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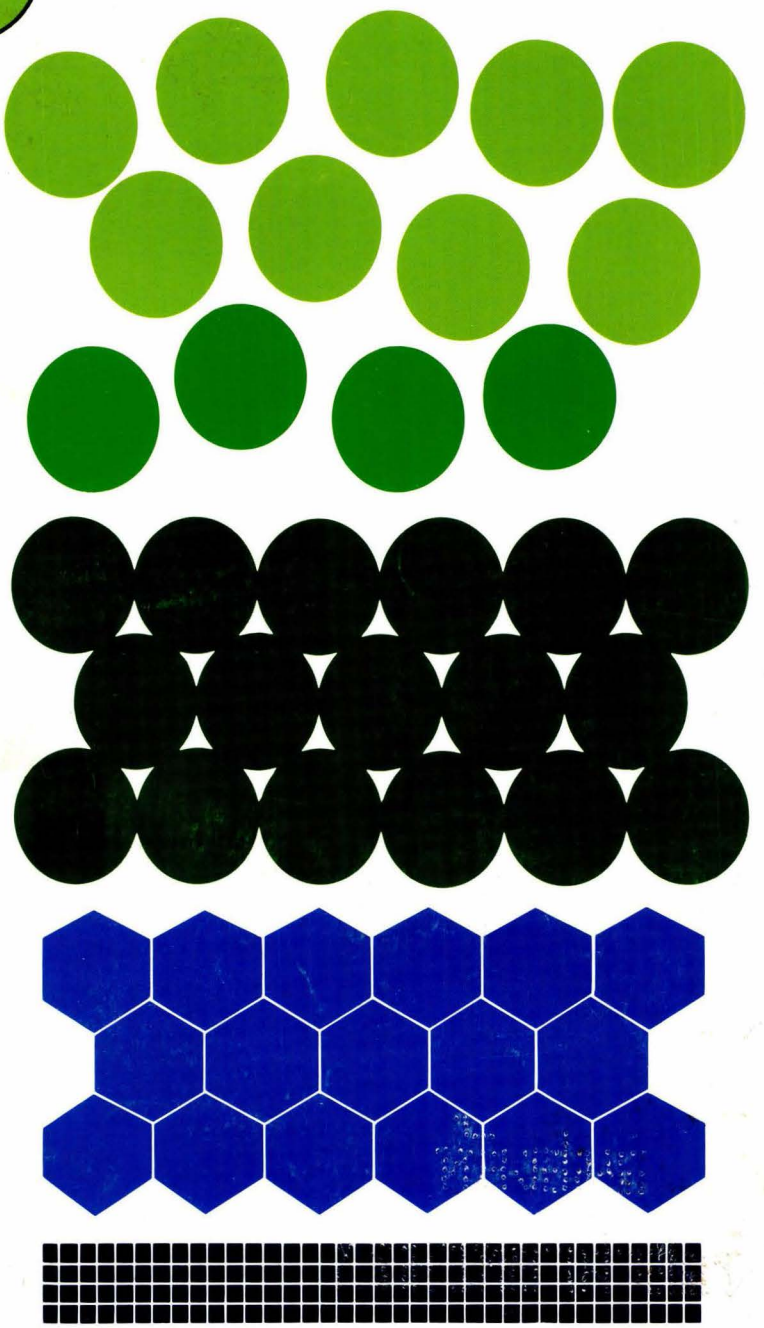
August 1992



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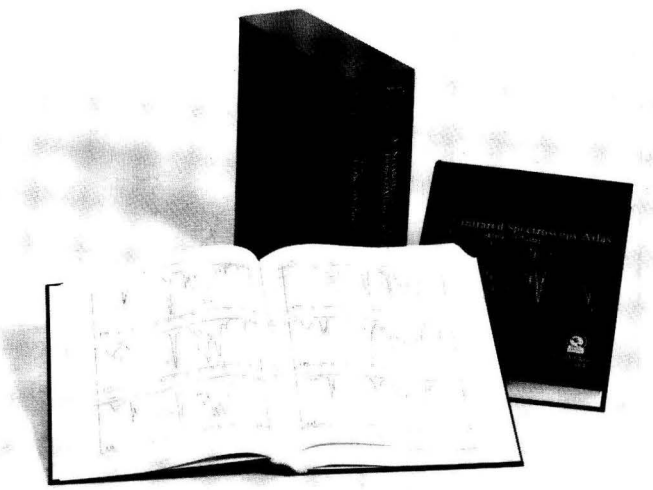

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AUGUST 1992

JOURNAL OF COATINGS TECHNOLOGY

VOLUME 64 NUMBER 811

Technical Articles

Open Forum

Federation News

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 7,300 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*, as well as *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 All manuscripts will be assumed to be previously unpublished writing of the authors, not under consideration for publication elsewhere.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.

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...for the Journal

Four complete copies should be sent to the Editor, JOURNAL OF COATINGS TECHNOLOGY, 492 Norristown Rd., Blue Bell, PA 19422-2350. 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 the Editor at the address listed previously.

...for Roon Foundation Award Competition

Ten complete copies of the manuscript are required, and should be submitted to the Chairman of the 1992 Roon Awards Committee, Richard Himics, Daniel Products Co., 400 Claremont Ave., Jersey City, NJ 07304. (For complete details, see "Roon Awards" section of the JOURNAL in January 1992 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). Another excellent reference work is "How to Write and Publish a Scientific Paper," by Robert A. Day (ISI Press, 3501 Market St., University City Science Center, Philadelphia, PA 19104).

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 repetitious 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 solicited. 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.

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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.

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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 $8\frac{1}{2}$ 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.

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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).

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* * * *

JOURNAL OF COATINGS TECHNOLOGY

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Official Digest

FEDERATION OF PAINT AND VARNISH PRODUCTION CLUBS

JUNE 1922

THE FEDERATION OF PAINT AND VARNISH PRODUCTION CLUBS

Comment

Happy Anniversary, FSCT!

Light the candles and let the festivities begin! The Federation of Societies for Coatings Technology is celebrating its 70th anniversary!

On June 15, 1922, delegates from nine "Production Men's Clubs" met in Cleveland and organized under the name "Federation of Paint and Varnish Production Clubs." After electing a Temporary Chairman (G.B. Heckel), plans were made for the group's annual meeting, to be held at the Ritz Carlton Hotel in Atlantic City. Dedicated to a project which they felt would benefit the paint and varnish industry, these men recorded their mission in the organization's official organ, *The Digest of Plant Managers' Committees* (known as the *Official Digest*):

> *"The foundation of any manufacturing business is production. If that be wrong, nothing can be right. Upon its correctness and integrity the consumer depends for adequate and proper service in the goods he buys. It is essential, therefore, that for adequate and fair service to the consumer, the fund of common knowledge as to correct methods, economic procedure and orderly practice should be placed freely at the disposal of all.*
>
> *There is a line which co-operation ends and competition properly begins, but back of that line the wise manufacturer will help rather than hinder his competitor; and this is the line behind which the Production Men's Clubs function.*
>
> *There is no manufacturer so wise that his technical and production staff cannot gain something of value from these clubs. No one knows it all—not even all of what all should know; but in these clubs with their two hundred individual members, there is a fund of valuable fundamental information on tap for those who are willing to stake their individual dollar's worth of knowledge against the "pot." . . .*
>
> *These clubs, now that they stand on common ground, will and should grow rapidly and should have a profound influence in bettering conditions and practices. It is to the interest of all manufacturers to support them and co-operate in their work."*

Much has changed since those days. The Federation has expanded from 200 members in the U.S. to over 7,000 worldwide. Its Annual Meeting & Paint Industries' Show, scheduled for Chicago on October 21-23, is expected to attract over 8,000 registrants, and will feature a full program of technical presentations keyed to the theme of "New Directions for a Changing World." Such new directions will be evidenced in the varied exhibits of nearly 280 industry leaders. The size and scope of these events confirm the rapid growth that was predicted by the original founders.

The Federation of Societies for Coatings Technology boasts a rich heritage, begun by those dedicated few in 1922. It is a tradition of service—benefits extend to the whole industry and not just a select few. It is a tradition of excellence—reflected in the quality of papers presented monthly in the JCT and in the many educational programs offered throughout each year. It is a tradition of continuity—the goals of the FSCT today reflect those expresed years ago—"to have a profound influence in bettering conditions and practices."

These traditions form a strong foundation on which the Federation will build for the future. So, don't blow out those candles yet—this party is just beginning!

Patricia D. Viola
Editor

Abstracts of Papers in This Issue

(Translations provided by: French—Montreal Society Member Alain Brisson, of Hoechst Canada, Inc. and Spanish—Mexico Society Member Carlos Urbina, of Instituto Mexicano de Tecnicos en Pinturas y Tintas.)

Latex Film Formation at the Molecular Level: The Effect of Coalescing Aids on Polymer Diffusion—M.A. Winnik, Y. Wang, and F. Haley

JCT, 64, No. 811, 51 (Aug. 1992)

An energy transfer technique is described which allows one to use fluorescence decay measurements to follow the extent of polymer diffusion in annealed latex films. These are poly(butyl methacrylate) (PBMA) films prepared from latex dispersions containing a mixture of 100 nm PBMA particles labeled, respectively, with donor and acceptor fluorescent dyes. From the data analysis, diffusion coefficients for the polymer molecules can be calculated.

These diffusion coefficients are enhanced when the latex dispersions are pre-equilibrated with small amounts of organic solvents commonly used as coalescents. Their effect can be described quantitatively in terms of the Williams-Landel-Ferry (WLF) equation. Some coalescents (e.g., diethyleneglycol butyl either) show deviations from simple WLF behavior. These deviations follow the behavior expected for solvent evaporation from the film by a Fickian diffusion process.

Energy transfer studies on the nascent films allow one to assess the extent of particle deformation and wetting, and are sensitive to the presence of voids on the 10-50Å scale between the deformed particles in the dried film.

Simultaneous Assessment of Influence on Hiding Power by Several Compositional Factors: Taguchi Approach—V.S. Vaidya and V.M. Natu

JCT, 64, No. 811, 63 (Aug. 1992)

In addition to the obvious compositional factors such as the scattering-absorbing pigment content and the pigment-binder volume ratio, other indirect factors such as micronized extender, rheological additive, dispersing agent, and alkaline earth metal soap are concomitantly examined for their influence on the hiding power of a glossy white alkyd enamel. Taguchi's Orthogonal Array (OA) Design is employed advantageously to quantify the effect of seven compositional factors on scattering and absorption coefficients through trials of eight different combinations. Among other interesting results, particularly notable are the promise of the micronized extender and the ineffectiveness of the chosen dispersing agent. More importantly, it is demonstrated that the application of the Taguchi OA strategy in coating research could lead to better "optimums" and increased "productivity" of research and development efforts.

Formation d'une Pellicule de Latex au Niveau Moléculaire: Effet Des Coalescents sur la Diffusion Polymérique—M.A. Winnik, Y. Wang, and F. Haley

JCT, 64, No. 811, 51 (Aug. 1992)

Une technique impliquant un transfer d'énergie est décrite. Cette dernière permet l'utilisation de mesures de fluorescence afin de suivre la diffusion polymérique de pellicules de latex recuites. Les pellicules utilisées sont fabriquées à base de polybutyl méthacrylate (PBMA) dispersées dans un latex contenant un mélange de particules de PBMA de taille de 100 nm, lesquelles sont étiquetées respectivement avec des colorants fluorescents agissant comme donneur ou accepteur. A partir des données analytiques, des coefficients de diffusion pour les molécules de polymères peuvent être calculés.

Les coefficients de diffusion sont augmentés lorsque les dispersions de latex sont pré-équilibrées avec de petites quantités de solvants organiques utilisées comme coalescents. Leurs effets peuvent être décrit quantitativement avec l'aide d'une équation de type Williams-Landel-Ferry (WLF). Quelques coalescents (e.g., diéthylèneglycol butyl éther) dévient du comportement de type WLF. Ces déviations suivent le comportement attendu pour l'évaporation de solvant provenant d'une pellicule. Ce comportement suit le procédé de diffusion de type Fickian.

Les études de transfer d'énergie de pellicules naissantes permettent d'évaleur la déformation des particules ainsi que le mouillage. Ces paramètres sont sensibles à la présence d'espace de l'ordre de 10-50 Å entre les particules déformées dans la pellicule séche.

Evaluation Simultanée de L'influ-ence sur le Pouvoir Cachant par Plusieurs Facteurs Reliés à la Composition: L'approache de Type Taguchi—V.S. Vaidya and V.M. Natu

JCT, 64, No. 811, 63 (Aug. 1992)

En plus des facteurs reliés à la composition tels que l'absorption-diffraction du contenu en pigment et le rapport volumique pigment-liant, d'autres facteurs indirects tels que la présence de matière de charge micronisée, additifs rhéologiques, agents dispersants et savons alcalino-terreux, sont étudiés afin de connaître leur influence sur le pouvoir cachant d'une peinture-émail brillante à l'alkyde. La méthodologie de type Taguchi est employée avantageusement pour la quantification de l'effet de sept facteurs différents sur les coefficients d'absorption et de diffraction. Le tout n'a requis que huit essais de différentes combinaisons. Les résultats obtenus démontrent l'efficacité des matières de

Formacion de Pelicula de Latex a Nivel Molecular: Efecto de las Ayudas Coalescentes en la Difusion del Polimero—M.A. Winnik, Y. Wang, and F. Haley

JCT, 64, No. 811, 51 (Aug. 1992)

Se describe una técnica de transferencia de energía seguida del uso de mediciones en la degradación de la fluorescencia para seguir la extensión de la difusión del polímero en películas de latex recocido. Estas son películas de poli(butil-metacrilato) [PBMA] preparadas de dispersiones de latex que contienen una mezola de 100 nm particulas de PBMA etiquetadas, respectivamente, con colorantes fluorescentes donantes y receptores. Se pueden calcular los coeficientes de difusión para las moléculas del polímero a partir de los datos del análisis.

Estos coeficientes de difusión se mejoran cuando las dispersiones de latex se pre-equilibran con pequeñas cantidades de solventes orgánicos comunmente usados como coalescentes. Su efecto se puede describir quantitativamente en términos de la ecuación de Williams-Landel-Ferry. Algunos coalescentes (por ejemplo: dietilenglicol butil eter) muestran desviaciones para un comportamiento simple WLF. Estas desviaciones siguen al comportamiento esperado para la evaporación del solvente de la película mediante un proceso de difusión Fickian.

Los estudios de transferencia de energía en películas nacientes sigue de uno a un exceso en la extensión de la deformacón de la partícula y la humectación, y son sensitivos a la presencia de cavidades en la escala de 10-50 Å entre las particulas deformadas en la película seca.

Evaluacion Simultanea de la Influencia de Factores de Compo-sicion en el Poder Cubriente: Aproximacion Taguchi—V.S. Vaidya and V.M. Natu

JCT, 64, No. 811, 63 (Aug. 1992)

En adición a los factores de composición ya conocidos, tales como el contenido de pigmento absorbido-disperso y el rango volumétrico del pigmento-ligante, se examina la influencia de otros factores indirectos como el extensor micronizado, aditivos reológicos, agentes dispersantes y jabones metálicos de tierras alcalinas en el poder cubriente de un esmalte alquidálico blanco de alto brillo. Se emplea ventajosamente de Diseño de Orden-amiento Ortogonal de Taguchi para cuantificar el efecto de siete factores de composición en coeficientes de dispersión y absorción con la sola combinación de ocho pruebas diferentes. Además de otros resultados interesantes, es particularmente notable los efectos del extensor micronizado y la

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Color Variation of Automotive Metallic Finishes—K. Tachi and C. Okuda

JCT, 64, No. 811, 71 (Aug. 1992)

Mechanisms of color variation by changes in spraying parameters have been studied by measuring the variation of aluminum flake orientation in wet films with time, and by evaluating the content and size of the flakes in paint droplets and films.

It was confirmed that the color variation resulted from the differences not only in the flake orientation, whose mechanism is provided in our previous paper, but also in the flake content and size in the film.

The differences in the content and size are caused by the nonuniformity of flake allotment to the paint droplets, which is attributed to the flake size not being sufficiently smaller than the droplet size, and by the selective deposition of the droplets. Small droplets contain only fine flakes or no flakes, and cannot deposit on the substrate easily. Therefore, the promotion of paint atomization results in the increase of both the content and average size of aluminum flakes in the film. Also, the suppression of small-droplet deposition by decreasing applied voltages has the same effects.

How to Start a Quality Program—Focus on Top Management and Total Employee Involvement—R.E. Bish

JCT, 64, No. 811, 79 (Aug. 1992)

Meeting present and future challenges in quality improvement will require management to take some new directions. The historical ways they have been approaching the quality improvement process have proven to be inadequate. They must start now to chart new courses. Where management and employees formerly faced many controlled situations, they are now facing an increasing number of situations that are complex and uncertain.

The purpose of this paper is to explore some directions which can be taken by a coatings manufacturer to combat these new and difficult challenges. Use of a proposed program and defining some principles of a continuous quality improvement program are used to convey possible new directions. Its goal is to outline a new course which will provide a framework for implementing continuing discussions about this complex problem.

charge micronisées ainsi que la mauvaise performance de l'agent de dispersion utilisé. De facon plus importante, il est démontré que l'utilisation de la méthodologie statistique de type Taguchi dans le domaine de la recherche sur les revêtements peut augmenter de facon significative les efforts déployés.

