January 1997

JCT

Journal of Coatings Technology

Federation of Societies for Coatings Technology

ice

International Coatings Expo

and Technology Conference

1996 Annual Meeting, International Expo and Technology Conference Wrap-Up Issue

1996 Mattiello Memorial Lecture

"Predicting In-Service Weatherability of Automotive Coatings: A New Approach"

First-Place Roon Paper

"Mechanistic Consideration of Particle Size Effects on Film Properties of Hard/Soft Latex Blends"

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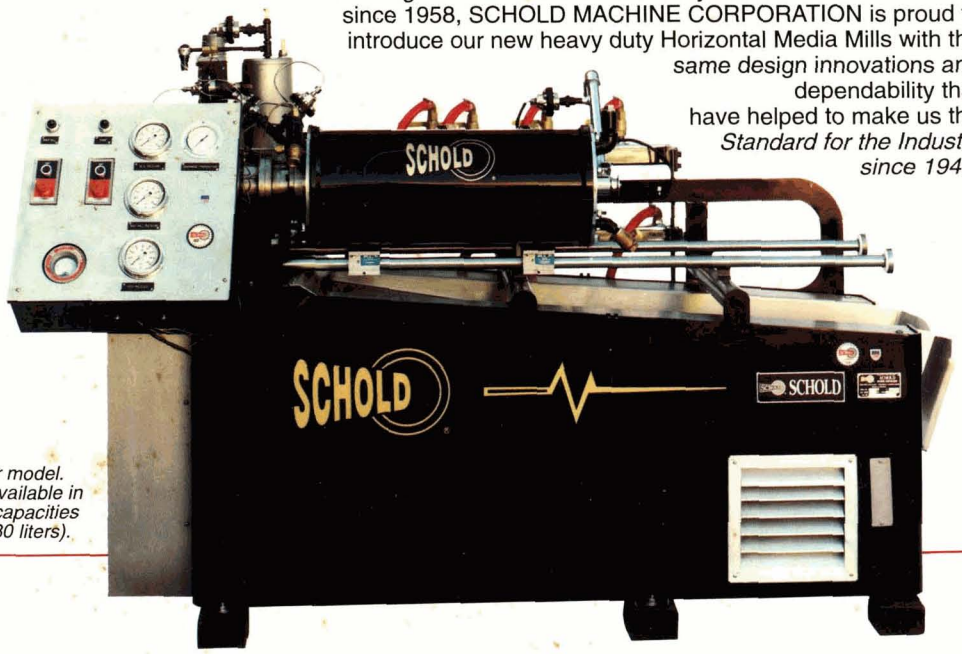

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JCT
JOURNAL OF COATINGS TECHNOLOGY

JANUARY 1997 VOL. 69, NO. 864

Technical Articles

Formulation and Production Forum

Federation News

Spotlight

Departments

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JOURNAL OF COATINGS TECHNOLOGY

Guide for Authors

GENERAL

The JOURNAL OF COATINGS TECHNOLOGY is published monthly by the Federation of Societies for Coatings Technology for its membership of approximately 7,000 in 26 Constituent Societies in the United States, Canada, Great Britain, and Mexico. The JOURNAL is devoted to the advancement of knowledge in the science and technology of surface coatings, the materials comprising such coatings, and their use and performance.

The Editors invite submission of original research papers, review papers, and papers under the special headings *Open Forum* and *Back to Basics*, and *Letters to the Editor*. All manuscripts will be assumed to be previously unpublished writing of the authors, not under consideration for publication elsewhere. When review papers contain tables or graphs from copyrighted articles, the authors will be required to obtain permission for use from the copyright holders. When the organization with which the authors are affiliated requires clearance of publications, authors are expected to obtain such clearance before submission of the manuscript. 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. 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 regional meetings or symposia of the Constituent Societies.

Papers in which proprietary products or processes are promoted for commercial purposes are specifically nonacceptable for publication.

SUBMISSION OF MANUSCRIPTS...

...for the Journal

Four complete copies should be sent to the Editor, JOURNAL OF COATINGS TECHNOLOGY, 492 Norristown Rd., Blue Bell, PA 19422. The cover letter should address copyright, clearance, and release issues discussed above and should specify paper category: *Original Research, Reviews, Open Forum*, or *Back to Basics*.

Letters 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 Mike Bell, Director of Educational Services, FSCT, 492 Norristown Rd., Blue Bell, PA 19422.

...for Roon Foundation Award Competition

Ten complete copies of the manuscript are required, and should be submitted to Mike Bell at the address previously listed.(For complete details, see "Roon Awards" section of the JOURNAL in the January 1997 issue.)

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).

Authors are encouraged to consider submissions in several categories and to prepare their manuscripts accordingly. The categories are:

Original Research Papers: The main technical content of the JOURNAL OF COATINGS TECHNOLOGY will continue to be original research papers. Editors support the trend in scientific writing to a direct, less formal style that permits limited use of personal pronouns to avoid repititious or awkward use of passive voice.

Review Papers: Papers that organize and compare data from numerous sources to provide new insights and unified concepts are solicted. Reviews that show how advances from other fields can beneficially be applied to coatings are also desired. Reviews that consist mainly of computer searches with little attempt to integrate or critically evaluate are not solicited.

Open Forum: Topics for this category may be nontechnical in nature, dealing with any aspect of the coatings industry. The subject may be approached informally. Editors encourage submission of manuscripts that constructively address industry problems and their solutions.

Back to Basics: Papers that provide useful guides to Federation members in carrying out their work are solicited. Topics in this category are technical but focus on the "how to" of coatings technology. Useful calculations for coatings formulation and procedures that make a paint test more reproducible are examples of suitable topics. Process and production topics, i.e., paint manufacture, will also be reviewed in the *Back to Basics* category.

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 originally composed for oral presentation will have to be revised or rewritten by the author to conform to the style described in this guide.

Manuscripts should be typed with double spacing on one side of $8\frac{1}{2}$ x 11 inch (22 x 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 x 7 inch (13 x 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

Main headings and sub-headings should be used to improve readability, and to break up typographical monotony. The text should *not* be presented as an alphanumeric outline.

The main headings usually should be INTRODUCTION, EXPERIMENTAL, RESULTS AND DISCUSSION, and SUMMARY or CONCLUSIONS. Sub-headings will be specific to the subject.

Only as much review as is necessary should be given to provide an introduction to the subject; the main burden for extensive background should be placed on the list of references.

Standard scientific and technical terminology should be used to convey clear and unambiguous meaning, but the use of technical jargon or slang should be avoided. Authors should bear in mind that the JOURNAL has an international audience, for many of whom English is a second, not native, language. Use of regional idioms or colloquialisms should be avoided. The use of obscure abbreviations is also discouraged. When appropriate, abbreviations should be made in parenthesis immediately following first mention of the term in the text, and then used alone whenever necessary.

Recent issues of the JOURNAL should be consulted for desired style and technical level.

Metric System

Metric system units should be used wherever applicable with the equivalent English units shown afterwords in parentheses. The ASTM Metric Practice Guide, E 380-72 (American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103) is a convenient reference.

Tables, Graphs, and Drawings

Tables, rather than descriptive text, should be used only when they are genuinely helpful. They should be proportioned in accordance with the height and width limitations of the JOURNAL'S pages. Each table should be typed on a separate sheet, rather than included in the text, and appended to the manuscript. Each table should be numbered and have a descriptive caption. Tables should be referenced in the text (e.g., "See *Table* 1").

In numerical data in tables, numbers less than one should have a zero before the decimal point.

Graphs should be on good quality white or nonphotographic blue-lined 8 1/2 x 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 from original for typesetting.

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 x 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. For oligomeric or polymeric materials, characteristics such as molecular weight, polydispersity, functional group content, etc. should be provided.

Equations

Equations must be typed, or written clearly, with equations numbered sequentially in parentheses to the right. If Greek letters are used, write out their names in the manuscript margin at the first point of use. Place superscripts^{a} and subscripts$_{b}$ accurately. Avoid the use of superscripts in a manner that can lead to their interpretation as exponents.

Summary

The paper should be concluded with a summary which is intelligible without reference to the main text. The summary may be more complete than the abstract, listing conclusions drawn from the text. A well written summary can serve to inspire the busy reader to turn back to the paper, to read it thoroughly.

Acknowledgment

If used, it should follow the summary.

References

These should be listed in the numerical order in which they are cited in the text, and should be placed at the end of the manuscript. Names of authors may or may not be shown in the text with reference numbers. If possible, include titles of articles referenced in the literature. The following are examples of acceptable reference citations for periodicals,[1,2,3] books,[4] 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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COMMENT

Progress Through Evolution—Not Revolution

Since 1992, the Federation has been involved in the process of learning strategic planning. To many, both participating and observing, this process has been tedious, slow-moving, and sometimes painful. However, the planning process must be kept in perspective. It is a process of progress through evolution, not revolution. This evolutionary process usually takes five years to become an important part of an organization's culture.

This past year, we have started to see the benefits that planning can and will bring to us. We have just completed our most successful exposition ever, with record attendance, exhibitors, and floor space. Our new Technology Conference exceeded all expectations. The Pan-American Expo was an exhibitor sell-out and had over 2000 participants in attendance. These planning successes yielded a surplus over our fiscal 1996 budget—a budget that represented an approximate 20% increase over fiscal 1995. Additionally, through the leadership and hard work of our Board of Directors, we are revising membership logistics and establishing criteria for Common Interest Groups.

These successes represent the beginning. We are now entering our fifth year in the planning process. This will be the year that we start to really work the plan. "Working the plan" forces a mode of continuing change on our organization. It also shifts our focus from a reactionary mind set to a proactive vision.

This proactive vision cannot be achieved without everyone working in a coordinated effort; it also cannot be achieved in a vacuum. I strongly urge open, but honest, communication and debate as we chart our future course. I stand ready and anxious to meet with any Society or Board Members to discuss the activities that will determine our future success.

By virtue of our last 74 years of hard work and success, we are an industry leader. The Federation has a significant role that it can—no, must—fill in the global coatings industry. As we begin our 75th year, let's use it to lay a firm supporting foundation for our continued growth and success. But, let's do it together.

M. Jay Austin
1996-97 FSCT President

Technical Abstracts

Spanish translations provided by Jesús Camacho, of Instituto Mexicano de Tecnicos en Pinturas y Tintas.

Predicting In-Service Weatherability of Automotive Coatings: A New Approach—D.R. Bauer

JCT, Vol. 69, No. 864, 84 (Jan. 1997)

The prediction of long-term weatherability of coatings has always been a difficult task. This task has been made significantly more difficult by the recent, rapid changes in coatings technology. Conventional weathering protocols which rely on observation of appearance changes after outdoor or laboratory exposures have not always been successful in anticipating in-service failures. This paper discusses the reason for this and describes a new approach for estimating in-service weatherability in coatings. The formalism begins by identifying specific failure modes and developing time-to-failure models which are based on fundamental studies of the chemistry and physics of failure. The statistical variation of the key material, process, and exposure parameters in the failure model are described in terms of distribution functions. Since photooxidation plays a critical role in most weathering issues, a specific distribution function for exposure harshness is estimated that can be used to describe the variation in photooxidation rate under actual in-service conditions. By combining a specific failure model with in-service variations in the key parameters, it is possible to estimate in-service failure rates as a function of material and processing variables, thus, allowing for improved risk assessment of any proposed material or processing change. The formalism also provides clearer direction in the design and use of specific laboratory and outdoor exposures in predicting performance. The method is illustrated by deriving distributions of time-to-failure based on two different hypothetical mechanisms of photo-induced coating delamination.

Predicción del Intemperismo de Servicio en Recubrimientos Automotivos: Un Nuevo Acercamiento—D.R. Bauer

La predicción del intemperismo de larga duración de recubrimientos siempre ha sido una tarea difícil. Dicha tarea se ha tornado significativamente más difícil por los recientes y rápidos cambios en tecnología de recubrimientos. Los protocolos convencionales de intemperismo, los cuales dependen de la observación en los cambios de apariencia después de exposiciones en laboratorio o en exteriores, no han sido siempre exitosos en la anticipación de fallas en el desempeño. Este documento expone las razones para esto y describe un nuevo acercamiento para estimar el intemperismo en el desempeño de recubrimientos. El formalismo comienza con la identificación de modos de falla específicos y desarrolla módelos de tiempo-falla, los cuales están basados en estudios fundamentales tanto de la química como de la física de la falla. La variación estadística del material clave, procesos y parámetros de exposición en el módelo de falla están descritos en términos de las funciones de distribución. La foto-oxidación juega un papel crítico en más temas de intemperismo, esta estimada una función de distribución específica para exposiciones severas y puede ser usada para describir la variación en razón de foto-oxidación bajo condiciones de servicio actuales. Mediante la combinación de un módelo de falla específico con variaciones de servicio en parámetros clave, es posible estimar tasas de falla de servicio como una función del material y variables del procesamiento, de esta forma, se permite el aseguramiento de riesgos de cualquier material propuesto o cambio en el procesamiento. El formalismo también proporciona una dirección más clara en el diseño y uso de exposiciones específicas de laboratorio o exteriores en la predicción del desempeño. El método es ilustrado mediante derivación de distribuciones de tiempo-falla basados en dos mecánismos hipotéticos diferentes de dalaminación de un recubrimiento foto-inducido.

Mechanistic Considerations of Particle Size Effects on Film Properties of Hard/Soft Latex Blends—S.T. Eckersley and B.J. Helmer

JCT, Vol. 69, No. 864, 97 (Jan. 1997)

Blends of hard (T_g ~ 60°C) and soft (T_g ~ 0°C) latexes were studied as a function of particle size ratio (R_{soft}/R_{hard}) and blend ratio (mass soft phase/mass hard phase). Addition of hard phase latex to the soft film forming latex significantly improved block resistance, even at blend ratios as low as 70/30. Film properties were not sacrificed, except at high concentrations of the hard phase (50/50). For a given blend ratio, the particle size ratio had a dramatic effect on the block resistance. For a 70/30 blend ratio, the block resistance of a blend with R_{soft}/R_{hard} = 4.0 was equivalent to that of a control latex having the same overall composition, but with a minimum film temperature 20°C higher than the blend.

The phenomenon can be explained in terms of the bulk and surface contributions to adhesion. The hard phase increases the elastic modulus (G') of the film. The magnitude of G' was found to increase with increasing R_{soft}/R_{hard}, an effect that is consistent with percolation theory. The effect of particle size ratio on the surface contribution to adhesion can be explained by particle packing. Visual models indicate that a high apparent surface concentration of hard particles would be expected for a large value of R_{soft}/R_{hard}, given ideal packing conditions. This effect was confirmed by scanning electron microscopy.

Consideraciones en el Mecánismo de los Efectos de Tamaño de Partícula en las Propiedades de Película de Mezclas de Latex Duro/Suave—S.T. Eckersley y B.J. Helmer

Mezclas de latex duro (Tg~60°C) y suave (Tg~0°C) fueron estudiadas como una función de la razón de tamaño de partícula (R_{suave}-R_{dura}) y razón de mezcla (fase suave de masa/fase dura de masa). Agregando latex de fase dura a latex de formación de película suave se mejora significativamente la resistencia al bloqueo, aún en relaciones de mezcla tan bajas como 70/30. No se sacrificaron propiedades de película (temperatura mínima de película (MFT), resistencia al esfuerzo y a la elongación) excepto a concentraciones de la fase dura (50/50). Para una mezcla dada, la razón de tamaño de partícula tuvó un efecto dramático en la resistencia de bloqueo. Para una razón de mezcla 70/30, la resistencia al bloqueo de la mexcla con R_{suave}/R_{duro} = 4.0 fué equivalente a la de un latex de control teniendo la misma composición total, pero con una temperatura de película mínima 20°C más grande que la mezcla. Una mezcla 70/30 con R_{suave}/R_{dura} = .026 mostró una resistencia al bloqueo que fué lejanamente inferior para el control.

El fenómeno puede ser explicado en términos de las contribuciones superficiales y de dimensión a la adhesión. La fase dura actúa como un rellenador de refuerzo inerte, de esta forma incrementa el valor del módulo de elasticidad de la película (G'). La magnitud de G' fué encontrada para incrementar con R_{suave}/R_{dura} incrementada, un efecto que es consistente con la teoría de la lixiviación. El efecto del tamaño de partícula sobre la contribución superficial a la adhesión puede ser explicado por el empaquetamiento de la partícula. Los módelos visuales indican que una concentración superficial aparentemente alta de partículas duras sería esperada para un valor grande de R_{suave}/R_{dura}, dadas condiciones ideales de empaquetamiento. Este efecto se confirmo mediante el microscopio de busqueda electrónica.

Another winner in 1997:

EUROPEAN COATINGS SHOW 97

Exhibition 8th – 10th April 1997
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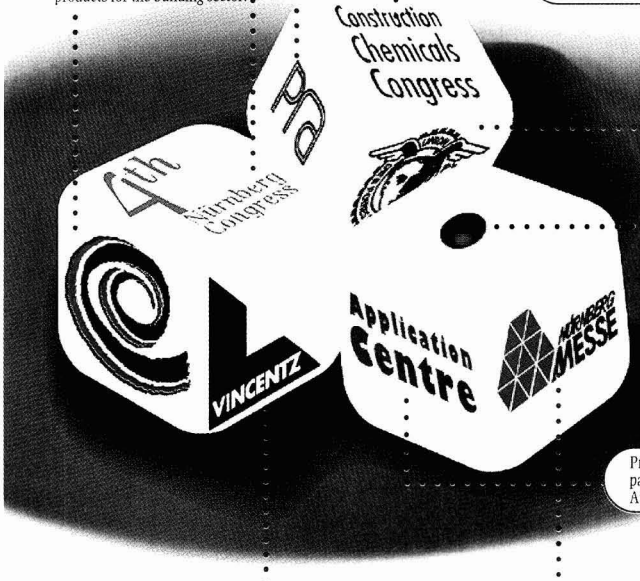
Decision makers in the world's paint industry already know it: the EUROPEAN COATINGS SHOW in Nuremberg will be the top event of 1997. Here you will find everything you want to know about raw materials, technology and applications. In short: everything relating to the production of high quality paints, adhesives and sealants at competitive prices. And for the first time the show will feature chemical products for the building sector.

The international Congress will have as its motto "Creative Advances in Coating Technology" and will once again attract hundreds of experts from all over the world. (Organised in conjunction with Britain's Paint Research Association PRA)

For the first time: chemical products for the building sector have their own congress, organised in collaboration with Germany's Association for Wood Preservatives and Chemical Products for the Building Sector.



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1997 Roon Awards Competition Underway Entries Invited; Awards Total Up to $4,000

FSCT Roon Awards Committee Chairman Clifford Schoff of PPG Industries, Inc., Allison Park, PA, has announced a Call for Papers for the 1997 competition. Prospective authors have the opportunity to earn up to $4,000 in cash prizes for outstanding papers.

The annual awards are sponsored by the Coatings Industry Education Foundation (CIEF) and were established to honor the late Leo Roon, founder of Nuodex Products Co., with support funds coming from the Roon Foundation. The awards will be presented at the Federation of Societies for Coatings Technology's Annual Meeting, on November 3-5, 1997, in Atlanta, GA.

To submit a paper for the competition, the following rules must be observed: (1) The paper must describe original work not previously published or presented; (2) The information must be directly related to the protective coatings industry; (3) It must be of such a caliber that it reflects a step forward in real scientific contribution to the coatings industry; and (4) It must be accompanied by a clearance for publication. The paper must also be prepared by someone associated with the organic coatings industry, including raw material suppliers and educators.

All of those interested in entering the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract by March 3, 1997 to: Roon Awards Competition, c/o FSCT, Attention: Michael G. Bell, Director of Educational Services, 492 Norristown Rd., Blue Bell, PA 19422.

Entries that arrive after the March 1 deadline will be considered for the 1998 competition.

1996 Roon Award Winner

FIRST PLACE—"Mechanistic Considerations of Particle Size Effects on Film Properties of Hard/Soft Latex Blends"—Sarah T. Eckersley and Bradley J. Helmer, of The Dow Chemical Company

(See page 65 of this issue).

Principles Governing the Roon Awards

These awards, established in 1957 by the late Leo Roon, founder of Nuodex Products Co., and supported by funds provided through the Roon Foundation, are for the best technical papers (other than those by a Constituent Society of the Federation) submitted for presentation at a Federation's Annual Meeting.

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

The principles governing the awards are as follows:

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

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

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

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

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

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

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

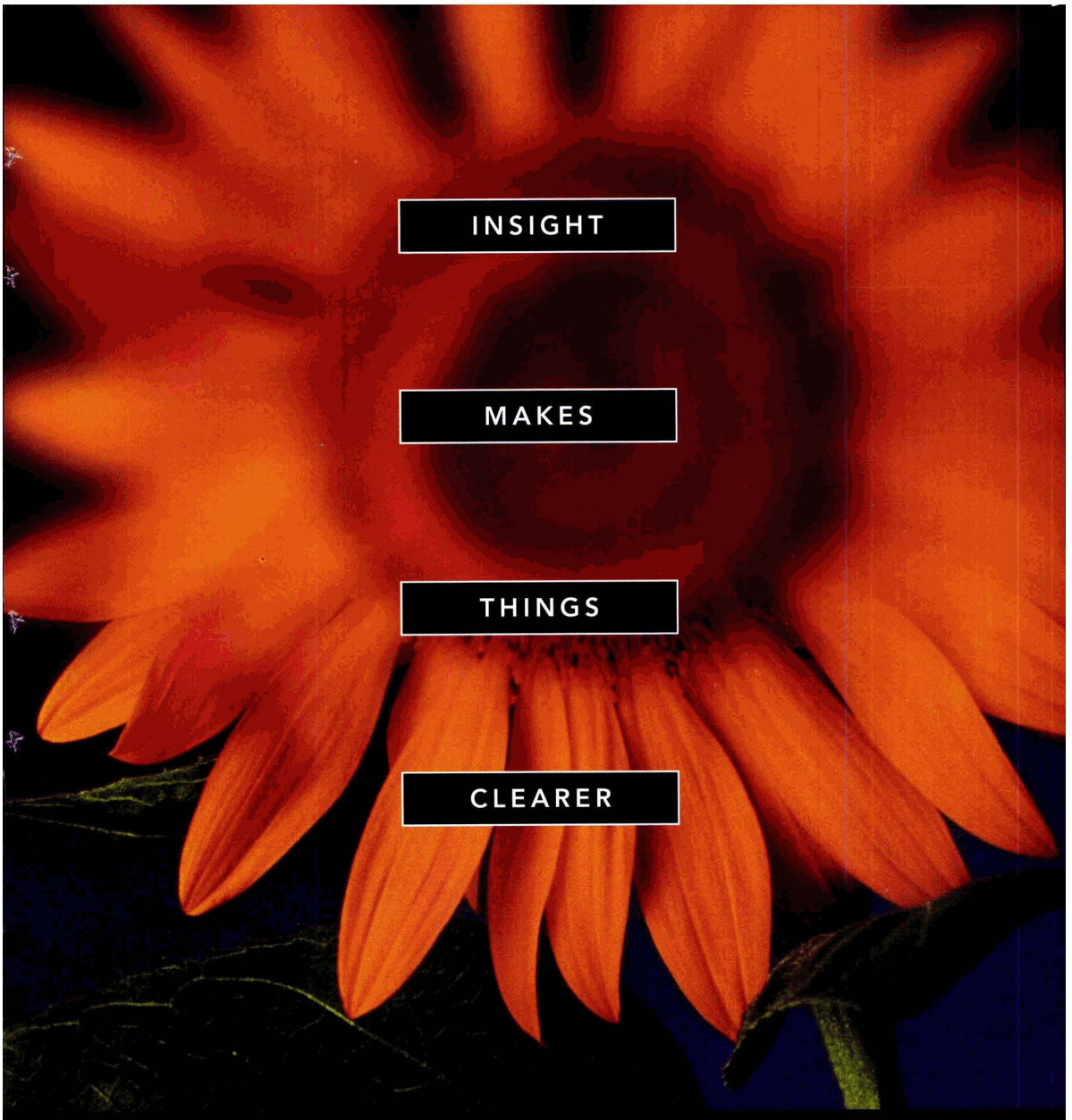
(8) The papers shall be concise and informative discussions of up to approximately 6,000 words. Papers greatly exceeding this length should be divided into more than one paper. Multiple entries in the competition from a single author are acceptable. It is requested that manuscripts be prepared in accordance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

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

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

(11) The Awards will be open to anyone involved in study or engaged in work related to the protective coatings industries, including paint, varnish and lacquer manufacturers, raw material

(Continued on next page.)



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FSCT Invites Nominees for 1998 Mattiello Lecturer

The Federation of Societies for Coatings Technology is seeking nominations for the 1998 Joseph J. Mattiello Lecturer. The Mattiello Lecture will be presented at the 76th Annual Meeting of the Federation, to be held October 14-16, 1998, in New Orleans, LA.

The lecture commemorates the contributions of Dr. Joseph J. Mattiello, former President of the Federation, who was instrumental in expanding the application of the sciences in the decorative and protective coatings fields.

The Mattiello Lecture Committee will select a person recognized for outstanding contributions to science, technology, and engineering related to the coatings industry to present a paper on a phase of chemistry, engineering, human relationship, or other discipline fundamental to paint, varnish, lacquer, or related protective and decorative coatings. The Mattiello Lecturer shall embody the standards of technical accomplishment, service to the coatings industry, and leadership established by Joseph J. Mattiello.

All nominations for the Mattiello Lecturer shall include the following information:

- Name, age, and place of birth
- Current position and brief job history
- Education and degrees, with dates
- Brief reference to other significant awards
- Description and significance of accomplishments that are deemed to qualify the nominee for the award.

The items cited should be concerned with coatings, be pertinent or related to coatings, or be concerned with the constituents of coatings. Some activities and accomplishments which are considered to be appropriate for citation in the nomination are the following:

- Publication and communications such as the following:
  - — Journal articles
  - — Patents
  - — Books (authored, edited, or organized)
  - — Chapter in books
  - — Lectures and presentations
  - — Symposia or meetings organized

(Reprints may be submitted with the nomination but should be restricted to those that reflect seminal contributions; teaching credentials or skills, per se, are not to be considered in this award.)

- Inventions and discoveries
- New scientific principles, understanding or insight
- New or improved products
- New or improved instrumentation or testing methods
- New or improved analytical methods
- Novel uses or applications of products
- New or improved processes for production of resins or coatings, etc.
- Engineering aspects
- New or improved application methods

Please forward all nominations by May 1, 1997, to Patricia D. Viola, Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422-2350.

Principles Governing the Roon Awards (cont'd)

suppliers, research laboratories and universities. (The Committee, however, will not accept papers which involve raw material sales promotion or are self-serving in regard to exploiting a proprietary product.)

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

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

(14) Those planning to submit a paper in 1997 must advise the Chair through FSCT Headquarters (contact Michael G. Bell, Director of Educational Services, Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422) by March 1. FSCT must receive 10 publication manuscripts by May 15.

(15) The 1997 Awards and accompanying engraved plaques will be presented during the FSCT Annual Meeting, November 3-5, 1997, Georgia World Congress Center, in Atlanta, GA.

Student Papers Invited for 1997 A.L. Hendry Awards Competition

Student authors are encouraged to submit entries in the 1997 Southern Society for Coatings Technology Alfred L. Hendry Award Competition.

This year's award features cash prizes to both the student author (or authors) and the author's sponsoring lab. The student receives a $1,000 cash award and expenses covering attendance at the FSCT Annual Meeting and International Coatings Expo in Atlanta, GA, on November 3-5, 1997, to receive the honor and a suitably inscribed certificate for the best paper submitted for the competition. In addition, the laboratory of the sponsoring school will also receive a grant of $500.

The competition is administered by the FSCT Educational Coordinating Committee and several committee members will judge the entries.

Submitted papers must describe the results of original research on a subject related to coatings technology, or present a significantly insightful, comprehensive review of a field of coatings technology. Work done on coatings related topics as part of an undergraduate research project or as a senior thesis is appropriate for submission.

Those wishing to enter the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract, by March 14, 1997 to: Hendry Awards Committee, c/o FSCT, 492 Norristown Rd., Blue Bell, PA 19422-2350. The deadline for receipt of manuscripts is July 3, 1997.

The A.L. Hendry Award is sponsored by the Southern Society for Coatings Technology and commemorates the industry contributions of the late Alfred L. Hendry, president of A.L. Hendry Co. in Tampa, FL. He was a Past-President of the Southern Society and an active participant in many of FSCT's educational activities.

Coming in the February Issue of the JCT

Technical Focus
Epoxy Coatings

Spotlights
Education
Corrosion

Product Overview
Raw Materials

Feature
Western Coatings Symposium and Show

JCT Interviews: Jay Austin

A conversation with the 75th President of the FSCT

Jay Austin laughingly refers to a favorite saying that he borrows from a long-time mentor, "It's only the lead dog that gets a change of scenery." After speaking with Jay, it is clear that this is not a man who would be content to simply follow the pack—either personally or professionally. Named the 75th President of the Federation of Societies for Coatings Technology at its recent Annual Meeting, he is dedicated to maintaining the FSCT's leadership role in the coatings industry. Essential to achieving this goal is planning—first defining where the organization is currently, setting the direction it needs to go, and then determining how it is going to get there. This process, initiated nearly five years ago by his FSCT predecessors, will be an integral part of Jay Austin's presidency.

Jay is currently employed with the Halox Pigments Division of Hammond Group, Inc., Hammond, IN. Hammond Group, Inc. is a privately owned chemical manufacturer supplying key raw materials to a number of industries such as: protective coatings, plastics, batteries, glass, and ceramics. Jay joined Hammond Group in 1973 as a Quality Control Chemist. In 1976, he moved to the company's Halox Division as Laboratory Director and currently holds the position of Vice President and General Manager.

Jay has been married to his lovely wife, Kathy, for almost 20 years. He has one daughter, Amy, who resides in the Detroit area. Jay is active in his local Presbyterian Church where he has served as a Deacon and Elder. His major complaint is that Kathy's "honey-do" list keeps him too busy to concentrate on his first love—GOLF! Jay finds it increasingly difficult to compete with his many friends in sales, somehow they seem to have more time available to work on their games. As you can see, Jay's sense of commitment is balanced with an equally keen sense of humor.

Jay set the tone for the coming FSCT year immediately after taking his oath of office by announcing specific goals which he and the FSCT Executive Committee had planned for the organization. With unprecedented speed, several of these goals already have been accomplished. Jay met with FSCT Headquarters staff in November to outline his vision for the year. In January, for the first time in Federation history, the President and Executive Committee met with the Chairs of the major committees and staff to establish missions and goals, and to promote open communication and interaction in all areas of Federation operations. Jay speaks with a quiet conviction that underscores his ability to head the Federation in its exciting 75th anniversary year. Clearly, with Jay as "lead dog" the FSCT will be enjoying a dramatic change of scenery in this pivotal year in its history!

Recently, JCT met with Jay to learn more about his plans for the FSCT.

JCT: The future of the Federation will obviously be shaped by the conditions which impact the coatings industry. What are those conditions? What do you see as the greatest challenges facing the industry today?

JA: Meeting environmental regulations is the greatest challenge. That's it. There's no doubt about it. Once laws are passed and regulations are made, it takes industry some time before it realizes the implications of what those regulations really are. Trying to keep up with them is really difficult and it becomes doubly difficult for raw materials suppliers. Not only do we have to keep up with regulations for ourselves, but in turn, we have to help our customers keep up with the regulations and always stay a step ahead or guess which direction they're going to go, so we can have new products ready for our customers when they need them.

JCT: What are conditions that you predict will have a major impact on your company?

JA: Globalization of our industry. A raw materials supplier who wants to be a player in the marketplace can no longer be just a U.S.-based company. They have to be in the global marketplace. We're basically a small specialty chemical manufacturer and it's a real challenge to play in the global arena. We're learning all the time. It's trial and error. You've got successes; you've got failures—let's put it this way, I never have a dull day!

"A raw material supplier who wants to be a player in the marketplace can no longer be just a U.S.-based company"

"Working for a raw material supplier, you need to have a network and the only way to generate that network is to interact with your peers."

"There's no place where you'll have better educational opportunities than at the Federation."

JCT: How long have you been a member of the Federation?

JA: It is approaching 20 years. I originally became a member because our company exhibited at the Paint Show. I was at the Show and wanted to find out what it was all about.

JCT: Why would you encourage someone to become involved in this organization?

JA: I'll repeat what I tell our employees. They have the choice of joining. The opportunity is there and if they join and become active professionally, they're going to be better people.

Working for a raw material supplier, you need to have a network and the only way to generate that network is to interact with your peers. There's no better way to do that then by joining the Federation.

You have to stay current with your job technology and understand what's happening in the industry. There's no place where you'll have better educational opportunities than at the Federation. And from my own experience, I've always found that you get back more in benefits to yourself and to your company than you ever invested in the activities, either at the local level or at the national level.

JCT: What skills do you feel that you can bring to the Federation presidency?

JA: Planning skills. I'm a firm believer in strategic planning. I do it. That's how I run my piece of the business. I do not like reacting to situations. I like as much control as I can have and I think planning skills and organizational skills are probably the main strengths that I bring.

The other thing I can bring is that I sincerely want to make the Federation successful. I hope that both the Federation and myself are better at the end of my tenure than we were in the beginning.

JCT: How can the Federation stay successful? What are some of the goals you have for the near future?

JA: This is the year we stop talking about strategic planning and start implementing it. I said that at the fall meeting of the Board of Directors and I'll repeat that throughout the year. We have to start implementing the plan. I think the Board gave us a mandate for implementation, to begin the process of change. Now, we have to move on that mandate.

JCT: What do you see as some challenges facing the FSCT?

JA: There are two major issues. Continued consolidation of our industry is a real concern. Simply because we have not done a good enough job marketing the benefits of the Federation. I think we always stand the chance of not having the support that we probably deserve from company management because they really don't understand what we're doing and all we are achieving.

The other thing is that, right now, we're not serving the basic needs of our individual members. That goes from the Society level all the way up to the national level. When we only have 25% of our members really active at the local Society level and 75% are being carried on the rolls, it becomes obvious that we're not meeting their needs. We've got to find out what those needs are and we have to focus on meeting them. I am very optimistic that the Common Interest Group (CIG) program being proposed is going to be an outlet for us to achieve that.

JCT: Do you have a message you will be bringing to the FSCT Societies?

JA: First and foremost, don't be afraid of change. I realize that we have a contingent that believe our overall goal is to weaken our local Societies—nothing could be further from the truth. In truth, we want to see stronger more active local Societies and are examining ways to strengthen the Federation support functions to them.

However, Societies must recognize how quickly the coatings business is changing. We have to restructure so that we can more quickly respond to challenges from both the industry and our growing number of competitors. But, this process for change must be carefully done and should be one of evolution, not revolution.

The Federation has a very significant role to play in the global paint business. The other associations, our CSI affiliates, are watching and waiting for the Federation to take the leadership role that is needed. We are the largest technical organization for coatings in the world. Along with that comes responsibility. And we have a responsibility to the industry to make sure we fulfill the role that it is demanding. If we don't do that, then someone else will. They won't do it as well and the industry will not be as good a place as it would have been if we had done what we need to do.

JCT: If you could be given a "tag name" for what you will represent for the Federation, what would it be?

JA: "The Proactive President." We're not going to just sit back and let things continue to happen to us. I want us to be out in front leading the way.

After taking the oath of office at the FSCT Annual Business Meeting in Chicago on October 25, Jay Austin began his tenure as President by announcing the following goals to be achieved by the FSCT Executive Committee:

- **Forge strategic alliances with other organizations**
- **Set up uniform committee structures**
- **Develop committee missions and goals**
- **Develop training session for committee chairs**
- **Develop detailed marketing program for the Federation and membership services**
- **Develop a significant new revenue stream to help fund CIEF**
- **Strengthen support services for local Societies**

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CLEARCorps Gains National Exposure As New EPA Lead Regulations Go Into Effect

The CLEARCorps program—a joint public service partnership of The Shriver Center, Baltimore, MD, and the National Paint and Coatings Association (NPCA), Washington, D.C.—has gained increasing national attention as new federal Environmental Protection Agency (EPA) lead disclosure regulations become effective.

According to NPCA, an EPA regulation enacted on September 6, 1996, required those selling or leasing most residential housing built before 1978 to disclose known lead-based paint and/or lead-based paint hazards. Effective December 6, 1996, the regulation's impact expands, requiring disclosure by owners of one to four residential dwellings.

The regulation, while not requiring any testing or removal of lead-based paint by sellers or landlords, naturally leads to an important question: What should an owner do about lead if the issue affects a potential property sale or rental?

The CLEARCorps program addresses this question, since it offers municipalities, individual homeowners and landlords demonstrated ways to make properties lead-safe and prevent childhood lead exposure, without turning to costly, often dangerous, lead removal processes.

Contrary to common perception, direct ingestion of deteriorated, old lead-based paint—usually by children chewing on paint chips—is a rare occurrence and is not the primary source of lead exposure. Common household dust is, in fact, the primary source of exposure. CLEARCorps, with its focus on simple and cost effective dust control techniques and permanent encapsulation abatement strategies, appropriately targets the most frequent pathway to lead exposure.

CLEARCorps is putting targeted, feasible and cost-effective solutions into practice in at-risk neighborhoods, where problems continue despite the dramatic decline in children's blood-lead levels. In 1996 alone, CLEARCorps is reducing lead at upwards of 500 to 600 homes, working with more than 40 AmeriCorps workers under the supervision of local operating sites in Baltimore, Minneapolis, and Charleston, with more work planned for 1997.

Overall, the CLEARCorps approach involves three key steps: (1) trained members test homes for lead-dust levels; (2) members clean, repair, and help make homes lead safe; and (3) members educate parents and other members of their communities on how to identify and effectively control lead dust hazards through personal hygiene, home maintenance, and cleaning techniques.

The CLEARCorps sites are serving as demonstration projects for the rest of the country. In addition, practical measures performed by communities are being tested on a scale that can inform public policy decisions and spur action.

National Paint & Coatings Association

Captive Use of Plastics Resins Up 9.9% in 1996

From comparisons with 1995 statistics, year-end estimates by The Society of the Plastics Industry, Inc., Washington, D.C., indicate that sales and captive use of plastics resins was up 9.9% in 1996. In addition, estimated resin production rose 6.9% from the 1995 levels.

U.S. resin sales and captive use for 1996 will total an estimated 87 billion pounds, while production is expected to reach 84 billion pounds.

"The increase in 1996 is a significant rebound from the much smaller growth experienced in 1995 and a return to a more typical pattern of industry growth," said Jan Neuenfeldt, Chairman of SPI's Committee on Resin Statistics (CRS). "Of special note is the fact that resin sales in 1996 rose nearly 10% despite a relatively flat level of consumer confidence and modest GDP growth of 2.4%."

Resin sales and captive use has increased at an average annual rate of 5.6% per year since 1986, while production has risen at an average of 5.2% annually over the last 10 years.

Thermoplastic resins showed the strongest growth in 1996, with production estimates up eight percent and sales and captive use up 11.9% for the year. Production as well as sales and captive use of thermoset resins was up four percent. Engineering resins production rose 2.2%, with sales and captive use up 1.7% over 1995 levels.

Ms. Neuenfeldt said that as the plastic industry matures and becomes increasingly interdependent with the U.S. and world economies, the outlook for future growth will be harder to predict. However, she said, "given the state of the economy and the significant rebound of the plastic industry, plastics have once again proven their strength in the marketplace."

The 1996 year-end projections are based on nine-month data as compiled by Association Services Group, LLC for SPI's Committee on Resin Statistics

In other news, SPI has moved its headquarters to: The Society of the Plastics Industry, Inc., 1801 K St., N.W., Ste. 600K, Washington, D.C. 20006-1301; phone: (202) 974-5200; fax: (202) 296-7005.

In addition, The American Plastics Council (APC) will move to the same building, enabling the two organizations to easily continue their long-standing tradition of cooperation on many issues vital to the plastics industry.

ARCO Purchases TDI and ADI Businesses of Olin Corp.

ARCO Chemical Co., Newtown Square, PA, has purchased the toluene diisocyanate (TDI) and aliphatic diisocyanate (ADI) businesses of Olin Corp. for $565 million, including an estimated $80 million of working capital.

With this transaction, ARCO has acquired Olin's TDI and ADI facilities at Lake Charles, LA, along with related patents and process technologies. As part of the transaction, ARCO will employ approximately 480 people previously associated with Olin at these facilities.

The acquired Olin assets represents TDI capacity of 250 million pounds and ADI capacity of 17 million pounds. ARCO will also be purchasing technology for the isocyanates and a dinitrotoluene technology package.

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HPS Expands its Facility in Boulder, CO

HPS, Boulder, CO, has constructed a new 27,500 square foot, two-story building adjacent to the company's current facility. The expansion provides for additional manufacturing and warehouse space, as well as an expanded shipping department.

HPS manufactures VacuComp™ vacuum components and valves with ISO-KF, ISO-Universal, CF, and ButtWeld fittings. The SensaVac® gauge line includes standard and convection Pirani gauges and hot and cold cathode ionization gauges.

HSIA Reports on Revision to Methylene Chloride Standard

A report by the Halogenated Solvents Industry Alliance, Inc., Washington, D.C., indicates that the federal Occupational Safety and Health Administration (OSHA) had expected to issue its revised standard for methylene chloride during the fall of 1996, however, Congressional interest in the standard seems to be slowing the agency down. Of particular concern to OSHA is the inclusion in the Congressional spending bill for the current fiscal year of a directive to ensure that the standard:

- include a thorough review of the rule's potential impact on small businesses;
- does not pose problems for compliance with Environmental Protection Agency (EPA) regulations affecting sources of methylene chloride; and
- is consistent with the ongoing EPA recharacterization of the cancer risks associated with exposure to the solvent.

The appropriation's language was inserted as a result of HSIA's efforts to persuade OSHA to reconsider its decision to lower the permissible exposure limit (PEL) from 500 to 25 parts per million (ppm) as an eight-hour time-weighted average (TWA). HSIA has long supported a limit of 50 ppm, the level recommended by the American Conference of Governmental Industrial Hygienists (ACGIH).

24th International Waterborne, High-Solids, and Powder Coatings Symposium Slated for Feb. 5-7

The Southern Society for Coatings Technology, in conjunction with The University of Southern Mississippi (USM), Hattiesburg, MS, will conduct the 24th International Waterborne, High-Solids, and Powder Coatings Symposium on February 5-7, 1997, at the Hyatt Regency Hotel, in New Orleans, LA.

The symposium will focus on the chemistry, formulation, and new developments in waterborne, high-solids, and powder coatings. Topics scheduled for presentation include the following.

Wednesday Morning Session 8:00 am - 12:00 Noon

8:20 am—Plenary Lecture—"Perspectives on Higher-Solids Coatings"—Frank N. Jones, Eastern Michigan University

9:10 am—"High Solids, Metal-Binding Polymers"—V.S. Nithianandam, T.A. Reddy, S. Erhan, Ertech, Inc.

9:40 am—"Studies of Cured Films of an Amine-Adduct Cured Epoxide Resin Under Ambient and Subambient Cure Conditions"—K. Ghosh, K. Dangayach, P. Garcia, Shell Chemical Co.

10:10 am—Break

10:40 am—"Adhesion of Low Cure Temperature High-Solids Polyester-Melamine Coatings to CPO Treated Plastic Substrates"—J.M. Land, J.O. Stoffer, University of Missouri-Rolla

11:10 am—"In-situ Phosphatizing Coatings: A High-Solids Polyester Baking Enamel"—T. Yu, C.T. Lin, Northern Illinois University

11:40 am—"Acid Catalysis of Two Component Urethane Clearcoats for Automotive Applications"—J.D. Nordstrom, R.J. Barsotti, V.L. Stolarski, DuPont Automotive Products

Wednesday Afternoon Session 1:30 pm - 5:00 pm

1:30 pm—"Novel Ambient Temperature Curable Two-Component Waterborne-Silicon-Acrylic Coatings"—N. Harui, T. Hibi, C. Tagaito, M. Ooka, Dainippon Ink and Chemicals, Inc

2:00 pm—"Chemical Resistance of Waterborne Epoxy/Amine Coatings"—A. Wegmann, Ciba-Geigy Ltd

2:30 pm—"Evaluation of the Film Morphology and the Performance of Waterborne Epoxy Coatings"—E.C. Galgoci, K. Dangayach, A.B. Pangelinan, R.J. Knabe, D.R. Denley, G.A. York, Shell Chemical Co.

3:00 pm—Break

3:30 pm—"High Performance Two-Component Waterborne Epoxy/Amine Coating System"—C.F. Cheng, M.S. Sung, C. Peterson, C. Corbalis, Ciba Polymers

4:00 pm—"Waterborne Epoxy Silane Curing Agents"—M.J. Chen, F.D. Oserholtz, A. Chaves, P.E. Ramdatt, B.A. Waldman, Witco Corp.

4:30 pm—"Design of Pigment Dispersants: Selection of Anchoring Groups"—H.J.W. van den Haak, Akzo Nobel

Thursday Morning Session—A 8:00 am - 12:00 Noon

8:00 am—"The Synthesis of Waterborne Acrylic-Modified Alkyd and Their Application"—J.Y. Shim, Daihan Paint & Ink Co., Ltd.

8:30 am—"Recent Developments in the Production of High Quality Vinyl Ester-Based Latices"—F. Decocq, D. Heymans, S. Spanhove, C. Nootens, Shell Research S.A.

9:00 am—"New Surfactants for Emulsion Polymerization"—A.M. Fernandez, T. Shulman, Y. Li, Y. Cyrus, Rhône-Poulenc, Inc.

9:30 am—Break

10:00 am—"On the Study of High Temperature Instability of Polyether and Polyester-Based Polyurethane Dispersion"—H.H. Lo, Y.H. Jan, H.-Z. Wen,

(Continued on next page.)

Cleveland Society Plans 40th Annual Technical Symposium for May 22-23, 1997

The 40th Annual Technical Symposium of the Cleveland Society for Coatings Technology is slated for May 22-23, 1997, at Case Western Reserve University, Cleveland, OH. The preliminary program that follows reflects the symposium's theme: "Waterborne Coatings: Sink or Swim."

"Two-Component Waterborne Polyurethane Coatings—Maturation of an Idea"—Myron Shaffer and Douglas Wicks, Bayer Corporation;

"Shear Thickening and Time-Dependent Rheological Behavior in Aqueous Polyacrylic Ester Dispersions"—Alex Jamieson, Case Western Reserve University;

"Formulating with P-Series Glycol Ethers"—Carol Fox, Arco Chemical;

"Polysiloxanes for High Temperature Waterborne Coatings"—James D. Greene, Wacker Silicones;

"Waterborne Epoxy Coatings—A Perspective on Dry"—Joseph Muldey, Henkel Corp.;

"Aluminum Pigments in Water—Fact or Fallacy?"—Martha Davies, Reynolds Metals;

"The Effect of Rheological Additives on the Properties of Water-Based Coatings"—David Bryant, Rheox, Inc.;

"On-Line Troubleshooting in Waterborne Systems"—Carol Williams and Charlie Tabbi, Reichhold Chemicals;

"Update on VOC Regulations"—Madeline Harding, The Sherwin-Williams Co.; and

"Environmental Issues Facing the Ohio Paint Industry"—Robert Toth, ICI Paint.

In addition, raw material and equipment suppliers will showcase their products with tabletop displays.

The registration fee is $150 per person. For more information, contact Vicki Fisher, Jamestown Paint Co., 108 Main St., Jamestown, PA 16134; (412) 932-3101.

N.-S. Chang, Y.T. Hwang, Union Chemical Laboratories

10:30 am—"Effect of Chain Extender on Stability and Properties of Water-Dispersed Polyurethane Coatings"—H.-C. Li, F.-J. Tsai, Y.O. Hsiung, D.-L. Kuo, Union Chemical Laboratories

11:00 am—"Preparation of Anionic Polyurethane Dispersions with Polybutadiene Polyols"—R.H. Boutier, Elf Atochem North America Inc.

11:30 am—"Flame Retardant Brominated Styrene-Based Polymers. XI. Alumina Trihydrate-Filled Dibromostyrene-Based Acrylic Latex"—J. Wang, N.A. Favstritsky, Great Lakes Chemical Corp.

Thursday Morning Session—B
8:00 am -12:00 Noon

8:00 am—"UV-Curable Aqueous Flexographic Inks"—Z.J. Wang, J.A. Arceneaux, J.A. Hall, UCB Chemicals Corp.

8:30 am—"The Development of UV Curable Powder Coatings"—J.W. Rawlins, S.F. Thames, The University of Southern Mississippi

9:00 am—"Permanent UV Absorbers"—A. DeBellis, R. Iyenger, R. Ravichandren, J. Suhadolnik, Ciba-Geigy Corp.

9:30 am—Break

10:00 am—"The Effect of Solvent Selection on 2K-PU Coating Performance"—N. Hazel, I. Biggin, I. Kersey, BP Chemicals

10:30 am—"A New Formaldehyde Free, Etch Resistant Melamine Crosslinker"—A. Essenfeld, K.J. Wu, Cytec Industries, Inc.

11:00 am—"Propoxylated Phenolic Resins in Fast Dry, Moisture and Solvent Resistant Air-Dry Thermoset Coatings"—S. Harris, C. Rodriguez, A. Randall, D. Hutchings, ARCO Chemical Co.

11:30 am—"The Role of Surface Modifiers in High-Solids Coatings-Part II"—W.R. Pistillo, Lubrizol Corporation

Thursday Afternoon Session—A
1:30 pm - 5:30 pm

1:30 pm—"On a New Class of Reactive Phenolic Resins for the Can Coating Industry"—T. Burkhart, P. Oberressl, Vianova Resins GmbH, D. Chambers, Hoechst Celanese Corp.

2:00 pm—"Phenolic Ester Alcohol Provides Route to Ultra Low VOC Coatings"—V. Swarup, A.I. Yezrielev, J.L. Smith, Exxon Chemical Co.

2:30 pm—"A Novel Liquid Rheology Additive for Solvent-Based and Solvent-Free Coatings"—J. Hajas, BYK-Chemie GmbH

3:00 pm—Break

3:30 pm—"Film Formation in Powder Coatings"—Z. Huang, L.E. Scriven, H.T. Davis, The University of Minnesota

4:00 pm—"New Two-Component Powder Coating Binders: Polyester-Acrylate Hybrid as TGIC Cure Alternative"—T. Agawa, E.D. Dumain, Reichhold Chemicals

4:30 pm—"Performance Enhancement Through the Control of Special Interpigment Phenomena"—E.W. Orr, BYK-Chemie USA

5:00 pm—"Preparation of Low VOC Coatings by Grafting Alkyd Resins to Acrylic Copolymer Emulsions and Miniemulsions"—J.W. Gooch, Polymers and Coatings Consultant, F.J. Schork,

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G.W. Poehlein, S.T. Wang, Georgia Institute of Technology

Thursday Afternoon Session—B
1:30 pm - 5:30 pm

1:30 pm—"Degradation and Properties or Water-Based Silica Filled Coatings"—A.M. Morrow, N.S. Allen, M. Edge, D. Aldcroft, G.J. Earl, The Manchester Metropolitan University

2:00 pm—"Solvent-Free Acrylic Resins Used in Emulsion Polymerization for the Graphic Arts Industry"—S. Boucher, S. Singhal, Henkel Corp.

2:30 pm—"Waterborne Fluorinated Polyolefins in Coatings"—S. Kuwamura, T. Hibi, T. Agawa, Dainippon Ink and Chemicals Inc.

3:00 pm—Break

3:30 pm—"Effect of Pigmentation on the Surface Chemistry of Pigmented Coatings"—H. Al-Turaif, P. LePoutre, University of Maine

4:00 pm—"Stone and Concrete Surfaces Can Be Protected from Oil and Water-Based Stains by Applying a New, Low-VOC, Water-Soluble Fluoropolymer"—J.G. Linert, 3M Co.

4:30 pm—"New Nonurethane Nonionic Associative Thickeners"—G.M. Zody, A.L. Steinmetz, C.W. Glancy, United Catalysts Inc.

5:00 pm—"Flame Retardant Brominated Styrene-Based Polymers. XII. Flame Retardancy of Dibromostyrene-Based Acrylic Latex Coated Fabrics"—J. Wang, R.S. Rose, Great Lakes Chemical Corp.

Friday Morning Session
8:00 am - 12:00 Noon

8:00 am—"The Use of Phase State Diagrams to Design Polymer/Polymer Heterophase Coatings"—V. Verkholantsev, Tambour LTD-Israel

8:30 am—"Two-Component Waterborne Polyurethane Coatings Based on Low Viscosity Hydrophobic Polyisocyanates"—A.T. Chen, R.S. Blackwell, J.M. O'Connor, M.J. Morgan, Olin Corp.

9:00 am—"Environmental Assessment of Painting Technologies"—M. Harsch, M. Finkbeiner, M. Schuckert, P. Eyerer, University of Stuttgart-Germany

9:30 am—Break

10:00 am—"Arylzene™: A Novel Resin Technology with a Multiplicity of Chemistry and Performance"—D. Hutchings, A. Randall, R. Hariharan, E. Lucas, S. Elahi, J. Mills, E. Nagy, Georgia-Pacific

10:30 am—"In-Situ Phosphatizing Coatings: An Air Dried Lacquer System"—C. Wang, Y.-Y. Chuang, C.-T. Lin, Northern Illinois University

11:00 am—"Predisol PC Pigment Preparations"—P.A. Lewis, Sun Chemical Corp.

11:30 am—"The Rheology of Mixing in Two-Component Waterborne Polyurethane Coatings"—H. Bui, M. Dvorchak, K. Hudson, J. Hunter, Bayer Corp.

In addition to the symposium, short courses will be held during the week. Two short courses entitled,"Practical Emulsion Polymerization," and "The Physical Principles of Formulation," are slated for February 1-2. Scheduled to take place on February 3-4 are the courses: "Modern Coatings Technology," "Water-Soluble/Waterborne Polymers," and "Reformulating to Waterborne Coatings."

For symposium or short course information, contact The University of Southern Mississippi, Polymer Science Dept., Box 10063, Hattiesburg, MS 39406-0063; Phone: (610) 266-4868.

Western Coatings Show Exhibitors as of 12/1/96

ABC
ABO Industries
Akzo Resins
Air Products & Chemicals
American Paint & Coatings Journal
ANGUS Chemical Co.
Aqualon
Ashland Chemical
Atlas Electric Devices
BF Goodrich Specialty Chemicals
BASF Corp.
BatchMaster
J.K. Bice
Brookfield Engineering Labs
Buckman Laboratories
BYK-Chemie
BYK-Gardner
CB Mills
Cal Poly San Luis Obispo
Cal Poly Pomona
Calgon Crop.
Coatings World/Ink World
Colortec
Composite Particles
Consolidated Color
Creative Marketing Group
Dorsett & Jackson, Inc.
DuPont
Eagle Zinc
ELRAP
EPS, Inc.
Federation of Societies for Coatings Technology
Flash from the Past
Fawcett Co., Inc.
Fuji Silysia Chemical
Haake/Fisions Instruments
Harcros Pigments
Hercules Inc.
Hilton-Davis Co.
Hoechst Celanese Corp.
Horiba Instruments, Inc.
Hüls America Inc.
E.T. Horn Co.
P.T. Hutchins
Industrial Oil Products
Industrial Paint & Powder Magazine
Ishihara
S.C. Johnson Polymer
Journal of Coatings Technology
Kish
Kronos
Macbeth
Mallinckrodt-Trimet
Manufacturing Business Systems
Michelman, Inc.
Morehouse-COWLES
Myers Engineering
Ni-Chem
Norman International
Norton Packaging
Occidental Chemical
OSi Specialties, Inc.
Pacific Resource Recovery
Paint & Coatings Industry Magazine
Rheox, Inc.
Rohm & Haas
Sartomer
SCM
SEPR
Shell Chemical Co.
Silberline
Southwest Mining Group
Spencer Machine & Tool
Stat-Ease
Summit Precision Polymer
Sun Chemical—Pigments
Synergistic Performance Corp.
Tavco Chemicals
Tego Chemie
Trans Western Chemical
Tri-Iso
Utah Clay Technology
R.T. Vanderbilt
Van Water & Rogers
Vorti-Siv
Western Equipment Co.
Yamada
Zeelan Industries
Zeneca Biocides
Zeneca Resins

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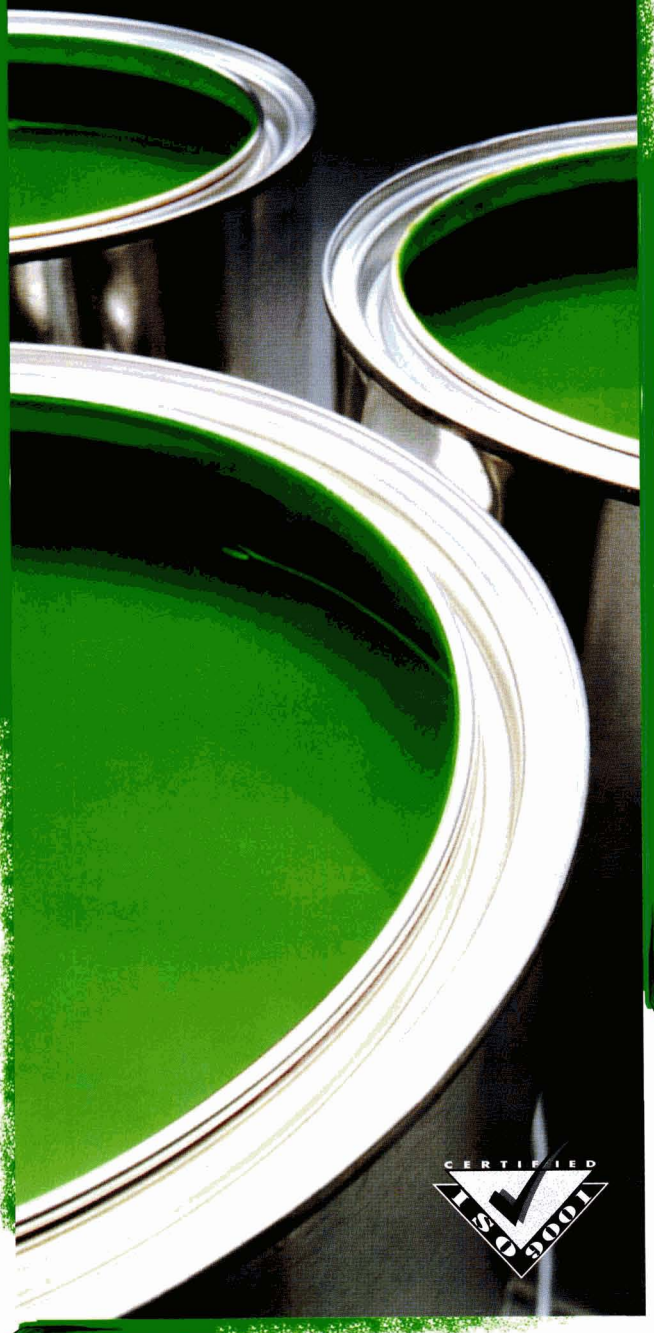

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SER-AD™ coatings additives were developed to be nature-friendly, much as the waterborne coatings in which they're used. When you formulate with these SER-AD products, you will improve finish quality and address issues such as odor, VOCs and harmful compounds.

SER-AD FA 379 is the nitrite-free solution to flash rusting. This anti-corrosive additive forms a monomolecular barrier to protect the metal surface from water and improve coating adhesion. Effective during manufacturing, storage and application, SER-AD FA 379 permanently inhibits corrosion, long after the coating has dried.

SER-AD FX 1070, a VOC-free, unique PUR thickener, increases high-shear viscosity to provide improved brushing characteristics and higher film build for a better coating appearance.

SER-AD FX 511, a low-odor coalescing agent that promotes the formation of continuous films in a broad range of water-reducible resins, stays in the coating longer to help prevent cracking.

