CT, into a new joint venture company. GE-Carbide Silicones, Inc., will be headquartered in Waterford, NY.

Philip M. Gross, currently Vice President and General Manager of GE Silicones, has been designated President, and James F. Flynn, Vice President and General Manager of the silicones business in Union Carbide's Specialty Chemicals Division, has been named Executive Vice President of the joint venture.

In other news, Elocar Co., a joint venture of Union Carbide and Swiss Polymers,

Inc., announced it will construct a new facility to manufacture spray-dried Elotex® redispersible polymer powders at a site in Garland, TX. Swiss Polymers is the U.S. affiliate of Elotex AG, Switzerland.

Technology for the powder manufacturing process will be provided by Elotex AG to ensure that all products are identical to the materials manufactured in Europe.

In addition, Elotex AG will continue to export products to the U.S. until the new plant is operational early in 1989. The new plant will be adjacent to the manufacturing operations of UCAR Emulsion Systems in Garland.

Center for Materials Fabrication Research Funds Available for 1988-89; Projects on Industrial Use of Electrotechnologies Encouraged

A new cofunding program is being offered by the Center for Materials Fabrication (CMF), Electric Power Research Institute (EPRI), Palo Alto, CA. Innovative uses of induction and electric infrared technology may qualify for partial funding under the Electrotechnology Implementation Program.

The program is designed to encourage the innovative industrial use of electrotechnologies. Funds are available for 1988 and 1989 projects. Applications for development funds may be submitted by manufacturers of products fabricated from metals, plastics, ceramics, or composites. In addition, project opportunities may be submitted by electric utilities or equipment suppliers. CMF is seeking proposals which meet the following criteria:

- the application involves a major use of electricity;
- the application represents a state-of-the-art development or novel use of the technology;
- the application has significant market potential; and
- a preliminary assessment of technical and economic benefits has been conducted.

In return for assistance, companies receiving funding will provide nonproprietary technical, economic, and performance data that CMF may use in publications. Plant tours, videos, and photographs of the operation also may be requested by CMF.

Examples of innovative applications of induction include: heat restoration during hot rolling; interstage annealing during wire drawing; sealing of plastic; flexible automated heat treatment cells; rapid sintering for powder metal products; and heating dies or molds for forming.

Project ideas for using electric infrared may include: heating, curing, or drying thick or irregularly shaped objects; heat treating; preheating sheet materials or dies; and automation. CMF also is accepting project ideas for microwave and radio frequency heating and drying of plastics, ceramics, and composites.

Application forms for the cofunding program and more information about the program are available from CMF by writing the Center for Materials Fabrication, 505 King Ave., Columbus, OH 43201-2693.

EPRI is the nonprofit research and development arm of the U.S. electric utility industry.

Sherwin-Williams Proposes Formulations Facility For Effingham, IL, Industrial Park

The Chemical Coatings Division, Sherwin-Williams Co., Chicago, IL, plans to construct a satellite manufacturing plant dedicated to small-batch production of industrial coatings in the Effingham, IL, Industrial Park. The plant is targeted for completion the first quarter of 1989.

The facility is the first phase of a multi-phase development planned for newly acquired 46.2-acre property. The plant will manufacture custom formulations of baking and dry enamels in quantities of 500 gallons or less and will serve industrial finishers in the Midwest.

The Effingham plant is the second small-batch facility planned by the Chemical Coatings Division. In January, the Division broke ground for a satellite plant in Greensboro, NC.

The Chemical Coatings Division of Sherwin-Williams formulates and manu-

factures industrial coatings for metal, wood, and plastic.

Angus Chemical Contracts Complete Amical® Product Line

The Abbott Laboratories' Industrial Biocide business and product line, Amical, has been purchased by Angus Chemical Co., Northbrook, IL.

The Angus acquisition from Abbott Laboratories includes the chemistry behind the Biocide business products, the complete line of Amical products, and related production technology.

Joining Angus from Abbott Labs are Director of Biocide Development—John Alderman, previously Amical Program Manager, and Product Manager—Biocide—Kenneth Littel, previously Microbiologist.

Akzo Coatings Constructs New Headquarters in Troy

Akzo Coatings Inc., Troy, MI, has announced a major corporate expansion program for a new 80,000 sq ft facility situated in the Tech Square Research Park in Troy. The new site is located on 8.57 acres and will more than triple current office space and laboratory facilities.

The expansion will include 35,000 sq ft for office space, 45,000 sq ft for the research and development laboratory, and an atrium addition that will connect the two buildings. New construction on the atrium addition will be completed in the fall with occupancy scheduled for September. The building features will include state-of-the-art research and development facilities and equipment.

Titanium Dioxide Deleted From Title III Section 313 List

The Environmental Protection Agency (EPA) announced June 9 that it has deleted the substance titanium dioxide from the list of toxic chemicals under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

The rule became effective immediately. This relieves facilities from their obligation to submit SARA Section 313 Toxic Release Inventory (TRI) reports on titanium dioxide for this first year of reporting.

The EPA received three separate petitions to delist titanium dioxide (CAS No. 13463-67-7) from the list of toxic chemicals. The petitions were from: E.I. du Pont de Nemours & Co., Inc.; SCM Chemicals, Inc.,

Didier Taylor Refractories Corp.; and Kemira Oy. A proposed rule, announcing EPA's intent to grant the petitions, was published previously in the *Federal Register* (53 FR 5004, Feb. 19, 1988).

EPA cites that there is insufficient evidence that titanium dioxide causes adverse effects to human health or the environment. The final rule will include EPA's evaluation of the chemical, which specifically covers acute and chronic toxicity, oncogenicity, and potential parties of exposure. The proposed rule contains information on EPA's review of the petitions, including the toxicity evaluation and other hazard assessment information.

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 1988 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 1988.)

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 afterwards 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, 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}, books⁴ and patents.⁵

- (1) Pascal, R.H. and Reig, F.L., "Pigment Colors and Surfactant Selection," *Official Digest*, 36, No. 475 (Part 1), 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. 1, John Wiley & Sons, Inc., New York, 1973.
- (5) Henderson, W.A., Jr. and Singh, B. (to American Cyanamid Co.), U.S. Patent 4,361,518 (Nov. 30, 1982).

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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Epoxy Powder Coatings for Conformal Coating And Corrosion Protection of Copper

Richard D. Granata, Philip Deck, and Henry Leidheiser, Jr.
Lehigh University*

Epoxy powder coatings were utilized to form thin, highly resistive, low-defect-density coatings on copper. Substrates having protrusions or sharp edges required greater coating thickness to achieve the same defect density. The following properties of the coatings were studied: adherence, wettability, flow characteristics at cure temperature, stress, resistance of the cured coating to aggressive environments, and the delamination tendency in the presence of an applied cathodic potential. The electrical properties were determined using electrochemical impedance spectroscopy, the application of a constant DC potential, and the application of a cyclic, increasing DC potential. The conformal properties of a substrate/coating system can be well characterized by these techniques, and the techniques serve a useful role in predicting corrosion-related failures.

INTRODUCTION

The objective of this work is to explore the application of electrostatic powder techniques to the preparation of electrically insulated and corrosion protective coatings on thin copper sheets containing recesses, holes, and channels. This report summarizes laboratory experience in testing the applicability of epoxy powder coatings to the conformal coating of copper substrates and the protection of copper substrates against corrosion. The emphasis of this paper is on the methods used to appraise the coatings and to determine electrical pathways through the coating.

EXPERIMENTAL

Epoxy Powders

All powders used in this work were obtained as proprietary materials from the Polymer Corp. (now Morton Powder Coatings), Reading, PA. The great majority of the work was carried out with four different powders that formed coatings identified in the report as O, 47-1, 47-2, and FR. The latter material was formulated so as to be flame retardant. Two mesh sizes were studied—200 and 270. Unless otherwise stated, the reported measurements were made with coatings formed from powders having a 200 mesh size.

The powders as obtained from the manufacturer were characterized by differential scanning calorimetry using a 10 mg sample and a Perkin Elmer Model DSC-1B unit. The sample pans were not hermetically sealed in order to allow the escape of volatile products. Each sample was scanned twice over a temperature range of 37-337°C at a scan rate of 20°C/min. The instrument was calibrated using a tin standard. *Figure 1* shows schematically the type of data obtained and *Table 1* gives the numbers for the different characteristics shown in *Figure 1* for each of the four powders.

The first scans showed a small endothermic peak at 66-70°C that may be attributed to powder coalescence or a phase change in the pre-polymer epoxy materials. A broad exotherm was also observed on the first scan, centered about 180°C, the result of epoxy crosslinking reactions. Neither of these peaks was observed on the second scan. Glass transition temperatures were observed at approximately 100°C and 80-90°C, respectively, on the first and second scans. Ninety percent of the weight loss for polymers O, 47-1, and 47-2 occurred during the first scan. It is concluded that polymers O, 47-1, and 47-2 have the same polymer structure. The formulations are

*Department of Chemistry and Zettlemoyer Center for Surface Studies, Bethlehem, PA 18015.

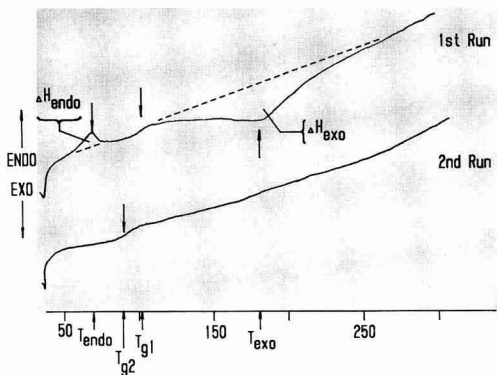


Figure 1—Typical differential scanning calorimetric results for epoxy powder material. Endotherm, exotherm, and transition temperatures are labeled

known to differ in thixotrope (silica) content. Polymer FR has a different polymer structure.

Substrate

The substrate used in these studies was a proprietary product manufactured by Gould Electronics. The majority of studies was carried out on a product colloquially known as “double-treated copper” in which one side is less rough than the other side. A few studies were carried out on a second product known as “double-rough copper,” in which both sides have roughnesses intermediate to the roughnesses of double-treated copper. All the experiments reported herein were performed on surfaces representative of those shown in Figures 2 and 3. The substrate thickness was either 1.4 mils or 2.8 mils.

The composition of the as-received surface was determined using X-ray photoelectron spectroscopy. The information obtained from a single set of samples is summarized in Table 2. It is not known if these data are typical of production, but they do indicate that the surface of the copper had been treated by the manufacturer and that both zinc and chromium were present at the very outer surface in significant concentration. It is probable that the surface of the copper was largely covered with a

mixture of ZnO and ZnCrO₄, but no exhaustive analyses were done to test this probability. These results are important because it should be recognized that the epoxy coatings are in contact with a surface that is neither pure copper nor pure copper oxide, except at machined surfaces such as holes.

The test panels, approximately 28.7 × 38.2 × 0.008 cm, were obtained either in the form of hole-free foils or with sets of different size holes. Each set of similarly sized holes was in a square pattern of 31 holes on a side, 961 holes within a test area. The holes were of five different sizes, 0.5, 0.8, 1.2, 1.6, and 2.0 mm in diameter. The hole centers were spaced 0.254 cm (0.100 in.) in all cases.

Preparation of Coatings

The coatings were prepared from the powder using a hand-held, GEMA Model 705 electrostatic gun. The panel to be coated was suspended vertically and the gun was held approximately 10 cm from the panel. In most cases, both sides of the panel were coated. The main variables that affected coating thickness were substrate dimensions, spray time, fluidized bed air pressure, carrier air flow, powder flow, powder type, powder depth in the fluidized bed, electrostatic gun deflector, and setting. A calibration curve of coating thickness as a function of spray time was developed for a standard set of experimental conditions so that it was relatively easy to obtain coatings of the desired thickness. The powder adhered to the substrate very well and negligible amounts of powder were lost from the surface after electrostatic coating and before curing. Coating thicknesses of 12-140 μm were readily obtainable. The coatings were cured by suspending the panel in a pre-heated, air circulating oven at 200-205°C for 10 min. Coating thicknesses were routinely measured with an Elcometer Minitector. The accuracy of the meter was checked against microscopic measurements of cross sections and against gravimetric measurements.

Electrochemical Measurements

Impedance measurements were carried out using a Princeton Applied Research Model 368 AC Impedance System. All measurements were made in 0.5M NaCl solution at room temperature. Two types of electrochemical cells were used for the measurements: (1) a single-tube O-ring cell for specimens without holes and (2) a double-tube, O-ring cell in which a specimen with holes is sandwiched between the two tubes and clamped together. The areas of specimens with holes in contact with the O-rings were coated with an epoxy paint to provide a good sealing surface for the O-rings. A counter electrode was inserted in each tube of the cell. The O-ring diameter was 3.2 cm. For specimens without holes, the area exposed to electrolyte was 8.8 cm². For specimens with holes, both sides were exposed to electrolyte. Thus, the surface area exposed to the electrolyte was 2 sides × 8.8 cm², minus the area of the holes, plus the area of the hole sides. The same number (119) of holes was exposed to the electrolyte in all experiments with holed specimens. Therefore, the surface areas were 8.8, 14.0, 15.2, 16.3, 17.0, and 17.4 cm² for specimens with no, 2.0, 1.6, 1.2,

Table 1 — Characteristics of Four Powders as Illustrated in Figure 1

Polymer	First Scan				Second Scan			
	T _{endo} ^a	ΔH _{endo} ^b	T _{endo}	ΔH _{exo}	T _g	% wt Loss	Total % wt Loss	
0	66	0.92	179	7.78	108	-1.85	86	-2.05
47-1	70	0.83	180	8.64	98	-1.55	88	-1.55
47-2	69	1.12	181	8.65	102	-1.56	91	-1.77
FR	66	0.74	181	10.09	110	-1.46	78	-2.50

(a) T (°C)

(b) ΔH (cal·g⁻¹)

0.8, and 0.5 mm holes, respectively. Since it is not known, *a priori*, whether these surface areas represent a normalizing basis for comparison, data will be presented and compared among 3.2 cm diameter disks. Note that the surface area values are different by less than a factor of 2.

Two different types of DC electrochemical tests were used to appraise the conductive pathways in the coating. In the first case, the sample was immersed in 0.5M NaCl and a three-electrode potentiostatic technique was used to increase the applied cathodic potential of the coated panel at a rate of $100 \text{ mV}\cdot\text{S}^{-1}$ up to a potential of -4 V vs SCE. The applied potential was terminated at this point, and the sample was permitted to return to its rest potential, and the scanning potential was again applied. Experiments were run for up to 50 consecutive scans over a 4-hr period. The current-potential relationship was recorded continuously using a Princeton Applied Research Model 350 Corrosion Measurement Console with tape data storage.

A variation of this technique was used in which a voltage of -4 V vs SCE was continuously applied and the current was simultaneously monitored. The measurement parameter was the time required before the current achieved a value of $1 \mu\text{amp}$ ($10^{-7} \text{ A}\cdot\text{cm}^{-2}$).

EXPERIMENTAL RESULTS

Adhesion Properties

A tensile adhesion test was performed on coatings on hole-free substrates by fastening a flat surface (anchor) of known area to the coating with an adhesive and then

Table 2 — Surface Analysis of Copper

Substrate	Side (#)	Atomic Percentage			
		Zn	Cr	Cu	O
Double-Treated	Less rough	16.6	9.1	1.0	73.3
Double-Treated	Rough	5.7	7.9	3.6	82.4
Double-Rough	Less rough	15.3	9.3	1.2	74.3
Double-Rough	Rough	18.7	7.1	1.0	73.2

pulling the coating off the substrate while recording the force required. Because the substrate is thin and flexible, anchors were bonded to both sides of the sample to provide rigidity. The measurement is valid for failure at either side of the sample. A closed-bottom screw anchor, known as a Star Tampin (Star Expansion Industries, Mountainville, NY), was sanded to a smooth flat surface on its bottom with 320 grit silicon carbide paper and cleaned by swabbing with trichloroethylene. A drop of an ethyl cyanoacrylate adhesive (Loctite Superbond 414, 420, or 495) was put on the anchor surface and the anchor was clamped to the coating for 10 min. Eyebolts were screwed into the anchors, but left slightly loose so the force pulling the anchor was as near normal to the substrate as possible. After standing for at least 20 min, the anchor/substrate/anchor assembly was pull-tested in a Dillon Model LW Tester. An anchor with a 1.90 cm bottom diameter was used, so the forces were converted to pressure units (psi) for the 2.84 cm^2 area of adhesion. The rate of pull was 2.54 cm per min. The maximum force measurable with these anchors is 17.2 MPa (2500 psi). No failures were observed at 17.2 MPa (2500 psi) in any of the tests. By comparison, a variety of other coat-

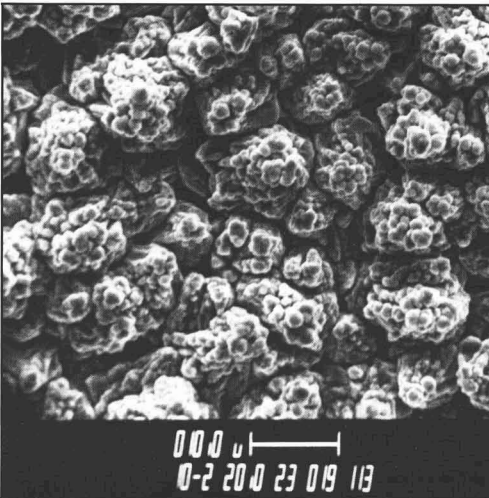


Figure 2—Electron micrograph of rough side of "double-treated copper." This surface was used in the majority of the studies reported herein

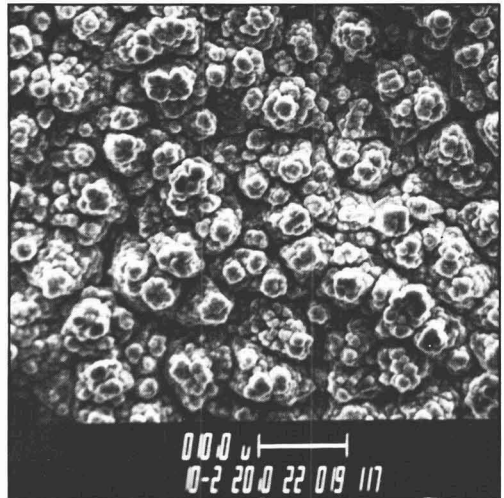


Figure 3—Electron micrograph of rough side of "double-rough copper." This surface was used in a few of the studies reported herein

Table 3 — Wettability of Four Substrates by Epoxy Powders

Substrate	Contact Angle in Degrees	
	Epoxy: 47-1	47-2
Teflon.....	83.2 ± 4.2	79.3 ± 5.7
Glass.....	21.6 ± 6.3	19.7 ± 5.0
Copper.....	27.8 ± 5.4	24.5 ± 1.8
Zinc.....	23.2 ± 4.1	25.7 ± 2.9
FR-4.....	22.0 ± 4.2	16.2 ± 5.0

ings, including solvent-based epoxies, fluoropolymers, and vinyl esters, failed in the range of 0.69-6.9 MPa (100-1000 psi).

Wettability Properties Of Epoxy Powders

The wettability properties were determined by making contact angle measurements on powders that were cured. The measurements were made at room temperature after the powder had solidified. The data of importance are those obtained on copper substrates, but measurements were also made on substrates of Teflon®, glass, and zinc for comparison purposes. It should be pointed out, however, that the measurements cannot be extrapolated directly to the rough, chemically modified substrate used in other experiments, but they do apply to the cut surfaces at the edges of holes.

The substrates were Fisher brand glass slides, Teflon sheet, 0.08 cm in thickness; copper and zinc sheets, 0.15 cm in thickness; and a double-rough copper foil precoated with a solvent-based epoxy known as FR-4 (circuit board material). Specimen size was 2.5 × 7.5 cm. The glass and Teflon samples were immersed in a 50:50 solution of sulfuric and nitric acids for 1 hr, after which they were washed in deionized water, followed by ethanol, and were wiped dry with lint-free paper tissue. The copper and zinc specimens were cleaned in methanol and abraded with 320, 400, and 600 grit emery paper followed by wet polishing using 3 μm and 0.5 μm alumina. They were thoroughly rinsed with deionized water and wiped dry with lint-free paper tissue.

Contact angle measurements were made with isolated particles. The method of obtaining the individual particles was as follows. A small amount of the epoxy powder was sandwiched between two clean glass slides. The powder was spread evenly over the entire length of the slides by moving the slides parallel to one another. The top slide was removed with adhering powder and it was suspended over the substrate upon which measurements were to be made. The slide was given a sharp rap in order to transfer the powder to the substrate.

Curing of the powder was accomplished by placing the substrate on a pre-heated hot plate with a surface temperature a 200°C for 1 min. The droplets were photographed at 135X magnification and the contact angle was determined from measurements of the photographs. The data are summarized in Table 3 where it will be noted that

the powders had low contact angles with glass, copper, zinc, and FR-4. There was little difference between the two types of powders. Both powders exhibited good wettability of copper.

Stress in the Coating

Coating thin copper foil on one side only caused the panel to curl inward on the coated side. The stresses on the coating are tensile in nature. When both sides of the foil were coated, the foil remained flat.

The stress in the coated samples was determined as follows: Two sheets of stainless steel foil, 15 cm × 2.5 cm × 43 μm, cleaned in ethanol and pre-weighed, were taped to the two sides of a steel panel such that the exposed surface of the experimental sample was 2 cm × 12.5 cm. Scotch 811 removable tape was used to permit removal of the tape prior to curing with minimal loss in epoxy powder. Both sides of the panel assembly were coated. The foils were removed from the steel base and were stored in an air-circulating oven pre-heated to 200°C for 10 min.

After curing, it was noted that the foils curled but also had a slight twist. The value of the curl used in the calculations that follow was the maximum deflection. The stress in the coating was determined from the following equation,

$$\sigma_{eq} = \frac{dEt^3}{3cI^2(t+c)(1-\nu)} \quad (1)$$

where σ_{eq} is the equilibrium stress, d is the deflection, E is Young's modulus for the substrate, t is the substrate thickness, c is the coating thickness, l is the length of the foil, and ν is Poisson's ratio for the substrates. Table 4 gives the values obtained. Stress develops as the coating cures and cools to ambient temperature. Shrinkage of the film over a sharp projection or edge can be critical in the degradation of protective coating properties.