Variation de Couleur de Finis Métalliques Automobile—K. Tachi and C. Okuda

JCT, 64, No. 811, 71 (Aug. 1992)

Les mécanismes de variation de couleur par les changements de paramètres de pulvérisation ont été étudiés en mesurant la variation de l'orientation de flocons d'aluminium dans des feuils humides en fonction du temps et en évaluant le contenu et la taille des flocons dans des gouttelettes de peintures.

L'étude a confirmé que la variation de couleur provient des différences, non seulement de l'orientation des flocons tel que décrit précédemment, mais aussi du contenu des flocons et de leurs tailles dans le feuil de peinture.

Les différences dans le contenu et la taille sont causées par la non-uniformité de la répartition des flocons dans les gouttelettes de peintures, qui sont attribuées à la taille des flocons qui ne sont pas suffisamment petits par rapport à la taille des gouttelettes, ainsi que par la déposition sélective des gouttelettes. De petites gouttelettes ne contiennent seulement que de fins flocons, ou pas de flocons du tout, et ne peuvent se déposer sur le subjectile de façon adéquate. Par conséquent, l'utilisation du procédé d'atomisation permet l'amélioration du contenu et de la taille moyenne des flocons d'aluminium dans le feuil. Egalement, la suppression de la déposition de fines gouttelettes par la diminution du voltage a les mêmes effets.

Comment Mettre au Point un Programme de Qualité—Implication de la Haute Direction et des Employés—R.E. Bish

JCT, 64, No. 811, 79 (Aug. 1992)

Les défis actuels et futurs en terme d'amélioration de la qualité vont demander à la haute direction de prendre de nouvelles avenues. Les approaches prises par le passé pour l'amélioration de la qualité se sont avérées inadéquates. Il est maintenant temps de débuter une nouvelle approache de la qualité. La haute direction et les employés ont fait face par le passé à des situations maitrisées. Maintenant ils doivent faire face à un plus grand nombre de situations complexes et incertaines.

L'objet de cet article est d'explorer les avenues qui peuvent être prises par les fabricants de peintures pour maitriser les nombreux défis. Un programme est proposé contenant des principes directeurs pour une amélioration continue de la qualité, et possiblement suggérer de nouvelles avenues. Le but est de souligner un programme qui permettra l'encadrement et l'implémentation de discussions au sujet de cet épineux probléme.

inefectividad del agente dispersante escogido. Más importante aún, es la muestra de que el uso de la estrategia OA de Taguchi en las Investigaciones de recubrimientos pueden ayudar a mejorar, optimizar e incrementar la productividad de los resultados R&D.

Variacion del Color en Acabados Metalicos Automotricez—K. Tachi and C. Okuda

JCT, 64, No. 811, 71 (Aug. 1992)

Se estudian los mecanismos en la variación del color debida a los cambios en los parámetros de espreado midiendo la variación en la orientación de la hojuela de aluminio en películas humedas con el tiempo, y mediante la evaluación del contenido y el tamaño de las hojuelas en las gotas de pintura ye en películas.

Se confirmó que la variación del color no resulta sólo de la diferencias en la orientación de la hojuela cuyo mecanismo se tocó en un artículo previo, sino también del contenido y el tamaño de la hojuela en la película.

Las diferencias en el contenido y el tamaño de la hojuela son causados por la no uniformidad de la misma a lo largo de las gotas de pintura, lo oual se atribuye a que el tamaño de al hojuela no es lo suficientemente pequeño para el tamaño de la gota, y por un deposito selectivo de las gotas. Las gotas pequeñas solo contienen hojuelas finas o polvos, y no se pueden depositar facilmente sobre el sustrato. Sin embargo, la aplicación de sistemas de atomización para pintura aumenta tanto el contenido como el tamaño promedio de las hojuelas de aluminio en la película. También, la aplicación de voltajes en decremento sobre la supresión del depósito de las gotas pequeñas tiene el mismo efecto.

Como Empezar un Programa de Calidad—Atencion Especial en Niveles Gerenciales Altos y Participacion Total de los Empleados—R.E. Bish

JCT, 64, No. 811, 79 (Aug. 1992)

Conociendo los retos del presente y los del futuro, el mejoramiento de la calidad requiere que los niveles gerenciales temen nuevas direcciones. En base a datos históricos, el mejoramiento de la calidad ha demostrado que las rutas tomadas han sido la inadecuadas. Es el momento ahora, de comenzar nuevos curos. En donde la gerencia y los empleados formen un frenfe común para el control de muchas situaciones, ya que en estos momentos se están enfrentando al incremento de situaciones complejas e inciertas.

El propósito de éste artículo es explorar algunas direcciones que pueden tomar el fabricante de recubrimientos y así combatir estos nuevos y dificiles retos. Se utiliza un programa continuo de mejoramiento de la calidad y la definición de algunos principios para convertir las nuevas direcciones posibles. El aclerto es, proponer un nuevo curso el cual proporcione una guia de seguimiento para implementar discusiones continuas aceroa de este problema tan complejo.

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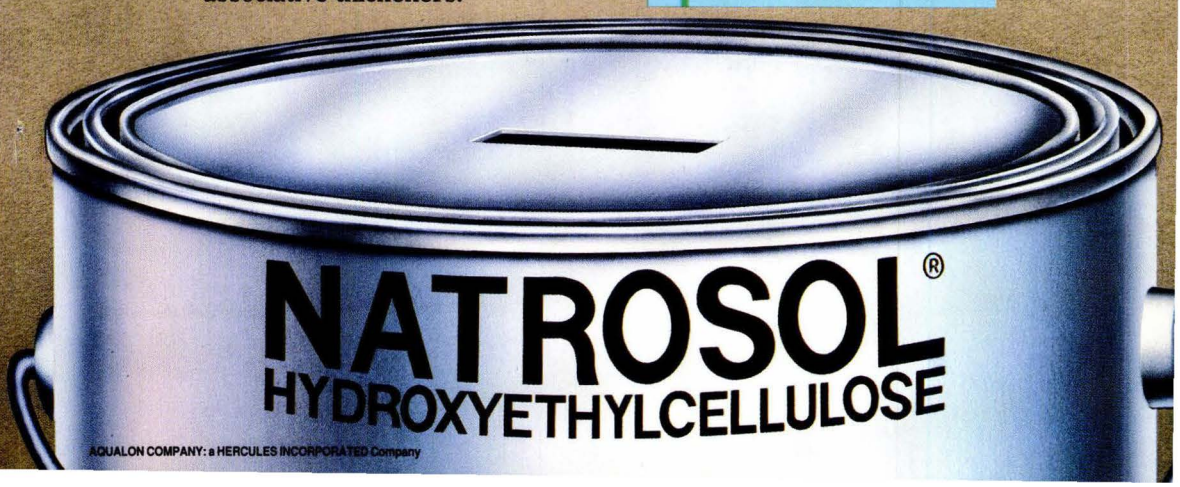


AQUALON COMPANY: a HERCULES INCORPORATED Company

John A. Lanning, of Louisville, and Joseph P. Walton, of Cleveland Are Nominated to Federation Officer Positions for 1992-93

John A. Lanning (Louisville Society), Product Quality Manager, of Courtaulds Coatings, Inc./Porter Paints Division, Louisville, KY, has been nominated for the position of President-Elect of the Federation of Societies for Coatings Technology.

Mr. Lanning, currently Secretary-Treasurer of the Federation, has been a member of the Board of Directors since 1989, and served on the Board as a Member-at-Large from 1985-87. He is Secretary-Treasurer of the Coatings Industry Education Fund, serves as a member of the Finance Committee, and is an Ex-Officio member of the Professional Development Committee. Chairman of the 1992 Annual Meeting Program Committee, he was formerly Chairman of the Paint Show Exhibits' Awards and Society Speaker Awards Committees.

J.A. Lanning

A Past-President of the Louisville Society (1983-84), he received the Society's Outstanding Service Award in 1990. In addition, Mr. Lanning was a member of the Membership and Technical Committees.

Graduated from the University of Louisville, he has been a member of the coatings industry for 26 years.

SECRETARY-TREASURER

Nominated to serve as Secretary-Treasurer of the Federation is Joseph P. Walton (Cleveland Society), Executive Vice President, of Jamestown Paint & Varnish Company, Jamestown, PA.

Mr. Walton, a member of the FSCT Manufacturing Committee, served as Chairman of the Committee from 1987-90. He also was a member of the Annual Meeting Program Committee.

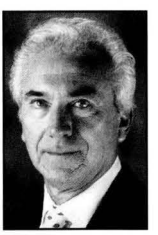
J.P. Walton

Mr. Walton is a Past-Chairman of the Cleveland Society Manufacturing and Directory Committees.

He was graduated from Wheeling Jesuit College and has been active in the coatings industry for 19 years. Mr. Walton served as Chairman of the National Paint & Coatings Association's Manufacturing Management Committee, and is the First Vice President of the Cleveland Paint and Coatings Association. He is the 1992 recipient of the Western Reserve Chapter of the National Management Association's Manager of the Year Award.

PRESIDENT

The current President-Elect, Colin D. Penny (Baltimore Society), President, of Hampton Paint Mfg. Company, Inc., Hampton, VA, will assume the Presidency at the close of the 1992 Annual Meeting, October 23, in Chicago, IL.



C.D. Penny

Mr. Penny served as Secretary-Treasurer of the Federation (1990-91), and has been a member of the FSCT Executive Committee and Board of Directors since 1989. He is a member of the Finance Committee, and has served as Chairman of the Planning, Technical Advisory, and Paint Industries' Show Exhibits' Awards Committees. In addition, Mr. Penny was a Trustee of the Coatings Industry Education Fund, and an Ex-Officio member of the Professional Development Committee. He also served as a member of the Ad-Hoc Building Committee, and was the Federation delegate to the Scientific Committee (NPCA).

Mr. Penny is a Past-President of the Baltimore Society (1974-75) and, in 1976, was presented the Herman H. Shuger Memorial Award of the Baltimore Coatings Industry Awards Council. In addition, he has served as Chairman of the Educational Committee of the Baltimore Society.

Mr. Penny is a graduate of Bristol College of Technology in England. Active in the coatings industry for 45 years, he has been a member of the Oil and Colour Chemists' Association since 1952, and is a Past-President of the Washington Paint Technical Group.

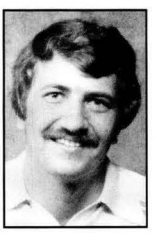
OTHER NOMINATIONS

The Federation Nominating Committee also submitted the names of candidates for Executive Committee and Board of Directors positions.

Executive Committee

Society Representative Member:

Larry Brandenburger (Northwestern Society), Vice President—Research and Development, of the Valspar Corporation, Minneapolis, MN, has been nominated for a three-year term.



L. Brandenburger

Dr. Brandenburger has been the Northwestern Society Representative to the Board of Directors since 1990, and is a member of the FSCT Finance Committee.

He was President of the Northwestern Society (1986-87) and served on the Society's Technical Committee. Dr. Brandenburger has been a member of the North Dakota State University (NDSU) Industry Advisory Board Committee to Polymers and Coatings since 1980.

He received B.S. and Ph.D. Degrees in Chemistry from NDSU, and has been a contributor to the coatings industry for 23 years.

Board of Directors

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

John C. Ballard (Louisville Society), National Coatings Manager, of Burgess Pigment Company, Sandersville, GA, a Past-President of the Federation (1989-90), has been nominated for a two-year term.

J.C. Ballard

Mr. Ballard is Chairman of the Li-

aison Committee, and serves on the Finance and Nominating Committees. He was a member of the Executive Committee from 1987-91, and was an at-large-member on the Board of Directors from 1978-80. Mr. Ballard also has served as Chairman of the Mattiello Lecture, Paint Show Exhibits' Awards, and Annual Meeting Program Committees, as a Trustee of the Coatings Industry Education Fund, and as an Ex-Officio member of the Professional Development Committee.

He is a Past-President of the Louisville Society (1976-77).

Graduated from the University of Louisville, Mr. Ballard has been associated with the coatings industry for 35 years. In addition to his efforts on behalf of the Federation, he is an active member of the National Decorating Products Association.

Members-at-Large (Two-year terms):

Darlene R. Brezinski (Chicago Society), President, of Consolidated Research Inc., Mount Prospect, IL, has been nominated for a two-year term.

Dr. Brezinski is a member of the Publications Committee, the Editorial Review Board of the JCT, Co-Editor of the new

D.R. Brezinski

P.A. Hiscocks

Federation Series on Coatings Technology, and Editor of *An Infrared Spectroscopy Atlas for the Coatings Industry (Fourth Edition)*. She also has served as Chairman of the Annual Meeting Program, George Baugh Heckel, Mattiello Lecture, and Roon Committees. In 1983, Dr. Brezinski was the recipient of the Federation's George Baugh Heckel Award, was a 1991 recipient of the Union Carbide Award, and is a member of the Gallow's Birds.

Currently, Dr. Brezinski serves as Chairman of the Chicago Society Technical Committee.

She was graduated from Mundelein College, and received the M.S. and Ph.D. Degrees in Chemistry from Iowa State University. Dr. Brezinski has been a contributor to the coatings industry for 20 years.

Peter A. Hiscocks (Toronto Society), Senior Group Chemist, of Ashland Chemical, Mississauga, Ontario, Canada, has been nominated to serve a two-year term.

Mr. Hiscocks is a member of the Professional Development Committee, and a Past-Chairman of the Annual Meeting Program Committee.

He is a Past-President of the Montreal Society (1976-77) and the Toronto Society (1983-84). Mr. Hiscocks also served as Technical Committee Chairman of both the Montreal and Toronto Societies. He has received First and Third Place Prizes in the A.F. Voss/*American Paint Journal* Awards competition.

Mr. Hiscocks was graduated from Loyola College (Montreal, Quebec), and has been active in the coatings industry for approximately 25 years.

* * *

Elections will take place during the Board of Directors meeting on October 20, in Chicago, IL.

Merging and Emerging Technology Session To Be Featured at 1992 FSCT Annual Meeting

A total of 12 program sessions, featuring more than 49 technical presentations, await registrants at the 1992 FSCT Annual Meeting and Paint Industries' Show, to be held on October 21-23 at McCormick Place North, Chicago, IL.

The Annual Meeting programming will follow the opening Keynote Address on Wednesday, October 21, by noted journalist Jack Anderson. Program Committee Chairman John A. Lanning, of Courtaulds/Porter Paints Div., Louisville, KY, has noted that the presentations will be keyed to the theme of "New Directions for a Changing World." Since the coatings industry's future depends on changing existing business strategies in formulating products, responding to regulatory and safety demands, and managing resources, the programming is designed to assist in defining and achieving these goals.

One such session will explore the topic of "Adopting Merging and Emerging Technologies to Drive Innovation." Presentations which are planned include:

- "The Application of Human Odor Perception to Odor Quantification of Coating Compositions"—Dr. Taki Anagnostou, of Eastern Michigan University;
- "Water-Reducible Adhesion Promoters for Coatings on Polypropylene-Based Substrates"—Jonathan Lawniczak, Eastman Chemical Company;
- "Powder Coatings—Its History and Future"—Roy G. Foulk, Evtech
- "Merging Wood and Paint Technologies in the Next Century"—Sam Williams, U.S. Department of Agriculture Forest Service; and
- "Planning for Profit from Emerging Technologies"—Howard Ellerhorst, Jr., The Chemark Consulting Group.

Sessions are also being developed by various FSCT committees to explore such areas as:

"Employee Involvement—Overcoming the Obstacles to Empowerment"—Manufacturing Committee

"Advanced Topics"—Professional Development Committee

"Formulation Factors for the Design of Corrosion-Resistant Direct-to-Metal (DTM) Coatings"—Corrosion Committee

"Material Quality"—Program Committee.

Highlighting the Annual Meeting will be the Mattiello Memorial Lecture, "Polyurethane Polyols: Ester-Bond-Free Resins for High Solids Coatings," by Dr. John L. Gardon, of Akzo Coatings Inc. Additional features will be Roon Award presentations, FSCT Constituent Society papers, and papers presented on behalf of overseas organizations.

A Poster Session, featuring noncommercial work in new ideas and techniques in coatings research, will be held on Thursday in the exhibit hall (*See accompanying story—Ed.*).

Following the Mattiello Lecture will be the FSCT Awards Luncheon. Featured speaker will be former mayor of Chicago, Jane Byrne.

Program Committee

Assisting Chairman Lanning in developing programming are: Clifford Schoff (Vice-Chairman), PPG Industries, Inc., Allison Park, PA; G. Dale Cheever, GM Corp., Research Laboratory, Warren, MI; Richard J. Himics, Daniel Products Co., Jersey City, NJ; Louis Holzknecht, Devoe Coatings Co., Louisville, KY; Ronda Miles, Union Carbide Corp., Garland, TX; Rose Ryntz, Akzo Coatings America, Inc., Troy, MI; and Roger Woodhull, California Products Corp., Cambridge, MA.

Paint Industries' Show

In conjunction with the Annual Meeting will be the 57th FSCT Paint Industries' Show, where the largest exhibition of products and services of suppliers to the international coatings industry will be presented. With 279 exhibiting companies featured in 92,500 sq ft of booth space in McCormick Place North, the Paint Industries' Show promises to be a record-setting event.

Displays will feature a wide variety of raw materials, production equipment, containers and filling equipment, laboratory apparatus, and testing devices for the paint and coatings producer. (*For current list of exhibitors, see page 28—Ed.*).