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Wrap-Up

Federation of Societies for Coatings Technology Presents

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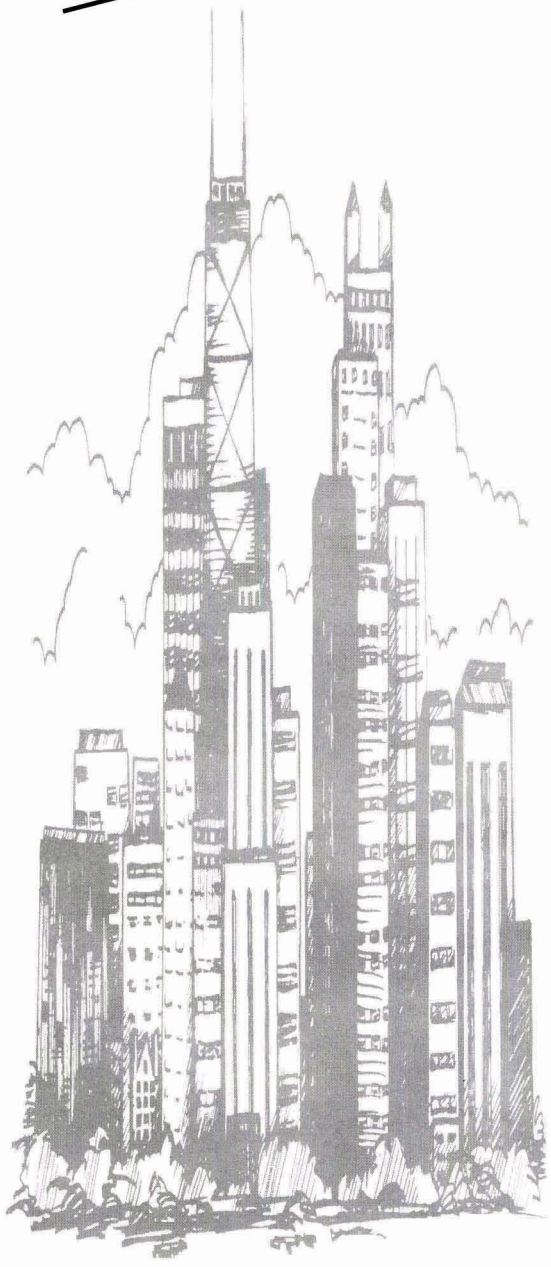
INTERNATIONAL COATINGS EXPO



1996

International Coatings Expo

FSCT Annual Meeting

Technology Conference

October 22-25, 1996
McCormick Place North
Chicago, Illinois

International Coatings Expo Sets New "Paint Show" Records As 8772 Registrants Attend 1996 Industry Events in Chicago

Chicago is a city that defies limitations. So, it seems particularly fitting that Chicago was the site selected by the Federation to introduce its new Annual Meeting format and—even more appropriately—to set new standards of success. With its emphasis on "Insights and Innovations," the FSCT convention offered attendees three distinct venues for expanding their knowledge of new and exciting technologies.

Held in Chicago on October 22-25 were the Federation's 74th Annual Meeting, the International Coatings Expo, and the International Coatings Technology Conference. The 1996 convention exceeded expectations in every way—from the number of attendees, amount of exhibit space contracted, to the number of exhibiting companies.

Formerly known as the "Paint Industries' Show," the FSCT-sponsored exhibition attracted 8772 attendees to McCormick Place North. This total exceeds the previous record of 8693 set in Washington D.C. in 1990—and reflects a growth from the last Paint Show held in Chicago in 1992, where registrants numbered 8404. The record-setting number of supplier companies—320—filled 97,000 square feet of exhibit space with state of the art raw materials, equipment, and services for the coatings industry.

Introduced in Chicago was the first International Coatings Technology Conference. The Conference attracted 525 registrants—more than double the expected attendance. A variety of programs were offered, including six one-day pre-convention training seminars and four two-day conference courses.

Technical presentations were also an important part of the FSCT Annual Meeting. From the Keynote Address given by Dr. Walter McCrone to the Mattiello Memorial Lecture presented by Dr. David Bauer, the Annual Meeting offered attendees many opportunities to learn of the latest innovations in the world of coatings.

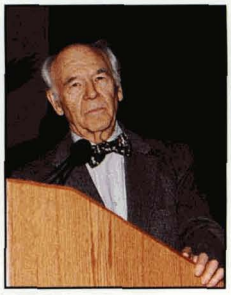
On the following pages, highlights of these three events are presented. Their success is credited to the efforts of the exhibiting companies, the attendees, and all of the FSCT Committee members who worked so diligently to insure the highest quality event. With success like this, it's easy to see why Chicago will always be "our kind of town."

The FSCT's "First Gentleman" Marty Brezinski (with scissors) officially opens the Annual Meeting and International Coatings Expo with the traditional ribbon cutting ceremony. Assisting Mr. Brezinski are (from left): Secretary/Treasurer Tom Hill; Lyn Hill; incoming Secretary/Treasurer Forest Fleming; Terri Fleming; FSCT President Darlene Brezinski; Kathy Austin; President-Elect Jay Austin; Executive Committee member Gerry Gough; and Executive Vice President Bob Ziegler

FSCT Annual Meeting Opens with Keynote Address And Presentation of George Baugh Heckel Award

What could the Shroud of Turin, the Vinland Map, and a da Vinci art forgery possibly have in common? All have been examined by renowned forensic scientist Walter C. McCrone, Director Emeritus of the McCrone Institute. All were declared fakes. And all became topics of Dr. McCrone's Keynote Address at the Annual Meeting Opening Session on October 23.

Dr. McCrone focused on "Ten Thousand Dollar Per Square Centimeter Coatings." He stated that, of the many compositions of coatings, none are more expensive than some of the aesthetic coatings. Coatings applied to a canvas by Leonardo da Vinci, for example, have sold for more than $20,000/cm.



Walter McCrone

There is an increasing need for scientific techniques to detect art forgeries. In his Keynote Address, Dr. McCrone discussed how complex coatings are analyzed by polarized light microscopy supplemented by Fourier Transform Infrared Absorption and Scanning Electron Microscopy with Energy Dispersion X-ray analysis.

George Pilcher Receives Heckel Award

On October 23, George R. Pilcher became the 45th recipient of the Heckel Award, the FSCT's most prestigious honor *(see related story on page 35).*

In his acceptance speech, Mr. Pilcher thanked the Federation and those who have been important in his career. He acknowledged the influence of Dr. John Weaver for "telling me one of your famous 'old goat/ young kid' stories, putting a pen in my hand and instructing me to sign-on as a member of the Cleveland Society Educational Committee . . ."

"Now, more than ever, the Federation occupies a pivotal position in our industry, and speaks with a voice of unique authority as a powerful educational force . . ."

For supporting his participation in the work of the FSCT, Mr. Pilcher thanked his previous supervisors, Doug Scherrer and Jerry Pontius (Sherwin-Williams), and employers Bob Torba and Mike Quinn (Hanna Chemical Coatings Corp. and its successor companies Reliance Universal, Akzo and Akzo Nobel). Stated Mr. Pilcher, "In a day and age when corporate profits are under unceasing fire, and corporate travel funds and personnel assets are increasingly precious, (these) gentlemen unflinchingly supported my belief that a more well-educated industry benefits every company within that industry."

Mr. Pilcher expressed his thanks to his wife, Dorothy, and to his children Katharine, Elizabeth and Gregory. A former educator, Mrs. Pilcher shares with her husband the belief that "in a chemical-based industry where the word 'chemical' is increasingly considered by the public to be a pejorative term—education both within and without our industry is the key to our future."

Mr. Pilcher concluded that, despite personal sacrifices, his participation in the Federation has been worthwhile since, "now, more than ever, the Federation occupies a pivotal position in our industry, and speaks with a voice of unique authority as a powerful educational force, reaching-out far beyond its own membership to carry the message to future researchers, and to the public at large, that our industry truly does contribute to 'better living through chemistry.'"

Jay Austin Assumes FSCT Presidency at Annual Meeting

At the FSCT Business Meeting, held on Friday, October 25, the Federation officially swore in the slate of officers for 1996-97.

Forest Fleming, of Akzo Nobel Coatings Inc. (Piedmont Society) accepted the position of Secretary/Treasurer. Sworn in as President-Elect was Thomas E. Hill, formerly of Pratt & Lambert (Western New York Society).

Jay Austin, of Halox Pigments, Hammond, IN, assumed the position of FSCT President.

In his acceptance comments, Mr. Austin acknowledged the honor and responsibility which accompany the acceptance of this critical role. It is a role which he pledged to take very seriously.

Noting that the Federation is entering the fifth year of strategic planning, Mr. Austin explained that the planning process is one that usually takes this length of time to become an important part of an organization's culture. However, he urged that, "Now is the time to stop talking so much about strategies and start working the plan. Planning means being proactive and it also means change. Proaction can influence the future and does improve our chances for success. Reaction, our mode of the past, almost always improves the chances of someone else's success."

Mr. Austin congratulated the FSCT Board of Directors for working to provide a vision which "fosters the ability for the Federation to grow and change to meet the rapidly changing dynamics of our industry."

(For discussion of FSCT objectives enumerated by Mr. Austin, see article on page 14.)

Marcelo Herrera, of Mexico Society, Honored with President's Award

In 1993, the FSCT Board of Directors established a special award to recognize significant contributions made by an individual during the tenure of a President.

At the Annual Meeting, FSCT President Darlene Brezinski announced that the 1996 recipient is an individual who has done much to further the strategic goals of the Federation. Marcelo Herrera, of DuPont, S.A. de C.V., served as President of the Mexico Society (Instituto Mexicano de Tecnicos en Pinturas y Tintas) in 1995-96. His efforts and energy greatly contributed to the success of the FSCT's first exposition for the Latin American industry. The highly successful Pan-American Coatings Expo was held in Mexico City, on August 15-17, 1996, exceeding all expectations.

Mr. Herrera provided invaluable assistance—from translating materials, and preparing promotional information, to facilitating communications between the FSCT, the Instituto, and the Mexican trade association, ANAFAPYT.

Mr. Herrera's enthusiasm for the work of the Mexico Society is infectious. He states that the Instituto provides a means of educating those involved in the coatings industry in Mexico, helping to identify common problems and to find solutions. He feels this expertise will provide the tools needed to be more flexible in order to survive. Mr. Herrera acknowledges that economic problems in his country have seriously affected industry. "There are many problems in our world, but they don't stop us. They only delay us." He expressed optimism that cooperation between industry associations, such as FSCT, ANAFAPYT, and the Society will help strengthen technical expertise and promote industry grow.

Distinguished Service Award Presented to Robert Ziegler

At the FSCT Annual Business meeting, Jay Austin (right) presented Robert F. Ziegler with a Distinguished Service Award. Mr. Ziegler, Executive Vice President of the organization since 1987, has served the FSCT for 20 years.

Annual Meeting Awards Winners

George Baugh Heckel Award *(see page 35)* —
George R. Pilcher, Akzo Nobel Coatings

Distinguished Service Award *(page 37)* —
Darlene R. Brezinski, Consolidated Research

President's Award *(page 37)* —
Marcelo Herrera , DuPont, S.A. de C.V.

Armin J. Bruning Award *(page 37)*—
Percy E. Pierce, Consolidated Research, Inc. and Robert T. Marcus, Pantone Inc. *(page 00)*

Roon Foundation Award *(page 38)* —
First Prize ($2,500)—"Mechanistic Considerations of Particle Size Effects on Film Properties of Hard/Soft Latex Blends"—Sarah T. Eckersley and Bradley J. Helmer, The Dow Chemical Co.

Alfred L. Hendry Award *(page 38)* —
"Curing Profiles of the New Xenon Chloride Lamp"—Kip Sharp, University of Southern Mississippi.

Society Secretaries Awards *(page 38)* —
First Prize ($500)—Arthur Lorenz (Sinclair-Ameritone), Secretary of the Los Angeles Society

Second Prize ($250)—Jeffrey L. Buchman (Morton International), Secretary of the Golden Gate Society.

Society Speaker Awards *(page 39)* —
First Prize ($250)—Latoska Price (Akzo Nobel Coatings Inc.), Detroit Society

Second Prize ($100)—Max T. Wills (Cal Poly State University), Los Angeles Society

Corrosion Committee Publication Award *(page 39)*—
"Unified Model for the Degradation of Organic Coatings on Steel in a Neutral Electrolyte"—T. Nguyen and J.B. Hubbard, of National Institute of Standards and Technology and J.M. Pommersheim, of Bucknell

A.F. Voss/American Paint & Coatings Journal Awards *(page 39)*
First Prize ($600)—"Direct VOC Analysis of Water-Based Coatings by Solid Phase Micro Extraction and Gas Chromatography"—Los Angeles Society

Second Prize ($400)—"An Investigation of the Effects of Formulation on Selected Properties of UV Curable IPN Coatings"—Detroit Society

Annual Meeting Poster Session *(page 40)* —
First Prize ($300)—"Surfactant Stratification in Latex Coatings-Depth Profiling Studies"—Bor-J. Niu and M.W. Urban, North Dakota State University.

Second Prize ($200)—"UV Curable Powder Coatings—Generation I"—Shelby F. Thames and James W. Rawlins, The University of Southern Mississippi.

Third Prize ($100)—"Synthesis of UV Free Radical and Cationic Cured Coatings from Lesquerella Oil"—Shelby F. Thames and Haibin Yu, The University of Southern Mississippi.

Golden Impeller Award *(page 40)* —
Thomas J. Daly, Ace Hardware Corp., Paint Div.

International Coatings Expo Awards *(see page 29 for complete listing)*

ICE '96 Surpasses Former "Paint Show" Records of Success

In 1996, in recognition of its growing international audience and its increasing expansion into allied technologies, the Federation of Societies for Coatings Technology changed the name of the highly successful "Paint Industries' Show" to the "International Coatings Expo" (ICE). The industry's response was even more positive than expected. When McCormick Place North opened its doors to ICE '96 on October 23-25, all previous Paint Show records were swept aside. The most successful exposition ever sponsored by the Federation, the 1996 International Coatings Expo attracted 8,772 attendees—easily topping the previous record set in Washington D.C. in 1990 by nearly 200.

In addition, ICE '96 exceeded all past records in the number of suppliers (320) and exhibit space contracted (over 97,000 square feet), enabling registrants to experience the latest in raw materials, equipment and services offered by the industry. According to George Laquna, of Pinturas Ideal in Caracas, Venezuela, "This Expo was worth the six-hour plane ride! I will always come back." Vic Willis, of Ace Hardware has attended the Show for 40 years and favorably remarked on the changes and growth, "The Expo gets more sophisticated every year."

Award-Winning Booths at International Coatings Expo

The following companies were recipients of the 1996 International Coatings Expo Awards. These awards are presented to the companies sponsoring outstanding exhibits in the Expo on the basis of technical excellence, educational value, attractiveness, and novelty. The awards are divided into four categories: Raw Materials (single booth, double, 3-5, 6-9, 10+); Production Equipment (single, double, and 3+); Service Industries; and Laboratory and Testing Equipment. The Federation congratulates the award winners.

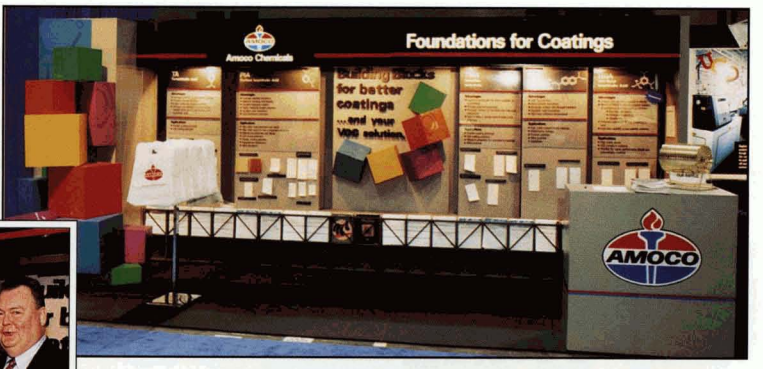
An exhibitor for 15 years, SC Johnson, Racine, WI, won in the category of Raw Materials—10+ Booths. Accepting the award is Erhard Karl.

Engelhard Corp. (now including The Mearl Corp.), Iselin, NJ, took the prize for Raw Materials—6-9 Booths. They have been an exhibitor for 47 years. Accepting the award (from left) are Don Watson and Dave Ludwig.

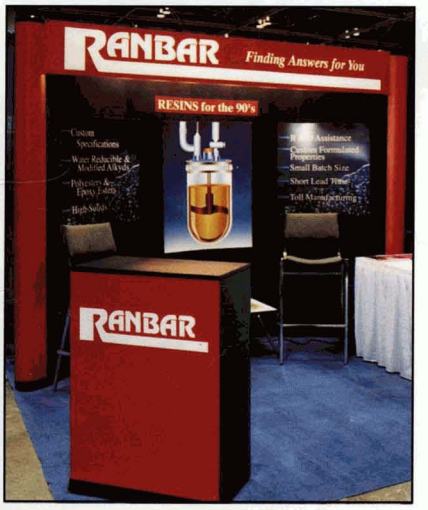
International Coatings Expo

A 16-year exhibitor, 3M/Zeelan Industries, St. Paul, MN, was the recipient of the Raw Materials—3-5 Booth award. Pictured receiving the plaque are James Helbling, Sharon Nelson, and Bill Loomis.

Amoco Chemicals, Chicago, IL, a 10-year exhibitor, took the prize for Raw Materials—Double Booth. Accepting the plaque and ribbon are George McConaghy, Tom Webster, and Steve Petkus.

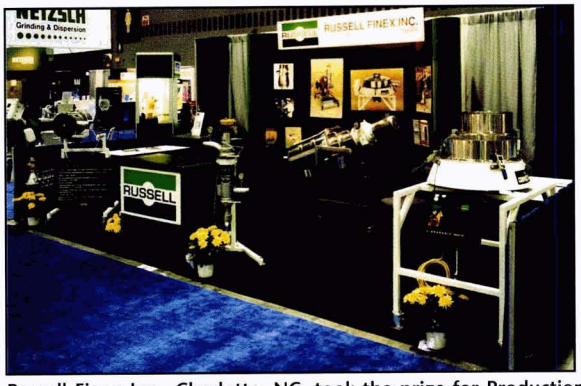


An exhibitor for five years, Ranbar Technology Inc., Glenshaw, PA, won in the category Raw Materials—Single Booth. Staff members of Ranbar accepting the award are Raymond Kushnen, Randy Russell Sr., Joe Markovich, Richard Marci, and Randy Russell Jr.



International Coatings Expo

An eight-year exhibitor, Versa-Matic Pump Co., Export, PA, was the recipient of the Production Equipment—3+ Booths award. Pictured receiving the award are Jim Paterson, Mike Weber, Nick Dorsch, Scott Champlin, and Kevin Hogue.



Russell Finex Inc., Charlotte, NC, took the prize for Production Equipment—Double Booth. They have been exhibiting in the Expo for 23 years. Presented with the plaque and ribbon are Robert Lee and Shaun Edwards.

50-Year Exhibit Award

Vorti-Siv Division, M&M Industries, Salem, OH, was recognized for having participated as an exhibitor for 50 years in the International Coatings Expo *(formerly the Paint Industries' Show)* sponsored by the Federation.

A plaque commemorating the occasion was presented to Vorti-Siv Division by the Federation.

Vorti-Siv joins 10 other exhibiting companies participating for 50 or more years in the Show, including: Ashland Chemical Co. (57); Atlas Electric Devices Co. (54); Columbian Chemicals Co. (61); Engineered Polymer Solutions (55); Hüls America Inc. (60); Reichhold, Inc. (58); Rheox, Inc. (51); Rohm and Haas Co. (61); South Florida Test Service (54); and Union Carbide Corp. (61).

FSCT and Hüls: Partners in Progress

At the 1996 International Coatings Expo, Hüls America, Inc. celebrated its 60th year of participation in FSCT Shows.

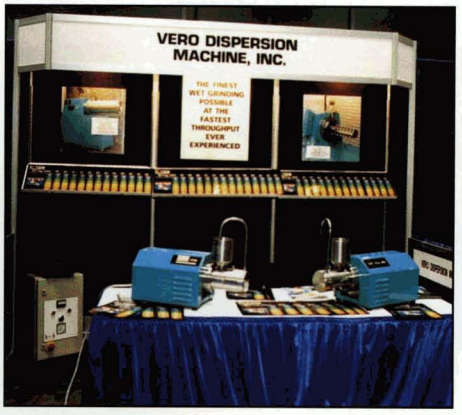
In 1932, the fledgling company, Nuodex Products Inc., exhibited at the first Paint Show, displaying three small sample bottles of its liquid driers. Now, over 60 years later, its successor company, Hüls America, Inc., has updated the Nuodex products for modern performance and environmental requirements, offering more than 1200 products for coatings.

At the 1996 International Coatings Expo, (the "new" Paint Show), Hüls joins an elite handful of companies with a similar record of longevity. For Hüls, that first Federation event in 1932 "was the beginning of an enduring and mutually rewarding relationship with the coatings industry and one of the key associations."

"In celebrating its diamond anniversary as an FSCT Paint Show participant, Hüls recognizes the major role played by one of its predecessors in advancing coatings technology."

Pictured in the above photo are (from left): Dr. Klaus Burzin, President and CEO, Hüls America; FSCT President Darlene Brezinski; Robert Morlino, Group Vice President, Colorants and Biocides Div., Hüls; Jack Collins, Vice President, Sales and Customer Service, Colorants and Biocides Div., Hüls; and FSCT Executive Vice President Robert Ziegler.

Vero Dispersion Machines, Vero Beach, FL, a two-year exhibitor, took the prize for Production Equipment—Single Booth. Accepting the plaque and ribbon are John Allen and Alan Taylor.



An exhibitor for 54 years, Atlas Electric Devices Co., Chicago, IL, was the recipient of the Service Industries Award. Accepting the award are Jared Summerville and Larry Bond.

International Coatings Expo

Winning in the category Laboratory and Testing Equipment was Taotek North America, Inc., Corob North America Div. The three-year exhibitor is located in Charlotte, NC. Accepting the award on behalf of the company are Carlos Salas and Umberto Marazzi.

New Exhibitors

The Federation was pleased to welcome the following new exhibitors to the 1996 FSCT International Coatings Expo

ABC/Italtinto
Adhesives Age
Araki Iron Works Co., Ltd.
Arizona Instrument Corp.
Arizona Oxides
Atotech USA Inc.
Bergen Barrel & Drum Co.
Borden Chemicals, Inc.
British Standards Institution, Inc.
C.I.P. Products/Sellers Cleaning Systems
Chemical Incorporated
CMI International
Color Instruments, Inc.
Container Management Services, Inc.
D.I.R.T. Systems
EG&G Instruments
ELT (Electronic Label Technology, Inc.)
Eurea, Germany
Fillite
Gamry Instruments, Inc.
Graco Inc.
Hampshire Chemical Corp.
J.W. Hanson Co., Inc.
Ideal Equipment Co., Ltd.
IGT Reprotest Inc.
Industrial Oil Products
Ink World Magazine
Inpra-Latina
Intellution
JMG Plastics, Inc.
M.P. Kenes, Inc.
LabelMaster
Laporte/SCP-Laponite Rheological Additives
Mallinckrodt Inc.
Nichem Corp.
North American Packaging Corp. (NAMPAC)
Pfaudler, Inc. A Unit of Robbins & Myers, Inc.
Powder Coating Magazine
Royce Associates
Singleton Corp.
Solartron Transducers
Thomas Scientific
UCB Chemicals
Victaulic (Environmental Products Div.)
Westerlins Maskinfabrik AB

International Coatings Expo

A.P. Dataweigh Systems
ABC/Italtinto
Aceto Corporation
ACT Laboratories, Inc.
Adhesive Age
Advanced Software Designs
Air Products & Chemicals, Inc.
Akzo Nobel Chemicals & Akzo Nobel Resins
Alar Engineering Corp.
Alcan Toyo America, Inc
AlliedSignal Inc.
Alnor Oil Co.
Ambrose Co.
ACS, Information & Services
American Colors
American Paint and Coatings Journal
Amoco Chemical Co.
ANGUS Chemical Co.
Anker Labelers USA Inc.
Aqualon Company
Araki Chemical Axis Co., Ltd
ARCO Chemical Co.
Argus Business Media
Arizona Instruments Corp.
Arizona Oxides Inc.
Ashland Chemical Co.
Atlas Electric Devices
Atotech USA Inc
Aztec Peroxides, Inc.
B.A.G. Corp.
BASF Corp.
BatchMaster Software, Inc.
Bayer Corporation
Bergen Barrel & Drum Co.
Blacoh Fluid Control, Inc
Borden Chemicals, Inc.
Bowers Process Equipment Inc.
British Standards Institution, Inc.
Brookfield Engineering Labs., Inc.
Buckman Laboratories, Inc.
Buhler Inc.
Bulkcon Systems International
Burgess Pigment Co.
BYK-Chemie USA
BYK-Gardner, Inc.
C.I.P. Products/Sellers Cleaning Sys.
Cabot Corp.
Calgon Corp.
Cardolite Corp.
CB Environmental
CB Mills
CCP
CEM Corp.
Center for Applied Engineering
Chemical & Engineering News
Chemical Manufacturers Assoc.
Chemical Marketing Reporter
Chemical Week
Chemicals Incorporated
Chemir/Polytech Laboratories, Inc.
Ciba-Geigy Corp., Additives, Pigments, & Polymers Divs.
Cimbar Performance Minerals
Civacon
Clariant Corp.
Clawson Container Co.
CMI International
Coatings Magazine
Color Corp.
Color Instruments, Inc.
ColorTec Associates
Columbian Chemicals Co.
Composite Particles, Inc.
Consolidated Research, Inc.
Container Management Services
Corrosion Control Consul. & Labs
Cortec Corp.
CR Minerals Corp.
Crosfield Co.
Cytec Industries Inc.
D.I.R.T. Systems
Daniel Products Co., Inc.
Datacolor International
J. De Vree & Co. N.V.
DeFelsko Corp.
Degussa Corp.
University of Detroit Mercy
Disti-Kleen, Inc./Vanwyk Engineering
Dominion Colour Corp.
Dover
Dow Chemical Co.
Dow Corning Corp.
Draiswerke GmbH
Draiswerke, Inc.
Drew Industrial Div. of Ashland
Dry Branch Kaolin Co.
DuPont Nylon Intermediates & Specialties
DuPont Performance Chemicals
Eagle Zinc Co.
Eastern Michigan University
Eastman Chemical Co.
Ebonex Corp.
ECC International
EG&G Instruments
Eiger Machinery, Inc.
Elf Atochem North America, Inc.
ELT (Electronic Label Tech., Inc.)
EMCO Chemical Distributors, Inc.
EMCO USA (Epworth-Morehouse-COWLES)
Engineered Polymer Solutions, Inc.
Engelhard/Mearl Corp. -
Erichsen, inc.
Erie Chemical Sales
Etna Products Inc.
Eurea, Germany
European Coatings Journal
Exxon Chemical Co.
Fabricated Metals, Inc.
Fawcett Co. Inc.
Federation of Societies for Coatings Technology
Fillite
Filter Specialists, Inc.
Fischer Technology Inc.
Fluid Management
Formation Systems, Inc.
Fuji Silysia Chemical
H.B. Fuller Co.
G A F Filter Systems
Gamry Instruments, Inc.
Paul N. Gardner Co., Inc.
Garrison Industries, Inc.
Georgia Pacific Resins, Inc.
BFGoodrich Co. Specialty Chemicals
The Goodyear Tire & Rubber Co., Chemical Division
Grace Davison
Graco, Inc.
Haake, Inc.
Halox
Hampshire Chemical Corp.
J.W. Hanson Co., Inc.
Harcros Pigments Inc.
Hedwin Corp.
Henkel Corp.
HERO Industries Limited
Heucotech Ltd.
Hickson Specialties
Hilton Davis Co.
Hockmeyer Equipment Corp.
Hoechst Celanese Corp.
Horiba Instruments Inc.
J.M. Huber Corp.
Huls America, Inc.
Hunterlab
Huntsman Corp.
ICIS-LOR
Ideal Equipment Co., Ltd.
Ideal Manufacturing & Sales Corp.
IGT Reprotest Inc.
INDCO Inc.
Industrial Oil Products Corp.
Industrial Paint & Owder Magazine
Ink World Magazine
Inmark, Inc.
Inpra-Latina
Intellution
Interfibe Corp.
International Compliance Center
International Speciality Chemicals
International Specialty Products (ISP)
ITT Marlow/ITT A-C Pump
JMG Plastics, Inc.
S.C. Johnson Polymers
K-T Feldspar Corp.
Kady International
M.P. Kenes, Inc.
Kenrich Petrochemicals, Inc.
King Industries, Inc.
Kline & Co., Inc.
Kraft Chemical Co.
Kromachem Inc.
KTA-Tator Inc.
Labelmaster
Laporte/SCP- Laponite Rheological Additives
LaQue Corrosion Services
Lawter International
The Leneta Co.
Liquid Controls Corp.
Littleford Day Inc.
Longview Fibre
The Lubrizol Corp.
Lucas Meyer, Inc.
Luzenac America
3M OH and ESD
3M Specialty Chemicals
3M/Zeelan
Macbeth, Div. of Kollmorgen
Mallinckrodt Inc.
Manufacturing Business Systems
Mapico
The McCrone Group
McWhorter Technologies
Michelman, Inc.
Micro Powders, Inc.
Microfluidics Corp.
Micromeritics
Micromet Instrument
Mid-States Eng. & Mfg.
Mineral Pigments
Ming-Zu Chemical Industries
MiniFibers, Inc.
Minolta Corp.
Mississippi Lime Co.
UMR Coatings Institute
Mitsubishi Chemical
Modern Paint & Coatings Magazine
Monsanto Co.
Morton International
Muetek Analytic Inc.
Myers Engineering
Nacan Products Ltd.
NACE International
Nagase Co., Ltd.
Nametre Co.
Netzsch Incorporated
Neupak, Inc.
New Way Packaging Machinery, Inc.
Nichem Corp.
North America Packaging Corp.
North Dakota State University
Nyco Minerals
Ohio Polychemical Co.
Olin Corp.
Omega Recycling Technologies, Inc.
Omnimark Instrument Corp.
OSi Specialties Group/Witco Group
Oxychem
Paint & Coatings Industry Magazine
Paint Research Association
Parasol System, Inc.
Parker Hannfin Corp.
Particle Sizing Systems, Inc.
Peninsula Polymers
Pfaudler, Inc.
Phenoxy Associates
Pico Chemicals Corp.
Plastican, Inc.
Polar Minerals
Poly-Resyn, Inc.
Powder Coating Magazine
PPG Industries, Inc., Specialty Chem.
PQ Corp./ Potters Industries
Precision Dispensing
Premier Mill Corp.
Purity Zinc Metals
Q-Panel Lab Products
Q-Sales and Leasing
Quackenbush Co., Inc.
K.J. Quinn & Co., Inc.
Raabe Corp.
RadTech Intl. North America
Ranbar Technology, Inc.
Reichhold Chemicals, Inc.
Rexam Mulox
Rheox, Inc.
Rhone-Poulenc, Inc.
Rohm and Haas Co.
Ronningen-Petter
Charles Ross & Son Co.
Royce Associates, ALP/Wax Division
Russell Finex, Inc.
San Esters Corp.
Sartomer Co.
Schenectady International, Inc.
Schlumberger Industries
Schold Machine Co.
SEPR, Ceramic Beads & Powders
Shamrock Technologies, Inc.
Shell Chemical Co.
Sherwin Williams Chemicals
Silberline Mfg. Co., Inc.
Singleton Corp.
Snyder Industries
Software 2000, Inc.
Solartron Tranducers
Southern Clay Products, Inc.
University of Southern Mississippi
Specialty Minerals, Inc.
Spencer Machine & Tool Co., Inc.
Spraymation, Inc.
Startex Chemical, Inc.
Steel Structures Painting Council
Stretch-O-Seal Corp.
Sub-Tropical Testing Service
Summit Precision Polymers Corp.
Sun Chemical Corp.
TA Instruments, Inc.
Taber Industries
Taotek North America, Inc.
Tayca Corp.
Tech Pak, Inc.
Teemark Corp.
Tego Chemie Service USA
Thiele Engineering Co.
Thomas Scientific
Tikkurila/Kemira
Troy Corp.
U.S. Aluminum, Inc.
U.S. Borax, Inc.
U.S. Silica Co.
U.S. Zinc
UCB Chemicals
Unimin Specialty Minerals
Union Carbide Corp.
Union Process, Inc.
United Mineral & Chemical Corp.
United Soy Bean Board
Van De Mark Group
Van Waters & Rogers Inc.
R.T. Vanderbilt Co., Inc.
Vero Dispersion Machines, Inc.
Versa-Matic Pump Co.
Victaulic
VORTI-SIV Div., MM Industries, Inc.
Wacker Silicones Corp.
Wearlon Div. of Decora, Inc.
Westerlins Maskinfabrik AB
Western Equipment Co.
Wilden Pump
Witco Corp.
World Minerals Inc.
WSI Chemical Inc.
X-Rite, Inc.
Yamada America, Inc.
Zaclon, Inc.
Carl Zeiss, Inc., Microscope Division
Zemex Industrial Minerals Corp.
Zeneca Biocides
Zeneca Resins

FSCT Annual Meeting

The Annual Meeting of the Federation of Societies for Coatings Technology was held in Chicago's McCormick Place on October 23-25. Highlights of the meeting included key technical presentations geared to the theme of "Insights & Innovations." From the Keynote Address given by renowned forensic scientist Dr. Walter McCrone to the Mattiello Memorial Lecture presented by Dr. David Bauer, the Annual Meeting offered attendees many opportunities to learn of the latest innovations in the world of coatings technology. The Annual Meeting also afforded the opportunity for the FSCT to acknowledge the recipients of the organization's significant honors and awards. These are detailed in the following pages.

George R. Pilcher Receives 1996 George Baugh Heckel Award at Federation's Annual Meeting

George R. Pilcher, Technical Director, Coil and Extrusion Business Unit, for Akzo Nobel Coatings Inc., Columbus, OH, was the recipient of the Federation's highest honor, the George Baugh Heckel Award, for 1996.

Mr. Pilcher, a member of the CDIC Society for Coatings Technology, received the award during the Opening Session of the Federation's Annual Meeting, at McCormick Place, in Chicago, IL, on October 23.

The Heckel Award recognizes the outstanding contributions that Mr. Pilcher has made to the organization's interest and prestige. Established in 1951, the Award is named in honor of the Federation's first Chairman and Secretary.

A member of the Federation since 1976, Mr. Pilcher will serve as a Member-at-Large on its Board of Directors for 1997. He previously served in this capacity from 1988-90.

George Pilcher (right) receives the George Baugh Heckel Award from FSCT Past-President and Heckel Award Chair Clarke Boyce.

Mr. Pilcher's considerable contributions to the organization include active involvement on many FSCT committees, including the Professional Development Committee (1985-89) for which he was Chair from 1987-88. A member of the Annual Meeting Program Committee in 1986 and 1988-91, he chaired that group in 1989. He chaired the Roon Awards Committee in 1991 and served as a member from 1991-96. Mr. Pilcher has been a member of the Mattiello Memorial Lecture Committee (1991-1996) and serves as the 1996 Chair.

He was a member of the APJ/Voss Award Committee (1984-91); Finance Committee (1989-90), and Nominating Committee (1989-90). At the Federation's Annual Meeting, he has chaired sessions for five years.

Mr. Pilcher has been a member of the Editorial Review Board of the JOURNAL OF COATINGS TECHNOLOGY from 1993 to the present.

Technical Focus Speaker F. Louis Floyd Talks About "Pigment Flocculation is a Figment of Your Imagination"

Over the past several years, one of the most popular features of the FSCT Annual Meeting has been the presentation by the Technical Focus Speaker. In 1996, this was no exception as F. Louis Floyd addressed attendees on "Pigment Flocculation is a Figment of Your Imagination." This Technical Focus presentation was as intriguing as its title suggests and the audience responded favorably to Mr. Floyd. "This is the best paper presented in terms of scientific content and delivery style" . . . Excellent talk!"

The Technical Focus Speaker is selected by the Federation to honor on-going work in critical technical areas. Mr. Floyd's presentation was given on Wednesday, October 23, at McCormick Place North to one of the largest audiences ever present for an Annual Meeting technical talk.

F. Louis Floyd is Vice President for Technology at Duron Paints and Wallcoverings, in Baltimore, MD. Prior to joining Duron, Mr. Floyd spent 21 years with Glidden (ICI) Strongsville Research Center leading various research efforts on new consumer, industrial, and maintenance coating systems.

Mr. Floyd recently served as a Member at Large on the FSCT Board of Directors. He is the recipient of four FSCT Roon Awards and has served for many years on the Editorial Review Board of the JOURNAL OF COATINGS TECHNOLOGY. Mr. Floyd was Chair of the FSCT Publications Committee in 1995-96. He is a past Chairman of the Gordon Research Conference on the Physics and Chemistry of Coatings and Films. A regular lecturer at Lehigh University and Kent State University, he has contributed over 20 publications and over 50 presentations.

Mr. Floyd began his presentation with some background information on philosophies which have driven research and development in the coatings industry. According to the speaker, the industry annually spends millions of dollars on R&D, process engineering, and production troubleshooting, trying to increase the efficiency of the use of titanium dioxide. This is influenced by the common assumption that a typical dried paint film contains flocculated pigment, which originates from a less-than-perfect dispersion in the wet state.

Evidence for this assumption derives from such measurements as opacity, color and gloss; coupled with microscopic observations which show particle-particle contact in a dried film. These observations are paired with models of "perfect" dispersion in the solid state, which clearly show that the contributions from TiO_2 are below theoretical levels. Mr. Floyd questioned whether flocculation is the cause.

Mr. Floyd examined the validity of the assumptions regarding dispersion stability. In addition, he maintained that the the mind-set regarding what "random" looks like is faulty. He suggests that the models used to describe perfect dispersion are flawed and that TiO_2 has been utilized as efficiently as is possible for a random system.

Mr. Floyd stated that further improvements in this area will require a departure from random systems to more ordered systems—the opposite direction from most current research. He cautioned that this is still work in progress.

Melinda Rutledge presents F. Louis Floyd with a certificate commemorating his 1996 Technical Focus presentation.

Other Annual Meeting Awards Presented

Distinguished Service Award

The FSCT Distinguished Service Award was presented to Darlene R. Brezinski, of the Southern Society, in grateful recognition of her valuable contributions to the progress of the Federation while serving as President of the organization in 1995-96. Dr. Brezinski is President of Consolidated Research, Inc., Kingsford, MI.

Darlene Brezinski is presented with the FSCT Distinguished Service Award from incoming President Jay Austin.

President's Award

The FSCT President's Award recognizes and honrs an individual who has made significant contributions to the Federation during the tenure of a President. The selection of an awardee is at the sole discretion of the President of the Federation and has only been awarded once before. The 1996 recipient, Marcelo Herrera, of DuPont, S.A. de C.V., was selected by President Darlene R. Brezinski, in grateful recognition of his valuable contributions in the development of the first FSCT Pan-American Expo, held in August 15-17 in Mexico City, Mexico.

Marcelo Herrera accepts the 1996 President's Award from Darlene Brezinski.

Armin J. Bruning Award

Established in 1962, this award is dedicated to the memory of Armin "Joe" Bruning, the inventor of a colorimeter. He was devoted to the pursuit of the scientific study of color.

This year the award was presented to two recipients. Recognized for their outstanding contributions to the science of color in the field of coatings technology were Percy E. Pierce, of Consolidated Research, Inc. and Robert T. Marcus, of Pantone Inc. Their numerous contributions to the coatings industry are well documented by patents and published articles. Drs. Marcus and Pierce authored the monograph, "Color and Appearance," as part of the *FSCT Series on Coatings Technology*. They are credited with the development of a method to match metallic paints using color instrumentation. Both men are recognized for their strong support of color education.

Dr. Brezinski presents the Armin J. Bruning Award to Robert T. Marcus. Unavailable for the photograph was recipient Percy Pierce.

Roon Foundation Awards

These cash awards and plaques, established by the late Leo Roon, and administered by the Coatings Industry Education Foundation, are for the best technical papers entered in the competition and submitted for presentation at the Federation's Annual Meeting by individual's associated with the organic coatings industry.

First Prize ($2,500)—"Mechanistic Considerations of Particle Size Effects on Film Properties of Hard/Soft Latex Blends"—Sarah T. Eckersley and Bradley J. Helmer, of The Dow Chemical Co.

(See page 97 of this issue.)

Darlene Brezinski presents Roon Awards to Sarah T. Eckersley and Bradley J. Helmer.

Alfred L. Hendry Award

Sponsored by a grant from the Southern Society of the Federation, this Award of $1,000 is for the best undergraduate student paper submitted for competition. The 1996 competition was won by Kip Sharp, of The University of Southern Mississippi, for the paper "Curing Profiles of the New Xenon Chloride Lamp."

Kip Sharp accepts the Alfred L. Hendry Award from Melinda Rutledge.

Society Secretaries Awards

Each year the Federation acknowledges excellence displayed in the preparation and assembling of the minutes of each Society's monthly business meeting with presentation of the Society Secretaries Awards. These awards are made to the Secretaries of FSCT Constituent Societies who furnish to the Journal of Coatings Technology the most interesting reports of Society meetings and discussions following the presentation of papers at those meetings.

Criteria for these awards include content, organization of details, readability, and summary of technical presentations given at monthly meetings. Awards for 1996 were presented to:

First Prize ($500)—Arthur Lorenz (Sinclair-Ameritone), Secretary of the Los Angeles Society.

Second Prize ($250)—Jeffrey L. Buchman (Morton International), Secretary of the Golden Gate Society.

Society Secretaries Award Chair Kevin Pelling (right) presents awards to James Hall (Los Angeles Society) who accepted on behalf of recipient Arthur Lorenz, and Patricia Shaw (Golden Gate) who accepted for Jeffrey L. Buchman.

Society Speaker Awards

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

First Prize ($250)—Latoska Price (Akzo Nobel Coatings Inc.), Detroit Society.

Second Prize ($100)—Max T. Wills (Cal Poly State University), Los Angeles Society.

Latoska Price receives the first place prize in the Society Speaker competition from Committee Chair Freidun Anwari.

Corrosion Committee Publication Award

A cash prize of $1,000 was presented for the best corrosion related paper published in the Journal of Coatings Technology from July 1995 to June 1996. Papers in the competition were judged by the Federation's Corrosion Committee. Equal emphasis was given to originality, scientific importance, and practical value.

The 1996 award was won by Tinh Nguyen and J.B. Hubbard, of National Institute of Standards and Technology and James M. Pommersheim, of Bucknell, for their work entitled, "Unified Model for the Degradation of Organic Coatings on Steel in a Neutral Electrolyte," which was published in the April 1996 issue of the Journal of Coatings Technology.

Corrosion Committee Chair Charles Hegedus (right) presents Tinh Nguyen with the Corrosion Committee Publication Award.

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

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

First Prize ($600)—"Direct VOC Analysis of Water-Based Coatings by Solid Phase Micro Extraction and Gas Chromatography," Los Angeles Society.

Second Prize ($400)—"An Investigation of the Effects of Formulation on Selected Properties of UV Curable IPN Coatings," Detroit Society.

Chuck Reitter, of the American Paint & Coatings Journal (center), presents Max Wills (left) with First Prize in the A.F. Voss/APJ Awards. Also pictured is L.A. Society President V.C. Bud Jenkins.

On behalf of the Detroit Society, Latoska Price accepts Second Prize in the A.V. Voss/APJ Awards from Chuck Reitter.

Annual Meeting Poster Session

A Poster Session, designed to provide a noncommercial arena for new ideas, new techniques, preliminary results, work that is significant but not ready for full publication, results or ideas that do not fit normal publication criteria, etc., took place at the Annual Meeting.

First Prize ($300)—"Surfactant Stratification in Latex Coatings-Depth Profiling Studies"—Bor-J. Niu and M.W. Urban, of North Dakota State University.

Second Prize ($200)—"UV Curable Powder Coatings—Generation I"—Shelby F. Thames and James W. Rawlins, of The University of Southern Mississippi.

Third Prize ($100)—"Synthesis of UV Free Radical and Cationic Cured Coatings from Lesquerella Oil"—Shelby F. Thames and Haibin Yu, of The University of Southern Mississippi.

Program Committee Chair Steve Hodges (right) presents Bor-J. Niu with First Prize in the Poster Session Competition.

Golden Impeller Award

This annual award, offered by Morehouse Industries, Inc., for outstanding achievement in dispersion technology, was presented at the Annual Meeting to Thomas J. Daly, of Ace Hardware Corp., Paint Div., Matteson, IL.

Thomas J. Daly (left) accepts the Golden Impeller Award from Rocky Courtain, of Morehouse-COWLES.

David Bauer Presents Mattiello Memorial Lecture

Focusing on recent work in the area of prediction of coating service life, Dr. David R. Bauer, of Ford Research Laboratory, presented the Joseph J. Mattiello Memorial Lecture, on October 25, during the FSCT Annual Meeting. As Senior Staff Technical Specialist in the Manufacturing Systems Department of the Ford Research Labs, Dr. Bauer directs long-term research on paint application, characterization, and evaluation. Chosen from among those who have made outstanding contributions to science, Dr. Bauer's presentation was on "Predicting In-Service Weatherability of Automotive Coatings: A New Approach."

(See page 84 of this issue.)

Darlene Brezinski presents David Bauer with a plaque commemorating his 1996 Mattiello Memorial Lecture presentation.

FSCT Officers — Past and Present

Incoming President Jay Austin receives the Presidential Medallion from Darlene Brezinski.

Elected to serve on the Federation's Executive Committee for the year 1996-97 are (seated, from left): Terry Gelhot, Darlene R. Brezinski, and Thomas E. Hill. Standing: Forest Fleming, J. Dick Mullen, Gerry J. Gough, and Jay Austin.

The Swearing In . .

Taking the oath of their office for their respective positions for the coming year (from top), Secretary-Treasurer Forest Fleming, President-Elect Tom Hill, and President Jay Austin, are congratulated by Past-President Darlene Brezinski.

FSCT Past Presidents in attendance included (seated, from left): Joseph P. Walton (1994-95); Colin D. Penny (1993-94); John Oates (1977-78); John A. Lanning (1993-94); and A. Clarke Boyce (1982-83). Standing: James E. Geiger (1988-89); Deryk R. Pawsey (1987-88); Kurt F. Weitz (1990-91); William F. Holmes (1991-92); and James A. McCormick (1978-79).

CIEF Receives Funds from Grace Davison and Troy

During the Federation Awards Luncheon, the Coatings Industry Education Foundation was the recipient of two monetary gifts, one in the amount of $5,000 from Grace Davison, a Unit of W.R. Grace & Co.-Conn., and another in the amount of $2,500 from Troy Corp.

The contribution this year by Grace marks the second annual gift (minimum five years) of $5,000 to provide financial assistance for ongoing CIEF educational programs. The fund will be administered and distributed entirely by the CIEF. The donation by Troy is given annually with proceeds from the Troy Fun Run, a five-kilometer fitness run held during the International Coatings Expo (ICE). Since the inaugural run in 1987, Troy has donated over $14,000 to the educational activities of the CIEF.

James Chwirut, Marketing Manager/Coatings Products, for W.R. Grace & Co.-Conn. presents CIEF President Mary Brodie with a check for $5,000.

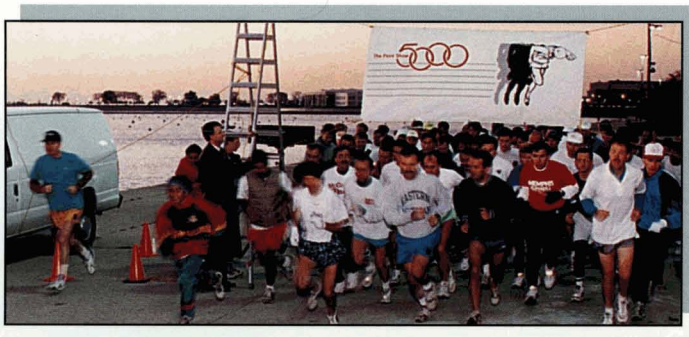
Ms. Brodie accepts a check in the amount of $2,500 from Don Williams, Product Manager/ Additives, of Troy Corp., from the proceeds of the Troy Fun Run.

ICE Participants Run for Fun

There's got to be an easier way to experience a sunrise, but some participants of the 1996 Troy Fun Run thought that getting up early for a five kilometer (3.1 miles) race was "a walk in the park." Runners assembled at 7:00 a.m. on Thursday, October 24 at Buckingham Fountain in Chicago's famous Grant Park. The first place finisher at last year's Fun Run, Joe Sarver, of Cerdec Corp., was proclaimed the winner of this 1996 event. With a finishing time of 17:13, Joe commented on the typical Chicago-like weather, "It was like a hurricane!" Brian Hamill, of Hamill Adhesives finished second and Emilio Del Valle, of Prod. Quin Jela in Guadalajara placed third.

Of the female participants, Mimi Wood, of Baltimore, OH, crossed the finish line at 23:15. Following close behind was Jane Bailey of Rohm and Haas Canada. When she caught her breath, Jane commented, "It's nice to get out and have something to do instead of eating!"

Proceeds from the Run, sponsored annually by Troy Chemical Corp., were donated to the Coatings Industry Education Foundation for ongoing educational programs.



Coatings Societies International

Representatives of the six member organizations of Coatings Societies International met informally during ICE '96. Pictured here are (left to right): Simon Lawrence, OCCA President; Forest Fleming, Incoming FSCT Secretary-Treasurer; Christopher Pacey-Day, OCCA General Secretary; Jay Austin, FSCT President-Elect; Don MacDonald, SCANZ Past-President; Ray McConnell, SCAA Past-President; Gerry Gough, Birmingham Club Representative; Fred Morpeth, OCCA Past-President; Darlene Brezinski, FSCT President; Mike Symes, SLF Past-President; Tom Hill, FSCT Secretary-Treasurer; John Lanning, FSCT Past-President; Robert Ziegler, FSCT Executive Vice President; Francis Borel, FATIPEC Secretary General; and Alain Clause, FATIPEC President.

International Visitors Reception

Bettina Gregory, of ABC News, Addresses FSCT Luncheon

The FSCT was proud to present ABC Senior News Correspondent Bettina Gregory as its Annual Luncheon Speaker. The luncheon was held on October 24, at McCormick Place East. Tha audience enjoyed Ms. Gregory's insights into the recent Presidential election and her personal anecdotes on the Washington scene.

This year marks the 22nd year that Ms. Gregory has spent with ABC News. During these years, she has covered the White House, the Pentagon, Capitol Hill and the federal regulatory agencies as well as numerous presidential races and national political conventions. She has appeared on *World News Tonight with Peter Jennings, Good Morning America,* and both as a guest and a contributing correspondent to *Nightline* with Ted Koppel.

In 1994, she was named as ABC Radio's chief special events anchor. She anchored live gavel-to-gavel coverage of the entire O.J. Simpson murder trial for ABC Radio, where she also anchored live coverage of the 50th anniversary of the Normandy Invasion, and coverage of President Clinton's speeches and news conferences. She anchored live coverage of this year's Republican presidential primaries, and does a daily political wrap-up for the radio network. She regularly substitutes for Peter Jennings on his daily radio feature, *Peter Jennings Journal.*

Ms. Gregory has also been a magazine reporter, contributing reports to *Lifetime Magazine,* produced by ABC News for the Lifetime cable channel. She has also written and narrated biographies for the show entitled *Biography* on the Arts and Entertainment cable channel. Her biography of First Lady Hillary Rodham Clinton won the ACE Cable Award as the Best Documentary of 1994.

Ms. Gregory has received numerous awards. One of her specials, "Flaws in the Shield: The Business of Defense," won the prestigious National Headliners Award for Outstanding Investigative Reporting by a TV network. *TV Guide* has also included Ms. Gregory in its lists of the top ten investigative reporters in television.

She covered the 1996 Summer Olympic Games for ABC Radio in Atlanta this past summer, and anchored ABC Radio's live coverage of both the 1996 Democratic and Republican national conventions.

Social Guest Program

Activities for Social Guest registrants began on Wednesday afternoon with a Welcome Social at the Chicago Hilton and Towers Hotel.

On Thursday, Social Guests enjoyed a continental breakfast and afterwards departed on motorcoaches for a tour of Chicago's downtown area. A visit to the Art Institute of Chicago followed. Participants viewed the traveling exhibition of the works of Edgar Degas. Organized by the National Gallery in London and the Art Institute of Chicago, the exhibit featured his later works between 1886, when he participated in the last impressionists exhibit and 1918, the year of his death.

An alternate choice to the Art Institute was Navy Pier, offering attendees a visit to the IMAX Theatre.

An exclusive luncheon for Social Guests was included in the tour.

Members of the 1996 Social Guest Committee

FSCT Thanks the 1996 Host Committee Members

Gregory E. McWright, Chair, ANGUS Chemical Co.
Natu C. Patel, Ace Hardware Corp.
Thomas P. Yates, The Valspar Corp.
Victor M. Willis
Karl E. Schmidt, Premier Coatings, Inc.
William W. Fotis, The Valspar Corp.
Debra McWright, Social Guest Program

International Coatings Technology Conference

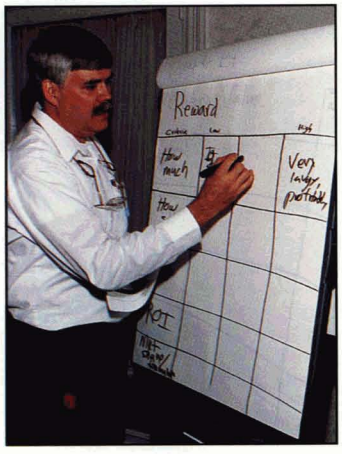
The Federation of Societies for Coatings Technology introduced its first International Coatings Technology Conference at the 1996 Annual Meeting. The Conference, designed to provide a forum for learning at all levels of the coatings industry, attracted 525 registrants—more than double the expected attendance. A variety of programs were offered, including six one-day pre-convention training seminars and four two-day conference courses. Even before it opened on October 22, the Conference boasted sold-out attendance at three of its offerings— "Executive Forum: Managing Technology for Strategic Success in the Coatings Industry," "Surfactant Chemistry," and the hands-on training program, "Coatings Spray Applications." Other programs were presented to standing-room only crowds.

The following pages present highlights of the Technology Conference. Future issues of the JCT will report on the courses and topics covered.

Executive Forum

Managing Technology for Strategic Success in the Coatings Industry

This interactive, executive level workshop introduced participants to the management tools and techniques required to fully link the R&D function with the strategic objective of the business. The forum earned high grades from enthusiastic registrants: "This was an exceptional and very timely course." . . . "Overall I found the program provided an effective strategy that we will try to put into practice . . ."

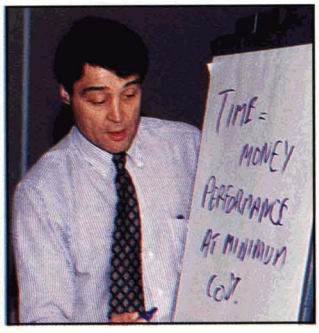


John Martin, of Arthur D. Little, instructs participants during the Executive Forum.

Pre-Convention Training Seminars

Faster to Market with Better Products through Design of Experiments

Designed to assist the coatings technologist in becoming more effective in the R&D function, this seminar focused on benefits of Design of Experiments (DOE): cutting the time from inception to market; increasing product quality; lowering raw materials costs; increasing research and development productivity; and insuring manufacturable products.



Charles Rooney, of Orr & Boss, explains the benefits of design of experiments.

"A good mix of topics"

Surfactant Chemistry

One of the most eagerly anticipated programs featured at the Technology Conference, this course offered a better understanding of surfactants and polymers, as well as new technologies and users in this area. Speakers provided a working knowledge of surfactant synergy in waterborne technology and offered information on defoamers. Registrants commented on the value of the seminar, ". . . a good blend of applications with supporting theory . . . More! Give us more!"

Winning Technical Presentations

Through lecture, interaction and small group projects, this course helped attendees to develop proper speaking techniques and to organize data; to handle question and answer sessions; and to communicate clearly to all audiences. This instruction was rated highly by participants who expressed new confidence in tackling the often intimidating challenge of public speaking.

Participants of the Surfactant Chemistry course gained a fuller understanding of this critical area.

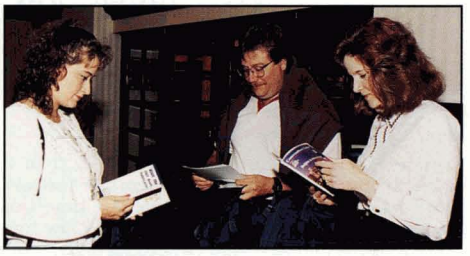
Effective Technical and Scientific Writing

Assisting those with responsibility for writing memos, letters, reports, manuals, specifications and proposals on a routine basis, this seminar included in-class writing exercises designed for practical application. Attendees appreciated the limited registration which "allowed for individual instruction."

Coatings Spray Applications

This program took participants off-site to Binks Manufacturing Co. to learn how to properly select, maintain, and operate spray finishing equipment and to answer a variety of questions related to spray finishing. Attendees responded favorably to the hands-on training, "I really liked the part where we disassembled and reassembled the gun. I learn the material better when I participate rather than just read. Thanks for the opportunity!"

"I learn the material better when I participate rather than just read. Thanks for the opportunity!"



Conference participants study the offerings in the official FSCT Convention Guide.

Conference Courses

Advances in Coatings Characterization

Providing a quick review of key analytical techniques used in the industry, this course demonstrated the successful application of these techniques for solving practical paint and coatings problems.

Substrates and Coatings

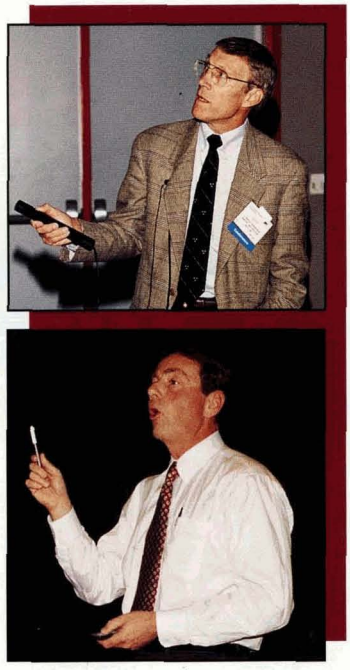
Attendees learned of the various factors which should be considered to develop the right coatings for the right substrate. Instructors provided a better understanding of the effects substrates have on coatings performance. The substrates discussed included plastics, wood, metal and concrete.

Polymer Chemistry for the Coatings Formulator

Developed by the FSCT Professional Development Committee, this course provided current information on the essential concepts of polymer science for coatings formulators, R&D chemists, and sales and marketing personnel with strong technical backgrounds. The two-day program, featuring 12 presentations by leading industry experts, impressed many attendees, "Great course! . . .Very informative! . . . A good mix of topics."

Back to Basics: A General Overview of Coatings Technology

A popular offering, this program was originally presented as part of the Eastern Training Conference by the Philadelphia Society for Coatings Technology. It was designed for chemists new to the industry or those with minimal experience. Attendees were provided with an overview of coating types, basic coatings composition, and cost savings ideas for formulation.



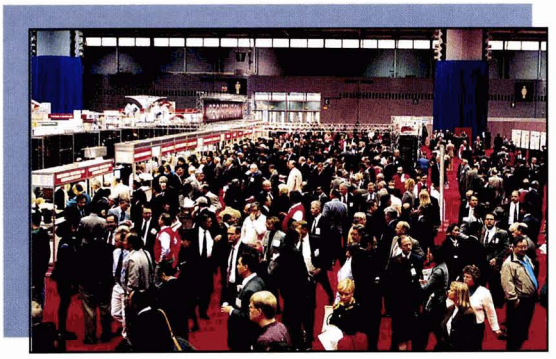
Course instructers included: (top) J. David Nordstrom, Polymer Chemistry for the Coatings Formulator, and Sam Morell, Back to Basics: A General Overview of Coatings Technology.

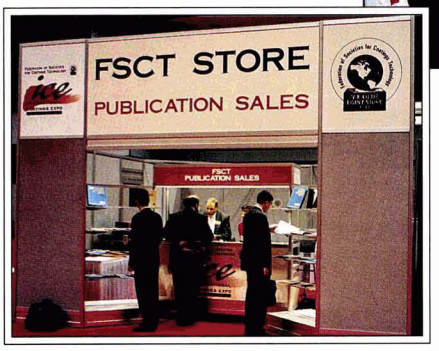
FSCT Program Committee

Steve A. Hodges, *Chair*	Halox Pigments
Andrew G. Gilicinski	Air Products & Chemicals
Thomas L. Johnson	ANGUS Chemical Co.
Gail Pollano	Zeneca Resins
Latoska Price	Akzo Nobel Coatings Inc.
Suzanne M. Rodgers	BYK-Chemie USA
Beverly Spears	Tarr, Inc.
Michael Bell	FSCT Staff

"More! Give us more!"