The internal stress of the coating is given by equation (1). The stress calculated is an equilibrium stress since the substrate is allowed to deform. The actual stress on a rigid, nondeformed substrate is higher by 1-10% and is dependent on the modulus and Poisson's ratio of the coating. It is assumed that the elastic properties of the coating and substrate are isotropic, the coating adheres to the substrate, and the differential shrinkage vs coating

Table 4 — Measurement of Stress in Two Powder Coatings

Coating	Length (mm)	Coating Thickness (μm)	Maximum Deflection (mm)	Equilibrium Stress (MPa)
47-1	124.1	59.5 ± 6.6	23.1 ± 0.1	1.93
	125.0	51.8 ± 6.2	16.8 ± 0.5	1.72
	125.9	49.5 ± 3.8	24.1 ± 0.1	2.61
	122.4	57.6 ± 4.0	18.8 ± 0.2	1.71
				(mean = 1.99 ± 0.42)
47-2.....	123.9	75.8 ± 5.8	45.1 ± 1.2	2.56
	125.7	76.0 ± 5.4	37.4 ± 0.6	2.06
	125.7	60.7 ± 0.5	28.7 ± 0.5	2.27
				(mean = 2.30 ± 0.25)

Teflon is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

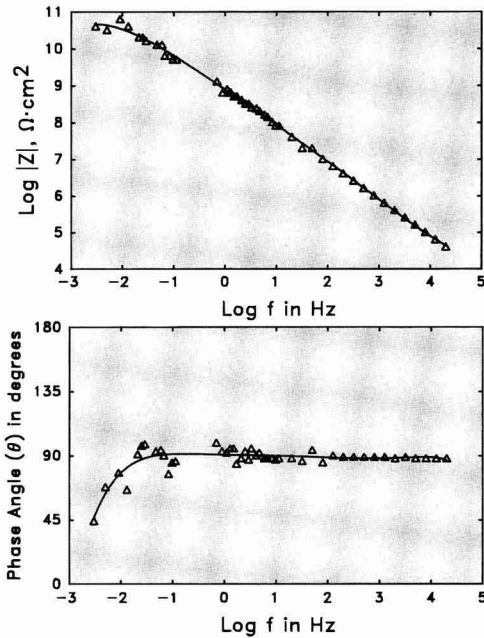


Figure 4—Typical AC impedance results for coating O, greater than 100 μm in thickness, on a hole-free copper substrate after immersion in 0.5M NaCl for 60 days

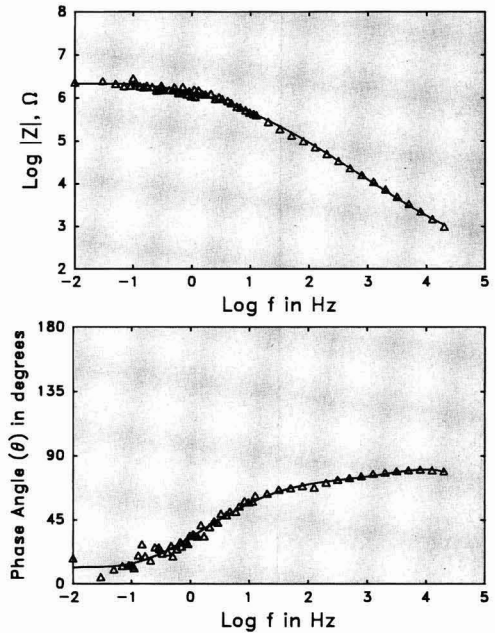


Figure 5—AC impedance results for coating 47-1, 20 μm in thickness, on a copper substrate containing 1.2 mm diameter holes shortly after immersion in 0.5M NaCl

thickness can be neglected. Shimbo, et al.^{1,2} obtained a range of internal stress for epoxy resin coatings of 2.2-5.7 MPa. The values in Table 4 are at the lower end of this range, but well within the range of 0.3-5 MPa given by other authors.³⁻⁶ The 47-1 epoxy has a 13% lower stress value which may be due to the presence of amorphous silica. The action of a mineral filler of small expansion coefficient will reduce coating shrinkage, thereby reducing stress.

Electrical Properties

Figure 4 shows the AC impedance characteristics for a coating approximately 100 μm thick on a hole-free copper panel after exposure of the coated panel to 0.5M NaCl for 60 days. The linear relationship between the log of the impedance and the log of the frequency (slope = -1) and the phase shift of approximately 90° over a wide frequency range are both indicative of the fact that the coating behaved largely as a capacitor and that no highly conductive paths exist or were developed by the exposure to the NaCl environment.

Similar experiments were carried out with panels containing holes, 1.2 mm in diameter, using coating 47-1. Coatings thicker than approximately 40 μm exhibited electrical responses similar to that shown in Figure 4 for the hole-free material and the electrical properties did not change after exposure to 0.5M NaCl for 60 days. Coatings thinner than approximately 40 μm on substrates with

holes yielded impedance spectra comparable to that of a 20 μm thick coating shown in Figure 5. The shape of the curve and the phase angle below 10 Hz are characteristic of a capacitor and resistor in parallel. Conductive pathways through the coating existed or were developed on exposure to the NaCl electrolyte.

One method for appraising the existence of conductive pathways is to determine the impedance at low frequencies. Figure 6 shows the impedance at 10⁻² Hz as a function of coating thickness. It will be noted that an impedance of >10¹⁰ ohms is obtained when the coating

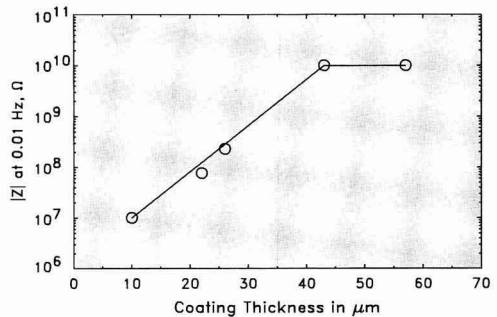


Figure 6—Impedance at 10⁻² Hz of coating 47-1 as a function of coating thickness for substrates with holes

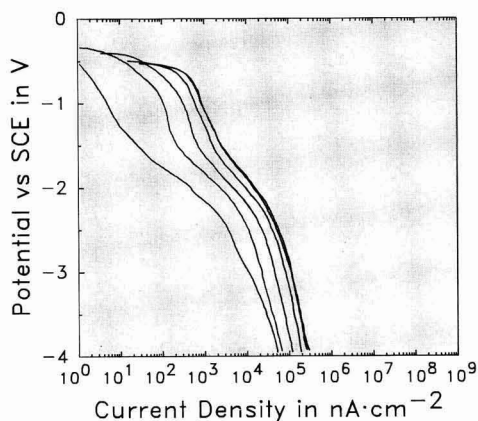


Figure 7—Defect test cathodic polarization curves obtained in 3% NaCl for sample with 0.5 mm diameter holes

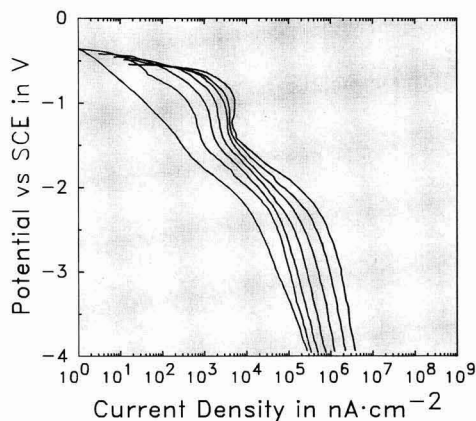


Figure 9—Defect test cathodic polarization curves obtained in 3% NaCl for sample with 1.2 mm diameter holes

thickness is greater than approximately 40 μm for substrates with holes.

A more aggressive test was to determine the effect of a substantial potential on the conductive pathways existing on the coated substrates containing holes. Panels containing holes, 0.5, 0.8, and 1.2 mm in diameter, were coated with coating O to a thickness of 67 μm . The panels were exposed to 0.5M NaCl and they were polarized cathodically to -4 V vs SCE at a rate of $100\text{ mV}\cdot\text{S}^{-1}$. As stated previously, this cathodic polarization was continued repetitiously to a maximum of 50 times, each time polarizing to -4 V , allowing the potential to return to the steady state value, and polarizing again. The curves that were obtained using this procedure are shown in Figures 7, 8, and 9 for the panels containing 0.5, 0.8, and 1.2 mm diameter holes, respectively. There are two noteworthy

characteristics of these curves: (1) The curves move to the right on successive scans, a fact which indicates that the metallic surface area for the cathodic reaction increases after each scan, and (2) the current density at a fixed potential and at a fixed scan number is greater with increase in hole diameter.

Further verification of the injurious effect of an applied potential of -4 V is found in the impedance data shown in Figure 10. The upper set of plots is the impedance spectrum taken shortly after immersion in 0.5M NaCl. The lower set is after polarization at -4 V . The low frequency impedance values have shifted to lower values after polarization at -4 V and the phase angles shifted from 90° to 20° . These data confirm that conductive pathways were developed by the applied cathodic potential.

Data obtained from the constant potential test are shown in Figure 11 for three different coatings on hole-free panels. The range of values obtained in multiple experiments is shown as the horizontal bar and the midpoint on the log scale is indicated in order to differentiate the data for the three coatings. The results were not reproducible at the larger coating thicknesses but it is clear that the failure time increased with increase in coating thickness.

Similar experiments were carried out with coating FR on panels with holes. The coating thickness was maintained constant at 62 μm and the time to failure was determined as a function of hole size. The hole sizes in these experiments were 0.8, 1.2, 1.6, and 2.0 mm in diameter. The data are plotted in Figure 12 as a function of the length of the periphery of the holes. Although the scatter in the data is large, it is apparent that the lifetime is an approximately linear function of the length of the edge region bordering the holes. Another way of phrasing this concept is that the number of latent defects that cannot tolerate a cathodic potential of -4 V increases linearly with the edge length.

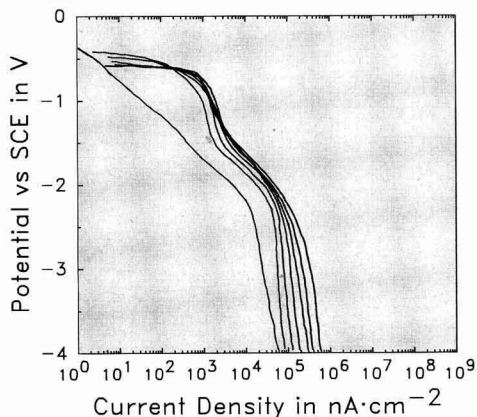


Figure 8—Defect test cathodic polarization curves obtained in 3% NaCl for sample with 0.8 mm diameter holes

Another measurement that dramatically shows the importance of holes in the panel on the number of latent defects in the coating is shown by the curves in Figure 13. The panel was polarized cathodically to a potential of -4 V vs SCE and the current density was determined. It will be noted that the current density was very low on the hole-free sample above a thickness of $20 \mu\text{m}$, whereas on the panel with holes it required $40 \mu\text{m}$ in thickness to obtain the same low current density.

A limited number of experiments was performed on the effect of powder mesh size on the electrical properties of coated panels and only two mesh sizes were studied: 200 and 270. Hole-free copper and copper foil containing 0.8 mm and 1.2 mm diameter holes were used. The ability of the coating to cover the substrate well was determined using the cathodic polarization defect test in which the panel was polarized at -4 V vs SCE and the current density was determined. Two conclusions were drawn: (1) The current density on the hole-free copper tended to be lower in the case of the 270 mesh powder than with the 200 mesh powder, and (2) the 200 mesh powder yielded a coating that exhibited fewer defects on the samples containing holes than the 270 mesh powder. Thus, it appears that the smaller particle size powder gives fewer defects on hole-free copper and the larger particle size powder gives fewer defects around the holes.

Nature of the Hole Edge

Careful study of the coated panels containing holes while polarizing cathodically in 0.5M NaCl suggested that the hydrogen gas bubbles were coming largely from

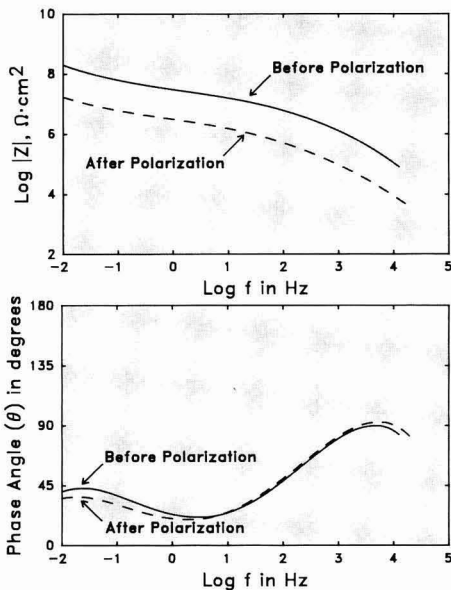


Figure 10—AC impedance data for coating O on a hole-free copper substrate before and after DC polarization at -4 V vs SCE in 0.5M NaCl

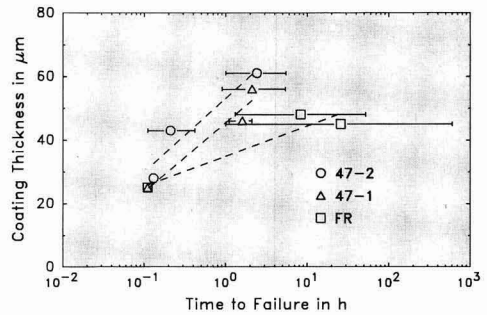


Figure 11—Time to failure as a function of coating thickness for coatings 47-1, 47-2, and FR on hole-free copper when polarized cathodically at -4 V vs SCE in 0.5M NaCl

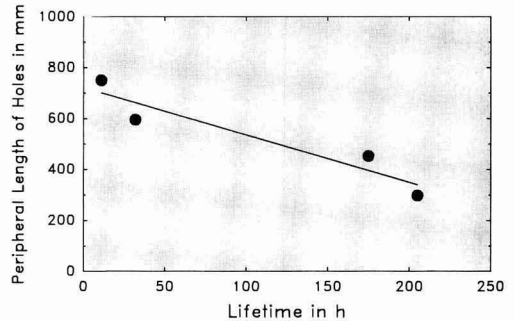


Figure 12—Time to failure as a function of the length of the periphery of holes for coating FR on copper when polarized cathodically at -4 V vs SCE in 0.5M NaCl

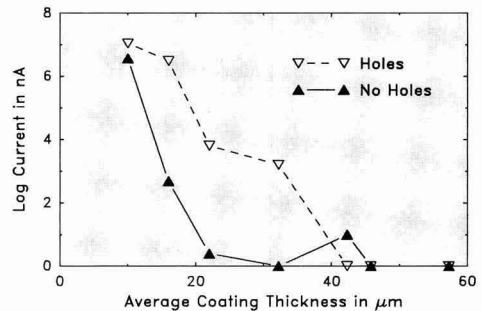


Figure 13—Plots for cathodic polarization defect tests in 3% NaCl showing average coating thickness vs maximum current density for 0.008 cm thick substrates. Data are given for specimens without holes and with 1.2 mm diameter holes

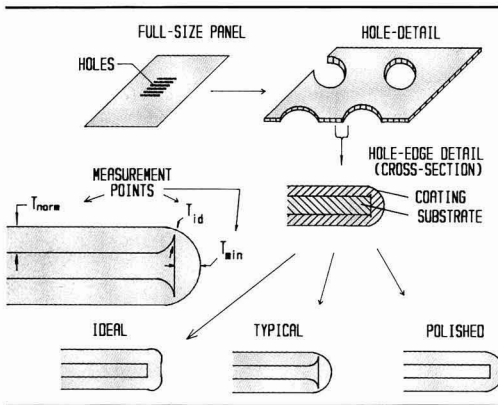


Figure 14—Diagram of hole-edge cross section and coating thickness measurement locations. See Table 7 for measured values

the edges of holes. A microscopic study of the morphology of the hole edges was then undertaken.

Coated panels were mounted in Wood's metal (m.p. 70°C), cut with a diamond saw perpendicular to the planar surface of the panel and polished with 600 grit metallographic paper, followed by 5 μm and 0.3 μm alumina. Photomicrographs of the cross-sectioned samples were made and the dimensions of the important parameters, as shown in Figure 14, for samples A, B, C, D, and E are given in Table 5. The important point is that each hole edge contained a large burr, as shown for the "typical" sample in Figure 14.

Several panels were abraded with 400 and 600 grit metallographic paper followed by 5 μm and 0.3 μm alumina. Mounted samples of these abraded panels were examined which indicated that the burrs had been removed and the cross section was similar to that indicated as "polished" in the schematic diagram of Figure 14. Data were obtained from micrographs of the four polished samples F, G, H, and I and are given in Table 5. The average coating thickness ratio relative to the average normal coating thickness (T_{norm}) at the burr in the unpolished samples was 0.28 and was 0.37 at the hole edge for the polished samples. Thus, the coating at the polished edge was 32% thicker than at the burr edge.

Table 5 — Coating Thicknesses and Thickness Ratios At Hole Edge

Specimen	T_{norm} (μm)	T_{id} (μm)	T_{min} (μm)	T_{id} / T_{norm}	T_{min} / T_{norm}	Hole Edge Polished
A	40.4	38.4	12.4	0.95	0.30	No
B	38.9	47.8	7.6	1.23	0.20	No
C	41.7	40.4	12.7	0.97	0.30	No
D	43.4	42.9	13.2	0.99	0.30	No
E	66.0	52.1	19.6	0.79	0.30	No
F	49.0	39.1	17.8	0.80	0.36	Yes
G	49.0	38.4	17.5	0.78	0.36	Yes
H	52.4	42.4	19.6	0.81	0.37	Yes
I	47.9	70.6	22.1	1.22	0.38	Yes

Scanning electron microscopy (SEM) of the hole-detail region for an uncoated specimen showed on one side the disruption of the nodular surface near the edge due to passage of the drill. The other side showed machining marks, due to the drill, including burrs (slivers) up to 5 μm in length protruding perpendicularly from the edge. These areas are probably the most difficult on which to obtain conformal coating because of the substrate damage at the cut edge. Figure 15 gives a schematic of the hole/edge deformation or burr.

Modeling the Hole Edge

The ability of electrostatic coatings to coat edges, burrs, or other similar shapes was investigated in the following manner. Straight pins were coated with 47-1 or 47-2 epoxy powders and examined under a light microscope and by SEM. Figure 16 shows epoxy particles electrostatically adhered to the pin surfaces. The powder coating appears uniform around the tip. The surface topographical features are a consequence of the powder particle size. Figure 16 also shows that the epoxy particles have a wide size distribution with some of the particles exceeding 10 μm in long dimension.

During the cure of the electrostatically applied powder, the particles fuse into a continuous film. Crosslinking reactions retard the coalescence of the particles and the flow of the sintered film. Film shrinkage occurs and internal stresses develop in the film. Film shrinkage can make a significant contribution to coating thinning at the burr or edge.

Draining is typically a problem for solvent-based coatings applied to vertical substrates. Figure 17a gives a draining profile for a coating on a substrate at an angle β from the vertical. Thick coatings of low viscosity will result in a large thickness gradient. As defined in the following equation,

$$\frac{h [1 - (x_h/x_o)^2]}{x_h^2} = \rho g \cos \beta (\eta/\gamma) \quad (2)$$

the driving force for the draining is the gravitational force. Figure 17b defines the dimensions, h, x_h , and x_o , the angle, β, and the draining profile as applicable to the system under study. The assumption is made that the thickness is initially uniform about the substrate profile, that is, ideal deposition of the powder is assumed. Using measurements for three specimens and assuming an ori-

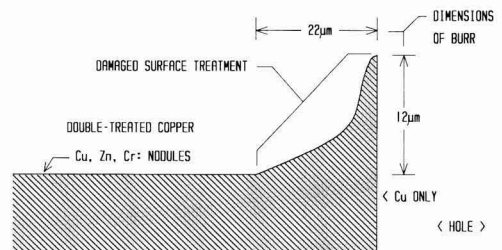


Figure 15—Schematic of burr illustrating typical dimensions at hole edge

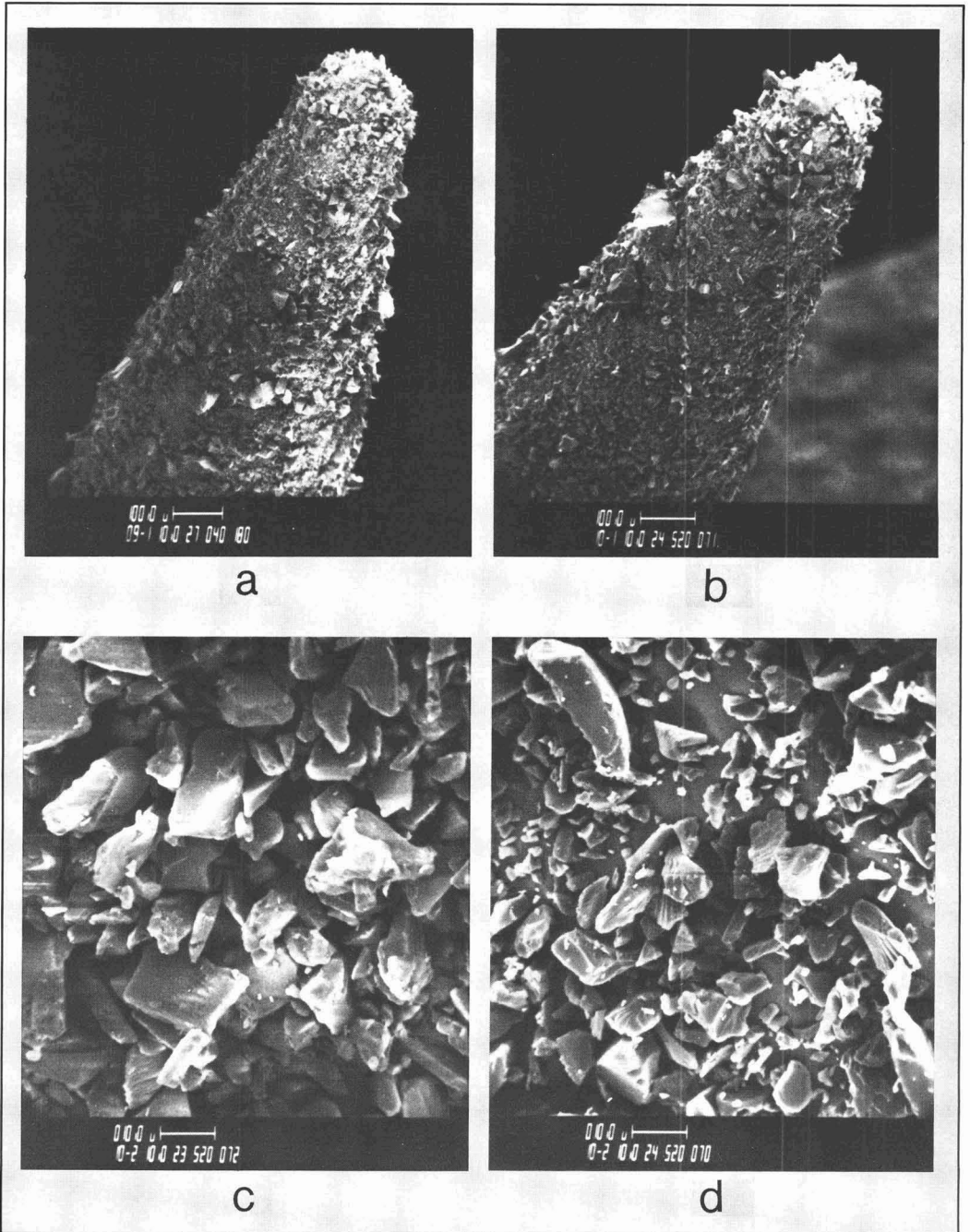


Figure 16—Scanning electron micrograph of a steel pin coated with epoxy powder and not cured or heated. Upper: markers are 100 μm; lower: markers are 10 μm

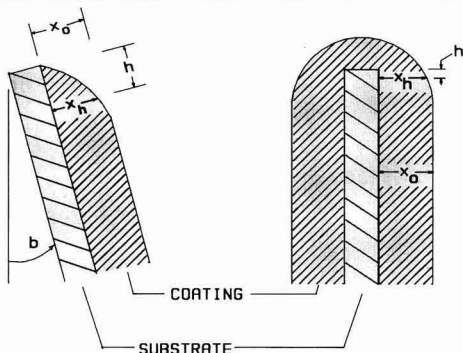


Figure 17—Sketch of model for draining of liquid coating from substrate

entation of $\beta = 45^\circ$, calculations yield a mean value for $t/(\eta)$ of $0.132 \text{ sec}\cdot\text{cm}^2\cdot\text{g}^{-1}$. Table 6 gives data and derived values. A reasonable flow time to assume for 200°C before crosslinking reactions impede flow is 10 sec. The corresponding viscosity would be 76 poise. de Lange⁷ gives a viscosity range for epoxy powders with good leveling characteristics as $60 \approx 100$ poise. Broad assumptions were made in the model and the role of the burr was not directly considered. The results suggest that particle coalescence and flow characteristics are significant factors in the conformal coating process with powder coatings.