Exhibit hours will be 10:00 a.m. to 5:30 p.m. on Wednesday, Oct. 21; 9:00 a.m. to 5:30 p.m., on Thursday, Oct. 22; and 9:00 a.m. to 12:00 noon, on Friday, Oct. 23.

Host Committee

The Chicago Society will serve as the Host Committee for the Annual Meeting. General Chairman of the 1992 Annual Meeting is Ted Fuhs, of Tru-Test Manufacturing Co., Cary, IL. Assisting him are the following sub-committee chairpersons: *Registration Area*—Patricia J. McGrath, of Ashland Chemical, Inc.; *Information Services*—Natu C. Patel, of Ace Hardware Corp., Paint Div.; *Program Operations*—Karl E. Schmidt, of Premier Coatings; *FSCT Exhibit*—Victor M. Willis, of Ace Hardware; *Hospitality Suite*—Thomas P. Yates, of United Coatings, Inc.; and *Spouses' Program*—Cynthia Fuhs.

Registration Fees

Advance registration forms and information have been forwarded to all members. Advance fees are $65 for members

Poster Session to Be Featured at 1992 FSCT Annual Meeting & Paint Show

Chairman of the 1992 FSCT Annual Meeting Program Committee, John Lanning, has announced that the Annual Meeting and Paint Industries' Show will feature a Poster Session as part of its programming. The session is designed to provide a forum for individuals who are actively involved in coatings research and will give each participant an opportunity to display posters of the work and also make brief presentations on the project. The purpose of the session is 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.

There will also be cash awards for the best poster displays. These are:

First Prize—$300
Second Prize—$200
Third Prize—$100.

The projects and their posters will be judged on the following criteria: originality/novelty, scientific content, and quality of display. Participation in the Poster Session is at the discretion of the Annual Meeting Program Committee.

The Poster Session will be held on Thursday, October 22, in a special area on the main exhibit floor. The posters will be displayed from 9:00 a.m. to 5:00 p.m. and authors are scheduled to be present from 11:00 a.m. until 2:00 p.m. Each participant will be provided with a 10' x 10' space, a draped table and easels.

The deadline for entry into the competition is August 31, and all interested parties should contact Cliff Schoff, Chair of the Poster Session Subcommittee, PPG Industries, P.O. Box 9, Allison Park, PA 15101/(412) 492-5355.

and $80 for nonmembers. The fee for spouses' activities is $50 in advance. Retired members and their spouses may register at the special advance-only fee of $25 each.

On-site registration will be $75 for full-time and $55 for one-day for members. Nonmember fees will be $95 for full-time and $70 for one-day. Spouses' activities will be $60 on-site.

Hotel Reservations

Seven hotels have reserved blocks of rooms for this event. The Chicago Hilton and Towers will serve as the headquarters hotel. Other hotels include Essex Inn on Grant Park, Executive Plaza Hotel, Hyatt Regency Chicago, McCormick Center Hotel, Palmer House Hilton, and Stouffer Riviere Hotel. All hotel reservations will be processed through the Chicago Convention & Tourism Bureau's FSCT Housing Bureau. Hotel reservation forms and information brochures have been mailed to all members.

Spouses' Activities

FSCT Spouses' Activities begin on Wednesday, October 21, with a wine and cheese social in the Chicago Hilton Hotel.

On Thursday, following a continental breakfast in the Chicago Hilton, registered spouses will tour the Art Institute of Chicago and the John G. Shedd Aquarium.

Chicago's newest attraction, the Oceanarium at the Shedd Aquarium, will also be a highlight of the tour. The Oceanarium is the world's largest indoor marine pavilion, and home to the Harbor Seals, Sea Otters, and Rockhopper Penquins.

Luncheon will be served at the Mid-America Club, located on one of the tallest buildings in Chicago, offering a spectacular view of the city's skyline.

The tour limit is 650. Advance registration is recommended.

Airline Information

The Federation's Travel Desk has negotiated reduced rates on United and USAir to Chicago featuring up to 40% discounts. For transportation arrangements, call:

1-800-448-FSCT or **215-628-2549**

Mention "*Paint Show 92*."

An agent will make your reservations, write your tickets using your credit card number, and mail the tickets directly to you.

In addition, the official carriers may be contacted directly. Be sure to reference the file numbers as follow:

USAir 1-800-334-8644
Reference Gold File #62330000
United* 1-800-521-4041
Reference Meeting Code: 533GU
*Seven day advance purchase required.
Certain restrictions may apply.

A Five Kilometer Fitness Run

For Attendees at the 1992 Paint Industries' Show in Chicago, IL

Thursday, October 22, at 7:00 a.m.
Start & Finish: Lakeshore Drive and Jackson Drive

Sponsored by Troy Corporation
In conjunction with the Federation of Societies for Coatings Technology

All runners are invited to join us this year for the sixth annual Paint Show 5000, a five kilometer fun and fitness run in Chicago, IL.

The run is scheduled to start 7:00 a.m. on Thursday. Participants will run on a measured, police-protected five kilometer (3.1 mile) course on the beautiful Lakeshore Drive. A time clock will be located at the finish.

The Paint Show 5000 is designed to be a fun, fitness, or training event. You must be preregistered to run. Open to all who want to take a five kilometer running tour of Chicago.

Everyone will be a winner. Sweat shirts will be given to all participants, but you must be preregistered to run. **NO ENTRIES WILL BE ACCEPTED ON RACE DAY.**

Entry fee: $5.00 US Funds. **Entries must be received before October 16, 1992.** Runners' registration fee will be donated to the Coatings Industry Education Fund.

Mail entry form with a check for $5.00 entry fee in US Funds (no cash, please) payable to:

Troy Corporation/Paint Show 5000
P.O. Box 366, East Hanover, NJ 07936-0366

NAME (Please Print)

COMPANY

ADDRESS

CITY/STATE

ZIP TELEPHONE

In consideration of this entry being accepted, I the undersigned intending to be legally bound, hereby for myself, my heirs, executors and administrators, waive and release any and all rights and claims I may have against the Troy Corporation, the Federation of Societies for Coatings Technology, the city sponsors, their staff, officials, volunteers and any representatives, successors or assignees for any injuries that may be suffered by me in this event. I further hereby certify that I am physically fit and have sufficiently trained for the completion of this event.

SIGNATURE

DATE

SWEAT SHIRT SIZE (Circle One)
Large — X-Large

Proposed Revisions to the By-Laws of The Coatings Industry Education Fund

Due to the realignment of responsibilities between the Federation Educational Coordinating Committee and the Coatings Industry Education Fund, the CIEF Board of Trustees has proposed the following revised By-Laws for CIEF.

The revised By-Laws will be submitted for approval to the members of the Corporation (FSCT Board of Directors) at its meeting on October 20, 1992, in Chicago, and publication here serves as notification to the members.

CIEF Objectives

The objectives of the Coatings Industry Education Fund are:

(1) To advance the knowledge and application of the chemical, physical and mathematical sciences relative to the technology of protective coatings by supporting research at colleges, universities and research institutes.

(2) To develop educational activities at colleges and universities in the interest of fundamental research through the granting of fellowships.

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

CIEF Administration

The Board of Directors of the Federation constitute the stockholders, or members of CIEF. These members are obliged by the Articles of Incorporation to meet at least once a year at an Annual Meeting, at which time they elect the Trustees of the CIEF. This body must number not fewer than three nor more than eleven individuals, as presently set forth by the By-Laws.

It is the duty of the Trustees to manage the business affairs of the CIEF; to approve the budget; to allocate funds for educational purposes, i.e., scholarships, fellowships and grants and to attempt to secure funds over and above those made available to the CIEF by the Federation of Societies for Coatings Technology in the event that such funds are necessary to further CIEF objectives.

The officers of the Coatings Industry Education Fund are elected for a one-year term, by the Trustees, from among their members.

Research Grants and Publications

From its inception in 1957 through 1984, the former Paint Research Institute (now the Coatings Industry Education Fund) provided support for research in colleges and universities ranging geographically from California to England and topically from polymer solution thermodynamics to the practically oriented subject of filiform corrosion. One hundred and fifty-three papers, or reports, from this research were published as "Proceedings of the PRI" in the Journal of Coatings Technology.

Offices

(1) The principal office in Delaware shall be in the City of Wilmington, County of New Castle, State of Delaware. The corporation may also have other offices at such other places within and without the State of Delaware as the Board of Trustees may from time to time determine.

Seal

(2) The corporate seal shall have inscribed thereon the name of the corporation, the year of its organization and the words "Corporate Seal, Delaware."

Members of the Corporation

(3) The members shall be the Directors for the time being of the Federation of Societies for Coatings Technology (hereinafter referred to as the "Federation"). A person shall become a member upon being elected a Director of the Federation, and shall be a member for so long as such member continues to be a Director thereof. A member whose term of office as Director of the Federation expires before an annual meeting of the members shall not be entitled to vote as a member upon any business of the meeting unless and until such person shall have been reelected a Director of the Federation and thus become a member.

Meetings of Members of the Corporation

(4) Meetings of the members of the corporation may be held at such places within or without the State of Delaware as may be designated by the Board of Trustees.

(5) The annual meeting of members shall be held during the last quarter of each year upon such notice as is hereinafter provided.

(6) Written notice of the time, date and place of the annual meeting of members shall be mailed to each member at such address as appears on the membership list at least ten days prior to the meeting.

(7) Special meetings of members for any purpose or purposes may be called by the President and shall be called at the request in writing of any six of the members.

(8) Written notice of a special meeting of members stating the time, place and object thereof shall be mailed to each member at such address as appears on the membership register at least ten days prior to the meeting. The business transacted at such special meeting shall be confined to the objects stated in the notice.

(9) The presence in person or by proxy of a majority of the members shall constitute a quorum for the transaction of business at any regular or special meeting.

(10) At meetings of the members each member shall be entitled to one vote, and each member may vote in person or by proxy appointed by an instrument in writing subscribed by such member or by such member's duly authorized attorney-in-fact and filed with the Secretary-Treasurer of the corporation.

(11) At meetings of members, the President, or in the absence of the President, the Vice-President, or in the absence of the President and the Vice-President, a chairman chosen by a majority of the members present shall act as chairman of the meeting and the Secretary-Treasurer of the corporation, or in the absence of the Secretary-Treasurer, a person appointed by the chairman of the meeting shall act as secretary of the meeting.

Board of Trustees

(12) The business and affairs of the corporation shall be managed by the Board of Trustees. The Board shall consist of the President and not less than two and not more than ten other persons, who shall be elected at the annual meeting of members.

(13) Trustees shall be elected for a three-year term or such lesser term as may be fixed by the Board so that the terms of approximately one-third of the Trustees will expire each year.

(14) A Trustee need not be a resident of the State of Delaware or a member of the corporation.

(15) Within ten days after each annual election of Trustees, the Board shall meet at a place designated by the President to elect officers and transact such other business as may be brought before the meeting.

(16) Other meetings of the Board may be held at such place within or without the State of Delaware as a majority of the Trustees may from time to time designate or as may be designated by the President in the notice calling the meeting.

(17) Regular meetings of the Board may be held at such time and place as shall be determined by the Board.

(18) At all meetings of the Board the presence of a majority of the Trustees shall constitute a quorum for the transaction of business, and the act of a majority of the Trustees present at any meetings at which there is a quorum shall be the act of the Board, except as may be otherwise specifically provided by law or by the Certificate of Incorporation or by these By-Laws.

(19) Special meetings of the Board may be called by the President on five days' notice to each Trustee, given either personally or by mail or by telegram; special meetings shall be called by the President or Secretary-Treasurer in like manner and on like notice on the written request of two Trustees. Such request shall state the purpose or purposes of the proposed meeting.

(20) Vacancies in the Board for any cause, including vacancies resulting from an increase in the number of Trustees, shall be filled by a majority vote of the members of the Corporation at any meeting at which a quorum is present, and each person so elected shall be a Trustee for the full unexpired portion of the term of his or her predecessor, or if the vacancy results from an increase in the number of Trustees, then until the next annual meeting.

Officers

(21) The executive officers of the corporation shall be a President, a Vice-President, and a Secretary-Treasurer, who shall be elected by the Board of Trustees at its first meeting after each annual meeting of members of the corporation.

(22) The Board may at any time elect such other officers and assistant officers as it shall deem necessary, who shall have such authority and shall perform such duties as from time to time shall be prescribed by the Board.

(23) Any two offices may be held by the same person, except the offices of the President and Secretary-Treasurer.

(24) The officers of the corporation shall hold office for one year and until their successors are elected and qualify. Any officer elected by the Board may be removed at any time by the affirmative vote of a majority of the entire Board.

(25) If the office of any officer of the corporation shall become vacant for any cause, the Board shall elect another person to fill the vacancy, and such person so elected shall hold the office for the unexpired portion of the term.

President

(26) The President shall be the chief executive officer of the corporation and shall have general supervision over the business and operation of the corporation. The President shall preside at all meetings of the members of the corporation and the Board of Trustees. The President shall sign, execute and acknowledge in the name of the corporation, deeds, mortgages, bonds, contracts or other instruments authorized by the Board, and, in general, shall perform all duties incident to the office of president of a non-profit corporation and such other duties as from time to time may be assigned by the Board.

Vice-President

(27) The Vice-President shall, in the absence or disability of the President, perform the duties and exercise the powers of the President; shall perform such other duties as shall from time to time be assigned by the Board of Trustees or the President or prescribed by these By-Laws.

Secretary-Treasurer

(28) The Secretary-Treasurer shall act as secretary of all meetings of the Board of Trustees and members of the corporation, and shall keep the minutes of such meetings in the minute book of the corporation. The Secretary-Treasurer shall see that notices are given and records and reports properly kept and filed by the corporation as required by these By-Laws and by law and shall be the custodian of the seal of the corporation and see that it is affixed to all documents to be executed on behalf of the corporation under its seal. The Secretary-Treasurer shall keep the membership book of the corporation and in general shall perform all duties incident to the duties of a secretary of a non-profit corporation and such other duties as may be assigned from time to time by the Board or by the President. The Secretary-Treasurer shall have custody of the funds or other property of the corporation and shall keep full and accurate accounts of receipts and disbursements of the same in books of the corporation; shall collect and receive all moneys or other properties due the corporation and shall deposit in the name of or to the credit of the corporation all funds or other property of the corporation in such banks or other places of deposit as the Board of Trustees may from time to time designate; shall disburse the funds and deliver other property of the corporation in such manner, at such times and to such person or persons as the board may from time to time designate; shall, whenever so required by the Board, render an account showing transactions as Secretary-Treasurer and the financial condition of the corporation and in general shall discharge such other duties as may from time to time be assigned by the Board or by the President. The Secretary-Treasurer shall, if ordered by the Board, give a bond for the faithful discharge of duties in such amount as shall be fixed by the Board. The accounts and books of the Secretary-Treasurer shall, if ordered by the Board, be audited annually by a firm of certified public accountants appointed by the Board.

Finance Committee

(29) The Board of Trustees shall utilize the Finance Committee of the Federation of Societies for Coatings Technology to recommend to the Board the manner in which the assets of the corporation should be invested. Decisions involving policy shall be solely determined by the Trustees.

Indemnification

(30) The corporation shall indemnify any trustee or officer of the corporation who was or is an "authorized representative" of the corporation (which shall mean, for the purpose of this Article, a

trustee or officer of the corporation or such a person serving at the request of the corporation as a trustee, officer, partner, fiduciary or trustee of another corporation, partnership, joint venture, trust, employee benefit plan or other enterprise) and who was or is a "party" (which shall include for purposes of this Article the giving of testimony or similar involvement) or is threatened to be made a party to any "proceeding" (which shall mean for purposes of this Article any threatened, pending or completed action, suit, appeal or other proceeding of any nature, whether civil, criminal, administrative or investigative, whether formal or informal, and whether brought by or in the right of the corporation, its members or otherwise) by reason of the fact that such person was or is an authorized representative of the corporation to the fullest extent permitted by law, including without limitation, indemnification against expenses (which shall include for purposes of this Article attorneys' fees and disbursements), damages, punitive damages, judgments, penalties, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such proceeding unless the act or failure to act giving rise to the claim is finally determined by a court to have constituted willful misconduct or recklessness. If an authorized representative is not entitled to indemnification in respect of a portion of any liabilities to which such person may be subject, the corporation shall nonetheless indemnify such person to the maximum extent for the remaining portion of the liabilities.

(31) The corporation shall pay the expenses (including attorneys' fees and disbursements) actually and reasonably incurred in defending a proceeding on behalf of any person entitled to indemnification under Section 29 of this Article in advance of the final disposition of such proceeding upon receipt of an undertaking by or on behalf of such person to repay such amount if it shall ultimately be determined that such person is not entitled to be indemnified by the corporation as authorized in this Article. The financial ability of such authorized representative to make such repayment shall not be prerequisite to the making of an advance.

(32) To further effect, satisfy or secure the indemnification obligations provided herein or otherwise, the corporation may maintain insurance, obtain a letter of credit, act as self-insurer, create a reserve, trust, escrow, cash collateral or other fund or account, enter into indemnification agreements, pledge or grant a security interest in any assets or properties of the corporation, or use any other mechanism or arrangement whatsoever in such amounts, at such costs, and upon such other terms and conditions as the Board of Trustees shall deem appropriate.

(33) Each person who shall act as an authorized representative of the corporation shall be deemed to be doing so in reliance upon the rights of indemnification provided by this Article.