Welcome to ICE





Regulatory Update January 1997

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 National Paint and Coatings Association, Washington, D.C. 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.

Standards for Ozone and Particulate Matter Issued—On November 27, the Environmental Protection Agency (EPA) issued its combined national ambient air quality standards (NAAQS) for ozone and particulate matter. The new standards would substantially restrict emissions from both pollutants. EPA has estimated that this NAAQS will throw 335 counties in the United States into nonattainment status under Clean Air Act requirements.

Under the proposal, the current concentration limit for ozone would be lowered from 0.12 parts per million (ppm) to 0.08 ppm, measured over the course of an eight-hour time period. In addition, the averaging time for this limit, as well as the method EPA uses to determine compliance, would be changed. An additional 24-hour and an annual 2.5-PM requirement would be added to the existing particulate matter standard.

For more information on the ozone requirements, contact David McKee, EPA, (919) 541-5288. For additional information on the particulate matter standard, contact Patrician Koman, EPA, (919) 541-5170.

Environmental Protection Agency
November 25, 1996—61 FR 59932
Hazardous Waste Treatment, Storage, and Disposal Facilities and Hazardous Waste Generators; Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers
Action: Final rule

The Environmental Protection Agency (EPA) has published the final rule which will reduce organic air emissions from certain hazardous waste management activities to levels that are safe for human health and the environment. These standards, known as the subpart CC standards, apply to certain tanks, containers and surface impoundments used to manage hazardous waste capable of releasing organic waste constituents.

Previously, EPA had delayed the effective date of this notice in order to incorporate amendments to the rule, including providing additional compliance options to owners and operators. The rule went into effect Dec. 6, 1996. The amendments to the regulation include eliminating instrument monitoring and recordkeeping requirements for the majority of containers.

In a last-minute addition to the rule, the compliance requirements for 90-day storage units were increased; however, the compliance deadline was not extended. Under this amendment, provisions governing air emissions from process vents (subpart AA) and air emissions for equipment leaks (subpart BB) are now applicable to 90-day units even when they are not subject to a Part 270 permit, or are not located at a facility with some Part 270 permitted operations. In reaction to this amendment, NPCA has filed a motion to stay the Dec. 6 effective date, arguing that EPA had previously agreed not to apply these provisions to 90-day storage facilities.

Copies of this rule are available electronically on EPA's Cleanup Information Bulletin Board, (301) 589-8366 under the filename "RCRAAMEN.ZIP" or over the Internet at www.epa.gov. For additional information on the development of this rule, contact Michele Aston, EPA, (919) 541-2363. For technical information on regulatory requirements, contact the EPA Hotline at (800) 424-9346.

Environmental Protection Agency
November 25, 1996—61 FR 59849
National Emission Standards for Hazardous Air Pollutant Emissions: Group I Polymers and Resins and Group IV Polymers and Resins
Action: Advance notice of proposed rulemaking (ANPR)

In this notice, the Environmental Protection Agency (EPA) has proposed changes to the recently issued national emission standards for hazardous air pollutants (NESHAP) affecting Group I and IV resins and polymers. The proposed amendments will parallel the proposed changes to the NESHAP for the synthetic organic chemical manufacturing industry.

Over a dozen types of polymers and resins, including elastomers and latex, are regulated under this ANPR. Under the proposal, continuous process vents, control requirements for storage vessels, equipment leaks, and waste water are affected.

Comments on this notice were due by Dec. 26. For further information, contact Robert Rosensteel, EPA, (919) 541-5608.

Environmental Protection Agency
December 5, 1996—61 FR 64572
National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories: Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Other Processes Subject to the Negotiated Regulation for Equipment Leaks; Rule Clarifications
Action: Final rule; amendments

The Environmental Protection Agency (EPA) has issued a final

rule clarifying amendments to the Hazardous Organic NESHAP. The rule requires new and existing major sources to control emissions of hazardous air pollutants to the level reflecting application of the maximum achievable control technology, and is applicable to producers of benzene, toluene and other chemicals.

Among the proposed amendments were revisions that would eliminate the need for filing some implementation plans that would otherwise be due Dec. 31, 1996.

The regulation was effective Dec. 5. For further information, contact EPA's Dr. Janet Meyer, (919) 541-5254, or Mary Tom Kissell, (919) 541-4516.

Environmental Protection Agency
December 11, 1996—61 FR 65267
Amendments to Streamline the National Pollutant Discharge Elimination System Program Regulations: Round Two; Proposed Rule
Action: Proposed rule

As part of its effort to simplify or eliminate unnecessary regulations, the Environmental Protection Agency has proposed changes to the National Pollutant Discharge Elimination System (NPDES) regulations. This proposal is intended to streamline NPDES permitting procedures by simplifying procedures and removing redundant requirements.

The amendments include allowing facilities to appeal a waste water discharge permit decision directly to the agency board, rather than through an evidentiary hearing process. Additionally, the option for group permit applications would be removed, monitoring requirements would be consolidated, and the information new sources are required to submit would be amended.

Written comments on this proposal must be received by Feb. 10, 1997. Send an original and three copies to NPDES Round II Streamlining Rule, Comment Clerk, Water Docket MC-4101, EPA, 401 M St., S.W., Washington, D.C. 20460.

For additional information, contact Thomas Charlton, EPA, (202) 260-6960.

States Proposed Legislation and Regulations

ALABAMA

Air Quality (Regulation)—A final regulation (15 ALAM 948; 10/31/96) of the Alabama Department of Environmental Management (DEM) revises the definition of "volatile organic compound" (VOC) to conform with the federal definition; clarifies permit requirements for synthetic minor sources; and incorporates federal national emission standards for hazardous air pollutants. The rule went into effect Nov. 21. Contact James Warr, DEM, (205) 271-7710.

ARKANSAS

Air Quality (Proposed Regulation)—The Arkansas Department of Pollution Control and Ecology (DPCE) proposed a rule which would allow small facilities emitting less than 100 tons per year of pollutants to operate under a pollution prevention plan rather than a permit. Contact Mike Porta, DPCE, (501) 682-0780.

CALIFORNIA

Hazardous Waste (Regulation)—The California Department of Toxic Substances Control (DTSC) has readopted an emergency rule (96 CARR 1973; 10/25/96) which amends requirements for the use of tank systems for the transfer, storage or treatment of hazardous waste, including postponing the compliance date for the implementation of secondary containment standards until Jan. 1, 1998. The rule went into effect Oct. 15. Contact Joan Ferber, DTSC, (916) 322-6409.

A final regulation of the DTSC establishes procedures for public agencies to obtain permission to operate permanent household hazardous waste collection facilities. The rule went into effect Nov. 7. Contact Joan Ferber, DTSC, (916) 322-6409.

Proposition 65 (Regulation)—The California Office of Environmental Health Hazard Assessment (OEHHA) adopted a final rule which updates the list of chemicals that are known to the state to cause cancer or reproductive toxicity, as required under Proposition 65. The list was effective Sept. 24. Contact OEHHA, (916) 322-6325.

CONNECTICUT

Air Quality (Proposed Regulation)—A proposal (58 CTLJ 2C; 10/15/96) issued by the Connecticut Department of Environmental Protection (DEP) would reduce air pollution abatement fees for the registration and inspection of sources, and for small businesses. Contact Ellen Walton, DEP, (860) 424-3027.

Solid Waste (Regulation)—A final regulation (58 CTLJ 6C; 10/22/96) of the Connecticut Department of Environmental Protection (DEP) establishes fees for solid waste facilities, permit renewal, permit modification, and construction permits. The rule became effective Sept. 23. Contact Robert Hannon, DEP, (860) 424-3022.

FLORIDA

Air Quality (Proposed Regulation)—The Florida Department of Environmental Protection (DEP) intends to promulgate regulations (22 FLAR 6273; 11/1/96) to broaden the eligibility criteria for Title V air quality permits and to reduce the reporting requirements for such permits. Contact Beth Hardin, DEP, (904) 488-0114.

Community Right-to-Know (Proposed Regulation)—The Florida DEP plans to issue a proposal (22 FLAR 6247; 11/1/96) to amend standards for chemical release inventory and reporting, including changing the effective date for chemicals regulated under Section 313. Contact Gregg Dawkins, DEP, (904) 413-
9970.

IDAHO

Air Quality (Proposed Regulation)—A proposal (1996 IDAB 67; 11/6/96) issued by the Idaho Department of Health and Welfare (DHW) would incorporate federal air quality requirements, as well as maximum achievable control technology standards. Contact Tim Teater, DHW, (208) 373-0502.

ILLINOIS

Air Quality (Regulation)—The Illinois Pollution Control Board

(PCB) adopted a regulation (21 ILR 14428; 11/8/96) which amends requirements for VOC emissions in the Chicago area, including the clarification of recordkeeping and reporting criteria for coatings operations. The rule became effective Oct. 17. Contact Dorothy Gunn, PCB, (312) 814-6931.

INDIANA

Air Quality (Proposed Regulation)—The Indiana Department of Environmental Management (DEM) plans to introduce a proposal (20 INR 637; 11/1/96) which would incorporate by reference the federal national emission standard for hazardous air pollutants for the manufacture of Groups I, II, and IV polymers and resins. Contact Larry Fedor, DEM, (317) 232-8223.

Water Quality (Proposed Regulation)—A regulation (20 INR 374; 11/1/96) proposed by the Indiana Water Pollution Control Board (WPCB) would update water quality requirements and the national pollutant elimination system program by, among other things, setting interim ground water quality criteria, and by specifying procedures for evaluating variance applications. Contact Lonnie Brumfield, WPCB, (317) 233-2547.

KENTUCKY

Lead (Regulation)—The Kentucky Department for Health Services (DHS) adopted an emergency regulation (23 ARKY 1903; 11/1/96) which establishes training and certification requirements for persons who perform lead hazard inspection and abatement, and sets up permit requirements for abatement conducted in target housing and child-occupied facilities. The rule became effective Oct. 1. Contact William Moore,. DHS, (502) 564-7900.

LOUISIANA

Air Quality (Proposed Regulation)—A proposed regulation (22 LAR 1014; 10/20/96) of the Louisiana Department of Environmental Quality (DEQ) would permit sources with 100 tons or more of annual emissions to offset emission increases by achieving greater VOC reductions in other operations in the area instead of complying with lowest achievable emission rate requirements. Contact Patsy Deaville, DEQ, (504) 765-0399.

Community Right-to-Know (Regulation)—A final rule (22 LAR 976; 10/20/96) adopted by the Louisiana DEQ establishes standards for responding to off-site emergency transportation incidents; specifies procedures for the removal of abandoned containers; details requirements for creating emergency response storage facilities; and sets up recordkeeping and reporting requirements. The regulation was effective Oct. 20. Contact Patsy Deaville, DEQ, (504) 765-0399.

Spray Paint Restrictions—LA H. 52 (Schneider) prohibits the sale, purchase or possession of airbrush propellant by a minor; and prohibits the inhalation of an airbrush propellant. The legislation was prefiled on Nov. 19.

MAINE

Air Quality (Regulation)—The Maine Department of Environmental Protection (DEP) adopted a final rule which amends the maximum allowable ambient air quality increases for particulate matter and removes federal permit shield provisions. The regulation went into effect Aug. 6. Contact Jeffrey Crawford, DEP, (207) 287-2437.

MASSACHUSETTS

Hazardous Materials Transportation (Proposed Regulation)—A proposed rule (804 MAR 55; 11/15/96) of the Massachusetts Registry of Motor Vehicles (RMV) would amend current hazardous materials transportation requirements; incorporate federal standards for the use of controlled substances; and establish a minimum age requirement of 18 to operate a commercial vehicle involved in intrastate commerce. Contact Mary Corbett, RMV, (617) 351-9951.

MICHIGAN

Hazardous Waste (Regulation)—The Michigan Department of Environmental Quality (DEQ) adopted a regulation (1996 MIR 5; 10/31/96) which requires documentation of waste treatment by generators performing on-site treatment of their hazardous waste; and requires large-quantity hazardous waste generators to comply with federal air emission standards for process vents, leaks, tanks, containers, and surface impoundments. The rule became effective Oct. 15. Contact Ronda Blayer, DEQ, (517) 373-9548.

MINNESOTA

Air Quality (Proposed Regulation)—The Minnesota Pollution Control Agency (PCA) intends to amend current regulations (21 MNSR 507; 10/14/96) concerning national emission standards for hazardous air pollutants by incorporating federal requirements for wood furniture, ship building and repair, printing, and polymers and resins. Contact Sheryl Livingston, PCA, (612) 297-7894.

MISSOURI

Air Quality (Regulation)—A final rule (21 MOR 2654; 11/15/96) adopted by the Missouri Department of Natural Resources (DNR) establishes emission control technology control criteria and procedures for sources that emit or have the potential to emit hazardous air pollutants. Contact Jim Kavanaugh, DNR, (573) 751-4817.

MONTANA

Hazardous Waste (Regulation)—A final regulation (1996 MTAR 2851; 10/24/96) of the Montana Department of Environmental Quality (DEQ) would amend waste management requirements to conform with federal standards, including revising permitting provisions, requirements for recyclable materials, and standards governing commercial chemical products and container residues. The rule went into effect Oct. 25. Contact Mark Stahly, DEQ, (406) 444-3742.

NEBRASKA

Hazardous Waste (Proposed Regulation)—A proposal issued by the Nebraska Department of Environmental Quality (DEQ) would amend hazardous waste management requirements; remove reporting requirements for small quantity generators and conditionally exempt small quantity generators; and establish provisions for universal waste. Contact Joe Francis, DEQ, (402) 471-2186.

NEW HAMPSHIRE

Solid Waste (Proposed Regulation)—A proposed interim rule (16 NHHR 12; 10/11/96) issued by the New Hampshire Department of Environmental Services (DES) would establish standards for the registration, design, installation, operation and maintenance of underground storage tanks. Contact Lynn Woodard, DES, (603) 271-1165.

NEW JERSEY

Hazardous Materials Transportation—The New Jersey Department of Environmental Protection (DEP) adopted a final regulation which allows transporters of hazardous materials to operate transfer stations, at which they have 10 days to store or repack the materials. Contact Bill Krimson, DEP, (609) 584-4250.

Hazardous Waste (Regulation)—A final rule (28 NJR 4606; 10/21/96) adopted by the New Jersey DEP incorporates federal requirements for hazardous waste; amends the hazardous waste fee schedule; and updates penalties for unpaid fees. The regulation went into effect Oct. 21. Contact Janis Hoagland, DEP, (609) 292-0716.

NORTH CAROLINA

Air Quality (Proposed Regulation)—The North Carolina Department of Environment, Health and Natural Resources (DEHNR) proposed a regulation (11 NCR 1271; 11/15/96) which would amend air pollution control standards, change the time for reporting malfunctions, and establish procedures to expedite permit processing. Contact Thomas Allen, DEHNR, (919) 733-1489.

OHIO

Solid Waste (Proposed Regulation)—A proposed regulation of the Ohio Department of Commerce (DOC) amends requirements for underground storage tanks by establishing a permit and inspection fee schedule; requiring specific inspections; and implementing application and renewal procedures for inspections. Contact Ray Roe, DOC, (614) 752-7079.

OKLAHOMA

Community Right-to-Know (Regulation)—A final regulation of the Oklahoma Department of Environmental Quality (DEQ) updates standards for emergency planning and community right-to-know by increasing the reportable quantity for substance spills for which reporting is required. The rule was effective Oct. 25. Contact Monty Elder, DEQ, (405) 271-8062.

Water Quality (Regulation)—The Oklahoma DEQ adopted final regulations (13 OKR 4081, 4093; 10/15/96) which amend the application procedure and annual fees for discharge permits, general permits, and industrial surface impoundments. The rule became effective Oct. 25. Contact Cary Pirrong, DEQ, (405) 271-5205.

OREGON

Air Quality (Proposed Regulation)—A proposed regulation (36 ORRB 14; 11/1/96) of the Oregon Department of Environmental Quality (DEQ) would postpone Title V permitting requirements for 18 months for sources with the potential to emit at major source levels, but with low actual emissions. Contact Susan Greco, DEQ, (503) 229-5213.

Hazardous Materials Transportation—The Oregon Department of Transportation (DOT) adopted a final rule (36 ORRB 10/11/1/96) which applies federal standards and penalties to persons who transport or cause to be transported hazardous materials. The Regulation became effective Sept. 17. Contact Brenda Trump, DOT, (503) 945-5278.

PENNSYLVANIA

Environmental Audits (Notice)—The Pennsylvania Department of Environmental Protection (DEP) has issued a final voluntary environmental compliance audit policy (26 PAB 4804; 10/5/96) to encourage companies to find and fix environmental problems. The policy provides waivers from fines and penalties to facilities that disclose and correct environmental violations. Contact Richard Mather, DEP, (717) 787-7060.

RHODE ISLAND

Air Quality (Regulation)—A final regulation (1996 RIGR 184; 9/30/96) of the Rhode Island Department of Environmental Management (DEM) amends the definition of best available control technology; incorporates ambient air quality increments for PM-10; and changes the date that annual emission fees are due to Sept. 1. The rule was effective Aug. 19. Contact Douglas McVay, DEM, (401) 277-2808.

TENNESSEE

Air Quality (Proposed Regulation)—A proposed rule (22 TNAR 103; 10/15/96) of the Tennessee Department of Environment and Conservation (DEC) would establish fees for multiple air pollutants, amend the construction and annual emission fee schedule, and define minor sources and conditional major sources. Contact Malcolm Butler, DEC, (615) 532-0600.

The Tennessee DEC proposed a rule (22 TNAR 52; 11/15/96) which would amend air control requirements for miscellaneous metal parts coatings and would establish an emission limit for heavy-duty truck touch-ups. Contact Malcolm Butler, DEC, (615) 532-0600.

TEXAS

Air Quality (Proposed Regulation)—The Texas Department of Environmental Quality (DEQ) proposed a regulation which would establish emission specifications, and monitoring and recordkeeping requirements for solvent-using processes and surface coating operations. Contact Heather Evans, DEQ, (512) 239-1970.

Spray Paint Restrictions—TX H. 105 (Serna) relates to regulating customer access to aerosol paint and creating an offense for the possession of aerosol paint by a person younger than 18 years of age. The bill was prefiled for consideration on Nov. 12.

Fall 1996 Board of Directors Meeting

Thirty-four members and 22 guests attended the Fall Meeting of the Board of Directors of the Federation of Societies for Coatings Technology, on October 22, 1996, in Chicago, Illinois.

The following persons were in attendance:

Officers

President ..... Darlene Brezinski
President-Elect ..... M. Jay Austin
Secretary-Treasurer ..... Thomas E. Hill

Society Representatives

Baltimore ..... Joseph D. Giusto
Birmingham ..... Gerry J. Gough
C-D-I-C ..... William Hollifield
Chicago ..... Evans Angelos
Cleveland ..... Brenda Carr
Dallas ..... Charles Kaplan
Detroit ..... Van Evener
Golden Gate ..... Patricia Shaw
Houston ..... Vic Santamaria
Kansas City ..... Mark Algaier
Los Angeles ..... James Hall
Louisville ..... Larry Pitchford
Mexico ..... Martha Colin
Montreal ..... Suzanne Richardson
New England ..... Michael Iannuzzi
New York ..... Michael Frantz
Pacific Northwest ..... Yvon Poitras
Philadelphia ..... Donald Denny
Piedmont ..... Forest Fleming
Pittsburgh ..... William Spangenberg
Rocky Mountain ..... J. Dick Mullen
St. Louis ..... Terry Gelhot
Southern ..... James E. Geiger
Toronto ..... David Jack

Other Members

Freidun Anwari ..... Cleveland
F. Louis Floyd ..... Baltimore
William Holmes ..... Dallas
John Oates ..... New York
Dennis Owen ..... Golden Gate
Joseph P. Walton ..... Cleveland

Guests

Federation Past-Presidents Clarke Boyce, John Lanning, James McCormick, Deryk Pawsey, Colin Penny, and Kurt Weitz. (Board Members Geiger, Holmes, Oates, and Walton are also Past-Presidents of the FSCT.)

Dr. Mary G. Brodie, President, Coatings Industry Education Foundation.

Federation Annual Host Committee Chair Gregory McWright, of the Chicago Society.

Dr. Simon Lawrence, President, and Fred Morpeth, Past-President, Oil & Colour Chemists' Association.

Alain Clause, President, and Francis Borel, General Secretary, FATIPEC.

Ray McConnell, Past-President, Surface Coatings Association Australia.

Don MacDonald, Past-President, Surface Coatings Association New Zealand.

Michael Symes, Past-President and General Secretary, SLF.

Federation Staff Members Michael Bell, Director of Educational Services, Patricia Viola, Director of Publications, and Robert Ziegler, Executive Vice President.

Following a roll call of members, on a motion by Mr. Walton, seconded by Mr. Mullen, the report of the Spring 1996 meeting of the Board of Directors was approved as published in the July 1996 issue of the JOURNAL OF COATINGS TECHNOLOGY.

Reports of the Officers and Staff

President Brezinski

Following the Spring Board Meeting, Marty and I were fortunate to be able to attend the Southern Society Meeting. In addition to experiencing wonderful Southern hospitality, I was able to discuss many aspects of the strategic planning objectives with the members of the Society.

It was also our privilege to represent the Federation by attending the FATIPEC Congress in Brussels and the European Coatings show. All sessions of the Congress were very well attended, and the first CSI medal for an outstanding paper was also presented at the Congress. An informal meeting of CSI member representatives was also held.

Marty and I also had the pleasure of attending the first Pan American Coatings Expo. I would like to extend a very special thank you to the Mexican Society for all of their effort and assistance with this event. By all outward appearances, and the attendance, it would appear to have been a very successful meeting and show.

Both Marty and I would like to express our deep appreciation to everyone who has so graciously welcomed us this past

From left: Executive Vice President Robert F. Ziegler, President Darlene R. Brezinski (Chicago), and Secretary-Treasurer Thomas Hill (Western New York)

year, to the staff members who gave us a great deal of help and support, and to the Federation members who have been supportive in so many kind and generous ways. We have many wonderful memories to retain and friends that we have made worldwide because of this experience.

There have been some growing pains along the way, but there is no doubt that through honest and open discussion and sound strategic planning we will—together—build a stronger organization for the future which will be able to provide many benefits for our membership. It is encouraging to see healthy, spirited and respectful debate about many of these issues because it emphasizes the concern that our members have for the Federation. We have a great deal of work ahead of us these next years, but with the continued dedication of our membership and our staff we shall succeed.

DARLENE BREZINSKI
President

President Elect Austin

Shortly after the May Board of Directors meeting, I represented the Federation at the May 29, 1996 meeting of the North American Coatings Council (NACC). In summary, following a review of the various associations' activities, concerns and intended directors, the representatives from NPCA and CPCA advised those attending that the mission and purpose of the NACC developed at the September 5, 1995 meeting did not merit their further participation in the Council.

The Council determined, through vote, that the NACC should be dissolved and no further meetings scheduled. The NACC is now gone, but should not be forgotten. The underlying reasons for its formation still exist and should not be ignored by the FSCT.

In August, Kathy and I had the pleasure of attending the SCANZ Conference in New Zealand and the Golden Anniversary SCAA Conference in Australia. I'm happy to report that both sister CSI organizations had successful meetings and their warm hospitality left us with many fond memories of our visit.

It was quite interesting to note that both organizations face many of the same problems that we are attempting to deal with ourselves. Hopefully, all of us will be successful.

In my spare time, I've assigned Committee chairs for next year, helped with possible on strategic planning and prepared for Executive Committee review and approval, a general operational plan for next year.

I look forward to next year as FSCT President, with the strong desire to start implementing many of the strategies and good ideas developed over the last 12 to 18 months.

M. JAY AUSTIN
President Elect

Secretary-Treasurer Hill

The year 1996 has been an eventful one from a personal and professional perspective. I became an unwilling participant as the coatings industry continues its rationalization process. Many of you have also participated in this process. This process is not pleasant, but there is light at the end of the tunnel and no, that light is not a train coming in the other direction.

In traveling to the various Society meetings, committee meetings, etc., I am impressed by the dedication of those attending the meetings. At the same time, I am disturbed by the fact that seemingly, we engage less than 20% of our membership in Federation activities. That 20% has been carrying the ball for a long time and just like a defense in football that is on the field too long, some of the players are becoming tired. Tired people make mistakes and get fussy with each other at times.

The strategic planning effort and now implementation of that plan is the start of changing the Federation to resonate with more of our members and to "widen the tent" to include people involved in the business of coatings but are not Federation members. It has been exciting and challenging to be part of this process. Resisting change is natural. I have heard it said that the only person who likes change is a baby with a wet diaper. The Federation has undergone many changes in its history and somebody probably did not like some part of the changes. However, these changes have kept the Federation a viable force in the industry. I am confident that the path we are on will continue that viability.

Now that the preamble is out of the way, here is my report. We are on budget as of the last report at the Executive Committee meeting in September. How well we do for the year depends on the attendance at the International Coatings Expo and the related conferences. However, the staff at Blue Bell, particularly Bob Ziegler is committed to appropriate expense control, as is the Executive Committee.

The Finance Committee met and developed a balanced budget for 1997. This budget anticipates some additional costs in celebration of our 75th Anniversary. All other aspects of the budget fund normal expenses.

The Secretary-Treasurer serves as an Ex Officio member of the Professional Development Committee. Unfortunately, I was only able to attend one of their meetings. The Professional Development Committee has been and continues to be a key committee for the Federation. Their activities are central to the Federation's reason for being, "the continuing education and professional development of our members."

Finally, the Secretary-Treasurer serves as Treasurer of the Coatings Industry Education Foundation. I attended one of their meetings and participated in a conference call when a flight was cancelled. In these days of shrinking budgets, the CIEF trustees face a difficult job in attempting to impartially allocate funds from a pool that is getting smaller as needs increase. The CIEF has developed plans for increasing the size of the pool of funds and I trust that we will support their efforts.

I have appreciated the opportunity to serve as Secretary-Treasurer and thank the Federation staff for their support and assistance through the year. They are an outstanding group of individuals. I look forward to next year's activities with confidence that has its foundation in the outstanding people we serve.

THOMAS E. HILL
Secretary-Treasurer

Executive Vice President Ziegler

During the past year the Federation has undergone several major changes in programs, services, and direction. These

changes, ranging from staff personnel to the Annual Meeting and Expo, are for the most part a direct result of the ideas and concerns voiced in the ongoing strategic planning discussions. As the industry and the needs of its coatings technical personnel, FSCT members, have changed, so, too, the FSCT has attempted to keep pace by providing expanded and advanced educational programs. The challenges faced in developing these advances, by FSCT leadership, committees, and limited staff resources have been met and overcome. It is imperative, however, that the Board finalize the strategic vision of the FSCT and provide the necessary direction for future action.

The following report details the major activities of the past year.

Financial

The most recent figures (August 31, 1996) show income at $2,709,543 and expense at $1,999,540, for a net surplus of $710,002. The relative figures for 1995 showed a net of $526,841. Third quarter results will be forwarded to the Board in time for review prior to its fall meeting. Year-end financial projections indicate that with anticipated registration at the 1996 ICE, the FSCT will break-even.

The Finance Committee met on August 22 and developed the 1997 operating budget which was reviewed and approved by the Executive Committee at its September 13 meeting. Copies of the proposed budget have been forwarded to all Board members for their review prior to discussion at the fall meeting.

It should be noted here that since the change in personnel in the Controller position earlier this year, the FSCT has provided enhanced financial analysis in its reports to the Finance and Executive Committees, as well as to the Board. The improved financial condition of the FSCT is, in part, due to the focused attention to day-to-day financial matters.

Publications

For the first time, the Publications Committee has developed protocol and procedures for the review and approval of all newly proposed publications and those publications recommended for revision. Approval will be based on the timeliness, quality, and cost vs. benefit of any proposed publication, either print or electronic, thereby providing the FSCT with a measured and objective response.

Improvements in the content and appearance of the Journal of Coatings Technology continued in 1996. The latest editorial addition, "Spotlight," features focused articles and mini-buyer's guides which provide added benefit to readers, as well as providing additional opportunities for advertising. In November, a Buyers' Guide Supplement to the JCT will be featured — a first for the FSCT. Starting in the third quarter, the FSCT has retained an outside advertising salesperson who now works closely with the Publications and Marketing staff in promoting advertising in the JCT and other publications.

There is continued development of additional booklets to the Federation's *Series on Coatings Technology* with "Methodologies for Predicting the Service Life of Coating Systems," by Jonathan Martin, et al, published in June, "Finishing Exterior Wood," by William Finzel, being published in time for the convention, and "Adhesion Aspects of Polymeric Coatings," by Jamil Baghdachi, of BASF, in final proofreading stages. These booklets will bring to 25 the total number of *Series* offerings.

The Federation's CD-ROM product, *Panorama*, has been discontinued effective with the next disk update in November 1996. Originally developed to assist coatings manufacturers with the burden of maintaining the thousands of material safety data sheets required by regulations as an archival resource, *Panorama* fulfilled its purpose well. However, after three years, subscriptions have diminished to the point at which the Federation was forced to discontinue this offering. It was found that: 1) CD-ROM technology is not as widespread in the coatings industry as was thought from initial investigation; and, 2) coatings manufacturers perceived that *Panorama* should do more than for what it was designed, i.e., function both as an archive and as a database to automatically produce MSDS. In addition, the expense of maintaining the system, which included almost 100% more MSDS than originally planned, was a critical factor in this decision. Current subscribers have been notified and any subscriptions extending beyond that date will be refunded on a pro rata basis. Also notified were all suppliers of record as well as the NPCA, which had a revenue-sharing agreement on net income with the FSCT for its assistance in marketing *Panorama*. However, no net income was realized during the three-year life of the product.

Released in January 1996, the *Coatings Encyclopedic Dictionary*, edited by Stanley LeSota, has sold almost 900 copies to date

In collaboration with Consolidated Research, Inc., the FSCT continues its marketing and promotion of the CD-ROM educational tutorial, *SciQuest*. Sales to date have been encouraging and we look forward to incorporating future *SciQuest* "chapters" in FSCT educational offerings.

Marketing & Promotion

Current marketing programs have focused on three areas of FSCT activity: the new International Coatings Expo, Technology Conference and FSCT Annual Meeting; *Coatings Encyclopedic Dictionary*; and JCT advertising.

Substantial promotion of the new convention format was done primarily via mailings of post cards and brochures to members and non-members, print advertising in most of the industry publications, and on-site promotion during FSCT visits and exhibit participation. Recipients of mailings included past attendees, FSCT membership, and coatings, ink, and powder manufacturers included on several mailing lists acquired from major industry publications and associations.

Postcard mailings and print advertising was used exclusively in promoting Dictionary sales.

JCT advertising promotion has been greatly enhanced with the hiring of a dedicated salesperson. Scott Walter, formerly associated with *Modern Paint & Coatings*, is currently working with the FSCT's marketing and publications personnel in developing a coordinated campaign to increase advertising revenue. Since joining the FSCT sales effort, Mr. Walter's activity has led to some promising gains. We look forward to working with him as a team in expanding both the number of ad pages and advertisers in 1997.

Joseph D. Giusto (Baltimore) and President-Elect Jay Austin (Chicago)

William Hollifield (CDIC) and Gerry J. Gough (Birmingham)

In early October the FSCT will join the "web" with a home page on the Internet (web address — *www.coatingstech.org*). Contents of the site will include basic information on the history and mission of the FSCT, and also include detailed information on the variety of products, services, and programs being offered. Promotion of the Constituent Societies and their activities will be included as well. It is believed that the Internet will play a major role in future FSCT marketing and promotion.

Membership

Prior to the November Society update, the current membership total is 7,428, broken down into the following categories: 4,341-Active; 2,241-Associate; 619-Other (Educator, Student, Honorary, Retired); 227-Affiliate. During the same period last year the total stood at 7,466.

Annual Meeting / International Coatings Expo & Technology Conference

With the theme "Insights & Innovations," the Federation's 1996 convention format is truly innovative. Major changes in program offerings, including pre-convention training seminars and conference courses, provide exceptional educational opportunities for attendees. The Program Committee (Steve Hodges, Chair) accepted the challenge of producing this unique blend of technical presentations and course training and has succeeded admirably. Exhibit space in the International Coatings Expo (the "new" Paint Show) currently is at an all-time high of 96,200 sq.ft. and total exhibitors of 319, eclipsing the previous high of 92,200 sq.ft. (Chicago-1992) and 313 exhibitors (St. Louis-1995). Advance registration, to date, is slightly lower than anticipated. However, hotel reservations are higher than expected indicating the potential for a higher than normal on-site registration.

The Host Committee (Gregory McWright, Chair) from the Chicago Society has done an outstanding job in preparation for the convention. We sincerely appreciate the efforts of this dedicated group.

Pan-American Coatings Expo

The Mexico event, the first of its kind sponsored by the FSCT, was very successful, with 79 exhibitors and 873 meters of space taken. Attendance was placed at 2,000—1,700 of which represented the Mexico coatings manufacturing industry. Financially, a net surplus of $51,000 was realized from the meeting, exceeding the budget by $26,000. The assistance of the Mexico Society was instrumental in this success. The FSCT will investigate the potential for future plans in this area of the world.

1997 Spring Meetings

For the first time, in 1997 the FSCT will venture outside of North America to hold its Spring meeting of the Board of Directors. The meeting is scheduled to be held on May 16-18, at the Hyatt Regency in Birmingham, England. The Birmingham Club is currently planning to hold a technical seminar in conjunction with the meeting. Hotel and transportation information will be forwarded to the Board later this year. We look forward to working with the Birmingham Club in preparation for this meeting

Meanwhile, in wanting to bring to the Society leadership a better understanding of the headquarters and its staff capabilities, the Society Officers meeting will be held near the FSCT Headquarters Offices at the Marriott West in Conshohocken, PA, on June 20-21.

North American Coatings Council

A meeting of the council was held on May 29, 1996 and was hosted by the Canadian Paint & Coatings Association. Attending the meeting were representatives of the CPCA, National Paint & Coatings Association, Roof Coating Manufacturers Association, as well as, attending for the first time, representatives of the Painting and Decorating Contractors of America, National Decorating Products Association, and Steel Structures Painting Council. During discussions, the NPCA and CPCA representatives advised that the mission and purpose of the NACC developed at the previous meeting were not, in their opinions, worthy of their continuing their participation on the Council. It was, therefore, determined that the NACC would be terminated and that no further meetings be scheduled. However, subsequent discussions with the SSPC and PDCA indicated their intentions to seek areas in which they and the FSCT could cooperate. Future discussions with these groups will be scheduled.

Headquarters Staff

The following individuals continue to serve the Federation well in their respective positions: Michael Bell, Director of Educational Services; Victoria Graves, Director of Meetings and Conventions and Membership Services; Patricia Viola, Director of Publications; Lyn Pollock, Director of Marketing; Joseph Pontoski, Controller; Kathleen Wikiera, JCT Managing Editor; Jonna Coachman, JCT Associate Editor; Audrey Boozer, JCT Subscription Manager; Lisa McGlashen, Secretarial Assistant to the Executive Vice President; Mary Sorbello, Secretarial Assistant to the Director of Educational Services; Marie Wikiera, Meetings Coordinator; Linda Madden, DTP Operator; Meryl Simon, Order Dept.; and Dorothy Kwiatkowski, Secretary/Receptionist.

On behalf of the Staff, I wish to thank the Officers, Committees, and the many volunteers who have made 1996 both exciting and successful.

Robert F. Ziegler
Executive Vice President

Director of Educational Services Bell

Committee Liaison

Educational Coordinating Committee—The Educational Coordinating Committee has met once since the last meeting

of the FSCT Board of Directors, on August 6, 1996 in Pittsburgh. The meeting was part of the yearly meeting with the Chairs of the Constituent Society Educational Committees. The next meeting of the committee is scheduled for November in Cincinnati.

The meeting included Educational Chairs or designated representatives from 13 Societies: Baltimore, Birmingham, CDIC, Chicago, Detroit, Golden Gate, Kansas City, Louisville, New England, New York, Pacific Northwest, Pittsburgh, and Toronto. The meeting participants learned how to develop educational programs and received tips from FSCT staff and the ECC members on the various program formats and the steps needed to develop a program. Also, attendees had the opportunity to attend the tour of Bayer on the day following the meeting, which was held prior to the TAC meeting with the Technical Committee Chairs.

The Chair of the Educational Coordinating Committee is Melinda Rutledge of the Los Angeles Society.

The committee has been involved with two major projects:

Science Kit—FSCT Headquarters continues to process requests for the Science Kit. The kit is useful for members who provide guidance to students and thus far over 200 have been distributed. The kit is a "living" document and has been designed to expand to allow for additional experiments.

Distinguished Lecture Series—The Distinguished Lecture Series has had two requests for speakers since the Spring meeting of the Board of Directors. Notification was sent to the officers and Society Representatives of the Constituent Societies and also discussed during the Society Officers meeting in Seattle. The program is comprised of four recognized coatings speakers available for monthly meetings of the Societies, with FSCT picking up the bill.

Since the developmental work is complete on the Distinguished Lecture Series and the Science Kit, the ECC has begun the task of developing new activities, which are referred to as "Test Drilling Projects." The committee is evaluating several ideas suggested by the full Educational Committee at its August 1996 meeting.

The ECC has recommended to the Executive Committee that FSCT become involved in the InterSociety Polymer Education Council (IPEC). This is an organization made up of representatives of the Rubber and Polymer Chemistry Divisions of the American Chemical Society, the Society of Plastics Engineers, and the Society of the Plastics Industry. Its members work to provide educational information on polymer chemistry to high school teachers, through both its Polymer Ambassador program and the MaTR Institute. The Polymer Ambassador program provides funding for several chemistry teachers to conduct polymer chemistry training during "In Service" programs for fellow teachers. The MaTR Institute is a special collaboration between the National Science Foundation, IPEC and the University of Wisconsin-Stevens Point, and serves as an instructional center for 24 chemistry teachers each year from around the country. Between the outreach efforts of both programs, over 3,000 teachers received Polymer Chemistry training in 1995. IPEC has invited FSCT to join the organization and this has been proposed to the Executive Committee.

The committee also conducted a survey in May to better learn about the needs of the Societies and how to better assist the Chairs that attend the yearly meeting. Unfortunately, only six replies were received by the committee prior to its August meeting.

The committee also continues to work on the following projects: administering the activities surrounding the Southern Society's A.L. Hendry Award for the Best Student Paper; and reviewing the applications and distributing funds for the FSCT Small Society Scholarship program.

Technical Advisory Committee—The last meeting of the Technical Advisory Committee was held on August 7-8, 1996 in Pittsburgh, PA. This meeting included the yearly meeting with the Technical Chairs of the Constituent Society Technical Committees. The next meeting is tentatively scheduled for February 1997 in Louisville.

The meeting of the TAC with the Technical Committee Chairs attracted participants from the following Societies: Birmingham, CDIC, Chicago, Cleveland, Detroit, Golden Gate, Kansas City, Louisville, New England, New York, Northwestern, Pacific Northwest, Philadelphia, Piedmont, Rocky Mountain, and Toronto.

The Chair of the TAC is Fred Anwari of the Cleveland Society.

The committee has the following Mission Statement:

"The mission of the FSCT Technical Advisory Committee is to establish guidelines, facilitate projects and encourage Constituent Societies to participate in programs in a way that will advance understanding in coatings and related areas so that there will be a continuity of technical projects which will result in the presentation of a technical paper at the Annual Meeting and publication in the JOURNAL OF COATINGS TECHNOLOGY."

The committee is currently working on the following projects:

Society Technical Committees—The TAC Adoptive Society program continues to be the direct line between the Societies for the committee. Each committee member has assigned responsibility to maintain contact with four to five Societies in his or her general geographic area. In addition to assisting in meeting notification, this program gives each Society a resource contact on the TAC for project development and committee management information. The TAC is considering a change in the program to better serve the Societies by grouping the Societies by technical interest, membership total or the specific role of the Technical Chair.

APJ/Voss Award—The committee assumed the responsibility of the administration of the APJ/Voss Awards in 1995. These awards are presented for the outstanding Society papers submitted for the program. The TAC has spent a considerable amount of time evaluating and enhancing the program. The committee provided constructive critiques to all 1995 participants in hopes of improving submitted papers in future years. This year, two papers were entered in the competition.

Society Speakers Program—The committee also assumed this role in 1995. This award is given to the best presentations of Society Technical Papers at the Annual Meeting. As with the Voss Award, the committee has reviewed its performance as

Brenda Carr (Cleveland) and Evans Angelos (Chicago)

Simon Lawrence, President, Oil & Colour Chemists' Association

the award's administrator and also provided the participants with constructive feedback aimed at improving the presentations in the future.

Again this year, the attendees of the August meeting were able to see how the Society Speakers Program works first hand by having the opportunity to use the judging form on the meeting's guest speakers.

The TAC ran a survey in May to better learn about the needs of the Societies and how to better assist the Chairs that attend the yearly meeting. This survey was done in conjunction with the Educational Coordinating Committee survey. As with the ECC, the response was disappointing, with only four replies received by the committee prior to its August meeting.

Joint Coatings/Forest Products Committee—The last meeting of the Joint Coatings/Forest Products Committee was held in Chicago, IL, on September 5, 1996. The next meeting of the committee will be held in March 1997, in Madison, WI.

The committee is continuing to prepare a series of articles on pertinent topics. Previous articles in the series have been published in the *American Painting Contractor* and the *Paint Dealer*. The titles currently being developed are: Surface Preparation, Changing Wood Resources, Finishes Checklist, Mildew, New Wood Treatments, Finishing Shakes and Shingles, and Water Repellents. The committee is also researching the following topics for future articles: Log Cabin Coatings, Coatings Adhesion and Performance, Paint Quality, and New Deck Cleaners and Restorers. Each of the papers is prepared by a task group of participants, with representatives from both the wood and coatings portions of the committee. The committee also provided assistance to the Pacific Northwest Society with the selection of speakers for the 1996 Spring Week technical program.

The Chair of the Joint Coatings/Forest Products Committee is Tom Daniels of the New England Society.

Michael Symes, Past-President and General Secretary, SLF

Corrosion Committee—The Corrosion Committee last met on July 16, 1996 in Philadelphia, PA. The next meeting will be held in January 1997 in Cleveland.

The Chair of the Corrosion Committee is Charlie Hegedus of the Philadelphia Society.

The committee is currently involved with the following projects:

1996 International Coatings Technology Conference—The committee provided the Program Committee with two instructors for the "Advances in Coatings Characterization" program, to be held on Wednesday and Thursday, October 23-24, 1996 at McCormick Place North.

Monograph—The project to develop a monograph for the Federation series has been put on hold. The planned title was "Methodology for Assessing Corrosion Inhibiting Performance in Coatings." The reason for not developing the monograph was the inability to locate an author for the project. The committee will revisit this project at a later date.

Interaction with Corrosion-Related Societies—The committee continues to maintain contact with the following related organizations: NACE International, Steel Structures Painting Council (SSPC), ASTM and the Electrochemical Society.

Corrosion Committee Publication Award—The committee is revising the rules for the award and hopes to unveil the new competition for the 1997 Annual Meeting. As it stands now, the award is given to the best paper that has appeared over the last 12 months in the JOURNAL OF COATINGS TECHNOLOGY. The committee hopes to actively solicit papers for the competition, and in turn provide a larger selection of corrosion-related papers for the *JCT*.

Manufacturing Committee—The transformation of the Manufacturing Committee continues to run smoothly. The committee is now known as the Manufacturing Management Committee and last met on September 18-20, 1996 in Nashville, TN.

Don Mazzone of the Golden Gate Society is the Chair of the Manufacturing Committee.

The committee is currently involved in the following projects:

1997 FSCT International Coatings Technology Conference—The committee has discussed the possibility of submitting an outline for a one-day seminar for the 1997 FSCT International Coatings Technology Conference on the topic of "Re-engineering the Plant/Work Force for the Future." The program will deal with topics such as computers, empowerment, and QS 9000.

Society Interaction—A booklet entitled "The Guide for Society Manufacturing Chairs" was distributed to each Society last year and additional copies are available. The document provides guidance to Society Manufacturing Committee Chairs

regarding the position and includes a list of ideas for Societies interested in forming a Manufacturing Committee.

Professional Development Committee—The Professional Development Committee last met August 21-22, 1996 in Chicago. The next meeting of the PDC will be held in December, tentatively scheduled for Cincinnati.

The Chair of the PDC in 1995-96 has been Rose Ryntz of the Detroit Society. Rose's term as a committee member has expired. Her position as Chair will be filled by Ronda Miles of the Dallas Society for 1997.

The Mission Statement of the PDC is as follows:

"The purpose of the FSCT Professional Development Committee is to promote and maintain individual technical competence from basic techniques through state of the art technology within coatings and related industries in a way that will meet the needs of the individuals through appropriate educational and training mechanisms (short courses, technical symposia, and Annual Meeting sessions) so that coatings professionals can effectively contribute to the success of their respective employer within the global marketplace."

Listed below are the projects currently being worked on by the committee:

1996 International Coatings Technology Conference—The committee is presenting the program "Polymer Chemistry for the Coatings Formulator" on Wednesday and Thursday, October 23-24, 1996 as part of the ICTC. This is an enhancement of the program of the same name that was presented in 1995, which achieved a record attendance of 101.

"Computer Uses in Coatings"—This two day seminar was held on August 20-21, 1996 in Chicago. The seminar provided a general overview of the various uses of computers in formulation, manufacturing, design of experiments, and solvents. The committee plans to enhance the program and offer it again in 1997. There were 21 attendees for the event.

New Program—The PDC is developing a new program on Crosslinking Chemistry, to be conducted in the Spring of 1997.

Annual Meeting Program Committee—The 1996 Annual Meeting Program Committee has spent the last year drastically restructuring the technical offerings at the Annual Meeting. The theme of this year's event, "Insights and Innovations," aptly describes both the offerings of the newly created "International Coatings Technology Conference" and the activities undertaken by the committee in planning the event. The committee has spent the last year evaluating previous program offerings, conducting interviews with industry participants, developing programming and securing instructors for the event.

The committee has also begun the planning for the 1997 event. Much of the activity at the 1996 Annual Meeting will center around meeting with attendees to learn how to make the offerings even better and provide more educational opportunities for the attendees.

All one-day programming is being held on Tuesday, October 22 at the Chicago Hilton and Towers. These Pre-Convention Training Seminars are: Surfactant Chemistry; Winning Technical Presentations; Effective Technical and Scientific Writing; Design of Experiments; Spray Applications (to be held at Binks Manufacturing in Franklin Park, IL); and Technology Assessment (an Executive Forum that includes a Monday evening dinner).

There are four two-day programs, offered on Wednesday and Thursday at McCormick Place North. The titles of the courses are: Substrates and Coatings; Polymer Chemistry for the Coatings Formulator; Advances in Coatings Characterization; and Back to Basics in Coatings Chemistry.

Alain Clause, President, FATIPEC

In addition, there will be a technical program alongside the International Coatings Expo. This will include the Technical Focus Speaker, Roon Award Competition Papers, APJ/Voss Award Competition Papers, two sessions of International Papers and the Mattiello Memorial Lecture.

The Chair of the Program Committee is Steve Hodges of the Chicago Society.

Other Activities—The following activities are being done independent of committee activity or as a result of several committees working in unison:

Technical Focus Lecture—This again will be held as the initial technical presentation during the Annual Meeting Technical Program. This speaker is selected by the Chairs of the Educational Coordinating, Professional Development, Technical Advisory and Annual Meeting Program Committees. The 1996 honoree is F. Louis Floyd of Duron Paints and Wallcovering.

FSCT Video Offerings—The video "VOC Determination" continues to be offered to interested parties. The video was prepared by the Technical Committee of the New York Society for Coatings Technology.

Two other videos, "Good Tests, Bad Testing" and "Structure/Property Relationships for Thermoset Coatings" are also available to Societies for their monthly meetings.

List of Talks Available—This again has been made available to the Societies. The list has become a valuable resource for Societies when planning monthly meeting presentations. The 1996 edition was sent to all Societies in May.

Roon Award—The committee reviewed four papers for the 1996 competition. The entries will be presented on Wednesday afternoon at 2:00 pm at the annual meeting in Chicago.

Membership Survey—A survey has been sent to 2500 members. The purpose of the survey is to obtain feedback from members concerning the benefits we are currently providing as an organization and to determine what these individuals will need provided in the future to remain active in both the organization and the industry.

FSCT Travel—In addition to the above mentioned committee meetings, I attended the Host Committee Meeting in Chicago since the last meeting of the Board of Directors.

MICHAEL G. BELL
Director of Educational Services

Don MacDonald, Past-President, Surface Coatings Association New Zealand

Financial Report

THIRD QUARTER 1996
STATEMENT OF INCOME AND EXPENSE

The Statement of Income and Expense for the third quarter showed income at $2,958,444, and expenses at $2,291,697. (The totals for the same period in 1995 were: Income— $2,437,658; Expense — $1,988,062.)

1997 PROPOSED
OPERATING BUDGET

Mr. Walton, Chair of the Finance Committee, presented the proposed operating budget for 1997, which showed income and expense balanced at $3,305,500. On a motion by Mr. Mullen, seconded by Mr. Holmes, the proposed budget was unanimously approved by the Board.

Review of Actions of the Executive Committee

SEPTEMBER 13, 1996

That a Staff Education and Development Policy be approved.

That the Publications Committee Protocol and Procedures Policy be approved.

That the honorarium for the Mattiello Lecture be increased to $1,500.

That the proposal for reviewing Federation Committee activities be approved.

That the following recommendations of the Finance Committee be approved:

That the 1997 FSCT Operating Budget be balanced at $3,305,500.

That the basic non-member subscription rate to the JOURNAL OF COATINGS TECHNOLOGY be increased from $40 to $60 per year.

That the FSCT sponsor a Pan-American Coatings Expo in 1997, at a site to be determined.

That the travel reimbursement policy be revised to require the use of the Federation Travel Desk (Uniglobe Wings Travel) and that all airline travel be direct billed to the FSCT.

That the FSCT exhibit in four shows in 1997.

That a $10,000 grant be made to the InterSociety Polymer Education Council for the FSCT's participation in its educationally-related activities.

That the Investment Policy and Procedures proposal be approved.

That the auditing firm of Grant-Thornton be retained as independent auditors and business management counsel.

That a $200,000 line of credit with Mellon Bank be approved.

In response to a question regarding the line of credit, Mr. Hill noted that such an action was a prudent method of establishing credit at a time when the FSCT continues to enjoy an excellent financial status. He noted that the line of credit costs the FSCT nothing while it is not used.

(On a motion by Mr. Fleming, seconded by Mr. Denny, the actions of the Executive Committee for September 13, 1996 were unanimously approved.)

OCTOBER 21, 1996

That after review of the Strategic Plan Task Force proposals, it is recommended to the Board of Directors that the Membership and Common Interest Group proposals be adopted, as revised.

With respect to Organizational Restructure and the desire to streamline the Board of Directors, it is recommended that the Board of Directors consist of the President, the President-Elect, the Secretary-Treasurer, the Immediate Past-President, two other Past-Presidents, and all Society Representatives. And that additional discussion on Organizational Restructure will be done at the Executive Committee level and the results of these discussions will be reported for Board consideration as they develop.

That applications for Constituent Society membership or Affiliate membership be accepted at any FSCT meeting.

That the proposed grant budgeted in 1997 to CIEF be held at $50,000. And that matching grant funding be provided to CIEF on 50% of new funding up to a total matching grant of $25,000.

That the 1996 Annual Meeting Program Committee be congratulated for excellence in developing the successful series of seminars and conferences in the newly formatted International Coatings Conference.

That the proposed 1997 operating budget be revised to show the elimination of the 1997 Pan-American Coatings Expo ($50,000 net decrease) and a $50,000 increase in 1997 ICE registration income.

That the previously approved staff positions of information systems manager and marketing coordinator be filled.

In discussion, the Board noted its concern regarding the action on streamlining the group and limiting further discussion on Organizational Restructure to the Executive Committee. Dr. Brezinski, speaking for the Committee, advised that it was the intention of the Executive Committee to fully review the present proposal on restructure and consider the proposal along with other suggestions and Recommendations. The Committee, she said, will prepare a draft proposal which will be presented to the Board for its consideration.

(On a motion by Mr. Walton, seconded by Mr. Fleming, the actions of the Executive Committee for October 21 were approved, with six members voting negative. The Board directed that Bylaws revisions be drafted regarding the composition of the Board for its consideration.)

Elections

Mr. Walton, Chair of the Nominating Committee, read the names of the slate of nominees placed before the Board at its Spring 1996 meeting. He noted that there were no additional nominees.

President-Elect—Thomas E. Hill (Western New York Society), formerly of Pratt & Lambert Co., Buffalo, NY (one-year term)

Secretary-Treasurer—Forest Fleming (Piedmont Society), Akzo Nobel Coatings Inc., High Point, NC (one-year term)

Executive Committee—Terry Gelhot (St. Louis Society), Carboline Co., St. Louis, MO (three-year term)

Board of Directors—Members-at-Large (two-year terms each):

Donald Boyd (Pittsburgh Society), PPG Industries, Inc., Allison Park, PA

George R. Pilcher (C-D-I-C Society), Akzo Nobel Coatings Inc., Columbus, OH

Board of Directors—Past-President Member (two-year term):

A. Clarke Boyce (Toronto Society), Oakville, Ontario.

(On a motion by Mr. Geiger, seconded by Mr. Mullen, the above slate of nominees for FSCT Officer, Executive Committee, and Board of Directors positions was unanimously elected.)

Election to Federation Honorary Membership

Having been duly approved for nomination, the name of Victor M. Willis, of the Chicago Society, was placed before the Board for election to Federation Honorary Membership status. Following the count of a secret ballot, it was announced that Mr. Willis was unanimously elected a Federation Honorary Member. Congratulations to Mr. Willis were expressed by Dr. Brezinski on behalf of the FSCT.

Society Business

CERTIFICATES OF APPRECIATION

Certificates of Appreciation were presented to those Societies which showed the largest increase of membership (by size of Society) during 1995-96. They were: Philadelphia (Daniyel Firestone, Membership Chair), Piedmont (Charlie Howard), and Kansas City (Thomas Hilton).

Old Business

Dissolution of the Western New York Society — Mr. Hill, speaking for the Society, advised that plans are being made to reestablish the viability of the Western New York Society, and requested that the Board postpone any decision on the dissolution of the Society.

New Business

STRATEGIC PLAN IMPLEMENTATION

Following the Spring 1996 meeting of the Board of Directors, the Board members were divided and assigned to three task groups, each of which was to review a separate topic relating to implementation of the strategic plan developed at the February 1996 special meeting. These areas: Membership, Common Interest Groups, and Organizational Restructure, were addressed and outlines for implementation were developed and provided to Societies for comments.

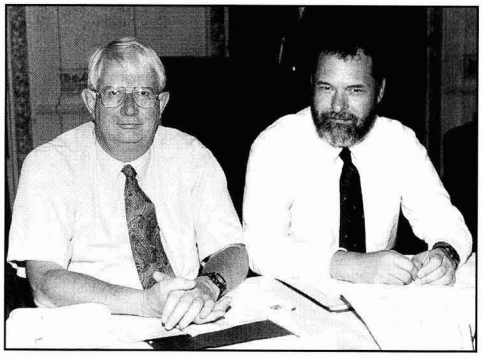
The following proposals are those that were originally presented to the Board for discussion:

MEMBERSHIP TASK GROUP PROPOSAL

I. Common Society Membership Year:
   A. Begins on July 1
   B. Ends on June 30

II. Membership Classification:
   A. Retain classes of membership (Active, Associate, Retired, Educator/Student)
   B. Society Representative: An Active or Associate member that has been active in a Society for a minimum of five years and has been through the Officers Chairs is qualified as a candidate for Society Representative.

III. Acceptance of New Membership:
   A. New members accepted at the National and Society levels
      1. Assigned to a Society in accordance to geographical boundary guidelines
      2. If outside a Society's boundaries accept as an affiliate member of the FSCT.
   B. Voting on Membership
      1. No reading or vote required
      2. Membership application form may require changes to membership qualification criteria



Larry Pitchford (Louisville) and Mark Algaier (Kansas City)

John Oates (New York), William Holmes (Dallas), and Joseph P. Walton (Cleveland)

IV. Collecting Membership Dues and Maintaining Society Roster at the Federation Level
- A. Optional: Determined by each Society
- B. Membership dues:
  1. No change in Society's annual dues structure
  2. Society membership dues schedules shall be recorded at FSCT Headquarters and updated yearly by the various Societies.

V. Promotional and Marketing Programs:
- A. Promoting the FSCT and Societies to Upper Manage ment
  1. Local Society should provide FSCT with a list of key managerial people so the FSCT can send them a survey to determine their key areas of interest. Societies should do a follow-up visit to discuss the survey results.
- B. Benefits of Being a FSCT Member
  1. We must improve our programs and services to help promote the FSCT as being the best and most economical source of professional development in the industry.
- C. Marketing Membership Promotional Awareness
  1. Federation should send a promotional newsletter to key management personnel that are identified by the various Societies.

VI. Improving Technical Programs:
- A. How do we improve programs?
  1. FSCT should develop a survey form to send to our members and non-members to determine what technical topics they are most interested in and provide feedback to the local Societies. This data can be used to create a speakers bureau that presents topics identified as an extension of the Educational Committee.
- B. Attracting Managerial People to Our Meetings
  1. Using the information from the Technical Program Survey, we can create focus groups made up of key Society people that visit with managers and customer contacts to explain what the FSCT is trying to accomplish and solicit their help in creating programs that they see are beneficial to their company or industry.

Common Interest Group Proposal

I. Definition and Objectives
- A. Common Interest Group (CIG) is an organized self-sustaining collection of individuals pursuing a joint area of study and conforming to a minimum set of standards as established by the FSCT Board of Directors.
- B. The purpose of a CIG is to provide opportunities to capture and enhance the technical drive and enthusiasm of FSCT members and to provide an international forum for specific focused topics of interest.

II. Starting a CIG

A petition must be submitted to the FSCT Board of Directors through the Executive Vice President requesting the formation of a CIG. The petition shall contain the following sections:

- A. Purpose
  1. The CIG's name.
  2. A mission statement consistent with the FSCT mission statement, which will include the scope and goals of the CIG.
- B. Members
  1. A designated CIG Chair and Treasurer, which are FSCT members. These officers, and any other CIG officers the CIG chooses, will be elected at the first Annual CIG meeting and must be held by FSCT members.
  2. A list of 30 names as initial CIG members (with the corresponding companies, addresses and phone numbers). The designated Treasurer of the CIG will collect $10 from each of these individuals as initial CIG dues. These individuals do not have to be FSCT members.
- C. Financial
  1. The CIG's annual dues structure.
  2. A request for matching start-up money with a proposed budget.

III. Granting Provisional Status

The FSCT Board will consider granting Provisional status to a CIG when a petition is submitted to the FSCT Board through the Executive Vice President at least 30 days prior to any FSCT Board Meeting. The petition will be approved by the FSCT Board based on conformity to II.A through II.C

- A. If Provisional Status is granted, the CIG's next fiscal and membership year will coincide with the beginning of the next fiscal year. The release of start-up money from the FSCT will be within 30 days of Board approval for Provisional status or by the start of the next fiscal year, which ever comes first.
- B. If Provisional status is not granted, the proposed CIG Chair will be notified within 30 days of the Board action. The notice will be in writing, contain reasons why Board

Martha Colin (Mexico) and James Hall (Los Angeles)

approval was not granted, and contain any pertinent Board and Executive Committee minutes.

C. The petition may be resubmitted any time in the future, with revisions, provided that the proposed membership list is current.

D. As soon as a petition has been submitted, the FSCT will publish an announcement in the JCT with a call for new members in the proposed CIG and provide meeting space for initial CIG organization at the next International Coatings Expo (ICE).