Ability of the Coating to Withstand An Aggressive Environment

Other environments were studied including high relative humidity and elevated temperature. Experiments were also performed using 0.5M NaCl at 60°C and an applied cathodic potential at a defect in the coating of -1.5 V vs SCE . This latter test is known as cathodic delamination.^{8,9}

Only a few experiments were carried out on coatings exposed to 80% relative humidity at 60°C . No significant change in the appearance of the coating nor its adherence to the copper was noted. All the coatings appeared to withstand high relative humidity very well.

A large number of experiments was conducted on panels with and without holes which were exposed to 0.5M NaCl for times up to 94 days. The generalization may be made that if the coating exhibited capacitive electrical

Table 6 — Calculation of Values for Drainage Model

Specimen	x_o ($\times 10^3 \text{ cm}$)	x_n ($\times 10^3 \text{ cm}$)	$\rho g \cos \beta (t/\eta)$ (cm^{-1})	t/η ($\text{s}\cdot\text{cm}^2\cdot\text{g}^{-1}$)
G.....	5.77	3.82	112	0.116
G.....	4.04	3.36	79	0.081
H.....	5.49	3.69	117	0.121
F.....	5.38	3.40	142	0.146
F.....	4.39	2.86	192	0.198
			128 avg.	0.132 avg.

Table 7 — Cathodic Delamination and Cathodic Blistering Of Three Coatings on Hole-Free Copper

Coating	Thickness (μm)	Delaminated Area in 100 hr (cm^2)	No. of Blisters in 100 hr
47-1	25	0.05	39
	47	<0.05	6, 11
	56	.06, .25	17, 30
47-2	27	<0.05	27
	43	<0.05	4, 4
	59	0.05, .36	13, 14
FR.....	24	0.18, .22	55
	46	0.18	15
	47	0.19, .20	33, >50

behavior down to frequencies of the order of 1 Hz and had impedances of 10^9 ohms or greater at a frequency of 10^{-2} Hz, there was no important change in the impedance characteristics upon exposure to the NaCl electrolyte. If the capacitive behavior only existed at higher frequencies and the impedance was less than 10^8 ohms at 10^{-2} Hz, the impedance characteristics changed by the long-term exposure to the NaCl electrolyte. These data suggest that if latent electrical pathways exist in the coating prior to immersion in NaCl solution, the electrolyte activates pathways or causes the development of additional pathways for charge transmittal through the coating.¹⁰

Cathodic delamination studies in 0.5M NaCl at 60°C and a cathodic potential of -1.5 V vs SCE were carried out on three coatings at several different film thicknesses. Data on the area delaminated about the defect after 100 hr and the number of cathodic blisters observed are summarized in Table 7. These three coatings on the copper substrate are highly resistant to cathodic delamination in comparison with many other coatings studied in this laboratory.¹¹

CONCLUSIONS

The work reported here shows conclusively that epoxy powder coatings can be utilized to form thin, highly resistive, low-defect-density coatings on copper. Powder coatings, as thin as $20 \mu\text{m}$, exhibited very low rates of charge transmittal associated with degradation when the coated metal was immersed in 0.5M NaCl and the metal was polarized cathodically to a potential of -4 V vs SCE .

The ability to form coatings with low defect density is a consequence of (a) the good wettability of the substrate by the coating, (b) the ability to flow at the cure temperature, and (c) the absence of solvents that interfere with the mating of polymer segments. The barrier nature of the coating is vividly demonstrated by the inability of ions and aqueous phase water to form conductive pathways in the coating. The chemical resistance of the coating is also demonstrated by the lack of attack of the coating by water at elevated temperatures.

A greater average coating thickness was required to achieve the same electrical resistance characteristics when the copper substrate contained drilled holes. The

burrs that are formed by drilling have a lesser coating thickness and the electrical defects occur at the hole edges. The number of latent defects that show up on cathodic polarization in NaCl solution is directly related to the length of the periphery of the holes in the test area.

ACKNOWLEDGMENT

Appreciation is expressed to IBM Corp., Endicott, NY, for providing support for this research and many of the experimental samples. We also express appreciation to Michael Applequist who provided assistance in the early stages of this research. Douglas Richart of the Polymer Corp. (now Morton Powders) was very helpful in recommending appropriate epoxy powders.

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The Vancouver, British Columbia, section of the Pacific Northwest Society has produced a 57-minute video covering a broad range of aspects related to safety during the manufacture of coatings. Designed as a thought-provoking film for use in training production and technical staff, the video was produced using home video equipment and features some talented members of the Society as principal characters.

The scenario used is a tour of a paint plant by the firm's general manager and production manager, who discuss major potential safety hazards, with a view to setting up a new safety program for the company. Their discussion covers pigments, resins, solvents, additives, the use of PPE and MSDS, high speed stirrers, fork lift trucks, labelling of containers, and fire safety procedures. The slogan, "Think Safely—Think Safety" is used throughout

the video to encourage viewers to focus on that during the workday.

The information is portrayed in a fairly light, and sometimes humorous, manner, and all the incidents in the video are based on actual accidents which were reported to the Society during a pre-script survey.

In addition to the video, a leaflet has been produced for distribution to viewers as a permanent, handy reference of the major hazards covered by the video.

The cost of \$65 (U.S.); \$75 (Canada) includes the video, plus 10 copies of the leaflet, as well as all handling and shipping charges. (Additional leaflets are available at \$1.00 each.)

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New Developments in Weather Resistant Powder Coatings

Manfred Hoppe
EMS-Chemie AG*

A disadvantage found when conventional weather resistant powder coatings are compared to liquid coatings is their relatively poor flow properties. The flow of thermoset powder coatings depends on a number of factors, including the selection of suitable pigments and fillers, pigment concentration, additives such as flow agents, bake schedule, reactivity and structure of the resinous components, melt viscosity, and the viscosity profile during crosslinking. This paper reports about recently developed carboxyl terminated triglycidyl isocyanurate (TGIC) cured polyesters which result in powder coatings with remarkably improved flow properties due to the polyester's molecular structure and functionality and the viscosity profile during the curing process. These improvements have been reached without any prolongation of the gel time and without compromising the weathering resistance of the film. Such new powder coatings completely crosslink at 160°C within 15 minutes yielding films with excellent mechanical properties.

INTRODUCTION

Powder coatings have distinct ecological and economic advantages over ordinary liquid, solvent-containing paints. However, with weather resistant systems based on carbonic functional saturated polyester resins, cross-linked with triglycidyl isocyanurate (TGIC), the question of the flow properties still remains.

As they contain a solvent, which can be in any mixture, liquid paints of any desired viscosity can be produced. This promotes optimal wetting between the binder and the

pigments or fillers during manufacture also with respect to the wetting of the substrates which are coated.

Powder coatings, on the other hand, are produced by a standard method involving extrusion of the already mixed dry binder/pigment/filler/additive mixture at temperatures between 90°C-130°C in co-kneaders or twin-screw extruders. The dispersing and wetting properties are determined by the type of extruder, the temperature, and the retention time, as well as by the melt viscosity and the wetting characteristics of the binder. It is also expected that there will be no increase of viscosity during the extrusion following an unwanted pre-reaction of the components.

From this, it follows that, as far as dispersing and wetting of the pigments or fillers are concerned, powder coatings become less favorable than liquid coatings even at the production stage.

CRITERIA FOR FLOW

Even more unfavorable are the pre-conditions which exist between liquid and powder coatings during application. Liquid paints immediately form a closed film. After application onto the substrate, powder coatings, which are comprised of pulverized solid particles, form a powdery layer which has many air inclusions so that a closed film can only be formed by heating above the melting point of the binder to allow the air to escape. Therefore, good flow properties of powder coatings will depend on their rheological behavior, where the following criteria apply¹⁻⁵: melt viscosity, reactivity, functionality, surface tension, pigment volume concentration (PVC), heating rate during crosslinking, and film thickness.

As a rule, a very low melt viscosity should produce good leveling behavior. This is because weak intermolecular attraction forces offer only marginal resistance to the flow of the coating. However, in practice, this effect has limitations since a viscosity which is too low can cause

Presented by Lawrence Wasowski, of AZS Corp., at the 65th Annual Meeting of the Federation of Societies for Coatings Technology, in Dallas, TX, on October 7, 1987.
*7013 Domat/EMS, Switzerland.

problems with edge covering of the items to be coated, and even runners on vertical surfaces. Also, low melt viscosity binders usually have low molecular weights; thus having low softening points which do not impart sufficient physical storage stability to the powder coatings produced from them. The means of improving the flow of higher molecular weight binders usually involve the use of dispersing agents which become concentrated on the surfaces of the pigments and fillers, thus improving the wetting and fineness of the dispersion and thereby reducing the melt viscosity.

Other criteria which influence the flow of thermosetting powder coatings are the functionality of the binder and its reactivity. Binder systems with high reactivity, i.e., a high crosslinking rate, low curing temperatures, and short curing times are possible. However, they shorten the time period before reaching the gel state. This has to be long enough to allow a film with an attractive surface to be formed, as fusion on the substrate is followed by an increase in viscosity. The crosslinking rate is influenced by the functionality, i.e., the degree of branching of the binder or of the crosslinking components, as well as by the accelerator whose behavior should be completely latent during the manufacture of the powder coating during the extrusion. At temperatures above the curing temperatures, these accelerators should efficiently promote the crosslinking reaction.

An ideal binder system for powder coatings should possess sufficient functionality to achieve the required degree of crosslink density in the totally cured state. At the same time, it should provide a linear, smooth initial increase in viscosity during the molten state, thus not influencing greatly the flow properties. However, as soon as a closed film has been formed and the air inclusions totally expelled, the completion of the crosslinking reaction should be reached as swiftly as possible to avoid overlong curing times.

The curing conditions also influence the rheological behavior and thus, the appearance of the coatings. It is particularly important with fast-curing powder coatings that the heating time until the required curing temperature is

reached, is kept short, thus avoiding an undesirable viscosity rise during the melt state. An optimum substrate wetting and the formation of smooth surfaces are then possible. Insufficient substrate wetting can easily cause adhesion problems and inadequate anticorrosion properties.

The surface tension is of considerable importance for the wetting of the pigments or fillers during extrusion, the wetting of the substrates which are to be covered, and, in particular, for the complete removal of included air and the appearance of the crosslinked surface. A low surface tension will, of course, promote the wetting characteristics during manufacture and application, but it can also cause surfaces to manifest marked sinusoidal waves. High surface tensions have bad wetting properties. On the other hand, they try to reduce the total surface area, thus producing much smoother and stress-relieved surfaces leading to a better appearance. Another important disadvantage of a too high surface tension is the increased likelihood of crater or pinhole formation which is undesirable. The surface tension of powder coating binders is not greatly influenced by the synthesis of such products, so that it can be appropriately adjusted by the addition of additives, such as leveling agents, defoamers, etc.

POLYESTER RESINS FOR 93/7 TGIC SYSTEMS

General

The aim of the work reported here was to develop new polyester resins for the formulation of polyester/TGIC powder coatings having improved flow properties compared to the prior art.

If, in considering the previously mentioned discussions, we regard the rheological behavior as an important criterion for the flow characteristics of powder coatings, it becomes apparent that the factors to be improved over the prior art are: melt viscosity, functionality, and reactivity. Therefore, our research work was concentrated on these parameters while not forgetting the other objective, namely, a curing between 160°-200°C within 5 to 15 min

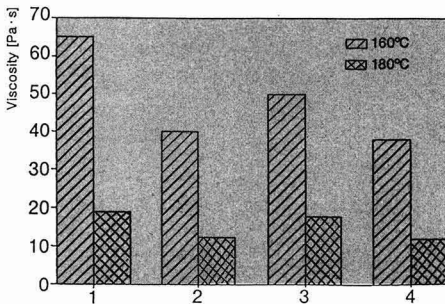


Figure 1—Melt viscosities of polyester resins in Pascal-seconds at 160 and 180°C. 1: prior type, normal curing; 2: newly developed type, normal curing; 3: prior type, low temperature curing; 4: newly developed type, low temperature curing

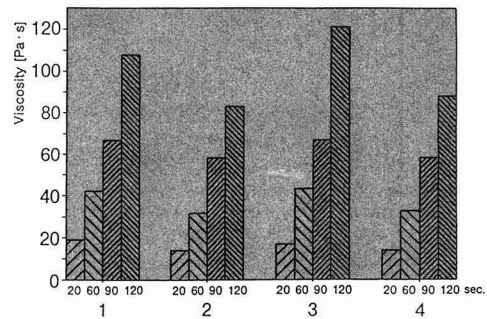


Figure 2—Melt viscosities of commercially ready powder coatings on curing, in Pascal-seconds conducted at 160°C. 1: prior type, normal curing; 2: newly developed type, normal curing; 3: prior type, low temperature curing; 4: newly developed type, low temperature curing

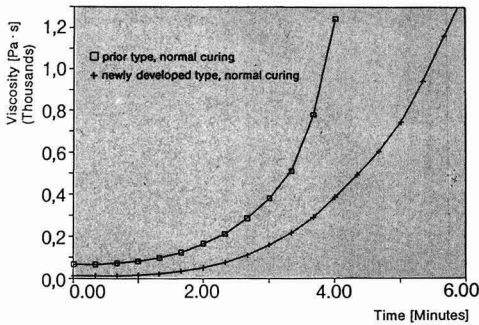


Figure 3—Viscosity on curing for normal curing type polyester powder coatings in Pascal-seconds at 180°C

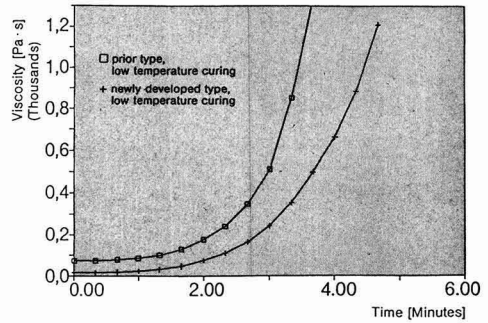


Figure 4—Viscosity on curing for low temperature curing type polyester powder coatings in Pascal-seconds at 180°C

with the retention of all coating properties and weathering resistance specific to this binder system.

After optimizing the viscosity, functionality, and reactivity so that only a small viscosity rise in the molten state occurred, thereby allowing enough time for the formation of a good leveling film with a rapid total crosslinking in the gel state, we were able to conclude that complete curing is not possible in under 15 min at 160°C. As a consequence, two new polyester resins were developed. The "normal curing" type undergoes complete crosslinking in 5 min at 200°C or 20 min at 165°C, while the "low temperature curing" type cures in under 15 min at 160°C. Both of these products satisfy the requirement of better flow properties compared to the prior art, as described in the following sections.

Resin Melt Viscosities

Figure 1 shows a comparison between the melt viscosities of the pure resins at temperatures of 160°C and 180°C and the melt viscosities of resins according to the prior art. At 160° and 180°C, both new types, i.e., the normal curing and the low-temperature curing resins, have lower melt viscosities.

Powder Coating Melt Viscosities

Much more significant, however, are the viscosities of commercially ready powder coatings.

The production and composition of the tested powder coatings were, in all the tested samples, identical. Each sample was made up of: 60.0 wt% resin/hardener, 39.0 wt% titanium dioxide (Kronos® 2160), 0.5 wt% flow control agent (Acronal® 4F), and 0.5 wt% benzoin, and produced in a Buss co-kneader.

The viscosity measurements (see Figure 2) after 20, 60, 90, and 120 sec at 160°C were taken using an ICI-cone/plate viscosimeter (DIN 53229) after a heating period of 40 sec.

After 20 sec, the newly developed products exhibit viscosities which are lower by more than 25%. The rise of

viscosity is much slower so that the flow of these products does not meet much resistance and more time is available for leveling.

Figure 3 shows the comparison between the viscosity behavior of the normal curing type and a previously used type at 180°C, i.e., at a normal curing temperature for these coating systems, as a function of time, after a heating period of 20 sec. Noticeable are the different initial viscosities, the different viscosity rises in the molten state, and the very early transition into the gel state. With the previously used type, there is much less time available for the formation of the film due to the rapid rise in viscosity; the gel state is reached in approximately 3.5 min. The newly developed polyester reaches the gel state in approximately 5 min.

Figure 4 depicts similar behavior. A comparison is shown between the new low temperature or quick curing product and a conventional product under the same curing conditions.

The initial viscosity of the conventional product is higher and rises very rapidly after the first minute. The gel state is reached in about 3 min. The viscosity of the newly developed product rises more evenly, with the gel state being reached in approximately 4 min.

The much more favorable rheological behavior of the new product does not necessarily extend the curing time. Complete curing is reached in the same time period as before. It seems, therefore, that the viscosity rise in the molten state proceeds more or less linearly while the

Table 1—Required Curing Conditions for Normal Curing Powder Coatings

Object Temp. in °C	Cure Time in min	Erichsen Penetration in mm		Reverse Impact in in.-lb	
		1 ^a	2 ^b	1	2
200	5	>10	>10	>160	>160
180	10	>10	>10	>160	>160
165	20	>10	>10	>160	>160

(a) Prior state-of-the-art product.
(b) Newly developed product.

Kronos is a registered trademark of Titan Company, A/S, Christiania, Norway.
Acronal is a registered trademark of Badische Anilin- & Soda-Fabrik Aktiengesellschaft, Ludwigshafen (Rhine), Germany.

Table 2—Required Curing Conditions for Low Temperature Curing Powder Coatings

Object Temp. in °C	Cure Time in min	Erichsen Penetration in mm		Reverse Impact in in.-lb	
		1 ^a	2 ^b	1	2
		200	3	>10	>10
180	8	>10	>10	>160	>160
165	12	>10	>10	>160	>160
160	15	>10	>10	>160	>160

(a) Prior state-of-the-art product.
(b) Newly developed product.

crosslinking only starts at the end of the molten state or during the gel state, but then proceeds very quickly.

Required Curing Conditions

Table 1 shows the curing times taken to obtain good coating properties at different temperatures for a normal curing powder coating type. Although the rheological properties are quite different, the full penetration and impact values are obtained in 20 min at 165°C and there is no difference between the absolute values. Table 2 shows the same values for the low temperature or quick curing system. It is evident that the full coating properties are reached in only 15 min at 160°C, despite the slower viscosity rise and the longer flow time.

DSC Results

Differential Scanning Calorimetry (DSC) and kinetic measurements according to ASTM E 698 were carried out. The results are shown in Figures 5-8 and confirm that total chemical crosslinking has been completed, while at the same time the full coating properties of the powder coating have been achieved. From Figure 5, we can see the temperature and time dependence of the degree of conversion for the newly developed normal curing polyester type. The DSC results are comparable to the required curing times obtained by standard coating tests, e.g., 5 min at 200°C, 10 min at 180°C, and 20 min at 165°C, respectively. Figure 6 shows that after curing under these conditions, any residual enthalpy is equal to zero and the glass transition temperatures remain constant. Therefore, the crosslinking reactions between epoxy and carboxyl groups are completed. Quite similar

Table 3—Evaluation of Flow Properties According to DIN 53230

Evaluation	Normal Curing		Low Temperature Curing	
	1 ^a	2 ^b	1	2
Evaluation	2-3	1	3	1-2

(a) Prior state-of-the-art product.
(b) Newly developed product.

Rating scale: 0—excellent; 1—very good; 2—good; 3—moderate; 4—bad; 5—no flow.

Table 4—Gloss Results After Quick Weathering For 1000 hr on SUNTEST^a Instrument

Powder Coating	Color	% Gloss, 60°		
		Initial	Residual	% Change
Normal curing	White (RAL9001)	93	86	92.5
	Red (RAL3016)	91	82	90.1
	Brown (RAL8014)	91	75	82.4
Low temperature curing	White (RAL9001)	89	88	98.9
	Red (RAL3016)	92	80	87
	Brown (RAL8014)	92	75	81.5

(a) SUNTEST instrument from Original-Hanau-Quarzlampen GmbH, with xenon lamp corresponding to daylight D 65, luminous intensity 150 KLux, blackboard temperature ca. 40°C, with flood/irradiation cycle of 3/17.

relationships have been found (see Figure 7) for a powder coating based on the newly developed low temperature curable polyester. In Figure 7, as shown previously, the conversion functions are plotted between 160°-200°C. In Figure 8, the DSC profiles relate as before to the standard coating tests at the same temperatures. It can also be seen from Figure 8 that, for this polyester, the completion of the curing reaction is equivalent to the most favorable balance of coating characteristics under the given conditions.