(34) All rights of indemnification under this Article shall be deemed a contract between the corporation and the person entitled to indemnification under this Article pursuant to which the corporation and each such person intend to be legally bound. Any repeal, amendment or modification hereof shall be prospective only and shall not limit, but may expand, any rights or obligations in respect of any proceeding whether commenced prior to or after such change to the extent such proceeding pertains to actions or failures to act occurring prior to such change.

(35) The indemnification, as authorized by this Article, shall not be deemed exclusive of any other rights to which those seeking indemnification or advancement of expenses may be entitled under any statute, agreement, vote of members or disinterested Trustees or otherwise, both as to action in an official capacity and as to action in any other capacity while holding such office. The indemnification and advancement of expenses provided by, or granted pursuant to, this Article shall continue as to a person who has ceased to be an officer or trustee in respect of proceedings pertaining to actions or failures to act occurring prior to such time, and shall inure to the benefits of the heirs, executors and administrators of such person.

Fiscal Year

(36) The fiscal year of the corporation shall be the calendar year.

Waiver of Notice

(37) Any notice required to be given by law or the Certificate of Incorporation of the corporation or these By-Laws may be waived by a written instrument, signed by the person or persons entitled to such notice either before or after required time for the notice.

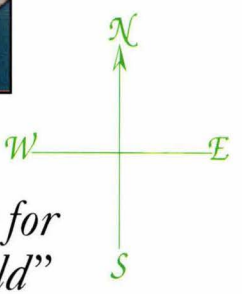
Amendments

(38) The Board of Trustees may make, alter, amend or repeal the By-Laws of the corporation. The procedure herein set forth shall require that 10 days' notice of the time and place of each meeting and of the proposed alteration or amendment to be considered be given.

Federation of Societies for Coatings Technology

1992 Annual Meeting & Paint Industries' Show

Hotel Information/Reservation Application
• Advance Registration Form •



"New Directions for a Changing World"

McCormick Place North
Wednesday, Thursday, Friday • October 21-22-23, 1992
Chicago, Illinois

The combined Annual Meeting and Paint Industries' Show is a major educational activity of the Federation. This international coatings manufacturing industry event consists of three days of technical program sessions and exhibits, running concurrently. Registration is required for admission.

From the President:

It's been four long years since the Federation has held its Annual Meeting and Paint Show in Chicago. The industry has changed greatly since 1988, especially in the areas of compliance with regulations and the technology needed to maintain and prosper in these difficult times.

As always, the mission of the FSCT is the technical advancement and education of both its membership and the industry. The highlight of our efforts, the Annual Meeting and Paint Show, offers the best opportunity around to get the knowledge and insight to help your company—and to help yourself.

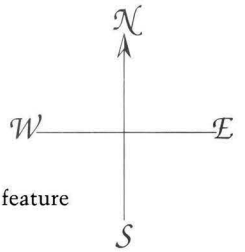
Please take a few moments to read over the following pages. I'm sure you will see many topics being presented in the Technical Program or suppliers participating in the Paint Show that will make the difference for you in 1992 and beyond.

Meanwhile, I look forward to seeing you in Chicago!

William F. Holmes
President, FSCT

Photo courtesy of Gene Hickmott/Chicago Convention & Tourism Bureau

McCormick Place Complex—site of the Federation's 70th Annual Meeting and 57th Paint Industries' Show



"New Directions for a Changing World"

Looking towards the future, the theme of this year's Annual Meeting Program, "New Directions for a Changing World," focuses on the need to change existing business strategies in formulating products, responding to regulatory and safety demands, and prudent management of resources. The "new directions" being addressed in presentations include adopting merging and emerging technologies to drive innovation, developing environmentally friendly products and processes, and embracing total quality systems to effectively compete in a global market.

Under development are the following program session themes:

- Advanced Topics
- Formulation Factors for the Design of Corrosion-Resistant Direct-to-Metal Coatings (DTM)
- Material Quality
- Employee Involvement—Overcoming the Obstacles to Empowerment
- Waste Minimization
- Merging/Emerging Technologies
- Roon Award Competition Papers

Additional topics will feature presentations on:

- Powder Coatings
- Pigments for High Performance Coatings
- Wood Finishing
- Recycling
- EB Curing Systems
- Waterborne Paint Systems
- Corrosion Inhibitors
- Low VOC Coatings
- Paint Filtration
- Epoxy Resins
- Adhesion Promoters

Highlighting the technical program will be the Mattiello Memorial Lecture by Dr. John L. Gardon, of AKZO Coatings, Inc., Detroit, MI. Dr. Gardon's presentation will be made during the Friday morning session. The Keynote Address, scheduled for Wednesday morning, will be given by noted columnist, Jack Anderson.

A Poster Session, featuring non-commercial work in new ideas and techniques in coatings research will be held on Thursday in the exhibit hall.

Record-Setting Paint Show to Feature Products of Over 260 Companies

The largest Paint Show in Federation history—indeed, the largest coatings-related exhibition in the world—will be held in conjunction with the Annual Meeting in McCormick Place North. Over 260 supplier companies to the coatings manufacturing industry will be present to discuss their newest products and services. In over 90,000 sq. ft. of exhibits will be displayed a wide variety of raw materials, production equipment, containers and filling equipment, laboratory apparatus, and testing devices for the paint and coatings producer.

Key personnel from the top technical and sales staff will be on-hand to provide attendees with an opportunity to learn of the latest developments in their products and services. Listed elsewhere are the exhibitors who have reserved space in the Paint Industries' Show.

Exhibit hours will be:

10:00 am-5:30 pm ..... Wednesday, October 21
9:00 am-5:30 pm ..... Thursday, October 22
9:00 am-12:00 Noon ..... Friday, October 23

Jane Byrne, Former Mayor of Chicago, to Speak at Federation Luncheon

The annual Federation Luncheon will be held on Friday, October 23, at McCormick Center Hotel. The featured speaker will be Jane Byrne, former Mayor of Chicago. Tickets for the luncheon may be purchased for $25 either in advance by filling in the appropriate information on the registration form or on-site at the Registration Area of McCormick Place North.

Hotel Information

Whether you wish the value of a moderately priced hotel, or the luxury of an upscale property, the choice is yours. The FSCT has arranged for convention rates at seven official Paint Show hotels. All reservations must be placed through the Chicago Convention & Tourism Bureau's FSCT Housing Bureau to obtain the preferred rates. A confirmation will be mailed from the Bureau.

Deposits

A $100 deposit per guest room and $300 deposit per suite is required in order to process requests. This is a refundable deposit. The following methods of payment are acceptable: checks made payable to the FSCT Housing Bureau or credit cards. Credit card choices include American Express, Mastercard, or Visa. Please note that the deposit will be applied immediately to the credit card used.

Deadlines

Reservations must be placed by September 18 to obtain the convention rates. After September 18, call the hotel directly.

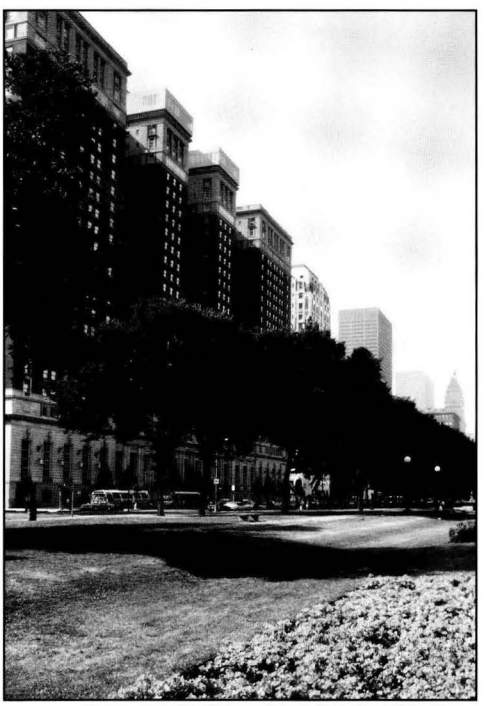


Photo courtesy of Ron Schramm/Chicago Convention & Visitors Bureau

The Chicago Hilton—headquarters hotel for the FSCT Annual Meeting & Paint Industries' Show

Changes/Cancellations:

For changes or cancellations prior to September 18, call the FSCT Housing Bureau at 312-567-8507 or fax your change to 312-567-8577. After September 18, call the hotel directly.

Do it Your Way and $ave!

You have the convenience of placing a phone call, mailing, or faxing your request for hotel accommodations to the FSCT Housing Bureau.

Call! 800-723-2000 or 312-567-8507

Have the information requested on the Hotel Reservation Form available before you place your call. Reservationists are available 8:30 a.m. - 6:30 p.m., Monday through Friday, Central Standard Time. Reservations will be immediately confirmed over the phone and also by mail.

Fax! 312-567-8577

Anytime, any day. Fax the Hotel Reservation Form at your convenience. Be sure to include a phone number and retain your copy of the form for your records. Confirmations will be sent via fax within one working day of receipt of request.

Mail!

Send your form to the FSCT Housing Bureau for processing. Be sure to include a phone number and keep a copy of the form for your records. Your confirmation will be mailed.

Airline Information

The Federation's Travel Desk has negotiated super deals on United and USAir to Chicago featuring up to 40% discounts. To make your transportation arrangements to the Paint Show, call the FSCT Travel Desk at 1-800-448-FSCT or 215-628-2549 and mention "Paint Show 92." An agent will make your reservations, write your tickets using your credit card number, and mail the tickets directly to you.

or

Call the official carriers directly. Be sure to reference the file numbers provided:

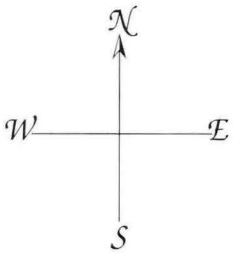
USAir 1-800-334-8644
REFERENCE Gold File#62330000

United* 1-800-521-4041
REFERENCE Meeting Code: 533GU

* Seven day advance purchase required.

For each airline, certain restrictions may apply.

Participating Hotels



Chicago Hilton and Towers (headquarters)

Luxury property located on Grant Park and five minutes from McCormick Place. Shuttle service, twenty-four hour coffee shop and room service. Fine dining at Buckingham's, Kitty O'Sheas Irish Pub, Fast Lane Deli plus entertainment in Lakeside Green Lounge. Special Towers accommodations for business travelers. Services include: health club with indoor pool, business center, drug store, unisex hair salon, boutiques and indoor parking garage.

312-922-4400

(Requests for rooms limited to 10 per company)

Hyatt Regency Chicago

Thirty six-story, twin-tower hotel with 10 restaurants and lounges. Located on the Chicago River and at the beginning of Chicago's Magnificent Mile, offering immediate access to shopping, entertainment, parks, museums, and other cultural attractions.

312-565-1234

McCormick Center Hotel

Features newly remodeled guest rooms. Connected to McCormick Place North by covered pedestrian walkway. Hotel operates three restaurants, complimentary indoor pool and full service health club.

312-791-1900

(Requests for rooms limited to 10 per company)

Palmer House Hilton

Historic hotel with newly restored guest rooms in downtown location. Five blocks to the Chicago Hilton and over 50 restaurants nearby. Deluxe category hotel, featuring five restaurants, fitness center, business center and ticket/tour desk. (NPCA headquarters.)

312-726-7500

Executive Plaza Hotel

The Executive Plaza Hotel is conveniently located just west of Michigan Avenue, at the Chicago River. Walk to the finest restaurants, night clubs, and Chicago's most popular attractions. Large guest rooms feature a separate seating area, work area, remote control TV, mini bar, coffee maker, and clock radio...additional services include multi-lingual concierge staff, exercise facility and business center.

312-346-7100

Essex Inn on Grant Park

Across from Grant Park and close to the FSCT headquarters hotel. Free courtesy shuttle downtown. New York style deli and lounge. Outdoor heated pool. Free parking for guests. Airport limousine service.

312-939-2800

Stouffer Riviere Hotel

New hotel located at the corner of State St. and Wacker Dr. overlooking the Chicago River. Within walking distance to Chicago's business, culture and shopping districts. Guests enjoy complimentary coffee, newspaper, with wake up call. Complimentary shoeshine service, complimentary health club.

312-372-7200

Useful Phone Numbers

Federation's Travel Desk 1-800-448-FSCT
or 215-628-2549
Reference: "Paint Show 92"

USAir: 1-800-334-8644, Ref. Gold File #62330000.

United: 1-800-521-4041, Ref. Meeting Code 533GU.

FSCT Housing Department 800-723-2000
312-567-8507

Dates to Remember

Hotel Reservations (deadline) ..... September 18

Advance Registration (deadline) ..... September 18

Annual Meeting & Paint Show ..... October 21-23

*Hotel Room and Suite Rates**

Code	Property	Singles	Doubles/Twins	1 BR Suite *	2 BR Suite *
#111	Chicago Hilton Hotel	$120,145,175	$145,155,185	$395-560	$525-735
#119	Chicago Hilton Towers	$210	$225	$450-675	$665-895
#113	Hyatt Regency Chicago	$142	$162	$356-2500	$507-2690
#110	McCormick Center Hotel	$129,145	$149,165	$375-504	$673-1200
#112	Palmer House Hilton	$115,130,145	$130,145,160	$295-710	$615-865
#107	Executive Plaza Hotel	$110	$125	$175	$250
#106	Essex Inn on Grant Park	$96	$108		
#116	Stouffer Riviere Hotel	$145	$165	$450 & up	$550 & up

*Rates do not include 12.4% hotel tax. (Subject to change.)
Requests for rooms at the Chicago Hilton and Towers and McCormick Center Hotel will be limited to 10 rooms per company.
Room Type Key: Single (1 person, 1 bed); Double (2 people, 1 bed); Twin (2 people, 2 beds); 1BR Suite (parlor + 1 bedroom); 2 BR Suite (parlor + 2 bedrooms).

Shuttle Service

Shuttle Bus service will be provided between the cooperating hotels* and the McCormick Place North. The routes and schedules are listed below.

Route 1

Chicago Hilton—
8th Street Entrance

Essex Inn on Grant—
Walk to Chicago Hilton

Palmer House—
Wabash Avenue Entrance

Route 2

Executive Plaza Hotel—
Wacker Drive

Stouffer Riviere Hotel—
Walk to Executive Plaza Hotel

Hyatt Regency Chicago—
Wacker Drive Eastbound

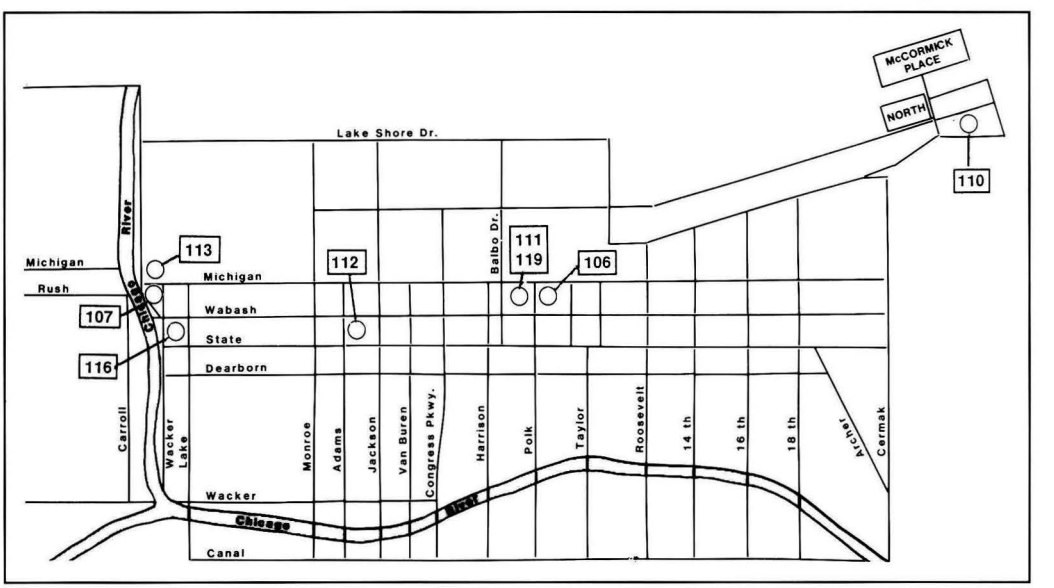
Shuttle Schedule
Hours of Operation

Tuesday, October 20—
8:00 am - 8:30 pm

Wednesday, October 21—
7:30 am - 6:30 pm
6:30 - 12 midnight*
*(Shuttle service between the cooperating hotels and the Chicago Hilton)

Thursday, October 22—
7:30 am - 6:30 pm

Friday, October 23—
7:30 am - 3:00 pm



1992 FSCT ANNUAL MEETING AND PAINT INDUSTRIES' SHOW
MCCORMICK PLACE NORTH
WEDNESDAY, THURSDAY, AND FRIDAY, OCTOBER 21-23, 1992

HOTEL RESERVATION FORM

MAIL FORM & DEPOSIT TO:

FSCT Housing Bureau
c/o Chicago Convention & Tourism Bureau
McCormick Place on the Lake
2301 South Lakeshore Dr.
Chicago, IL 60616

PHONE/FAX:

(800) 723-2000 Continental U.S.
& outside Chicago
(312) 567-8507 Outside the U.S.
FAX: 312-567-8577

HOTEL PREFERENCE

List the three digit code of your preference. First choice will be assigned if available. List other preferences to avoid delay. If your first choice is not available, your deposit will be applied to your next available choice. The deadline is September 18.