IV. Granting Active Status

A. At least 30 days before the FSCT Board Meeting prior to the end of the CIG's third fiscal year, the CIG Chair will submit a request to change the CIG's status to Active. The request must show that:
   1. The CIG has at least 60 members.
   2. The CIG has become financially self-sufficient.
   3. The CIG has met the requirements to become Active.

B. If a CIG does not attain Active status within its first three fiscal years, the CIG will be disbanded with all assets reverting to the FSCT general fund.

C. If a request for Active status is not submitted within its first three years for a Provisional CIG or within one year for a CIG on Probation, the CIG will be disbanded with all assets reverting to the FSCT general fund.

V. Active Status Requirements

Once a CIG has gained Active Status:

A. The CIG must have an Annual Meeting. The minutes of the CIG's Annual Meeting are to be published in the JCT. CIG officers will be elected at the first and all subsequent Annual Meeting.

B. The CIG will provide at least 1/2 day of technical programming in conjunction with ICE as coordinated by the FSCT Program Committee.

C. CIGs must formally communicate with their members (with minimal FSCT staff support) at least twice a year. This may be a newsletter, FAX, E-Mail, or other form of permanent communication. A copy of this communication is to be filed with the FSCT.

D. The CIG must conform to the FSCT Constitution and Bylaws.

E. The CIG must adopt a general set of Bylaws provided by the FSCT and a fiscal and membership year coincid ing with the FSCT (to be detailed at a later date). Additional Bylaws may be adopted by the CIG.

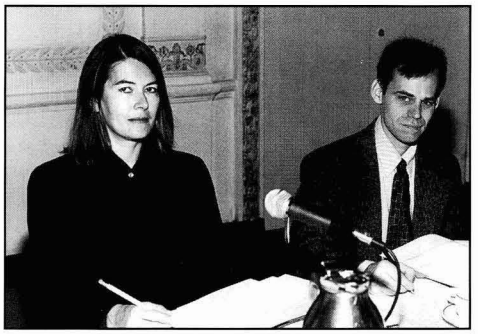
F. The CIG Chair must submit an annual report to the FSCT Board containing:
   1. A summary of the year's activities and the dues structure for publication in the JOURNAL OF COATINGS TECHNOLOGY.
   2. A year-end accounting of finances—income, expenses, and current assets.
   3. A list of CIG officers and members, with the corresponding companies, addresses and phone, fax, and E-mail numbers, for publication in the FSCT *Membership Directory*.
   4. Outline of proposed future events.

G. If an Active CIG does not meet all of these requirements in any fiscal year, it will be place on Probation for one year.

H. All CIG activities fall under the jurisdiction of the FSCT Board of Directors.

VI. Probation Status

Probation status is allowed for a maximum of one year.



Suzanne Richardson (Montreal) and Michael Iannuzzi (New England)

A. If the requirements for Active status are fulfilled during that year, the CIG may request a reclassification as Active (see IV).

B. If the requirements for Active status are not fulfilled during that year or the CIG ceases to exist as part of the FSCT, the CIG will be disbanded with all assets reverting to the FSCT general fund.

C. Active CIG status may be placed on Probation more than once.

VII. Other CIG Activities

Each CIG:

A. May advertise events, programs, publications, or membership recruitment in the JCT with approval of the JCT Editor.

B. Will use the FSCT Staff for collection of Membership dues.

C. May use the FSCT logo in any of its publications.

D. May be charged for any services provided by the FSCT Staff at the discretion of the FSCT Board of Directors.

E. Will have its membership open to all FSCT members and interested non-members.

F. Will be represented on a CIG Council when Active. The CIG Council will be created when the total number of Active CIGs is five or more. The CIG council will then elect one representative to the FSCT Board for every five CIGs (rounded down to the nearest five) on the CIG council.

G. Will be listed on the FSCT membership application form. Membership to one CIG for one year will be free to new FSCT members. Additional CIGs can be joined for the appropriate fee.

VIII. CIG Survey

A. The FSCT Staff will send a CIG interest form, listing a broad selection of CIG topics, to all FSCT members.

B. The results of this survey will be published in the JCT along with a call for individuals to start CIGs and the procedure to do so.

C. The list of respondents who showed interest in a particular topic will be forwarded to anyone wishing to start a CIG on that topic or a closely related one.

D. The procedure to start a CIG, as outlined in section II, will then be followed.

ORGANIZATIONAL STRUCTURE PROPOSAL

The current Executive Committee and committees that will be replaced by CIGs will be discontinued.

Michael Frantz (New York), and
Larry Brandenburger (Northwestern)

I. The Board of Directors

The establishment and execution of general policies and the administration of the Federation shall be vested in the Board of Directors and the President.

A. Composition
The Board of Directors shall consist of thirteen (13) Council Representatives, three (3) officers and one (1) Past-President. The Board of Directors will meet at the Annual Meeting, in February and in June.

B. Representation
Appointment to the Board of Directors shall occur at the Annual Meeting by the Council of Representatives. The council shall select three (3) representatives from large Societies, five (5) representatives from medium Societies and five (5) representatives from small Societies. These board members shall serve three (3) year terms and one-third of the board shall stand for election each year.

The Council of Representatives shall elect the Secretary-Treasurer, President Elect of the Federation, and fill the position of the Immediate Past-President should the need arise.

Societies included in each category are as follows:

Large	Medium	Small
Chicago	Cleveland	Baltimore
Los Angeles	Detroit	Birmingham
New York	Golden Gate	CDIC
Southern	Louisville	Dallas
Toronto	Montreal	Houston
	New England	Kansas City
	Northwest	Mexico
	Pacific Northwest	Pittsburgh
	Philadelphia	Rocky Mountain
	Piedmont	St. Louis

C. Notes to Above
This proposal acknowledges the concerns of each Society about representation on the Board of Directors. Large Societies will have representatives on the Board most frequently as three of the five large Societies are represented at all times. Each Society should be represented at least every other term. The intent is that terms on the Board of Directors will be rotated.

Additionally, assigning responsibility of the Nominating Committee to the Representatives Council is viewed as a positive step in maintaining accountability of the Board of Directors to the Constituent Societies.

We realize that to get the process started, terms of office of Society Reps to the Board will have to be staggered. Approximately one third of the terms will be one-year terms, one third will be two-year terms and one third will be three-year terms. The initial terms will be decided by lottery and within two years all terms will be for three years.

Finally, an argument could be made that turning over the Board every three years may not provide the continuity needed to be an effective Board member. However, since the Board will be meeting more frequently and Society Reps can remain on the Representatives Council as long as they continue to be elected, we viewed the change as a positive for the Federation.

II. Officers

The three (3) officers on the Board shall be the President, the President Elect and the Secretary-Treasurer.

III. Past-President

The Past President on the Board shall be the immediate Past President of the Federation. Should the immediate Past President be unable to serve, the position shall be filled by a Past President elected by the representatives' council. Two Past Presidents are to be selected to two-year terms by all of the Past Presidents to serve on the Federation Council in an advisory capacity without vote.

IV. Council of Representatives

The Council of Representatives shall consist of the Society Representatives of each Society and a representative of each Common Interest Group (CIG) as these groups mature to recognized status.

A. Duties of Council Representatives
1. The duties of the Council Representative shall be to:
   a. Represent the Constituent Society as a member of the Federation Council and when elected to serve on the Board of Directors.
   b. Represent the Constituent Society at the business session of the Federation during the Annual Meeting.
   c. Report on all business of the Federation to the Constituent Society.
2. Alternate Society Representative.
   In the absence of the Society Representative, an accredited Alternate Society Representative shall perform all functions of the Society Representative except serving on the Board of Directors.

B. Federation Council
1. The duties of the Federation Council shall be:
   a. To consider the viewpoints of the respective Constituent Societies, the Federation Past-Presidents

Yvon Poitras (Pacific Northwest) and
Donald Denny (Philadelphia)

FSCT Presents Awards During Annual Board Meeting

Victor M. Willis, of the Chicago Society, accepts a certificate from FSCT President Darlene R. Brezinski, upon his unanimous election to Federation Honorary Membership

FSCT President Darlene R. Brezinski presents a Membership Certificate to Donald Denny of the Philadelphia Society on behalf of the Society's Membership Chair Daniyel Firestone for the largest increase in membership for a large Society.

On behalf of the Piedmont Society's Membership Chair Charlie Howard, Forest Fleming accepts a Membership Certificate from FSCT President Darlene R. Brezinski which commemorates the largest increase in membership for a medium Society.

Mark Algaier of the Kansas City Society accepts a Membership Certificate from FSCT President Darlene R. Brezinski on behalf of Thomas Hilton for the largest increase in membership for a small Society.

and the Common Interest Groups on matters before the Federation.
b. To represent their viewpoints to the Federation Officers and Board of Directors.
c. To nominate and elect Federation Officers.
d. To select Society Representatives to the Board of Directors.
e. To vote on proposals by the Board of Directors to amend the Articles of Incorporation and the Bylaws of the Federation.
f. To hold at least one meeting each year to coincide with the Annual Meeting of the Federation.
g. To receive written reports on the activities of the Federation Officers, the Committee Chairs and the President of the Coatings Industry Education Foundation.
h. Vote on petitions for new Constituent Society charters and changes in Constituent Society bound aries.

C. Alternative Society Representatives on the Board of Directors

If any Society Representative on the Board of Directors is unable to attend a Board Meeting, that person shall be replaced at the meeting by another Society Representative of the class (large, medium, small society) represented by the absentee.

V. Committees

The six committees listed in the Bylaws are as follows:

1. Nominating
2. Bylaws
3. Educational
4. Finance
5. Membership
6. Publications

Two committees shall be added;

1. Professional Development
2. Awards

All other committees are in the Standing Rules and can be eliminated by a two-thirds vote of the Board, and be active only at the pleasure of the President.

VI. Bylaws Changes

A. Article XV —Amendments

1. Proposals to amend these Bylaws may be originated by:
Delete (3) "The Executive Committee."
Add "The petition of an established Common Interest Group."

2. Process
The process to amend these Bylaws requires the following five steps, taken in sequence.
a. Editing of proposals and comments by the Bylaws committee:

All proposals to amend these Bylaws shall be submitted to the Bylaws Committee for editing, clarifying and the combining of similar proposals from various sources. The Bylaws Committee must act on all proposals it receives, but may submit recommendations for or against adoption with reasons for its position. The Bylaws Committee shall forward to the Executive Vice President, within sixty (60) days of receipt of such proposals, the enabling resolution for the edited amendments.

3. Distribution of the Bylaws Committee report:
The Executive Vice President shall distribute the enabling resolutions and the report of the Bylaws Committee to the President and Secretary of each Constituent Society, the Board of Directors and to the entire membership of the Federation Council, at least ninety (90) days prior to the regular or special meeting of the Board at which the proposed amendments are to be considered.

4. Consideration by Federation Board of Directors

a. Resolutions to alter, amend, or repeal these Bylaws may be considered at any regular or special meeting of the Federation Board of Directors. A majority vote of all members of the Board shall be required to make any changes in the text of the proposed amendments, provided that any such changes may not exceed or reduce the purpose or intent of the amendments as previously published.

b. Resolutions to alter, amend or repeal these Bylaws, having been subject to consideration by the Federation Board of Directors, must be approved by a two-thirds vote of the entire membership of the Board of Directors.

5. Notification, by the Executive Vice President, of the action of the Board of Directors, following the steps described in Article XV B (2) above.

6. Consideration by Federation Council

Resolutions to amend these Bylaws, having first been approved by the Federation Board of Directors, may be considered at any regular or special meeting of the Federation Council. Adoption of the resolution to amend these Bylaws requires a two-thirds vote of the entire membership of the Federation Council. The approved amendments shall become effective immediately or at a time specified in the resolution.

Failure of the Council to pass an amendment to the Bylaws approved by the Board of Directors requires the Council of Representatives to submit a written report outlining their objections to the Board of Directors. The Board may resubmit the change but it must start back at step number one of the process.

B. Article IV — Organization

A. General Policies and Administration

The establishment and execution of general policies and the administration of the Federation shall be vested in the Board of Directors and the President.

B. Board of Directors

1. The duties of the Board shall be:

a. Establish broad lines of Federation policy and make recommendations regarding the administration of the Federation.

b. Act with the President in executing the general policies and the administration of the Federation.

c. Select and appoint a person to execute the duties of Federation Executive Vice President, and to fix the compensation and prescribe the duties of that office.

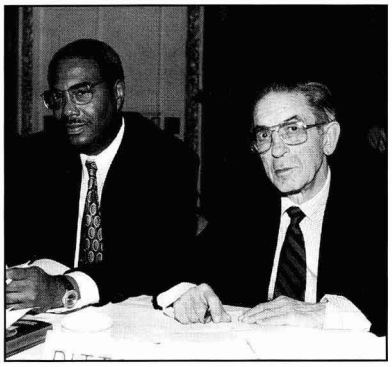
d. Adopt the annual operating budget and authorize the expenditure of all funds in keeping with the provisions of these Bylaws, either by specific direction to the President and Secretary-Treasurer, or by limited allocation of funds to be expended at the discretion of Committees duly appointed by the President.

e. Submit to the Federation Council the agenda of all meetings.

f. Submit to the Federation Council the minutes of all meetings.

g. Submit to the Federation Council a report of all actions taken.

h. Specify the duties and functions of all Committees except as otherwise provided for in these Bylaws.



Forest Fleming (Piedmont) and William Spangenberg (Pittsburgh)

i. Fill vacancies occurring among the elected officers, the Past-President and the Board of Directors.

j. Vote on proposals to amend the Articles of Incorporation, Bylaws, and Standing Rules.

k. Elect Federation Honorary Members.

l. Hold at least three meetings each year, one at Annual Meeting, and such special meetings as may be called by the President.

m. Approve the site of each Federation Annual Meeting and Expo.

n. Receive written reports on their activities from the Federation Officers, Committee Chairmen, and the President of the Coatings Industry Education Foundation semi-annually, and from Constituent Societies annually.

o. Serve as the stockholders (or members) of the Coatings Industry Education Foundation and attend the Annual Meeting to elect Trustees of the Coatings Industry Education Foundation.

2. Emergency Funding: Between meetings of the Board of Directors, two elected officers acting together are authorized to expend funds up to 1% of the approved budget, or an amount previously set by the Board of Directors for non-budgeted items.

3. Quorum: The presence of a majority of the Board of Directors shall constitute a quorum and a majority of those voting shall be sufficient to carry any vote, except as otherwise provided in these Bylaws and the Articles of Incorporation.

4. Liability: A member of the Board of Directors shall not be personally liable for monetary damages for any action taken, or any failure to take any action, unless such member has breached or failed to perform the duties of the director's office as provided for under Section 8363 of the Pennsylvania Director's Liability Act and the breach or failure to perform constitutes self-dealing, willful misconduct or recklessness. Any repeal, amendment, or modification of this provision shall be prospective only and shall not increase, but may decrease, the Director's liability with respect to actions or failures to act occurring prior to such change.

C. Officers

The Officers of the Federation shall consist of a President, President-Elect, and Secretary-Treasurer. All Officers shall at all times be Active Members of the Federation.

1. President: The President shall be the chief executive officer of the Federation; shall, in general, perform all duties incident to the office of President and such other duties as may be assigned by the Board of Directors; and shall preside at all meetings of the members and of the Board of Directors.

2. President-Elect: The President-Elect shall automatically succeed the President and shall act in the stead of the President whenever necessary, or whenever the presidency is declared vacated by the Board of Directors.

3. Secretary-Treasurer: The duties of the Secretary-Treasurer shall be to:

a. Act as a custodian of the books and records of the Federation.

b. Serve as financial officer of the Federation.

c. Have charge and custody of, and be responsible for, all funds of the Federation, and the books and records relating to the same.

d. Deposit all such funds in the name of the Federation in depositories selected by the Board of Directors.

e. Render to the President, the Board of Directors and the Federation Council, annually, and at other times, an account of all the Secretary-Treasurer's transactions as Secretary-Treasurer and of the financial condition of the Federation.

f. Serve as custodian of the corporate seal and affix the seal to all documents, the execution and delivery of which are duly authorized.

g. Record the minutes of all meetings of the members and of the Board of Directors, and give all notices of such meeting in accordance with these Bylaws.

h. Perform such other duties as are incident to the office of Secretary-Treasurer and as may be assigned by the Board of Directors or by the President.

The above proposals were reviewed and revised by the Executive Committee at its meeting of October 21, 1996. The following revised proposals were presented to the Board for its consideration (Revisions to the original proposals are noted in brackets, following the revised proposal):

MEMBERSHIP TASK GROUP PROPOSAL
(Revised October 21, 1996)

I. Common Society Membership Year:
   A. Begins on July 1
   B. Ends on June 30

II. Membership Classification:
   A. Retain classes of membership (Active, Associate, Retired, Educator/Student)
   B. Society Representative: An Active member (or an Associate member that has been active in a Society for a minimum of five years and has been through the Officer Chairs) is qualified as a candidate for Society Representative.

III. Acceptance of New Membership:
   A. New member accepted at the National and Society levels.
      1. Assigned to a Society in accordance to geographical boundary guidelines
      2. If outside a Society's boundaries accept as an Affiliate member of the FSCT
   B. Voting on Membership
      1. No reading or vote required
      2. Membership application form may require changes to membership qualification criteria

IV. Collection of Annual Membership Dues and Maintaining Society Roster at the Federation Level:

A. Optional: Determined by each Society
B. Membership Dues:
1. No change in Society's annual dues structure
2. Society membership dues schedules shall be recorded at FSCT Headquarters and updated yearly by the various Societies.

[Sections V and VI of the orginal proposal were deleted]

COMMON INTEREST GROUPS TASK GROUP PROPOSAL
(Revised October 21, 1996)

I. Definition and Objectives:

A. Common Interest Group (CIG) is an organized self-sustaining collection of individuals pursuing a joint area of study and conforming to a minimum set of standards as established by the FSCT Board of Directors.

B. The purpose of a CIG is to provide opportunities to capture and enhance the technical drive and enthusiasm of FSCT members and to provide an international forum for specific focused topics of interest.

II. Starting a CIG:

A petition must be submitted to the FSCT Board of Directors through the Executive [Vice President] Committee requesting the formation of a CIG. The petition shall contain the following sections:

A. Purpose:
1. The CIG's name
2. A mission statement consistent with the FSCT mission statement, which will include the scope and goals of the CIG.

B. Members:
1. A designated CIG Chair and Treasurer, which are FSCT members. These officers, and any other CIG officers the CIG choose, will be elected at the first annual CIG meeting and must be held by FSCT members.
2. A list of [30] names as initial CIG members (with corresponding companies, addresses and phone numbers). The designated Treasurer of the CIG will collect $10 from each of these individuals as initial CIG dues. These individuals do not have to be FSCT members.

C. Financial:
1. The CIG's annual dues structure.
2. A request for matching start-up money with a proposed budget.

III. Granting Provisional Status:

The FSCT Board will consider granting Provisional status to a CIG when a petition is submitted to the FSCT Board through the Executive [Vice President] Committee at least 30 days prior to any FSCT Board meeting. The petition will be approved by the FSCT Board based on conformity to II.A through II.C.

A. If Provisional status is granted, the CIG's next fiscal and membership year will coincide with the beginning of the next fiscal year. The release of start-up money from the FSCT will be within 30 days of Board approval for provisional status or by the start of the next fiscal year, whichever comes first.

B. If Provisional status is not granted, the proposed CIG Chair will be notified within 30 days of the Board action. The notice will be in writing, contain reasons why Board approval was not granted, and contain any pertinent Board and Executive Committee minutes.

C. The petition may be resubmitted any time in the future, with revision, provided that the proposed membership list is current.

D. As soon as a petition has been submitted, the FSCT will publish an announcement in the JCT with a call for new members in the proposed CIG and provide meeting space for initial CIG organization at the next International Coatings Expo (ICE).

James E. Geiger (Southern) and David Jack (Toronto)

IV. Granting Active Status:

A. At least 30 days before the FSCT Board meeting prior to the end of the CIG's third fiscal year, the CIG Chair will submit a request to change the CIG's status to Active. The request must show that:
1. The CIG has at least 50 members, all of whom must be Federation members.
2. The CIG has become financially self-sufficient.
3. The CIG has met the requirements to become Active.

B. If a CIG does not attain Active status within its first three fiscal years, the CIG will be disbanded with all assets reverting to the FSCT general fund.

C. If a request for Active status is not submitted within its first three years for a Provisional CIG or within one year for a CIG on Probation, the CIG will be disbanded with assets reverting to the FSCT general fund.

V. Active Status Requirements:

Once a CIG has gained Active status:

A. The CIG must have an Annual Meeting. The minutes of the CIG's Annual Meeting are to be published in the JCT. CIG officers will be elected at the first and all subsequent Annual Meetings.

B. The CIG will provide at least 1/2 day of technical programming in conjunction with ICE as coordinated by the FSCT Program Committee.

C. CIGs must formally communicate with their members [(with minimal FSCT staff support)] at least twice a year. This may be a newsletter, FAX, E-Mail, or other form of permanent communication. A copy of this communication is to be filed with the FSCT.

D. The CIG must conform to the FSCT Constitution and Bylaws.

E. The CIG must adopt a general set of Bylaws provided by the FSCT and a fiscal and membership year coinciding with the FSCT (to be detailed at a later date). Additional Bylaws may be adopted by the CIG.

F. The CIG Chair must submit an annual report to the FSCT Board containing:
1. A summary of the year's activities and the dues structure for publication in the JOURNAL OF COATINGS TECHNOLOGY.
2. A year-end accounting of finances — income, expenses, and current assets.
3. A list of CIG officers and members, with the corresponding companies, addresses and phone, fax, and E-Mail numbers, for publication in the *FSCT Membership Directory*.
4. An outline of proposed future events.

G. If an Active CIG does not meet all of these requirements in any fiscal year, it will be placed on Probation for one year.

Raymond McConnell, Past-President, Surface Coatings Association Australia

VI. Probation Status:

Probation status is allowed for a maximum of one year.

A. If the requirements for Active status are fulfilled during that year, the CIG may request a reclassification as Active (see IV).

B. If the requirements for Active status are not fulfilled during that year or the CIG ceases to exist as part of the FSCT, the CIG will be disbanded with all assets reverting to the FSCT general fund.

C. Active CIG status may be placed on Probation more than once.

[Section V(H), and VII and VIII of the original proposal were deleted]

ORGANIZATIONAL RESTRUCTURE TASK GROUP PROPOSAL

The proposal was withdrawn from Board consideration at this meeting and will be discussed by the Executive Committee with a revised proposal being made to the Board at a later date.

BOARD DISCUSSION AND VOTING

MEMBERSHIP —

To alleviate the possibility of undue influence from supplier members, on a motion by Mr. Geiger, seconded by Mr. Brandenburger, Section II(B) was removed in its entirety, by a vote of 22 affirmative, with 10 negatives.

On a motion by Mr. Brandenburger, seconded by Mr. Geiger, the Board approved the suspension of the Bylaws to allow for acceptance of membership applications at any FSCT-sponsored meeting. One negative vote was cast by Ms. Colin, representing the Mexico Society, who requested special consideration for the Society due to its particular membership acceptance policies.

COMMON INTEREST GROUPS —

On a motion by Mr. Holmes, seconded by Ms. Carr, the proposal to implement Common Interest groups was approved, with one revision to Section IV(A) 1, as follows: "1. The CIG has 50 members or more, all of whom must be FSCT members." One negative vote was cast.

On a motion by Mr. Hall, seconded by Mr. Hollifield, the Board voted 25 affirmative, 6 negatives, with 3 abstentions, to direct that the Bylaws Committee draft revision language for Board consideration.

Other Business

ADMINISTRATIVE MOTION —

A motion by Mr. Brandenburger, seconded by Mr. Denny, to direct the Executive Committee to conduct a study of headquarters administrative and operational staff, with the goal of reducing the administrative expense ratio to 20% of budget, failed by a vote of 31 negative, to 3 affirmative.

Committee Reports

Armin J. Bruning Award

The 1996 Armin J. Bruning Award will be presented to Dr. Percy E. Pierce and Dr. Robert T. Marcus. Dr. Pierce retired from PPG Industries, Inc. in 1991. Dr. Marcus was formerly a colleague of Dr. Pierce at PPG Industries and is currently Director of the Color Standards Laboratory at Pantone, Inc. They have collaborated jointly on many endeavors from which the coatings industry has benefited. In particular they are recognized for numerous contributions towards color education, best exemplified by their Federation Series publication on "Color and Appearance." Another outstanding contribution was their work on metallic color modeling for color matching.

ALLAN B. J. RODRIGUES
Acting Chair

Bylaws

The Bylaws Committee has been asked to give opinions on two matters:

(1) Dissolution of the Western New York Society:

The Society that wants to disband should follow the procedure for relinquishing territory, since, in effect, it is relinquishing all its territory (see Article SR I section B2). Society members shall be notified of the action 30 days prior to a vote by their Board of Directors to dissolve. The Society shall then notify the Federation of such action by a letter to the Executive Vice President signed by the President and Secretary of the Society.

Since no provision for the dissolution of a Society appears in the FSCT Bylaws, we will assume that the remainder of the dissolution process is the reverse of the Establishment process (Article SR I section A).

Ninety days before taking action the Board of Directors shall notify all Societies regarding the dissolution of the Society.

If no objection from any Society is received by the Board of Directors, dissolution will occur by majority vote. If an objective is received, a three-fourths majority of all members of the Board of Directors is required.

The Executive Vice President of the Federation shall advise the nearby Societies, whose territories come within 100 miles of the dissolved Society, with respect to the dissolution of the Society. It is suggested that the FSCT inform the nearby Societies of the dissolved Society's boundaries and outline the proce-

dure for enlargement of a Society's boundaries as defined in Article SR I section B3.

It is also suggested that the FSCT inform members of the dissolved Society that they are now Affiliated Members until the dissolved Society's territory is annexed by a nearby Society.

A check should also be done that the dissolved Society met any requirements of their Bylaws.

(2) The Establishment of the Southwest Society:

Although the proposed boundary may conflict with existing boundaries, SR I section A7 and 8 addresses this by stating that this action is permissible if there is no objection by a nearby Society. If there is, a three quarters Board of Directors vote is required to establish the Society. In reality, I believe that most Societies would vote against the establishment if a nearby Society made their objections vocal—the Southwest Society obviously cannot include the entire state of Texas. This should be resolved before a Board of Directors vote is made.

The proposed Southwest Society should write in their Bylaws that the Society Representative to the Board of Directors must be an active member or this could violate the FSCT Bylaws.

Under Section XVIII of the Southwest Society's proposed bylaws, the section that reads "..., or the laws of the state of Arizona concerning corporations." should also include all the names of the states within the proposed geographical boundaries.

There should be a statement that the President of the Society is a member of all committees.

There is no mention of a procedure for passing resolutions by the Board of Directors (i.e., majority and quorum).

It may be difficult to make Bylaws changes because a majority of a quorum of one-third of the active members is required (see section XX and XXII); the same is true for election of officers and Society Representative.

These comments were forwarded to FSCT Headquarters and the Executive Committee in May 1996.

FREIDUN ANWARI
Chair

(The subject of the dissolution of the Western New York Society was tabled by the Board during this meeting. Comments regarding revisions to the application for Constituent Society status by the Arizona Section of the Rocky Mountain Society have been reviewed and responded to by the Society with revisions now being considered by the Bylaws Committee.)

Corrosion

The Committee met on July 16, 1996 in Blue Bell for a full-day meeting. The Committee plans to meet briefly at the International Coatings Expo in October 1996 and for a full day in January 1997. The following is a summary of current committee projects and interest.

Corrosion Exposure Test Project—The FSCT Corrosion Committee is following and overseeing a project being performed by the Cleveland Society Technical Committee. The goal of this project is to determine how various accelerated corrosion test methods (e.g., salt spray, immersion, Procession") correlate with exterior exposures. The project is in its third and final year. Results from the first year of exposure were published in the July 1996 issue of the JOURNAL OF COATINGS TECHNOLOGY. The results following two years of exterior exposure have been statistically analyzed and indicate some correlation between exposure sites and accelerated methods. A paper detailing this information is being prepared. Following the completion of all the exposures and the appropriate analysis of data, a final presentation and paper detailing the results and conclusions will be prepared. This information will provide essential guidance to those doing accelerated and real-world exposures of coatings.

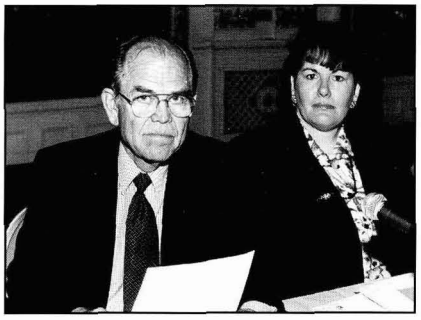
Monograph—The Corrosion Committee has initiated an effort to prepare a monograph entitled "Methodology for Assessing Corrosion Inhibiting Performance of Coatings" to be part of the FSCT *Series on Coatings Technology*. The objective of this monograph is to provide specific guidelines, rationale, and strategy for selecting and/or designing corrosion testing and analysis of organic coatings. A prospective author that was previously identified has been unable to contribute due to other work-related commitments. The committee actively is seeking alternative authors. A list of potential authors has been tabulated and the committee is in the process of soliciting their assistance.

1996 International Coatings Technology Conference (ICTC)—The Corrosion Committee once again will be contributing to the FSCT annual technical gathering. The Committee will be participating in the Coatings Characterization Program of the ICTC. This program will be a two-day event, with the second afternoon dedicated to characterization of coatings using electrochemical impedance spectroscopy (EIS). Drs. Richard Granata and Peter Kamarchik, both members of the Corrosion Committee, will be providing basic information about the technique and its capabilities, as well as real world case studies in which the technique has been applied to advance the understanding of coatings technology. The Committee is actively discussing the potential of organizing a program on corrosion testing for the 1997 ICTC.

Corrosion Committee Publication Award: Corrosion-related publications from the JOURNAL OF COATINGS TECHNOLOGY have been identified and currently are being reviewed and evaluated. The winning selection(s) will be determined by the time of the International Coatings Technology Conference and the award winner(s) will be announced at that time.

The Corrosion Committee has received approval to change the format of the award selection process. Starting in 1997, the award no longer will be selected from papers previously published in the JOURNAL OF COATINGS TECHNOLOGY but they will be solicited as original, previously unpublished work. The papers will then be evaluated by Corrosion Committee members on technical and practical merit as related to corrosion and coatings technology. Winning papers will be submitted to the JOURNAL OF COATINGS TECHNOLOGY Editorial Review Board to be reviewed for publication. Submissions also may be presented at the FSCT ICTC at the discretion of the Program Committee for that event. The Committee is currently drafting guidelines for these procedures. It is suspected that this new process will

F. Louis Floyd (Baltimore), Freidun Anwari (Cleveland) and Dennis Owen (Golden Gate)



J. Dick Mullen (Rocky Mountain) and Terry Gelhot (St. Louis)

further encourage and promote high quality publications on the subject of corrosion technology as related to coatings.

Interaction with Corrosion-Related Organizations—The Committee continues to maintain contact with the following organizations: NACE International, Steel Structures Painting Council (SSPC), American Society for Testing and Materials (ASTM), American Chemical Society (ACS), and the Electrochemical Society. A plan is being established to promote even closer ties and cooperative efforts between the coatings/corrosion related efforts within these organizations and the FSCT Corrosion Committee.

Internet Activity—The Committee has gathered a list of corrosion related sites on the Internet. These sites contain information on professional Societies, academic studies, government activities, and company interests. The Committee is exploring a means to disseminate this information to the FSCT membership. The Committee also discussed the FSCT's efforts to develop a home page and a desire for the Committee to provide input on corrosion related topics and activities.

Development of Topic List for Society Technical Committees—The committee has started to develop a list of potential topics for Society Technical Committees to pursue. Providing suggested topics will be an ongoing effort and the list will be passed along to the Technical Committee Chairs at their meeting with the Technical Advisory Committee in August.

CHARLES HEGEDUS
Chair

Educational Coordinating

The Educational Coordinating Committee (ECC) serves an important role in the overall strategic planning of the FSCT. Our functions, for now, are pretty well defined. We develop projects and resources necessary to further the educational and informational work of the Educational Committees of the Constituent Societies. We request and administer Federation funds for identified educational resources. Another function is to manage the small Society scholarship program. Finally, we administer the annual A. L. Hendry Award.

We are proud of the enthusiastic members who serve on the ECC. They are:

Mike Bell - FSCT Staff
Paul Baukema - Akzo Nobel Coatings
Harvest Collier - University of Missouri-Rolla
Walter Fibiger - ITE Consultants
Gerald Mattson - University of Southern Mississippi
Herman Mustapha Bacchus - Valspar Corporation
DeVilla Moncrief - Sherwin-Williams
Melinda Rutledge - Rheox

The ECC has met twice this year. Our first meeting was held on Friday, April 19, in Chicago. The second meeting was held on Tuesday, August 6, in Pittsburgh. Results and updates of our activities are detailed below.

Coatings/Science Resource Binder—It was reported that approximately 250 binders, "Presenting Science Through Coatings: A Spectrum of Possibilities," have been distributed since it was unveiled last year. It was discussed that advertising about the kit might be promoted on the FSCT Web Page when available. The Committee has tried to review feedback from individuals using the kit, but with little success. Our group feels that linking up with other educational organizations might help the distribution of our science kit.

Society Speakers Program—We have felt it was time to "fine tune" this successful project to improve the quality of technical presentations at monthly Society meetings. The title has been changed to elevate the quality and uniqueness of this program. The new title is "The FSCT Distinguished Lecture Series." Promotional material has been sent to all Societies with the new headings. Slots are filling up fast for the 1996-97 year.

The Southern Society A. L. Hendry Award—This annual award emphasizes undergraduate work, and increases interest by also rewarding the sponsoring lab. The 1996 A. L. Hendry Award, which includes a $1000 prize, will be awarded to Kip Sharp of the University of Southern Mississippi. Mr. Sharp, along with Sonny Jonnson, Chris Miller, and Gerald Mattson, authored "Curing Profiles of a New Xenon Chloride Lamp." The laboratory at USM will receive a grant of $500 for their contribution. We will be discussing ways to promote and increase the participation of entries for 1997. Thanks to Harvest Collier, an e-mail promotional letter will be sent to colleges and universities with coatings programs.

FSCT Small Society Scholarship Program—An announcement has been sent to each Society to provide matching funds to support educational activities. As in the past, support is limited to $400 per Society or Section of a Society. The focus is placed to assist those Societies or Sections which have limited funds available for educational efforts, including scholarships and grants. Please encourage your Society to participate! The deadline of October 31, 1996 is rapidly approaching.

FSCT Technical Focus Award—The Technical Focus Award Speaker will initiate the technical portion of this year's International Coatings Expo and Technology Conference. This award recognizes current and timely contributions of an educational or technical nature, especially those of a younger member of the Federation. The cash prize for the award is $500. The Annual Meeting Program Committee is currently managing this program, with members from the ECC, Professional Development Committee, and the Technical Advisory Committee. The committee selects each year's recipient in the spring. This year's recipient, Mr. F. Louis Floyd of Duron Paints and Wallcoverings, will speak at 1:00 p. m. on Wednesday, October 23, 1996.

Inter-Society Polymer Education Council—The ECC has submitted a letter to the FSCT Executive Committee regarding membership in the above council. The benefits were spelled out in detail. Additional information will be provided after the Executive Committee has had the opportunity to respond to the proposal.

Full Education Committee—Society Educational Chairs and the ECC met for their Annual Meeting on Wednesday, August 7, 1996, in Pittsburgh, PA We decided to coordinate with the Technical Advisory Committee's Annual Meeting being held the next day at the same location. A tour of the Bayer facility was provided for both groups on Thursday, August 8. This

"back to back" of the Educational and Technical groups definitely helped the FSCT staff travel schedule. We feel it was worth the change from the traditional month of June. The attendance did increase to 16 Societies being represented. Another change implemented this year was the format of the Annual Meeting. We have done away with the "reading" of each Society's educational activities.

We provided three talks on Choices in Education, in the morning. Walter Fibiger gave an excellent presentation on a successful yearly course offered in Toronto on basic coatings technology. Valuable information was provided in detail for attendees to take with them. Paul Baukema spoke about curriculum choices in education. Mike Bell spoke about how to develop a one-day seminar. Breakout groups followed the presentation for participants to gather additional information in their areas of interest.

In the afternoon, we selected certain Societies to talk in detail about their successful programs in the following categories: science fairs, scholarships, and career days.

Next Meeting Date and Location—The next meeting of the FSCT Educational Coordinating Committee will be held on Friday, November 8, 1996 in Cincinnati, Ohio.

We have term limits in place on our committee to guarantee an influx of new members to insure the vitality of fresh ideas. We thank you for your continuing support and guidance.

MELINDA K. RUTLEDGE
Chair

Membership

The Membership Committee has focused on membership recruitment this year. To accomplish this goal the committee has obtained a list of attendees to the Waterborne Symposium held in New Orleans sponsored by The Southern Society for Coatings Technology and the University of Southern Mississippi. From this information committee member Horace Philipp has identified those attendees who are not listed in the 1996 FSCT *Year Book* and forwarded the list to Staff for further actions. Staff entered the prospects on the database and sent membership packets to each. In addition, each Society membership chair received a listing of the leads for their area. A prospect list from Kent State was also secured by the committee and similar action was taken.

The Committee would also like to conduct a "Member Get a Member" campaign this year to further enhance its recruitment efforts. The campaign would involve each of the 7,400 Federation members. An application form would be sent to every current member with the challenge to sign up at least one new member for the 1996-97 year. The targeted prospects would be colleagues at work and/or customers.

Vic Santamaria (Houston) and Patricia Shaw (Golden Gate)

The Membership Committee would like to recognize the three Societies whose rosters attained the largest increase in membership for the 1995-96 year. The Membership Chair for each Society will receive an Awards Plaque to recognize their outstanding achievement. The winning Societies are:

Small Society (under 189 members)
Kansas City with an increase of 14.2%
Membership Chair Thomas Hilton, of Weskem-Hall, Inc.

Medium Society (190 to 340 members)
Piedmont with an increase of 13.25%
Membership Chair Charlie Howard, of Blue Ridge Talc Co.

Large Society (341 members or more)
Philadelphia with an increase of 4%
Membership Chair Daniyel Firestone, of S. E. Firestone Associates.

Lastly, the Membership Committee awaits the Board's decision on any changes to be made in the way we recruit members.

W. JEFF SHUBERT
Chair

Professional Development

The Professional Development Committee has had a variety of far reaching projects in 1996. An overview of the technical needs, which resulted in potential lists of Common Interest Groups (CIGs) and strategies of the PDC in relation to the FSCT Strategic Plan, were discussed. As a result of these discussions, proposals for technical competence and roles of the PDC in the "future" FSCT structure were submitted to the Strategic Planning Committee. Development of technical seminars continued, as in past years, with discussions including methods through which technical information should be exchanged with the FSCT members. A membership survey questionnaire was developed, in conjunction with FSCT Staff, which will be conducted in the fourth quarter of 1996.

The Committee has developed two seminars for 1996, which include:

Computer Uses in the Coatings Industry—A newly developed course that was successfully beta-tested at the Annual Meeting in St. Louis last year, is designed to provide the latest information on computer uses and software to assist those responsible for the development and production of coatings. The objective of the two-day course is:

- Provide attendees with a general overview of the various uses of computers in the coatings industry.
- Give attendees a basic understanding of specific coatings related applications for computers, such as: Design of Experiments; Formulation, including regulatory compliance; and Manufacturing/Production Capabilities, e.g., Materials Resource Planning (MRP).

This course was offered August 20-21, 1996 in Chicago and attracted over 30 attendees.

Polymer Chemistry for the Coatings Formulator—This is a newly created course which will provide current information on polymer chemistry for coatings formulators, R&D chemists, and sales and marketing personnel with strong technical backgrounds or interests. Attendees will realize a greater understanding of the essential concepts of polymer science and the underlying principles to determine coating performance. The course helps attendees to develop coatings using scientific principles as opposed to trial and error and is also relevant for ink, sealant, and adhesive industry personnel. Attendees will learn:

Van Evener (Detroit) and Charles Kaplan (Dallas)

• Fundamental principles behind chain-growth and step-growth polymerization
• The basic principles of emulsion polymerization and how it differs from solution polymerization
• Cross-linking reactions and how they modify film performance
• The most important classes of polymers used in coating, what type of properties can be expected from each type, and how polymer chemistry can be used to modify those properties
• How polymer structure is related to the rheology and mechanical properties of polymers
• How polymers are characterized with modem analytical techniques.

The Committee will offer this course as a two-day symposium at the Annual Meeting in Chicago.

The courses defined above have been organized as a result of needs defined by the membership gathered through past surveys of the FSCT. In order to keep a "pulse" on the FSCT membership's changing job requirements, the PDC is cooperating with FSCT Staff to develop a method by which an accurate definition of the FSCT's membership professional development needs can be obtained. A survey of selected FSCT individuals will be conducted in the fourth quarter of 1996. The FSCT Annual Meeting attendee questionnaire was also addressed as a method through which membership information could be obtained. Modified questions were developed and submitted to the Annual Program Committee for consideration.

A newly created course, "Understanding Crosslinking for Improved Locating Performance" is being developed for FSCT membership. The course will review the theoretical implications of crosslinking and describe chemistries utilized to achieve desired properties. It is the intent of the Committee to publish papers from this course and offer them in an edited form as a newly created Monograph to the Publications Committee. The course is targeted for offering April 16-18, 1997 in Orlando, Florida

The media through which the educational programs for FSCT members is offered is also being examined. Distance learning, books on tape, CD-ROM tutorials, or a "news group" on the Internet are all being explored. The PDC hopes that with information learned from the membership survey the format of newly created offerings can be appropriately marketed.

The Committee also participated in selection of the "Technical Focus Speaker" for the Annual Meeting. It was great pleasure to nominate F. Louis Floyd who will present a lecture on Critical Pigment Volume Concentration.

As my term expires as PDC Chair this year, and my involvement in the PDC as a member draws to a close, I would like to take the opportunity to thank all of the dedicated past and present members of this Committee and FSCT Staff, whom, over the past two years, have supported the vast amount of offerings developed and offered to FSCT membership. During my term as Chair, our Committee has not only developed a Mission Statement to align itself with the Strategic Plan, but we have also offered several successful courses to the membership, which included:

Formulating for the Clean Air Act
Polymer Chemistry for the Coatings Formulator
Computer Applications in Coatings
The Chemistry of Adhesives, Sealants, and Caulks
Analyses of Painted Surfaces Through Analytical Methodology

The method of technical offerings included not only general seminars but "hands-on-tutorials" that were well received by attendees. Membership survey information, through cooperation with Staff, was developed to meet the changing technical needs of coating professionals.

We co-instituted, with cooperation of the Educational Coordinating Committee and the Technical Advisory Committee, the "Technical Focus Speaker" which has become a successful event at the Annual Meeting.

We participated, with the Executive Committee, in strategic planning, analyzing the strengths and weaknesses of the PDC and aligning our mission with the FSCT Strategic Plan. We offered several comments and suggestions on potential areas of opportunity for strengthening the FSCT as an organization.

It is with great pleasure that I turn the reins of this motivated, competent, energetic, productive Committee over to Ronda Miles, to whom I wish the greatest success.

ROSE A. RYNTZ
Chair

Publications

The committee first defined its objectives or goals for the future taking the strategic plan into consideration. They are:

(1) Help all members do their job better.
(2) Grow the Federation globally.
(3) Employ a broad definition of publications, including periodicals, texts, videos, databases, web sites, CDs, etc.
(4) Be the pre-eminent source of technical information on coatings and the coatings industry.
(5) Strive to make publications the prime mode of communication of Federation information within the industry.
(6) Manage publications in order to maximize informational value to members and financial value to the Federation.
(7) Maintain the currency of all publications (regularly review viability).

Second, the committee defined its operating protocol as follows.

(1) "Publications" (this term referring to Committee and Staff) will assume responsibility for defining, designing, producing, pricing, placing, and maintaining publications with attendant assessment of value to the audience, and financial management.
(2) Responsibility for these will be assumed by Publications, with oversight provided by the Executive Committee and the Board of Directors of the Federation.
(3) Publications will make recommendations for division of responsibility between the committee and staff; and will set meeting frequency.

(4) Publications will:

(a) Generate, identify and evaluate proposals for new products

(b) Determine feasibility of each publication through cost and price analysis

(c) Establish prices of publication through analysis of value provided

(d) Maintain financial and time budgets on all projects

(e) Regularly review existing publications

(f) Maximize effectiveness of the JCT through: monitoring use for FSCT communication; expanding advertising opportunities; and recommending pricing to reflect value.

Third and last, the committee designed a review and approval procedure for publication proposals. The committee determined that many factors have to be taken into account when determining the feasibility of a proposed project, including all costs incurred in completing the project, such as: staff salaries and overhead, production costs, distribution costs, and marketing costs. The review and approval procedure is as outlined below.

(1) Preliminary proposal/idea is submitted to Publications Committee.

(a) Proposal includes:

1. intent
2. content outline
3. needs assessment

(If these are not provided, the committee assigns a champion to work with "proposer.")

(b) Publications Committee reviews prepared proposal

(2) (a) Further draft of content is prepared (fleshed out proposal)

(b) Cost/market analysis is prepared (by committee and "proposer")

(3) Further review by Publications Committee (based on costs, risks, and need)

(4) Preliminary editorial content review to confirm technical soundness. (The JCT Editorial Review Board could be requested to perform reviews, as needed)

(5) Recommendation made to FSCT Executive Committee. If approval is given:

(6) Do it! On time and on budget!

Long-term goals for the committee are as follows.

(1) Analyze financial data—set financial goals

(2) Develop future publications: 3 per year

(3) Develop arrangement to market other products

(4) Review all publications on a minimum of once every three years

(5) Establish and foster relationships with other FSCT committees

(6) Evaluate optimal use of resources to accomplish Publications Committee goals and objectives.

BRENDA L. CARR
Chair

Technical Advisory

The Technical Advisory Committee (TAC) met on August 7, 8 and 9 in Pittsburgh, PA. The first day, plans for the following two-day joint meeting with the Society Technical Committee Chairs were reviewed. The next day started with a tour of Bayer's research facilities. The Societies' Educational Committee Chairs, who were holding a concurrent meeting, also attended. Highlights included plastic extrusion, urethane injection foam molding, wood composite and compact disc pilot plant lines. The coatings and pigments laboratories were also toured. The afternoon was devoted to reports from the individual Society Chairs.

On the last day, Tom Hill gave an overview of the Strategic Plan with Freidun Anwari detailing the proposed Common Interest Groups. This was followed by a review of the Society Speakers Competition and A. F. Voss/APCJ judging forms. As an exercise, each Technical Committee Chair used the Society Speakers form to grade the next speaker, Herb Johnston of Battelle. Mr. Johnston spoke on the Focus Industry Technology Transfer Project (FITT). This program "provides an opportunity for an industry trade organization or a professional Society to collaborate with the scientific and engineering experts of the federal laboratories." Several case studies were cited and literature was distributed giving greater detail of the available programs.

The day ended with a formal brainstorming session on the topic: What can the TAC do to help Society Technical Committee Chairs fulfill their duties? Ideas were organized and prioritized by the entire group. The top responses were to provide a forum for information exchange: project ideas, equipment sources, speakers list ... and more training for Technical Chairs: volunteerism, Internet, literature searches, presentation skills, technical writing ... Surprisingly, research money was given very low priority. These ideas will be acted upon at the next TAC meeting in February 1997, in Louisville, KY.

FREIDUN ANWARI
Chair

Society Reports

BALTIMORE

Seven monthly meetings featured technical presentations, two of which were hosted by the Educational and Manufacturing committees. The new Columbus Center (for marine biotechnology) was toured. A one-day seminar "Knowledge is Wealth, Ignorance is Bliss" was held featuring seven speakers. Topics explored included VOC compliant coatings, silicone based additives, polysiloxanes resins, and computer aided formulation. Various testing instruments and software were demonstrated. . . At the annual awards banquet James M. Smith of Eastech received the Herman Shuger Memorial Award for signal service to the coatings industry; merit awards were presented to Helene Ranfone of Duron Inc., Connie Sauer of Duron Inc., Peter Rengel of RJ Chemicals and Miriam Singer of Rohm & Haas Co.. . . A scholarship was presented to David Sokoloff.

BIRMINGHAM

Membership has fallen slightly, currently standing at 175 . . . This year the Club celebrated its 60th anniversary of affiliation with the Federation. Federation President Darlene Brezinski and Membership Director Victoria Graves attended the anniversary meeting, held in March. . . Seven technical meetings were held with average attendance of 65, half of whom were non-members. . . Over 80 delegates attended a one day environmental Club symposium entitled, "Paint at the Cross-roads," to hear speakers from regulatory authorities, industry and consultants. . . Club Bylaws have been amended to align with the Federation's. If ratified, these changes should broaden the range of potential new members and permit a wider range of existing members to serve as Club officers.

CDIC

Goals for the year included strengthening the Educational and Technical Committees plus starting a series of Bosses'

Nights. . . The Manufacturing Committee arranged a tour of the Reynolds Metal Company's Coil Coating Line at Ashland, OH, a video tour of Sun Chemicals' pigment producing facilities and an actual tour of Sun's application and technical service laboratories. . . The Educational Committee participated in Career Day at a Cincinnati Public School. . . The Technical Committee considered participation in the technical study started by the St. Louis Society but found insufficient interest by the membership. They are currently researching a potential project on the adhesion of aqueous coatings to polypropylene.

CLEVELAND

Averaging 85 attendees per meeting, eight monthly meetings incorporating dual speakers at most and a joint meeting with the CPCA were held. . . A 35% response to a membership survey indicating future technical presentation topics was received. . . The first meeting with the Directors of Macromolecular Science, School of Engineering and Director of Corporate Relations of Case Western Reserve University was held to discuss areas of mutual cooperation. . . $500 was donated to the CIEF's Honor and Remembrance Fund in honor of Fred Schwab and Helen Skowronska. . . The second year of the Newsletter and Meeting Lottery was a success. Members who attend four meetings are given a CSCT logo golf shirt. . . A complete set of FSCT *Series on Coatings Technology* monographs, purchased at the beginning of the year for display, were given out as door prizes at the final meeting of the year. . . The 39th Annual Technical/Manufacturing Symposium was a success . . . The Society was involved in judging at local Science Fairs as well as donating $800 to the John Hay High School Fair. . . A portion of the profits from a golf outing went to Educational Scholarships for students. . . Melissa Herdzak was granted the Memorial Scholarship Award and Erica Loye the Educational Scholarship Award. . . Victor Sandorf was presented with the CSCT Honorary Member Award, Fred Anwari received the Dr. Frank Selden Award, J.P. Walton received an Award of Merit and the CRGI, an Award of Appreciation, while Richard Mikol won both an Award of Appreciation and second Place Award in the FSCT Society Secretaries Competition. Roy "Skip" Glover accepted the President's Special Award. Fred Schwab, who had been active on both the Society and Federation levels for many years, was posthumously named a Federation Honorary Member.

DALLAS

Membership is 150. . . "The Role of Acetylenic Glycols in Waterborne Coatings" was presented by Samuel P. Morell as part of the FSCT Distinguished Lecture Series for continuing education. . . Expanding educational funding at the college level, grants to local candidates to attend university short courses, ICE seminars and the technical program at the Southwestern Paint Convention will be actively considered. . . The 54th Southwestern Paint Convention is scheduled for April 2-4, 1997 at the Hyatt Regency, Dallas, TX. The theme will be, "AIM for the Future — NOW."

DETROIT

Eight meetings were held with the Society and the DPCA sponsoring joint meetings every other month. . . Membership declined slightly from 443 to 421. . . FOCUS (Future Of Coatings Under Study) presented the highly rated topic, "Driving Technology to Meet New Challenges" to 170 people. The next FOCUS will be held on April 24, 1997. . . Mr. Gabe Gabriel runs an excellent educational program with seven courses offered through the University of Detroit/Mercy. . . Research and educational awards of about $8000 were presented in area schools and universities, with $700 to Eastern Michigan for a teachers workshop. . . The Technical Committee presented a paper entitled, "An Investigation of the Effects of Formulation on Selected Properties of UV Curable IPN Coatings," at the 1996 ICE. . . The DSCT assisted the DPCA on the "Picture it Painted" project. . . "Toys for Tots" donations were made at the November and December meetings. . . Cartoons in the monthly meeting bulletin have the members creating a humorous "Caption of the Month" to win a complimentary dinner voucher. . . The Society regrets the loss of Ted Larson, who died this past year.

GOLDEN GATE

Membership totaled 220, down 3% from last year. . . Two scholarships were awarded last year to undergraduate students. This year two scholarships will be awarded: one for a short course, the other for a member working towards a degree. . . The California Polytechnic State University at San Luis Obispo's Polymers and Coatings Program has completed its sixth full year, offering a summer short course and an undergraduate concentration while trying to establish a year round internship program. Companies interested in participating should contact James Westover at 805-756-2566. . . The GGSCT Policy Manual is now updated, being stored on floppy disc for ease of future modification. . . 17 participants in the Suppliers' Table Top Display at the June meeting exhibited their products and contributed raffle prizes to the 45 attending members. . . 12 technical books were added to the Redwood City Library science and technology collection. . . Officers from the Golden Gate, Los Angeles, Pacific Northwest and Rocky Mountain Societies met in July to discuss mutual interests. . . Los Angeles and Golden Gate Societies planned to organize a joint Manufacturer's Seminar to be given at both locations.

HOUSTON

Activities included seven Technical Meetings, a Bingo Night, a Past-President's Night, a Scholarship Awards Night and a spouses outing to Lake Charles. . . 250 people attended the Southwestern Paint Convention including FSCT President Brezinski and Director of Publications Pat Viola. The meeting focused on assisting participants to improve their technical, environmental, and managerial skills. . . The Society revised the process of officer succession to: Secretary, Treasurer, Vice President and President. . . Expanding membership will be high priority in the coming year. . . Society Honorary Membership has been granted to Art McDermott, a Past-President.

KANSAS CITY

Membership totals 125, a nine percent increase with further growth anticipated. . . Five educational meetings and three social events were arranged. . . Educational Committee was active in judging the KC "Science Pioneers" Science Fair, setting up May's Educational Night with Mr. Wizard (a.k.a. Dr. Marvin Dixon, William Jewell College), and participating in a presentation of "How to Make Paint" to a local elementary school. . . Hosted St. Louis/Kansas City Societies' Lake of the Ozark Seminar.

LOS ANGELES

The Western Coatings Societies Symposium and Show will be held February 18-20, 1997 at the Disneyland Hotel in Anaheim. In exchange for significant help in organizing and producing the event, proceeds from the Symposium will be shared with the Southern California Paint and Coatings Association. Several SCPCA members will serve in key positions at the Symposium. . . An increase in membership was reported and recognition from the Federation was received for having the largest increase in new members this year. . . The Technical Committee conducted a seminar, held at Cal Poly Pomona, on

pigment dispersion techniques with a hands-on color lab and is sponsoring at least one paper at the ICE on the analysis of VOC in low VOC coatings. . . The Scholarship committee awarded $10,250 to 10 college undergraduates, two $500 Fellowships to members working in the industry and also administered $3,500 from the Cal Poly Foundation to three undergraduates at San Luis Obispo for the 1996-97 academic year. . . Challenges continue to be industry acquisitions and mergers, as well as declining attendance at monthly meetings.

LOUISVILLE

In the Society's first use of the FSCT's Distinguished Lecture Series Speakers Program Dr. Kenneth Hoy presented "Decompressive Spray, a New Spray Technique," and the annual "Manufacturing Night" was highlighted by a presentation on "The Theory of Constraints." Other topics focused on Defoamer Theory, Solventless Architectural Coatings, TiO_2 Properties and Specifications, and Laser Technology. . . The Spring Symposium was the most highly attended and successful presentation ever with an abundance of high quality papers on diverse subjects. . . The first active Manufacturing Chair in some time has been appointed. . . Society continued to provide educational opportunities through the Louisville Society Educational Grant. This past year's recipient was Jeffrey Ray Carpenter of Marcus Paint.

MEXICO

Membership stands at 146, a decrease of 30%. . . The 1995-96 program featured four technical talks with an average attendance of 70, the annual dance party with 170 attending and 14 Society Executive Committee Meetings. . . Ten technical presentations were held during the Pan-American Coatings Expo and attracted 170 attendees. . . The Mexico Society Library now has 745 technical books, six audiovisual products, 70 subscriptions to different technical publications, and 30 videos from technical symposia. The library is now automated and soon worldwide access will be available. . . The Society is planning a technical course, "Technology of Coatings."

MONTREAL

Membership was stable after several years of decline. . . Seven meetings and a symposium were held during the year . . . The technical program showed increased attendance and a survey was held to select topics for the '97 program. . . 80 members attended the Christmas luncheon and a food collection was made for needy families. . . Two Technical Committee projects are planned for this year, a joint project with the Northwestern Society on the influence of acid rain and a study on the rheology of commercial paints.

NEW ENGLAND

Seven well attended technical meetings were held, half of which were joint meetings with the New England Paint and Coatings Association. The practice of holding meetings in several different locations throughout the year is credited with providing the geographically disperse membership greater opportunity to attend monthly meetings. . . The Technical Committee has been revived and its initial project is to develop a troubleshooting procedure for the coatings formulator. The mission of the Technical Committee is to provide a technical resource to the NESCT where common concerns are researched and solutions presented. This will be accomplished by forming and utilizing partnerships between suppliers, formulators and end users. The process will enhance the overall industry image of member companies of the Society. . . A three town paint swap was held in Southern New Hampshire. The New Hampshire Department of Environmental Services Solid Waste Division cites this event as a model of how to run a successful swap, the goal of which is to reduce the amount of good paint being brought to the hazardous waste collection.

NEW YORK

Membership stands at 577. . . Six dinner meetings were held. . . The Joint Legislative Update Meeting was held with the Fifth Annual Environmental and Regulations Exhibit. The keynote speaker, New Jersey Assemblyman John E. Rooney, presented "An Environmental Perspective," discussing how governmental agencies and industry can work together. . . Rudy Berndlmaier of the Technical Committee presented "Rheology Modifiers for Low VOC Bake Coatings," at the Annual Meeting in St. Louis and received second prize among the papers presented by Constituent Societies. The Committee is working on two additional projects. . . George Schmitz, the Educational Committee Co-Chair presented two one-semester coatings technology courses at Fairleigh Dickinson University. . . The Mattiello Scholarship of $1000 was awarded to H.D. Dai, the NYSCT Scholarship of $1000 was granted to Raymond Michael Doss and the Melvin Gerson Memorial Scholarship was presented to Brant J. Berndlmaier. . . The Roy H. Kienle Award was presented to Sheila Westerveld and Michael C. Frantz was given the Presidents Service Award. . . Jack Mikey, of Tri-Chem, Dan Drucker, of Insul-X, and Aaron Fyman, of Norton and Sons, were recognized for 25-years of membership in the Society.

PACIFIC NORTHWEST

Membership stands at 255, a decrease of 26. . . The Portland section taught a five-week Basic Coatings Technology course to 50 store and sales personnel while the Vancouver section has upgraded their night program at Kwentlan College to a 12-session three-semester course. . . Each of the three sections received $1000 to distribute as scholarships. Portland supplemented their $1000 so that two $750 scholarships could be awarded to recipients to attend the short course at California Polytechnic State University (Cal Poly). Puget Sound Section also offered two $750 scholarship to candidates who attended Cal Poly, while Vancouver Section awarded $500 each to candidates who will be attending local universities. . . The annual spring symposium and meeting doubled as the FSCT Spring Week which bolstered attendance. In the Pacific Northwest Society's 50th year, the 1997 Spring Symposium will be held in Vancouver BC Canada at the Pan Pacific Hotel on May 8-10, 1997. At this symposium, the Society will celebrate its 50th year anniversary.

PIEDMONT

Ten meetings were held, two in conjunction with the Piedmont Paint and Coating Association. . . The Educational Committee awarded four $1000 scholarships to David King, Rhuda Byne, Jennifer Gauntt and William Zimmerman of High Point University. . . The Technical Committee was awarded the 1995 A.F. Voss/*American Paint and Coatings Journal* Award with a paper entitled, "EPA Reference Method 24 Round Robin Analysis of Wood Furniture Amino Plast Coatings.". . . 35 new members were accepted but several long-time members were lost due to corporate withdrawal and downsizing. . . The Mini-Technical and Exhibition Show is scheduled for March 19, 1997 at the Showcase in the Park, High Point, NC.