Flow Properties

As shown in Table 3, the flow properties—important for powder coatings based on the newly developed polyester types—were assessed visually according to a scale recommended in DIN 53230. Excellent flow properties, i.e., an evaluation equal to zero, were obtained by using a commercial, acrylate-based paint. The improvements that were obtained over the prior art are easy to see. Both the normal curing coating and the low temperature curing system have changed from moderate to good or very good.

Weathering Results

It was possible to achieve the improvements with respect to flow properties while retaining the weathering resistance usual for polyester/TGIC powder coatings. Table 4 shows the loss of gloss after 1000 hr of SUNTESTER (of the Original-Hanau-Quarzlampen GmbH) quick weathering. A minimum of 40% of the original gloss must remain after completion of 1000 hr of quick weathering in the SUNTESTER to conform with the German specification for the use of weather resistant powder coatings for coating aluminum components. These are used for aluminum sections in window or door frames, facade units, etc. This German specification is laid down by the Guetgemeinschaft für die Stueckbeschichtung von Bauteilen (GSB), an association of coatings manufacturers and constructors for anodized aluminum building products. The tests were carried out at a black-panel temperature of 40°C with a flood/irradiation-cycle of 3 and 17 min. Three colors are specified, namely, white (RAL 9001), red (RAL 3016), and brown (RAL 8014) for the test. Both systems satisfy the set demand without

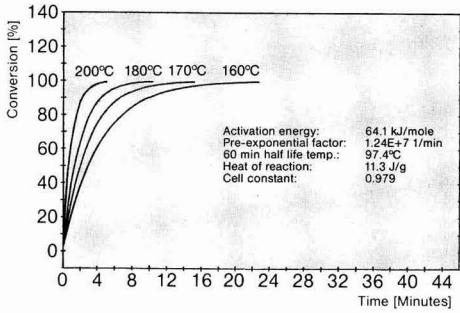


Figure 5—Degree of cure dependence for newly developed normal curing polyester powder (Grilesta V 73-7) as derived by DSC Stability Kinetics (ASTM E 698) V 1.0

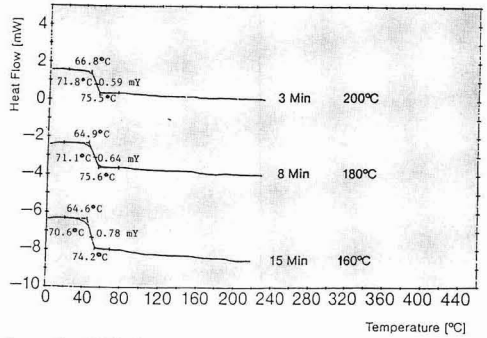


Figure 8—DSC thermograms for newly developed low temperature curing polyester powder coatings (Grilesta V 73-9) at three curing temperatures. Sample size: 9.2 mg; rate: 20°C/min; on DuPont 1090

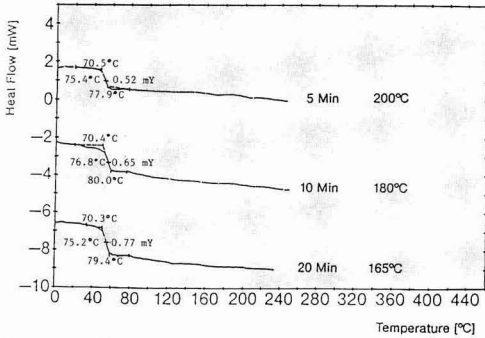


Figure 6—DSC thermograms for newly developed normal curing polyester powder coatings (Grilesta V 73-7) at three curing temperatures. Sample size: 10.1 mg; rate: 20°C/min; on DuPont 1090

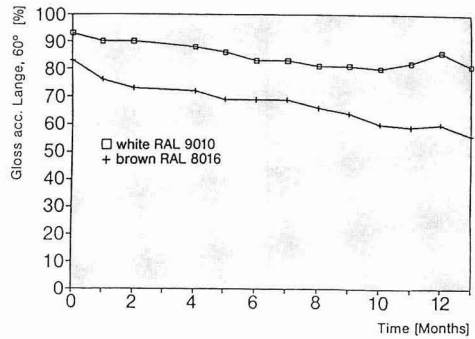


Figure 9—Gloss retention for new normal curing polyester powder coatings on Florida exposure; test plates unwashed

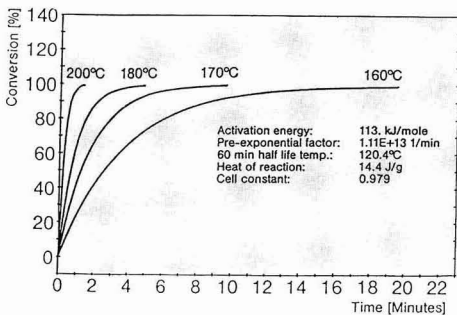


Figure 7—Degree of cure dependence for newly developed low temperature curing polyester powder (Grilesta V 73-9) as derived by DSC Stability Kinetics (ASTM E 698) V 1.0

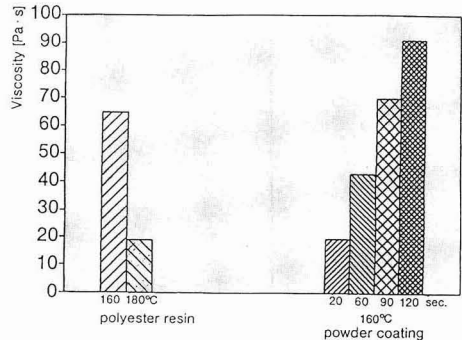


Figure 10—Polyester melt viscosities and powder coating viscosity changes on curing to 95/5 polyester; viscosities in Pascal-seconds

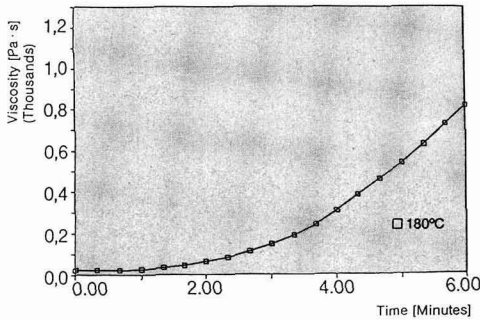


Figure 11—Viscosity on curing for 95/5 type polyester/TGIC powder coating at 180°C

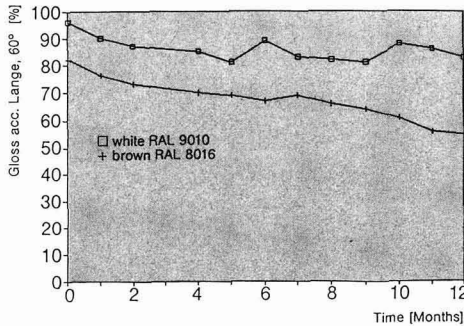


Figure 12—Gloss retention for 95/5 type polyester/TGIC powder coatings on Florida exposure; test plates unwashed

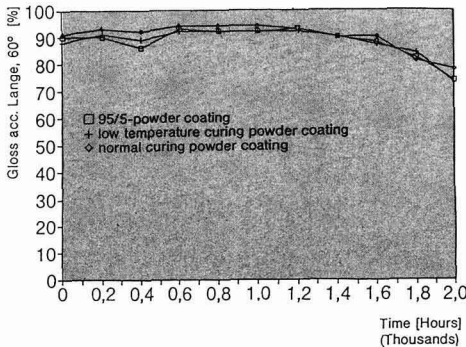


Figure 13—Gloss retention after 2000 hr in Weather-Ometer for three white powder coatings based on two 93/7 type polyesters and the 95/5 type polyester

Table 5—Required Curing Conditions for 95/5 Type Polyester/TGIC Powder Coating

Object Temp. in °C	Cure Time in min	Ericksen Penetration in mm	Reverse Impact in in.-lb
200	8	>10	>160
180	10	10	140
	12	>10	>160
165	20	>10	>160

problems in spite of the fact that previous experience has shown low temperature curing powders to be problematic. The red and brown colored coatings, especially, have difficulty in reaching the required 40% gloss maintenance.

Figure 9 shows the plot of the degree of gloss, measured at 60° for white (RAL 9010) and brown (RAL 8016), during a period of 13 months of Florida weathering. The degree of gloss was measured on unwashed test plates and the loss of gloss corresponds to the values usual for polyester/TGIC powder coatings. The GSB values require a remaining 50% gloss after 12 months' weathering.

POLYESTER RESIN FOR 95/5 TGIC SYSTEMS

The good results and the knowledge obtained during the development of the new polyester resins combined with TGIC in a ratio of 93:7 motivated us to carry out further experiments with the aim of reducing the TGIC content, since this is relatively expensive. The result of this work was a polyester resin with a ratio of polyester to TGIC of 95:5. It has a sufficient crosslink density with excellent coating properties and good to very good flow properties.

Melt Viscosities

Figure 10 shows (on the left) the melt viscosities of the new polyester resin at 160 and 180°C. At both temperatures, the value of the melt viscosity is equivalent to that of the standard 93/7 polyester resins. The melt viscosity of the prepared powder coating after 20, 60, 90, and 120 sec at 160°C is plotted on the right side. Viscosities are also shown which are comparable after 20, 60, and 90 sec to the prior 93/7 systems, while after 120 sec a value is obtained which is as low as that for the newly developed 93/7 systems. The rise in viscosity in the molten state

Table 6—Gloss Results on 95/5 Type Polyester System After 1000 hr Weathering on SUNTEST® Instrument

Color	% Gloss, 60°		
	Initial	Residual	% Change
White (RAL9001)	89.5	84	93.9
Red (RAL3016)	81.9	68	83.0
Brown (RAL8014)	81.4	42	51.6

(a) SUNTEST instrument same as in Table 4.

also proceeds relatively uniformly so that there is sufficient time for the formation of the film. The measurement of the viscosity was made after 20 sec heating time and using the same formulation as described previously, i.e., 60 wt% resin/hardener.

The favorable viscosity curve is even more evident in *Figure 11* where the viscosity at 180°C is plotted. It can be seen that the transition to the gel state at this temperature occurs after only 5 min.

Required Curing Conditions

It is surprising that even the 95/5 system requires only a relatively short curing time in spite of the relatively long gel time. *Table 5* shows the curing times required to obtain the full coating properties at various temperatures. With this product, it also appears that after reaching the gel state the complete degree of crosslinking is obtained very rapidly.

Weathering Results

It is clear that the gloss results obtained during 13 months of Florida weathering (see *Figure 12*) indicate that the weathering resistance corresponds to ordinary 93/7 systems. The tests were carried out on white and brown pigmented coatings and the measurement of the degree of gloss at 60° was performed in the original state, i.e., the test plates were unwashed. *Table 6* shows that the 95/5 system has met the requirements for coatings of structural components as laid down in the relevant standards for West Germany.

Figure 13 shows the Weather-Ometer® (Atlas Electric Devices Co.) test according to ASTM G 26-77 with a xenon lamp, 63°C black-panel temperature, 0.35 watts per square meter power at 340 nanometers, and a flood/irradiation-cycle of 18 and 102 min. Comparisons are made between white powder coatings obtained from the

95/5 polyester resin and the new normal and low temperature curing polyester resins. It is also clear that, after 2000 hr of exposure, there are no differences between these systems aged under the mentioned accelerated testing method.

SUMMARY

The basic differences between liquid and powder coatings concerning the various wetting and flow properties have been described. The relevant criteria, especially the influences of melt viscosity, functionality, and reactivity on the rheological behavior and on the flow properties of powder coatings have been discussed.

By optimizing these criteria, a normal and a low temperature curing polyester resin were developed for the formulation of weather resistant polyester/TGIC powder coatings in the ratio of 93:7. These systems possess much better flow properties when compared to the prior art, while at the same time retaining the current standard curing conditions, weather resistance, and excellent coating properties.

A polyester resin was also developed with a ratio of polyester resin to TGIC of 95:5, possessing adequate crosslinking density, excellent coating properties, and improved flow qualities compared to the prior art after curing under normal conditions.

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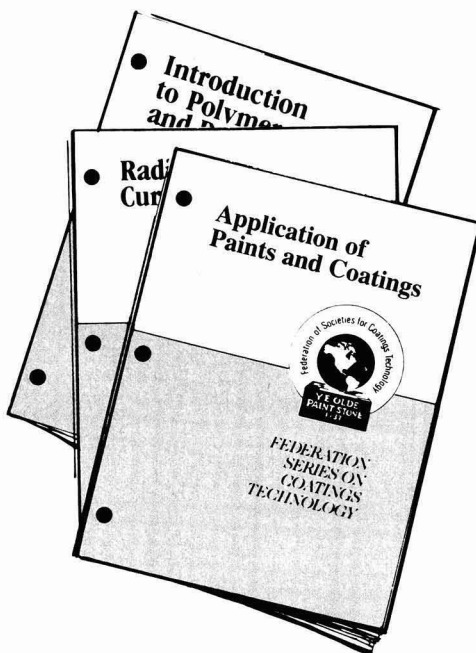
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The theme of the 1987 Annual Meeting of the Federation of Societies for Coatings Technology, "People and Technology: Cornerstones of Progress," recognized that the people who make up the industry are its most valuable resource. The program session "Tools for Professional Success in the Coatings Industry," jointly organized by the Program Committee and the Professional Development Committee, was dedicated to training these vital workers. It provided an overview of the functions of the various business groups within the coatings industry, with special attention given to how each relates to the technical group. The speakers offered an excellent view of the current thinking and knowledge which are important to professional and personal growth and development. The papers presented focused on statistical process control, communication, the technical person in relation to his specific environment, and the ideal function of a total organization.

TOOLS FOR PROFESSIONAL SUCCESS IN THE COATINGS INDUSTRY—A SUMMARY

**By Gretchen L. McKay, Owner, Milton Hill Associates
And Richard J. Himics, President, Daniel Products Company**

As moderator for this session, Richard G. Anderson, Vice President of DeSoto, Inc., shared the insight he gained throughout his 30-year career in the coatings industry. In his opening remarks, he stated that personal and professional growth depend upon an individual having a set of beliefs about himself or herself. The first belief is that in order to understand your company, the industry, and the business environment, you must invest time and effort outside your job. Secondly, believe that you can make an important contribution and to do so, you must act intelligently and energetically in this direction. Finally, real success requires not only support from those around you but also the belief that they, in turn, can teach you.

The first speaker, John A. Gordon, of Eastern Michigan University, described the ideal functioning of a total organization. In "Nothing Happens Until Someone Sells Something," he stated that changing circumstances make it more difficult to be successful. The Coatings Industry is fiercely competitive and now works under serious limitations from governmental regulations, such as the Clean Air Acts (1970, 1977), heavy metals regulation, and hazardous waste management. Hazardous waste disposal looms as an especially troublesome and costly area. The coatings market is shrinking because the materials of construction are changing and our own markets are being lost to manufactured goods which are coated overseas and subsequently sold in this country. Larger companies are buying smaller ones and, frequently, the purchasers are divisions of overseas conglomerates.

In the end, success must be measured by a profitable return which will fuel the business and keep it going. This also makes it imperative that all parts of a company work together closely and effectively to improve market position. The linkage between Development, Production, and Marketing of products is often forgotten or not understood. In order for this cooperative effort to be most productive, persons in each department must know the basic goals of the company and understand how their work can best help to reach these objectives.

For example, technical people often do not understand the problems of marketing. Formulas must not only meet the stated parameters of performance but they also must contribute to the attainment of the customer's goals. After analyzing the market, it is the job of marketing to define and convey those goals to the formulator, emphasizing company strengths, and to select targets based on the account's market share, the probability of success, the potential impact that success will have on the rest of the market, R&D time required, and elapsed time necessary to produce profitable sales volume. In turn, the technical group must develop a product that will satisfy the customer while reaching their own company's goals. Success depends on real teamwork, which can be well coordinated through the task force approach. The task force plans the strategy and periodically reviews progress among all the functions involved. Members must also recognize that the coatings business is very conservative. The entire process of analyzing the market, deciding where the company should go, picking the targets, setting up a

task force, following up on the plans and actions, and repeating the cycle when new targets are established, depends on people and their informed contributions to a team effort.

In "Managing R&D Staffs—A Productivity Tool," James M. Butler, of Enterprise Coatings, discussed the special management needs of today's researchers. His comments were focused on the new breed of workers emerging in the United States—the "knowledge workers." These people, who make their living with their brains instead of through physical labor, have unique outlooks and management style requirements.

Effective management of the knowledge worker is important because brain power will play a central role in the market and in the economic success of companies in the future. It can help establish the key competitive edge that all companies need to survive in the competitive business climate of today.

Knowledge workers are much different from the workers managers most readily understand. Creative and personally independent, they often know more about their jobs and assignments than do their managers. They demand participation in every part of their job, as well as a high level of freedom and flexibility to set their own priorities, while at the same time generating new and challenging projects and assignments for themselves. Their work involves solving complex problems, collecting data, processing data, analyzing data, and disseminating information.

Managers must understand that knowledge workers tend to have values and prac-

tices more parallel to the socio-cultural values of our society today—self-management, self-interest, diversity, entrepreneurship, and innovation. To motivate these workers, opportunities and environments which allow them to be self-motivated and to act out their roles in life as they deem appropriate must be established and created. Furthermore, to facilitate the work of

Specific products are successfully introduced with SPC techniques when information, shared by the SPC manager and developmental chemist, is monitored and corrective action taken when necessary. If these two individuals do not share the same short-term goals they may lose sight of their collaborating mission. The SPC manager must then assert his authority, not

product which is saleable. Once specifications are set, the paint chemist must *design* an efficient formula that meets specifications at minimum cost, *evaluate* alternative materials, *examine* new materials and technologies, and *simplify* the formula—thereby reducing chance for error and generating a more consistently producible formulation. For the technical professional, a successful project conclusion generates pride of accomplishment—a prime motivational drive.

It is the responsibility of manufacturing to produce products that conform to product and package specifications as outlined by R&D and Marketing, and to meet the timing and volume of sales demand. Manufacturing must remain dynamic in its pursuit of internal improvement. It must strive to *minimize* operational cost, *increase* flexibility, *evaluate* new equipment and procedures, and *streamline* the process flow (process simplicity reduces the potential for problems, yielding less downtime). For the manufacturing professional, a fast-paced environment provides quick reinforcement of pride in a successfully accomplished project.

Although the technology utilized by each department is different, the departments' functions are conceptually the same: designing a marketable product is comparable to producing quality products on time (getting the customer what he wants when he wants it) and designing an efficient formula correlates with improving manufacturing system (similar thought processes are required for proper design of either system). Both departments share pride of accomplishment (desire to improve self-esteem, a basic human trait).

If one accepts that the conceptual functions and objectives of R&D and Manufacturing are really quite similar, and dis-

“Specific products are successfully introduced with SPC techniques when information, shared by the SPC manager and developmental chemist, is monitored and corrective action taken when necessary.”

the knowledge worker, the manager can no longer be the boss. He must instead be an associate, supplying and directing resources when and where they are needed.

Organizations employing these workers require a new approach to achieve their goals. First, they must find what their customers need. They then need to consult with the knowledge worker and other employees about how those needs can best be satisfied. Achieving the goals of all concerned requires that the customer, the organization, the knowledge workers, and the organizational structure follow the customer mission and work toward this end result.

Taki J. Anagnostou, of Eastern Michigan University, presented “The SPC Manager and Development Chemist: Keys to SPC Implementation.” He began by stating that SPC is an excellent concept. It is one that company operation executives, once exposed to its basic principles, enthusiastically endorse. However, this enthusiasm quickly turns to discouragement as those executives see that SPC techniques, when properly applied and properly enforced, can be disruptive to normal operations. How a company reacts during this initial stage will often give insight into the overall success or failure of their SPC program.

Failure to achieve expected improvements from the SPC techniques is frequently due to lack of communication between the SPC manager and the company's development chemists. Although trained in the mechanics of SPC, the SPC manager may not be all that knowledgeable in coating formulation, manufacture, and application. It is the development chemist who has this expertise and must specify the correct evaluation tests and the acceptable variability which identify the performance of a coating. No one can perform this task more appropriately than this individual.

only with the development chemists, but also with the other parts of the organization (such as manufacturing, accounting, sales, etc.). Without in-depth knowledge of the coating operation, including product development and manufacturing, there is no way an SPC manager can exert such a dominant leadership role.

The key to success for any SPC operation is coordination between the SPC manager and the development chemists. Without the input and cooperation of these chemists, SPC implementation in a coating manufacturing operation is doomed to failure.

As Manufacturing Manager of General Paint and Coatings, Richard M. Hille has hands-on experience with the question “R&D and Manufacturing: Partners or Ad-

“Improvement of communication requires the proper placement of competent, skilled people and the opportunity/mechanism to communicate effectively.”

versaries?” He states that it is often heard that the primary reason R&D and Manufacturing have difficulties is that their basic methods of operation, ultimate goals, and objectives are significantly different. But if each department's goals and motivators are reviewed, it is seen that their respective goals and objectives are extremely similar.

The first and foremost objective of any coatings R&D laboratory is to design a

counts the divergent technology utilized, what tends to create adversarial relationships? The author suggests that the root cause for disruptions at the R&D/Manufacturing interface is based on one or a combination of two personal relationship-type factors: true incompetence (when professional judgement and decisions are habitually incorrect, forming adversarial situations) and communication failure (inability

to effectively communicate problems, concerns, and requirements).

The prevention or correction of incompetence should begin in the interview/hiring process, and continue with on-the-job as well as external training in both technical and interpersonal skills. Improvement of communication requires the proper placement of competent, skilled people and the opportunity/mechanism to communicate effectively. Suitable liaison personnel, quality circles and the like, and informal meetings provide both mechanisms and opportunities for the appreciation of other's concerns and problems that lead to better team work. This is required to meet long term common objectives and the ultimate goal that both functional departments have, i.e., to provide the customer what he wants, when he wants it, and at a price he is willing to pay.

In "Communicating the Technical Word," Gretchen McKay, of Milton Hill Associates, discussed how important it is for chemists in the coatings industry to become proficient technical communicators. These communication skills are the key to interfacing with others successfully. They will enable the technical person to communicate ideas, opinions, observations, and recommendations to people in research and development, marketing, management, production, and sales, as well as customers and clients.