1) ☐☐☐ _____ 2) ☐☐☐ _____ 3) ☐☐☐ _____
Code Hotel Code Hotel Code Hotel

RESERVATION REQUEST

Names of Occupants	Room Type	Rate	Arrival	Depart

For additional reservations, feel free to copy this form.
Requests for the Chicago Hilton and McCormick Center Hotel will be limited to 10 rooms per company.

METHOD OF PAYMENT

Deposit Required. No form will be processed without a deposit. Credit cards will be billed immediately for first nights deposit

Credit Card (American Express, Mastercard, or VISA only.) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiration Date: ☐☐/☐☐ Signature _____

or Check made payable to: "FSCT Housing Bureau" $ _____ Check No. _____

MAIL ALL CONFIRMATIONS TO:

Name: _____ Telephone: _____
Company: _____ FAX: _____
Address: _____
City/State (Province): _____ Zip Code (Mailing Code): _____
Country (if other than U.S.): _____

If requested room rate is not available, the nearest rate will be assigned by the FSCT Housing Bureau. We cannot guarantee that the accommodations will be assigned in your preferred hotels.

☐ _____ is handicapped and requires special assistance. Phone: _____
Name

HOW TO MAKE YOUR ARRANGEMENTS

1. To place AIRLINE reservations, call the Federation's Travel Desk at 1-800-448-FSCT or 215-628-2549 and mention "Paint Show 92". To contact carriers directly, call the following numbers and reference the file numbers provided: US Air: 1-800-334-8644, Ref. Gold File #62330000. United: 1-800-521-4041, Ref. Meeting Code 533GU.

2. To make HOTEL reservations, mail or fax the housing application to the FSCT Housing Department. Housing cut-off date is September 18.

3. REGISTER IN ADVANCE for the Annual Meeting and Paint Industries' Show by filling out the form and mailing it as instructed with your registration payment.

4. To register your SPOUSE or GUEST, fill out the spouse portion of the advance registration form.

5. Mark OCTOBER 21-23 on your calendar. Don't forget — you get a discount if you register by September 18.

Registration Instructions

Advance register to attend the 1992 Annual Meeting and Paint Industries' Show by filling out and mailing the registration form and fees to the FSCT Headquarters Office.

The registration options are listed below. Advance registration forms must be received by September 18.

Register in Advance and SAVE!

Full Time	Advance	On-Site
Member	$65	$75
Non-member	$80	$95
Spouse	$50	$60

Advance Registration

If you register in advance you may pick up your badge at the McCormick Place North Registration Area during the following hours:

Tues., Oct. 20 ..... 8:00 am - 5:00 pm
Wed.-Thurs., Oct. 21-22 ..... 7:30 am - 5:30 pm
Fri., Oct. 23 ..... 7:30 am - 12:00 noon

On-Site Registration

Register at McCormick Place North.

Tues., Oct. 20 ..... 8:00 am - 5:00 pm
Wed.-Thurs., Oct. 21-22 ..... 7:30 am - 5:30 pm
Fri., Oct. 23 ..... 7:30 am - 12:00 noon

Cancellation and Refund Policy

All cancellations must be submitted in writing to the FSCT Headquarters Office. Cancellations received by October 16 will be subject to a $10 handling charge. A $25 charge will be made after that date.

Hotel Reservation Instructions

(1) Reservations must be placed by September 18. Reservations may be phoned, faxed or mailed to the FSCT Housing Bureau.

(2) Confirmations will be mailed from the Housing Bureau. Please allow 30 days for receipt of confirmation.

(3) A one-night's deposit **must** accompany each reservation request. Requests will not be processed without deposit or credit card. Acceptable payments include: personal check, bank draft, and certified check. Checks should be made payable to FSCT Housing Bureau. Credit cards may be used.

(4) Keep a photocopy of your housing request.

(5) Prior to September 18, all changes must be made through the FSCT Housing Bureau. After September 18, all changes should be made directly with the Bureau, subject to availability.

Airport & City Transportation

From Midway Airport

Airport Shuttle (service to downtown hotels, provided by Continental Air Transport) ..... $9.50 one way, $16.75 round trip
Limousine $45
Taxi $20-22

From O'Hare International Airport

Airport Shuttle (service to downtown hotels, provided by Continental Air Transport) ..... $12.50 one way, $22.00 round trip
Limousine $45
Taxi $20-22

(There is also CTA subway service from O'Hare to the Loop on a 24-hour basis, seven days a week. Board trains on the lower level of Terminal 4. The fare is $1.00 and the ride takes approximately 34 minutes.)

To get around Chicago, taxis are readily available throughout the downtown and near north areas. You'll find most of Chicago's best-known restaurants and entertainment are near downtown hotels. The public transportation system runs 24 hours a day, and routes are clearly posted on CTA vehicles, bus stops, and at subway and El stations. If you have a question about modes of transportation, ask the concierge or front desk personnel at your hotel.

1992 Advance Registration

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY
492 Norristown Rd., Blue Bell, PA 19422-2350

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

Please fill out this form and mail with a check in the correct amount (made payable to the FSCT) **to the Federation address shown above.** All checks must be payable in U.S. Funds. Any that are not will be returned. DEADLINE DATE FOR ADVANCE REGISTRATION IS **SEPTEMBER 18**. NONE WILL BE ACCEPTED AFTER THAT DATE.

NO CREDIT CARDS WILL BE ACCEPTED. NO FAXES WILL BE ACCEPTED.

INDUSTRY REGISTRATION FEES:

A ☐ MEMBER $65.00

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

_____
Federation Constituent Society

B ☐ NON-MEMBER $80.00

G ☐ SPECIAL FEE FOR RETIRED MEMBERS $25.00

_____
Federation Constituent Society

INFORMATION FOR REGISTRATION BADGE:

NICKNAME

FIRST NAME LAST NAME

COMPANY

STREET

CITY STATE *(U.S. only)* POSTAL CODE

COUNTRY *(OTHER THAN U.S.)* TELEPHONE NO.

BUSINESS CLASSIFICATION DATA FOR THE ABOVE REGISTRANT:

YOUR COMPANY (CHECK ONE BLOCK)

- AA ☐ Manufacturers of Paints, Varnishes, Lacquers, Printing Inks, Sealants
- BB ☐ Manufacturers of Raw Materials
- CC ☐ Manufacturers of Equipment and Containers
- DD ☐ Sales Agent for Raw Materials + Equipment
- EE ☐ Government Agency
- FF ☐ Research/Testing/ Consulting
- GG ☐ Educational Institution Library
- HH ☐ Paint Consumer
- JJ ☐ Other

YOUR POSITION (CHECK ONE BLOCK)

- KK ☐ Management/ Administration
- LL ☐ Manufacturing and Engineering
- MM ☐ Quality Control
- NN ☐ Research and Development
- PP ☐ Technical Sales Service
- QQ ☐ Sales and Marketing
- RR ☐ Consultant
- SS ☐ Educator/Student/ Librarian
- TT ☐ Other

SPOUSES REGISTRATION AND INFORMATION FOR REGISTRATION BADGE:

D ☐ SPOUSE $50.00

NICKNAME

FIRST NAME LAST NAME

SPECIAL FEE FOR THE SPOUSES OF RETIRED MEMBERS ONLY:

CITY STATE *(U.S. only)* POSTAL CODE

H ☐ $25.00

TICKETS FOR FEDERATION LUNCHEON, FRIDAY, OCTOBER 23 (@$ 25.00)

☐ **NUMBER REQUIRED: _____ $25.00 EACH.**

A $10.00 CHARGE WILL BE MADE FOR CANCELLATIONS RECEIVED PRIOR TO OCTOBER 16. A $25.00 CHARGE WILL BE MADE FOR CANCELLATIONS RECEIVED AFTER THAT DATE.

1992 PAINT INDUSTRIES' SHOW

Current List of Exhibitors

ACS/C&E News
ACS/Industry Relations
Aceto Corp.
Advanced Coatings Technologies
Advanced Software Designs
Agglo Recovery, Inc.
Air Products & Chemicals, Inc.
Ajinomoto U.S.A., Inc.
Akzo Chemicals & Resins
Alar Engineering Corp.
Alcan-Toyo America, Inc.
Alcoa Industrial Chemicals
Allied-Signal Corp.
Alt-Chem International
Ambrose Co.
American Cyanamid Co.
American Iron & Steel Institute
Amoco Chemical Co.
ANGUS Chemical Co.
Anker Labelers USA, Inc.
Aqualon Co.
Arco Chemical Co.
Ashland Chemical, Inc. IC&S Div.
Atlas Electric Devices Co.
Aztec Catalyst Co.

B&P Environmental Resources
B.A.G. Corp.
BASF Corp.
T.J. Bell, Inc./Erichsen Instruments
Blackmer Pump, Dover Resources
Bohlin Instruments, Inc.
Brookfield Engineering Labs., Inc.
Brookhaven Instruments Corp.
Buckman Laboratories, Inc.
Buhler, Inc.
Bulk Lift International, Inc.
Burgess Pigment Co.
BYK-Chemie USA
BYK-Gardner, Inc.

C B Mills, Inc.
CPS Chemical Co., Inc.
CR Minerals Corp.
Cabot Corp., Cab-O-Sil & Special Blacks Div.
Caframo Ltd.
Calgon Corp., Div. of Merck & Co.
Cappelle, Inc.
The Carborundum Co.
Cardolite Corp.
Cargill, Inc.
Carri-Med Americas, Inc.
Carroll Scientific, Inc.
Celite Corp.
Chemical Marketing Reporter
Chemical Week
CIBA-GEIGY Corp.
Coatings Magazine
Color Corp. of America
Colorgen, Inc.
Colortec Associates
Columbian Chemicals Co.
Consolidated Research, Inc.
Cookson Pigments, Inc.
Coulter Corp.
Cray Valley Products, Inc.
Crosfield Chemicals, Inc.
Cuno Process Filtration Products

D/L Laboratories
DSA Consulting, Inc.
Daniel Products Co.
Dantco Mixers Corp.
Datacolor International
Day-Glo Color Corp.
Defelsko Corp.
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Dow Chemical USA
Dow Corning Corp.
Draiswerke, Inc.
Drew Industrial Div.
Dry Branch Kaolin Co.
Du Pont Co.

ECC International
EM Industries, Inc.
EMCO Chemical Distributors Inc.
EOG Environmental, Inc.
Eagle Picher Minerals, Inc.
Eagle Zinc Co.
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Eastman Chemical Co.
Ebonex Corp.
Eiger Machinery, Inc.
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FMC Corp., Food & Pharmaceutical Prod. Div.
Fawcett Co., Inc.
Federation of Societies for Coatings Technology
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Fischer Technology, Inc.
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FMJ International Publications Ltd.
Freeman Polymers
H.B. Fuller Co.

Paul N. Gardner Co., Inc.
B.F. Goodrich Co., Spec. Polym. & Chem. Div.
Goodyear Tire & Rubber Co.,
W.R. Grace & Co., Davison Chemical Div.
Guer-Tin Bros. Polymers

Haake, Inc.
Halox Pigments, Div. of Hammond Lead Products
Harcros Pigments, Inc.
Henkel Corp., Coatings & Inks Div.
Heraeus DSET Laboratories, Inc.
Heucotech Ltd.
Hilton-Davis Co.
Hitox Corp. of America
Hockmeyer Equipment Corp.
Hoechst Celanese Corp., Pigments Div.
Hoechst Celanese Corp., Waxes & Lubricants Group
Horiba Instruments, Inc.
J.M. Huber Corp.
Hüls America, Inc.
Hunterlab

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ICI Resins U.S.
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Industrial Finishing Magazine
Interfibe Corp.
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International Resources, Inc.
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Journal of Coatings Technology

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K-T Feldspar Corp.
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Kent State University
King Industries, Inc.
Kraft Chemical Co.
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Lawter International
Leeds & Northrup, Microtrac Div.
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Lightnin
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Macbeth, Div. of Kollmorgen Corp.
Magnesium Elektron, Inc.
Malvern Instruments
Malvern Minerals Co.
Matec Applied Sciences
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The Mearl Corp.
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Micro Powders, Inc.
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Obron Atlantic Corp.
Ohio Polychemical Co.
Olin Chemicals
ORTECH International

PPG Industries, Inc., Silica Products
PPG Industries, Inc., Spec. Chems.
PQ Corp.
Pacific Micro Software Engineering
Paint & Coatings Industry Mag.
Peninsula Polymers
Pen Kem, Inc.
Perkin-Elmer
Pfizer Specialty Minerals
Philips Container Co.
Physica USA
Pico Chemical Corp.
Plastican, Inc.
Polar Minerals
Pollution Control Industries
Poly-Resyn, Inc.
Premier Mill Corp.
Progressive Recovery, Inc.
Pyosa, S.A. de C.V.

The Q-Panel Co.
The Quackenbush Co.
Quantachrome Corp.

Raabe Corp.
Ranbar Technology Inc.
Reichhold Chemicals, Inc.
RHEOX, Inc.
Rhône-Poulenc Inc.
Rohm and Haas Co.
Rosedale Products, Inc.
Charles Ross and Son Co.
Russell Finex Inc.

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Sandoz Chemicals Corp.
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Sartomer Co. Inc.
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Schold Machine Corp.
Scott-Bader
Semi-Bulk Systems, Inc.
Serac, Inc.
Shamrock Technologies, Inc.
Shell Chemical Co.
Sherwin-Williams Chemicals Co.
Shimadzu Scientific Instruments
Silberline Manufacturing Co.
Sino-American Minerals, Inc.
Sloss Industries Corp.
South Florida Test Service, Inc.
Southern Clay Products, Inc.
University of Southern Mississippi
Spartan Color Corp.
Startex Chemical Co.
Steel Structures Painting Council
Sub-Tropical Testing Service
Sun Chemical Corp.
Systech Environmental Corp.

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Teledyne Taber
Texaco Chemical Co.
Thiele Engineering Co.
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Viking Pump, Inc., a Unit of Idex
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Wacker Silicones Corp.
Wallon Machinery, Inc.
Warren-Rupp, Inc., a Unit of Idex
Wilden Pump & Engineering Co.
Witco Corp.

X-Rite, Inc.

Zeelan Industries, Inc.

Columnist Jack Anderson to Give Keynote Address at Annual Meeting

Noted columnist Jack Anderson will present the Keynote Address at Wednesday's Opening Session at the FSCT 70th Annual Meeting. With his *Merry Go Round* column appearing in over 1000 newspapers daily, Anderson is the most widely syndicated columnist in the world. Additionally, he is a regular contributor to *The Real Story*, CNBC's nightly live information-based show; a daily radio commentator for UPI Radio Network's 1100 stations; the best-selling author of numerous books (the most recent being *Stormin' Norman*); and the most dynamic speaker on the nation's lecture circuit.

It was from his column that we first heard of the Savings and Loan scandal, the Iran/Contra Arms-for-Hostages deal, and the danger of Saddam Hussein. Anderson fascinates and educates audiences with his insights and inside stories—always standing for the public's right to know.

Spouses to Tour Chicago Sites

Spouses Activities begin on Wednesday, October 21, with a wine and cheese social in the Chicago Hilton Hotel.

On Thursday, following a continental breakfast in the Chicago Hilton, registered spouses will depart on deluxe motorcoaches for the Art Institute of Chicago and the John G. Shedd Aquarium.

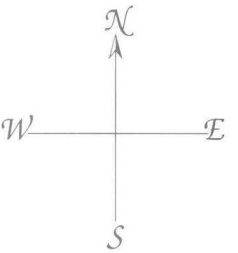
To enhance the viewing of the Art Institute's magnificent collection, spouses will receive a private lecture on "Highlights of the Art Institute of Chicago." The monumental stained-glass America Window by Chagall, and the great gilded Trading Room of Chicago's famous Stock Exchange Building will be among the highlights. After the presentation, spouses will have ample time to view the galleries.

Chicago's newest attraction, the Oceanarium at the Shedd Aquarium, will also be included in the tour. The Oceanarium is the world's largest indoor marine pavilion. Home to the Harbor Seals, Sea Otters, and Rockhopper Penquins, the Oceanarium features an elaborate re-creation of the Pacific Northwest temperate rain forest habitat. Spouses will stroll through scenic nature trails to an amphitheater where the Oceanarium staff will demonstrate the behaviors of beluga whales and white side dolphins.

A delicious luncheon will be served at the Mid-America Club located atop one of the tallest buildings in Chicago, offering a spectacular view of the Chicago skyline.

Comfortable walking shoes are recommended.

The tour limit is 650. Advance registration for the spouses activities is recommended.



FSCT Board of Directors to Meet On Tuesday at Chicago Hilton

The Board of Directors of the Federation will meet on Tuesday, October 20, at 9:00 am in the Chicago Hilton Hotel.

NPCA Annual Meeting Same Week

The National Paint & Coatings Association will hold its annual meeting on October 19-21, 1992, at the Palmer House, in Chicago.