PHILADELPHIA

Membership stands at 319. . . Eight business meetings with technical presentations were held. . . Joint meetings with the Philadelphia PPCA were successful and benefited both the Association and the Society. . . The Ben Franklin Award for

long time service to the coatings industry was awarded to Donald Fritz... The Technical Committee had a full program of speakers at its meetings... The Spring Seminar was integrated into the Eastern Training Conference and Show which attracted 200 attendees. Eleven lectures focusing on the History and Basics of Coatings Technology and advanced formulation ideas were given. In addition, 84 exhibitors participated in the trade show... A survey was taken of attendees about programming preferences which will be integrated into the 1998 conference.

PITTSBURGH

Ten technical meetings were held including a plant tour of Lordstown General Motors facilities and PPG operations, a Christmas Party, an Allegheny River and Spouses' Night, a golf outing and several expert speakers presentations. The Manufacturing Committee set up a visit to Bayer when the Federation Education and Technical Committees met in Pittsburgh in August... The Educational Committee awarded $1000 each to Jennifer Rediske and Sara Crytzer. Involved in judging and awards at the Pittsburgh Science Fair, the Society provided two awards for projects based on coatings chemistry. A task group visited numerous schools on their career days and works closely with the Career Awareness Program of the Boy Scouts of America and the Pittsburgh Voyagers Program for Junior High students.

ROCKY MOUNTAIN

Membership remains strong and approximately 20 members attend each technical session... Eight technical sessions were held... Paul Delmonico won the semi-annual scholarship funded by the RMSCT and attended the one-week course on polymers at Cal Poly... 70 members and guests were at the June meeting, held at the Tamarron Resort in southwestern Colorado. They were treated to an excellent technical session ... The June 1997 meeting will be held at Steamboat Springs, CO.

ST. LOUIS

The Society hosted the 1995 Paint Industries' Show with keynote speaker Captain James Lovell, Commander of Apollo 13... Eight meetings were held including the Christmas Party, Spouses' Night Out and Past Presidents' Night which hosted eight Past Presidents. 25-Year membership pins were awarded to: Kirshan Sood, William Reckel, James Linsley, Steve Crouse, and Ed Hinden. Bud Hackney was awarded a 50-Year membership pin... The Educational Committee awarded four scholarships, consisting of a short course of choice at the University of Missouri-Rolla, to Sharon Masek, Betsy Hudson, Chrissa Schremp and Steve De La Roche. ... In addition, a grant of $750 was awarded to the University of Missouri-Rolla for the Wouter Bouch Endowed Scholarship Fund... The Membership Committee reports 33 applications for both new and transferring memberships... The Society was saddened by the loss of Dr. Fred Weber, Jr. and Pete Macy who died this past year.

SOUTHERN

Membership increased to 500 for all five sections... Scholarship funds were supplied and the Waterborne Symposium in New Orleans was co-sponsored with the University of Southern Mississippi... Dr. Gerald A. Mattson was awarded an honorarium in recognition of his long-time service... 234 people at the annual meeting, including FSCT President Brezinski and her husband Marty, enjoyed an excellent technical program at the Hyatt Westshore in Tampa, FL.

TORONTO

Membership stands at 466... Kurt Weitz, a Federation and Society Past-President, was presented with a plaque recognizing his election to Society Honorary Member... 15 students successfully completed the first and second semesters of the three semester program at George Brown College, Toronto. Eighteen students graduated after the third semester at Mohawk College, Brantford Campus and 20 students in four distant learning locations completed the three-semester program. They obtained their Certificates in Coatings Technology issued by George Brown College... Randy Coates presented the Society Technical Committee paper, "Non-Toxic Anti-Corrosive Pigments in Aqueous Primer Formulations," at the FSCT Annual Meeting in St. Louis... The annual symposium was entitled "Coating Lab 2000—The Next Generation" and featured tabletop exhibits of equipment, software and services. A mini-symposium on "Coating Plastics: Challenges and opportunities" was well attended... A first joint meeting with the Oil & Colour Chemists' Association of Ontario was successful... Also successful were the traditional toy donation to the CHUM City Children's Christmas Wish Foundation, the Christmas Luncheon and the annual Golf Tournament... Spouse's Night was held at the Art Gallery of Ontario with a slide talk on "The Application of Science to the Examination and Conservation of Works of Art."

The next meeting of the FSCT Board of Directors will take place on Sunday, May 18, 1997, at 9:00 am, at the Hyatt Birmingham, in Birmingham, England.

Annual Meeting of the Stockholders of the Coatings Industry Education Foundation

The Annual Stockholders Meeting of the Coatings Industry Education Foundation was held on October 22, 1996, at the Chicago Hilton Hotel, Chicago, Illinois.

Presiding at the meeting was CIEF President Mary G. Brodie who presented the following report:

I. The Joseph A. Vasta Memorial Scholarship in Coatings Science

The Joseph A. Vasta Memorial Scholarship was awarded to Carolyn Soderstrom, the most outstanding student in the Polymer and Coatings Concentration at California Polytechnic State University. The 1997 Scholarship will go to a student at Eastern Michigan University. Donations to the fund through June 30, 1996 amount to $61,333. The fund balance (including 1996 interest) was $56,649 as of that date.

II. The Ernest T. Trigg Foundation

As reported previously the Trigg Foundation funds are in the hands of the CIEF. Two additional donations of funds were transferred to CIEF in 1996, namely stock holdings from the Paul B. Cefalu Estate valued at $19,671.23 at the time of transfer (February-March 1996) and $17,851 in cash in April 1996. This brings the cash balance to $118,224 as of 6/30/96 (including interest). The stock holdings increase this value to approximately $138,000.

III. The Coatings Industry Honor and Remembrance Fund

The Coatings Industry Honor and Remembrance Fund received donations amounting to $750 through 6/30/96. This brings total donations since inception (1992) to $19,980 and the value as of 6/30/96 to $21,704.

IV. Review Schedule for Recipient Schools

The schools slated for review in 1996 are DePaul University—(D. Boyd) and California Polytechnic State University (1996)—(G. Pilcher or S. Lauren). Since fund raising is CIEF's key priority this year these visits may be delayed into 1997 purely due to time constraints.

V. Educators' Luncheon at the Annual Meeting in Chicago

The fifth annual Educators' Luncheon will be held in Chicago on Wednesday, October 23, 1996. Six schools which have substantive coatings programs will be represented. This gathering presents an opportunity for the Trustees and Educators to discuss the CIEF funding program and other mutual concerns. It has been an effective communication tool.

VI. Recommendations for Appointment to the Board of Trustees

The Trustees have recommended to incoming President Jay Austin, the following candidates for three year appointments to the CIEF Board:

Current Trustees	Recommended Successors
Sidney Lauren	Re-appointment of Sidney Lauren
Stephen Sides	Saul Spindel

The Trustees have also proposed the addition of another Trustee to the Board. The Bylaws (20) state that "if the vacancy on the Board results from an increase in the number of Trustees, then the person serves until the next Annual Meeting." At that point that Trustee would be eligible for a full-term appointment. Mr. Thad Broome has been recommended as the added Trustee.

VI. Investment of CIEF Funds

In January 1996, the Trustees decided to move the major portion of the CIEF investments from the money market to the Vanguard MMR Prime Portfolio to increase the yield from 3.25% to around 5.0%. The Cefalu Estate Stock Portfolio was discussed at the June CIEF meeting and the decision was to sell these stocks and invest the money in an income producing vehicle. Specific investment choices will be addressed at the October meeting. The current FSCT investment policy along with advice from Mr. Geiger will guide this discussion.

VIII. Educational Grants for Academic Year 1996-97

Requests for funding for 1996-97 totaled $186,325, which was $129,325 greater than the amount for which CIEF Trustees could provide, namely $57,000. This response represents a refusal rate of 69%. Fortunately, the Trustees were able to provide an additional $7,500 in the form of the ongoing (1) Vasta and (2) Trigg Scholarships, which brings the total of CIEF grants to $64,500. This shortfall reflects CIEF's current financial situation rather than the merit of the programs or their needs. Table 1 summarizes the funding requests and the CIEF dollar commitments.

IX. "Project Tomorrow"

"Project Tomorrow" is the name given to CIEF's fund raising campaign. It will address corporations and individuals in separate phases.

The corporate campaign will ask for a commitment to donate $5000 each year for five years with the option to continue longer if the donor is satisfied that this is a beneficial arrangement. All donations are tax deductible.

The individual campaign will be addressed to gifts of any size. It will focus initially on FSCT members probably through the membership renewal process. This is difficult with the mailings going out from each Society. It will also require different material to make the request.

For obvious reasons CIEF's focus to date has been on the corporate phase. The necessary materials have gone through a number of iterations but should be ready to start solicitation within the next few months.

MARY G. BRODIE
CIEF President

Other Business

ELECTION OF 1997 TRUSTEES:

On a motion by Mr. Holmes, seconded by Mr. Geiger, the Stockholders unanimously approved the addition of one Trustee to the Board.

On a motion by Mr. Holmes, seconded by Mr. Geiger, the following individuals were unanimously elected to the Board of Trustees:

Re-appointment of Sidney Lauren for a three-year term.
Election of Saul Spindel for a three-year term.
Election of Thad Broome to a one-year term.

Table 1—Coatings Industry Education Foundation—Type of Request

Institution	Grant	Capital Scholarship	Fellowship	Research Grant	CIEF Commitments
DePaul University	—	—	$8,000	$2,000	$8,000 Fellowship
California Polytechnic State University	$24,000	$6,500	—	—	$6,000 Scholarship $2,500 Vasta Scholarship
University of Missouri-Rolla	—	$16,500	$12,000	—	$10,000 Scholarship $2,500 Trigg Scholarship
University of Southern Mississippi	—	$20,000	$12,000	—	$10,000 Scholarship
North Dakota State University	$25,325	$15,000	$12,000	— $10,000 Special	$10,000 Scholarship $2,500 Trigg Scholarship
Eastern Michigan University	—	$18,000	$5,000	—	$13,000 Scholarship
Sub-Totals	$49,325	$76,000	$59,000	$2,000	Scholarships: $49,000 Fellowships: $8,000 Capital Grants: None Research Grants: None Vasta Scholarships: $2,500 Trigg Scholarships: $5,000 $64,500
TOTAL FUNDS REQUESTED:		$186,325			
TOTAL FUNDS COMMITTED:		$64,500			

In Memoriam

We report with deep report the passing of the following members during the past year

Birmingham

J.R. Bourne ..... (Retired)

CDIC

Harry J. Poth ..... Dean & Barry Paint
Society Honorary Member

Detroit

Ted Larson ..... (Retired)

Golden Gate

Rose Lefebre ..... (Retired)
Edward Quesada ..... Flecto Company

Kansas City

William C. Hunt ..... (Retired) Tnemec Co., Inc.
Society Past-President
Terryl F. Johnson ..... (Retired) Cook Paint & Varnish
FSCT Past-President
Society Past-President
50-Year Member
Society Honorary Member

New York

Benjamin Chatzinoff ..... Quaker City Chemicals
Society Past-President
John D. Mickey ..... Tri-Chem, Inc.
Clarence F. Silleck ..... (Retired) CJ Osborn Chemical Co.

Northwestern

Donald C. Pellow ..... (Retired)

Pacific Northwest

Joseph Dibiase ..... Farwest Paint

Philadelphia

Benjamin Chatzinoff ..... Quaker City Chemicals
Society Past-President

St. Louis

Harold Brod ..... Brod Dugan Co.
Pete Macy ..... Mozel, Inc.
Dr. Fred Weber, Jr. ..... (Retired) Archway Sales
Society Past-President
50-Year Member
Society Honorary Member

Southern

William Armstrong-Smith ..... Smith Armstrong-Smith Co.
Jack Everts ..... Ecological Paint Association
Paul N. Gardner Sr. ..... Paul N. Gardner Co., Inc.
50-Year Member
William Raymond Tooke Jr. ..... Micromeritics Co.

Toronto

Al MacDonalds ..... Hüls Canada Inc.

Professional Development Committee of the Federation of Societies for Coatings Technology

Presents

"Crosslinking for the Coatings Chemist"

Wednesday-Friday, April 23-25, 1997

Orlando Airport Marriott, Orlando, FL

Course Description

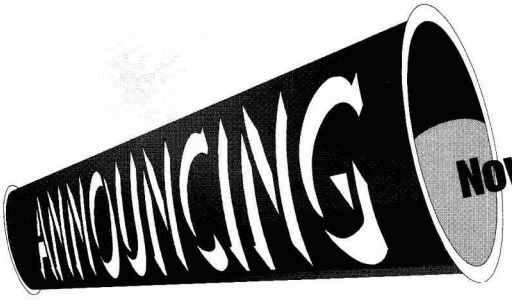
The purpose of this course is to provide information on the physical chemistry involved in crosslinking, including topics such as what it is, fundamentals of inter-intra molecular crosslinking, the temperature requirements, and measurement criteria. The course is designed for the following individuals: formulators, polymer chemists, and those involved in the following end-use applications: automotive, architectural, and general industry. All attendees are required to have a background in chemistry.

Topics to be Covered

Attendees will receive information on the following topics:

Types of Crosslinking Mechanisms
How to Measure Crosslinking Density
Kinetic vs. Diffusion Controlled Crosslinking
Temperature Requirements and Oven Selection
Catalyst Effects
Advances and Interactions with Formulation Variables
Influence of Basecoat Primer

For more information, contact Mike Bell, Director of Educational Services, Federation of Societies for Coatings Technology, 492 Norristown Road, Blue Bell, Pennsylvania 19422-2350; Phone: (610) 940-0777; Fax: (610) 940-0292; Web Site: http://www.coatingstech.org



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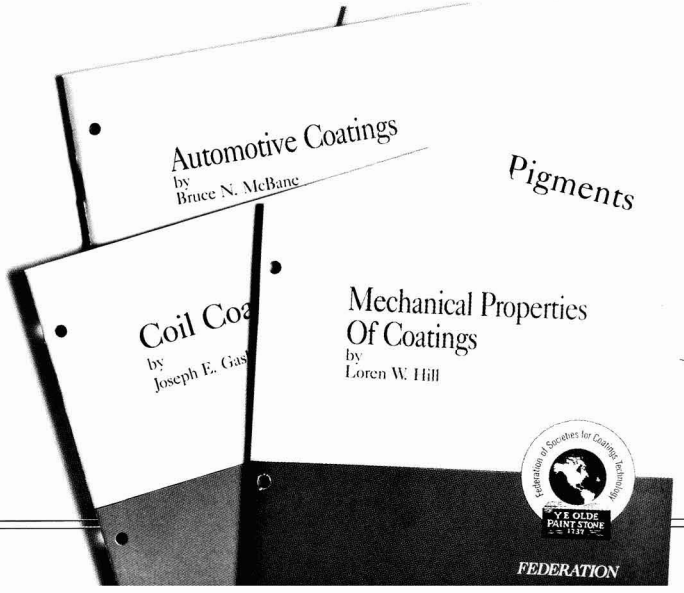

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- The Year Book, the **Who's Who in the Coatings Industry** provides names, addresses, phone and fax numbers of over 7,400 coatings professionals. Included with dues, the spiral-bound desk reference lists FSCT's 26 Constituent Societies and Affiliated members. (a $150 value)
- FSCT's reference materials including the *Coatings Encyclopedic Dictionary, SciQuest,* and the *Series on Coatings Technology* are available to members at discounted prices - you can **save up to 25%** .

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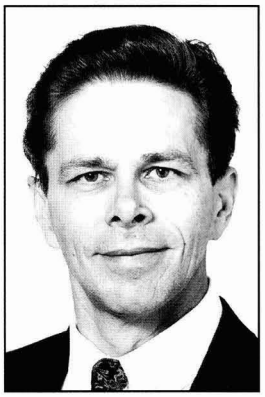

Dr. Bauer is author of over 90 papers in the area of paint and plastics research. He has made over 80 presentations on work in these areas. He has carried out research in the area of cure and network structure in high solids coatings, flow control and coating rheology, polymer photodegradation and stabilization, plastics characterization and recycling, and coating service life prediction.

Dr. Bauer is on the review boards of the Journal of Coatings Technology *and* Polymer Degradation and Stability. *He is active in the American Chemical Society and has served as Chairman of the Division of Polymeric Materials: Science and Engineering. He is also a member of Sigma Xi (past chair of the Ford Chapter) and the Society of Plastics Engineers. He has been an organizer and chair of symposia at ACS national meetings and has lectured in numerous workshops on network structure and coatings.*

* *1996 Mattiello Memorial Lecture* *

Predicting In-Service Weatherability of Automotive Coatings: A New Approach

David R. Bauer—Ford Motor Co.*

The prediction of long-term weatherability of coatings has always been a difficult task. This task has been made significantly more difficult by the recent, rapid changes in coatings technology. Conventional weathering protocols which rely on observation of appearance changes after outdoor or laboratory exposures have not always been successful in anticipating in-service failures. This paper discusses the reason for this and describes a new approach for estimating in-service weatherability in coatings. The formalism begins by identifying specific failure modes and developing time-to-failure models which are based on fundamental studies of the chemistry and physics of failure. The statistical variation of the key material, process, and exposure parameters in the failure model are described in terms of distribution functions. Since photooxidation plays a critical role in most weathering issues, a specific distribution function for exposure harshness is estimated that can be used to describe the variation in photooxidation rate under actual in-service conditions. By combining a specific failure model with in-service variations in the key parameters, it is possible to estimate in-service failure rates as a function of material and processing variables, thus, allowing for improved risk assessment of any proposed material or processing change. The formalism also provides clearer direction in the design and use of specific laboratory and outdoor exposures in predicting performance. The method is illustrated by deriving distributions of time-to-failure based on two different hypothetical mechanisms of photo-induced coating delamination.

INTRODUCTION

The ability to predict accurately the long-term weatherability performance of coatings is essential both for the coatings industry and its customers. The failure to anticipate the occurrence of in-service failures leads to high warranty costs and dissatisfied customers. On the other hand, "overengineering" a paint system can add significant cost without providing significant value to the customer. Up until the present time, the industry has relied on a weatherability protocol that involves subjecting a limited number of samples of a given type to a variety of outdoor and laboratory exposures. Outdoor exposures such as those performed at test sites in Florida or Arizona are taken as the de-facto standards by which coatings are judged. Coatings are evaluated by observing changes in appearance, particularly gloss loss. Material qualification is often based on the results of short term (a few years) outdoor exposure combined with results from accelerated laboratory tests. Longer term outdoor exposures are then used to validate the laboratory testing. The criterion by which accelerated laboratory tests are judged is the ability to "correlate" with Florida exposure. Correlation can essentially be defined as having a constant and reproducible acceleration factor for a given coating technology.[1] Issues with accelerated tests have been discussed in detail.[1-4] Harsh laboratory testing can induce chemistry that does not occur in service or change the balance of the degradation and stabilization reactions so that the relationship between laboratory test results and outdoor expo-

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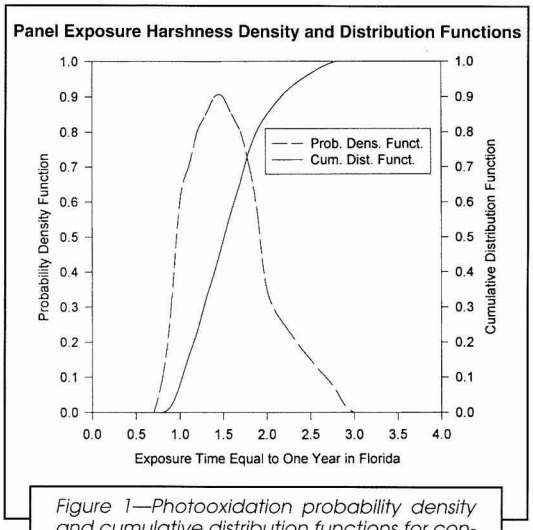

Figure 1—Photooxidation probability density and cumulative distribution functions for continuous exposure. The variation in photooxidation rate is calculated from a population weighted geographical variation in UV light intensity and temperature using equation (1). The abscissa is the years of continuous exposure equivalent to one year of continuous exposure in Florida.

sures is unreliable. This can lead to rejection of durable materials and qualification of poor materials. Over the years, there have been significant improvements in accelerated weathering chambers which have provided more controlled exposures that better match outdoor exposures. Despite the recognized limitations of accelerated test methods, this weatherability protocol served the automotive coating industry reasonably well until roughly 10 years ago.

Although no one knew it at the time, the failure of conventional weatherability testing basically coincided with the rapid change in automotive coating technologies that began around 1980 and is still continuing. The main drivers for this revolution have been the need to improve corrosion resistance, to reduce solvent emissions from the painting process and to improve the initial gloss and gloss retention. The issue of corrosion resistance has been discussed in detail by Dickie.[5] Suffice it to say that the development of cathodic electrocoat, together with the increased use of galvanized steel, has greatly improved in-service corrosion performance. In fact, the corrosion protection afforded by cathodic electrocoat was so good that additional spray primers were not required for corrosion protection. Prior to the mid-70s, automotive topcoat technologies were based on monocoat low solids acrylic enamels or lacquers. Gloss retention was considered to be the most important appearance factor. Gloss loss tends to be gradual. The rate of gloss loss depended both on coating resin and pigmentation. Metallics tended to lose gloss faster than non-metallics. Gloss loss in-service was such that customers were required to wax their vehicles on a regular basis to maintain appearance. The main role of testing was to eliminate coatings with very high gloss loss rates. Such coatings could be readily identified after one to two years of Florida exposure.

The need for lower solvent emissions led to the development of high-solids enamels which were based on relatively low molecular weight acrylic resins. Prototype high-solids coatings tended to have higher gloss loss rates than their low solids counterparts. To improve gloss retention, light stabilizers (ultraviolet light absorbers, UVAs, and hindered amine light stabilizers, HALS) were added to high-solids coatings. With proper stabilization, high solids monocoats were developed that were equivalent to or better than low solids monocoats for gloss retention.

The development of basecoat/clearcoat systems dramatically improved both initial appearance and gloss retention. High gloss levels could often be maintained for five years or longer in Florida exposure tests. Initially, basecoat/clearcoat systems were based on low solids acrylics; however, high-solids versions were introduced by the mid-80s. A critical factor for weatherability testing was that new failure modes were encountered during the development of basecoat/clearcoat systems. Rather than gloss loss, basecoat/clearcoats tended to fail under certain circumstances by either cracking or delamination. For example, basecoat-clearcoat delamination was observed after several years in Florida exposure on test samples in which the UVA was purposely left out. Volatility of the UVA during baking was identified as an issue and improved UVAs were developed. These improved UVAs were considered to be essentially permanent in the coating.[6,7] Cracking was observed in certain formulations after very long exposure times to harsh accelerated tests. The effect of resin and crosslinker chemistry on cracking was studied extensively. This led to significant changes in both resin and crosslinker technologies. The fact that basecoat/clearcoat systems could be exposed for a much longer time than typical monocoats without loss of gloss led to the belief that these systems were inherently more durable.

In retrospect, several issues with the conventional weatherability protocol can be identified. For example, the long exposure times and the fact that failures tended to occur with little prior warning led to much greater reliance on accelerated test results. At the same time, the rapid changes in coating chemistry reduced the reliability of many common accelerated tests (i.e., accelerated factors were not known with confidence). In addition, conventional weatherability testing focuses on a specific outdoor exposure (i.e., Florida) rather than on in-service performance. It does not provide any quantitative way to relate in-service performance with the results of either laboratory or outdoor exposures.[8] In large part, this is a result of the fact that the typical times to failure in service are highly variable. Since failure levels after 10 years in service of as little as a few percent may be considered to be unacceptable, service life prediction methodologies must be able to handle the large variability that is observed in practice. The methodologies must also be able to deal with multiple failure modes, and must be able to relate through quantitative models, the

results of a variety of test protocols to in-service performance. Clearly, conventional weatherability testing does not meet these criteria.

Extensive research has been undertaken to address the deficiencies in weatherability testing. The research has taken two basic directions. The first focuses on measurements of the chemistry of weathering. By relating physical failure to chemistry (e.g., photooxidation), it is possible to develop a better understanding of the effects of different exposure conditions on material performance. Since chemical changes can often be detected before physical failure, this can improve the reliability of predictions based on the combination of short term outdoor testing and laboratory testing.[2] It also makes possible the development of mechanistic physico-chemical models of failure as opposed to purely empirical models. These efforts have recently been reviewed by Dickie[5] and Bauer.[4,9]

The second direction involves developing methodologies to deal with the inherent variability of failure using reliability theory. Reliability theory has been widely used to evaluate electronic and mechanical components. The application of reliability theory to coating weatherability has been reviewed by Martin et al.[8] Most applications have involved using empirical models of failure. In this paper, a formalism to combine quantitative physico-chemical models of weathering failure with statistical analysis of parameter variability is presented. The goal is to be able to estimate in-service failure rates as a function of material and processing parameters (including the variability of these parameters). Since photooxidation plays a dominant role in most weathering processes, key exposure parameters include light intensity, wavelength distributions, temperature, and humidity. Variations in these parameters are used to generate an "exposure distribution function" for coating photooxidation. For failure modes driven by photooxidation, the time-to-failure can be expressed as a product of the exposure function and a function of key material and processing parameters. The material and processing function depends on the specific mechanism of failure. For illustration purposes, equations for time-to-failure are derived for two different possible mechanisms of coating delamination. The distribution function for time-to-failure can be calculated in terms of the distribution functions for the key parameters using relatively simple mathematical methods. The examples demonstrate why conventional weatherability testing did not anticipate in-service failures and how to modify testing protocols to improve reliability.

ESTIMATION OF AN EXPOSURE DISTRIBUTION FUNCTION

To calculate an exposure distribution function, it is necessary to first identify the key exposure parameters, determine the function that relates the value of these parameters to time-to-failure, and to determine the variation in these parameters. In principle, there will be a unique exposure distribution function for each mode of failure. Since photooxidation is a critical parameter for most coating weathering failures, we will derive an estimation of the distribution of in-service photooxidation rates. The key exposure parameters for coating photooxidation are ultraviolet light intensity, the distribution of that intensity with wavelength, temperature, and moisture. All of the exposure parameters vary both with geographical location as well as seasonally.[10] For the purposes of this exercise, we limit the discussion to variations within the continental United States. The total amount of ultraviolet light per year varies geographically by roughly a factor of two being highest in the southern (particularly southwest) portions of the country and lowest in the Pacific Northwest and upper New England. The seasonal variation of UV light intensity ranges from a factor of 2 (summer to winter ratio) in the southern portion of the country to over a factor of five in the northern portion. With the exception of the southwestern U.S. which has a significantly higher level of total UV light, and total UV dosage in the summer varies only by about 20% over the continental U.S. The wavelength distribution of light intensity also varies with location and season. In general, high UV light intensities will tend to have higher relative levels of light at shorter wavelengths. Ideally, the variation in the intensity distribution with wavelength would be combined with an action spectrum for coating photooxidation to determine the geographical variation in photooxidation rate. Unfortunately, photooxidation action spectra have not been measured for common coatings used in automotive topcoats. Fortunately, the geographical dependence of wavelength distribution during the summer when UV levels are highest is not large and will be ignored in this version of the exposure distribution function.

Coating photooxidation rates also depend on coating temperature. Coating temperature will be a function of

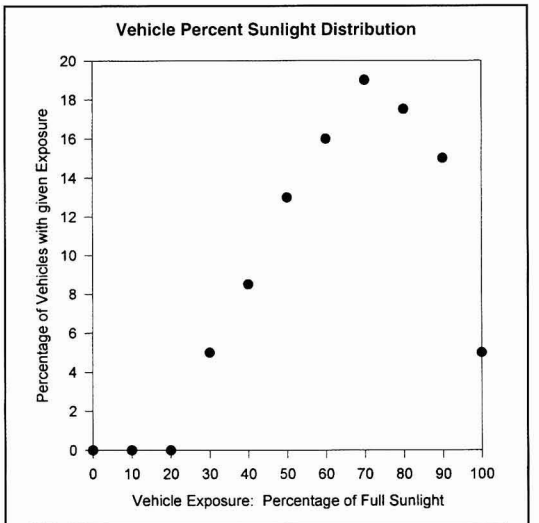

Figure 2—Estimated percentage of vehicles that are exposed to a given percentage of available sunlight.

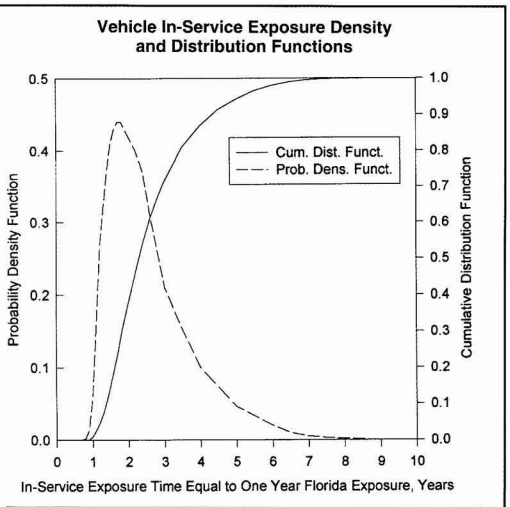

Figure 3—Estimated exposure probability density and cumulative distribution function for in-service coating photooxidation. The abscissa is the years in service equivalent to a long-term average continuous Florida exposure of one year. The in-service distribution functions are calculated from the continuous distribution function of Figure 1 and the distribution of percent sunlight received in service from Figure 2.

air temperature, light intensity, and coating color. The geographical temperature data that is available is, of course, air temperature (average, high, and low). Since we are interested in the temperature during peak light intensity, the air temperature that would seem to be most relevant is the mean daily high. Mean daily highs in January vary from 28°F in northern New England to 75°F in Florida while mean daily highs in July vary from 78°F in northern New England to 103°F in southwest Arizona. The mean daily high and the UV light intensity are correlated with one another; that is, they cannot be treated as independent random variables. In the analysis that follows, a particular function of intensity and temperature will be assumed to be a random variable. Humidity and rainfall also vary with geographical location. If we consider only the moisture conditions when light intensities and temperature are high, then to a first approximation one can divide the country into relatively wet (>1.5 inches of rain per month) and relatively dry (< 0.5 inches per month) regions with most of the country being in the relatively wet region. The most significant "dry" region is the southwestern U.S.

The light intensity, temperature, and humidity data described above are long-term averages. The calculation of an exposure distribution function that is designed to predict future performance will necessarily be an estimation if for no other reason than the fact that weather is simply not reproducible. UV light intensities vary by as much as ± 20% from year to year. Even long-term (5-10 year) averages vary by as much as ± 10% in a given location. Temperature and moisture conditions also vary significantly.

Based on the considerations presented, it is possible to estimate the variation in the critical exposure parameters as a function of geographical location. It is also necessary to determine how variations in these parameters affect the photooxidation rate for the particular failure mode under consideration. The fundamental studies of photooxidation are not extensive enough to derive a mechanistic dependence of photooxidation on intensity, temperature, and moisture. It is possible to conclude that for a given, constant exposure condition, the photooxidation rate for a given coating will be roughly constant over the course of the exposure.[11] Comparison of outdoor weathering results with xenon arc and Emmaqua weathering results suggests that for a given coating, the extent of photooxidation after a given time is proportional to the total dose of UV light. This observation is reasonably consistent with the current understanding of coating photooxidation kinetics.[12]

The dependence of coating photooxidation on temperature can be modeled using an Arrhenius dependence. Except for the effect of moisture which will be discussed in the following, we can express the amount of photooxidation for a given coating that occurs in a year in any particular location as,

$$\text{Photo} - \text{ox Extent} = C \int_0^1 I(t)\, e^{\frac{-E_a}{RT(t)}}\, dt \qquad (1)$$

Based on comparisons of Florida black box (elevated temperature) and open rack exposures as well as measurements of free radical formation rates as a function of temperature, we estimate the activation energy for photooxidation in coatings to be about 7 kcal/mole.[13] The distribution of photooxidation rates from location to location is not sensitive to variations of activation energy between 5 and 10 kcal/mole.

As discussed previously, the temperature used in equation (1) should be coating temperature. For a given color, the coating temperature will be higher than the air temperature by an amount proportional to the light intensity. Considering that most of the photooxidation occurs during periods of high light intensity and temperature, it is a reasonable assumption that for a given color, the coating temperature is offset from the air temperature by a constant amount.* Under these conditions, variations in the mean daily high will approximate variations in actual coating temperature.

Under the previously mentioned assumptions, equation (1) can be used together with monthly values of mean daily high temperatures and average monthly UV intensities to estimate the extent of photooxidation at

*Different colors will have different part temperatures at the same light intensity and air temperature. This will be true both in-service as well as in Florida and laboratory exposure testing. Typically, air temperatures (or black panel temperatures in laboratory tests) are monitored, not part temperatures. Material parameters determined by these tests will depend on color since color will affect part temperature. Under these conditions deriving an in-service exposure distribution function relative to Florida requires understanding of how the difference between part and air temperature varies with location and season. Since the effect of color on temperature offset will be roughly independent of geography during the summer months when photooxidation is highest, the assumption of a constant offset used above seems reasonable. In the future, it would be desirable to determine material parameters using actual part temperatures with suitable modification of the exposure distribution function.

different geographical locations. Since the goal is to predict the distribution of time-to-failure, it is convenient to express the exposure distribution function in terms of years of exposure to reach a photooxidation dose that would be achieved during an "average" year of continuous exposure in Florida (i.e., we determine the distribution function of the inverse of the photooxidation rate as given in equation (1). Thus, in this formalism, the exposure factor, EX, for an outdoor Florida exposure (long term average) has a value of 1. The exposure factor for outdoor exposure in Arizona is estimated to be around 0.80 (i.e., Arizona is roughly 25% harsher than Florida), while the outdoor exposure factor in Michigan is ~2 (i.e., a two year exposure in Michigan is equivalent to a one year exposure in Florida). The observed correlation between Florida and Michigan exposures of a factor of 2 in harshness agrees well with most coating performance results. The prediction that Arizona is harsher than Florida does not agree, however. This is a result of the effect of humidity and moisture on photooxidative degradation. Several effects of moisture have been observed. First, moisture can extract degradation products from the coating leading to higher rates of coating erosion (and gloss loss). Second, moisture can accumulate at weakened interfaces leading to faster delamination. Finally, humidity can actually increase the photooxidation rate in some (acrylic melamine) coatings by as much as a factor of 2.[14] For these reasons, harshness in dry regions is significantly smaller than that predicted by equation (1) (which ignores the effect of moisture). We have arbitrarily reduced the harshness factor for relatively dry regions of the U.S. by a factor of 25%. It should be noted that such a modification may not be valid for all coatings and failure modes. To calculate the exposure factor distribution function, it is necessary to weight the exposure factors at different geographical locations by the population density at that location. The probability density and cumulative distribution functions for the photooxidation exposure factor as determined by this procedure are shown in *Figure* 1. The definitions of probability density and cumulative distribution functions of random variables are reviewed in the Appendix. Various manipulations of these functions that will be necessary to derive time-to-failure distributions are also presented. The variation in harshness over the continental U.S. is predicted to range over a factor of about 3.

The distribution function in *Figure* 1 represents exposure harshness for a horizontal panel that is continuously exposed. Vehicle bodies can be thought of as having horizontal and vertical panels. The average UV light intensity incident on a vertical panel will be significantly less than that on a horizontal panel.[†] Nearly all photooxidative coating failures on vehicles are first observed on horizontal surfaces. Vehicles are, in general, not continuously exposed, nor do they necessarily remain in one location over the life of the vehicle. The percentage of UV dosage relative to continuous exposure that any vehicle receives depends primarily on the daily parking habits of the driver. In the absence of detailed survey data concerning vehicle parking habits, we will assume an arbitrary, but reasonable, percent sunlight distribution function. As shown in *Figure* 2, although the distribution is quite broad, most vehicles are assumed to be exposed to sunlight most of the time.

The vehicle in-service exposure factor distribution function can be calculated by combining the population weighted geographical distribution of outdoor exposure factors given in *Figure* 1 with the distribution of the percentage of time vehicles are exposed (*Figure* 2) (see Appendix for further details). As shown in *Figure* 3, this distribution is quite broad covering differences in harshness of almost a factor of 10. Outdoor exposure in Florida is (as intended) a relatively harsh test. Less than two percent of the vehicles in service are expected to see exposures that are equivalent to continuous exposure in Florida. This fraction would be somewhat larger for failure modes that are not moisture sensitive (under these conditions, the southwestern U.S. exposures would be significantly harsher than Florida). The mean vehicle in service sees exposures that are roughly half as harsh as outdoor exposure in Florida. Thus, a five year Florida exposure is equivalent to 10 years exposure for an "average" vehicle. However, one cannot conclude that a coating that passes five years Florida testing will be successful in service. It is possible to derive an approximate relationship between the time-to-failure in Florida and the predicted percent failure after 10 years in service from the cumulative distribution in *Figure* 3. The accu-

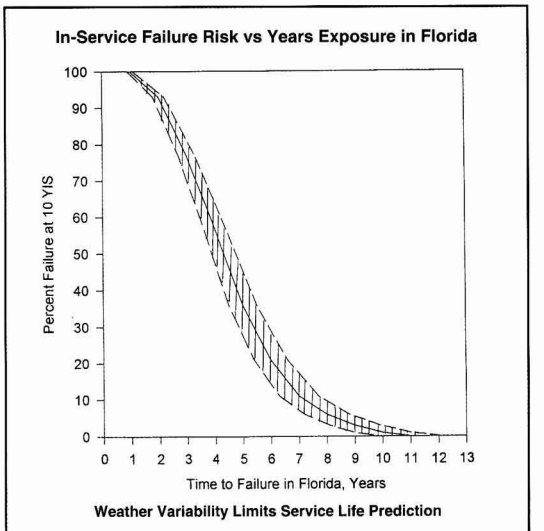

Figure 4—Estimated percent failure after 10 years in service versus failure time in Florida. The estimation considers only variation in exposure harshness and ignores processing and material variability. The solid line indicates the prediction assuming the long-term average weather values used in Figures 1 and 3. The band indicates the effect of a 10% variation in harshness.

[†]It should be noted that as much as 50% of the shorter wavelength UV light is scattered rather than direct, compared is <15% for visible light. Thus, the difference between vertical and horizontal UV dosage is not as great as for that for visible light. It can be reasonably estimated that the UV dose on a horizontal panel is roughly twice that of a randomly oriented vertical panel.

racy of this relationship is limited by the accuracy of the assumed percent sunlight distribution function in *Figure* 2, and by the fact that material and process variability are ignored. The accuracy of the relationship is also limited by the lack of reproducibility of the weather. The predicted relationship between time-to-failure in Florida and 10 YIS performance is shown in *Figure* 4. The solid line is the prediction based on long-term average weather data. The band indicates the uncertainty that results from a 10% long-term variation in weather harshness. Despite the semi-quantitative nature of derivation of the plot in *Figure* 4, this estimation clearly illustrates the problem of relying on outdoor Florida testing to assess in-service performance or validate laboratory test results. Very long Florida exposures (up to 10 years) are required to insure that failures in service will be minimal. Similar conclusions can be drawn concerning accelerated laboratory testing. For example, the acceleration factor for a typical xenon are exposure (boro-boro filters) is around 5. Thus, over 15,000 hours of exposure would be required to insure in-service performance. When the time-to-failure is very sensitive to processing or material variations, it becomes impossible to derive a unique relationship between in-service failure rates and the time to failure in Florida for an "average" coating. Under these conditions, calculation of the distribution of in-service failure times requires consideration of the variability in material and process parameters as well as the variability in exposure harshness. Such calculations are performed in the following for two different possible mechanisms of delamination.

DEVELOPMENT OF MODELS OF TIME-TO-FAILURE

The first step in developing quantitative models for time-to-failure involves identifying all likely failure modes. This is not as easy as it sounds. In fact, there are examples of coating failure modes that were observed in service without ever being anticipated in the laboratory. Up until recently, one of the major problems has been the lack of fundamental studies of the effects of material composition, processing, and exposure on the chemistry and physics of failure. The studies that are now being made together with the wealth of historical information concerning failures in coatings provide a sound starting place to decide which possible failure modes are most relevant for a given application. Nevertheless, it must be admitted that for new systems it is virtually impossible to guarantee that all possible failure modes will be identified prior to implementation. The formalism presented here can only calculate risks associated with specific failure modes that are identified.

Once a particular mode of failure has been identified, the next step is to determine the root cause (chemical and physical) of failure and the key parameters that affect the time-to-failure. For each root cause, it is necessary to derive a quantitative equation for time-to-failure. Validation of this equation is critical. For illustration purposes, we will develop expressions for time-to-failure based on two different hypothetical mechanisms that could potentially lead to coating delamination. The necessary experiments to validate the models will also be described, and the implications for coating specification and testing will be discussed. Both mechanisms involve transmission of UV light through a topcoat to a lower layer. The lower layer undergoes photooxidation leading to delamination. The first mechanism assumes that the percent transmission of light through the topcoat does not change with time. For this example, the transmission is small, but the underlying layer is assumed to be fairly photosensitive. The second mechanism assumes that the initial UV transmission to the lower layer is virtually zero, but increased with time due to the loss of ultraviolet light absorber (UVA) from the upper layer.

Constant UV Light Transmission

For this case, the root cause of delamination is assumed to be transmission of low levels of light through the topcoat, inducing photooxidation of the photosensitive underlayer (which in a real example might be either a plastic substrate or primer). Photooxidation of the under layer weakens the interface between the two layers leading to delamination. For convenience, the topcoat is chosen to be black since the transmission of light through a black coating is independent of wavelength. The intensity of light at the top of the lower layer is related to the intensity at the top of the upper layer of the coating, I_o, by Beer's law.

$$I = I_o\, 10^{-AL} \qquad (2)$$

where A is the absorbance per unit coating film thickness and L is the topcoat film thickness. We assume that substrate photooxidation can be described by equation (1) and that delamination occurs after a certain level of photooxidation is reached. For this mechanism of delamination, the time-to-failure can be given by,

$$t_f = P(\text{substrate})\, 10^{AL}\, EX \qquad (3)$$

where the value of P reflects the sensitivity of the particular underlayer to photooxidation and EX is the exposure harshness variable whose density and distribution functions are given in *Figure* 3.

Equation (3) expressed time-to-failure in terms of substrate, coating, and exposure variables. It is now necessary to validate the model and determine values for different material parameters. The parameter A can be measured directly via transmission measurements. The other parameters and model validation can be performed by measuring time-to-failure as a function of film thickness, light intensity, and temperature (we assume that the value obtained for the activation energy in this example is similar to that used to generate *Figure* 3). The value of P might also be found to depend on plastic or primer processing parameters. For illustration purposes we will assume that P is a material constant that does not vary. These experiments are best done under controlled laboratory conditions since in any outdoor exposure, conditions will be variable and not reproducible. It has to be recognized that while studies of chemical change (i.e., photooxidation rate) can be done under constant exposure conditions, the actual physical failure may re-

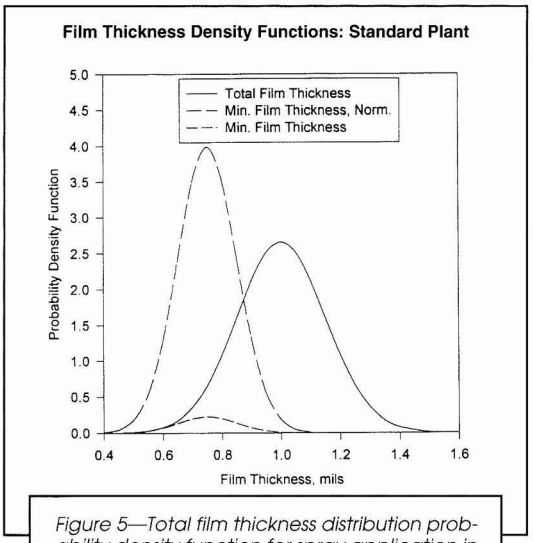

Figure 5—Total film thickness distribution probability density function for spray application in a hypothetical plant. The mean film thickness is 1.0 mils and the standard deviation is 0.15 mil. The minimum film thickness distribution function is also shown. The average minimum film thickness is 0.75 and the standard deviation is 0.1 mil.

quire exposure to the cyclic conditions (light-dark, hot-cold, wet-dry) that occur outdoors. It is clearly important to understand the physics of failure as well as the chemistry. Outdoor exposures on selected samples (i.e., samples designed to fail in a reasonably short time) provide a very useful reality check on laboratory exposure results. Such exposures also serve to validate the use of average exposure values to represent the effect of cyclic variations in intensity and temperature on the rate of photooxidation. This requires that we have a measure of the intensity, temperature, and other variables for the outdoor exposure that can be directly related to laboratory conditions.

It is also important to note that in service, delamination occurs without the customer doing anything. Cyclic exposure stresses can be sufficient to cause delamination of degraded interfaces. Laboratory testing simulates these stresses by either cyclic exposures, or by adhesion testing or both. In the delamination case studied here, we will assume that the in-service time-to-delamination can be approximated by conventional adhesion testing. In a real case, such assumptions would have to be validated. It is quite likely that in-service failures will occur over some range of cumulative damage. Laboratory testing should be designed to predict the smallest possible chemical damage required to induce failure.

The accuracy with which it is possible to construct quantitative failure models using controlled laboratory exposures is limited by the accuracy with which we can measure exposure conditions. While conventional laboratory weathering chambers are certainly more reproducible than outdoor exposure, they are hardly free from variability. Fischer has discussed the reproducibility of various standard laboratory chambers and cycles.[15] For a given type of chamber and test protocol, the chamber-to-chamber variation in "harshness" appears to be at least ± 10%. Accurate measurements of other parameters are also important. For example, measurements of film thickness are typically accurate to around ± 5-10%. This limits the accuracy of a determination of A. Finally, since time-to-failure is determined by adhesion testing at specific times, the accuracy of the value of t_f is limited by how often adhesion is tested and by the operator's ability to determine when loss of adhesion first occurs. It should not be surprising that variations of ± 20% will be observed even under controlled conditions.

To simplify the discussion, we assume that P and A in equation (3) are constants with P = 0.03 and A = 3. Since the distribution of EX is known (*Figure* 3), to calculate the distribution of times-to-failure, it is only necessary to determine the distribution of film thickness, L. Since film thickness is a critical parameter for all delamination issues and many other potential coating problems, some discussion of film thickness variability is warranted. Typically, film thicknesses are measured over different locations on a part (or vehicle) for several parts. As noted in the Appendix, the total distribution of film thicknesses can usually be fit by a Gaussian density function. A typical distribution is shown in *Figure* 5. In this example, the overall mean is 1.0 mil and the overall standard deviation is 0.15 mil. This ratio of the standard deviation to the mean is typical for spray application of a coating on a reasonably complex shape. In the case where coating delamination occurs as a result of light transmission through the coating, failure will occur first at the location with the thinnest film build (highest transmission). Thus, the most relevant film thickness distribution is the

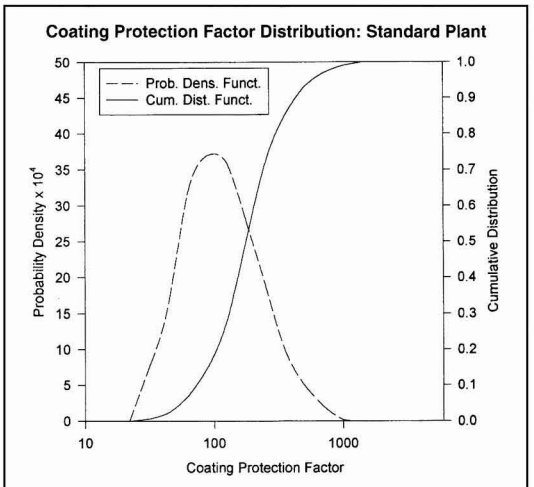

Figure 6—The coating protection factor probability density and cumulative distribution functions for a coating with the minimum film thickness distribution function of Figure 5 and a percent transmission of 0.1% at 1 mil (A=3).

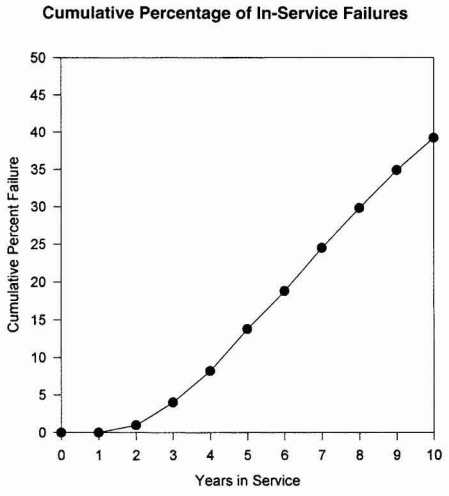

Figure 7—Cumulative percentage of in-service failures for the black monocoat where P = 0.03, A = 3, and whose minimum film thickness distribution function is given by Figure 5. A coating at the average minimum film thickness is predicted to survive over five years of Florida weatherability testing. Significant failures in service are seen after two years.

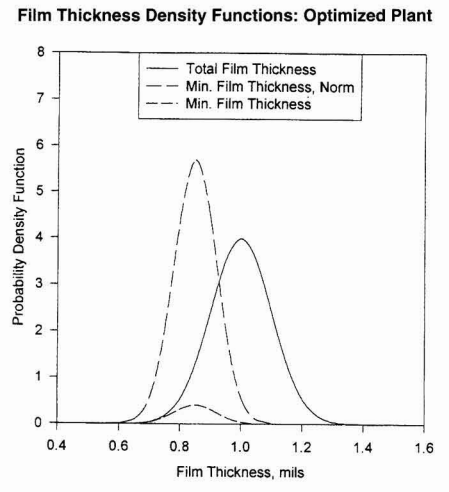

Figure 8—Total film thickness distribution probability density function for spray application in an optimized plant. The mean film thickness is 1.0 mils and the standard deviation is 0.10 mil. The minimum film thickness distribution is also shown. The average minimum film thickness is 0.85 and the standard deviation is 0.07 mil. Compare to Figure 5.

probability density of the minimum film thickness on a given part. A typical minimum film thickness density function is also shown in *Figure* 5. In this example, the minimum film thickness has a mean of 0.75 mil and a standard deviation of 0.1 mil. Using equation (3) and the assumed values of P and A, the predicted Florida (EX = 1) weatherability can be estimated to be 30 years for a coating with a film thickness = 1 mil (target value) and 5.4 years for a coating with film thickness = 0.75 mil (average minimum value). It will become clear that weatherability testing of target and even average minimum film thicknesses may not adequately predict weatherability. Following equations (A6–A8), it is possible to calculate the distribution function of the coating protection factor, 10^{AL}, from the distribution of the minimum film thickness given in *Figure* 5. The distribution function for A = 3 is shown in *Figure* 6. The strong dependence of the coating protection factor on film thickness leads to a very broad distribution function for this quantity.

According to equation (A12), the time-to-failure distribution function, $F_{TF}(t)$ is given by:

$$F_{TF}(t) = \int_0^{\infty} F_{EX}\left(\frac{t}{0.03x}\right) f_{CP}(x)\, dx \qquad (4)$$

where f_{CP} is the coating protection factor density function in *Figure* 6 and F_{EX} is the exposure cumulative distribution function given in *Figure* 3. The time-to-failure distribution function is shown in *Figure* 7. Again, it should be noted that the failure curve in *Figure* 7 assumes long term average weather. Weather variability will broaden the curve in a manner similar to *Figure* 4. *Figure* 7 illustrates yet another deficiency with conventional weatherability testing. Despite the fact that a coating at the average minimum film thickness is predicted to pass five years Florida exposure, failures are observed in service in as short a time as two years. In this case, the early failures are a result of the strong dependence of coating protection factor on film thickness and the existence of samples whose minimum film thickness is significantly below the average minimum. If all samples had a minimum film thickness of 0.75 mil, then the predicted 10 year in-service failure rate would have been ~30% according to *Figure* 4. No failures would have been seen prior to five years in service. Comparison of these predictions with those in *Figure* 7 confirm the importance of understanding process variability, particularly in understanding early failure rates. These disparities result from the fact that conventional weathering protocols did not require testing multiple samples manufactured under actual production conditions.

When failures are observed in-service, conventional weathering does not offer much quantitative assistance in resolving the problem, even if the basic mechanism is known. A significant advantage of this approach is that it is straightforward to evaluate changes in material and processes in terms of their impact on in-service performance. In the hypothetical failure mode, for example, one could consider adding stabilizers to the substrate to increase its photostability. Relatively short-term tests could be run to determine the increase in "P" value that might result from such a change. One could also in-

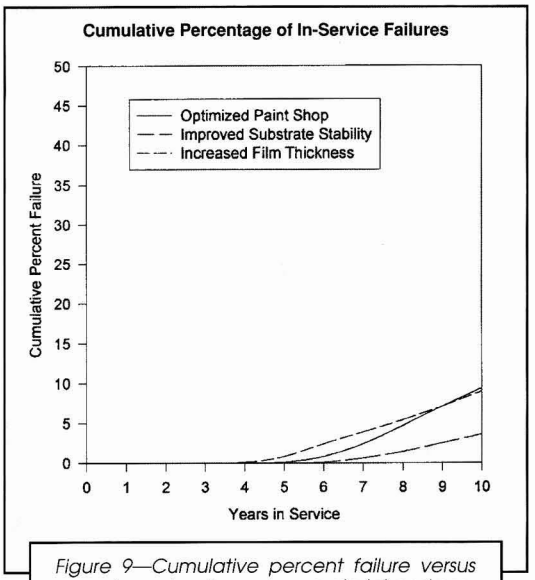

Figure 9—Cumulative percent failure versus years in service for various material and process modifications described in the test. Compare to results of Figure 7.

crease the target film thickness (from 1.0 to 1.2 mil) or improve the application process control to reduce the standard deviation of the film thickness distribution shown in *Figure* 8. The effects of these material and processing changes on cumulative failure rates are shown in *Figure* 9. For this hypothetical example, increasing the substrate stability by a factor of 3.3 (P = 0.1) reduces the failure rate after 10 years from 40% to 3%. Similarly, increasing the film thickness to 1.2 mil or optimizing the film thickness distribution reduces the failure rates to eight percent. The importance of processing and material variability on failure rates increases in relative importance as the overall failure rate decreases. Quantitative failure models are essential for reasonable cost-benefit analysis of modifications to improve weatherability.

Delamination Resulting from Loss of UVA

UVAs are typically added to coatings to absorb the UV light that induces photooxidation in the clearcoat and to protect the underlying layers from UV light. Until recently, it was assumed that UVAs were essentially permanent in the coating.[6,7] In 1993, this assumption was independently shown to be false by at least three laboratories.[16-18] For illustration purposes it is easiest to calculate the effect of UVA loss on the basecoat-clearcoat interface assuming that only UV light affects the interface. The product of the initial UVA concentration, $[UVA]_o$ and the UVA extinction coefficient can be used to define the initial absorbance per mil of coating, A_o^*. The initial absorbance, A_o, is just the product of the initial absorbance per mil and the clearcoat film thickness in mils.

A key finding of Pickett and Moore regarding UVA loss is that UVAs are self protecting.[17] The absorbance of UV light by UVAs in the upper layers of the film reduces the rate of loss of UVA in the lower layers by reducing the UV light intensity. The following expression for the rate of loss of UVA from a coating can be written:

$$\frac{d[UVA]}{dt} = -k\langle I\rangle\,[UVA] \qquad (5)$$

where,

$$\langle I\rangle = \frac{1-10^{-A}}{2.303A} \qquad (6)$$

where A is the total clearcoat UVA absorbance. Since A is proportional to [UVA], equation (5) can be rewritten as,

$$\frac{dA}{dt} = -k\,(1-10^{-A}) \qquad (7)$$

Integrating equation (7) yields the following expression for the variation in absorbance with time,

$$A(t) = \log\,(10^{A_o-kt} - 10^{-kt} + 1) \qquad (8)$$

where k is the loss rate. The cumulative dose of UV light at the top of the basecoat after time T is given by the following integration:

$$\int_0^T 10^{-A(t)}\,dt = T + \frac{A(T)}{k} - \frac{A_o}{k} \qquad (9)$$

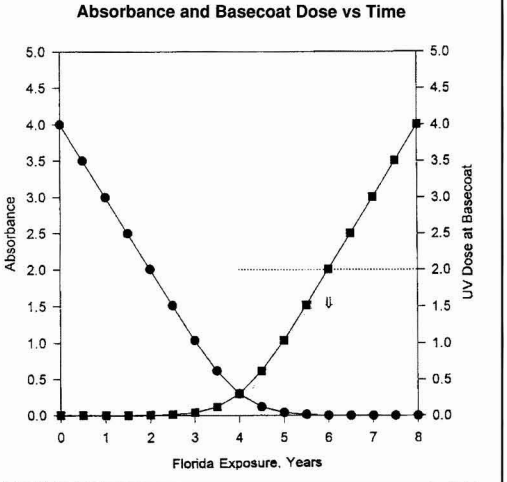

Figure 10—Loss of peak absorbance and cumulative dose of UV light at basecoat versus exposure time in Florida for a hypothetical basecoat-clearcoat. The loss rate is one absorbance unit per year. The value of $A_o^* L/k$ is 4. As indicated by the dashed horizontal line, delamination is assumed to occur at a cumulative dose equivalent to two years direct exposure in Florida (t_{BC} = 2), leading to delamination failure after six years.

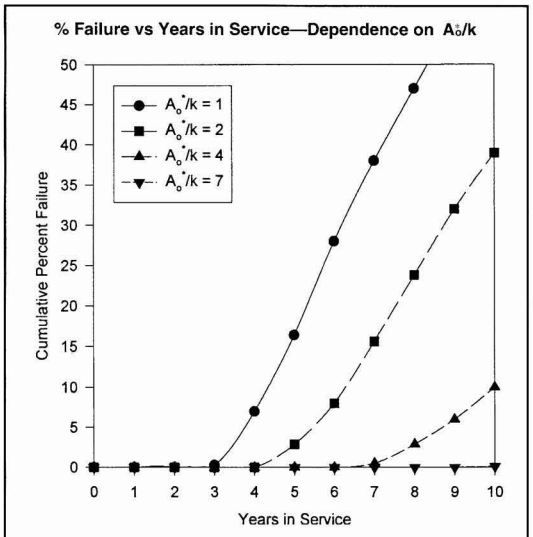

Figure 11—Cumulative percent failure versus years in service as a function of A^*_o/k for coatings with t_{BC} = 2 and an average minimum film thickness of 1.5 mils.

Plots of absorbance and cumulative basecoat dose are shown in *Figure* 10. The cumulative dose increases very slowly at first but then increases rapidly as the absorbance drops below 1. Failure is assumed to occur when the cumulative dose exceeds a particular value that depends on the stability of the basecoat-clearcoat interface.

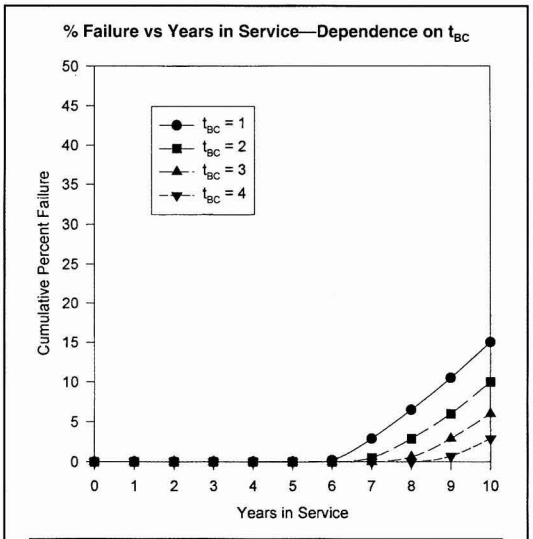

Figure 12—Cumulative percent failure versus years in service as a function of t_{BC} for coatings with A^*_o/k = 4 and an average minimum film thickness of 1.5 mils.

The cumulative dose to induce failure can be measured directly by exposing basecoat-clearcoats with no UVA fortification. The time-to-failure for such a system, t_{BC}, is assumed to be equivalent to the cumulative dose.