Technical communication has two goals. The first is to transmit accurate technical information to both technically and non-technically oriented individuals. This may be in the form of laboratory results, research reports, formal presentations and papers, and technical proposals. The second goal of technical communication is to

persuade an individual or group of people to act in a predetermined manner. We achieve this by offering a clear, objective presentation of the relevant facts supporting our ideas.

To communicate well requires that four basic steps be followed: plan, write, revise, and evaluate. In the planning stage, the purpose, audience, approach, and information to be included will be defined. Because people in technical fields tend to make decisions based on logic and rational thinking, an appropriate organizational sequence will also be selected. Following the plan, the ideas and information selected are then placed on paper in the second stage, writing. Not intended as final copy, it is not necessary to worry about sentence structure, grammar, or punctuation. This will be corrected in the third stage when the writing style is revised into clear, concise, and consistent form. Overworked ideas and jargon will be removed. The reader's interest will be maintained through the use of active verbs, adjectives, and adverbs. During the final stage, evaluation, the material

is reviewed for technical accuracy, persuasion, readability, and content.

In conclusion, communication, whether written or verbal, is often the only contact one individual has with another. It is an image of the writer, his or her ideas, experimental technique, and approaches to the subject. Therefore, the writer must take the responsibility of following the four steps to effective communication and perfecting the communication, making sure that the message sent is the one intended.

This session of the technical program of the Federation Annual Meeting provided all who attended with an opportunity to better understand their work environment and how they can continue to contribute positively to the growth of this very vital industry. As Mr. Anderson stated early in the program, to realize our greatest potential requires more than just an understanding of the technical, economic, and social factors which impact us. We must also realize it is not our education that gives us prosperity, but it is our prosperity that enables us to continue our education.

The Professional Development Committee of the Federation of Societies for Coatings Technology will sponsor the program session "Advanced Topics in Coatings Research," at the 1988 Annual Meeting of the Federation at McCormick Place, Chicago, IL, on October 19-21, 1988.

The program session will feature the following subject matter:

"Importance of Physico-Chemical Aspects in the Design of Powder Paint Resins," by P.J. Greidanus, of DSM Resins BV, The Netherlands;

"Evaluation of Preservatives: Designing the Optimal Test System," by P.K. Cooke, U.R. Gandhi, E.L. Leasure, and E.S. Lashen, of Rohm and Haas Co.;

"Surface Chemistry of ZDP, A Lubricant Additive," by K.L. Rhodes and P.C. Stair, of Northwestern University; and

"Current Studies of Curing and Polyester-Melamine Enamels; Possible Effects on Coating Performance," by S. Gan, R.D. Solimeno, and F.N. Jones, of North Dakota State University, and L.W. Hill, of Monsanto Co.



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Society Meetings

HOUSTON APR.

"Predispersed Polyethers and Waxes"

Elio Cohen, of Daniel Products Co., spoke on "ADVANTAGES OF PREDISPERSED POLYETHERS AND WAXES IN HIGH PERFORMANCE COATINGS." Mr. Cohen is a member of the New York Society.

The talk focused on wax additives and their uses in industrial finishes to improve surface properties of the paint in OEM, can coatings, wood finishes, and metal finishes. According to the speaker, the waxes lower the coefficient of friction and give greater apparent film hardness. Mr. Cohen stated that scratch, mar, scrub, and rub resistance are thus improved. The speaker used a slide presentation to illustrate his points.

The main detriments when using wax additives are loss of gloss, film clarity, and incorporation difficulty, said Mr. Cohen. He stated that the use of predispersed versions of polyethylene waxes will eliminate incorporation problems.

SANDRA SWIFT GIDLEY, *Secretary*

KANSAS CITY MAY

Officer Elections

The following members are named officers for 1988-89: President—Nick F. Dispensa, of Davis Paint Co.; Vice President—Roger Haines, of Tnemec Co., Inc.; Secretary—Mark Algaier, of Hillyard Chemical; Treasurer—H. Jeff Laurent, of F.R. Hall, Inc.; and Society Representative—Norman A. Hon, of Cook Paint & Varnish Co.

Federation Past-Presidents in attendance included J.C. Leslie (1974-75), Federation and Society Honorary Member, and Terry F. Johnson (1983-84), of Cook Paint & Varnish Co.

Educational Committee Chairman James J. O'Brien, of Du Pont Co., presented the FSCT Educational Committee's videotape, "The Choice," which promotes careers in the coatings industry.

NICK F. DISPENSA, *Secretary*

LOS ANGELES MAY

Awards Night

The following members in attendance were presented 25-Year Pins: Robert Q.

Hunter, Retired; L. Lloyd Haanstra, of Decratrend Corp.; Gerrard Salomon, of Custom Printing Inks; and Gerald L. West, of Decratrend Corp.

Also awarded 25-Year Pins but unable to attend were: G.J. Lauricella, of Reichhold Chemicals; Kenneth J. O'Morrow, of Oil & Solvent Process Co.; Frank Oppitz, of Sinclair Paint Co.; Herbert A. Wells, Retired; and Peter J. Hearst, of Naval Civil Engineering Lab.

Southern Society member Dan M. Dixon, of Engelhard Corp., discussed "UNDER UTILIZED KAOLIN."

The speaker talked about the recent history of calcined and specialty hydrous kaolin. In the opinion of Mr. Dixon, there is a grade of kaolin which has been very much under utilized by the coatings industry. He explored the attributes and limitations of this kaolin, with primary emphasis given to its physical performance contributions to coatings.

Q. Could wet scrub resistance be improved by calcining the delaminated clay?

A. Yes, you could but, unfortunately, you lose the advantages of delaminated clay with regard to porosity.

Q. Is delaminated clay better for chalking properties in exterior paints than calcined?

A. It depends on the PVC of the paint. At the same PVC, delaminated will outperform calcined.

JAMES F. CALKIN, *Secretary*

NEW ENGLAND MAY

Tech Expo

A moment of silence was observed in memory of Bruce Ocko, of The Truesdale Co., who died recently. Mr. Ocko was active in the preparation of the Tech Expo program.

The meeting was held in conjunction with second and final day of Tech Expo '88. The exposition total of approximately 330 registrants was the largest ever for Tech Expo.

Members elected to officer positions for 1988-89 are: President—Gail Pollano, of ICI Resins U.S. (formerly Polyvinyl Chemicals); Vice President—Roger Woodhull, of California Products Corp.; Secretary—Arthur Leman, of Samuel Cabot,

Inc.; Treasurer—Joseph T. Schrody, of Unocal Chemicals Div.; and Society Representative—Maureen M. Lein, of Davidson Rubber Co.

The meeting's speakers were Shelby Scott and John Henning, local newscasters from WBZ-TV. The open question and answer format focused on the political scene, the broadcasting industry, and the newscasters.

JOSEPH T. SCHRODY, *Secretary*

NORTHWESTERN MAY

"VOC Problems"

Officers elected for 1988-89 are: President—Richard W. Karlstad, of Ceramic Industrial Coatings; Vice President—Mark W. Uglem, of Hirschfield's Paint Mfg. Co.; Secretary—Terry Strom, of Ti-Kromatic Paints, Inc.; Treasurer—Daniel W. Dechaine, of Valspar Corp.; and Society Representative—Richard L. Fricker, of Valspar Corp.

Society member Al Heitcamp, of Cargill, Inc., talked on "VOC PROBLEMS AND PROPOSITION 65 IN CALIFORNIA."

Mr. Heitcamp discussed Proposition 65 and the problems it presents for the chemical industry. He stated that because of the manner in which Proposition 65 is written, courts can award one-fourth of any assessed pollution penalties to citizens who report the violations to the authorities. Also, the law requires warning labels for many suspected cancer causing agents on most consumer items, said Mr. Heitcamp.

The second speakers were Kate Kaering and Ray Erland from the Minneapolis Age and Opportunity Commission. They spoke on the "UTILIZATION OF MATURE WORKERS," focusing on those defined by the government as in the 45 and over age group.

MARK W. UGLEM, *Secretary*

PITTSBURGH MAY

Spouses' Night

The following members are elected officers for 1988-89: President—Richard G. Marci, of Ball Chemical Co.; Vice President—James Lore, of Watson-Standard Co.; Secretary—Carole Storme, of Valspar Corp.; Treasurer—Joseph Powell, of

Constituent Society Meetings and Secretaries

BALTIMORE (Third Thursday—Snyder's Willow Grove, Linthicum, MD). DONALD HILLIARD, Unocal, 1500 Carbon Ave., Baltimore, MD 21226. **VIRGINIA SECTION** (Fourth Wednesday—Ramada Inn-East, Williamsburg, VA).

BIRMINGHAM (First Thursday—Strathallan Hotel, Birmingham, England). D. A. A. WALLINGTON, Macpherson Drynamels Ltd., Westgate, Aldridge, West Midlands WS9 8YH England.

CDIC (Second Monday—Sept., Jan., Apr., June in Columbus; Oct., Dec., Mar., May in Cincinnati; and Nov., Feb. in Dayton). N. JAY HUBER, JR., Paint America Co., 1501 Webster St., Dayton, OH 45404.

CHICAGO (First Monday—meetings alternate between Como Inn in Chicago, IL and Sharko's West in Villa Park, IL). KEVIN P. MURRAY, DeSoto, Inc., 1700 S. Mt. Prospect Rd., Des Plaines, IL 60018.

CLEVELAND (Third Tuesday—meeting sites vary). ILONA NEMES-NEMETH, Sherwin-Williams Co., Cleveland Technical Center, 601 Canal Rd., Cleveland, OH 44113.

DALLAS (Thursday following second Wednesday—Harvey Hotel, North Dallas, TX). STEVE STEPHENS, Ribelin Sales, Inc., P.O. Box 461673, 3857 Miller Park Dr., Garland, TX 75046.

DETROIT (Second Tuesday—Ukrainian Cultural Center, Warren, MI). LIANA CALLAS ROBERTS, A.T. Callas Co., 1985 W. Big Beaver, Suite 308, Troy, MI 48043.

GOLDEN GATE (Monday before third Wednesday—Alternate between Francesco's in Oakland, CA and Holiday Inn in S. San Francisco). GORDON PLOCH, Triangle Coatings, Inc., 1930 Fairway Dr., San Leandro, CA 94577.

HOUSTON (Second Wednesday—Look's Sir-Loin Inn, Houston, TX). SANDRA SWIFT, Cron Chemical Corp., P.O. Box 14042, Houston, TX 77221.

KANSAS CITY (Second Thursday—Cascone's Restaurant, Kansas City, MO). NICK DISPENSA, Davis Paint Co., P.O. Box 7589, N. Kansas City, MO 64116.

LOS ANGELES (Second Wednesday—Steven's Steak House, Commerce, CA). JAMES F. CALKIN, E.T. Horn Co., 16141 Herron Ave., La Mirada, CA 90638.

LOUISVILLE (Third Wednesday—Executive West Motor Hotel, Louisville, KY). RAYMOND L. MUDD, Porter Paint Co., Coatings Div., P.O. Box 1439, 400 S. 13th St., Louisville, KY 40201-0439.

MEXICO (Fourth Thursday—meeting sites vary). ARTURO ITA, Pinturas Auroilin, S.A. De C.V., Poniente 150 No. 750, Nueva Industrial Vallejo, 02300 Mexico, D.F.

MONTREAL (First Wednesday—Bill Wong's Restaurant, Montreal). ROBERT BENOIT, NL Chemicals Canada Inc., 4 Place Ville-Marie, Ste. 500, Montreal, Que., Canada H3B 4M5.

NEW ENGLAND (Third Thursday—LeChateau Restaurant, Waltham, MA). JOSEPH T. SCHRODY, Unocal Chemicals Div., 90 Cumberland Rd., Leominster, MA 01453.

NEW YORK (Second Tuesday—Landmark II, East Rutherford, NJ). ARTHUR A. TRACTON, Hempel Coatings, Inc., Foot of Curie Ave., Wallington, NJ 07057.

NORTHWESTERN (Tuesday after first Monday—Jax Cafe, Minneapolis, MN). MARK W. UGLEM, Hirschfeld's Paint Mfg., Inc., 4450 Lyndale Ave., N., Minneapolis, MN 55412. **WINNEPEG SECTION** (Third Tuesday—Marigold Restaurant, Winnipeg). 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). EMIL IRAOLA, Olympic Home Care Products Co., 1141 N.W. 50th, Seattle, WA 98107.

PHILADELPHIA (Second Thursday—Williamson's, GSB Bldg., Philadelphia, PA). ORVILLE E. BROWN, M.A. Bruder & Sons Inc., 52nd & Grays Ave., Philadelphia, PA 19143.

PIEDMONT (Third Wednesday—Americana Inn, Greensboro, NC). FOREST G. FLEMING, Reliance Universal, Inc., P.O. Box 2124, High Point, NC 27261.

PITTSBURGH (Second Monday—Montemurro's, Sharpsburg, PA). JAMES LORE, Watson Standard Co., P.O. Box 11250, Pittsburgh, PA 15238.

ROCKY MOUNTAIN (Monday following first Wednesday—Holiday Inn North, Denver, CO). PAUL D. SILVA, Kwal Paints, Inc., 3900 Joliet St., P.O. Box 39485, Denver CO 80239.

ST. LOUIS (Third Tuesday—Salad Bowl, St. Louis, MO). HOWARD JEROME, Mozel Equipment 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). JAMES R. SALISBURY, Union Carbide Corp., 2043 Steel Dr., Tucker, GA 30084-5894.

TORONTO (Second Monday—Cambridge Motor Hotel, Toronto). ROY A. DONNELLY, St. Lawrence Chemical Co. Ltd., 321 Humberline Dr., Rexdale, Ont., Canada M9W 5T6.

WESTERN NEW YORK (Third Tuesday—meeting sites vary). MARKO K. MARKOFF, 182 Farmingdale Rd., Cheektowaga, NY 14225.

Union Carbide Corp.; and Society Representative—Raymond C. Uhlig, of PPG Industries, Inc.

A slide presentation on the "RENOVATION OF THE MEXICAN WAR STREETS AREA" was given by Brian Folts. He gave a brief summary of the influence history has had on the city of Pittsburgh, particularly the Mexican War of 1847.

JAMES LORE, *Secretary*

ST. LOUIS.....MAY

Past-Presidents' Night

The following Past-Presidents attended the meeting: Fred C. Weber, Jr. (1944-45); Bud Hackney (1952-53); George F. Robbins, Jr. (1958-59); Herman J. Lanson (1966-67); Elliott Lanson (1972-73); Robert Hesskamp (1974-75); John Folkerts (1978-79); Charles L. Grubbs (1985-86); and Al Zanardi (1986-87).

Elected to serve as officers for 1988-89 are: President—Robert Wagnon, of Mozel, Inc.; Vice President—Howard Jerome, of Mozel Equipment Co.; Secretary—Terry Ponce Gelholt, of Rockford Coatings Corp.; Treasurer—Stan Soboleski, of U.S. Paint Div.; Society Representative—John Folkerts, of Futura Coatings, Inc.; and Assistant Treasurer—Dennis Cahill, of Archway Chemical & Supply, Inc.

The \$350 prize won in the Materials Marketing Associates Awards Competition at the 1987 Annual Meeting in Dallas, TX, was presented to the Society by Robert F. Walsh, Jr., of Walsh & Associates, Inc. The novel seminar "How to Motivate Your Employees" was the winner in the Class C Competition.

Al Zanardi, of C.L. Smith, will become Chairman of a new Scholarship Committee which will explore alternative procedures for future scholarships.

Bill Arendt, of Velsicol Chemical Corp., was the program speaker. His subject matter was "VELATE 262 ISODECYL BENZOATE: A NEW GENERAL PURPOSE COALESCING AID FOR LATEX PAINT."

The speaker introduced the new isodecyl benzoate which can be used as a coalescing aid to the existing general use type alcohol/ester coalescent (TMPDMB). The isodecyl benzoate is low in odor and less pungent than the alcohol/ester, stated Mr. Arendt. The isodecyl benzoate was evaluated in five commercial type latex paints and the evaluation information was discussed in depth.

HOWARD JEROME, *Secretary*

Elections

BALTIMORE

Active

FOUN, CHEU-CHING—Farboil Co., Baltimore, MD.
KAHAN, LEO—Lasting Paint, Baltimore.
ROBERTS, JAMES F.—Duron Inc., Beltsville, MD.

Associate

TINKER, SCOTT R.—The C.P. Hall Co., Landisville, PA.

BIRMINGHAM

Active

PLAYFORD, ALAN C.—Mander-Domolac Ltd., Clwyd, Wales.
ROY, SUSAN—BASF Coatings & Inks Ltd., West Midland.

CHICAGO

Active

BABINSKI, EDMUND S.—Sherwin-Williams Co., Chicago, IL.
BIERWAGEN, GORDON P.—Avery DPD, Schererville, IN.
FAIRHURST, GEORGE—Ameritek, Addison, IL.
MCGILL, GEORGE T.—V.J. Dolan & Co., Inc., Chicago.
YANG, WENLIANG P.—Sherwin-Williams Co., Chicago.

Associate

AZZARELLO, STEVE M.—Oil Dri Corp. of America, Chicago, IL.
HORATH, RAYMOND F.—SCM Chemicals, Beecher, IL.
PERKINS, JACK H.—SCM Chemicals, Naperville, IL.
MITTON, SANDRA K.—SCM Chemicals, Rockford, IL.
WROBEL, JOSEPH J. JR.—CIBA-GEIGY Corp., Oak Brook, IL.

DALLAS

Active

HARBAUGH, ROSS B.—DeSoto Inc., Garland, TX.

DETROIT

Active

MCCELLIGOTT, TERRENCE J.—Albar Industries, Lapeer, MI.

KANSAS CITY

Active

BARNETT, TERRY L.—K.C. Coatings, Inc., Lenexa, KS.
JACOBS, JOSEPH M.—Cook Paint & Varnish Co., Kansas City, MO.
PEARL, JEFFREY K.—Earl Scheib Auto Paint, Springfield, MO.

NEW YORK

Active

BERCAW, JAMES J.—John L. Armitage Co., Newark, NJ.
HAUSMAN, GEORGE M.—Sun Chemical Corp., Carlstadt, NJ.
JELCIC, RAD M.—Taro Paint Mfg., Brooklyn, NY.
KENNEDY, JOHN F.—Reliance Universal, Somerset, NJ.
KULLMANN, RANDOLPH P.—John L. Armitage Co., Newark.
MAGINNIS, MICHAEL A.—Benjamin Moore, Newark.
NABAR, SHREERANG N.—Whittaker Corp., New Brunswick, NJ.
SKLAK, BRUCE Z.—Coventry Coatings Co., Gamerville, NY.

Associate

GLASS, DARRELL W.—Pfizer Pigments Inc., Farmington, CT.

Retired

STONER, HENRY R.—North Plainfield, NJ.

PACIFIC NORTHWEST

Associate

LUSSIER, REAL PIERRE—BASF Canada Ltd., Richmond, BC.
WAGNER, F. DEAN—Unocal Chemicals—Div. Union Oil of California, Clackamas, OR.

PIEDMONT

Active

ADAMS, THOMAS M.—Sadolin Paint Prod., Inc., Walkertown, NC.
BARNES, BOBBY J.—Sadolin Paint Prod., Inc., Winston-Salem, NC.
FANSLAU, ROBERT D.—Valspar Corp., High Point, NC.
JOYNER, WAYNE T.—Sadolin Paint Prod., Inc., Winston-Salem.
KOZAK, JOHN J.—Valspar Corp., High Point.
MILLIKAN, JEFF—Valspar Corp., High Point.
NEAL, ALLAN—Sun Chemical Corp., Charlotte, NC.
STOWERS, KURTZ—Reliance Universal, Inc., High Point.
TEDDER, CATHY S.—Sadolin Paint Prod., Inc., Walkertown.
WALCHER, FRANK—Valspar Corp., High Point.
WHITAKER, RONALD R.—Valspar Corp., High Point.
ZUIDEMA, KEITH J.—Valspar Corp., High Point.

Associate

McMILLIN, DAVID L.—Chemcentral, Inc., Jamestown, NC.
OWENS, BEECHER—Chemcentral, Inc., Jamestown.

TORONTO

Active

MURPHY, DAVID J.—Madison Chemical Ind., Milton, Ontario.

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People

American Society for Testing and Materials (ASTM), Philadelphia, PA, has named **Rhodes W. Polleys**, Senior Engineer, IBM Corp., its recipient of the 1988 ASTM Award of Merit. The award, sponsored by ASTM Committee B-8 on Metallic and Inorganic Coatings, cites Mr. Polleys for his 28 years of distinguished service and contributions to the development and editing of standards for Committee B-8. He has been a member of ASTM since 1959, and is the primary author of five standard definitions, test methods, practices, and specifications in this field.



R.W. Polleys



E.A. Flaig



M. Lazaro



M.J. Kenny

Hercules Incorporated, Wilmington, DE, has named **Ernest A. Flaig** as Business Director—Resins for its subsidiary, Hercules Quimica, in Mexico City. Among his many responsibilities, Mr. Flaig will coordinate all resins activities for the Mid-Americas Region, which includes Puerto Rico, Central America, Venezuela, Colombia, Peru, and Ecuador.

Richard G. Marci has rejoined the staff of Ball Chemical Co., Glenshaw, PA, after an absence of five years. He will be responsible for the technical service and development of the firm's formulated products. Mr. Marci currently serves as President of the Pittsburgh Society.

Dave Arment has been promoted to the position of Product/Marketing Manager of the Composites and Polymers group of Cook Paint & Varnish Co., Kansas City, MO. He will be responsible for the product and marketing management of polyester resins, polyester gel coats, and urethane foams.

Also, **John Bradley** has been named Product/Sales Manager of the Resin and Additives group. Mr. Bradley most recently served as Sales Manager—Resins, a function he will continue in his new position. He is a member of the Kansas City Society.

Jeff McDowell, Managing Director of Advanced Coatings, Inc., Temple City, CA, a wholly owned subsidiary of Crown Metro Aerospace Coatings, Inc., Greenville, SC, has announced the following appointments: **Jim Hanlon**—Sales/Marketing for California, Arizona, and Nevada; **Stan Haske**—Sales/Marketing for Southern California; and **John Griffin**—Sales/Marketing for Texas, Oklahoma, Kansas, Arkansas, and Louisiana.

D/L Laboratories, New York, NY, has promoted **Mario Lazaro** to the position of Group Leader. Mr. Lazaro, who has been with the firm for nine years, will supervise technical personnel in the laboratory research and testing programs conducted by D/L. He is a member of the New York Society.