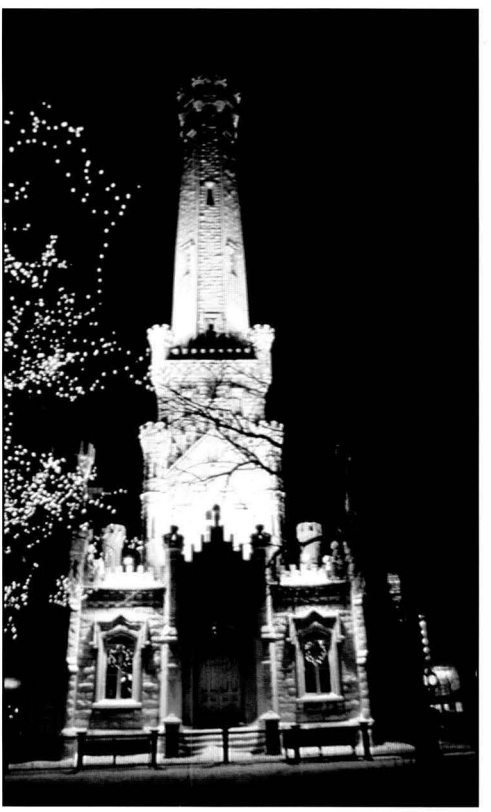


Photo courtesy of Ron Schramm/Chicago Convention & Tourism Bureau

Chicago's famous landmark— Water Tower Place

George F. Will and Paul Tsongas to Be Speakers At NPCA Annual Meeting, in Chicago, on Oct. 19-21

Journalist George F. Will, a syndicated newspaper columnist, TV news analyst, and contributing editor to *Newsweek* magazine, will be the Keynote Speaker at the Opening Session of the National Paint and Coatings Association's (NPCA) 105th Annual Meeting, on October 19-21, at the Palmer House Hotel, in Chicago, IL.

Mr. Will's newspaper column, which has been syndicated by *The Washington Post* since 1974 and now appears weekly in 480 U.S. newspapers, earned him a Pulitzer Prize in 1977. In addition to contributing twice-monthly essays to *Newsweek*, he is a panelist on ABC's "This Week with David Brinkley." Mr. Will also appears occasionally on "World News Tonight" and "Nightline."

He is the author of four collections of columns, two book on political philosophy, and a book about baseball.

A native son of Illinois, Mr. Will earned the B.A. Degree from Trinity College, in Connecticut; studied at Magdalen College, Oxford University, in England; and received the M.A. and Ph.D. Degrees from Princeton University. He has taught political philosophy at Michigan State University and the University of Toronto.

After spending three years on the staff of Senator Gordon Allott (R., Colo.), Mr. Will was named Washington Editor of *The National Review*.

Former Senator and 1992 Democratic Presidential candidate Paul Tsongas will address a general session during NPCA's 1992 Annual Meeting, on October 21.

Mr. Tsongas, who began his public service as a Peace Corps volunteer, represented the state of Massachusetts as a Congressman from 1975 to 1978, and as a Senator from 1979 to 1985. He has emerged as a strong spokesman for a new industrial policy in the U.S. With the end of the Cold War, and the diminished importance of military supremacy, Mr. Tsongas believes that the country's future depends on our ability to compete effectively as a major economic superpower.

As a Senator, he served on several committees including Foreign Relations, Energy and Natural Resources, and Small Business. Mr. Tsongas graduated from Dartmouth College, and he holds a Law Degree from Yale. He also attended the John F. Kennedy School of Government at Harvard University.

Mr. Tsongas is the author of "The Road from Here: Liberalism and Realities in the 1980s" and "Heading Home."

Women in Coatings Accepting Nominations For 1992 Award Presentations

Women in Coatings (WIC) is accepting names of all women who have made a significant contribution in support of paint and coatings and/or related industries for their 1992 WIC Awards. The presentations will take place during the Federation of Societies for Coatings Technology Annual Meeting, on October 21-23, 1992, in Chicago, IL.

Contributions can include the publication of technical or non-technical papers, presentations of information, or any significant accomplishment which benefits the industry in general.

The Award categories are as follows:

Communications—Overall contributions such as product information, promotions, advertising, and general public relations.

Management—Overall management of products, projects, customer accounts, department, or staff.

Leadership—Ability to lead within the industry as in actively participating in professional and trade organizations.

Research and Development—Overall contribution by way of research and development such as product innovation and processes.

Sales and Marketing—Overall contribution by way of sales and marketing as evidenced by increased recognition by customers and business associates within the industry, significant increase in sales, and development of a certain market segment.

Purchasing—Overall contribution resulting in cost savings of purchased materials, improvement of product quality by purchasing from quality conscious suppliers, and JIT inventory.

Industry Support—Other branches within the companies that are not included in the preceding categories (e.g., laboratory technicians, secretarial and clerical help, customer service and order desk, shipping and receiving, and computer operations).

The WIC Awards are designed to bring recognition to those women who have contributed to the advancement of paint and coatings and provide incentive to those women who are striving for excellence in their fields.

The group attempts to unite women in paints and coatings and related industries in a forum where support can be derived and common experiences can be shared in the overall pursuit of creating a stronger, more versatile industry.

Winners of the 1991 WIC Awards include: Communications—Valerie Braund, of General Paint Ltd.; Research and Development—Patricia Shaw, of Davlin Coatings, Inc.; Management—Deborah Grumski-Du, of Akzo Coatings, Inc.; Purchasing—Lou Ann Magrin, of Kelly Moore Paint Company; Industry Support—Barbara Whitaker, of Kerr-McGee Corporation; and Leadership—Mary Carole Storme, of The Valspar Corporation.

All nominations for the 1992 WIC Awards are due no later than September 18. Send the nominee's name, award category, and accomplishment(s) and appropriate date(s), to: Eve De La Vega-Irvine, c/o J.M. Huber Corp., Clay Div., One Huber Rd., Macon, GA 31298.

ASTM Group Seeks Standard Revision Input

The American Society for Testing and Materials (ASTM) has announced that Subcommittee D01.55, on "Factory Applied Coatings on Preformed Products," is about to revise an international standard and is interested in a selection of responses regarding the revision.

Subcommittee D01.55 is scheduled to begin working shortly on a revision of standard D 2199, "Method for Measurement of Plasticizer Migration from Vinyl Fabrics to Lacquers." The subcommittee is actively seeking comment from all interested parties regarding the content of this revision.

All suggestions should be forwarded, by October 1, to: George R. Pilcher, Akzo Coatings Inc., P.O. Box 147, Columbus, OH 43216-0147.

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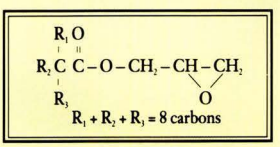

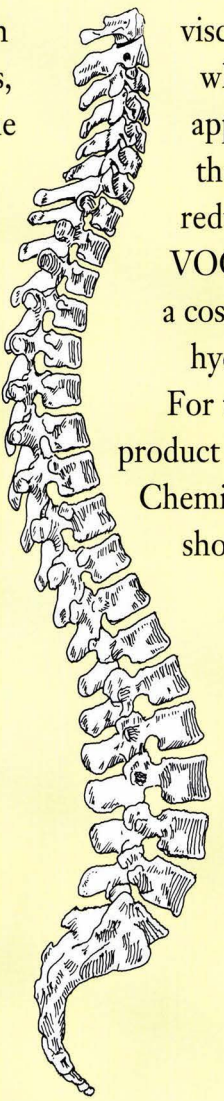

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Environmental Protection Agency Proposes New Hazardous Waste Identification Rule

The National Paint and Coatings Association (NPCA), Washington, D.C., has reported that the Environmental Protection Agency (EPA) has proposed a new Hazardous Waste Identification Rule (HWIR) to replace the "mixture" and "derived from" rules under the Resource Conservation and Recovery Act (RCRA). The proposal was announced by the EPA on May 20.

The HWIR proposal outlines two alternative approaches that exempt some wastes which pose no or little risk to public health and the environment from federal hazardous waste controls. Comments on the two approaches outlined in the proposed HWIR were accepted by the EPA until July 20.

The first approach would retain the current system for identifying hazardous waste, but would specify how low-risk wastes could qualify for an exemption. Exemptions would be allowed when hazardous constituents are below certain concentration levels. This alternative is known as the concentration-based exemption criteria (CBEC) approach.

The second approach would change the way hazardous wastes are currently identified. All wastes would enter and exit the hazardous waste regulatory system based upon the levels of contaminants found in the waste. This approach is also known as the expanded characteristics option (ECHO) proposal.

Both approaches would modify two rules that capture low-risk wastes, the so-called mixture and derived from rules, which currently require that nearly all wastes mixed with regulated hazardous waste or wastes derived from a hazardous waste are subject to full hazardous controls regardless of the degree of risk they present. Based on preliminary estimates, both approaches potentially exempt millions of tons of low-risk wastes from regulation.

NPCA reported that the proposed rule also includes the possible use of management standards in conjunction with whichever waste exemption alternative is implemented. This concept, which EPA has termed the "contingent management" approach, would deem wastes within certain hazardous constitutent concentration ranges contingently exempt from Subtitle C regulation if the wastes were managed in a prescribed manner (i.e., placed in a lined landfill).

Another significant issue in the HWIR is the interaction between the proposed CBEC and ECHO approaches and the RCRA land disposal restrictions. Section 304(m) of RCRA provides that treatment standards for hazardous waste must require that any threats to human health and the environment are minimized prior to land disposal. According to NPCA, to date, EPA has been unable to define risk-based standards that satisfy the "minimized threat" standard.

Troy Corp. Celebrates Inauguration of New Headquarters In East Hanover, NJ, with Open House, on June 26

Troy Corporation celebrated its 40th anniversary with the inauguration of its new corporate headquarters, in East Hanover, NJ, on June 26, with an open house ceremony. The move was made to accommodate the company's growth in size and personnel, and to enable the expansion of research and development and laboratory facilities.

The company's former corporate research and principal manufacturing facilities were located in Newark, NJ. Troy still maintains manufacturing and research and development facilities in Newark.

In addition, an industry-specific resource center known as ARTS (Applied Research and Technical Service) has been developed by Troy in Newark. The center is dedicated to taking the latest developments in performance materials research and applying them to solve specific industry or customer problems. The facility includes a recently expanded microbiological laboratory, as well as industry-specific labs, designed to provide technical assistance on new products, and develop new applications based on the intrinsic properties of existing products.

Mergers & Acquisitions...

Dowd and Guild Acquires Stay and Day Paint Materials Co.

Dowd and Guild, Inc., San Ramon, CA, has acquired Stay and Day Paint Materials Company, Los Angeles, CA. Stay and Day is a distributor of chemicals, packaging materials, and equipment for the paint and coatings industry.

As part of the agreement, Stay and Day will continue to serve the industry from its Los Angeles warehouse. Steve C. O'Donnell, Rudy Venegas, and Robert Toomey, former owners of Stay and Day, will continue to serve the company in sales capacities.

Calgon Carbon Corp. Purchases Reactivation Carbon Plant

Calgon Carbon Corporation, Pittsburgh, PA, has completed the acquisition of the facilities of Trans-Pacific Carbon Corporation, in Blue Lake, CA. Trans-Pacific reactivates spent granular activated carbon and manufactures powdered activated carbon.

Terms of the transactions were not disclosed.

ARCO Chemical and Yukong Ltd. Announce Preliminary Divestiture Agreement

ARCO Chemical Company, Newtown Square, PA, and Yukong Limited have announced that they have reached a preliminary agreement whereby ARCO Chemical Company will withdraw from their joint venture, Yukong ARCO Chemical, Limited, divesting its entire equity interest to Yukong Limited.

Yukong ARCO Chemical, which produces propylene oxide and styrene monomer in Ulsan, South Korea, will continue to operate under license from ARCO Chemical Company.

The preliminary agreement provides that ARCO Chemical Company will make an equity payment to Yukon ARCO Chemical and be released from all indemnification obligations to Yukong Limited with respect to the debt of Yukong ARCO Chemical. As of March 31, 1992, ARCO Chemical was contingently liable for $204 million.

ARCO Chemical Company indicated that the transaction will result in a one-time charge, which is expected to be $56 million, to second quarter 1992 earnings due to both the write-down of the existing equity investment and the aforementioned payment.

The transaction was subject to completion of the necessary contracts and various governmental approvals as well as approval by the respective Boards of Directors.

Regulatory UPDATE

AUGUST 1992

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. and edited by members of the FSCT Environmental Affairs Committee.

Department of Transportation
Research and Special Programs Administration
July 9, 1992—57 FR 30620
Hazardous Materials Transportation; Registration and Fee Assessment Program
Action: Final Rule

The Research and Special Programs Administration (RSPA) has established a national registration program for those transporting certain hazardous materials in foreign, intrastate, and interstate commerce. As part of the program, all affected parties are required to file an annual registration statement with RSPA and all registrants will be assessed a $300 fee. Of that $300, $250 will be applied toward a fund for emergency response training and grant programs for state and local governments. The remaining $50 will offset the Department of Transportation expenses for processing each registration statement.

The registration statement must be filed and the fees paid by August 31, 1992. After September 15, 1992, no person required to submit a registration statement will be permitted to transport any of the specified hazardous materials unless the registration is on file with RSPA. For further information, contact Joseph S. Nalevanko, Office of Hazardous Materials Planning and Analysis at (202) 366-4109, or Beth Romo, Office of Hazardous Materials Standards at (202) 366-4488.

The Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
June 30, 1992—57 FR 29091
Availability of Administrative Reports of Health Effects Studies
Action: Notice

The Agency for Toxic Substances and Disease Registry (ATSDR) has released several health assessment reports which are available to the public.

Three of the reports, relating to the adverse health effects of lead exposure, are: Child Lead Exposure; a Philadelphia Neighborhood Lead Study; and Arsenic and Lead Exposure Study. Other available reports are as follows: Mercury Exposure Study; Benzene Groundwater Exposure Study; and Exposure Study of Volatile Organic Compounds.

To obtain a copy of any or all of these reports, contact the U.S. Department of Commerce, National Technical Information Service, Springfield, VA at (703) 487-4650. For further information, contact Jeffrey Lybarger, M.D., M.S., Director, Division of Health Studies, ATSDR, Atlanta, GA at (404) 639-6200.

Notice: Clean Air Operating Permit Program—Final Regulations—In late June, the EPA issued its final version of the Clean Air Act Operating Permit Regulations. The regulations are expected to be published in the Federal Register in the near future.

Mandated by the Federal Clean Air Act Amendments of 1990, the regulations will be the foundation upon which states must construct clean air operating permit programs (which will eventually apply to virtually every significant stationary source of regulated air pollutants).

As was expected, the final regulations diminished certain provisions that had been somewhat more favorable to industry when proposed in May 1991. These include requirements for "operational flexibility" that allow for minor de minimis increases in emissions without the requirement of going through a time consuming permit modification process and the protection afforded by a so-called "permit shield" that will allow a source to rely only on the terms of its permit for understanding its compliance obligations. However, the proposal to defer from the program for five years non-major stationary sources remained unchanged.

Though states have until 1993 to submit programs and EPA has another year to approve state programs, many states—especially those with significant air pollution problems—are expected to have programs up and running sooner than the laws' timetable dictates.

Notice—The U.S. Government Printing Office (GPO) has announced the availability of a publication entitled, *Regulatory Programs of the United States Government.* In keeping with the timeliness of general bureaucracy, the report is a 1991 edition. It is 788 pages and costs $31.00. The following synopsis is quoted from a GPO press release:

> *"Americans spend billions of hours and billions of dollars each year dealing with federal regulations and paperwork. With over 100 agencies implementing thousands of regulations, the federal government af-*

fects nearly every facet of American life. Although intended to benefit and protect the American public, government regulations may—through faulty design or clumsy implementation—have an opposite, even harmful, effect. When federal regulations impose costs that exceed benefits, taxpayers, consumers, and businesses alike are adversely affected—paying both higher prices and higher taxes."

To order the publication, call the Superintendent of Documents, Washington, D.C. at (202) 783-3238.

Resource Conservation and Recovery Act—Despite objections from both sides of the isle, the House Energy and Commerce Committee reported legislation (H.R. 3865) to reauthorize the Resource Conservation and Recovery Act. Reportedly, Republicans are unhappy with the bill because it would generate new and burdensome regulatory responsibilities for the EPA while limiting White House oversight of the agency. Democrats complained that it addresses only municipal solid waste while dismissing essential hazardous waste and industrial waste issues.

In what now appears to be a desperate attempt to pass some sort of RCRA bill this year, it has been reported that Energy and Commerce Committee Chairman, John Dingell made a deal with committee Republicans before the final markup to try to prevent minority members from voting with disgruntled Democrats to kill the bill in committee. Rep. Dingell promised to vote in favor of amendments to pare back the limits on White House oversight and to allow EPA to consider costs when developing regulations. He also promised to vote against any hazardous waste or toxic emission reporting amendments.

Rep. Dingell's support is considered key in obtaining Rules Committee approval to bring an amendment to the floor. Several members have already indicated they will offer controversial floor amendments addressing industry nonhazardous waste and toxic use reduction. Rep. Dingell "assured Republicans" that he would press the Rules Committee to disallow all Subtitle C (hazardous waste) issues and would resist such amendments should the committee allow time to be considered.

Because there is so much speculation surrounding the fate of the Senate RCRA bill, Democratic House leaders may be disinclined to enter into what may be a blood bath on the House floor—especially if there is no guarantee the bill will move.

Interstate Waste—Bypassing committee review, legislation allowing states to ban out-of-state municipal solid waste is scheduled to be debated on the Senate floor at the end of July.

Senate Majority Leader, George Mitchell (D-ME), came through on a promise to Senators Max Baucus (D-MT) and Dan Coats (R-IN), sponsors of the bill (S. 2877), by scheduling the floor debate for expeditious consideration. Bypassing the committee markup process may be an indication that the comprehensive RCRA reauthorization bill (S. 976) will not be considered by the full Senate this year.