Early studies of unfortified basecoat-clearcoats suggest that the value of t_{BC} is at least one (i.e., an unprotected interface will resist delamination for at least one year in Florida). Under these conditions, the value of A at failure is very low and equation (9) can be rewritten to yield a simple expression for delamination time in Florida,

$$t_D(Fl.) = t_{BC} + \frac{A^*_o}{k} L \qquad (10)$$

where we have replaced A_o by $A^*_o L$. Since both t_{BC} and $1/k$ are proportional to EX, the time to delamination in service is given by,

$$t_D = EX\left(t_{BC} + \frac{A^*_o}{k} L\right) \qquad (11)$$

The value of A^*_o/k defines a clearcoat figure of merit, which will depend primarily on UVA selection and clearcoat chemistry. As illustrated in *Figure* 10, the value of A^*_o/k can be determined from reasonably short term exposures in Florida (or in an accelerated test with a known relationship to Florida). The minimum clearcoat film thickness typically has a mean of around 1.5 mil and a standard deviation of 0.2 mil (that is, it is similar in shape to the distribution given in *Figure* 5). As noted, t_{BC} can be estimated by exposing unfortified basecoat-clearcoats in Florida or a suitable accelerated test. The development of quantitative failure models provide key

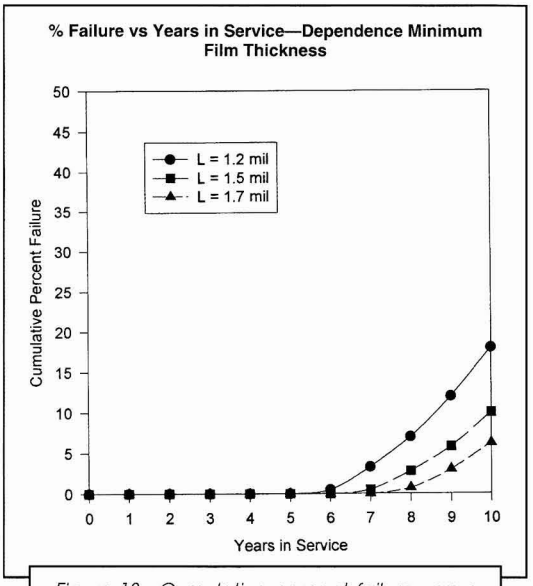

Figure 13—Cumulative percent failure versus years in service as a function of minimum average film thickness for coatings with A^*_o/k = 4 and t_{BC} = 2.

insights into measurement of specific coating properties that will be critical to overall weatherability. Often it will be possible to determine the values of key properties from relatively short-term exposures leading to more rapid development of more durable systems.

The time-to-failure distribution function can be calculated from the EX and L distribution functions (1.5 mil average minimum) for various hypothetical values of A_o^*/k and t_{BC} as shown in *Figures* 11 and 12. The dependence of the time-to-failure on average minimum film thickness is shown in *Figure* 13. This example clearly illustrates the power of this new approach to set both material and process specifications to guarantee acceptable long-term weatherability. Of course, to be applied to real in-service problems, the failure model must be carefully validated with all assumptions tested.

Since the dependence of failure time on film thickness is linear rather than exponential, this failure mode is not as sensitive to process variation as the previous case. To a reasonable approximation, the cumulative percent failure after 10 years-in-service can be estimated from *Figure* 4 using experimental average minimum film thicknesses together with values of A_o^*/k and t_{BC} in equation (10) to estimate the time-to-failure in Florida. For example, if $A_o^*/k = 2$, $t_{BC} = 2$, and the average minimum clearcoat thickness is 1.5, then the predicted failure time in Florida would be five years leading to an estimated in-service failure rate after 10 years of about 38% in good agreement with *Figure* 11. If, on the other hand, $A_o^*/k = 4$ and $t_{BC} = 3$, then the predicted failure time in Florida would be nine years and the predicted failure rate from *Figure* 4 is three percent. Including the distribution of film thickness about the average minimum in the calculation increases the predicted failure rate in this case to 5-6% at 10 years in service (*Figure* 12).

CONCLUSION

In this paper, a formalism has been presented for estimating in-service failure rates in coatings. The formalism involves developing an analytic model for time-to-failure in terms of measurable material, process, and exposure variables. The distribution functions of the key variables are then determined. These distribution functions are then used to estimate the time-to-failure distribution function. A particularly important distribution function for in-service coating weatherability involves estimating the distribution of photooxidation rates as a function of geography, customer parking habit, etc. This distribution function was combined with material and process distribution functions to estimate the time-to-failure for two hypothetical coating delamination mechanisms. These examples demonstrated how failures in service can be observed in a relatively short time for systems that nominally pass extended weatherability testing, particularly when the failure mode is very sensitive to process variations. The broad distribution of in-service harshness combined with the fact that some vehicles will see exposure conditions that approach Florida in harshness, leads to the conclusion that very long Florida exposure times (up to 10 years) would be required to guarantee in-service performance using the conventional weatherability approach. Such long exposures are unrealistic.

The use of outdoor and laboratory testing in this formalism is considerably different than in conventional testing. In conventional weatherability testing, the goal of laboratory testing often seems to be to induce failures in as short a time as possible. Coatings are then ranked in a relative manner. This typically requires the use of unusually harsh exposure conditions. In particular, short wavelength UV light is often used. In this new formalism, the goal is to develop and validate a quantitative model that can be related to in-service performance. Laboratory testing is done to validate and modify the time-to-failure model and to determine the values of key parameters. It is clear that unless an excitation spectrum for a particular failure mode is generated, the use of short wavelength UV light to accelerate failure will not provide the necessary information for model development. In many cases, it may not be useful to spend the time to develop an excitation spectrum just so one can use short wavelength UV light to accelerate failure. Increasing UV light intensity appears to be a more reliable way to increase the photooxidation rate. It should also be noted that variations in material and processing parameters must also be evaluated. In fact, understanding of the limitations of a particular technology will be most apparent when systems are tested which have been "weakened" in a quantitative way. For example, the sensitivity of a substrate-coating system to delamination is most readily evaluated by testing coatings with relatively high transmissions using outdoor-like exposure conditions. In this formalism outdoor testing is just another means for validating the failure model. The use of a mechanistic failure model that has been validated using a combination of laboratory and outdoor testing provides a more rational alternative to in-service risk assessment than continued use of conventional weatherability testing.

ACKNOWLEDGMENTS

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APPENDIX

Manipulating Probability Distribution and Density Functions

As discussed previously, the exposure, material, and process parameters used in any time-to-failure model will not be constants but will vary. Mathematically, the parameters can be described as random variables. In general, the random variable X can be described by its cumulative distribution function, $F_X(t)$, or by its probability density function, $f_X(t)$. The cumulative distribution function is defined as equal to the probability that the value of the random variable X is less than equal to t:

$$F_X(t) = P(X \leq t) \tag{A1}$$

All of the random variables relevant to this work are positive so that,

$$F_x(0) = 0 \qquad F_X(\infty) = 1 \tag{A2}$$

The probability density function is just the derivative of the cumulative distribution function,

$$f_x(t) = \frac{dF_x(t)}{dt} \tag{A3}$$

Thus, the probability density indicates the relative population at a particular value.

Particular analytic distribution and density functions are often used to represent actual experimental data. For example, time-to-failure can often be fit by a Weibull distribution,

$$F_x(t) = 1 - e^{-\left(\frac{t}{\beta}\right)^{\alpha}} \tag{A4}$$

where ß is a scale factor and α is a shape parameter. It should be noted that this function is completely empirical and the values of the parameters cannot be determined based on studies of mechanism. Changes in materials or processes may affect both parameters in unpredictable ways. It is often assumed that laboratory test results can be related to outdoor test results by holding α constant and changing only ß. Extrapolation of laboratory results to predict in-service failure rates using this same approximation is equivalent to assuming that the variability in service life is due to variations in material and processing, not to variations in exposure harshness. In general, this assumption will not be valid for most weathering processes.

Most processing random variables such as coating thickness can be described by a Gaussian probability density function,

$$f_L(t) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(t-m)^2}{2\sigma^2}} \tag{A5}$$

where m is the mean value of film thickness and σ is the standard deviation. The ratio of the standard deviation to the mean defines how tightly the process is controlled.

It is often necessary to calculate the distribution function of one variable from the distribution function of another variable. In general if Y and X are random variables which are related by,

$$Y = g(X) \tag{A6}$$

then,

$$F_Y(g(t)) = F_X(t) \tag{A7}$$

or,

$$F_Y(s) = F_X(g^{-1}(s)) \tag{A8}$$

Typically, it is possible to express the time-to-failure as a combination of sums and products of parameters for which distribution functions can be determined. For random variables, X, Y, and Z where X and Y are independent and where,

$$Z = X + Y \tag{A9}$$

then the cumulative distribution of Z is given by

$$F_Z(t) = \int_0^{\infty} F_Y(t-s)\, f_X(s)\, ds = \int_0^{\infty} F_X(t-s)\, f_Y(s)\, ds \tag{A10}$$

If,

$$Z = XY \tag{A11}$$

then,

$$F_Z(t) = \int_0^{\infty} F_Y\left(\frac{t}{s}\right) f_X(s)\, ds = \int_0^{\infty} F_X\left(\frac{t}{s}\right) f_Y(s)\, ds \tag{A12}$$

Using these equations, it is possible to compute the cumulative distribution function for the time-to-failure from the distribution and density functions of individual parameters for an arbitrarily complex time-to-failure model.

** First Place Winner in 1996 Roon Awards Competition **

Mechanistic Considerations of Particle Size Effects on Film Properties of Hard/Soft Latex Blends

Sarah T. Eckersley and Bradley J. Helmer—The Dow Chemical Company*

Blends of hard (T_g ~ 60°C) and soft (T_g ~ 0°C) latexes were studied as a function of particle size ratio (R_{soft}/R_{hard}) and blend ratio (mass soft phase/mass hard phase). Addition of hard phase latex to the soft film forming latex significantly improved block resistance, even at blend ratios as low as 70/30. Film properties were not sacrificed, except at high concentrations of the hard phase (50/50). For a given blend ratio, the particle size ratio had a dramatic effect on the block resistance. For a 70/30 blend ratio, the block resistance of a blend with R_{soft}/R_{hard} = 4.0 was equivalent to that of a control latex having the same overall composition, but with a minimum film temperature 20°C higher than the blend.

The phenomenon can be explained in terms of the bulk and surface contributions to adhesion. The hard phase increases the elastic modulus (G') of the film. The magnitude of G' was found to increase with increasing R_{soft}/R_{hard}, an effect that is consistent with percolation theory. The effect of particle size ratio on the surface contribution to adhesion can be explained by particle packing. Visual models indicate that a high apparent surface concentration of hard particles would be expected for a large value of R_{soft}/R_{hard}, given ideal packing conditions. This effect was confirmed by scanning electron microscopy.

INTRODUCTION

The trend toward reducing the volatile organic content (VOC) of architectural coatings is motivating the development of a new generation of low or zero VOC water-based coatings. These latexes form coherent films below room temperature with minimal (or no) coalescent present to function as a plasticizer. While this is easy to achieve using a latex with a low glass transition temperature (T_g < 10°C), significant film properties are sacrificed, in particular block resistance. Blocking is the tendency of film surfaces to adhere to one another. In practice, blocking is seen when painted surfaces are brought into contact (e.g., shutting a recently painted window).

The challenge is to develop room temperature film forming latexes which exhibit improved block resistance. One approach is to blend latexes having two distinct glass transition temperatures. The blend is comprised of a low T_g latex (soft phase) which forms a coherent film at room temperature and a latex with a T_g well above room temperature (hard phase). As we will demonstrate, the blended latex exhibits desirable characteristics of both of the blend components.

The use of blended latexes in coatings has been the focus of recent attention. Friel[1] described the blending of a binder latex (T_g ~ 5°C) with a hard latex (T_g ~ 60°C), where the two constituent latexes were synthesized from the same co-monomers. The weight ratios of the two latexes were such that the soft latex was always present in a greater proportion. Significant improvement in the block resistance of the blends as compared to the soft binder latex alone was reported. It was claimed that the soft latex particle size should be substantially larger than that of the hard latex. Heuts et al., investigated a similar system.[2] They reported results for minimum film temperature (MFT), storage modulus, and hardness as a function of blend ratio. In all of the blend systems discussed, the constituent latexes had equal particle sizes.

Other latex blend technologies are described in the patent literature. Snyder[3] describes blending of a multistage film forming latex and a hard non-film forming

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Table 1—Typical Emulsion Polymerization Recipe (Control Latex)

	Wt%
Reactor Charge:	
Deionized water	41.4
Polystyrene seed latex (30%)	0.6
Monomer Feed:	
Butyl acrylate	26.1
Styrene	24.1
Methacrylic acid	1.0
Aqueous Feed:	
Deionized water	5.2
Dowfax 2EP (45%)	1.1
$(NH_4)_2S_2O_8$	0.3
NH_4OH (28%)	0.2

latex. Schmidt et al.,[4] produced bimodal blends of poly(styrene-co-butyl acrylate) particles; the only differences between the constituent latexes being the particle sizes. It was claimed that the bimodal latex produces a film with superior luster, presumably due to improved packing efficiency of the bimodal latex particles. Buckmann and Bakker[5] described the rheology, film formation behavior, and drying behavior of bimodal latex blends having equivalent glass transition temperatures.

Investigations of the drying rates of blends have been recently published. Winnik and Feng[6] described the drying behavior of blends of hard and soft latexes. They found that blends of hard and soft latexes dried more slowly than the corresponding soft latex alone. This phenomenon was observed up to a limiting ratio of hard/soft particles. These same authors also investigated the transparency of latex films as a function of soft phase T_g and particle diameter.[7]

Boyce et al.,[8] described work in which small quantities of a small particle size latex containing wet adhesion monomer were blended with large-size, low-cost binders such as poly(vinyl acetate-co-butyl acrylate). The advantage of this approach was the achievement of good wet adhesion at low cost due to the very small amount of a cyclic ureido monomer required.

The characteristics of blends made from equal particle size latexes have been thoroughly investigated in reference (2). It was the intention of this research to explore the advantages of blends composed of latexes having different particle size hard and soft components. Single component latex systems were included as comparative controls. Mechanistic considerations of film formation and the resulting film performance were also explored.

EXPERIMENTAL

Emulsion Polymerization

Poly(styrene-co-butyl acrylate) latexes were prepared by seeded, semi-continuous emulsion polymerization in an agitated one-gallon reactor. Reaction temperature was 90°C. The monomer mixture was fed to the reactor over a period of four hours, and the aqueous stream was fed over a period of 4.5 hr. A typical recipe is given in *Table* 1. The surfactant employed was Dowfax® 2A1 (sodium salt of dodecylated sulfonated diphenyl ether). Following polymerization, the latexes were neutralized with 28% NH_4OH to a final pH of 8.6-9.0. The latexes were characterized as described in the following.

Minimum Film Temperature

The method used for measuring MFT followed ASTM Method D 2354-68.[9] Minimum film temperatures for five different latexes were measured concurrently. Four subsequent tests were performed for the same latexes, yielding five replicate measurements which were then averaged. The position of the latexes on the MFT bar was randomized to minimize the effect of air flowrate. This procedure was used to minimize the error associated with the poor reproducibility and subjectivity of the single point determination.

Dynamic Mechanical Spectroscopy

A Rheometrics RDS-II dynamic mechanical spectrometer was used in forced oscillation mode. Film samples were approximately 2 mm thick. A parallel plate geometry (8 mm) was employed. Temperature sweeps were conducted between -20 and 120°C at a frequency of 1 rad·s^{-1}. Prior to each temperature sweep, a strain sweep was performed at the lowest temperature in the range, in order to confirm linear viscoelasticity and to select an initial strain for the temperature sweep. The initial strain selected ranged from 0.02 to 0.03%. The strain was increased throughout the run in order to maintain sufficient signal as the modulus decayed with temperature.

Table 2—Latex Characteristics

Latex	Styrene	Butyl Acrylate	Methacrylic Acid	D (nm)	Tg (°C)	MFT (°C)
C	47	51	2	176	24	25 ± 1
SS	37	61	2	115	10	0.9[a]
SM	37	61	2	306	6	3 ± 1
SL	37	61	2	475	9	1 ± 1
HS	70	28	2	118	62	ND[b]
HL	70	28	2	441	54	ND

(a) Some measured values < 0°C.
(b) MFT values were not determined for the high T_g polymer.

Tensile Testing

Ultimate tensile strength and elongation were measured using an Instron, Model 4501, with a crosshead speed of 0.5 cm·s^{-1}. Testing was done on films 1.3 cm wide, 6.0 cm long and approximately 6 mils thick. Films were cast on PTFE to facilitate removal and then dried and conditioned for approximately 24 hr at constant temperature and humidity (21°C, 50% RH). Six replicate measurements were made. The values reported are the mean ultimate tensile strength and the mean percent elongation at break.

Differential Scanning Calorimetry

Glass transition temperatures were determined by differential scanning calorimetry using a DuPont Thermal Analysis system. Samples were conditioned with a temperature cycle up to 120°C, maintained at 120°C for two minutes, cooled to -40°C, then scanned at 10°C·min^{-1}. The inflection point of the curve was assigned as T_g.

Particle Size Determination

Latex particle sizes and particle size distributions were determined using hydrodynamic chromatography, as described in reference (10). All the latexes were monodispersed. The value reported is the volume median diameter.

Scanning Electron Microscopy

Electron micrographs were obtained on an ISI DS130F field emission gun scanning electron microscope at an accelerating voltage of 3 kV. This technique allows good imaging using a low accelerating voltage, reducing the problem of beam damage in low T_g polymers. Micrographs were obtained of both the "as-cast" latex film surface and liquid nitrogen cryo-fracture surfaces of the film interior.

Block Testing

The procedure employed to evaluate block resistance is comparable to other procedures used by the paint industry. A 6 mil thick film of latex was drawn down on a Leneta chart and dried for 24 hr at room temperature. This yielded a dry film thickness of approximately 3 mils. The dried films were cut into squares ~ 4 x 4 cm^2 and the squares were placed together with film/film contact established. Weights were placed on the specimens yielding a pressure of 0.16 kg·cm^{-2}. Blocking was evaluated after the weights had been in place for one hour, 24 hr, and one week according to the following scale:

10 ..... no adhesion, no tack
9 ..... very slight tack (aural observation)
8 ..... slight tack (aural observation)
7 ..... slight picking (visual observation)
6 ..... moderate picking
5 ..... significant picking
4 ..... 0-25% film removal
3 ..... 25-50% film removal
2 ..... 50-75% film removal
1 ..... 100% film removal (i.e., complete failure)

Four evaluations of each sample were made. It should be noted that this procedure differed in some respects from a typical paint test. In such a test, the paints are dried for different lengths of time and then the weight is placed on the specimen for 30 min. This tests the effect of drying time on the evaporation of fugitive coalescents, and is obviously not applicable to the solvent-free systems studied here.

RESULTS AND DISCUSSION

As noted in the Introduction, blending of a hard and a soft latex is reported to yield a film forming latex having good coalescing properties and superior block resistance.[1,2] There are a number of parameters that can be adjusted in a blend system. The parameters considered here include blend ratio (mass soft phase/mass hard phase) and the particle sizes of the constituent latexes.

The characteristics of the constituent latexes are given in *Table* 2. The latexes are identified by a two letter designation, for instance, "SL." The first letter (S) identifies the latex as soft; that is, it forms a film at room temperature. The contrary being the hard latexes (H), which do not coalesce. The second letter identifies the

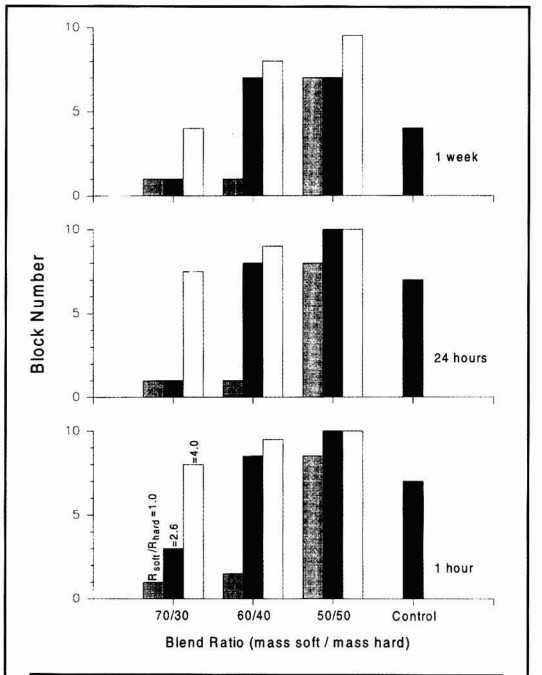

Figure 1—Blocking as a function of blend ratio and particle size ratio for blends with HS hard phase latex.

Table 3—Homogeneous Latex and Latex Blend Performance

Latex/ Blend	Size Ratio Rsoft/Rhard	MFT (°C)	One Hour Block	Tensile Strength (psi)	% Elongation
C	—	25±1	7	1200	290
SS	—	0.9[a]	1	730	780
SM	—	3 ± 1	1	720	770
SL	—	1 ± 1	1	670	770
		Small Hard Phase			
SSS70/HS30	1.0	2 ± 1	1	1040	560
SM70/HS30	2.6	4 ± 1	3	960	380
SL70/HS30	4.0	3 ± 1	8	1070	510
SS60/HS40	1.0	2 ± 2	1-2	ND[b]	ND
SM60/HS40	2.6	8 ± 2	8-9	ND	ND
SL60/HS40	4.0	6 ± 2	9-10	1050	390
SS50/HS50	1.0	6 ± 1	8-9	ND	ND
SM50/HS50	2.6	17 ± 3	10	ND	ND
SL50/HS50	4.0	12 ± 7	10	1230	10
		Large Hard Phase			
SS70/HL30	0.26	2 ± 1	1	740	600
SM70/HL30	0.69	2 ± 1	1	780	630
SL70/HL30	1.08	2 ± 1	1	790	620
SS60/HL40	0.26	2 ± 1	1	670	430
SM60/HL40	0.69	3 ± 1	3	720	370
SL60/HL40	1.08	3 ± 2	1	800	400
SS50/HL50	0.26	4 ± 2	2	790	30
SM50/HL50	0.69	6 ± 1	8-9	770	40
SL50/HL50	1.08	7 ± 1	10	820	270

(a) Some measured values <0°C.
(b) Not determined.

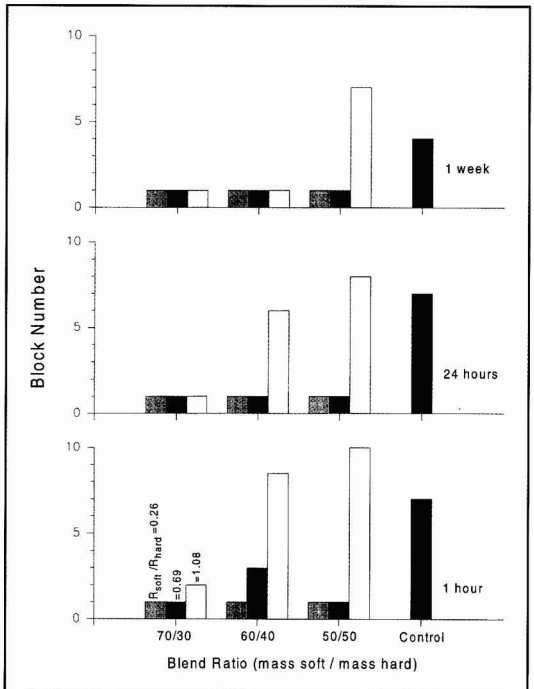

Figure 2—Blocking as a function of blend ratio and particle size ratio for blends with HL hard phase latex.

latex particle size. For instance, SL refers to the soft, large latex. In the case of the soft latexes, three particle sizes were made [small (S), medium (M) and large (L)]. In the case of the hard latexes, only the small and large particle sizes were produced.

The co-monomer ratios used for each of the latexes is given in *Table* 2, along with the latex characteristics. The MFT is reported as the average and standard deviation. The MFT's of the three soft latexes were approximately equal as were the glass transition temperatures of the two hard latexes. A control latex was also designed for this study. It had the same overall comonomer ratio as a 70/30 (mass ratio) blend of the constituent soft and hard latexes.

Blend Ratio and High Particle Size Ratio

Performance characteristics of all the systems studied here are summarized in *Table* 3. The blends are identified by the relative mass ratios of the constituent latexes. For example, blend latex SS70/HS30 is a 70/30 blend of SS (soft, small) and HS (hard, small).

A series of blends was prepared of HS (118 nm) as the discrete phase hard particle with film forming latexes having increasing particle sizes. The results for the nine blends are given in the second section of *Table* 3.

In order for the blend technology to be effective, it is necessary that the blended latex be a low temperature film former. The results of *Table* 3 demonstrate that for high levels of the soft phase, the presence of the secondary hard phase was not detrimental to film coalescence.

For relatively high blend ratios of soft to hard (70/30 and 60/40), the MFT was increased only slightly above the MFT of the neat soft latex (SS, MFT ~ 0°C). The 70/30 blends can be compared with the control latex C, which is a uniform copolymer having the same overall composition as the 70/30 blends. The MFT of C was slightly higher than room temperature (25°C) and would require coalescing solvent in a coating formulation.

As the hard-phase fraction was increased, the MFT also increased. At a blend ratio of 50/50, the influence of the discrete hard phase was evident. The MFT was substantially increased (from 0°C for the base soft latex to > 6°C). The standard deviation of the MFT measurement also increased with increasing blend ratio. This is not surprising, since at high hard-phase fractions, the continuity of the soft phase in the film is not assured. This point will be discussed in further detail in a later section. In effect, the hard phase functions as an inert, non-binding filler. This places practical limitations on the level of the hard phase that can be used.

Films were dried for 24 hr and the block numbers were measured after various lengths of time with the weights in place. Block numbers for one hour are given in *Table* 3. Block numbers for one hour, 24 hr and one week are depicted in *Figure* 1. A block number of 10 corresponds to a completely non-blocking film. A value of one indicates complete failure (off-scale negative). *Figure* 1 shows the blocking behavior as a function of both blend ratio and particle size ratio, R_{soft}/R_{hard}. The effect of the blend ratio on the block resistance was clear. For a given particle size ratio, as the fraction of the hard phase was increased, the block number also increased. This is in agreement with the results of reference (2). Given that the hard phase can be viewed as inert filler, this result was expected.

The effect of particle size ratio was more interesting. *Figure* 1 indicates that the particle size ratio had a significant effect on the block resistance (for a given blend ratio). As the ratio R_{soft}/R_{hard} was increased, the block number also increased. This observation was consistent for all of the blend ratios studied. The results for the 70/30 blends were perhaps the most revealing. The blend (SS70/HS30) having equivalent particle sizes, $R_{soft}/R_{hard} = 1$, failed within one hour. The blend (SL70/HS30) with the highest particle size ratio, $R_{soft}/R_{hard} = 4$, continued to show reasonable performance after one week.

The SL70/HS30 blend can also be compared to the neat soft latexes. The blend and the neat latexes had equivalent MFT's (within experimental error). The neat soft latexes all failed the blocking test within one hour. The addition of only 30% of the HS latex was sufficient to raise the blocking number from one to eight (after one hour). A block number of eight was defined to be slight tack.

The blocking behavior of the 70/30 blends can also be compared to the control latex C, which had the same overall composition. Blend SL70/HS30 and latex C showed equivalent block resistance. However, the MFT of the control latex was 20°C higher than that of blend SL70/HS30 and would have to be formulated with coalescent. It is reasonable to conclude that the latex blend

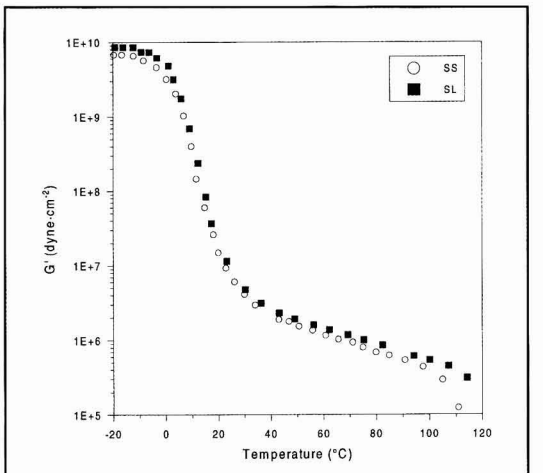

Figure 3—Dynamic mechanical behavior of the soft blend components.

shows highly desirable properties, provided R_{soft}/R_{hard} is large. A mechanistic explanation of this phenomenon will be offered in a later section.

Mechanical properties of the films were also studied (*Table* 3). The tensile strength of the soft latex films increased with the addition of hard phase. However, as the proportion of the hard phase was increased, the elongation at break decreased, from 770% for SL to 510% for SL70/HS30, to 10% for SL50/HS50. In other words, the films became more friable, indicating that the soft phase was not continuous. Film integrity was compromised at very high levels of the hard phase. The maximum tensile strength values of the 70/30 blends were slightly lower than that of the control. However, the elongation at break values were considerably higher.

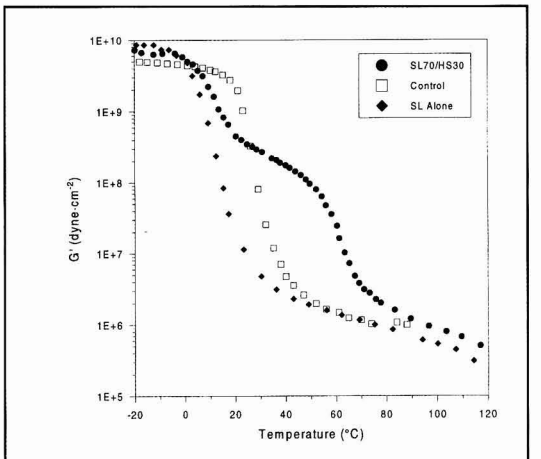

Figure 4—Dynamic mechanical behavior of SL70/HS30 blend, SL alone and control latex.

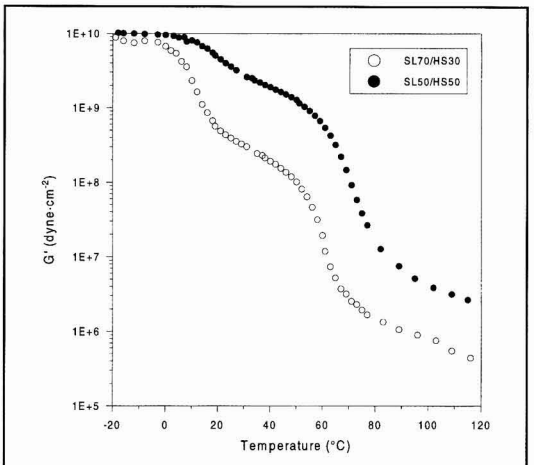

Figure 5—Dynamic mechanical behavior of blends of SS and HS at blend ratios of 70/30 and 50/50.

Low Particle Size Ratio

The effect of particle size ratio was probed further by evaluating blends of the same three soft latexes with a large hard latex, HL. The results are shown in the last section of *Table* 3. The MFT results for the 70/30 and 60/40 blend ratios were similar to those of the blend series with HS. The 50/50 blends behaved somewhat differently, in that the MFT did not increase to the same extent as with HS. This is reasonable, since the number average concentration of the large particles will be much smaller than for the previous series. It would be expected that the soft polymer would form a continuous film with the HL particles embedded in the soft matrix.

The tensile behavior of the blends with a high fraction of soft component was comparable to the neat soft latex. A soft film containing isolated HL particles would be expected to fail in the soft region. The effect of the hard filler is only apparent at high filler loading (50%).

The block numbers for the series are shown in *Figure* 2. The addition of the hard phase did not contribute to block resistance, except at impractical levels (i.e., 50/50) where the film integrity is sacrificed. Overall, the blends performed poorly in comparison with the control. Comparison of the blends of *Figures* 1 and 2 clearly demonstrates the effect of particle size ratio. The blends with a small value of R_{soft}/R_{hard} showed inferior block resistance when compared with blends with a high particle size ratio (for a given blend mass ratio).

Mechanistic Considerations

Blocking (or adhesion) of two chemically identical polymer films in contact can be considered to have both bulk and surface components. The intrinsic adhesive fracture energy is the sum of the contributions of the various failure modes, according to the following general expression[11]:

$$G_o = aG_{o,interfacial} + bG_{o,polymer} + cG_{o,substrate} \quad (1)$$

In this general expression, $G_{o,interfacial}$ is related to the thermodynamic wetting at the interface. In the case of two polymer films in contact, the interfacial component will be related to the degree of interdiffusion of the polymer chain across the interface. Interdiffusion has been shown to be a function of time and polymer material properties, including molecular weight and T_g.[12-14] In particular, it is related to the difference between the T_g and the annealing temperature. It has been shown,[15-17] that the tensile strength of latex films is related to the degree of interdiffusion during annealing.

The term $G_{o,polymer}$ is related to the cohesive failure of the polymer itself. Finally, the term $G_{o,substrate}$ is related to failure of the bond between the substrate and the polymer film. This failure mechanism can be discounted unless the films delaminate from the substrate, a situation not encountered here. Equation (1) emphasizes that block resistance is likely related both to the surface and bulk properties of the polymer film.

Bulk Film Characteristics

Dynamic mechanical analysis was employed to probe the film structure. *Figure* 3 shows the storage modulus (G') as a function of temperature for both the smallest (SS) and largest (SL) soft latexes. The overlap of these two curves demonstrates that the effect of particle size on blocking is not caused by differences in the neat latexes.

The dynamic mechanical spectra of neat latex SL, control latex C, and blend SL70/HS30 are shown in *Figure* 4. The curves for SL and C are typical of thermo-

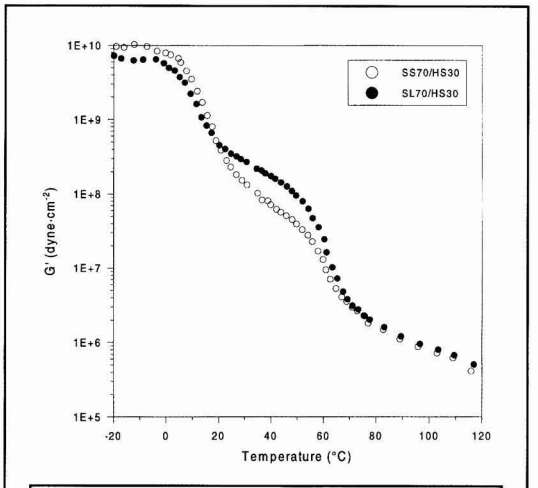

Figure 6—Dynamic mechanical behavior of 70/30 blends as a function of blend particle size ratio.

plastic polymers. The film prepared from the latex blend (SL70/HS30) shows two transitions, which is characteristic of films with two distinct domains. At temperatures between the T_gs of the soft and hard phases, the modulus of the SL70/HS30 is far above that of the soft component alone. This is expected, since the system can be considered as a soft polymer matrix filled with hard spheres. The effect of blend ratio is seen in *Figure* 5. The hard phase has a more pronounced effect as its concentration is increased. This effect is not surprising, and corroborates the work of Cavaillé et al., for poly(styrene)/poly(butyl acrylate) emulsion blends.[18]

The effect of particle size ratio on the dynamic mechanical behavior is shown in *Figure* 6 for blends SS70/HS30 and SL70/HS30. The moduli of both blends are well above that of the neat soft latexes. More interestingly, the two blends do not have the same modulus—temperature curves, despite having identical volume fractions of each phase. The modulus of blend SL70/HS30 with R_{soft}/R_{hard} = 4 is significantly higher than that of blend SS70/HS30 with R_{soft}/R_{hard} = 1, for temperatures between the two transitions. This is in agreement with the work of Dayong and Jiang,[19] where the elastic modulus of polyepichlorohydrin was found to be a function of the size of the glass beads used as filler as well as the volume fraction of filler. For a given volume fraction of filler, the elastic modulus was found to increase with a decrease in the filler size. In the case of our blend systems, increasing R_{soft}/R_{hard} gives a higher value of the storage modulus at temperatures above ambient, as well as improved block resistance.

Figure 6 shows that the storage modulus of the blends is a function of the soft phase latex particle size. This result is analagous to that of Dickie[20] for a heterogeneous acrylate system. In Dickie's work, the composite was demonstrated to preferentially display the property of the material which forms the continuous phase. For example, Dickie studied a 50/50 blend of a glassy polymer and a rubbery polymer. When the glassy material formed the continuous phase, the modulus was higher than when the rubber formed the continuous phase. The blend produced from latex SL displays more of the hard phase character than the blend produced from SS. This suggests that there is more connectivity of the hard phase in the blend containing SL. The concept of the high T_g particles forming a connected network in the latex film was explored further and was interpreted using percolation theory.

Percolation Theory

One aspect of percolation theory is concerned with the dispersion of one phase in another, a fertile area of research for latex-based coatings. The concept of the critical pigment volume concentration (CPVC) has been examined in terms of percolation theory.[21,22] For latex blend systems, the dispersed phase is the hard latex component. The individual hard particles will remain discrete throughout the film formation process. Provided the concentration of the hard phase does not exceed a critical value, it will be dispersed in a matrix of coalesced soft polymer. In the case of polymer blends, the parameter of interest is often the connectivity of the dispersed

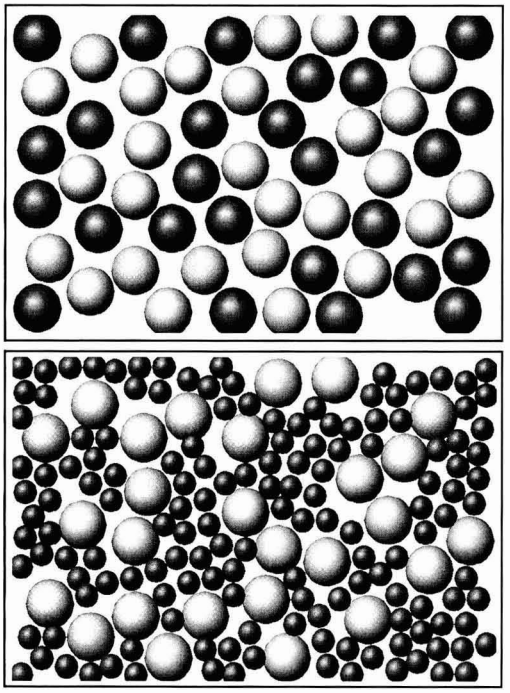

Figure 7—Illustration of the percolation threshold volume, V_p with V_{soft}/V_{hard} = 70/30.

phase. In this context, connectivity can be defined to be continuous contact or connection between the hard particles. This is a function of both phase volume and the particle size ratio (R_{soft}/R_{hard}) between the soft matrix phase and the discrete secondary phase. The continuous phase is not necessarily the phase present in the greater

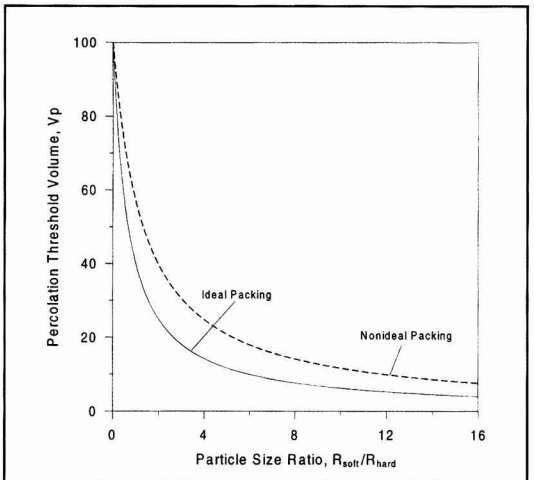

Figure 8—Percolation threshold volume as a function of particle size ratio.

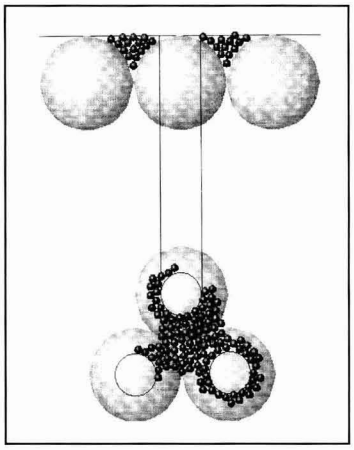

Figure 9—Illustration of particle packing for a 76/24 blend ratio of soft/hard with $R_{soft}/R_{hard} >> 1$.

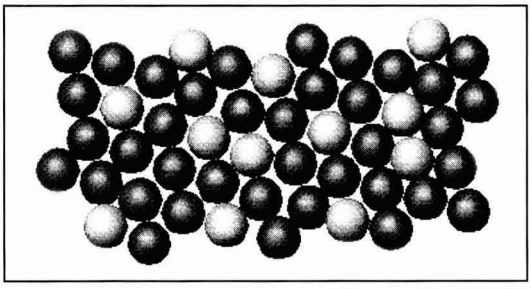

Figure 10—Illustration of particle packing for a 76/24 blend ratio of soft/hard with $R_{soft}/R_{hard} = 1$.

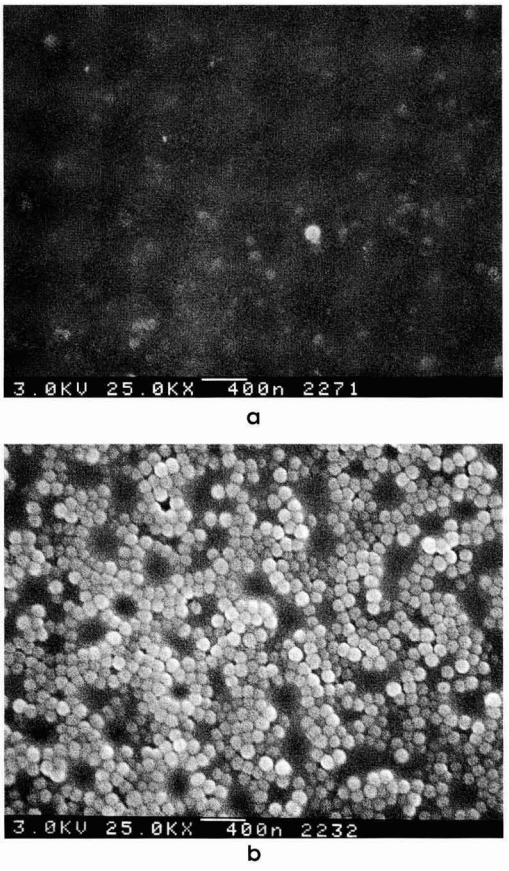

Figure 11—Scanning electron micrographs of the surfaces of 70/30 blends.

concentration, but depends on the volume fraction of each phase and the particle size ratio.

The effect of particle size ratio on the continuity of a network is illustrated in *Figure* 7, where the light-colored spheres represent the soft phase and the dark-colored spheres represent the hard phase. *Figure* 7 is a two dimensional representation of a three dimensional phenomenon. Therefore, the effect is somewhat exaggerated. This illustration depicts two systems where the volume fraction of the soft phase is approximately 0.7. The upper illustration shows that when the two phases have equal particle sizes ($R_{soft}/R_{hard} = 1$), and the particles are randomly packed, continuity of the secondary phase does not occur. If, on the other hand, there is a marked difference in particle sizes between the particles ($R_{soft}/R_{hard} >> 1$), the secondary phase forms a continuous network. The lower illustration of *Figure* 7 shows that for $R_{soft}/R_{hard} = 2$, the hard phase forms a percolated network (continuous hard/hard particle contact). This is an important concept for the design of nonblocking blended latexes, as the presence of networks of hard particles may be responsible for reduced blocking.

For any given particle size ratio, a percolation threshold volume fraction (Vp) exists. This is the minimum volume fraction of dispersed phase material required to form a monolayer network of connected hard particles throughout the film. At concentrations below Vp, continuous contact between the hard particles is not established. This is represented in the upper illustration of *Figure* 7. At concentrations in excess of Vp, the additional particles form multiple layers and fill the interstices between the soft matrix particles. This case is depicted in the lower illustration of *Figure* 7.

Kusy and others have studied the phenomenon in metallurgy, where fine metallic powders are dispersed with polymer spheres.[23,24] Continuity of the dispersed phase is required for electrical conductivity. These authors developed expressions for the percolation threshold volume as a function of the packing arrangement of the dispersed phase, and the fraction of primary phase surface covered by the dispersed phase. In the ideal case, this is simply the volume of the discrete phase required to form a monolayer of contacting particles throughout the matrix. In reality, not all the hard phase

particles are efficient: there is a tendency to pack in the soft particle interstices and to penetrate the soft particle surfaces. Kusy has derived an expression for Vp as a function of R_{soft}/R_{hard} for the non-ideal case. Further details and derivations are available in references (23) and (24). *Figure* 8 is a graphical representation of these expressions for both the ideal and non-ideal packing situations, where the hard particles are assumed to pack in a hexagonal arrangement. *Figure* 8 shows the effect of the particle size ratio on the amount of hard phase required for network formation. Kusy's work focused on the percolation behavior of polymer/metal aggregates and, therefore, may not apply quantitatively to latex systems. However, these relationships can be used conceptually to understand the performance of latex blends.

The blocking results presented in *Table* 3 are in accordance with the percolation theory model of the blend systems. As the R_{soft}/R_{hard} was increased, the block resistance of the blend improved. Considering *Figure* 8, it is apparent that increasing the particle size of the hard phase relative to the soft phase (or decreasing the particle size ratio) increases the volume of hard particle required for percolation. For example, in the non-ideal case, when R_{soft}/R_{hard} = 0.5 (i.e., the hard particles are twice as large as the soft ones), the percolation threshold volume is ~70%. That is, the latex must contain 70% hard particles in order to form a network. Obviously, this is prohibitively high for coating applications since film coalescence would be prevented. On the other hand, if R_{soft}/R_{hard} = 4 (e.g., blends of SL and HS), only 26% of the hard phase is required to form a percolated network. The minimum film and tensile results indicate that there is sufficient coalescence of the soft phase material to form tough, coherent films at low concentrations of the hard phase.

The results of Feng and Winnik[7] are also consistent with a percolation model of latex blends. These authors examined the effect of blend ratio on the transparency of blends of hard and soft latexes. They found that there was a critical volume fraction of soft polymer required to give a transparent film. The critical volume increased as R_{soft}/R_{hard} increased. It can be hypothesized that this should occur, since a continuous network of soft film is necessary for transparency.

The blocking behavior of latex blends has been established to be consistent with a percolation model of film reinforcement by the hard latex phase. However, this mechanistic view assumes that blocking is solely a bulk phenomenon. It is likely to have a surface contribution. Consequently, the effect of particle size on packing at the film surface was also examined.

Particle Packing

An illustration of the surface cross-section of a film with R_{soft}/R_{hard} >>1 is shown in the upper illustration of *Figure* 9. The large soft particles are arranged in the closest packing geometry. This configuration represents the most conservative case in the following discussion. The smaller hard particles are packed in such a manner that they fill the void space at the surface. Given closest packing conditions, the void space corresponds to 26% of the volume. This depiction of the surface is then rotated 90° to give the view shown in the lower illustration of *Figure* 9. The excluded circle shown is the only soft phase surface exposed. This can be contrasted with the situation illustrated in *Figure* 10 where the hard and soft particles are of equal size. Here, the amount of the soft phase exposed at the surface is equal to the concentration of the soft phase in the bulk. For instance, the illustration shown is a 74/26 volume ratio with 74% of the soft phase exposed on the surface. These two contrasting examples illustrate the effect of particle size on the relative amounts of the hard latex at the film surface. As the particle size difference is increased, a greater proportion of the hard phase is present at the film surface.

The electron micrographs of actual latex blends match the illustrations of *Figures* 9 and 10 remarkably well and demonstrate that blocking behavior can be explained in terms of surface particle packing. *Figures* 11 and 12 show electron micrographs of the film surfaces of the 70/30 and 50/50 blends, respectively. The hard polymer is visible as discrete particles. The soft polymer has fully coalesced into a smooth film. Micrographs 11a (SS70/

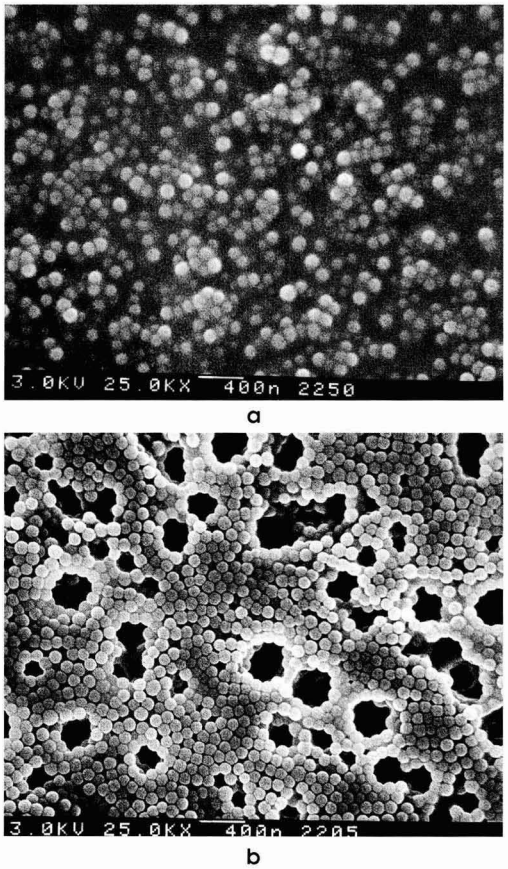

Figure 12—Scanning electron micrographs of the surfaces of 50/50 blends.

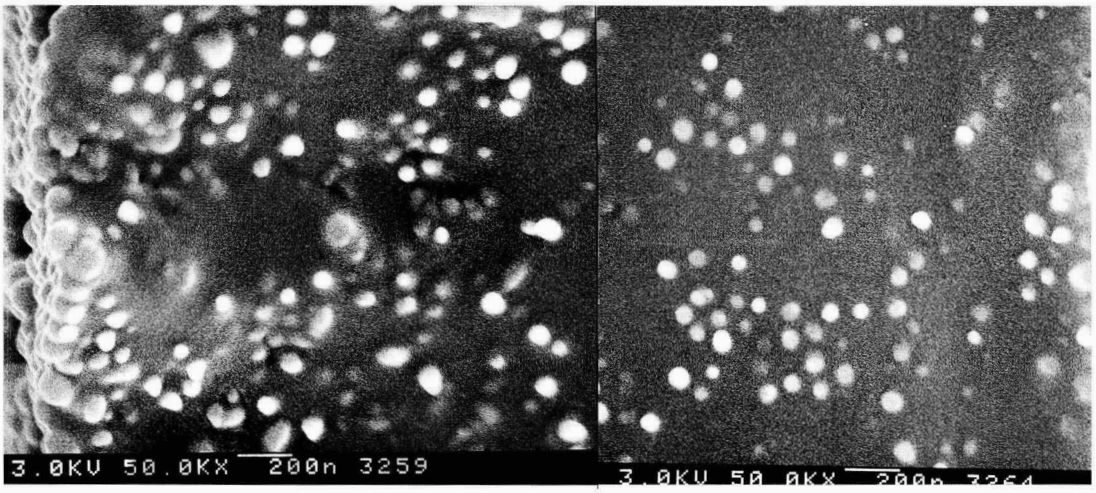

Figure 13—Scanning electron micrographs of a cross-section of SL60/HS40 blend.

HS30) and 12a (SS50/HS50) are for blends of equal size particles ($R_{soft}/R_{hard} = 1$). The hard particles are present at the film surface in the same proportion as in the interior of the film, in direct proportion to their concentration. This would be expected from random packing of compatible latexes having equal particle sizes.

Micrographs 11b (SL70/HS30) and 12b (SL50/HS50) are for blends where the hard particle is small ($R_{soft}/R_{hard} = 4$). These micrographs show that there is a greater concentration of the small-hard particles at the surface than in the comparable film with $R_{soft}/R_{hard} = 1$. Inspection of *Figure* 11b reveals the large soft latex particles surrounded by the small hard particles. This structure is due solely to the particle packing. It appears that there is sufficient penetration of the hard particles into the soft particles to achieve good film formation. The structure of the film in *Figure* 12b is similar to that of *Figure* 11b, in that the soft particles are surrounded by the small hard particles. However, the higher concentration of the hard phase produced some changes in film morphology. The surface shows defects in the form of air voids. It appears that there is insufficient soft binder for good film formation, an observation that supports the tensile testing result.

Figure 13 shows two electron micrographs of a film cross-section of the 60/40 blend (SL60/HS40) where the particle size ratio is again 4. The specimen was prepared by drying the film on a polytetrafluoroethylene (PTFE) substrate. The film was then freeze fractured by submersion in liquid nitrogen. *Figure* 13 shows the cross-section of the film from the top (air interface) to the bottom (PTFE interface). This figure demonstrates that the concentration of the small-hard particles is higher at the film surface than in the bulk (on average). This observation is consistent with the view of particle packing illustrated in *Figure* 9.

The electron micrographs clearly support the concept that a particle size differential (soft/hard) is desirable for enhanced performance in blend systems. The surface is rich in the hard phase component. There is reduced opportunity for diffusion of the polymer chains at the surface, since the effective glass transition is increased. Therefore, adhesion (or blocking) is effectively reduced in the blend, relative to the neat soft film.

CONCLUSIONS

Blends of hard and soft latexes were studied with respect to film block resistance, film formation characteristics, and mechanical properties. It was found that addition of the hard phase improved block resistance without sacrificing film formation or tensile properties, up to hard phase concentrations of 50%. Particle ratio (R_{soft}/R_{hard}) was found to have a dramatic effect on block resistance. For a given blend ratio, the best performance was seen for the highest value of R_{soft}/R_{hard}.

Adhesion between two surfaces has both bulk and surface components. The results presented in this article support a model where the small hard particles produce a percolated network in a blend film. The hard phase acts to reinforce the bulk film, thereby increasing the bulk modulus. In addition, the effective concentration of the hard particles at the film surface is high when the particle size ratio is also high, as shown by scanning electron microscopy. These experimental observations are consistent with a mechanism where a hard particle network structure in the bulk of the film and hard particle packing at the surface of the film act to enhance the block resistance of the film.

The results presented indicate that blending of hard and soft latexes can improve block resistance in neat latex films without compromising other properties. Further experimentation would be required to establish if similar behavior would be observed in formulated paints.

ACKNOWLEDGMENTS

The authors would like to thank Steve Droscha for making the latexes used in this study and Joan Marshall for the electron microscopy. We also appreciate the comments and suggestions of Drs. Ralph Czerepinski, Charles Kan, John Klier, and Charles McDonald.

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Rheology of Waterborne Coatings

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Introduction

Waterborne latex coatings were introduced because they are easy to use and lacked the health hazards and noxious odors of their solvent-borne counterparts. Unfortunately, aqueous-borne latex coatings do not possess the same rheological properties of solvent-borne coatings. If not correctly formulated, a latex paint can have inferior flow and leveling properties. They may not give adequate film build, and can be plagued by spattering during application. In order to achieve the equivalent rheology of their solvent-borne counterparts, latex formulations require the addition of rheology modifiers.

Early thickeners or rheological modifiers were derived from starch and casein and were of limited utility. In addition to their biodegradability, they produced poor films and had undesirable flow properties. They were soon replaced with high molecular weight cellulosic thickeners and clays. Cellulosic additives thicken latex systems by polymer chain entanglement. However, their viscosities during application and in drying are not ideal. They are poor in spatter resistance, do not have good flow and leveling properties, and are biodegradable. These inherent disadvantages of cellulosics resulted in the development of associative thickeners for latex coatings beginning in 1980.[1,2] These thickeners have several advantages over cellulosic additives.

Associative Thickeners

The three most popular types of associative thickeners are the styrene-maleic anhydride terpolymers (SMAT), hydrophobically modified alkali-swellable emulsions (HASE), and hydrophobically modified ethoxylated urethanes (HEUR). In each case their use provides advantages and disadvantages over their cellulosic predecessors.[3]

Associative thickeners are low molecular weight water-soluble polymers made of many water-soluble or hydrophilic portions attached to a small number of internal or pendant hydrophobic groups placed either randomly, or in blocks along a polymer backbone and/or as terminal moieties. An associative thickener in an aqueous medium encounters a highly organized water structure. Water molecules are strongly attracted to each other by hydrogen bonding, while the hydrophobes of an associative thickener are only weakly attracted to the water molecules. The strong water hydrogen bonding forces direct the polymer hydrophobes into clusters and thereby minimize the disruption of water structure. Hence, the structuring of water essentially forces the hydrophobic groups together into clusters. Unfavorable entropy does not allow for cluster dissolution. The intramolecular or intermolecular clustering of hydrophobes results in the formation of a pseudo-polymeric-network, in which the hydrophobic clusters are the crosslink junctions.[4,5] The macromolecular hydrophobic moieties may also associate with other hydrophobic surfaces such as the latex particles. This overall as-

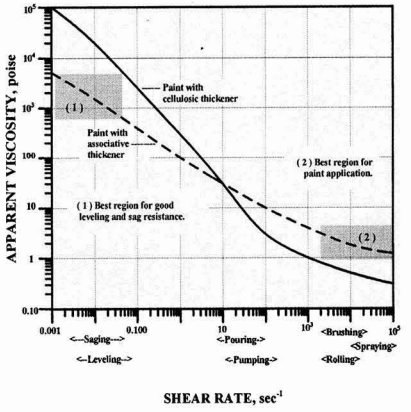

Figure 1—Flow curves of paints with different thickeners.

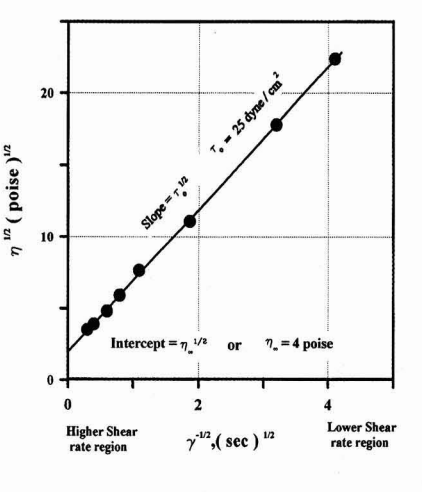

Figure 2—Typical plot of a Casson rheological equation.

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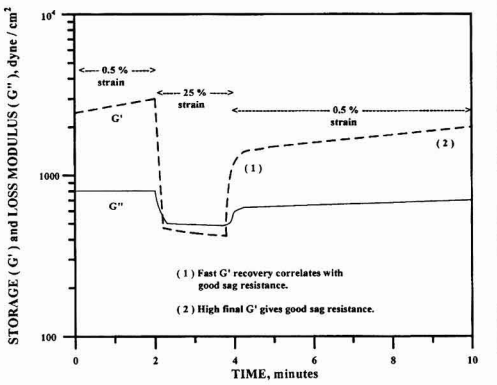

Figure 3—DMA step strain experiment using water-base enamel at a frequency of 10 rad/sec.

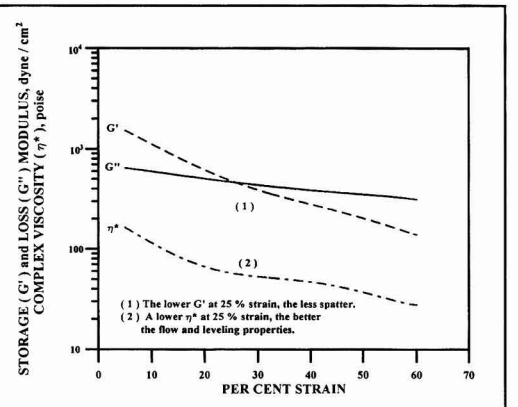

Figure 4—DMA strain sweep experiment at a frequency of 10 rad/sec using a water-base acrylic enamel.

sociation produces an increase in the viscosity of the latex system. The associative thickeners also improve the stability of the system by coating the latex and pigment particles with a protective layer that helps prevent coagulation of the paint during storage.