The appointment of **John F. DeBardeleben** as a Senior Sales Representative for the Humko Chemical Division of Witco Corp., New York, NY, has been announced. Mr. DeBardeleben, who will be based at Witco offices in Charlotte, NC, will represent Humko Chemical in eastern Virginia, North Carolina, and Florida.

In addition, Witco Corp. has appointed **Christopher M. Raines** as Director of International Accounting. Mr. Raines will be based at the firm's Administrative Center in Woodcliff Lake, NJ.

NL Chemicals, Inc., Hightstown, NJ, has announced the promotion of **Michael J. Kenny** to President—North American Operations. Since joining NL as a Sales Representative in 1969, Mr. Kenny has held other positions of increasing responsibility, including Regional Sales Manager, Director of Marketing and Technical Services, Director of Sales and Marketing, and most recently, Vice President—Sales and Marketing.

Volstatic, Inc., Florence, KY, has announced the promotion of **Bruce N. Kazich** to Manager—Central Region, for the company's line of electrostatic powder coating equipment. His primary responsibilities include managing Volstatic's central region representatives and coordinating all of the firm's sales efforts in the central United States.

Phillip W. Harbaugh, Manager of Product Development, Reliance Universal, Louisville, KY, is the 1988 recipient of the Louisville Society's Outstanding Service Award.

A graduate of Indiana University, Mr. Harbaugh's career began in 1950 with Jones Dabney in Louisville. After being employed with Jones for six years, he was Chief Chemist with DeSoto in Garland, TX, from 1956-1966; he was Technical Director there from 1966-1971. In 1971, he went to DeSoto's Chicago facility, where he served as Manager of Industrial Research, Production Control, Coil, Electro-

coatings, Industrial Color, and Process Engineering.

Mr. Harbaugh was President of the Dallas Society in 1963-1964 and was Council Representative. He served the Federation as a member of the Finance, Program, Planning, By-Laws, Environmental Control, and the Technical Information Systems Committees, and was Chairman of the Roon Awards Committee in 1986. Mr. Harbaugh served as Federation Treasurer in 1972.

In 1982, Mr. Harbaugh served as President of the Louisville Society and is currently the Society's Deputy Council Representative.

Joy Turner-Luke, of Studio 213, Sperryville, VA, has been elected President of the Inter-Society Color Council (ISCC).

An instrumental part of the American Society of Testing and Materials' (ASTM) committee on Paint and Related Coatings and Materials, Ms. Luke was partly responsible for establishing the Subcommittee on Artists' Paints and Related Materials in 1977. She is also active in the ASTM Appearance Committee, particularly the Subcommittee on Color Order Systems.

Primarily for her work on the Paint Committee, Ms. Luke received the ASTM Award of Merit in 1987. This award also carries with it the title of

Fellow of ASTM. She was previously honored by the Paint Committee in 1981 as the recipient of its prestigious Gardner Award for being the most efficient among leaders of the 26 paint subcommittees. In addition, she played a major role in the development of three ASTM standards relating to the safety and consistency of artists' paints.

Also, the following have been elected Officers of ISCC: **Hugh Fairman**—President-Elect; **Therese Commerford**—Secretary; and **Philip Hunter**—Treasurer. New members of the Board of Directors are **W. Nick Hale**, **James Cave**, and **Hilton Brown**, all of whom will serve a term of three years.

Robert V. Savoy has joined Akzo Chemicals Inc., Chicago, IL, as Business Manager—Monomers and Additives, for the Polymer Production Chemicals Group. Before joining Akzo, Mr. Savoy was employed by PPG Industries where he gained considerable experience in a variety of assignments in manufacturing, field sales, and most recently, marketing and project management.

Bee Chemical Co., Lansing, IL, has promoted **Bruce Corwin** to National Sales Manager for Injecta Color. Based in Chicago Heights, IL, Mr. Corwin will be responsible for all of Injecta Color's sales and marketing, and sales administration activities.

The first annual Hanna Chemical Coatings Award for the Best Project in the science and technology



of chemical coatings was presented recently at Ohio Science Day. The winner was **Jason P. Lochner**, an eighth grade student at Northwest Junior High School in Clayton, OH, for his project entitled "Why Metal Rusts." The judges found his work to be both comprehensive and well thought-out, exhibiting a balanced regard for both scientific content and practical application. The award consists of \$500.00 and an engraved plaque. It was established by Hanna Chemical Coatings Corp., a subsidiary of Reliance Universal, Inc., to help create a greater interest in the chemical coatings industry at the high school level, and to help foster a greater interest in chemical coatings as a potential field of endeavor.

Carmen V. Sarno has been named Assistant Vice President of Engineering for MetChem, the new division of Betz Industrial, Trevose, PA. Mr. Sarno joined the Betz organization in 1967 as an Engineer, and most recently served as an Assistant Vice President/Director of Engineering.

Richard C. Carnahan has joined the staff of The Macbeth Division of Kollmorgen Instruments Corp., Newburgh, NY, as Chief Financial Officer. He assumes responsibilities for all aspects of Macbeth's financial reporting, planning, and analysis. Mr. Carnahan comes to Macbeth after a 17-year career with Westinghouse Electric Corp.

Valerie M. Telford has joined Harshaw/Filtrol Partnership, Cleveland, OH, as Sales Representative for the company's Color Products Division. Ms. Telford previously worked at Mobay Chemical Co., where she had served in a number of assignments including Lab Technician, Sales Representative, and Applications Chemist.

Bringing to his new position his extensive experience in plastics production and management, **Jose Dall'Occhio** has been named Production Manager for Avecor, Inc.'s plant in Vonore, TN. Prior to joining Avecor, Mr. Dall'Occhio was with Ellay, Inc., in Commerce, CA, as Quality Control Engineer and Production Supervisor.

Clark Lukens has been named Assistant Vice President for Chemistry at the California Division of the United States Testing Co., Inc., Hoboken, NJ. Mr. Lukens joined the Testing Company in 1983 as Chemistry Department Manager.

Unocal Chemicals Division, Unocal Corp., Schaumburg, IL, has announced the following appointments: **Ralph Lopez**—Plant Operations Manager, Middletown, OH; **Chris S. Norton**—Customer Service Manager, Atlanta, GA; **Richard A. Roth**—Branch Manager, Detroit, MI; **Jay H. Thornton**—Senior Salesman, Atlanta; and **Joseph Krong**—Sales Representative, East Providence, RI.

Furane Products Co., a CIBA-GEIGY company, headquartered in Los Angeles, CA, has appointed **Anthony Mee** to the position of Marketing Manager, Electronic Chemicals. Prior to joining Furane, Mr. Mee was Electrical/Electronics Sales Manager—United Kingdom with CIBA-GEIGY Plastics in Cambridge, England.

Craig Flanders has been named General Manager of Trimont Chemicals, Inc., Cumberland, RI. His most recent position was as General Manager with AZS Corp.; prior to that, he spent 21 years with Union Carbide. Mr. Flanders is a member of the Southern Society.

Jan Springer has been named Sales Representative for Spectrachem Pacific, Inc., Gardena, CA. He will be responsible for sales, training, and service support programs for screen printing customers. A nine-year veteran of the screen printing industry, Mr. Springer was formerly a Sales Representative with Western Supply, Inc.

Vicki Salhus has been appointed Operations Manager of the Birmingham, AL, plant of Hanna Chemical Coatings Corp., Columbus, OH, a subsidiary of Reliance Universal Inc., Louisville, KY. Ms. Salhus joined Reliance in 1983 and performed a variety of administrative and production roles as Manager of Manufacturing Services.

Obituary

Alfred B. Kohl, founder of A.B. Kohl Sales Co., Towson, MD, died recently. He was 83 years old.

Mr. Kohl became involved in the coatings industry in 1930 when he joined William McGill Co., Baltimore, MD, as a Salesman. In 1949, he founded the A.B. Kohl Sales Co. The company was sold in 1975 with Mr. Kohl retiring in 1981. He was a 50-year member of the National Paint and Coatings Association.

George Brown College Schedules Fall Courses In Chemical Technician—Coatings

The St. James Campus of George Brown College, Toronto, Ontario, has scheduled its Fall 1988 evening courses in coatings and plastics technology.

The courses are approved by the Ministry of Colleges and Universities and certified jointly by the George Brown College and the Toronto Society for Coatings Technology. The courses are designed to be taken separately with accumulated credits being applied towards the Chemical Technician-Coatings Certificate and/or Diploma.

Coatings courses of interest being offered include "Plastics Materials," "Resins—B," "Polymer Chemistry," "Organic Coatings," and "Resins—A."

The course in "Plastics Materials" features polymer chemistry; types, properties, structure, applications, identification, degradation, and stabilization of plastics; additives and reinforcements; and rheology. "Resins—B" focuses on raw materials, manufacturing method types, properties, chemistry, curing, formulating for special properties, characterization, analysis and applications in coatings of polyurethanes, acrylics, and emulsions.

Definitions, polymer classification, primary and secondary forces, theory of functionality molecular weight and its distribution, configurations and conformations of polymer chains, morphology, polymerization conditions, addition-condensation polymerization, copolymerization, degradation and stabilization of polymers, properties of polymers, polymer solutions, and solvent-pigment-binder interactions are the topics of the course "Polymer Chemistry."

The course on "Organic Coatings" focuses on raw materials including: oils, resins, solvents, driers, additives, prime, and extender pigments. Also highlighted are formulations and properties of organic coatings: principles of formulation; film formation; dispersion; testing; lacquers and varnishes; trade sales, industrial, corrosion, chemical resistant, powder, high solids, and water-borne coatings; and preparation and application methods.

"Resins—A" (polyesters, alkyds, epoxies) deals with the chemical structure of raw materials, formulating resins to achieve specified properties, additives, condensation-addition polymerization, curing mechanisms, compounding, Patton K

factor, properties of uncured and cured resins, advantages and disadvantages of each resin, and applications in coatings and related industries.

Exemptions may be granted to students who have completed the same or equiv-

alent courses in other educational institutions.

For further information, contact Mr. P. Rodak, George Brown College, St. James Campus, 200 King St., E., Toronto, Ontario M5T 2T9, Canada.

Electrostatic Painting Technology Symposium Held May 12-13, in Toronto, Ontario

The 3rd International Symposium on the Theory and Trends in Electrostatic Painting Technology was held in Toronto, Ontario, Canada, on May 12-13. The symposium, which was sponsored by the Applied Electrostatics Research Centre of the University of Western Ontario, London, Ontario, was well attended by representatives from the paint industry, spray equipment manufacturers, and equipment users.

Eight technical papers were presented during three sessions covering the fundamental principles of powders and liquids, measurements and transfer efficiency, and safety and standards. A special panel discussion session was held in which representatives from major manufacturers and

users of equipment and paints for electrostatic coating reviewed recent trends and opportunities in materials and hardware.

Two additional symposia have been scheduled. The 4th International Symposium will be held in Southampton, UK, on September 5-6, 1988, while the 5th International Symposium is scheduled for Toronto during May of 1989.

Further information concerning these symposia can be obtained by writing to: Prof. I.I. Incullet, Director, Applied Electrostatics Research Centre, Faculty of Engineering Science, The University of Western Ontario, London, Ontario N6A 5B9, Canada.

CALL FOR PAPERS Water-Borne and Higher-Solids Coatings Symposium New Orleans, Louisiana February 1-3, 1989

The Southern Society for Coatings Technology and the Department of Polymer Science at the University of Southern Mississippi invite all interested persons to submit papers for presentation at the 16th Annual Water-Borne and Higher-Solids Coatings Symposium.

Papers relating to the chemistry, formulation, and marketing of water-borne, higher-solids, and other advanced coating systems are solicited. Papers relating to engineering aspects of coating systems or solvent abatement are also solicited.

Title and abstract should be sub-

mitted no later than Sept. 15, to: Dr. Gordon L. Nelson, Chairman
Department of Polymer Science
University of Southern
Mississippi
Southern Station Box 10076
Hattiesburg, MS 39406-0076

The completed paper should be submitted by December 15, 1988. Papers to be presented at the Symposium will be chosen based on abstracts.

It is preferred that all papers be original and of scientific value.

For additional information, call (601) 266-4868 or 266-4869.

Fall Courses in Coatings Technology Offered By University of Detroit and Detroit Society

The Division of Continuing Professional Education at the University of Detroit and the Detroit Society for Coatings Technology will sponsor six coatings courses scheduled to begin in September 1988.

"Coatings Laboratory," an eight-week course, is designed as a "hands-on" program which will cover the use and operation of equipment used in quality control and R & D laboratories. Tests will also be conducted which relate to paint manufacturing processes and how these results relate to field performance. The instructor is Gabriel Gabriel, of Mercury Paint.

"Surface Coatings Technology" is a ten-week course, intended for new employees and individuals entering the coating industry. The course will be taught by Donald Mordis, of BASF/Inmont. Some of the subjects covered are: principles of for-

mulation, color concepts and color matching, white and extender pigments, color pigments, pigment dispersion, paint calculations, paint driers and additives, formation and structure of paint films and solvents.

The ten-week course, "Fundamentals of Automotive Paint Systems," is also taught by Mr. Mordis. This course is a comprehensive survey of basic automobile paint raw materials and process systems.

"Polymer Technology for Coatings," a ten-week course, will include lectures on basic polymer concepts, polymers commonly used in coatings, and the relationship between the structure of the polymers and the properties of the coatings. Polymers for automotive coatings will be emphasized. A prerequisite for the course, taught by Stephen Peng, of Mt. Clemens

Coatings, is a course in organic chemistry or the equivalent.

A seven-week program on "Principles of Color Technology" is designed as an introductory course for those having no previous education in the field. After the first evening's lecture, the sessions will consist of matching four solid colors and eight "metallics." Students will do their own individual spraying. For more information on the color course, which will be taught by Harold Kuntze, of BASF/Inmont, contact Bohdan Melnyk at Chrysler Corp., 12800 Lynn Townsend Drive, Highland Park, MI 48203. Registration for this course is limited to six students.

"Electrodeposition" is a six-week course which will focus on the history and evolution of electrocoat, metal pretreatment and electrocoat chemistry, calculations for fee makeup, ultrafiltration, anolyte, and trouble shooting. The course instructor is L.E. Lucier, of Mt. Clemens Coatings.

Preregistration for these courses is recommended. For additional information, contact the University of Detroit, Continuing Professional Education, 4001 W. McNichols, Detroit, MI 48221.

CALL FOR PAPERS

The Institute of Metal Finishing Surface Finishing '89

April 11-14, 1989 Metropole, Brighton, England

The Institute of Metal Finishing, together with the Metal Finishing Association, the British Metal Finishing Suppliers Association, the Printed Circuit Association, and the British Electroless Nickel Society, is organizing the 1989 Surface Finishing Conference and Exhibition, to be held April 11-14, at the Metropole, Brighton, England.

There will be three categories of presentation:

(1) Fully researched science-based papers, complete with objectives, experimental methods, results, and conclusions. Accepted papers will be reviewed automatically for inclusion in the Institute Transactions.

(2) Technical papers which may lack the total scientific background and support of those in the first category, but which will provide fully detailed technical support for the conclusions offered. Such papers may be considered for inclusion in the Transactions, subject to review.

(3) Personal presentations for which synopses only will be required. Presenters will have personal experience of and expertise in the matters which they put forward, and such presentations must offer new ideas, views, or experiences—generally in the areas of production techniques, process materials, plant

or control, or general management matters. These presentations may, if so desired, be written, pre-printed, and bound in the Proceedings, along with all other papers, and given to all delegates. Only exceptionally will they be considered for the Transactions.

Under no circumstances may trade names be used in any presentations of categories 1 and 2, either in the written paper or verbally in the presentations.

Offers of papers are now being sought world-wide from academic institutions, from R & D departments of supply houses, users, research organizations and design authorities, from the technical departments of suppliers and processors who wish to give a technical presentation on any new product, process, or procedure, or from any organization or person on any surface-finishing related subject.

Those intending to submit papers are requested to send a 100-word synopsis, stating category for which the offer is made, to the Conference Secretary. Final papers will be required by January 31, 1989. For further details, write to: Conference Secretary, The Institute of Metal Finishing, Exeter House, 48 Holloway Head, Birmingham, B1 1NQ England.

Biennial Radiation Conference Slated for April 1989

The 7th International Meeting on Radiation Processing (I.M.R.P.) is being held at the Leeuwenhorst Congress Center, Noordwijkerhout, The Netherlands, on April 23-28, 1989. The biennial conference is dedicated to the dissemination and advancement of industrial radiation processing technology.

The I.M.R.P. conference will present state of the art technology which will provide information on the diverse industrial uses of radiation processing. The objectives of these meetings are to examine the industrial applications of electrons, x-rays, and gamma-rays; to analyze common problems; and to present information on new products, processes, technology, and research.

The program will include a mixture of invited lectures, papers, poster sessions, panels, open discussions, and tutorials. Subject matter to be covered includes radiation sterilization, waste treatment, food preservation, polymer modification, materials for application in radiation environments, semiconductors, industrial irradiation facilities, and dosimetry.

For more details on the conference, contact E. Franken, 7th International Meeting on Radiation Processing, P.O. Box 4240, 6710 EE Ede, The Netherlands.

Aliphatic Polyurethanes

A new brochure describes the features and benefits, end uses, and application information on a line of aliphatic polyurethane coatings. Also included are charts on typical physical properties, chemical and solvent resistance, suggested application equipment and conditions, and salt spray resistance. For a free copy of "Chemglaze® A-Line Aliphatic Polyurethane Coatings," contact: Lord Corp., Industrial Coatings Div., 2000 W. Grandview Blvd., P.O. Box 10038, Erie, PA 16514-0038.

Coating Systems

Painting and coating systems are highlighted in a new catalog which details a company's complete line of coating products for professional specifiers. The publication provides in-depth data on coating systems for interior, exterior, and heavy-duty maintenance applications. For further information on the "1988 Painting and Coating Systems Catalog," write Sherwin-Williams Stores Group, c/o Robert Silverman Co., 1375 Euclid Ave., Cleveland, OH 44115.

Chemical Reaction Database

Literature highlights a new chemical reaction database and search service. The new service makes it possible to search for and display reactions of organic and organometallic chemicals and biomolecules reported in more than 100 chemical journals. The database contains information on more than 250,000 synthetically useful reactions reported in approximately 20,000 scientific papers published worldwide since January 1985. For more details on Casreact, write Chemical Abstracts Service Customer Service, P.O. Box 3012, Columbus, OH 43210.

Software Program

Literature features a new software package designed to work with scanning densitometers. The software can perform quantitative analyses of 2-D gels, dot blocks, or similar samples and will automatically outline "spots" of interest, integrate density, or determine molecular weights or isoelectric points. For more data on the Q-GEL software package, contact Loretta Scheel or Mary Greenway, HBI, Haake Buchler Instruments, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001.

Water-Dispersible Elastomer

A new water dispersible polyurethane elastomer is the subject of a recently released technical data sheet. The elastomer is designed to provide adhesion to a wide variety of substrates, including fabric, plastic, and rubber. For more information on SPENSOL® L46, write NL Chemicals, Inc., P.O. Box 700, Hightstown, NJ 08520.

Liquid Packaging Machine

A bulletin highlights a high-speed volumetric, positive displacement, liquid and semi-liquid packaging machine. The machine is capable of filling quarts, gallons, and five-gallon containers and is available with a wide variety of nozzles and other features. For information on the Model 984, write Ambrose Co., 2649 151st Place N.E., Redmond, WA 98052.

Alkyd Resins

Information has been released which describes two new water dispersible alkyd resins for use in air dry and low bake coatings. For more information on KELSOL® 3918, a short oil alkyd, and KELSOL 3919, a chain-stopped alkyd, write NL Chemicals, Inc., P.O. Box 700, Hightstown, NJ 08520.

Chroma Meters

Recently published literature discusses two meters which are designed for quality control of painted and colored surfaces in manufacturing, and control of color density and ink characteristics in printing. For information on CR-221 and CR-221B chroma meters, contact John McCasland, Minolta Corp., 101 Williams Dr., Ramsey, NJ 07446.

UV-Cure Epoxies

A 12-page booklet has been published which describes formulating cationic UV-curable cycloaliphatic epoxide coatings. The booklet details the formulation of cycloaliphatic epoxide systems using polyether and polyester polyol flexibilizers in addition to a line of resins, photoinitiators, and other products. Formulation and curing variables influencing film properties are examined, including epoxy/hydroxyl ratio, polyether vs polyester polyol flexibilizers, film thickness, line speed, time after UV-exposure, and thermal post-cure. Copies of "Formulating Ultraviolet Light-Cured CYRACURE® Cycloaliphatic Epoxide Coatings," designated F-60590, can be obtained from Union Carbide Corp., UCAR Coatings Resins, Dept. L4490, 39 Old Ridgebury Rd., Danbury, CT 06817-0001.

ASTM Offers Separate Paint Volumes From the 1988 Annual Book of Standards

ASTM has published separate volumes for its *1988 Annual Book of ASTM Standards*. "Volume 06.01/Paint—Test for Formulated Products and Applied Coatings" features four major sections: paint, varnish, and lacquer as liquids; dry film properties; examination of paint products; and protective coating and lining work for power facilities. The 984-page volume, which includes 268 standards, lists for \$84; member cost is \$75.60.

"Volume 06.02/Paint—Pigments, Resins and Polymers" includes 50 specifications which fix the standard property requirements for various pigments, including white, black, bronze, blue, and red. One hundred fifty standards are contained in the 472-page volume,

which sells for \$52 for nonmembers and \$46.80 for members.

"Volume 06.03/Paint—Fatty Oils and Acids, Solvents, Miscellaneous; Aromatic Hydrocarbons" features 50 specifications which fix the standard property requirements for various solvents, including aromatic hydrocarbons alcohols, ketones, and esters. Accompanying the specifications are over 50 test methods which explain standard procedures for conducting physical and chemical tests on solvents and for determining solubility and miscibility. The 830 pages feature 243 standards. List price is \$74 for nonmembers and \$66.60 for members.

For ordering information, contact ASTM, 1916 Race St., Philadelphia, PA 19103.

Polyurethane Enamels

A polyurethane enamel which is designed for use as a smooth or textured coating over plastic, metal, or wood substrates is the focus of new literature. Suggested applications include the coating of business machines, computers, other electronic enclosures, as well as the finishing of newer structural plastics that cannot tolerate high baking temperatures. For additional details on "Polane® T Polyurethane Enamel," contact Sherwin-Williams Stores Group, c/o Robert Silverman Co., 1375 Euclid Ave., Cleveland, OH 44115.