The broader RCRA bill already has language that would allow states increased authority to block shipments of garbage into their states if a local jurisdiction requests the state government to ban out-of-state waste. Rumors are rampant that Sen. Baucus may also try to lift certain provisions from the floundering S. 976 and attach them to the interstate waste bill. He also may try to attach some controversial general recycling amendments.

Indoor Air Quality—In yet another draft of Indoor Air Quality legislation developed by Representatives Joseph Kennedy II (D-MA) and Robert Andrews (D-NJ), employers would be required to reduce air contaminants in the workplace.

The new version would require the Occupational Safety and Health Administration (OSHA) to inspect a workplace if an employer failed to reduce air contaminants after a certain percentage of employees filed complaints. The Department of Labor would establish the number of complaints needed to trigger the standard.

Earlier provisions that have been deleted from this current draft would have mandated specific OSHA standards on air contaminants and ventilation and required labeling of products that emit hazardous gases. Other provisions include the creation of an OSHA Office of Indoor Air Quality to coordinate all indoor air activities and to act as liaison to public interest groups, labor and businesses to compile information on controlling and reducing contaminants. Employees would also be able to file civil suits against employers who fail to decrease indoor air contaminants within 180 days of receiving an OSHA citation.

States Proposed Legislation and Regulations

California

Graffiti—CA A. 3457 (Elder) includes graffiti abatement as a specified purpose of a community services district and would enact procedures for the establishment of graffiti abatement districts with specified powers for the purpose of abating graffiti. Authorizes districts to impose a special tax on real property for the purposes of abating graffiti and would authorize districts to levy a tax, pursuant to the existing authority granted to cities and counties. The bill was released from the Senate Committee on Local Government on July 1.

Labeling—CA A. 2942 (Archie-Hudson) requires that any person who manufactures or sells five-gallon, plastic or metal straight-sided, open head containers intended for use, sale, distribution or any other purpose within the state, irrespective of point of origin, shall place warning labels on those containers prior to release for shipment. The bill, which is intended to prevent small children from drowning in five-gallon containers, passed the assembly in May. On June 25, it was amended in the Senate and re-referred to the Appropriations Committee.

Lead—CA A. 3487 (Friedman) adds lead-related work, as defined, to the list of employments or places of employment that require the issuance of a permit. Requires the Division of Occupational Safety and Health to propose a regulation containing specified requirements relating to lead-related work to the Occupational Safety and Health Standards Board for its review and adoption. The bill passed the Assembly in May. It was amended in the Senate on July 6 and re-referred to the Appropriations Committee.

Hazardous Waste (Regulation)—California's Department of Toxic Substance Control (DTSC) has proposed a

Permit-by-Rule (PBR) regulation for those operating on-site treatment facilities. Authorized under California's Hazardous Waste Control Act, the PBR regulation, among other things, focuses on wastewater treatment units, elementary neutralization units, and totally enclosed treatment units. PBR requires businesses to meet certain "disclosures" requirements (i.e., fingerprinting of managers and published notice, third-party liability insurance, "environmental investigations," retrofitting equipment, training and documentation, facility fees, and closure plans). In addition, in order to obtain a PBR, many local zoning laws require a land use permit to operate a "hazardous waste treatment facility." The DTSC has refused any blanket exemptions and instead is focusing on specific waste streams and processes listed in the current PBR regulations.

Negotiations between the DTSC and a coalition of California businesses is ongoing. Although current proposals indicate that those treating aqueous wastes, inorganic acids, or alkaline waste will not be exempt from DTSC regulation, the more onerous requirements (corrective action and financial assurances) are to be eliminated. De minimis exemptions for certain on-site treatments are still being discussed.

Colorado

Air Quality—CO S. 97 (Tebedo) designates the Office of Regulatory Reform to act as Ombudsman to provide assistance to small businesses in the implementation of the Federal Clean Air Act Amendments of 1990. Makes an appropriation. The bill was signed by the Governor on June 1.

Illinois

Lead—IL H. 1852 (Ronan) creates the Lead Poisoning and Lead Abatement Act; requires blood testing for lead poisoning; provides for inspection of dwelling units for lead and remedial action to remove lead; amends the Illinois State Income Tax Act to create a tax credit for the cost of lead abatement and creates the Lead Poisoning Screening, Prevention and Abatement Fund. The bill passed the Senate and was sent to the House for concurrence on June 25.

Air Quality—IL H. 4037 (Ryder) amends EPA Act; creates the Clean Air Act Permit Program; requires such sources of pollution to obtain permits from EPA; regulates such pollution in accordance with the Federal Clean Air Act. The bill passed the Senate on June 30 and was sent to the House for concurrence.

Massachusetts

Lead—MA H. 5867 (Committee on Health Care) is the comprehensive bill, amending the lead paint statutes, promised by the Massachusetts legislature. The bill combines H. 1884, H. 2069, H. 2820, H. 3010, H. 3724, H. 3906, H. 4490, H. 4666, H. 4668, H. 4878, H. 5036, H. 5038, S. 464, and S. 482. The bill was introduced on June 26 and referred to the Joint Committee on Ways and Means.

Michigan

Painting Contractor Certification—H. 5903 (Mathieu) regulates hazardous painting by providing for education, testing, and licensing of paint and coatings applicators. Authorized certain agencies to charge fees and investigate alleged or apparent violations. The bill was introduced on June 9 and referred to the House Committee on State Affairs.

Environmental Labeling—MI S. 985 (Bouchard) requires truth in labeling for degradable, biodegradable, or photodegradable bags or containers; requires bags and containers to meet standards for decomposition. The bill was introduced on June 11 and referred to the Senate Committee on Natural Resources and Environmental Affairs.

Air Quality—MI S. 1015 (Wartner) requires Clean Air Act regulations to comply with federal standards. The bill was introduced on June 11 and referred to the Senate Committee on Natural Resources and Environmental Affairs.

New York

Packaging—NY A. 9245 (Hinchey et al.) enacts the Environmentally Sound Packaging Act; requires packaging to be reusable or recyclable; provides exceptions and makes related provisions. The bill was released from the Assembly Committee on Ways and Means on June 16 and is now in the Rules Committee.

Lead—NY A. 11063 (Lasher) permits New York City's Department of Housing Preservation and Development to be able to provide a grant or a loan to a privately owned multiple dwelling for the purpose of removing and abating lead-based paint. The bill passed the Senate on June 25.

NY A. 11978 (Committee on Rules) establishes a comprehensive lead poisoning prevention program to prevent lead poisoning, minimize the risk of exposure to environmental lead, and reduce the number of children with lead poisoning. The bill, drafted by the Governor's office with no tax provision, was introduced on June 10. On July 7, it passed the Assembly, was substituted for S. 8559, and passed the Senate.

NY A. 11670 (Eve) enacts the Comprehensive Lead Poisoning Prevention Act. Makes various provisions for regulations for lead poisoning prevention, case management of children with elevated lead levels and minimizing exposure to environmental lead. Requires insurance coverage for lead screening services, and provides for licensing of contractors involved with lead removal projects. The legislation initially called for a 25-cent per gallon tax on the sale of paint. The tax was amended out of the bill before it passed the Assembly on June 26. It is now in the Senate Rules Committee.

NY A. 10416 (Clark) increases the penalty for the failure to comply with a notice and demand for the discontinuance of a paint condition conducive to lead poisoning (i.e., abatement) to $5,000. The bill was released from the Assembly Committee on Health and referred to the Committee on Codes on June 9.

Graffiti—NY S. 2369 (Padavan) authorizes the New York City Departments of Consumer Affairs, Sanitation, Environmental Protection, and Transportation and the New York City Police Department to issue summons for violations involving the sale of aerosol spray paint cans and broad tipped indelible markers. The bill passed both the Senate and the House on June 26.

NY A. 12334 (Seminerio) imposes criminal sanctions upon persons who deface public or private property by means of aerosol paint cans. The bill was introduced on June 28 and referred to the Assembly Committee on Codes.

Packaging—NY A. 12410 (Committee on Rules) makes provisions with regard to exempting until January 1, 1995 tin-coated steel cans with low levels of naturally occurring lead from hazardous packaging regulations. The bill was introduced on July 2. On July 7, it passed the assembly and was referred to the Senate Committee on Rules. The companion bill, S. 9001 (Johnson), was introduced on July 2 and referred to the Senate Rules Committee.

North Carolina

Occupational Safety and Health—NC H. 1388 (Fitch) requires certain employers to establish safety and health programs and safety and health committees in the workplace. The bill passed the House on June 18. On July 9, it passed the Senate and was sent back to the House for concurrence.

Pennsylvania

Packaging—PA S. 1733 (Fisher et al.) provides for the removal of toxics in packaging. Gives the Department of Environmental Resources certain responsibilities. Provides for enforcement and penalties. The bill passed the Senate on July 1 and was referred to the House Committee on Conservation.

Hazardous Waste (Regulation)—Pennsylvania has comprehensively revised its residual waste regulations, including those pertaining to nonhazardous industrial waste. Changes relate to the following: (1) permit by rule; (2) impoundments; (3) residual waste (including municipal waste management, permitting, waste analysis plans, and source reduction assessments); (4) "cross-over" special handling waste; and (5) the definition of "waste" (i.e., tying the definition to the process or manner in which waste is generated, rather than using the federal definition which declares that certain types of materials are considered waste if they are used in certain ways). (*Pennsylvania Bulletin* 3389—July 4, 1992).

Rhode Island

Air Quality—RI H. 8161 (E. Smith) amends Rhode Island's Clean Air Act to comply with the requirements of the Federal Clean Air Act Amendments of 1990 and makes other amendments relating to clean air. The bill passed the House on June 24 and was sent to the Senate.

Spring 1992 Board of Directors Meeting

Thirty-five members and 13 guests attended the Spring Meeting of the Board of Directors of the Federation of Societies for Coatings Technology, on May 17, 1992, in Boston, MA.

The following were in attendance:

Officers

President ..... William F. Holmes
President-Elect ..... Colin D. Penny
Secretary-Treasurer ..... John A. Lanning

Society Representatives

Baltimore ..... Joseph D. Giusto
Birmingham ..... Gerry J. Gough
C-D-I-C ..... Lloyd J. Reindl
Chicago ..... Richard M. Hille
Cleveland ..... Fred G. Schwab
Dallas ..... Bruce W. Alvin
Detroit ..... William W. Passeno
Golden Gate ..... Timothy J. Donlin
Houston ..... Arthur McDermott
Kansas City ..... Norman A. Hon
Los Angeles ..... Jan P. Van Zelm
Louisville ..... James A. Hoeck
Mexico ..... Arturo Ita
Montreal ..... Horace S. Philipp
New England ..... Maureen M. Lein
New York ..... Richard J. Himics
Northwestern ..... Larry Brandenburger
Pacific Northwest ..... William E. Shackelford
Philadelphia ..... Wayne A. Kraus
Piedmont ..... Forrest Fleming
Pittsburgh ..... William C. Spangenberg
Rocky Mountain ..... John Delmonico
St. Louis ..... Terry Gelhot
Southern ..... Dan Dixon
Toronto ..... Arthur K. Hagopian
Western New York ..... Gerald F. Ivancie

Other Members

Thad T. Broome ..... Southern
James E. Geiger ..... Southern
Berger G. Justen ..... Southern
J. Dick Mullen ..... Rocky Mountain
Deryk R. Pawsey ..... Pacific Northwest
Kurt F. Weitz ..... Toronto

Guests

Federation Past-President and Chairman of the Planning Committee John Oates. (Board Members James Geiger, Deryk Pawsey, and Kurt Weitz are also Past-Presidents of the Federation.)

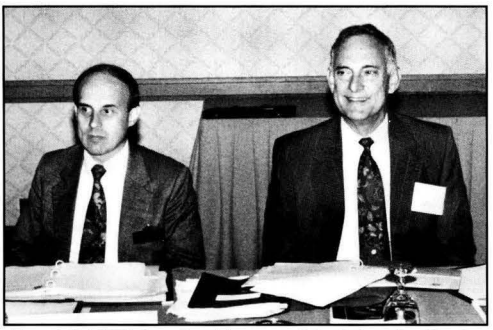
Society Officers attending the following day's meeting of Incoming Society Officers: Garnett Simmons (Birmingham); Lucio Huerta (Mexico); Richard Bordeleau (Montreal); Joanne Monique (New England); Mike Hazen (Toronto); and Edward Walker (Western New York).

Joe Maty, Editor, *American Paint & Coatings Journal.*

Staff

Michael G. Bell, Director of Educational Services; Victoria Graves, Director of Meetings and Conventions; Charles Schmidt, Controller; Patricia D. Viola, Director of Publications; and Robert F. Ziegler, Executive Vice President.

The report of the Fall 1991 Board of Directors Meeting was approved as published in the January 1992 issue of the JOURNAL OF COATINGS TECHNOLOGY.



From left: FSCT Secretary-Treasurer John A. Lanning (Louisville) and FSCT President William F. Holmes (Houston)

Reports of the Officers And Staff

PRESIDENT HOLMES

Occasionally it is said that the President's office is largely honorary in nature. This is not necessarily so; no sooner was I sworn in during the Toronto Annual Meeting, than I was sworn at by constituents wanting to know "now that you are President, what do you intend to do about (_)," fill in the blank. In true executive fashion, I rapidly learned to say, "Let me check that with my staff and I will get back to you." Staff, now, that is the really tough job.

My first official function after the Annual Meeting was to attend the NDPA in Chicago on November 21-22. Bob Ziegler and I were recognized at the opening ceremonies.

The January Finance and Executive Committee Meetings were held in Blue Bell on the 23rd and 24th; this was the first run-through of the re-structured Finance Committee, which now includes the Investment Committee and also takes the report of the Accounts Review Committee.

The next official function was the Southern Society Annual Meeting, a truly grand "Mickey Mouse" affair held in Orlando this year. Education was the keynote theme, and I was pleased to be asked to present a plaque to Dr. G. David Huffman, Vice President of Academic Affairs at the University of Southern Mississippi, denoting the funding of a chair in Polymer Science by the Southern Society. This is the first chair funded by a local Society.

The Southwestern Paint Convention in Houston on March 30-31 and the Pacific Northwest Symposium on April 30-May 2 are also scheduled for attendance.

WILLIAM F. HOLMES,
President

PRESIDENT-ELECT PENNY

Since assuming office in November, I have visited with three Societies: Baltimore in November at their Awards Night; January, together with Bob Ziegler, visited the Los Angeles Society; and in April, together with Mike Bell, was a guest of the Northwestern Society in Minneapolis. The visit to Northwestern coincided with their Education Night and it was most rewarding as we met with about 40 students mostly from North Dakota State University (250 miles away).

On January 24-25, I attended meetings of the Finance Committee, CIEF, and the Executive Committee. It was gratifying that, after talking for several years about a Memorial Fund, that endeavor has been rewarded.

In March, I attended the Board of Directors Meeting of NPCA. In conjunction with this meeting, a conference of NPCA and FSCT representatives was convened to review areas of cooperation between the two bodies.

The indications are that a new era of cooperative effort lies ahead which should be beneficial to both organizations in general and the coatings industry in particular.

In April, I attended the ASTM/EPA meeting on Lead Abatement, normally attended by a representative of the Technical Advisory Committee. This group is setting the standards for procedures and products associated with lead abatement.

COLIN D. PENNY,
President-Elect

SECRETARY-TREASURER LANNING

Since assuming my new office in November 1991, the following functions were attended:

New York Society Meeting—East Rutherford, NY, November 12, 1991. This was my first opportunity to address a Constituent Society on Quality Improvement in the paint industry and the training aides available through the Federation to make this possible.

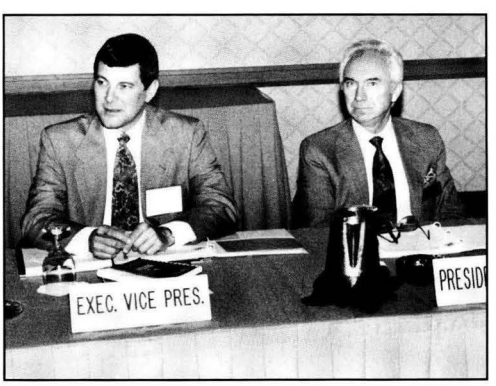
St. Louis Society Meeting—November 19, 1991. Executive Vice President Bob Ziegler and myself spent an enjoyable evening with the St. Louis Executive Committee and membership at the Salad Bowl Restaurant. Federation programs and slides showing the new headquarters were reviewed.

Professional Development Committee Meeting—Pittsburgh, January 14-15, 1992. This meeting was attended in an Ex Officio capacity with the other committee members.

The highlights of this meeting centered around Dr. Peter Hunt's proposal for a new series of seminars on TQM.

Accounts Review Committee—Blue Bell, PA, January 23, 1992. Met with Charles Schmidt and committee to review financial condition of the Federation and to review balance sheet and statement of accounts. The financial condition of the Federation is quite acceptable and looks stable for 1992.

Pittsburgh Society Meeting—Sharpsburg, PA, February 10, 1992. Patricia Viola and I represented the Federation. Both of us responded to questions about Federation activities. The Pittsburgh Society apparently has a strong interest in becoming more involved on Federation committees.



FSCT Executive Vice President Robert F. Ziegler and President-Elect Colin D. Penny (Baltimore)

To this point, my activities have brought me to the realization that the FSCT operates in an extremely professional and systematic manner.

JOHN A. LANNING,
Secretary-Treasurer

EXECUTIVE VICE PRESIDENT ZIEGLER

The Federation, in 1991, continued its tradition of service to its Constituent Societies and their membership with an increasing amount of programs, publications, and committee activities. The mission of the Federation, as a member-service organization, is to provide the tools and resources necessary for the professional development of the individual. The following reports indicate that the Federation is fulfilling its mission while continuing to be in excellent financial condition.