Hydrophobe Formation Thermodynamics

The associative strength and duration of hydrophobic clustering are governed by the chemical potential of the hydrophobes and steric factors such as the distance between hydrophobes on the polymer chain. The lower the chemical potential of the hydrophobe the greater the strength of the hydrophobic associations. The equation for the chemical potential, $\Delta\mu$, is:

$$\Delta\mu = 2RT - (V_s + V_p)(\delta_s - \delta_p)^2 X^2 / 2$$

where:

V_s = solvent molar volume
δ_s = solvent solubility parameter
X = hydrophobe volume fraction
T = Kelvin temperature
V_p = hydrophobe molar volume
δ_p = hydrophobe solubility parameter
R = gas law constant

Equation (1) also shows that hydrophobe chemical potential increases (more negative) if the differences in two solubility parameters increases and the molar volume of the hydrophobe increases. If the solubility parameter of the aqueous solvent is adjusted by the addition of cosolvents the strength of the hydrophobic associations can be altered. Thus, the viscosity of the latex system can be controlled.[6]

Other associative-like behaviors such as the enthalpically driven interactions of opposite charges in polyampholytic water soluble copolymers, and hydrogen bonds have also been suggested as the viscosity enhancement mechanism for ion containing associative thickeners.[7]

Advantages of Associative Thickeners

Associative thickeners are attractive in that higher viscosities at high shear rates lead to good film build per application with little to no roller spatter. Also, their characteristically lower viscosities at lower shear rates is desirable for improved flow and leveling, and high gloss. If the low shear rate viscosity is too high, leveling is compromised and solvent may be trapped to cause poor drying performance. The associative thickeners give better viscosities than cellulosic thickeners in both the low and high shear rate regions. See *Figure* 1. They are also resistant to microbial degradation and are compatible with a variety of latexes.

Disadvantages of Associative Thickeners

Disadvantages of associative thickeners include hydrolytic instability, phase separation, sensitivity to formulation changes, lifting of aged undercoats, and pH dependance. The latter factor is of particular significance in that latex coatings are usually formulated to a pH range of 8-10. This pH assures ionization of carboxyl groups on the latex surface and increases the hydrophilicity of the latex, thereby restricting latex flocculation tendencies with the addition of other formulation ingredients such as pigments and extenders. SMAT and HASE thickeners are particularly pH dependant. Their maximum thickening efficiency is in the pH range of 8-9. The pH range of 8-9 allows essentially complete ionization of their carboxyl groups where the polymer coils are expanded, due to charge-charge repulsions. In this condition, the hydrophobes are exposed and hydrophobic associations are optimized. At other pH values they either are insoluble or possess low thickening efficiencies at lower pH values.

Many latex coatings are pH adjusted with ammonia, a base of high vapor pressure. Thus, evaporation losses can reduce the coating pH, and this produces a loss in the viscosity efficiency of SMAT and/or HASE thickeners. The HEUR thickeners also have another disadvantage. At a pH greater than eight, most urethane functionalities are hydrolytically unstable leading to bond cleavage

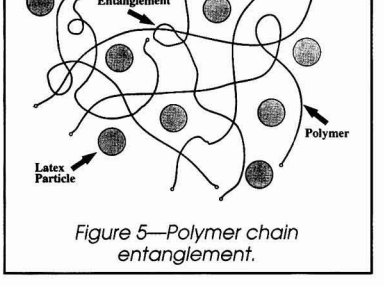

Figure 5—Polymer chain entanglement.

that lowers the molecular weight and results in a loss of thickening efficiency.[8]

Rheology of Associative Thickeners

There are two main rheological criteria for evaluating thickener efficiency. First, a thickener must have low shear viscosities which give an aesthetically pleasing in-can image of the coating, non-dripping properties, good flow and leveling, and minimum sagging tendencies. An efficient thickener must also provide adequate coating viscosity at the application shear rate so that high build in film thickness will occur and brush or roller drag will be minimized.[9] Finally, the coating extensional viscosity and elasticity must be low so that spattering and stringing will be absent.

Thickening efficiencies are determined using laboratory rheometers. The flow conditions studied in the laboratory must simulate the process conditions during the coating application and film drying. The instruments usually employed for this purpose are the Brookfield and Stormer viscometers, and an ICI cone and plate rheometer.

The Brookfield and Stormer viscometers are used to study low shear properties such as in-can thixotropy, dripping, flow and leveling, and running or sagging tendencies. The Stormer and low shear Brookfield viscosities correlate with brush pickup properties and flow from the can characteristics. These measurements often predict film leveling and sagging performance.

The ICI rheometer which operates at a high shear rate (10^4 sec^{-1}) allows prediction of fluid properties at shear rates similar to coating application conditions. ICI fluid viscosities of 1 to 2 poise usually indicate that excessive drag would be absent during the coating application.

Brookfield viscometers are used to study the low shear behavior of latex systems. These instruments can operate at low shear rates from about 0.1 to 100 sec^{-1}. These lower shear rates are comparable to that present during film leveling.

$$\sqrt{\eta} = \sqrt{\eta_\infty} + \frac{\sqrt{\tau_0}}{\sqrt{\gamma}}$$

The Casson equation is used with the Brookfield low shear measurements to predict coating viscosity at high shear rates.

The Casson equation shows that a plot of $\sqrt{\eta}$ versus $1/\sqrt{\gamma}$ data should be linear. The high shear viscosity, η_∞, and yield stress, τ_0, can be determined from the intercept and slope of the straight line fitted to the data[10] (see *Figure* 2). Due to the shear thinning nature of most coatings, nonlinear behavior is found at higher shear rates. The parameters, η_∞ and τ_0, should always be determined from the low shear region of the plot.[11]

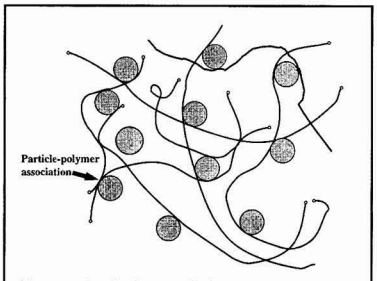

Figure 6—Polymer bridging between latex particles.

The calculated high shear viscosity from the Casson equation is comparable to the ICI high shear viscosities. The yield stress value is used to ascertain the sagging tendencies of an applied coating. Yield stress values measured before and after high shear mixing are important. To prevent settling during storage, a latex coating should have before high shear mixing yield stress and viscosity values greater than 10 dynes/cm^2 and 500 poise, respectively. However, a latex coating must also have a yield value less than 2.5 dynes/cm^2 and a lower viscosity immediately after high shear mixing to insure good flow and leveling. After high shear mixing, the yield stress value and viscosity must quickly increase over a short time period to prevent sagging.[12,13,14]

Dynamic Mechanical Analysis of Latex Coatings

Dynamic mechanical analysis (DMA) can also be used to determine the flow properties of a latex coating. In DMA, the coating is forced to undergo a harmonic strain at a given frequency, ω. The resulting stress on the coating can be divided into an elastic component, the storage modulus (G'), and a viscous component, the loss modulus (G").

Viscoelastic parameters determined by DMA can be used to predict spatter resistance, sagging, and flow and leveling of thickened latex systems.[15] Spatter resistance is predicted by measuring the elastic modulus G' at high strains. If G' is reasonably low, latex spattering is minimum. Flow and leveling can also be predicted by measuring the complex viscosity, η^*,versus strain. The complex viscosity is determined from the storage and loss modulus. The complex viscosity at frequency ω is defined as

$$\eta^* = \sqrt{\left(\frac{G'}{\omega}\right)^2 + \left(\frac{G''}{\omega}\right)^2}$$

Systems with lower η^* have better flow and leveling properties. See *Figures* 3 and 4.[15]

Proposed Thickening Mechanisms in Latex Systems

The associative polymer mechanism, which is active to thicken latex coatings, is a subject of debate. One proposed mechanism of thickening involves the formation of hydrophobic clusters, which increases the viscosity of the system. Another suggests that the thickening mechanism involves the association of the latex particles with the hydrophobes of the associative polymers thereby producing a pseudo polymeric structure of very high molecular weight, increased hydrodynamic volume, and system viscosity. Both mechanisms in addition to chain entanglement may be active. Also, the mechanism that dominates may depend upon the coating formulation (latex, pigment, co-solvent, surfactant type, and concentration).

Chain Entanglement

The chain entanglement theory applies to water-soluble polymers of high molecular weight such as the cellulosic thickeners. Polymers of high molecular weight such as hydroxyethyl cellulose possess a large hydrodynamic volume in aqueous systems. When these polymers are above their critical overlap concentration and exceed a critical molecular weight, entanglement of polymer coils occurs causing a viscosity enhancement of the latex system. There is no polymer interaction with the latex par-

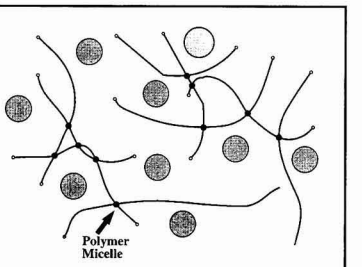

Figure 7—Polymer forming micellar bridges.

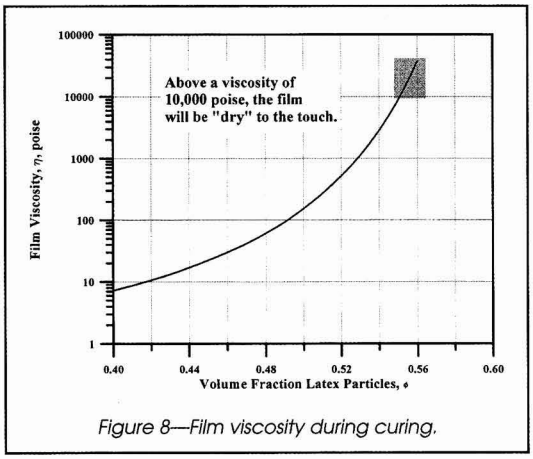

Figure 8—Film viscosity during curing.

ticles. When placed in a flow field there is a tendency for entangled polymers to orient with the flow field causing them to disentangle and this produces a decrease in the viscosity of the coating. Excessive shear thinning results in thin paint films having poor hiding characteristics.

In addition, these thickeners of high polymer molecular weight impart a large degree of elasticity to the coating. The polymer molecules can store elastic energy when they are elongated during a coating application. With removal of the force field after coating application, there is a fast recovery of the elongated polymers back to their unperturbed state. This release of stored energy causes the coating to have poor flow and leveling properties and also spatter[6] (see *Figure* 5). Thus, latexes with higher elongational viscosities will spatter more than coatings with lower extensional viscosities.[16]

Particle Bridging

Water-soluble polymers which are considered to thicken by a particle bridging mechanism are lower in molecular weight than the chain entanglement thickeners. This theory of association maintains that the hydrophobes of the low molecular weight polymer molecules are adsorbed onto the latex surfaces. The water-soluble polymer segments are free to extend into the aqueous medium. Thus, it is assumed that the polymer hydrophobes can effectively compete with surfactants and colloidal stabilizers for the latex surface adsorption sites. Polymer adsorption leads to an extensive network of latex particles loosely coupled together by low molecular weight polymers (see *Figure* 6). The coating would have a high viscosity at low shear conditions because of the network structure. However, in a shear field, the hydrophobes are desorbed from the latex surface. This destroys the network and reduces the coating viscosity during the application. This mechanism produces shear thinning, but not the extent experienced by the high molecular weight thickeners that produce enhanced fluid viscosity by polymer entanglement. After coating application and removal of the shear field, there is a slow re-adsorption of the polymer hydrophobes onto the surfaces of the latex particles. This leads to improved flow and leveling for latex systems thickened with associative polymers.[17] Because the network structure degenerates in the shear field produced by the application process, very little elastic energy is stored within the coating during application. Thus, the latex has less spatter.

Micellar Bridging

The micellar bridging mechanism requires the formation of hydrophobic clusters which causes a network of loosely coupled low molecular weight polymers to form within the system. In contrast to the particle bridging theory, hydrophobic associations with the latex particles are not necessary to form a viscous coating (see *Figure* 7). In a shear field, the hydrophobic clusters are broken up and shear thinning occurs. However, since the polymers of associative thickeners are lower in molecular weight and are more flexible than the polymers used by chain entanglement thickeners, they do not readily orient or elongate with the shear field and thus have larger high shear viscosities. This leads to higher film builds and better hiding. When the shear field is removed, recovery of the hydrophobic clusters is not instantaneous. This causes the coating to be less elastic which produces better spatter resistance and good flow and leveling properties.

Rheology During Latex Coating Curing

The Mooney rheological equation can be used to describe the viscous properties of a latex dispersion during the process of film formation.[18] The Mooney equation shows that the low shear viscosity of the system, is the result of magnifying the viscosity of the external fluid phase, η_e, by an exponential. For latex systems the external fluid is composed of water, co-solvents, surfactants, and other fluid additives. The value for η_e is about 0.5 poise. The value of the exponential term is dependent upon the volume fraction of solid particles making up the internal phase, ϕ, and constants K_1 and K_2. These constants are related to the shape and packing properties of the solid latex particles. For latex particles which are spherical, K_1, the shape constant, equals 2.5. The packing constant, K_2, is the volume fraction of internal phase present when the solid latex particles are packed in close contact. The K_2 value for spheres in a random, close-packed state is about 0.64.

$$\eta = \eta_e \, EXP \frac{K_1 K_2 \phi}{K_2 - \phi}$$

Figure 8, a plot of the Mooney equation for a typical latex, shows the rapid increase in coating viscosity that occurs as solvent evaporation from a film increases the volume fraction of latex particles. As the latex particles approach one another, capillary forces overcome particle-particle repulsion forces and coalescence into a solid film can occur. Usually a less volatile solvent is still present during the final stages of evaporation which plasticizes the polymer latex and thus assists in film coalescence. After coalescence is completed, this solvent slowly diffuses through the film to the surface and evaporates. The film will be "dry to the touch" when the system viscosity reaches 10^4 poise. After complete film curing, the viscosity exceeds 10^8 poise.

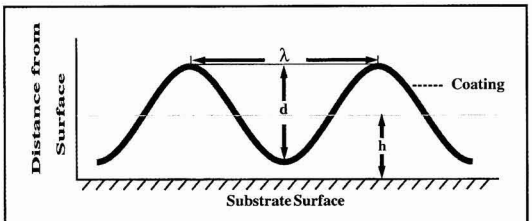

Figure 9—Cross-section of coated substrate with brush mark pattern.

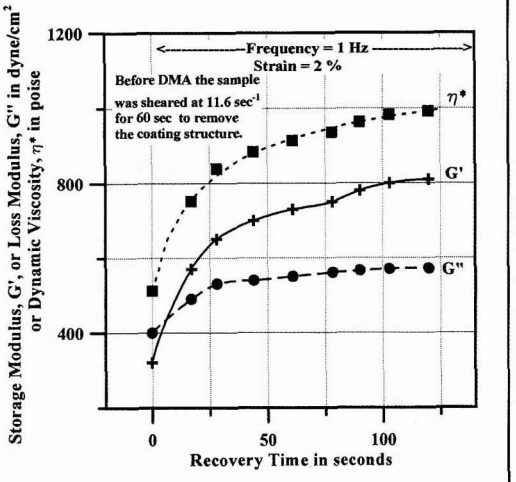

Figure 10—DMA analysis showing coating structure reformation after shear.

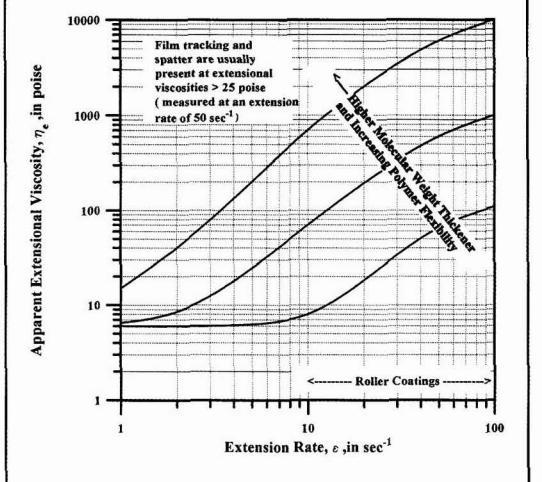

Figure 11—Typical extensional viscosity behavior of polymer thickened coatings.

Rheology During Leveling

The leveling of brush marks can be considered as a process where the drive toward equilibrium to a smooth surface is controlled by two opposing forces. Film leveling or flow is driven by surface tension forces which are resisted by fluid viscous forces. The leveling stress, τ, developed for a coating having a surface tension of y can be approximated by[19]

$$\tau = 4\pi^3 y h d / \lambda^3 \quad \text{or} \quad d = \frac{\tau \lambda^3}{4\pi^3 y h}$$

Where h is the average wet coating thickness, d is the brush mark depth and, λ is the brush mark wavelength (see *Figure* 9).

During leveling, y, λ, and h remain almost constant therefore, the leveling stress decreases as the brush mark depth decreases. The amount of coating flow which decreases brush mark depth during the leveling process depends upon the rheological properties of the coating. Leveling will cease when the leveling stress, τ, becomes equal to or less than the coating's yield stress, τ_o. Thus, the final brush mark depth can be found from equation (5) when we let τ equal to τ_o.

For example, latex coatings are usually applied at a wet thickness of 0.01 cm (4 mils) and typically have an after high shear mixing yield stress of 2 dyne/cm^2. The coating surface tension is about 25 dyne/cm. The wavelength of a brush mark varies but is about 0.1 cm. Using these application conditions, the relationship gives a final brush mark depth of about 6×10^{-5} cm (0.03 mils).

After film application, the coating viscosity must remain low long enough for leveling but then increase in viscosity with time to prevent film sagging. Otherwise, the flow rates for leveling must be faster than the viscosity increase due to the thixotropic nature of the coating. However, after leveling the viscosity must increase rapidly to prevent film sag. The total time for leveling varies with coating properties and is usually between 30 and 300 sec.[20]

DMA has been used to study the thixotropic or recovery properties experienced by a high solids enamel during leveling.[21] The enamel sample was first subjected to continuous strain to simulate the removal of rheological structure during a coating application. Thereafter, the increase in the storage and loss moduli was used to indicate the rate at which the structure reforms to prevent film sagging. *Figure* 10 shows that the dynamic viscosity rate of increase diminishes as the structure reforms. After about 300 sec the dynamic viscosity stabilizes to about 1200 poise. This suggests that all structure reformation is complete after this time period.

Extensional Viscosity

Newton, the father of rheology, defined the shear rate, γ, as the change in fluid velocity with respect to the direction which is perpendicular to the fluid velocity. The shear stress, τ, is determined from the product of the fluid's apparent shear viscosity, η, and the shear rate, i.e., $\tau = \eta \gamma$. As previously explained, paints are shear thinning, i.e., the shear viscosity decreases with increasing shear rates.

In contrast, the extensional strain rate, ε, is the change in fluid velocity with respect to the direction parallel to the fluid velocity. The extensional stress, τ_e, is determined from the product of the fluid's extensional viscosity, η_e , and the extensional strain rate, i.e., $\tau_e = \eta_e \varepsilon$.

Measurement of the extensional viscosity is difficult because a constant extensional strain rate cannot be easily maintained on a fluid. Trouton[22] showed that at very low extension rates the extensional viscosity is three times the apparent shear viscosity measured at very low or "zero" shear rates. Most coatings show Troutonian behavior at low extensional strain rates but are also tension

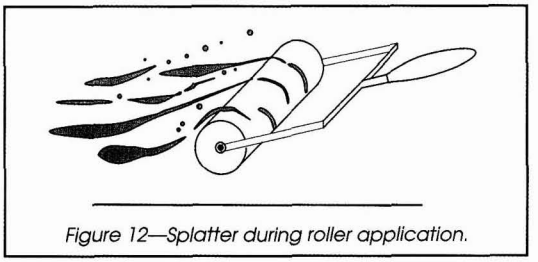

Figure 12—Splatter during roller application.

Table 1—Rheology Required for Good Thin Film Formation

Coating Process Step	Shear Rate (sec^{-1})	Viscosity (poise)	Yield Stress ($dyne/cm^2$)
Storage	0.1	>500	>10
Transfer to brush with dripless character	20	>25	>10
Substrate transfer with good film build-up and without excessive brush drag	10,000	1 to 3	<2.5
Drying with good leveling and minimum sagging	1.0	50 to 100	<2.5

stiffening at higher extensional strain rates. Fluids are tension stiffening when they have extensional viscosities that increase rapidly with increasing extensional strain rates. The increase in the extensional viscosity of coatings thickened with polymers is more rapid with increasing polymer molecular weight and macromolecular conformational flexibility (see *Figure* 11). Coatings with high extensional viscosities give spatter problems during application.[23]

When a paint has a high extensional viscosity then thin fibers or slender strings may form and lengthen during application. These elastic fibers eventually break. After breakage the fibers snap back onto both the substrate and applicator. The release of the energy stored within the elongated fibers results in the formation of small airborne paint droplets which produce splatter (see *Figure* 12). This same energy storage and release mechanism can also create coating tracks or surface patterns on the substrate.

Paints which use entangled high molecular weight polymers to increase viscosity usually have high extensional viscosities which give spatter. High molecular weight polymers maintain a high degree of entanglement when elongated. These entanglements store the elastic energy needed to promote spatter. Entanglement decreases with decreasing molecular weight.

In contrast, associative thickeners do not have high extensional viscosities because the network structures formed by polymer-polymer or polymer-latex associations are destroyed when the network is elongated. Elastic energy cannot be stored and released during the coating application and thus spatter and surface defects are minimized.

Summary

The rheology of a latex paint must be controlled to produce an acceptable coating. Conditions vary as a paint is sequentially taken from storage, applied to a substrate and then cured in place. As shown by *Table* 1, desirable films are produced only when paint viscosities and yield points are controlled at each process step. Thus, an understanding and control of paint rheology are essential if high quality coatings are to be produced from latex paints.

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JCT Spotlight

WATERBORNE COATINGS

by Rich Johnson*

AN OVERVIEW OF WATERBORNE COATINGS: A FORMULATOR'S PERSPECTIVE

"Even if you're on the right track, you'll get run over if you just sit there"
—Will Rogers

Waterbornes have been experiencing technological growth for the past 20 years, but it is not a steady growth. In the last five years we have seen an unprecedented increase in new technologies available to the formulator—technologies such as improved dispersions, high performance latexes, new formulation techniques, and unique additives. These changes are the result of regulatory and environmental concerns which make it necessary for formulators to constantly keep up to date with the technology just to compete. Staying informed is worth the effort because, with current information, you can develop waterbornes with equal or better properties than conventional systems. The challenge: finding, using and personalizing the new technologies, to come up with a truly superior low VOC coating. As we have all experienced, meeting the challenge can be difficult.

Almost every coatings magazine you pick up tells you about these successful low VOC waterbornes by using comparison charts and testing results; but they invite you to the party but forget to give you the directions. Most of the high performance low VOC coatings referred to in these articles are blends of latex and water-reducible or dispersion and water-reducible systems. So what you need to know is how to formulate so you can yield the best of both worlds. This article will overview waterbornes from a practical formulating point of view and attempt to shed some light on how to achieve specific properties in water systems. First we will deal with the odd dilemma of differentiating between the types of waterbornes, then we will look into resin choices, facets of formulation, and finally, where to expect new technologies.

IS A LATEX A DISPERSION; IS IT AN EMULSION?

This is an interesting dilemma when considering the different types of waterborne systems. Some people think that they can define and differentiate between latexes, dispersions, emulsions and water-reducibles; I found that I couldn't. To find the answer I went to McWhorter, a company that manufactures each of the waterborne systems, and met with a group of polymer scientists to ask this question: "How do you define and differentiate between waterborne, latex, dispersion and emulsion coatings?" To my surprise they are fighting with the same dilemma—the people in charge of knowing the difference don't always know the difference. Years of sloppy terminology and the very fact that these systems do indeed technically over-lap have caused "gray areas." As an example consider the following definitions:

> *LATEX PAINT: A paint containing a stable aqueous dispersion of synthetic resin, produced by emulsion polymerization, as the constituent of the binder.*
> *—The Coatings Encyclopedic Dictionary*†

This is confusing, using two of the four waterborne systems to define one. Maybe this explains why so many commonly known latexes are referred to as emulsions.

> *EMULSION PAINT: Paint, the vehicle of which is an emulsion of binder in water. The binder may be oil, oleoresinous varnish, resin, or other emulsifiable binder. Not to be confused with a latex paint in which the vehicle is a latex.*
> *—Coatings Encyclopedic Dictionary*

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† LeSota, S. (Ed.), *Coatings Encyclopedic Dictionary,* Federation of Societies for Coatings Technology, Blue Bell, PA, 1995.

". . . not to be confused with a latex. . . " I *am* confused, the experts are confused and it seems that most of the industry is too.

As a group of polymer scientists and paint chemists, we attempted to draw clear lines between these waterborne systems. Our discussion led us to create a chart of properties. As you will see by the ranges in the "gray chart" shown below, these systems' properties do overlap a bit causing gray areas. This chart clarifies the overlaps to help define the differences in these systems and, for instance, show where latex or a water-reducible becomes a dispersion.

A few other important and less confusing definitions are:

SURFACTANT: Contracted from surface active agents. These are additives which reduce surface tension and may form micelles and thereby improve wetting (wetting agents); help disperse pigments (dispersants); inhibit foam (defoamers); or emulsify (emulsifiers).
—Coatings Encyclopedic Dictionary

EMULSIFIER: Substance that intimately mixes, modifies the surface tension of colloidal droplets, and disperses dissimilar materials ordinarily immiscible, such as oil and water, to produce stable emulsions. The emulsifier has the double task of promoting the emulsification and of stabilizing the finished product.
—Coatings Encyclopedic Dictionary

*HYDROLYSIS: Disruptive reaction consisting of splitting a compound into two parts, one of which combines with the **H** ion of water and the other combines with the **OH** ion of water.*
—Coatings Encyclopedic Dictionary

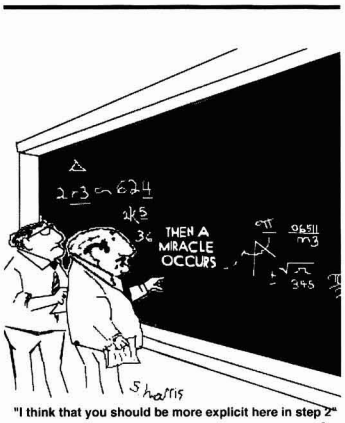
WATERBORNE COATINGS (Water-based coatings): . . . coatings in which the volatile content is predominately water.
—Coatings Encyclopedic Dictionary

WHAT IS THE DIFFICULTY IN FORMULATING WATERBORNE PAINTS?

Formulating waterborne paints can be easy, but formulating to specific customer requirements can be difficult. Experienced formulators have learned methods to make the "miracle" in step 2 (see cartoon above) occur. The use of specific additives, combinations of resins, manufacturing method and technique is the way that a successful supplier of waterborne paints is set apart. To achieve specific results in your coatings you need to look at the specific components of formulation.

Waterborne Resins—Advantages and Disadvantages

The first and most important component is your choice of waterborne resin(s). When formulated into paints the four systems from the gray chart offer different



"I think that you should be more explicit here in step 2"

advantages and shortcomings. As you may suspect, just as the definitions overlap, so do some of the properties. I have put together generalized charts (*Tables* 1-4) to clarify the pluses and minuses of paints based on resin choice.

WATER-REDUCIBLE: According to Gary Mardyla, Chemist for Standard Paints in Detroit, MI, "Today automotive companies are asking for VOCs that are 2.3 lb/gal or lower. Unmodified water-reducible resins can not be formulated to be lower then 2.3 lb/gal."

Water-reducible paints most closely duplicate the performance and appearance of conventional solvent-borne systems. The typical

THE GRAY CHART

	Shelf Life	Particle Size	Number Average MW	Appearance	% Solvent & Its Purpose	Mode of Stabilization
Water Reducible	6-24 mos. due to hydrolysis	very small (N/A)	<50,000	clear to slight haze	typically 20% co-solvent, **purpose:** solubility and film forming	hydrophilic groups which are a part of the polymer, such as a carboxyl group or tertiary groups
Latex	stable	.1 to 10μ	300,000 plus	translucent to opaque	<10% solvent **purpose:** coalescence	external surfactants or initiator fragments
Dispersion	4-24 mos. hydrolysis	.1 to 1μ	3,000-100,000	translucent	<2% (some exceptions) **purpose:** flow, solvent release and leveling	hydrophilic groups which are a part of the polymer such as a carboxyl group
Emulsion	2+ yrs	.1 to 10μ	<10,000	opaque to milky	0 to 5% in most cases, **purpose:** processing	external emulsifiers and/or surfactants

WATER-REDUCIBLE PAINT

Advantages	Disadvantages
Excellent gloss	
Excellent gloss retention	
6-24 month shelf life	6-24 month shelf life
Outstanding performance in baking enamels	
Broad variety of resin choices	
Excellent adhesion to most clean metals	Dry is affected by humidity and temperature
Good adhesion to some plastics	
Good air dry paint properties	Slower than solvent paint
Typically 3.5 to 2.3 lb/gal VOC	
Excellent salt fog resistance	
Can be formulated to good wetting of oily steel	Fair wetting of oily steel
Excellent clarity	

VOC for water-reducibles is 2.5 to 3.5 lb/gal. This was an acceptable VOC five years ago but now that legislation is forcing the VOC lower, this type of coating may not be capable of meeting your needs.

LATEX: Dennis A. Centofante, of Lilly Industries Inc., Indianapolis, IN, states that a problem with waterbornes may be attributed to the use of additives. "It seems to me that the reason waterborne systems do not perform as well on steel as conventional solvent-borne systems is contaminates, by this I mean additives. Additives that are used to solubilize or stabilize waterborne paints (surfactants, surface tension modifiers, emulsifiers) show up as weaknesses or discontinuities in the film. It seems that the fewer the additives the better the performance of the paint."

In trade sales and in many industrial maintenance applications, latexes have become the dominant vehicle. In these applications they outperform conventional solvent-borne systems and offer outstanding durability with convenience of application. In most industrial coatings applications, especially where protection of steel is required at thin film thickness, the performance of latex is not adequate. For interior wood coatings, the clarity and protection offered by latexes approach that of solvent-borne systems. This is the area where the most dynamic developments have occurred in the last few years. States Glenn F. Emmert, Chemist with PPG Industries Inc., Pittsburgh, PA, "The gloss and the clarity of our latex paints are adequate; my major problems are in manufacturing."

"If a little knowledge is dangerous, where is the man who has so much as to be out of danger?"—T.H. Huxley

DISPERSIONS: These are the newest of the waterborne technologies. In many cases there is not enough experience to say how good performance will be, but so far it looks outstanding. These dispersions offer alkyds, polyesters, acrylics, polyurethanes and numerous other resin choices at extremely low VOCs and minimized additive levels. There is much yet to be learned about this new technology; however, I believe that dispersions have the greatest promise for the future.

"The farther backward you can look, the farther forward you are likely to see."—Winston Churchill

EMULSIONS: Emulsions are probably the oldest waterborne technology. They are experiencing considerable growth and success in Europe. While not as widely accepted in the U.S., their potentially lower VOCs and superior appearance make them of particular interest. The newer developments have smaller, more consistent particle sizes and lower additive levels.

If you really wish to investigate waterborne resins in depth, there is an informative article called "Polymers for Water-Based Coatings—a Systematic Overview," by J.C. Padget in the December 1994 issue of the JOURNAL OF COATINGS TECHNOLOGY.

HYBRIDS: Combining two or more of the waterborne resins can yield the best performing paints. For instance, modification of water-reducible alkyds with latex or dispersion acrylics offers the superior gloss and adhesion of water-reducible with the early dry and film hardness of acrylics. Often waterborne systems offer compatibilities that are unexpected, for example, water-reducible polyesters can be modified with water-reducible alkyds (these resins are not usually compatible in solvent-borne systems) yielding coatings with the superior hardness of a short oil alkyd plus the substrate wetting characteristic of an alkyd and the flexibility of a polyester.

PIGMENTS: Pigment choices for waterborne systems are rather straightforward. Avoid pH sensitive pigments (depending on the pH of the waterborne system you are using) and avoid pigments that may be soluble in the strong co-solvents of some waterborne systems. Also, avoid extender pigments that may interfere with the pH stability of your waterborne paint.

The one area where waterborne systems fall short of conventional

LATEX PAINTS

Advantages	Disadvantages
Near zero VOC	Poor 20° gloss
Excellent adhesion to many plastics	At thin film thickness, fair to poor salt fog
Excellent exterior gloss retention	Fair to good adhesion to metal
Very fast dry	Limited resin choices
Versatility	Early water sensitivity
Easy clean-up	Environmentally sensitive (humidity)
Very fast water release	Slight haze in clear film
Good adhesion to many plastics	Flash rusting

systems is corrosion control over ferrous substrates. Wise formulation and extensive testing will lead you to combinations that will give you synergy of two to three anti-corrosives with the performance you need. For instance, neither Sicron RZ™ or zinc phosphate offer particularly good corrosion resistance alone, but when used together at a 90/10 zinc phosphate to Sicron RZ™ ratio, they offer excellent corrosion resistance (the right choices vary with the resin choices). Anti-corrosive pigments are very reactive so be sure to check stability. *(There will be a more in-depth discussion of pigments in the April issue of the JCT.)*

EMULSION PAINTS

Advantages	Disadvantages
Excellent gloss	Water sensitivity
Excellent gloss retention	Limited resin choices
36-month shelf life	Stability is a function of manufacturing
Low VOC	Fair wetting of oily steel
Renewed interest	Environmentally sensitive

ADDITIVES AND DRIERS: As Dr. Centofante said earlier, additives can be looked upon as contaminates so it is wise to minimize the number of additives and additive levels in formulations. While they are needed for stability and solubilization, they seldom improve the coating durability and often detract from performance.

Be sure to choose stable waterborne driers. Driers, like resins, can be susceptible to hydrolysis. Significantly higher levels of zirconium driers will often improve the through-dry of water-reducible alkyds.

An important consideration is the fact that the surface tension of water is 72 and the surface tension of most solvents is well below 30. To wet a substrate with low surface free energy a formulator must often use surface tension modifiers or co-solvents to lower the surface tension of waterborne paints, thus preventing "picture framing" or "pull away" from surface contaminates (fish eyes).

When your formulation calls for the use of amines for neutralization or stability, look into the evaporation rate of your amine. If neutralizing amines are left in the film they impart water sensitivity and poor salt fog, so be sure to consider amine volatility. Also amines cause yellowing in oxidizing systems; therefore, oxidizing waterborne systems will yellow more than systems that have little or no amines (solvent-borne systems).

CO-SOLVENTS: The major solvent here is water, yet the resins are not soluble in water. In drying, the last solvent to release should be your best for the resin to avoid most common failures and to achieve the best film properties. There are exceptions to this rule, such as no solvent latexes and dispersions.

Initial dry is often a function of a co-solvent. Initial dry can be slowed with co-solvents such as diethylene glycol monobutyl ether, diacetone alcohol, butoxy ethanol or n-propoxypropanol. Initial dry can be hurried with the addition of ethylene glycol monopropyl ether or acetone. Carefully choose your co-solvents as they can significantly improve many properties of waterborne systems.

Manufacturing

Many of the detrimental reactions that limit the stability of waterborne systems such as coalescence of latex, hydrolysis of ester linkages and transesterification occur at a faster rate in elevated temperatures. Minimize excess heat in manufacturing!

Baking Systems

Most of the previously mentioned points have been relative to air dry systems, but that is not to say that waterborne baking systems should be ignored. Waterborne bake systems offer performance to compete with solvent-borne systems. In "general industrial coatings," waterbornes are equivalent to solvent-bornes; it is only in the very high performance systems that additional formulation skills are required. Waterborne systems often have both hydroxyl and carboxyl functionality, therefore they can be reacted with urethanes and amino resins as well as polymeric azeredine and carbodiimide. This gives the formulator plenty to work with.

Application Equipment

It is extremely important that the chemist consider the application equipment when formulating. The new application technology is very sophisticated; you will need to do research here to be familiar with these technologies. For instance, a major concern in air dry dipping enamels is that the stabilizing amine or co-solvent remains in the coating at the correct ratio. When formulating for high speed electrostatic systems one must eliminate "dry spray." In a roller-applied latex, you need to consider formulations to eliminate foam. In an air-assisted airless gun application, you formulate to prevent air entrapment. Each formulation must be customized for the application equipment. *(Applica-*

DISPERSION PAINTS

ADVANTAGE	DISADVANTAGE
Very low to near zero VOC	Limited resin choices
High gloss	Technology is still in its infancy
Excellent gloss retention	Poor wetting of oily metal
Excellent adhesion to clean steel	Environmentally sensitive
Excellent adhesion to many plastics	
Fantastic clarity	

tion equipment will be the subject of a future article).

General Formulation Points

You need to consider all of the components of the formula: you must use care in manufacturing, you must formulate to specific application equipment, and you must consider the substrate. In other words, you need to look at formulation holistically. If you consider all of the details of formulation and keep abreast of breaking technology, then the magic in step 2 will appear.

"Common sense is not so common"
—Voltaire

WHERE SHOULD YOU LOOK FOR THE NEXT BREAKTHROUGH?

"Predictions are difficult—especially about the future"—Dan Quayle

In my opinion, dispersions and latexes have the most potential to meet future needs for performance in low VOC. Of course, there could be something else on the horizon that I am unaware of.

The driving force for change in the industry has certainly been legislation, and with the EPA's recent announcement of its commitment to strict enforcement of environmental policies the pressure for change has become very real. Be proactive in the laboratory, read, attend seminars, ask the tough questions of your suppliers and even visit the Internet often (there is a great amount of information there). The new technology to comply with tomorrow's legislation is being made today and it is your job to know and use this new technology.

Conventional systems have met our needs for many decades but their time is past. In the words of Jim Larson, creator of *The Far Side,* "No matter how hard you throw a dead fish into the water you can't make it swim." The new technologies will have to build the paint formulators bridge to the 21st century.

RICH JOHNSON is Vice President of Sierra Paint Corporation in Minnetonka, MN. A graduate of the University of Minnesota with a B.S. in Chemistry, Mr. Johnson was employed for 23 years at Cargill and for one year with McWhorter performing technical service for water, high solids and UV coatings. Previous experience includes employment as a chemist for Speed-O-Lac, long range research for Whittaker, and as Technical Director for Forman Ford Paints. He spent three years in cancer research for the Public Health Department.

OTHER CONSIDERATIONS

Entire books have been devoted to waterborne systems. In this overview, I did not touch on electrodeposition, waterborne UV, and some less common types. I also have not discussed trade sales coatings where latex dominates, because the technology is quite mature. The growth of waterborne coatings in the next few years will be in industrials where new technologies will continue to contribute. Waterborne coatings now account for approximately half of the coatings in the United States. I believe that the technology and growth in waterbornes will continue to accelerate in the next five years and this can be to the advantage of the skilled waterborne formulator who is innovating to meet the customer's performance needs at very low VOC.

Production Equipment

Tank Cleaning System

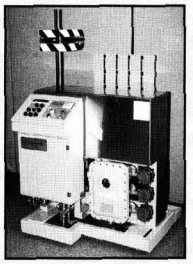
DISTI-KLEEN, INC.

The SKM tank cleaning system has been introduced by Disti-Kleen, Inc. The SKM is designed to clean round and square open mixing tanks inside and outside with a rotating spray system. High pressure washing with a pressure of 112-1,100 psi uses hot caustic, water, or solvents. The basic model is explosion proof and suitable for using flammable solvents.

Circle No. 48 on Reader Service Card

Automatic Test Panel Spray Machine

SPRAYMATION, INC.



The 310940 Series Machine is highlighted by Spraymation Inc. This is a three axis machine, with the spray equipment being traversed horizontally, and the panels indexed for lapping strokes, or moved constantly to simulate production line spraying. The distance between the spray gun and panel can be programmed to move when required. All types of spray equipment can be used, including conventional air atomized, airless, elecrostatic, and HVLP.

Circle No. 52 on Reader Service Card

Turbomill®

NETZSCH INCORPORATED

The Netzsch Turbomill® has been newly redesigned to provide fine and fast grinding. The mill features a sealed, rotating basket. Since it is sealed, the basket eliminates grinding bead spillage. Its rotating action creates a circulator flow at the top and bottom of the basket which increases production capacity and improves fineness. Turbomill is available in three sizes: 15 HP, 50 HP, and 150 HP.

Circle No. 49 on Reader Service Card

Small Recovery Still

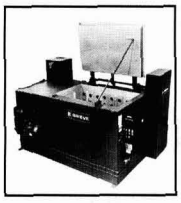
CB ENVIRONMENTAL TECHNOLOGIES

CB-Environmental Technologies introduces the Read Head® Micro 15 solvent recovery still for the small solvent user. The Micro 15 has a distillation vessel capacity of 15 gallons and applies 6kW of heat to the recoverable material. The unit features explosion-proof construction and a one-button operator interface, and vacuum operation is standard. A 12-minute product video is available.

Circle No. 53 on Reader Service Card

Gas-Fired, Top Loading Oven

THE GRIEVE CORP.

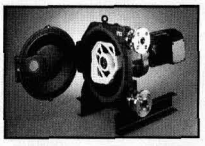


The Grieve No. 615 is a gas-fired, top loading oven used for drying water-based lacquer on parts. A 175,000 BTU heat input capacity powered gas burner provides operating temperatures up to 650°F. Heated air is circulated horizontally through the oven workspace by a 2,500 CFM recirculating blower driven by a 2-HP electric motor. This oven features an air-operated, full opening, rear-hinged door on the oven top.

Circle No. 50 on Reader Service Card

Industrial Hose Pump

WATSON-MARLOW PUMPS



Watson-Marlow Pumps has added two new pumps to its line of 900 Series industrial hose pumps: the 910 and 915 models. The 910 Model is capable of flow rates from .02 to .75 GPM. The 915 Model offers flow rates from .05 to 3.2 GPM. Both models pump at pressures up to 110 psi and can handle corrosive chemicals, abrasive slurries, viscous materials, adhesives, coatings, wastewater, and other industrial applications.

Circle No. 54 on Reader Service Card

Vacuum/Pressure Pumps

BARNANT COMPANY

The high capacity vacuum/pressure pump (model 7530-10) by Barnant Co. has a free air capacity of up to 1.1 cfm, a vacuum capacity of 20" Hg, and pressure capacity of 18 psig. The 1/12 HP thermally protected, fan cooled motor provides power for starting loads under 5 psi. The pump head is made from Valox. Gas media contacts only corrosion-resistant internal parts.

Circle No. 51 on Reader Service Card

Performance Oriented Packaging

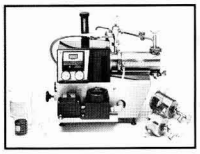
SKOLNIK INDUSTRIES

Skolnik Industries has published a 10-page, reference guide that addresses industry-wide questions relative to performance oriented packaging. Full-color photos provide at-a-glance reference to drum identification and application concerning salvage drums, overpacks, Hazmat containers, primary containment, stainless steel, and PIH containers and other UN certified packaging.

Circle No. 55 on Reader Service Card

Grinding and Dispersion

EPWORTH MOREHOUSE-COWLES



Epworth Morehouse-COWLES provides a range of products including dissolvers, mixers, media mills, stone mills, tanks and vapor recovery units. Production and bench-top size Zinger™ horizontal media mills offer new technology in small media milling. In addition, ferrous or nonferrous, large media or small with sand to stainless spheres, from flint pebbles to zirconia are available.

Circle No. 56 on Reader Service Card

In-Barrel Metering Pump

IRIS ENGINEERING

A light weight in-barrel metering pump (IBMP) is available from Iris Engineering. This submersible pump meters liquids from barrels directly to a process. Flow rates up to 3,600 cc/min. with viscosities to 25,000 cps at pressures up to 650 psi. Applications for the IBMP include metering two-part urethanes, adhesives, dyes, additives, epoxies, and other liquids.

Circle No. 60 on Reader Service Card

HSD Milling System

HOCKMEYER EQUIPMENT CORP.

New standards for the technology of milling via the HSD Milling System are presented by Hockmeyer Equipment Corp. The HSD unit reportedly provides lower operating costs, higher yield, and ease of operation. Batch volumes range from portable tanks up to 1,200 gallon stationary tanks, while viscosity ranges exceed conventional bead milling technology.

Circle No. 57 on Reader Service Card

Washdown System

C-M-P SYSTEMS

C - M - P Washdown Separator Systems clean hooks, hangers, and rework parts as well as handle ash collection, ash/water separation and rust protection in one process. This system includes a booth/separator structure and separator tank.

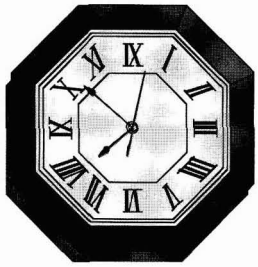
Circle No. 58 on Reader Service Card

Horizontal Media Mills

SCHOLD MACHINE CO.

Schold Machine Co. presents horizontal media mills that come complete with rotary screen with carbide gap, SS alloy discs, pressurized shaft seals, zoned chamber cooling, media discharge tray, and sliding chamber. Some safety features include: low barrier fluid shutoff, low barrier fluid pressure shutoff, high temperature shutoff, high pressure shutoff, and motor high temperature shutoff.

Circle No. 59 on Reader Service Card

How Much  Do You Spend in Training?

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TruTest Manufacturing

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BIRMINGHAM—OCTOBER

"Alternative Technologies"

George Hind received a 50-year membership pin and Grahame Fowkes, of Technivelopments Co. was presented with a 25-year membership pin.

George R. Hayward spoke on "ALTERNATIVE TECHNOLOGIES."

Mr. Hayward discussed some of the technologies available today, such as conventional, high-solids, and solvent-free coatings, as well as some of the problems encountered with each, including life cycle analysis.

In addition, Mr. Hayward stated that the volume of resin systems such as alkyds, vinyls, and cellulose are decreasing while acrylics, epoxies, P/U's, and polyesters are increasing.

Mr. Hayward concluded that the media hype surrounding some materials is more harmful than actual scientific evidence indicates. According to the speaker, phthalate plasticizers have received bad publicity. He also stated that TGIC will have its maximum allowable content reduced to 0.1% by May 1998.

Application methods also need to be considered, air drying or ambient curing two-pack materials may be best but as the main object is to actually paint something, then the substrate required performance and cost must enter the equation.

JOE BROWN, *President*

BIRMINGHAM—NOVEMBER

"Managing Change"

Jeffrey Ellwood, of Univar Europe, discussed "MANAGING CHANGE."

According to Mr. Ellwood, companies should manage change and not use consultants. The essential prerequisite is to ask other company members their views. The speaker cautioned against making changes for the sake of change.

Key questions that need to be asked include the following: (1) Why change? (2) What are the reasons? and (3) Ask customers and workers first.

Mr. Ellwood stressed the importance of infrastructure, collective ideas, the pros and cons of salary versus bonus.

In order to implement change, a mission statement is required. The statement should embrace the needs of both customers and employees. Mr. Ellwood recommended listening to the employees' position.

JOE BROWN, *President*

CDIC—NOVEMBER

"Advanced Color Formulation"

Society Representative William Hollifield, of D&L Paint Co., reviewed the FSCT Board Meeting held during the Annual Meeting in Chicago, IL.

The Bylaws Chair, Paul R. Guevin, of P.R. Guevin Associates, announced that a proposal to move up officer elections to allow the incoming treasurer each year to attend the FSCT's new officer orientation meeting will appear in the December meeting notice.

Robert Olmstead, of Macbeth, presented a discussion on "ADVANCED COLOR FORMULATION."

Mr. Olmstead stated that in previous years, color matching was based on experience and training, and eventually supplemented with instrumentation. He then discussed the various theoretical underpinnings including the additivity and subtractivity principles, as well as Kubelka-Munk for describing reflectance and transmittance.

In addition, the speaker presented a software solution that uses a two-constant factor and presents calculations in absolute units.

JOHN E. IMES, *Secretary*

CHICAGO—NOVEMBER

"Environmentally Friendly Coatings"

Technical Committee Chair Keith Moody, of Eastman Chemical Co., announced that a planning meeting to establish committee objectives for 1996-97 will be held.

The evening's technical speaker, Edward W. Orr, of BYK-Chemie USA, spoke on "ADDITIVE USAGE IN ENVIRONMENTALLY FRIENDLY COATINGS."

According to Mr. Orr, over the past few decades, dramatic technology shifts have occurred in the coatings industry. Rapid changes in pigments, resins, and solvents have helped make environmentally friendly coatings possible; however, such changes have also created many technical hurdles.

Mr. Orr provided an overview of new additive technologies while emphasizing three areas: wetting and dispersing, surface flow and leveling, and defoaming. In addition, the speaker outlined chemical determinants of additive performance for a variety of new coatings.

Mr. Orr discussed the structure-performance correlations, as well as displayed practical examples. He also discussed the decision points necessary to determine the proper choice of additive.

VICTOR WILLIS, *Publicity*

CLEVELAND—OCTOBER

"Acrylate Modified Epoxy/Amine Cure Coatings"

A moment of silence was observed for the death of retired Society Member George Dreka.

Bylaws Committee Chair Virginia Sherman, of Kalcor Coatings Co., is seeking members to serve on this committee.

The evening's technical presentation was delivered by Michael Bailey, Sartomer Co. He spoke on "NEW DEVELOPMENTS IN ACRYLATE MODIFIED EPOXY/AMINE CURE COATINGS."

Mr. Bailey stated that the newly developed liquid resins have acrylate func-

Constituent Society Meetings and Secretaries

BALTIMORE (Third Thursday—Martin's West, Woodlawn, MD). COLIN D. CROWLEY, ChemCentral Corp., P.O. Box 690, Fallston, MD 21047 .

BIRMINGHAM (First Thursday—Strathallan Hotel, Birmingham, England). RICHARD J. VICKERMAN, Ciba Polymers Ltd., Duxford, Cambridge, Cambs. CB2 4QA, England.

CDIC (Second Monday—Location alternates between Cincinnati, Columbus, Dayton, and Indianapolis). JOHN E. IMES, DuPont Co., 8065 Holyrood Ct., Dublin, OH 43017.

CHICAGO (First Monday—Embassy Suites Hotel, Hwy. 56, Lombard, IL). WILLIAM C. BELLMAN, The Valspar Corp., 300 Gilman, Wheeling, IL 60090-5808.

CLEVELAND (Third Tuesday—meeting sites vary). JENNIFER L. RUMBERG, The Mahoning Paint Corp., P.O. Box 1282, Youngstown, OH 44501-1282.

DALLAS (Second Thursday following first Wednesday—Dallas Medallion Hotel, Dallas, TX). BILL J. BRISTOL, Jones-Blair Co., 2728 Empire Central, P.O. Box 35286, Dallas, TX 75235.

DETROIT (Second Tuesday—meeting sites vary). RAYMOND S. STEWART, Akzo Nobel Coatings Inc., 1845 Maxwell St., P.O. Box 7062, Troy, MI 48007-7062.

GOLDEN GATE (Monday after second Wednesday—Francesco's, Oakland, CA). DON MAZZONE, Dowd & Guild, Inc., 14 Crow Canyon Ct., #200, San Ramon, CA 94583.

HOUSTON (Second Wednesday—Medallion Hotel, Houston, TX). LARRY BAUER, O'Brien Powder Products, Inc., 9800 Genard, Houston, TX 77041.

KANSAS CITY (Second Thursday—Cascone's Restaurant, N. Kansas City, MO). DEBBIE KOSS, Davis Paint Co., 1311 Iron St., P.O. Box 7589, N. Kansas City, MO 64116.

LOS ANGELES (Second Wednesday—Maggies Pub, Santa Fe Springs, CA). JOSEPH C. REILLY, Rohm and Haas Co., 432 Cienaga Dr., Fullerton, CA 92635.

LOUISVILLE (Third Wednesday—Executive West Motor Hotel, Louisville, KY). CHRIS A. LOCKHART, Reynolds Metals Co., 4101 Camp Ground Rd., Louisville, KY 40211.

MEXICO (Every fifteen days—Gabriel Mancera, Mexico City, Mexico). MANUEL MAESTRO, DuPont, S.A. de C.V., Km. 9.5 via Dr. Gustavo Baz, Co. Barrientos, 54110 Tlalnepantla, Edo de Mexico, Mexico.

MONTREAL (First Wednesday— Restaurant Le Bifthèque, St. Laurent, Quebec). ROBERT BENOIT, Kronos Canada Inc., 3390 Marie Victorin, Varennes, Que., J3X 1T4 Canada.

NEW ENGLAND (Third Thursday—Best Western TLC, Waltham, MA). DAVID GORVINE, RSM Sales, 79 Park Rd., Lynn, MA 01904.

NEW YORK (Second Tuesday—Landmark II, East Rutherford, NJ). LARRY WAELDE, Troy Corp., 8 Vreeland Rd., Florham Park, NJ 07932.

NORTHWESTERN (Second Tuesday—Jax Cafe, Minneapolis, MN). GLEN VETTER, The Valspar Corp., 1101 S. Third St., P.O. Box 1461, Minneapolis, MN 55440.

PACIFIC NORTHWEST (PORTLAND SECTION—Tuesday before third Wednesday—Tony Roma's, Mall 205, Portland, OR; SEATTLE SECTION—Third Wednesday—Wyndham Gardes Hotel, Sea-Tac, WA; VANCOUVER SECTION—Thursday after third Wednesday—Abercorn Inn, Richmond, B.C.). BEVERLY SPEARS, Synergistic Performance Corp., 5950 6th Ave., St., Ste. 109, Seattle, WA 98108.

PHILADELPHIA (Second Thursday—DoubleTree Guest Suites, Plymouth Meeting, PA). SUE M. NIELSEN, Best Bros. Paint Manufacturing Co., Inc., 172 Shillington Rd., Sinking Spring, PA 19608-2056.

PIEDMONT (Third Wednesday—Ramada Inn Airport, Greensboro, NC). CLARENCE D. HOFFMAN, Kohl Marketing, Inc., 4 Tarrywood Ct., Greensboro, NC 27455.

PITTSBURGH (Second Monday—Montemurro's Restaurant, Sharpsburg, PA). JOSEPH E. HUNT, Palmer Supplies Co. of Pittsburgh, 8980 Perry Hwy., Pittsburgh, PA 15237.

ROCKY MOUNTAIN (Monday following first Wednesday—DelMonico Hall, Denver, CO). JOHN ELVERUM, Hauser Chemical Research, 5555 Airport Blvd., Boulder, CO 80301.

ST. LOUIS (Third Tuesday—The Salad Bowl Restaurant, St. Louis, MO). LOU L. VOIT, Cemsac Chemicals Corp., P.O. Box 6427, Chesterfield, MO 63006.

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; and SOUTH FLORIDA SECTION—Tuesday prior to Central Florida Section). GREG SCHARFETTER, Thompson Minwax Co., 10136 Magnolia Dr., P.O. Box 667, Olive Branch, MS 38654.

TORONTO (Second Monday—Speranza Restaurant & Banquet Hall Convention Centre, Brampton, Ont., Canada). ALEXANDER KING, Tioxide Canada, Inc., 350 Burnhamthorpe Rd., W., Ste. 210, Mississauga, Ont. L5B 3J1, Canada.

tionality and are capable of crosslinking. He noted that they serve as reactive diluents for viscosity reduction, as a modifier to enhance performance and can be used alone or in combination with conventional epoxy diluents to achieve 100% solids.

The speaker cited viscosity reduction, rapid ambient and sub-ambient temperature curing capability, improved flexibility and impact with no significant loss of chemical resistance as some of the advantages. With these benefits, acrylate monomers are finding a market in traffic striping, industrial floor coatings, and adhesive sealants.

Mr. Bailey also discussed the formulating guidelines, stating the basic formulation is a two-component system. Part A is comprised with 60-80% epoxy resin by weight, while Part B contains 20-40% by weight of the amine curing agents. He also mentioned that all commercial aliphatic, cycloaliphatic, and amidoamine curing agents can be used.

According to Mr. Bailey, a combination of the aliphatic and cycloaliphatic amines give the best combination of cure speed, hardness and chemical resistance. Mr. Bailey concluded that the best overall performance is given with 20-30% by weight of acrylate modification.

Q. What film thickness were you testing in your data?

A. It was 15 mils thick in the cure data.

JENNIFER RUMBERG, *Secretary*

GOLDEN GATE—NOVEMBER

"Self-Cleaning Filtration"

Jonathan Wilson, of Air Pel Filtration, spoke on "NEW SELF CLEANING FILTRATION METHODS FOR TODAY'S COATINGS."

Mr. Wilson classified filtration into four different methods: basket strainers, bag filters, cartridge filters, and self-cleaning filters.

The speaker explained that basket strainers are the most crude. Bag filters are used frequently; however, they are costly with production stoppage. Mr. Wilson noted that cartridge filters are messy to change and can cause contamination in the batch.

According to the speaker, self-cleaning filters consist of a permanent filter screen that is mechanically cleared; therefore pressure is reduced. Since disposal does not occur, the filter rating stays constant.

Self-cleaning filters vary in their design. The mechanism to clean the screens can be a piston on rotating blades. The screen can be wedge wire or a perfo-

1996-97 Officers of the Birmingham Club include (seated, from left): Honorary Treasurer—Susan Roy, BASF Coatings & Inks Ltd.; President—Joe E. Brown, Blagden Chemicals Ltd.; Program and Publicity Chair—Brian A. Fowler, Resiblend Services; and Honorary Secretary—Graham W. Fowkes, Technivelopments. Standing: Society Representative—Gerry J. Gough, ICI Packaging Coatings; President-Elect Designate—Rex A.J. Slatter, Trimite Ltd.; Technical Chair—Roland L. Staples, Nortax; Bill Jenkins; and David C. Morris, PPG Industries (UK) Ltd.

rated metal screen. It can be operated manually or automatically, electrically, or pneumatically powered.

TIM SPECHT, *Secretary*

KANSAS CITY—OCTOBER

"Low Cost Reactive Diluents"

The meeting's speaker was John Massingill, of Eastern Michigan University. Dr. Massingill spoke on the "DEVELOPMENT OF LOW COST REACTIVE DILUENTS."

Dr. Massingill discussed technology to help identify VOC reduction capabilities of vegetable oil reactive diluents in epoxy coatings. He stated that red iron oxide primers of six epoxy resins formulations were prepared and tested. These six formulations were based on modifications to a blend of high and low molecular weight bisphenol A epoxy resins.

Two of the formulations were prepared by adding 20 and 30%, respectively, of fully epoxidized linseed oil to the blend of epoxy resins. The other four formulations were prepared by advancing the molecular weight of a single low molecular weight epoxy resin with either epoxidized linseed oil or vernonia oil.

Dr. Massingill stated that depending on the degree of advancement, resins with different epoxy equivalent weights were obtained. Red iron oxide primers of these six modified epoxy coatings were compared with that of the primer from the unmodified epoxy blend.

The VOC of the straight formulation was 260 g/l and could be reduced to 140 and 120 g/l when 20 and 30% fully epoxidized linseed oil were added. However, drying times were increased.

According to Dr. Massingill, formulations based on the advanced resins gave higher VOC (260 to 330 g/l), but drying times were decreased. Hardness, adhesion, impact corrosion, and humidity resistance were good for all formulations.

DEBBIE KOSS, *Secretary*

LOUISVILLE—OCTOBER

"The Importance of Dispersion"

John Lanning, of Courtaulds Coatings, Inc., solicited new members for the Society's Manufacturing Committee.

Ilona Duvall, of Red Spot Paint and Varnish, announced that the 1997 Spring Symposium will be held on April 16.

John Sneeringer, of Premier Mill spoke on "THE IMPORTANCE OF DISPERSION . . . A DISCUSSION OF VARIOUS DISPERSION DEVICES AND PRINCIPLES."

Mr. Sneeringer identified the stages of dispersion as the following: (1) particular clumps; (2) premix; (3) initial sheer; and (4) final dispersion.

Different types of equipment are required to achieve various levels of dispersion. The rheology of the vehicle and pigment also dictate the equipment to be used. Mr. Sneeringer highlighted current dispersion equipment: high speed dispersion, rotor/stator dispersers, dual shaft mixers, multiple shafts, and combinations of rotors and stators, double planetary mixers, roll mills, ball mills, sand mills, and horizontal media mills.

Mr. Sneeringer identified the process variables for proper dispersion as quality of premix, rheology of material, grinding media, fluidization of media bed (efficient transfer of energy) and residence time in mill. He concluded that no one mill is best for all applications. Different mills and dispersers are more efficient and better suited for specific applications. Mr. Sneeringer recommended considering all process variables when choosing equipment.