Paint Spray Booth Management Program

Information has been released which details the features and benefits of a paint spray booth management program. A four-page technical bulletin provides descriptions of paint detackifiers, supplier-related factors, plant-related factors, strippers and maskings, hot tank strippers, and cleaners. For a copy of the Bulletin TF-155, "Paint Spray Booth Management Program," contact Nalco Chemical Co., Marketing Communications Dept., One Nalco Center, Naperville, IL 60566-1024.













Low Toxicity Solvents

The addition of a new high purity propylene carbonate to a company's line of low toxicity solvents has been announced in literature. The highly polar solvent/reactive intermediate reportedly offers high boiling and flash points, low viscosity, and a low freezing point. Complete product information is available from the Marketing Communications Dept., ARCO Chemical Co., 3801 West Chester Pike, Newtown Square, PA 19073.

Industrial Color Video

The first of a five-part video series on "Industrial Color Technology, Theory and Applications," has been released. The tape, entitled, "Spectral Curves: Clues for Solving Color Problems," discusses the application of spectrophotometric curves to diagnosing color problems. The video series will be available for VHS or BETA formats and tapes are priced at \$395 each. For more information, contact Applied Color Systems, Inc., P.O. Box 5800, Princeton, NJ 08543.

Now, CasChem's Caspols can work for you in dozens of different ways.

MARINE 	BREWERIES 	PLANES 
OFFICE EQUIPMENT 	DAIRIES 	SUBWAYS 
TRUCKS 	MANUFACTURING 	CONSTRUCTION 
AUTOMOTIVE 	SEWAGE 	BUILDINGS 

Now CasChem has an even dozen polyols for industrial urethane coatings. This complete line of polyols meets needs for maintenance, marine, transportation and industrial product finishes. And with the advent of Caspol® 1842, extremely low VOC's are now possible.

Even as the line expands, CasChem continues to meet the requirements in high solids, low VOC and emerging applications for plastic substrates. All supported by a high-level technical service, WORLD-WIDE SUPPLIER.

For a brochure that summarizes properties and data for Caspol Polyols for the formulation of urethane coatings, please call toll free 1-800-CASCHEM (Caspol Dept.) or write to us.

CasChem

CasChem, Inc., 40 Avenue A, Bayonne, NJ 07002

Mastic Coatings

A new technical data sheet introduces the features of a high solids epoxy mastic coating for industrial maintenance and new construction applications. The coating is designed to provide adhesion on steel, galvanized steel, masonry, concrete, and wood in both corrosive and non-corrosive environments. For details on Du Pont 25P, contact Donald W. Altmaier, Du Pont Co., External Affairs Dept., Wilmington, DE 19898.

Linseed/Tung Oil

A linseed/tung oil water-reducible stain vehicle, which can be formulated at a 186 g/L VOC in a semi-transparent cedar stain is the subject of a product bulletin. The stains can be formulated for spray, brush, roller, or wiping applications. Samples and additional data on Aquamac 610 are available from McWhorter, 400 E. Cottageplace, Carpentersville, IL 60110.

Immersion Circulators

Literature introduces a line of compact immersion circulators designed to be interchangeable with a wide variety of bath vessels. The circulator can be used for a multitude of applications when combined with refrigerated, heating, or open baths. For further details on the Haake D8 line of immersion circulators, contact Carol Yodice or Mary Greenway, HBI, Haake Buchler Instruments, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001.

Performance Chemicals

A four-color, illustrated brochure describes the use of performance chemicals for cleaning formulations. Included is a discussion on the specific qualities and benefits of a wide range of nonionic surfactants, polymers, chelating agents, and other chemicals used in varied cleaning applications. Copies may be obtained free of charge from: BASF Performance Chemicals, 100 Cherry Hill Rd., Parsippany, NJ 07054.

Paint Manufacturing

A new, four-page, full-color news bulletin designed for manufacturers of paint and coatings, features information on products, literature, and industry updates, as well as practical "how-to" articles. Each issue highlights a variety of new products, including resins, rheological additives, and other specialty chemicals. For a free copy of "Resources," write: Attn. Advertising Manager, NL Chemicals, Inc., P.O. Box 700, Hightstown, NJ 08520.

Primer Paints

An interior paint which provides a base prime coat over gypsum board, wood, and concrete surfaces is the subject of a new technical bulletin. Available in a powder form that is designed to mix with water, or in a ready-mixed form, the primer is intended for application with brush, roller, or spray equipment. For more information on SHEETROCK® First Coat paint, contact United States Gypsum Co., Dept. 122-ZZ, 101 S. Wacker Dr., Chicago, IL 60606.

Polyester Packaging Resins

A new product brochure, with updated information on a company's full line of polyester packaging resins, is now available. The brochure provides information on applications, characteristics of the resins, as well as information on resource recovery and recycling of polyester soft drink containers. The brochure is available by writing Goodyear Polyester Div., 1144 E. Market St., Akron, OH 44316.

Emulsions

Information has been released which describes the features of a company's line of emulsions for the building products industry. Details on density, viscosity, solids content, pH, and glass transition temperature are highlighted. For a copy of the "Emulsions for Building Products" brochure, contact Air Products and Chemicals, Inc., Polymer Chemicals Div., Allentown, PA 18195.

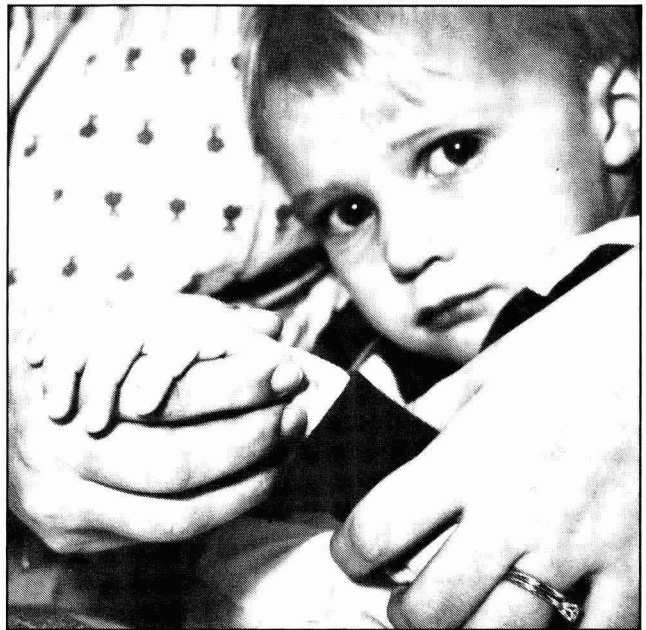
High Solids Resins

A recently published technical bulletin details the characteristics and suggested applications of two additions to a line of high solids specialty resins. AROPLAZ® 3766 is a 75% solids long oil alkyd based on a mixture of color retentive oils and cut in exempt mineral spirits. AROPLAZ 6235 is a short tall oil alkyd designed for low VOC baking finishes. For additional information, contact NL Chemicals, Inc., P.O. Box 700, Hightstown, NJ 08520.

Batch Mixer

A new, four-page, full-color, pocket brochure describes the features of a batch mixer and highlights the range of capabilities available for solids blending. Using graphs and photographs, the brochure details the system's tumble blending, impeller-forced blending, and impeller processing. For more information, contact Betty Felix, Mixing Equipment Co., 135 Mt. Read Blvd., P.O. Box 1370, Rochester, NY 14603.

Why me, Mommy?



Children often ask hard-to-answer questions. And parents don't always have the right answers. But how do you explain **cancer** to your child?

The doctors and scientists at St. Jude Children's Research Hospital have been trying to answer this "why me" since 1962. We've found many cures; we're working on a cause.

Our hope is that once a cause can be found, a prevention might not be too far behind. Until that time; however, St. Jude Hospital's work must continue . . . for the sake of all children.

To find out how you can help St. Jude answer the questions of childhood cancer, write for your free brochure, or call 1-800-238-9100.



St. Jude Children's Research Hospital
505 North Parkway, Memphis, TN 38105

Book Review

THE BASICS OF TECHNICAL COMMUNICATING

By

B. Edward Cain

Published by

American Chemical Society

1155 16th Street, NW

Washington, DC 20036 (1988)

xiii + 198 pages \$29.95

Reviewed by

H. Earl Hill

Consultant

Erie, PA

"The Basics of Technical Communicat- ing" is a book written primarily for profes- sionals in science and technology. It is ori- ented toward the special needs of chemists and other professional scientists. Actually, however, it should be useful to all those interested in improving their communica- tion skills. It also could form part of the basis for a course for college science and technology students. It complements two other American Chemical Society books, "The ACS Style Guide" and "Writing the Laboratory Notebook." The need for com- munication skills as part of the essential tools required for their disciplines, has be- come increasingly evident for technical professionals. It is more important than ever to match technical ability in a scientifi- c discipline with the ability to communi- cate effectively. In many cases a direct relationship exists between this ability and the opportunity to advance.

Most people, at one time or another, have to explain their thoughts and findings to others in a logical manner. Professionals in science and technology must communi- cate the scientific discoveries that influence and shape society. Business professionals must prepare reports that address a variety of audiences and serve many needs. Re- searchers need to apply for funds to per- form specific projects. All of these situa- tions require logical thinking and good communication skills. The essence of techni- cal communication is to be able to meet these requirements in the most precise manner possible.

The book is divided into three sections: (1) Improving Your Technical Communi- cation Skills, (2) Assembling Your Report, and (3) Specific Needs. It is not intended to teach basic English, but is intended to demon- strate a variety of applications of using correct English to communicate effectively. The style of the book is such that each of these chapters is short and to-the-point. The first section contains four chapters; the

second and the third—seven chapters each. They occupy about the same respective page percentages.

The first section contains the topics: What is Technical Communication?, Eliminating Wordiness and Jargon, Using Correct Punctuation, and Selecting the Appropriate Verb. Each of these chapters does an excellent job of addressing its subject. The extended definition of technical com- munication is almost in itself worth the price of admission. The following three chapters give a clear, well presented dis- cussion of their topics. They are in such a form that they could also be used as "quick references."

The second section of the book concerns assembling a report. Everything from the outline, to gathering data, to documenta- tion, to visual aids, to abstracts, to comput- er use, and to proofreading is covered. Be- sides being a good discussion of each of these topics, the chapters would be excel- lent reference sources in the actual process of writing a report. There is an outstanding segment on outlines. For those who are mathematically inclined, there is an inter- esting use of Boolean logic as applied to literature searches. This section also con- tains an exceptional discussion of how to prepare an abstract, plus helpful informa- tion on proofreading.

The final section of the book covers specific needs. The chapter topics are: Academic Laboratory Reports, Industrial Business Reports, Journal Publications, Grants and Proposals, Business Correspondence, Resumes, and Memos and Short Reports. Most of this material will be of specific interest to chemists and other pro- fessional scientists. However, the chapters on Industrial and Business Reports, Busi- ness Correspondence, Resumes (especially in this day and age!), and Memos and Short Reports will be of value to a wide audi- ence. All are well done. The book con- cludes with a first-class, readable index.

This 18 chapter book gives brief but thorough information on meeting the needs of technical communication by means of a wide variety of topics covering the tools of the trade. It describes how to do this in clear, precise and unambiguous language. I have only two objections to the book. The first, a minor one, is the style of the Con- tents. There are some stylistic vertical lines used in delineating page numbers. These are rather confusing, making, for example, 20 look like 120. If the book goes into a second edition these should be omitted.

The second objection is more serious. To make the book considerably more use- ful, there should have been a bibliographi- cal section added at the end of the chapters entitled "Additional Reading" or "Further Reading." This omission makes the book

incomplete. There is sufficient "white space" at the end of the chapters where this information could have been added without increasing the size of the book. Other than these two concerns, and perhaps just a little too much brevity of some of the chapters, the book is quite suitable for its intended purpose. It should serve both as an intro- ductory text for undergraduates needing technical communication skills; and for chemists and other professional scientists, serve as both a good refresher as well as a reference book to keep at their desk for everyday use. Chapters 2,3,4,7,8,9 should be required reading for authors prior to submission of papers to the JOURNAL OF COATINGS TECHNOLOGY, or for that matter, any scientific journal.

TREATISE ON CLEAN SURFACE TECHNOLOGY Vol. 1

Edited by

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Reviewed by

G. Dale Cheever

Polymers Department

General Motors Research

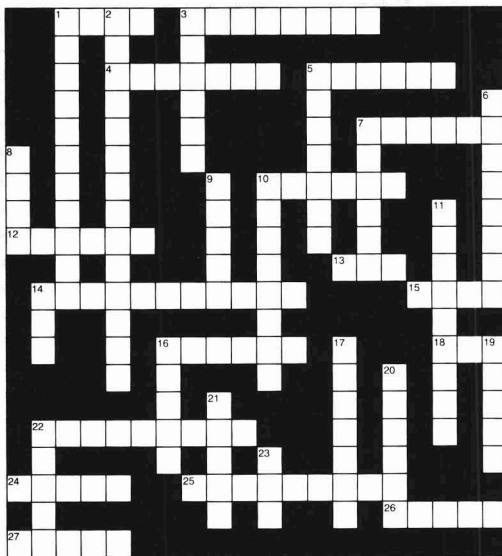
Warren, MI

This book is a review of the clean sur- face technology literature by 13 contribu- tors and is a valuable contribution in this field. Each of the 13 chapters is well orga- nized with numerous references. The titles of the articles or books cited assist the reader in selecting the articles of interest.

The cleaning energy sources discussed include: ultraviolet light (UV)/ozone, UV/ enhanced outgassing, chromic acid, and ul- trasonic vibrations. The substrates de- scribed include: liquids, metals, plastics, and biomaterials. For example, a wide variety of contaminants are removed by UV/ ozone cleaning, such as human skin oils, airborne contamination, silicon oils, and cleaning solvent residues. Although the writer of the chapter on UV/ozone cleaning includes a section on safety considerations, safety aspects, in general, are not dis- cussed. In future volumes, the editor and contributing authors may wish to include more of the safety aspects of cleaning tech- nology.

CrossLinks

by Earl Hill



Solution
to be
published in
September issue

No. 25

ACROSS

1. Oxide of iron
3. Small surface defect
4. High M.W. epoxy resin
5. Flat printing press plate
7. Type of mill
10. Oxide film of copper, p_____
12. A design on paper
13. Analytical test method (Abr.)
14. Converting a solid to a colloidal sol'n
15. Wood molding
16. Light tint; soft delicate hue
18. State of matter (Chem.)
22. To divide; to separate
24. A test for coating film properties
25. Process of catalyzing
26. Hexane derived alkyl radical (Chem.)
27. Surface attribute

DOWN

1. Printing method famous in a song
2. Alkaline hydrolysis (Chem.)
3. Turpentine hydrocarbon (Chem.)
5. Synthetic high polymer
6. Hardness measurement method
7. And yet another hardness method
8. Processed press cake
9. An etching; a lithograph
10. A nasty parasite or virus
11. Irish moss carbohydrate
14. Vinyl polymer, _____B (Abr.)
16. What goes in a ball mill
17. Scattered, as light (Syn.)
19. Ferrous metallic substrate
20. Chemical, wood ash derived
21. Exhibiting polarity
22. Test p_____
23. Film defect upon application

Letters to the Editor

Debate on Use of Titanium Dioxide Pigments Continues

TO THE EDITOR:

I imagine that quite a few "old timers" must have been amused on reading J. H. Braun's article in your March issue (60, No. 758, 67, 1988) to find calcium-base titanium pigment described as obsolete "for lack of merit." To say the least, this is an odd comment in reference to a type of pigment that completely dominated the white pigment field for almost 25 years!

NL Industries' regrettable decision to discontinue its manufacture occurred at a time when it still represented the largest volume of any single grade of titanium pigment used by the paint industry—despite the "incompatibility with latex paints" also mentioned in the article.

The demise of calcium-base rutile pigment was the result of economic pressures caused by an unrealistic pricing policy. The NL calcium-base pigments were sold at a price based upon their titanium-dioxide content, the calcium-anhydrite portion adding only about \$0.01 per lb to the price of the composite (delivered!). This was far below the price of any comparable fine extender, and remained constant over a period during which the price of titanium dioxide itself increased by over 10%.

The pricing of titanium pigments is very different today. Not only have they become very much more expensive, but any added "surface-treatments," such as Braun's silica shell, or the voluminous alumina and silica additives in the flat and latex-grades, are sold at the full price of titanium dioxide. No other extender costs as much.

Although some titanium-pigment producers have apparently embarked on a program designed to persuade paint formulators to reduce the paint industry's consumption of fine-particle-size extenders,

they have been careful to avoid any discussion of the economics of the situation. If the silica shell is to cost the paint manufacturer as much as titanium dioxide, it would prove to be less expensive to use vehicle solids for the purpose.

There would seem to be a fallacy, moreover, in Braun's assumption that a commercial extender must have a diameter no larger than the mean spacing of titanium-dioxide particles if it is to serve as a spacer in low-PVC finishes.

If the extender particle diameter is roughly the same as that of the titanium dioxide, the distribution of the two will remain random within the dry paint film—no "crowding," or packing, will take place. If total solids remain the same, the mean spacing of titanium-dioxide particles remains the same, and so does hiding power. However, extender volume has replaced vehicle solids volume, and that lowers cost.

Furthermore, if the particle-size distribution of the added extender is such that no voids are created large enough to accommodate more than single particles of titanium dioxide, "crowding" will not take place. Such a particle-size distribution also ensures a relatively low oil-absorption, as compared to the ultra-fine uniform particle size envisioned by Braun, and is available at lower cost.

It is a common failing of the research community to place a very low priority upon cost savings, and to equate them with lower quality. There is no necessary relationship between titanium-pigment content and quality, however, and the money saved by replacing expensive "surface treatment" with spacing extender may be better

utilized to increase total solids—or even to increase hiding power.

FRED B. STIEG
PigmentTech Consulting
Jekyll Island, GA

* * *

The market place, not I, passed verdict on the merits of calcium sulfate-extended titanium dioxide pigments. All commercial grades disappeared in the 1960's even though, as Mr. Stieg points out, the extender was thrown in for free.

Mr. Stieg makes a second point that extender particles equal in size to the TiO₂ pigment can improve the economics of coatings formulated below the Critical Pigment Volume Concentration (CPVC) by replacing more costly vehicles without detriment to hiding. True, but only at very low rutile volume concentrations. Above about 10 volume % (Figure 5 of my paper), extender particles of rutile size do increase distances between TiO₂ particles where the extender particles are located, but crowd the TiO₂ elsewhere in the film. A moment of thought or a glance at Figure 1 will convince the reader that in a fixed volume (i.e., below the CPVC and above a minimum PVC), the substitution of continuous medium (the binder) by discrete particles of pigment size (the extender) diminishes the uniformity of TiO₂ spacing. A few pigment particles are spaced too far for optical effectiveness, many more are crowded too closely.

JUERGEN H. BRAUN
E. I. du Pont de Nemours & Co., Inc.
Wilmington, DE

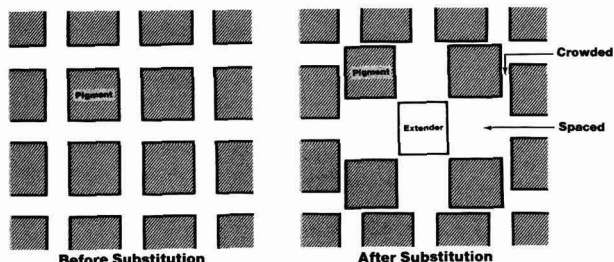


Figure 1—Substitution of binder by extender particle. (Effect on spacing of pigment particles)

TO THE EDITOR:

It has been interesting and enjoyable to read the recent flood of literature published on the use of TiO₂. Mr. Juergen H. Braun's paper on "Crowding and Spacing Titanium Dioxide Pigments" (JCT, March 1988) was no exception. His paper was well written and documented, however, there are three areas of his paper I disagree with.

The data listed for mean particle size for "typical extenders" is the mean

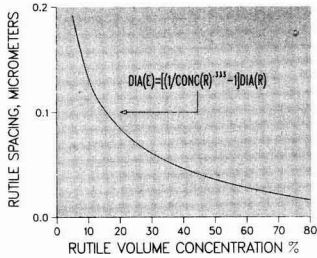


Figure 5—Rutile spacing and volume concentration

equivalent spherical diameter based on weight percent. Each of the extenders listed has a significant volume fraction which meet the size requirements for a spacer defined in the paper. The amount of particles small enough to space TiO_2 on a volume basis is the correct way to quantify the spacing capability of a given extender.

TiO_2 manufacturers have been taking advantage of the concept of TiO_2 spacing by various treatments for years. There is no doubt that this is a very effective method. This information is of little value today however, because TiO_2 is in such short supply.

If fine particle extenders do provide some spacing ability, there is little incentive for paint manufacturers to choose a coated TiO_2 product to provide a spacer. By purchasing a treated product, they are paying TiO_2 prices for the spacer fraction of the products.

Apart from these three points, Mr. Braun and his associates have provided some accurate and thought-provoking information. I hope that the JCT will continue to publish quality papers providing both practical solutions and academic stimulation.

DAVID K. FREDERICK
OMYA, Inc.
Proctor, VT

* * *

D. K. Frederick makes a point that deserved emphasis. Volume rather than weight contribution of each size fraction of extender is of primary importance to paint film performance.

TiO_2 manufacturers have indeed spaced TiO_2 by surface coatings. This spacing, however, is not the primary objective of coatings on TiO_2 pigments. Coatings are applied for dry hiding, durability, and dispersibility.

True, highly coated TiO_2 pigments deliver to the paint manufacturer less TiO_2 , i.e., less of the work horse of optical performance, than the less coated pig-

ments. But a fluffy coating of hydrous oxides on the rutile is the most cost-efficient way of aiding dry hiding because the coating spaces TiO_2 particles and creates finely divided pores in the paint film.

JUERGEN H. BRAUN

Address letters to Editor,

JOURNAL OF COATINGS TECHNOLOGY
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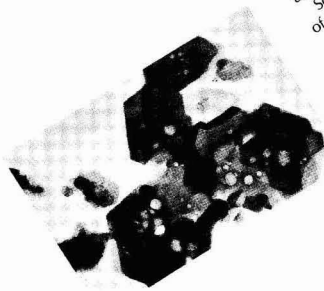
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Coming Events

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For information on FSCT meetings, contact FSCT, 1315 Walnut St., Philadelphia, PA 19107 (215-545-1506).

1988

(Oct. 19-21)—66th Annual Meeting and 53rd Paint Industries' Show. McCormick Place, Chicago, IL.