CHRIS A. LOCKHART, *Secretary*

NEW YORK—NOVEMBER

"Epoxy-Amine Cured Coatings"

Michael Bailey, of Sartomer Co., discussed "NEW DEVELOPMENTS IN ACRYLATE MODIFIED EPOXY-AMINE CURED COATINGS."

Mr. Bailey highlighted a number of the current and new acrylate reactive diluents that are available. His presentation centered on the physical and chemical properties of epoxy-amine coatings modified with various diluents. Among the properties discussed by Mr. Bailey were pot life, viscosity reduction, film hardness and flexibility, and application.

LARRY WAELDE, *Secretary*

Elected to serve as Officers of the Detroit Society for 1996-97 are: President—Tedd Strobehn, Boehle Chemicals Co.; Vice President—Jan Hammond, BASF Corp.; Treasurer—Keith Stricker, A.T. Callas Co.; and Secretary—Ray Stewart, Akzo Nobel Coatings, Inc.

Members elected Officers of the Los Angeles Society are: Vice President—Joe Evans, Trail Chemical; Society Representative—James Hall, ICI Paints; Immediate Past-President—Robert Skarvan, Engineered Polymer Solutions; President—V.C. Bud Jenkins, Consultant; Past-President—Phillip C. Bremenstuhl, Zeneca Resins; Treasurer—Art Lorenz; and Secretary—Joe Reilly, Rohm and Haas Co.

New York Society Officers for 1996-97 include: Society Representative— George M. Amrich, Jr., Benjamin Moore & Co.; Vice President—Robert W. Schroeder, Daniel Products Co., Inc.; President— John W. Du, Hüls America, Inc.; Secretary—Larry R. Waelde, Troy Chemical Corp.; and E. Robert Cardin, Rohm and Haas Co.

Elected to serve as Officers for the Pacific Northwest Society are: Administrative Secretary—William Schackelford, Volatile Free, Inc.; Society Representative—Yvon Poitras, Horizon Chemicals Ltd.; Treasurer—Kelvin Huget, Imasco Minerals, Inc.; Secretary—Beverly Spears, Tarr Inc.; President—Edward J. Linton, Cloverdale Paint Inc.; and Vice President—Kenneth Wenzel, Chemical Distributors, Inc.

PACIFIC NORTHWEST (VANCOUVER SECTION)—OCTOBER

"Flatting Agents for Today's High Quality Finishes"

Technical Committee Chair Yoichi Seo, of Flecto Coatings, Ltd., announced that the goal for completing the Educational and Technical Committee's video is May 1997. The FSCT and PNWSCT may contribute to the funding.

Paul Andreassen, of Consolidated Coatings Corp., reported that new regulations for British Columbia Paint Care are expected in the spring. These regulations will include a requirement to take back empty paint cans and aerosol cans at collection depots.

Mr. Andreassen stated that 70% of paint that can be recycled is actually to be reused or recycled. He noted that penalties can be levied of up to $200,000 for an offense.

In addition, Mr. Andreassen said that 94 depots have been opened.

Pacific Northwest Society member Roy Seeman, of Fuji Silysia Chemical, discussed "Flatting Agents for Today's High Quality Industrial Finishes."

Kelvin Huget, *Secretary*

PHILADELPHIA—OCTOBER

"Standard Deviation"

Wayne Kraus, of Hercules Incorporated, reported that planning for the 1998 Eastern Training Conference is underway. The event will be held on May 11-13 at the Valley Forge Convention Center. Members are urged to volunteer.

In other news, Mr. Kraus reminded members of the newly formed PSCT Job Placement Service. This program will enable members to find either employees or employment from among the membership.

Pat Petersen, of ARCO Chemical Co. accepted a plaque honoring the company's participation in the 1996 Eastern Training Conference.

The evening's technical speaker was Richard Roesler, of Bayer. He discussed "What's a Standard Deviation Good for Anyway?"

Dr. Roesler stressed the importance of studying multiple variables, but this calls for more experimental design. Graphical analysis can make the whole process more effective and easy to read.

The speaker noted that statistical design comes primarily from the scientific method where observations, hypotheses, and experiments originate. The experiments reveal data to support, or disprove the hypotheses. Under the scientific method, if the data never violates the hypothesis, it becomes a scientific law.

Dr. Roesler demonstrated several designed experiments, using samples and statistics to give two- and three-dimensional design spaces. He said that replicates of data will always give you better information and therefore, more accurate experiments and better-decision making.

Factorial designs are a way to study several different variables, while mixture designs are used extensively in the coatings industry to analyze blends, reactions, oligomers, and polymers as well as manpower, budgets, and market shares.

SUE NIELSEN, *Secretary*

PHILADELPHIA—NOVEMBER

"High Performance Waterborne Polyurethane Coatings"

Technical Committee Chair Bernadette Corujo, of Zeneca Resins, reported on a new project which will deal with adhesion. Their goal is to publish a paper in the JOURNAL OF COATINGS TECHNOLOGY, or present one at the next FSCT Annual Meeting.

Educational Committee Chair Rich Granata, of Lehigh University, reported on the first of several forums based on the FSCT *Series on Coatings Technology.*

Philadelphia Society member Bill Buckley, of Air Products and Chemicals, Inc., discussed "HIGH PERFORMANCE WATERBORNE POLYURETHANE COATINGS."

Mr. Buckley introduced two waterborne products which rival solventborne products for gloss, adhesion, hardness, flexibility, chemical resistance, and salt spray resistance.

The speaker recommended these products for heavy-duty industrial and maintenance coatings, storage tank and pipe coatings, floor and wall coatings, and rail car and equipment coatings. Both of these products use standard isocyanates.

In addition, Mr. Buckley described typical properties and characteristics of the products and coatings formulated with them with a variety of isocyanate types. Several representative panels of coatings made from the two systems were displayed.

SUE NIELSEN, *Secretary*

TORONTO—SEPTEMBER

"UN Packaging Regulations"

Norman Levine, of Norman Intl. discussed "UN PACKAGING REGULATIONS."

Mr. Levine described certified packaging for UN packaging regulations. The UN packaging testing method was explained to include fully packaged material under intense pressure. Also, certain physical testers were required on fibre-board packaging material.

In addition, Mr. Levine discussed the penalties for not using UN certified packaging material or a UN certified agency. Normal fees were split by country: $25,000 in the United States and $50,000 in Canada.

ALEXANDER P. KING, *Secretary*

TORONTO—OCTOBER

"Regulatory Issues"

A moment of silence was observed for the death of Robert H. Purnell, of Sun Chemical.

Kevin Pelling, of Chemroy Canada Inc., received the Hüls gavel. Past-President Bob Ng, of Hoechst Canada Inc., presented *Robert's Rules of Order* to Mr. Pelling.

The evening's technical speaker was Simon Lawrence, Ciba Pigments Division. He discussed "GLOBAL COMPANIES—LOCAL REGULATIONS—INCOMPATIBLE PARTNERS?"

Mr. Lawrence cited different governing bodies legislating regulations from North America to Europe. He said that in Europe, any supplier with a new product has to advise the local authorities. In addition, a European company must notify local authorities if a non-European manufactured product is going to be used.

The speaker also noted local differences within Europe. These differences were usually associated with upper and/or lower limits rather than testing methods. The exception, however, is with French regulators, who request extra tests be performed for the development of new raw materials.

ALEXANDER P. KING, *Secretary*

Future Society Meetings

Baltimore

(Jan. 16)—"How to Choose the Right Silicone Additive"—Robert E. Ruckle, OSi Specialties.
(Feb. 20)—Plant tour of General Motors facility.
(Mar. 20)—General Meeting—To be announced.
(Apr. 17)—"High Performance Emulsions for Universal Primers"—Mike Wildman, E.P.S. and Nominations.
(May 15)—Election of Officers.

Chicago

(Feb. 3)—"Coalescing Solvents: VOC and Odor"—Mike Anchor, BASF Corp.
(Mar. 3)—"New Developments in Acrylate Modified Epoxy-Amine Cured Coatings"—Michael Bailey, Sartomer Co.
(Apr. 7)—"General Industrial Melamine-Crosslinked Polyester Coatings–Structure/Property Characteristics of Dibasic Acids and Their Relationship to Weathering"—Phil Heidt, Eastman Chemical Co.
(May 30)—Annual Awards Banquet.

Los Angeles

(Feb. 12)—Spouses' Night.
(Mar. 12)—"Efficient Use of TiO_2 in Architectural Finishes"—DuPont White Pigments & Minerals Products.
(Apr. 9)—Bosses' Night. "Rheology Testing for the Paint Industry"—Scott Crane, Haake Instruments.
(May 14)—"The Use of Polyols a 'New Generation' in High Performance Coatings"—Steve Seneker, Arco Chemical Co.
(June 11)—Annual Meeting and Election of Officers.

New York

(Feb. 13)—Legislative Update.
(Mar. 4)—Mini Workshop—"Applications Equipment, HVLP, Electrostatic, etc."—Dennis Stephens, ITW Ransburg; "Tools PC Software"—T. Wu, Formu; "Paint Technology Summary for the New People in the Industry"—George Schmitz, S.P. Morell, Inc.; and "Surfactant Chemistry Summary"—speaker from Rhone-Poulenc Co.
(Apr. 8)—"Operating Variables on Milling Efficiency and Material Wear"—Gerald Amback, SEPR.
(May 13)—PaVac Awards Night. "Chemistry of Iron Oxides"—George Poldosky, Harcros.

Philadelphia

(Feb.)—Manfacturers' Night.
(Mar. 13)—"Failure Analysis of Coatings"—Bud Senkowski, KTA-Tator.
(Apr.)—Awards Night.
(May 8)—"Dispersants for Industrial Coatings"—Peter Hibbert, ICI.

Rocky Mountain

Denver/Arizona

(Mar. 10/11)—"Efficient Use of TiO_2 in Architectural Finishes"—DuPont White Pigments & Mineral Products
(Apr. 7/8)—"Rheology Testing for the Paint Industry"—Scott Crane, Haake Instruments.
(May 12/13)—"The Use of Polyols a 'New Generation' in High Performance Coatings"—Steve Seneker, Arco Chemical Co.

New FSCT Members

BALTIMORE

Active

Howard, Grover—21st Century Coating, Inc., Alexandria, VA.

CDIC

Active

Boley, Lisa A.—Akzo Nobel Coatings, Inc., Columbus, OH.
Culhane, William O.—International Paper, Loveland, OH.
Ellingson, Peter C.—Procter & Gamble, Cincinnati, OH.
Hollifield, Bill M.—D&L Paint Co., Liberty, IN.
Krueger, Jonathan K.—Akzo Nobel Coatings, Inc., Columbus.
Rider, Lee A.—Formulabs, Piqua, OH.
Taylor, Kent J.—M.P. Kenes Inc., Crete, IL.

Associate

Conner, Bernard J.—Advanced Tech Pdts., Cincinnati.
Fisher, Linda M.—Morton International, Lansing, IL.

CHICAGO

Active

Bury, Rafael—USG Research, Libertyville, IL.
Ceglarek, Vera J.—Halox Pigments, Hammond, IN.
Cole, Harold F.—Dexter Packaging Products, Waukegan, IL.
Griffin, Steven J.—The C. P. Hall Co., Bedford Park, IL.
Kaleta, David T.—AITI, Batavia, IL.
Konen, Ronald H.—Morton International, Batavia.
Krohn, Rex M., Jr.—The Valspar Corp., Kankakee, IL.
Nevins, Norman—Halox Pigments, Hammond.
Oppenheim, Barry—The Valspar Corp., Wheeling, IL.
Pinchok, Michael A.—The Valspar Corp., Fort Wayne, IN.
Ponnaganti, Raja S.—Morton International, Lansing, IL.
Simkins, Deborah A.—Color Corp of America, Rockford, IL.
Stewart, Susan M.—Rust-Oleum, Pleasant Prarie, WI.
Wise, Claude T.—Wise Tech. Marketing, Chicago, IL.

Associate

Burke, Tom S.—Tri-Star Group, Dekalb, IL.
DiSantis, Dirk—Lawter International, Pleasant Prairie, WI.
McKenna, Michael F.—Cleveland Pigment, Chicago, IL.
Meehan, Theodore F.—Pico Chemical Corp., Chicago Heights, IL.
Skrobot, Pete—Halox Pigments, Hammond, IN.
Vaidya, Bachu B.—Dyechem, Chicago.
Watton, Harry B.—Rycoline Products, Clifton, NJ.

CLEVELAND

Active

Allen, Kimberly S.—Lord Corporation, Erie, PA.
Campese, John A.—The Sherwin-Williams Co., Cleveland, OH.
Debroy, Tapan K.—The Lubrizol Corp., Wickliffe, OH.
DePaulo, Lisa J.—The Sherwin-Williams Co., Cleveland.
DiCola, Louisa D.—The Sherwin-Williams Co., Cleveland.
Engelking, Greg—ICI Paints Glidden, Strongsville, OH.
Groseclose, Rhea G.—ICI Paints Glidden, Strongsville.
Hairston, Thomas G.—Gibson-Homans Corp., Twinsburg, OH.
Headley, Jeffery S.—Jamestown Paint Co., Jamestown, PA.
Husbands, Daniel J.—The Sherwin-Williams Co., Cleveland.
Jackson, Ulysses—The Sherwin-Williams Co., Cleveland.
Joecken, John A.—The Sherwin-Williams Co., Cleveland.
Johnston, Richard G.—The Sherwin-Williams Co., Cleveland.
Khan, Ayaz—ICI Paints Glidden, Strongsville.
Kirby, James A.—Kirby & Associates, Inc., Hudson, OH.
Klimovich, David F.—The Sherwin-Williams Co., Cleveland.
Koger, Linwood G.—The Sherwin-Williams Co., Cleveland.
Leighty, Chad E.—Morton International, Orrville, OH.
Lubnin, Alexander V.—BFGoodrich, Brecksville, OH.
Madigan, Lorette—The Sherwin-Williams Co., Cleveland.
Morgan, Tammy A.—BFGoodrich Company, Brecksville.
Neely, David J.—Morton International, Orrville.
Pellon, William R.—ICI Paints Glidden, Strongsville.
Porvasnik, Stacey A.—The Sherwin-Williams Co., Cleveland.
Price, Eleonore—Mactac, Stow, OH.
Price, Lawrence—Mactac, Stow.
Rao, Madhukar—The Sherwin-Williams Co., Cleveland.
Reed, Robert C.—The Sherwin-Williams Co., Cleveland.
Richardson, Thomas W.—Tremco, Aurora, OH.
Rota, Darlene D.—The Sherwin-Williams Co., Cleveland.
Segal, Michael B.—Mameco International, Cleveland.
Simpson, Charles H.—The The Sherwin-Williams Co., Cleveland.
Smith, Wanda J.—The Sherwin-Williams Co., Cleveland.
Tetzlaf, David J.—The Sherwin-Williams Co., Cleveland.
Toman, Alan P.—ICI Packaging Coatings, Strongsville.
Torres, Victor—RPM, Inc, Medina, OH.
Young, Francis X.—The Sherwin-Williams Co., Cleveland.
Zhu, Jiandong—Jamestown Paint Co., Jamestown.

Associate

Besand, Mark J.—Shell Chemical Co, Chagrin Falls, OH.
Boyle, Adam J.—INR Specialty Prod., Medina, OH.
Callahan, Amy M.—Goodyear, Akron, OH.
French, Peter E.—Palmer Supplies Co., Cleveland, OH.
Irvine, W. Bryn—Palmer Supplies Co., Cleveland.
Mastrantoni, John L.—M. F. Cachat Co., Cleveland.
McCluggage, Ken—Marlite, Stone Creek, OH
O'Connor, Patrick W.—Cleveland Pigment, Akron.
Roth, Amy L.—Amoco Chemicals, Westlake, OH.
Volker, Rick A.—Van Leer Containers, Rocky River, OH.

DALLAS

Active

Copp, John R.—Rust-Oleum CPS, Tulsa, OK.

DETROIT

Associate

Bedard, Paul N.—CIBA Additives, Troy, MI.
Myers, Gregory—Wacker Silicones, Adrian, MI.

KANSAS CITY

Active

Agin, Robert Wayne—Tnemec Co., Inc., North Kansas City, MO.
Angerer, Mark—Iowa Paint Mfg., Co., Des Moines, IA.
Bain, Mary—CCP, North Kansas City.
Belekevich, Bob—CCP, North Kansas City.
Brantner, Sandra—CCP, North Kansas City.
Burns, Theresa L.—Hillyard Industries, St. Joseph, MO.
Chubin, David—CCP, North Kansas City.
Eslinger, Del—CCP, North Kansas City.
Frakes, Kyle R.—Tnemec Co., Inc., North Kansas City.
Glanz, Matthew A.—Iowa Paint Mfg. Co., Des Moines.
Harkness, Guy L.—CCP, North Kansas City.
Jochims, Sheryl A.—Iowa Paint Mfg. Co., Des Moines.
Julien, Tim—CCP, North Kansas City.
Kaza, Mike—CCP, North Kansas City.
Koenig, Kim—CCP, North Kansas City.
Longwith, Chet—CCP, North Kansas City.
Page, Noble—CCP, North Kansas City.
Sayed-Sweet, Yasmin—CCP, North Kansas City.
Smith, Kimberly D.—Davis Paint Company, North Kansas City.

Smyth, Scott—CCP, North Kansas City.
Stadler, Jane—CCP, North Kansas City.

Associate

Mategrano, Louis C.—Peninsula Polymers, Overland Park, KS.

LOS ANGELES

Active

Brod, Gregory C.—Behr Process Corp, Santa Ana, CA.
Burdette, David L.—Continental Coatings Co., Fontana, CA.
Dineros, Ramon B.—Union Carbide, Torrance, CA.
Khan, Omar—American Ind. Paint Co., Baldwin Park, CA.
Lapuz, Gerald A.—Environmental Chemic, Anaheim, CA.
Morando, Eusebio A.—Consolidated Color Corp, Hawaiian Gardens, CA.
Pun, Ray Q.—Carter Holt Harvey Roofing, Inc., Corona, CA.
Rocha, Daniel A.—Behr Process Corp., Santa Ana.
Shah, Rajnikant P.—Courtaulds Aerospace, Burbank, CA.
Strelecki, Leticia E.—Behr Process Corp., Santa Ana.
Wauchope, John J.—MFG & Consulting Chemists, Inc., San Bernardino, CA.
Zheng, Hai-Lin—Fu Lu Development Co., City of Industry, CA.

Associate

Donnelly, Paula—Kronos, Inc., Fullerton, CA.
Floyd, Eric D.—Applied Remediation Technologies, Irvine, CA.
Hamilton, Jennifer L.—Decorative Colorchem, Huntington Beach, CA.
Mather, James Thomas—Chemcentral Corp., Santa Fe Springs, CA.
McNamara, Ted—Seegott Inc., Streetsboro, OH.
Roots, Kevin G.—Western Ecotec Coatings, Inc., San Bernadino, CA.

Educator and Student

Jenkins, Tim M.—UC Riverside, Riverside, CA.
Volpone, Michael A.—Ameron International, Ontario, CA.

LOUISVILLE

Active

Cash, Steven B.—Progress Paint, Louisville, KY.
Harlow, Scott D.—Jasper Chemical Coatings, Jasper, IN.
Walsh, Thomas E.—Specialty Coating Services, Louisville.

Associate

Kratzer, Sam—Seegott Inc., Richmond, IN.
Ryan, Jeff S.—Akzo Nobel Surf Chem., Florence, KY.
Steffensen, Steven H.—Eastman Chemical, Columbus, OH.

MONTREAL

Active

Belanger, Louis M.—Transports Quebec, Quebec City, Que.
Belanger, Michel—Transports Quebec, Quebec City.
Brodeur, Gisepe G.B.—Stucco-Mix Int. Cell-Tex, Inc., Chambly, Que.
Gagnon, Mare—Colorspec Inc., Laval, Que.

Associate

Dumais, Dan—Carterchem Canada Inc., Montreal, Que.
Kabakian, Leon—Van Waters & Rogers, Lachine, Que.
Semper, Karl—Van Waters & Rogers, Lachine.

NEW YORK

Associate

Cooper, Leonora—*SP* Morell & Co., Armonk, NY.
Genter, Rick H.—D. H. Litter Co., Brick, NJ.
Miller, Robert T.—Troy Corporation, Florham Park, NJ.
Rudeau, Thomas G.—E. W. Kaufmann Co., Southampton, PA.

Retired

Klugman, Werner—Pleasantville, NY.

NORTHWESTERN

Active

Ahl, Coleen M.—Werneke Ink, Co., Plymouth, MN.
Bolz, Jason T.—The Valspar Corp., Minneapolis, MN.
Fungfook, Mark A.—The Valspar Corp., Minneapolis.
Hendrickson, William A.—Aveka, Inc., Woodburn, MN.
Magel, Michael T.—Sierra and TK Prod., Minnetonka, MN.
Scanlan, Thomas J.—Indue Sales & Services, Woodbury, MN.
Schultze, Gary R.—Ashland Chemical Co., Prior Lake, MN.

Associate

DeGreeff, Rose M.—Crystal Cabinets, Princeton, MN.
Franklin, Joseph D.—WR Grace, Davison Div., Brookfield, WI.
Pettijohn, W. Thomas—Wayne Pigment Corp, Milwaukee, WI.
Werner, Todd A.—Circuit Supply Inc., Plymouth, MN.

Educator and Student

Jeffcoate, Carol S.—North Dakota State University, Fargo, ND.

PIEDMONT

Active

Wang, Hugh—FMC Co., Bessemer City, NC.

ST. LOUIS

Active

Berger, Shari K.—Monsanto, St. Louis, MO.
Bordeau, Wayne L.—Katalin Industrial Coatings, St. Louis.
Eng, Beth—Carboline, St. Louis.
Flageolle, John E.—Dennis Chemical Co., St. Louis.
Fultz, Scott B.—Dennis Chemical, St. Louis.
Gibson, Don J.—Akzo Nobel Resins, East St. Louis, IL.
Gish, Lawrence E.—Akzo Nobel Resins, East St. Louis.
Kipp, John H.—Dennis Chemical Co., St. Louis.
Rose, Stephen D.—Carboline Co., Lake Charles, LA.
Sackett, Dan J.—Akzo Nobel Resins, East St. Louis.
Schmidt, Susan T.—Nascote, Nashville, IL.
Schweikart, James W.—Akzo Nobel Resins, East St. Louis.
Strott, Wallace H.—Vanex Inc., Mt. Vernon, IL.

Associate

Baumstark, David T.—Archway Sales, St. Louis, MO.
Manz, Steven V.—Abner Hood Inc., Clayton, MO.
Pluth, Dale E.—Thomas & English, St. Louis.
Skrobot, Peter—Halox Pigments, Hammond, IN.

TORONTO

Active

Ali, Zamaul—K-G Packaging, Brampton, Ont..
Cantera, Dale W.—Huls Canada, Brampton.
Comley, David G.—Duracoat Powder Mfg., Grimsby, Ont..
Dam, Phillips—St. Clair Paint, Toronto, Ontario.
Fairbanks, Margaret E.—K-G Packaging, Concord, Ont.
Monterroso, Carlos E.—K-G Packaging, Concord.
Naraine, Narpal—K-G Packaging, Concord.
Roberts, Glen E.—DuPont Canada, Mississauga, Ont..
Lachman, Premanand—K-G Packaging, Mississauga.
Totten, Craig B.—Huls Canada Inc., Brampton.

Associate

Atkinson, Ken—Clariant Canada Inc., Lachine, Que..
Beamish, Heather A.—Monsanto Canada, Mississauga, Ont..
Wilkinson, Pete—Coatings Magazine, Oakville, Ont..

WESTERN NEW YORK

Active

Marx, David E.—Chameleon Color Card, Lockport, NY.
McNinch, Richard L.—Corning Incorporated, Painted Post, NY.
Walczak, Barbara—Iimak, Amherst, NY.


R.T. Miller

Troy Corp., Florham Park, NJ, has appointed **Robert T. Miller** as Manager, Paint Coatings Laboratory. He will have responsibilities in the oversight and management of the paint and powder coatings laboratories and technical services. Mr. Moore most recently served as Vice President/Technical and Director of Manufacturing at Duron, Inc. He is a member of the New York Society.

Fitz Chem Corp., Elmhurst, IL, has promoted **Robert Milano** to the position of Sales Manager. Mr. Milano brings more that 13 years of sales experience in the coatings, plastics, and printing ink industries to this post.

Vincent J. Arabia has accepted the position of Area Representative/Coatings and Plastics for Buckman Laboratories, Memphis, TN. Mr. Arabia will be responsible for sales in the South Central region.

Lewis J. Privon has accepted the position of Account Manager in Northern California for the E.T. Horn Co., La Mirada, CA. Mr. Privon's primary job will be servicing the coatings, composites, adhesives, and ink and graphics industries.

Hahn Northwest, Inc., Seattle WA, has hired **William R. Clary** as a New Sales Associate. Mr. Clary brings over 30 years of industry experience to this position serving the Pacific Northwest market.

Mary McKnight, Research Chemist with the National Institute of Standards and Technology, Gaithersburg, MD, has been named the 1996 recipient of the Standards Engineering Society/American Society for Testing and Materials Robert J. Painter Award. The award was presented to Dr. McKnight in recognition of her distinguished service, exceptional contributions, and achievement and prominent leadership toward advancing the standardization of coatings and lead paint abatement technologies.

Thomas C. Osborne has been named Chief Executive Officer of ICI Paints in North America, Cleveland, OH. In addition to this title, he will also serve as President of The Glidden Co. Mr. Osborne has been with the ICI paint business for 23 years in the United States and United Kingdom. Most recently he had overall responsibility for the company-owned Stores Division.

Marilyn J. Wiels, a 28-year employee of Raabe Corp., Menomonee Falls, WI, has been promoted to the new position of Human Resource Manager.

Fabricolor Inc., Paterson, NJ, has named **Tom Ashe** Marketing Manager for the ink industry. In addition to this promotion, Mr. Ashe will retain his current responsibilities as the Midwest and West Coast Sales Manager for the pigments group as well.

Hüls America, Inc., Somerset, NJ, has elected **Joseph H. Fuhrman** Vice President. Mr. Fuhrman joined Hüls in 1989 and previously served as General Manager of the Specialty Chemicals business unit.

In addition, **Todd Katres** has been promoted to Southern Account Manager for the Coatings Raw Materials Division.

ANGUS Chemical Co., Buffalo Grove, IL, has promoted **Cleve Madlock** to the position of Vice President/Domestic Sales and has named **Kent S. Strong** Vice President/Europe. Mr. Madlock will be responsible for all sales of nitroparaffins, their derivatives, and biocides in the United States and Canada. Mr. Strong, previously Director/New Product Development, will handle sales, marketing, and administration in Europe for ANGUS Chemie.

In addition, **Gregory P. Jorjorian** has accepted the position of Managing Director of the Biocides Business Group at ANGUS. Previously, Mr. Jorjorian worked as a Consultant for the company in the area of acquisitions.

Uve Svinis has joined the staff of Crosfield Co., Joilet, IL, as Technical Service Manager/Surface Coatings. Mr. Svinis has been involved in the paint and coatings industry for over 21 years and brings valuable experience to this position. He was recently employed by Reichhold Chemicals, Research Triangle Park, NC.

Jim McCarthy has been promoted to Marketing Manager/International, for Elf Atochem North America, Inc., Philadelphia, PA. In this position, Mr. McCarthy will be responsible for Kynar 500® resin throughout Asia Pacific.

In addition, **Jean-Louis Pey** has been appointed Development Manager for Rilsan® powder coatings. Mr. Pey is being transferred from Elf Atochem S.A. in Paris where his most recent assignment was European Sales Manager for Rilsan powder coatings.

Also, **Neil Lehman** has been named Demand Manager of Engineering Polymers. Mr. Lehman will be responsible for implementing the company's operations planning process for Rilsan polyamide resins and Pebax® copolyamide resins.


L.N. Moon

Lloyd N. Moon has joined Witco Corp., Greenwich, CT, as Vice President, where he will be in charge of industry and government relations as well as the company's communications activities including public relations, marketing programs, and internal communications. Mr. Moon has also been named an Assistant Secretary and Liaison to Witco's Board of Directors.

Ciba Additives, Tarrytown, NY, has announced the following appointments: **Peter J. Schirman**—Vice President/Additives for Coatings, Radiation Curing and Photography; **Andy Mar**—Business Director/Automotive Coatings; **Mark McCusker**—Business Director/Trade Sales and Industrial Coatings; **Keith Cooper**—Business Director/Photography and Radiation Curing; and **Walter Renz**—Industry Marketing Executive/Additives for Coatings, Radiation Curing and Photography.

Obituary

M. Alain Clause, President of Federation d'Associations de Techniciens des Industries de Peintures, Vernis Emaux et Encres d'Imprimerie de l'Europe (FATIPEC), passed away on November 19, 1996. He was 46 years old.

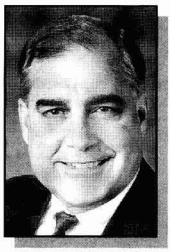
Mr. Clause is survived by his wife, Martine, and a son.

The appointment of **Bernard J. Burke** to Vice President of Operations has been announced by the E.W. Kaufmann Co., Southampton, PA. Mr. Burke was previously employed by Rohm and Haas Co. and Finnaren and Haley.

In addition, **Thomas G. Rudeau** has joined the sales staff and will be servicing the New York Metro area as well as accounts in Pennsylvania and Connecticut. Mr. Rudeau is a member of the New York Society.

Akzo Nobel Coatings, Inc., Zion, IL, has appointed **Dennis J. Wacker** to the position of National Sales and Marketing Manager/General Industrial Coatings. In this capacity, Mr. Wacker will manage the development and growth of General Industrial Coatings within Akzo Nobel's Specialty Coatings Unit in North America.

Also, **John J. Zeiss** has joined Akzo as Market Manager/General Industrial Coatings. He will be responsible for developing and implementing marketing strategies for key General Industrial market segments within the Specialty Coatings Unit in North America.



D.J. Wacker

J.J. Zeiss

The Paint & Decorating Retailers Association (PDRA), St. Louis, MO, has elected its officers for the coming year. They are: President—**Gary Fahndrich**, West Side Decorating Center, Saginaw, MI; Vice President—**Frank Facciobene, Jr.**, All Florida Decorating Center, Melbourne, FL; and Treasurer—**Edward Agostinelli**, Gleem Color Design, Mobile, AL.

New directors elected to begin a three-year term are: **Tim Bowling**, Hoover Paint & Wallcovering; **Clark Abbott**, The Paint Can; **Robert Schmank**, Miller Brothers Paint & Wallpaper; and **J. Stephen Wray**, Bird Paints.

In other PDRA news, **Laura L. Melton** has been hired as Marketing/Promotions Coordinator.

Five employees of PPG Industries, Inc., Pittsburgh, PA, have been inducted into the PPG Collegium in honor of their career contributions to product development.

—**Philippe Faucher**, Director of Automotive Electrocoat for Europe, Paris, France.

—**James J. Finley**, Staff Scientist/Vacuum Coatings, PPG Glass Technology.

—**Hilary E. Holste**, Director of Resin Process Engineering.

—**John F. McConnell**, Manager of Glass Engineering Special Projects, PPG Glass Technology.

—**Barry VanGemert**, Scientist, Chemicals Technical Center.

Distinguished colleagues of the PPG Collegium are encouraged to have close ties with the acedemic community, publish technical papers, share their knowledge within PPG as consultants and seminar leaders, and broaden their technical expertise.

Ted Herz has accepted the position of Business Director for the Rubber Chemicals and Pigments Division of Degussa Corp., Ridgefield Park, NJ. In this capacity, Mr. Herz will manage carbon black and organosilane products tailored to the inks, plastics, coatings, and mechanical rubber goods industries for North America.

Freedom Chemical Co., Philadelphia, PA, has appointed **Edward J. Rish** to the position of President of Freedom Textile Chemicals Co. Headquartered in Charlotte, NC, Mr. Rish will have day-to-day responsibility for all locations and functions of the Freedom Textile business.

Jacob W. Ribar, of Construction Technology Laboratories, Skokie, IL, has been named a 1996 recipient of the American Society for Testing and Materials' (ASTM), W. Conshohocken, PA, Award of Merit. Mr. Ribar was selected for the award for his outstanding leadership and notable contributions to Committee C-12 on Mortar for Unit Masonry. The title of Fellow accompanies the award.

Books/ Publications

Waterborne and Solvent Based Surface Coatings

Waterborne and Solvent Based Epoxy Systems for Surface Coatings and Their Practical End User Applications, is the title of a new book published by SITA Technology Ltd. The publication, which consists of 12 chapters, is one of a new series that concentrates on waterborne systems for industrial coatings.

Circle No. 30 on the Reader Service Card

Business Directory

The 20th edition of the "Business Directory of Hong Kong 1996/97" is available from Current Publications Ltd. This version lists more than 12,300 major and active firms and organizations in Hong Kong, including importers and distributors of various merchandise, manufacturers, exporters and re-exporters of different products.

Circle No. 31 on the Reader Service Card

Product Guide

Hüls America, Inc. has published a new edition of its "Corporate Profile and Product Guide." This four-page brochure provides an overview of the company's history, corporate mission, and products. Also included are addresses for Hüls' corporate and regional headquarters, manufacturing sites, and the technical center.

Circle No. 32 on the Reader Service Card

Conference Proceedings

Copies of the Powder Coatings '96 Conference Proceedings are available for purchase from Goyer Management. The 335-page soft bound book contains all 15 technical papers presented during the conference along with two alternate papers.

Circle No. 33 on the Reader Service Card

Educational Outreach

A new monograph documenting the experiments and demonstrations presented at the Educational Outreach Session at the American Vacuum Society 42nd National Symposium has been published. A companion video tape of the session, which shows the contributors presenting the demonstrations described in the monograph, is also available.

Circle No. 34 on the Reader Service Card

Laboratory Apparatus

Spectrophotometer

Shimadzu Scientific Instruments' new double beam AA-6200 atomic absorption spectrophotometer is available. The spectrophotometer is compatible with Windows™ 95 and AtomicA's software Wizard.

Circle No. 35 on the Reader Service Card

Colorimeter

The ClearScan APHA/Gardner Transmittance Colorimeter has been introduced by Hunter Associates Laboratory, Inc. This instrument is designed for the measurement of color in liquids such as resins, solvents, acids, perfumes, and varnishes. The ClearScan provides both APHA and Gardner Scale values plus tristimulus color measurements.

Circle No. 36 on the Reader Service Card

Tait Cell

EG&G Instruments Princeton Applied Research has issued a product sheet on the new model K0307 Tait Cell. With a sample area of diameter of 2.5 in., the new Tait Cell reportedly provides a working electrode area of approximately 5 in. squared, thus accommodating a vast range of working electrode sizes.

Circle No. 37 on the Reader Service Card

Spot Curing Lamp

Light-Welder® 3010-EC, an ultra high intensity UV/visible spot curing lamp has been introduced by Dymax Corp. Simplicity of design and sturdy construction assure easy set-up and use.

Circle No. 38 on the Reader Service Card

Report Writer

Crystal Reports, a Windows™ based report writer, is now available from BatchMaster Software Corp. Crystal Reports is designed to let you access BatchMaster data, link files, perform calculations, restrict variables, and produce critical reports.

Circle No. 39 on the Reader service Card

Computer Software

Nametron Corp. has licensed the Visual Basic® programming system, Applications Edition, from Microsoft Corp., for inclusion in the NameSoft OpenControl softlogic product suite. OpenControl includes the Visual Flowchart Language, a flowchart-based programming environment for machine control applications.

Circle No. 40 on the Reader Service Card

Writer Software

Software designed to improve lab productivity and decrease errors by elminating the process of transcribing chromatographic results into report format has been produced by Varian Associates, Inc. The Star Custom Report Writer, used with Varian's Star Chromatography Workstation Version 4.5, is designed to allow chromatographers to customize reports with just a few clicks of the mouse.

Circle No. 41 on the Reader Service Card

Vacuum Valves

A line of vacuum valves that are smaller than standard vacuum poppet valves has been introduced. The VacuComp™ LoPro™ Vacuum Valves can be tailored to the user's needs with options available in flanges, seals, solenoids, and limit switches.

Circle No. 42 on the Reader Service Card

Bulk Bag Discharger

A bulk bag discharger with weight batch filling head that delivers bulk material directly to containers, filling machines, or process equipment in preselected amounts by weight, has been developed by Flexicon Corp. The weight batch filling head can be cantilever-mounted from the bulk bag discharger frame, or mounted remotely above and discharge point desired.

Circle No. 43 on the Reader Service Card

Humidity-Controlled Oven

A humidity-controlled walk-in oven measuring 8' W x 13' D x 8'8" H has been manufactured by The Grieve Corp. Highlights of the No. 782 oven include 4" thick insulated walls and a 3" thick insulated floor. The oven also features a 6,000 CFM, 5HP powered forced exhauster to enhance circulation and a two-pen recording controller to monitor and control temperature as well as humidity.

Circle No. 44 on the Reader Service Card

Overspray Collection

A.J. Dralle, Inc. has announced its new XFP-6000 system for the collection of aerospace chromate coating overspray. This system demonstrates a 78.73% efficiency on 0.3-0.4 micron-size particles, and an 98.45% efficiency on 3 to 5 micron-size particles.

Circle No. 45 on the Reader Service Card

Stain Video

Cabot Stains has made available an instructional video entitled, "How to Achieve Beautiful Long-Lasting Stain Results." This 16-minute video offers an in-depth look at surface preparation, choosing the right product for your job, and proper application techniques.

Circle No. 46 on the Reader Service Card

Waste Prevention

A new study from Franklin Associates, Ltd., "Waste Management and Reduction Trends in the Polystyrene Industry, 1974-1994," shows the polystyrene industry has diverted 10.4% from the waste stream over a 20-year period. This 40-page study covers all types of polystyrene packaging and disposables—from injection molding to expandable bead.

Circle No. 47 on the Reader Service Card

Federation Meetings

For information on FSCT meetings, contact Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422 (610) 940-0777, FAX: (610) 940-0292.

1997

(May 17-18)—FSCT Spring Board of Directors Meeting. May 17—Social Tour; May 18—Board Meeting. Hyatt Regency, Birmingham, England.

(June 20-21)—FSCT Incoming Society Officers Meeting. June 20—FSCT Headquarters Visit, Meeting, and Reception; June 21—Society Officers Meeting. Marriott West, Conshohocken, PA.

(Nov. 3-5)—FSCT Annual Meeting and International Coatings Technology Expo and Conference (Formerly Annual Meeting and Paint Industries' Show). Georgia World Congress Center, Atlanta, GA.

1998

(Oct. 14-16)—FSCT Annual Meeting and International Coatings Technology Expo and Conference (Formerly Annual Meeting and Paint Industries' Show). Ernest N. Morial Convention Center, New Orleans, LA.

Special Society Meetings

1997

(Feb. 5-7)—24th Annual International Waterborne, High-Solids, and Powder Coatings Symposium. Sponsored by the Southern Society and The University of Southern Mississippi (USM). New Orleans, LA. (Robson F. Storey or Shelby F. Thames, Co-Organizers, WBHS&PC Symposium, Dept. of Polymer Science, USM, Box 10076, Hattiesburg, MS 39406-0076).

(Feb. 18-20)—Western Coatings Societies' 23rd Biennial Symposium and Show. Sponsored by the Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies. Disneyland Hotel and Convention Center, Anaheim, CA. (Robert J. Skarvan, EPS, Inc., 5501 E. Slauson Ave., Los Angeles, CA 90040; (800) 642-7077 or for exhibit space: Roberta Garcia, ICI Paints, 6100 S. Garfield Ave., Los Angeles, CA 90040; (213) 888-8888, ext. 8343).

(Mar. 19)—Mini-Trade Show & Symposium. Sponsored by the Piedmont Society. Showplace on the Park, High Point, NC. (Nellie Moretz, Lilly Industries, 2147 Brevard Rd., High Point, NC 27263; (910) 889-6344).

(Apr. 2-4)—Southwestern Paint Convention. "AIM for the Future—NOW!" Co-sponsored by the Dallas and Houston Societies. Hyatt Regency Reunion, Dallas, TX. (General Chairman Bruce Bridges, Texas Resin Co., 2728 Empire Central, Dallas, TX 75235; (800) 492-9400).

(Apr. 16)—1997 Spring Symposium. Sponsored by the Louisville Society. (Ilona Duvall, Red Spot Paint and Varnish, P.O. Box 418, Evansville, IN 47703-0418; (812) 428-9100).

(Apr. 30-May 1)—"Additives and Modifiers for Modern Coatings." Symposium co-sponsored by the New York Society for Coatings Technology and the Polytechnic University. Holiday Inn-North Conference Center, Newark, NJ. (Paul Mazer, Troy Corp., 8 Vreeland Rd., P.O. Box 955, Florham Park, NJ 07932-0955; (201) 443-0003; fax: (201) 443-0257).

(May 8-10)—50th Annual Spring Symposium. Sponsored by the Pacific Northwest Society. Pan-Pacific Hotel, Vancouver, British Columbia. (Kelvin J. Huget, Imasco Minerals Inc., 19287-98A Ave., Surrey, B.C. V4N 4C8; (604) 888-3848; fax: (604) 888-5671).

(May 12-14)—Southern Society Annual Meeting. King and Prince Beach and Golf Resort, St. Simons Island, GA. (Eve Irvine, J.M. Huber Corp., One Huber Rd., Macon, GA 31298; (912) 750-5433).

(May 15-16)—"Transatlantic Coatings Technology—Diverging or Converging." Sponsored by the Birmingham Paint, Varnish and Lacquer Club. Solihull, N. Birmingham, England. (Joe Brown, Blagden Chemicals Ltd., Piperell Way, Haverhill, Suffolk, CB9 8PH; Telephone: 01440 62821).

(May 22-23)—40th Annual Technical Symposium. "Waterborne Coatings: Sink or Swim." Symposium sponsored by the Cleveland Society. Case Western Reserve University, Cleveland, OH. (Vicki Fisher, Jamestown Paint Co., 108 Main St., Jamestown, PA 16134; (412) 932-3101).

(June 13-15)—RMSCT's June Outing. Steamboat Sheraton, Steamboat Springs, CO. (Charlie Schroeder, Fel-Pro Chemical Products, L.P., 6120 E. 58th Ave., Commerce City, CO 80022; (303) 289-5651).

1998

(May 11-14)—Eastern Training Conference II. Sponsored by the Philadelphia Society. Valley Forge Convention Center, King of Prussia, PA. (Wayne Kraus, Hercules Incorporated, Research Center, 500 Hercules Rd., Wilmington, DE 19808).

Other Organizations

1997—North America

(Feb. 1-5)—SPFA Annual Meeting. Sponsored by the Steel Plate Fabricators Association. Westin Mission Hills Resort, Rancho Mirage, CA. (SPFA, 3158 Des Plaines Ave., Des Plaines, IL 60018).

(Feb. 3-5)—Fifth Bridge Congress on Coatings Systems for Bridges and Steel Structures. Cosponsored by University of Missouri-Rolla (UMR) and the Steel Structures Painting Council. St. Louis Airport Marriott, St. Louis, MO. (UMR Coatings Institute, 1870 Miner Circle, Rolla, MO 65409).

(Feb. 5-7)—24th Annual International Waterborne, High-Solids, and Powder Coatings Symposium. Sponsored by the Southern Society and The University of Southern Mississippi (USM). New Orleans, LA. (Robson F. Storey or Shelby F. Thames, Co-Organizers, WBHS&PC Symposium, Dept. of Polymer Science, USM, Box 10076, Hattiesburg, MS 39406-0076).

(Feb. 10-15)—"Spray Foam '97." Sponsored by The Society of the Plastics Industry, Inc. Disneyland Hotel, Anaheim, CA. (SPI/SPFD, 1275 K St., N.W., Ste. 400, Washington, D.C. 20005).

(Feb. 14-15)—"Spring Decor '97: Paint & Decorating Show." Sponsored by the National Decorating Products Association (NDPA). Charlotte Convention Center, Charlotte, NC. (Teri Flotron, NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Feb. 18-20)—Western Coatings Societies' 23rd Biennial Symposium and Show. Sponsored by the Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies. Disneyland Hotel and Convention Center, Anaheim, CA. (Robert J. Skarvan, EPS, Inc., 5501 E. Slauson Ave., Los Angeles, CA 90040; (800) 642-7077 or for exhibit space: Roberta Garcia, ICI Paints, 6100 S. Garfield Ave., Los Angeles, CA 90040; (213) 888-8888, ext. 8343).

(Feb. 22-24)—"Interiors Decor Showcase '97." Sponsored by the National Decorating Products Association (NDPA). Toronto Congress Centre, Toronto, Ontario, Canada. (Teri Flotron, NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Feb. 24-26)—"Basic Coatings for Sales, Marketing, and General Personnel." Short Course sponsored by University of Missouri-Rolla (UMR). St. Louis Airport Marriott, St. Louis, MO. (UMR Coatings Institute, 1870 Miner Circle, Rolla, MO 65409).

(Mar. 1-2)—"Degradation and Stabilization of Polymers." Sponsored by the State University of New York. Hilton Head Island, SC. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 3-5)—"Polymer Stabilizers and Modifiers '97: Conference and Exhibit." Sponsored by the State University of New York, Institute of Materials Science and the Division of Polymeric Materials:

Science and Engineering of the American Chemical Society (ACS). Hilton Head Island, SC. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 3-5)—"International Seminar on the Technology of Inherently Conductive Polymers." Short course sponsored by Advanced Polymer Courses. Princess Resort, San Diego, CA. (M. Aldissi, Advanced Polymer Courses, 536 Main St., Unit 1, Falmouth, MA 02540).

(Mar. 9-13)—NPCA's Architectural and Industrial Coatings Committee meetings. Sponsored by the National Paint and Coatings Association (NPCA). Breakers Resort, Palm Beach, FL. (Cheryl Matthews, NPCA, 1500 Rhode Island Ave., N.W., Washington, D.C. 20005-5597).

(Mar. 9-13)—"AIChE Spring National Meeting/Petrochem and Technochem '97." Sponsored by the American Institute of Chemical Engineers (AIChE). George R. Brown Convention Center, Houston, TX. (AIChE, 345 E. 47th St., New York, NY 10017).

(Mar. 10-12)—"Introduction to Polymer Colloids/Emulsion Polymers." Sponsored by the State University of New York. Hilton Head Island, SC. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 10-13)—"Pigment Dispersions: Science and Technology." Sponsored by the State University of New York. Hilton Head Island, SC. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 9-13)—"AIChE Spring National Meeting/Petrochem and Technochem '97." Sponsored by the American Institute of Chemical Engineers (AIChE). George R. Brown Convention Center, Houston, TX. (AIChE, 345 E. 47th St., New York, NY 10017).

(Mar. 11-14)—"Introduction to Coatings Science." Short course sponsored by The University of Southern Mississippi (USM). Hattiesburg, MS. (Dr. Shelby F. Thames, Director, USM, Box 10037, Hattiesburg, MS 39406-0037).

(Mar. 19)—Mini-Trade Show & Symposium. Sponsored by the Piedmont Society. Showplace on the Park, High Point, NC. (Nellie Moretz, Lilly Industries, 2147 Brevard Rd., High Point, NC 27263; (910) 889-6344).

(Mar. 19-21)—"Carbon Black World '97." Sponsored by Intertech Corp. La Mansión del Río Hotel, San Antonio, TX. (Melanie Searle, Intertech Conferences, 411 U.S. Route One, Portland, ME 04105).

(Mar. 23-26)—Spring Convention. Sponsored by The Adhesive and Sealant Council, Inc. Pittsburgh Hilton and Towers, Pittsburgh, PA. (The Adhesive and Sealant Council, Inc., 1627 K St., N.W., Ste. 1000, Washington, D.C. 20006).

(Mar. 24-25)—"Caulks and Sealants Short Course 1." Sponsored by The Adhesive and Sealant Council, Inc. Pittsburgh Hilton and Towers, Pittsburgh, PA. (The Adhesive and Sealant Council, Inc., 1627 K St., N.W., Ste. 1000, Washington, D.C. 20006).

(Apr. 2-4)—Southwestern Paint Convention. "AIM for the Future—NOW!" Cosponsored by the Dallas and Houston Societies. Hyatt Regency Reunion, Dallas, TX. (General Chairman Bruce Bridges, Texas Resin Co., 2728 Empire Central, Dallas, TX 75235; (800) 492-9400).

(Apr. 7-10)—12th Annual Advanced Composites Conference and Exposition. Sponsored by The Engineering Society (ESD) and SAE International. Westin Hotel, Renaissance Center, Detroit, MI. (Wael Berrached, ESD, 29355 Northwestern Hwy., Ste. 200, Southfield, MI 48034).

(Apr. 7-11)—"Basic Composition of Coatings." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 1870 Miner Circle, Rolla, MO 65409).

(Apr. 8-10)—Sixth Annual Advanced Coatings Technology Conference & Exposition. Sponsored by The Engineering Society (ESD) and SAE International. Westin Hotel, Renaissance Center, Detroit, MI. (Wael Berrached, ESD, 29355 Northwestern Hwy., Ste. 200, Southfield, MI 48034).

(Apr. 9-10)—"Polyurethane Coatings." Seminar sponsored by Technomic Publishing Co., Inc. Crowne Plaza, Hasbrouck Heights, NJ. (Program Division, Technomic Publishing Co., Inc., 851 New Holland Ave., Box 3535, Lancaster, PA 17604).

(Apr. 12-17)—"Vacuum Coating Manufacturing and Technology Issues." Conference Sponosred by the Society of Vacuum Coaters. New Orleans Marriott, New Orleans, LA. (Society of Vacuum Coaters, 440 Live Oak Loop, Albuquerque, NM 87122-1407).

(Apr. 14-15)—Second Management Conference. Sponsored by the American Institute of Chemical Engineers (AIChE). Ritz-Carlton, Philadelphia, PA. (AIChE, 345 E. 47th St., New York, NY 10017).

(Apr. 21-24)—"Introduction to Paint Formulation." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 1870 Miner Circle, Rolla, MO 65409).

(Apr. 22-24)—"Rapid Prototyping and Manufacturing '97." Conference and exhibition sponsored by the Society of Manufacturing Engineers (SME). Hyatt Regency Dearborn, Dearborn, MI. (SME Customer Service, One SME Dr., P.O. Box 930, Dearborn, MI 48121`).

(Apr. 23-26)—"Coverings '97." Flooring exhibition sponsored by TSI, Inc. Orange County Convention Center, Orlando, FL. (Coverings, 900 E. Indiantown Rd., Ste. 207, Jupiter, FL 33477).

(Apr. 30-May 1)—"Additives and Modifiers for Modern Coatings." Symposium cosponsored by the New York Society for Coatings Technology and the Polytechnic University. Holiday Inn-North Conference Center, Newark, NJ. (Paul Mazer, Troy Corp., 8 Vreeland Rd., P.O. Box 955, Florham Park, NJ 07932-0955; (201) 443-0003; fax: (201) 443-0257).

(May 1-2)—"Paint Volatile Organic Compounds (VOCs)." Training course sponsored by the American Society for Testing and Materials (ASTM). Chicago, IL. (Kristina Falkenstein, ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959).

(May 4-6)—"Pollution Prevention: Tools for Making It Really Happen." Sponsored by the American Institute of Chemical Engineers (AIChE). Sheraton Meadowlands, East Rutherford, NJ. (AIChE, 345 E. 47th St., New York, NY 10017).

(May 4-8)—43rd Annual Technical Meeting and Exposition. Sponsored by the Institute of Environmental Sciences. Los Angeles Airport

Hilton & Towers, Los Angeles, CA. (Institute of Environmental Sciences, 940 E. Northwest Hwy., Mount Prospect, IL 60056).

(May 7-9)—"Adhesive and Coating Adhesion." Sponsored by the State University of New York. Orlando, FL. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

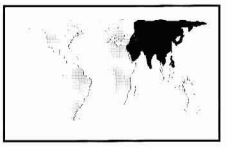
(May 7-9)—"Block and Graft Copolymer Blends." Sponsored by the State University of New York. Orlando, FL. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(May 8-10)—50th Annual Spring Symposium. Sponsored by the Pacific Northwest Society. Pan-Pacific Hotel, Vancouver, British Columbia. (Kelvin J. Huget, Imasco Minerals Inc., 19287-98A Ave., Surrey, B.C. V4N 4C8; (604) 888-3848; fax: (604) 888-5671).

(May 12-13)—"Polyurethane Catalysis." Seminar sponsored by Technomic Publishing Co., Inc. Sheraton Colony Square, Atlanta, GA. (Program Division, Technomic Publishing Co., Inc., 851 New Holland Ave., Box 3535, Lancaster, PA 17604).

(May 12-14)—Southern Society Annual Meeting. King and Prince Beach and Golf Resort, St. Simons Island, GA. (Eve Irvine, J.M. Huber Corp., One Huber Rd., Macon, GA 31298; (912) 750-5433).

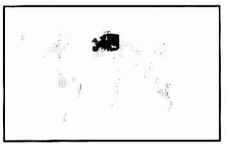
1997—Asia



(Mar. 9-11)—India International Coatings Show '97. Sponsored by FMJ International Publications Ltd. World Trade Centre, Bombay, India. (Jane Malcolm-Coe, PR & Publicity Dept., FMJ International Publications Ltd., Queensway House, 2 Queensway, Redhill, Surrey, RH1 1QS, England).

(Oct. 22-24)—"New Developments in Colour Material Science and Technology." 70th Anniversary Conference on Colour Materials Tokyo sponsored by the Japan Society of Colour Material. Arcadia Ichigaya (Shigaku Kaikan), Tokyo, Japan. (Shuichi Hamada, Japan Society of Colour Material, Kitamura Bldg. 5F, 9-12, 2-chome, Iwamoto-cho, Chiyoda-ku, Tokyo 101, Japan).

1997—Europe



(Apr. 8-10)—European Coatings Show '97. Exhibition and conference sponsored by Vincentz Verlag. Nürnberg, Germany. (Vincentz Verlag, Postfach 6247, D-30062 Hannover, Germany).

(Apr. 14-19)—Hannover Fair '97. Industrial fair sponsored by Hannover Fairs USA, Inc. Hannover Fairgrounds, Hannover, Germany. (Andrea Anderson, Project Director, Hannover Fairs USA, Inc., 103 Carnegie Center, Princeton, NJ 08540).

(May 6-7)—"PE '97." Sponsored by Maack Business Services. Milano, Italy. (Maack Business Services, Moosacherstrasse 14, CH-8804 AU/Zürich, Switzerland).

(May 12-14)—"Epoxy Technologies for Ambient Cure Protective Coatings." Sponsored by Paint Research Association. Brussels, Belgium. (Conference Secretary, Paint Research Association, 8 Waldegrave Rd., Teddington, Middlesex, TW11 8LD England).

(May 15-16)—"Transatlantic Coatings Technology—Diverging or Converging." Sponsored by the Birmingham Paint, Varnish and Lacquer Club. Solihull, N. Birmingham, England. (Joe Brown, Blagden Chemicals Ltd., Piperell Way, Haverhill, Suffolk, CB9 8PH; Telephone: 01440 62821).

(May 17-18)—FSCT Spring Board of Directors Meeting. May 17—Social Tour; May 18—Board Meeting. Hyatt Regency, Birmingham, England.

(May 29-June 1)—15th SLF-Congress. Sponsored by the Skandinaviska Lackteknikers Förbund (SLF). Lillehammer, Norway. (Bent Haflan, Jotun A/S, P.O. Box 2021 Hasle, N-3235 Sandefjord, Norway; or Svein Singstad, Scanox A/S, P.O. Box 42 Ainabru, Norway).

(June 9-11)—19th Annual International Conference on the Degradation and Stabilization of Polymers. Sponsored by the State University of New York. Luzern, Switzerland. (Angelos V. Patsis, Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(June 16-18)—RadTech Europe '97. Sponsored by Vincentz Verlag. Palais de Congrés, Lyon, France. (Esther Schwencke, Vincentz Verlag, P.O. Box 67 42, D-30062 Hanover, Germany).

1997—South America

(Sept. 15-17)—Fifth International Paint Congress and Exhibition on Paint Industry Suppliers. Sponsored by the Brazilian Association of Paint Manufacturers (ABRAFATI). Palacio de Convenções do Anhembi, São Paulo, Brazil. (Congress Organization Secretariat, Específica S/C Ltda., Rua Augusta, 2516-2° andar-cj. 22, 01412-100-São Paulo, SP-Brazil).

(Oct. 6-9)—"Latin-American Interfinish." Hotel Transamerica's Convention Center, São Paulo, Brazil. (Associação Brasileira de Tratamentos de Superfície, Av. Paulista, 1313, 9°a., conj. 913, CEP 01311-923 São Paulo, SP-Brazil).

Advertisers' Index

NOTE: The Advertisers' Index is published for the convenience of our readers and as an additional service to our advertisers. The publisher assumes no liability for errors or omissions.

Humbug from Hillman

Friend Larry Hill, in his column, "Overspray," last June quoted from an ancient Humbug, "Politicians are like baby diapers. They should be changed often." Larry promptly received a call from Aileen Dodrill advising, "And for the same reason!" 'Nuf said!

Bob Athey recently quoted his mentor, Dr. Chlorophyl with, "Diplomacy is the art of saying 'nice doggy' until you can find a rock." Dr. Chlorophyl goes on to follow with some horticultural advice:

Welcome to the Gardener's Psychiatric Hotline

(1) If you are buying plants, yet have no space or time to plant (obsessive-compulsive), please press, 1, repeatedly.

(2) If you want someone else to do the digging (co-dependent), please ask someone to press 2.

(3) If you will plant anything and everything (multiple personalities), please press 3, 4, 5, and 6.

(4) If you are sure the sun, rain, bugs, and plant diseases are out to get you (paranoid-delusional), don't press any number. We know who you are and what you want. We have already traced your call.

(5) If you are sure the flowers are talking to you, listen carefully and a little voice will tell you which number to press.

(6) If you can't throw away a plant, even if it is dying (manic-depressive), it doesn't matter which number you press.

(7) If you believe your garden is being attacked by evil spirits, press 6-6-6.

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Barbara Lauren is consistently impressed by Bob Levey's contests in *The Washington Post*. In September he challenged his readers to make-up-a-word to describe the following:

"His eyes are hooded, his jaw slack. He does not speak or stir. He occasionally twitches, but only long enough to change the channel with remote control. It is a Sunday afternoon in September, and the man of the house is deeply transfixed by professional football on television, to the exclusion of all else. This stupor is called . . ."

And the winner—Sunday-nambulance.

There were a number of almosts, including:

Prejockupation
Sofanaticism
Fanstaticism
Zend Zone
Gippnosis
Fanesthasized
Trance-Sylvania

I am pleased to be informed that Dave Platt is still learning as he ages. To wit:

—He's learned that no matter how thin you slice it, there are always two sides.

—He's learned that motel mattresses are better on the side away from the phone.

—He's learned that kindness is more important than perfection.

And, amazingly enough, he discovered that a mule dressed in a tuxedo is still a mule.

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Experience has given Dick Stewart the right to define a Senior Citizen:

—A senior citizen is one who was here before television, frozen food, credit cards, and ballpoint pens. For us, "time sharing" meant togetherness not computers and a "chip" was a piece of wood.

—Hardware meant hard wear and software wasn't even a word.

—We were before panty hose, drip dry clothes, dish washers, clothes dryers and electric blankets.

—We got married first and then lived together. (Quaint?)

—We were before Batman, vitamin pills, and disposable diapers.

—Cigarette smoking was fashionable, grass was for mowing, and "Aids" meant beauty lotions or help for someone in trouble.

We are today's senior citizens: a hardy bunch when you think of how much the world has changed and the adjustments we have had to make just to keep up.

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Last month we featured quotes from the *Yetter Letter* sent to me by Jeff Sturm. Here's another:

When the press writes ..... It really means

Controversial	Did something bad we can't prove
Unidentified source	Person quoted previously who asked not to be named
Scandal-plagued	Guilty
Feisty	Short, female
Recently	We lost the press release
Self-styled	Phony
Embattled	He should quit

—Herb Hillman, Humbug's Nest, P.O. Box 135, Whitingham, VT 05361.

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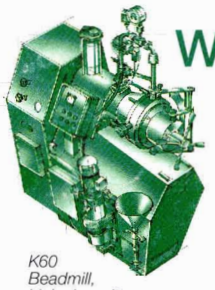

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Fax (905) 940-3298

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