1989

(May 16-19)—Federation "Spring Week." Seminar on the 16th and 17th; FSCT Incoming Society Officers Meeting on the 18th; FSCT Board of Directors Meeting on the 19th. Los Angeles Airport Marriott, Los Angeles, CA.

(Nov. 8-10)—67th Annual Meeting and 54th Paint Industries' Show. Rivergate, New Orleans, LA.

1990

(Oct. 19-21)—68th Annual Meeting and 55th Paint Industries' Show. Convention Center, Washington, D.C.

SPECIAL SOCIETY MEETINGS

1989

(Feb. 1-3)—Southern Society 16th Annual Water-Borne and Higher-Solids Coatings Symposium. New Orleans, LA. (Dr. Gordon L. Nelson, Chairman, Dept. of Polymer Science, University of Southern Mississippi, Southern Station Box 10076, Hattiesburg, MS 39406-0076).

(Mar. 14-16)—Western Coatings Societies' 19th Biennial Symposium and Show. Disneyland Hotel and Convention Center, Anaheim, CA. (Andrew R. Ellis, NL Chemicals, 231 E. Imperial Highway, Suite 221, Fullerton, CA 92635).

(Apr. 5-7)—Southern Society. Annual Meeting. Hyatt Regency Westshore, Tampa, FL.

(May 4-6)—Pacific Northwest Society. Annual Symposium. Portland Marriott, Portland, OR. (John Daller, McCloskey Corp., 4155 N.W. Yeon, Portland, OR 97210).

OTHER ORGANIZATIONS

1988

(Aug. 15-17)—"Radiation Curable Coatings" Short Course sponsored by North Dakota State University, Fargo, ND. (Frank Jones, NDSU, Fargo, ND 58105).

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(Aug. 16-18)—"Process Safety Management" Seminar sponsored by Du Pont Co., Wilmington, DE. (Du Pont Safety Services, Barley Mill Plaza, P19-1104, Wilmington, DE 19898).

(Aug. 22-26)—11th Annual Short Course "Advances in Emulsion Polymerization and Latex Technology." Schatzalp Berghotel, Davos, Switzerland. (Dr. Gary W. Poehlein, Graduate Office (Savant), Georgia Institute of Technology, Atlanta, GA 30332-0265).

(Aug. 29-Nov. 30)—"How to Comply with Hazardous Waste Management Regulations" Seminar sponsored by Environmental Resource Center. Aug. 29—Boston, MA; Aug. 31—Indianapolis, IN; Sept. 2—Louisville, KY; Oct. 3—Detroit, MI; Oct. 5—Toledo, OH; Oct. 6—Cleveland, OH; Oct. 31—Tampa, FL; Nov. 2—Birmingham, AL; Nov. 3—New Orleans, LA; Nov. 28—Denver, CO; and Nov. 30—Phoenix, AZ. (Maryel Tomter, Environmental Resource Center, 608 Southview Circle, Fayetteville, NC 28301).

(Aug. 30-Dec. 1)—"How to Comply with Current SARA Title III and OSHA Right-to-Know Regulations" Seminar sponsored by Environmental Resource Center. Aug. 30—Boston, MA; Sept. 1—Indianapolis, IN; Sept. 2—Louisville, KY; Oct. 4—Detroit, MI; Oct. 5—Toledo, OH; Oct. 7—Cleveland, OH; Nov. 1—Tampa, FL; Nov. 2—Birmingham, AL; Nov. 4—New Orleans, LA; Nov. 29—Denver, CO; and Dec. 1—Phoenix, AZ. (Maryel Tomter, Environmental Resource Center, 608 Southview Circle, Fayetteville, NC 28301).

(Sept. 5-7)—"Estimating for Painting Contractors and Maintenance Engineers." Course sponsored by the University of Missouri-Rolla, Rolla, MO. (Coatings and Polymer Science Program, Dept. of Chemistry, UMR, Rolla, MO 65401-0249).

(Sept. 12-16)—"57th Introductory Short Course—The Basic Composition of Coatings." Course sponsored by the University of Missouri-Rolla, Rolla, MO. (Coatings and Polymer Science Program, Dept. of Chemistry, UMR, Rolla, MO 65401-0249).

(Sept. 12-16)—"Laboratory Corrosion Testing" Short Course cosponsored by the Southwestern Ohio Section of the National Association of Corrosion Engineers and the NACE/Fontana Corrosion Center at Ohio State. Ohio State University, Columbus, OH. (NACE, P.O. Box 218340, Houston, TX 77218).

(Sept. 13-14)—"Polymer Flow Using the Torque Rheometer" Seminar sponsored by Haake Buchler Instruments, Inc. Wyndham Hotel/Greenspoint, Houston, TX. (HBI, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001).

(Sept. 13-15)—"Strategy of Experimentation" Seminar sponsored by Du Pont Co. Boston, MA. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Sept. 13-15)—"Focus on Data" Seminar sponsored by Du Pont Co., San Diego, CA. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Sept. 13-15)—Liquitex Expo '88. Philadelphia Civic Center, Philadelphia, PA. (Liquitex Expo, P.O. Box 630, West Paterson, NJ 07424).

(Sept. 18-21)—Southern Decorating Products Association Fall Seminar. Williamsburg, VA. (Dave Bailey, SDPA, 2971 Flowers Rd., S., Suite 137, Atlanta, GA, 30311).

(Sept. 18-24)—XIth Congress of FATIPEC. Aachen, Germany. (C. Bourgerie, FATIPEC Secretary General, 76 Blvd. Pereire, 75017 Paris, France).

(Sept. 19-22)—Verbundwerk '88 Science and Technology of Composite Materials. Wiesbaden, W. Germany. (Demat Exposition Managing, 6000 Frankfurt, AM Main, Postbox 110 611, W. Germany).

(Sept. 20-22)—Third Annual Hazardous Waste and Hazardous Materials Management Exhibition and Conference. Convention Center, Cleveland, OH. (Ursula Barri, Northwest Center for Professional Education, 13555 Bel-Red Rd., C-96870, Bellevue, WA 98009).

(Sept. 23)—"Quality Technology for Managers" Seminar sponsored by Du Pont Co. San Francisco, CA. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Sept. 25-30)—"Polymers in Information Storage Technology" Symposium sponsored by the American Chemical Society. Los Angeles, CA. (K.L. Mittal, IBM-Corporate Technical Inst., 500 Columbus Ave., Thornwood, NY 10594).

(Sept. 26-29)—"Combustion Processes and the Quality of the Indoor Environment" International Conference sponsored by The

Association Dedicated to Air Pollution Control and Hazardous Waste Management. Ramada Inn, Niagara Falls, NY. (Dan Denne, Meetings Dept., APCA, P.O. Box 2861, Pittsburgh, PA 15230).

(Sept. 27-28)—"Polymer Flow Using the Torque Rheometer" Seminar sponsored by Haake Buchler Instruments, Inc. Holiday Inn Crowne Plaza, Los Angeles, CA. (HBI, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001).

(Sept. 27-29)—"Inspection of Coatings and Linings for Immersion Service" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Oct. 1-4)—Canadian Paint and Coatings Association 1988 Convention. Hotel Newfoundland, St. John's, Newfoundland. (Harold Duffett, The Standard Manufacturing Co. Ltd., P.O. Box 6090, St. John's, Newfoundland, Canada).

(Oct. 3-7)—"17th Introductory—Paint Formulation." Course sponsored by the University of Missouri-Rolla, Rolla, MO. (Coatings and Polymer Science Program, Dept. of Chemistry, UMR, Rolla, MO 65401-0249).

(Oct. 4-6)—"Strategy of Experimentation" Seminar sponsored by Du Pont Co. Wilmington, DE. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Oct. 4-7)—12th World Congress on Metal Finishing, INTERFINISH 88. Palais des Congres, Paris, France. (SEPIC INTERFINISH, 17 rue d'Uzes, 75002 Paris, France).

(Oct. 5-7)—Fall Meeting of the National Coil Coaters Association. Westin Hotel, O'Hare Airport, Chicago, IL. (NCCA, 1900 Arch St., Philadelphia, PA 19103).

(Oct. 5-7)—Update '88 Canadian Region—Eastern Conference sponsored by the National Association of Corrosion Engineers. Prince Hotel, Toronto, Ont., Canada. (A. Simcoe, Chairman, Valspar Inc., 645 Coronation Dr., West Hill, Ont., M1E 3R6).

(Oct. 9-12)—17th Annual Conference of the North American Thermal Analysis Society. Lake Buena Vista, FL. (Heidi K. Chen, Akzo Chemie America, 8401 W. 47th St., McCook, IL 60525).

(Oct. 10-13)—15th International Naval Stores Meeting. Intercontinental Ritz and Meridien Hotels, Lisbon, Portugal. (Manco L. Snapp, Jr., Arizona Chemical Co., Panama City, FL).

(Oct. 13-14)—"Polymer Flow Using the Torque Rheometer" Seminar sponsored by Haake Buchler Instruments, Inc. Capri Hotel, Vancouver, B.C., Canada. (HBI, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001).

(Oct. 17-19)—National Paint & Coatings Association Annual Meeting. Palmer House, Chicago, IL. (NPCA, 1500 Rhode Island Ave., N.W., Washington, D.C. 20005).

(Oct. 17-19)—National Association of Corrosion Engineers—Tulsa Section. South Central Region Conference. Sheraton-Kensington Hotel, Tulsa, OK. (Conference Chairman Terry May, Mesa Corrosion Control, Inc., P.O. Box 52608, Tulsa, OK 74152).

(Oct. 18-20)—Fall National Plant Engineering and Maintenance Show and Conference. Georgia World Congress Center, Atlanta, GA. (Conference Director, National Plant Engineering and Maintenance Conference, 999 Summer St., P.O. Box 3833, Stamford, CT 06905).

(Oct. 25-26)—"Polymer Flow Using the Torque Rheometer" Seminar sponsored by Haake Buchler Instruments, Inc. Sheraton Airport Hotel, Minneapolis, MN. (HBI, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001).

(Oct. 25-27)—"Strategy of Formulations Development" Seminar sponsored by Du Pont Co. Wilmington, DE. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Oct. 26-28)—"Principles in the Stabilization and Controlled Degradation of Polymers," "Principles of High Performance Composites," and "Fundamentals of Adhesion: Theory, Practice and Applications" Short Courses sponsored by the State University of New York. Hotel Thayer, West Point, NY. (Angelos V. Patsis, Chairman, Dept. of Chemistry, DSB 209, State University of New York, New Paltz, NY 12561).

(Oct. 31-Nov. 4)—"Introduction to Polymer Chemistry." Course sponsored by the University of Missouri-Rolla, Rolla, MO. (Coatings and Polymer Science Program, Dept. of Chemistry, UMR, Rolla, MO 65401-0249).



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(Nov. 1-2)—"Paint Volatile Organic Compounds (VOC)." Two-day Workshop sponsored by ASTM. Hyatt Cherry Hill, Cherry Hill, NJ. (Margaret Cassidy, ASTM, 1916 Race St., Philadelphia, PA 19103).

(Nov. 1-3)—"Maintenance/Industrial Painting Practices" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Nov. 2-3)—"Painting Processes: Industrial Paint Application Technology." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(Nov. 4-6)—41st Annual Show and Convention of National Decorating Products Association. McCormick Place, Chicago, IL. (Lillian Smyser, NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Nov. 7-9)—Paint Research Association. Eighth International Conference. Amsterdam, The Netherlands. (Mr. Dip Dasgupta, Head of Information Dept., Paint RA, Waldegrave Rd., Teddington, Middlesex TW11 8LD England).

(Nov. 7-11)—Seventh International Congress on Marine Corrosion and Fouling. Universidad Politécnica de Valencia, Valencia, Spain. [Cátedra de Construcción III, Departamento de Construcciones Arquitectónicas, Universidad Politécnica de Valencia, Camino de Vera, s/n, 46022 Valencia (Spain).]

(Nov. 8-9)—"Polymer Flow Using the Torque Rheometer" Seminar sponsored by Haake Buchler Instruments, Inc. Holiday Inn Metro Airport, Detroit, MI. (HBI, Inc., 244 Saddle River Rd., Saddle Brook, NJ 07662-6001).

(Nov. 8-10)—"Process Safety Management" Seminar sponsored by Du Pont Co., Wilmington, DE. (Du Pont Safety Services, Barley Mill Plaza, P19-1104, Wilmington, DE, 19898).

(Nov. 8-10)—"Focus on Data" Seminar sponsored by Du Pont Co. Chicago, IL. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Nov. 8-11)—"What European Industry Is Doing" International Symposium on Corrosion Prevention in the Process Industries. Sponsored by the National Association of Corrosion Engineers. Amsterdam Hilton Hotel, Amsterdam, The Netherlands. (NACE Career Development Div., P.O. Box 218340, Houston, TX 77218).

(Nov. 10-13)—10th Annual American Indian Science and Engineering Society Conference. Grand Kempinski Hotel, Dallas, TX. (Karon Johnson, AISES, 1085—14th St., Ste. 1506A, Boulder, CO 80302-7309).

(Nov. 13-17)—Steel Structures Painting Council. National Conference and Exposition. Civic Center, Baltimore MD. (SSPC, 4400 Fifth Ave., Pittsburgh, PA 15213).

(Nov. 14-16)—"Quality Control in the Coatings and Polymer Industry." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(Nov. 15-17)—"Engineering for Electroplating" Seminar. Sponsored by Products Finishing magazine. Hotel Inter-Continental, Atlanta, GA. (Julianne Hall, Products Finishing, 6600 Clough Pike, Cincinnati, OH 45244-4090).

(Nov. 15-17)—"Strategy of Experimentation" Seminar sponsored by Du Pont Co. Houston, TX. (Du Pont Quality Management Services, Barley Mill Plaza, Bldg. P27-2110, Wilmington, DE 19898).

(Nov. 28-Dec. 1)—"Introduction to Coatings Technology." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(Nov. 28-Dec. 3)—Materials Research Society Fall Meeting, Symposia, and Exhibition. Boston, MA (MRS, 9800 McKnight Rd., Ste. 327, Pittsburgh, PA 15237).

(Nov. 29-Dec. 1)—"Inspection of High Performance Coatings" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Nov. 29-Dec. 1)—"Engineering for Electroplating" Seminar. Sponsored by Products Finishing magazine. Omni San Diego, San Diego, CA. (Julianne Hall, Products Finishing, 6600 Clough Pike, Cincinnati, OH 45244-4090).

(Dec. 3-9)—Chemtech China '88. China International Exhibition Centre, Beijing, China. (SHK International Services Ltd., 22/F., 151 Gloucester Rd., Hong Kong).

(Dec. 5-9)—"Fundamentals of Chromatographic Analysis." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(Dec. 12-14)—Winter National Plant Engineering and Maintenance Show and Conference. Anaheim Convention Center, Anaheim, CA. (Conference Director, National Plant Engineering and Maintenance Conference, 999 Summer St., P.O. Box 3833, Stamford, CT 06905).

1989

(Jan. 24-26)—"Bridge/Highway Structures Coatings Inspection" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Feb. 1-5)—International Symposium on Industrial Metal Finishing. Karaikudi, India. (Central Electrochemical Research Institute, Karaikudi-623 006, Tamil Nadu, India).

(Feb. 19-22)—"Principles of Adhesion" Short Course and 12th Annual Meeting of The Adhesion Society. Marriott Hotel, Hilton Head Island, SC. (Don Hunston, National Bureau of Standards, Polymers Div., Gaithersburg, MD 20899).

(Feb. 28-Mar. 2)—"Level II—Industrial Maintenance Course" sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Mar. 13-17)—Color '89. Sixth Congress of the International Color Association (AIC). Centro Cultural San Martín, Buenos Aires, Argentina. (Color '89, Grupo Argentino del Color, c/o División Óptica, Inti, C.C. 157, 1650 San Martín (BA), Argentina).

(Mar. 14-16)—"Inspection of High Performance Coatings" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Apr. 8-9)—Eastern Decorating Products Show sponsored by the National Decorating Products Association. World Trade Center, Boston, MA. (Lillian Smysor, NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Apr. 11-14)—"Advances in Corrosion Protection by Organic Coatings" Symposium. Christ's College Cambridge, England. (David Scantlebury, Corrosion and Protection Centre, UMIST, P.O. Box 88, Manchester, U.K. or Martin W. Kendig, Rockwell International Science Center, Thousand Oaks, CA 91360).

(Apr. 23-28)—"7th International Meeting on Radiation Processing." Noordwijkerhout, The Netherlands. (E. Franken, 7th International Meeting on Radiation Processing, P.O. Box 4240, 6710 EE Ede, The Netherlands).

(Apr. 24-28)—"Applied Rheology for Industrial Chemists." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(May 1-4)—Society of Manufacturing Engineers' International Conference. Cobo Hall, Detroit, MI. (Violet Greco, SME, One SME Dr., P.O. Box 930, Dearborn, MI 48121-0930).

(May 8-12)—"Dispersion of Pigments and Resins in Fluid Media." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(May 22-26)—"Adhesion Principles and Practice for Coatings and Polymer Scientists." Short Course sponsored by Kent State University, Kent, OH. (Carl J. Knauss, Chemistry Dept., Kent State Univ., Kent, OH 44242).

(June 21-23)—Oil and Colour Chemists' Association Biennial Conference. Grosvenor Hotel, Chester, England. (Mr. Christopher Lacey-Day, Director, OCCA, Priory House, 967 Harrow Rd., Wembley, Middlesex HA0 2SF, England).

(June 21-23)—"Surface Modification and the Phenomena Resulting from Such Treatments." Conference cosponsored by Dow Corning Corp. and Colorado State University. Holiday Inn, Midland, MI. (W.T. Collins, Dow Corning Corp., Mail Stop C41C00, Midland, MI 48686-0994).

(Aug. 3-6)—31st Annual Convention of the Oil and Colour Chemists' Association Australia. Fairmont Resort, Leura, New South Wales. (Peter Parsons, Tioxide Australia P/L, 2A/6 Tooronga Terrace, Beverly Hills, NSW, Australia 2209).

(Sept. 25-30)—American Chemical Society. 196th National Meeting. Los Angeles, CA. (B.R. Hodson, ACS, 1155—16th St. NW, Washington, D.C. 20036).

(Sept. 26-28)—"Inspection of Coatings and Linings for Immersion Service" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Oct. 24-26)—8th International Conference on the Internal and External Protection of Pipes. Cosponsored by BHRA and Snamprogetti. Florence, Italy. (Conference Organizer (Pipe Protection), BHRA, The Fluid Engineering Centre, Cranfield, Bedford MK43 0AJ, England).

(Oct. 31-Nov. 2)—"Maintenance/Industrial Painting Practices" Course sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Nov. 18-20)—National Decorating Products Show sponsored by the National Decorating Products Association. McCormick Place, Chicago, IL. (Lillian Smysor, NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Nov. 28-30)—"Level II—Industrial Maintenance Course" sponsored by KTA-Tator, Inc., Pittsburgh, PA. (KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275).

(Nov. 28-Dec. 1)—The Inter-Society Color Council Williamsburg Conference. Williamsburg, VA. (Roy Berns, Rochester Institute of Technology, P.O. Box 9887, Rochester, NY 14623-0887).

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'Humbug' from Hillman

Harold M. Werner plucked the following from his local community occasional, which, in turn, yanked it out of the *Cleveland Free-Net* (at least, that's what it seemed to read). I don't know for sure, but I fear that Harold had me in mind. You young folks—just wait!!!

Old Timer's Lament

Thought I'd let my doctor check me
'Cause I didn't feel quite right.
All those aches and pains annoyed me,
And I couldn't sleep at night.

He could find no real disorder,
But he wouldn't let it rest.
What with Medicare and Blue Cross,
Wouldn't hurt to do some tests.

To the hospital he sent me.
'Though I didn't feel that bad.
He arranged for them to give me
Every test that could be had.

I was fluoroscoped and cystoscoped,
My aging frame displayed,
Strapped on an ice cold table
While my gizzards were X-rayed.

I was checked for worms and parasites,
For fungus and the crud
Then they shoved long needles in me,
Taking samples of my blood.

Doctors came to check me over,
Probed and pushed and poked around,
And to make sure I was living,
Had me wired up for sound.

And for now they have concluded,
Their results have filled a page.
What I have will surely kill me,
My affliction is old age!!

I have just declared August to be Humbug's poetry month because I found this contribution from Mike Frantz in the files. Mike mentions that it was sent by Jan Prins, who says it has been circulating in Europe for some time. We must have sales departments in common!

Paint chemist, paint chemist, miracle man
Make me some paint as fast as you can.
To dry in ten minutes and last for ten years;
Flow out to perfection, but no sign of tears.

Paint chemist, paint chemist, grind it so fine.
Minimum Hegeman gage reading, nine.
No settling, no skinning, no float, and no flood,
Resistance to everything, better than good.

Paint chemist, paint chemist, what do you say?
Ten gallons, ten colors wanted today.
Spray, brush, or dip and roller coat, too,
Ten bob* = gallon will just about do.

Paint chemist, paint chemist, did I forget?
No smell and no tarte** or the workers will fret.
And film must be lethal to molds and bacteria,
Good Heavens, the fellows gone into hysteria!!!

*Probably about five bucks.... Humbug.
**Certainly, nothing to eat.... Humbug.

In the spirit of things, we have this bit which old reliable, Roy Tasse, found in the magazine, *Stripped Gears*.

Dr. Magnus Pyke, a noted scientist, recently explained why ketchup is often difficult to get out of the bottle. Ketchup, it seems, falls in the category of substances (like some toothpastes and mayonnaise) that simply cannot make up their minds whether they are liquids or solids. The solids, mixed in their suspended states with liquid ketchup, form a subsidiary structure—a sort of temporary scaffolding—which breaks down with good shaking.

Dr. Pyke had one final statement:

You bang and bump and shake
the bottle.
First nothing'll come,
then a lott'll.

—Rotary Club Bulletin, New York

Before we leave Roy and his favorite magazine, here is a non-poetic bit:

Before his daring escape from prison, the desperate criminal had been photographed from four different angles.

The prison authorities sent copies of the photos to police chiefs all across the land with orders to notify them the moment an arrest was made.

The next day, a telex was received from an ambitious sheriff of a small town: "Pictures received. All four men shot while resisting arrest."

—Rotary Down Under

—Herb Hillman
Humbug's Nest
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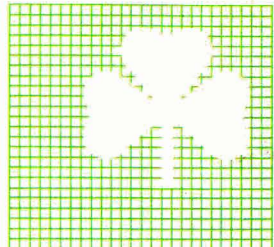
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