1992 FINANCIAL STATEMENT

The final, audited report of revenue and expenses for 1991 showed total revenue of $2,691,321, and expenses of $2,654,151, both reasonably within the budget set at $2,654,000. The statement has been forwarded to all Board Members.

1992 BUDGET AND FIRST QUARTER 1992 STATEMENT

The Finance and Executive Committees have approved the 1992 operating budget, balanced at $2,765,000, allocated as follows:

Income: Publications—27.7%; Membership Dues—1.7%; Annual Meeting and Paint Show—63.8%; Educational Activities—2.4%; and Miscellaneous—4.4%.

Expense: Federation Office/Administration—35.9%; Publications—26.3%; Annual Meeting and Paint Show—19.2%; Officers/Board/Committees—6.8%; Educational Activities—8.4%; and Miscellaneous—3.4%.

Of note, is an increase over 1991's budget of almost two percent in the funding allocated for educational activities. This increase reflects the Federation's goals in providing for additional educational programs for industry and membership.

The First Quarter 1992 Statement shows an increase of revenue over expenses of $1,283,753 (vs. 1,001,057, in 1991, and 1,043,723, in 1990).

PUBLICATIONS

JCT—Total pages published in 1991 were 1,140, compared with 1,206 in 1990. The decrease is directly related to the continuing downturn in advertising, which is being felt in both trade and commercial publications. However, editorially, the *JCT* continues to be the premier technical publication in the coatings industry. In addition to featuring top-notch technical articles, special issues devoted to "Coatings Education" (February) and "Critical Pigment Volume Concentration" (March) were very well received.

We wish to acknowledge the fine work of the Publications Committee and Editorial Review Board and Dr. Thomas J. Miranda, who recently retired from his position as Chairman of the groups. Taking over this responsibility is Dr. Robert F. Brady, Jr., of the U.S. Naval Research Laboratory (Baltimore Society). We welcome Bob as an integral part of our continuing efforts to improve the effectiveness of the *JCT* and other publications.

Year Book—The 1992 Membership Directory has a new look. Produced entirely in-house by staff, the Year Book's new format is both pleasant to look at and easier to read. Although the computer programming (and debugging) to produce the publication resulted in delayed mailing to the membership, the experience gained this year will afford an increase in efficiency and lower costs in the future.

Maureen Lein (New England) and Richard Himics (New York)

Series Booklets—Three new booklets in the *Federation Series on Coatings Technology* were published during 1991: "Cationic Radiation Curing," by Joseph V. Koleske, "Rheology," by Clifford K. Schoff, and "Powder Coatings," by Josef H. Jilek, for a total of 19 units to the Series. The 20th addition to the Series, "Introduction to Pigments," by Juergen H. Braun, of Du Pont, will be published shortly. Approximately 13 additional booklets are in various stages of completion. In addition to these, previously published monographs include: "Introduction to Coatings Technology"; "Solvents"; "Coil Coatings"; "Corrosion Protection by Coatings"; "Mechanical Properties of Coatings"; "Automotive Coatings"; "Coating Film Defects"; "Application of Paints and Coatings"; "Organic Pigments"; "Inorganic Primer Pigments"; "Marine Coatings"; "Sealants and Caulks"; and, "Aerospace and Aircraft Coatings."

Other—Initial sales of the new *Infrared Spectroscopy Atlas for the Coatings Industry* have been encouraging . . . The desktop publishing system continued its expansion with the publication of the *Year Book*. With total savings over outside typesetting costs approaching $100,000 to date for the *JCT* alone, staff is investigating upgrading the system to increase efficiency and production and to limit dependence on outside suppliers.

MEMBERSHIP

Total membership stands at 7,349 (vs. 7,392 in 1991). A breakdown by categories shows: Active—4,533; Associate—2,211; and Other (Honorary, Educator/Student, Retired)—605. The lack of

James Geiger (Southern) and Joseph Giusto (Baltimore)

significant reduction in overall membership reflects the success of the membership retention and recruitment program instituted by the FSCT Membership Services Committee (Brenda Carr, Chairperson), and we sincerely thank the committee and the Society Membership Chairmen for their efforts. Outstanding increases in membership by the Detroit (10%), Philadelphia (11%), and Mexico (38%) Societies will be acknowledged in Boston (Spring Week) with Certificates of Appreciation being presented to their respective Representatives.

To better inform prospective members of FSCT benefits and activities, staff and the committee have developed a promotional folder which is available in quantity to Societies for use in their recruitment efforts.

The results of a recent survey of Society Membership Chairmen is being studied to determine what, if any, proposals should be made to the Board regarding updating membership categories and streamlining election procedures.

Annual Meeting and Paint Show

The 1991 Annual Meeting and Paint Show were very successful. The attendance of 7,812 was the fourth highest, while exhibit space, limited by the confines of the Toronto Convention Centre, was fully reserved at 81,240 net sq. ft., with 266 exhibiting companies represented. The technical programming, on the theme, "The International Coatings Environment: Today's Opportunity, Tomorrow's Challenge," was well-attended with standing room only available in some sessions. We thank Program Committee Chairman Gerry Parsons and his committee, as well as the Toronto Society (Larry Ham, Host Committee Chairman) for their excellent work in making the 1991 AM&PS a success.

Plans are well underway for the 1992 Annual Meeting, to be held October 21-23 in Chicago. The Chicago Society's Host Committee, under the Chairmanship of Ted Fuhs, has met several times and is working with staff in developing its program. Meanwhile, Program Chairman John Lanning (Louisville Society) and his committee are finalizing the listing of speakers and presentations on the theme "New Directions for a Changing World."

Exhibitor response to the Paint Show is very encouraging. With almost six months to go, 262 supplier companies have reserved 89,900 net sq. ft. of space, making the 1992 Paint Show the largest in FSCT history. Booth space has been increased to accommodate additional exhibitors.

The Federation headquarters hotel, the Chicago Hilton and Towers, is one of seven hotels selected to accommodate attendees. The others are: Hyatt Regency, McCormick Center Hotel, Palmer House, Executive Plaza, Essex Inn, and Stouffer Riviere. Shuttle bus service will be provided between the hotels and McCormick Place. Hotel and advance registration information will be forwarded to all members in May.

Gerry Gough (Birmingham) and Lloyd Reindl (CDIC)

Spring Week

The ninth annual FSCT Spring Week meetings will be held May 17-20 at the Sheraton Boston Hotel, in Boston, MA. The seminar program, "Understanding Corrosion Protection (How Rusty Are We?)" was developed by the FSCT Corrosion Committee (Jay Austin, Chairman) and will be held May 19-20.

Preceding the seminar will be the Board of Directors Meeting, May 17, and the Incoming Society Officers Meeting, on May 18. The Federation will introduce a new format for the Society Officers in Boston. Featured will be a series of table topics on a variety of themes relevant to the operation and conduct of Constituent Societies. Monitoring the discussions will be staff and FSCT Officers.

We are very pleased to note that the New England Society will sponsor a tour of the city ("In Search of the Paint Stone") on Sunday, May 17, and we sincerely thank the Society for its involvement. We also appreciate the generosity of the Eastman Chemical Co., for sponsoring the Board of Directors Reception on Saturday evening, and BYK-Chemie USA and BYK-Gardner, Inc., for their sponsorship of the Society Officers Reception on Sunday.

Committee Liaison

Staff continues to closely support the activities of the Federation's many committees, including the Corrosion, Educational and Educational Coordinating, Manufacturing, Annual Meeting Program, Professional Development, and Technical Advisory Committees. Detailed reports of these and other committee activities may be found in the report of the Director of Educational Services and in the individual reports of the committee chairmen.

NPCA Cooperative Liaison

On approval by the Executive Committee at its January 24, 1992 meeting, representatives of the FSCT (Joseph Giusto, Richard Hille, Colin Penny, and Robert Ziegler) met with members and staff of the National Paint & Coatings Association to discuss areas in which there may be an opportunity for mutual support and cooperation. The meeting, held March 4, in Tucson, explored the backgrounds and programs of the two organizations and a consensus was reached that the groups continue to explore possible areas of cooperation. A subsequent meeting (Messrs. Hille, Ziegler, NPCA President Biff Mautz, and Executive Director Andrew Doyle) on April 8 developed agenda topics for a meeting of the full committee, scheduled for May 27. Initial indications are that there are areas in which the FSCT and NPCA can cooperate for the betterment of their respective memberships and the industry. All findings and proposals will be made to the FSCT and the NPCA Executive Committees for consideration and recommendations to their Board of Directors.

Officer/Staff Visits

Since the Fall 1991 report, visits have been made to the monthly or Executive Committee meetings of the New York, St. Louis, Los Angeles, Toronto Societies and the Birmingham Club. The Federation was also represented at the Southwestern Paint Convention, in Houston; the conference and exposition of the Oil & Colour Chemists' Association, in Harrogate, England; and the National Decorating Products Association Convention, in Chicago.

Staff

On January 31, 1992, Thomas A. Kocis, Director of Field Services, retired from the FSCT staff. We wish Tom well in his retirement and thank him for his excellent efforts. We also thank the current staff for their good work and support. They are: Michael Bell, Director of Educational Services; Charles Schmidt, Controller; Patricia Viola, Director of Publications; Victoria Graves, Director of Meetings and Conventions; Samuel Amicone, Associate Editor; Kathleen Wikiera, Assistant Editor; Lorraine Ledford, Advertising

Services; Audrey Boozer, Subscription Fulfillment; Linda Madden, DTP Operator; Dorothy Kwiatkowski, Mary Sorbello, and Lisa Torrens, Secretaries; Meryl Cohen, Order Dept.; and Marie Wikiera, Receptionist.

ROBERT F. ZIEGLER,
Executive Vice President

DIRECTOR OF EDUCATIONAL SERVICES BELL

Committee Liaison

EDUCATIONAL COORDINATING COMMITTEE

The Educational Coordinating Committee (ECC) has met twice since the November 1991 Board of Directors meeting, on Tuesday, December 3, 1992 in Cleveland, OH, and on Saturday, March 14, 1992 in Orlando, FL.

The major undertakings of the committee include the following:

Committee Reorganization: The committee reorganized its structure (approved at the November 1991 Board of Directors meeting) and has been working to ensure adherence. It is working closely with the Coatings Industry Education Fund (CIEF) to guarantee a smooth transition of the University Scholarship Program and is also planning to interact closer with other FSCT committees to further the cause of education.

Scholarships: The ECC recommended to the FSCT Executive Committee the following schools for scholarship funds for 1992-93. They are: Eastern Michigan University; Kent State University; University of Southern Mississippi; California Polytechnic University at San Luis Obispo; University of Missouri—Rolla; and North Dakota State University. In 1992, this activity will be transferred to the CIEF Board of Trustees.

Test Drilling Projects: The ECC has been working on two "Test Drilling" projects. Both ideas were developed as a result of brainstorming activities at the June 1991 meeting of the full Educational Committee (the Coordinating Committee and the Educational Committee Chairs of the 26 Constituent Societies). The two projects are: (1) General Coatings Awareness Package—This project is being investigated by the full committee with the hope that a champion will come forward to turn the idea into a reality. The committee has an outline of the project at this time. (2) Monthly Meetings Program Package—A subcommittee has been appointed and is collecting data to formulate a plan for ECC review. To date, a survey has been conducted by the subcommittee and additional information will be gathered at both the FSCT Society Officers Meeting and the full Educational Committee meeting in late May. The subcommittee has also developed a timeline to complete the project.

A. L. Hendry Award: The ECC has received three manuscripts for the 1992 competition. In 1991, two papers were submitted. The committee is also reviewing the guidelines of the award with the Southern Society and hopes to enhance the program to encourage more participation.

Full Educational Committee Meeting: The meeting of the full Educational Committee is scheduled for Friday, May 30, 1992 at the Airport Marriott Hotel in Pittsburgh, PA.

Other Activities: The ECC is beginning to work with the NPCA to identify the future personnel needs of the coatings industry going into the 21st Century. This is a vital first step to any activity to promote careers in the industry to high school students. The committee recently completed work on the annual "Guide to Coatings Courses" which appeared in the February issue of the JOURNAL OF COATINGS TECHNOLOGY.

James Hoeck (Louisville) and Arturo Ita (Mexico)

TECHNICAL ADVISORY COMMITTEE

The Technical Advisory Committee (TAC) has held two meetings since November 1991. The committee met on Friday, March 13, 1992 in Orlando, FL, and on Tuesday, April 28, 1992 in Washington, DC. The TAC has been active with several projects, including:

Joint Coatings/Forest Products Committee—The Joint Coatings/Forest Products Committee last met in Madison, WI, on Monday, March 23, 1992. Items discussed at the meeting included the publishing of an article entitled, "Moisture Control in Residential and Commercial Buildings," in the March issue of *American Painting Contractor*. The *APC* will also be publishing additional papers prepared by the committee in the coming months.

The committee is also developing additional papers on the following subjects: low VOC finishes; mildew resistance; and surface preparation and refinishing.

The committee is also seeking input on the needs of the coatings industry regarding the potential new papers. Several topics under consideration include: mediation of lead paint; water repellency; UV protection; sealers; effects of moisture content; mill-glaze; and life-cycle analysis of coated wood products.

The committee is also contributing information for the 1993 Spring Week Seminar, being organized by the Professional Development Committee.

John Delmonico (Rocky Mountain) and Terry Gelhot (St. Louis)

Richard Hille (Chicago) and Fred Schwab (Cleveland)

Collaborative Reference Program: The TAC serves as the Federation contact for this program. In 1991, over 50 companies participated in the activity. The committee is working to make the program more appealing to companies, by evaluating the test offerings and recommending additional tests.

Adoptive Society Program: This program was implemented in 1991 to provide each of the Constituent Societies with a committee contact. The idea has been well received and the TAC plans to continue the program. The purpose of the program is to provide committee assistance in the form of an advisor to each Society. The ultimate goal is to encourage interaction between the various Societies served by the advisor.

ASTM/NIBS Lead Abatement Project: The committee serves as the Federation's representative to this activity, run jointly by the American Society for Testing and Materials and the National Institute of Building Sciences. This group is evaluating various methods of lead abatement from existing structures.

Meeting with Society Technical Chairs: The committee will meet with the Constituent Society Technical Chairs on September 24-25, 1992. This meeting will include reports on the status of Society Technical projects and group discussions on a variety of topics related to developing technical projects. A plant tour is also planned. The site for this meeting has yet to be determined.

PROFESSIONAL DEVELOPMENT COMMITTEE—The Professional Development Committee met on January 14-15, 1992 in Pittsburgh, PA. Projects of the committee include the following:

FSCT Quality Management Series: The committee will sponsor four courses this year, including: "How to Implement Total Quality Management and Secure ISO 9000 Series Certification"—June 8-10, 1992, Philadelphia, PA; "Gauge/Measurement Process Assessment and Improvement"—June 11-12, 1992, Philadelphia; "Statistical Process Control and Its Application in the Coatings Industry" (SPC Level I)—September 14-15, 1992, Atlanta, GA; and "Practical Application of Intermediate Statistics in a Total Quality Management System" (SPC II)—September 16-18, 1992, Atlanta.

The instructor for the four courses will again be Dr. Peter Hunt, President of Productivity Management Consultants, Clearwater, FL.

Spring Week—1993: The PDC is producing the technical seminar for Spring Week 1993, scheduled for Houston, TX on May 18-19. The theme of the seminar is "Substrates and Application Methods" and the committee is working with several substrate related organizations to ensure the presentation of the most up-to-date information on the topic.

Good Tests/Bad Testing Video: The video, "Good Tests/Bad Testing" has been seen by numerous Societies since it was produced in April 1991. A short survey has been sent with the video, to learn more about the viewers. The following are some of the results: Production Value (Quality)—89.9% Excellent or Good; Video Message—92.9% Excellent or Good; Agree with Message—89.9% Totally or Somewhat Agreed with video's message; Medium to receive Coatings information—43.3% Magazines/Newsletters, 24.9% Conferences/Seminars, and 22.3% Video Tapes. This information will assist the committee when planning future activities for the Federation.

Annual Meeting Symposium: The committee will again sponsor a symposium at the 1992 Annual Meeting in Chicago. The theme of this year's symposium is "Advanced Topics." The session will be held on Wednesday afternoon, October 21.

CORROSION COMMITTEE

The Corrosion Committee has met twice since the Annual Meeting, on Thursday, December 5, 1991 in Chicago, IL, and on Thursday, March 5, 1992, in Philadelphia, PA. The committee is currently involved in the following activities:

Spring Week—1992: The committee has developed the technical seminar for the 1992 Spring Week. The seminar will be held on Tuesday and Wednesday, May 19-20. The theme of the seminar is "Understanding Corrosion Protection: (How Rusty Are We?)" and the two-day event will have three sessions: Tuesday morning—Corrosion Basics; Tuesday afternoon—Testing, and Wednesday—General Formulation/Technology.

Corrosion Committee Publication Award: The committee annually honors the best corrosion-related paper which appears in the *JCT*. The committee will announce the winner during the 1992 Annual Meeting and Paint Show.

Annual Meeting Symposium: The committee will sponsor a symposium at the 1992 Annual Meeting entitled, "Formulation Factors for the Design of Corrosion-Resistant Direct-to-Metal (DTM) Coatings." The session will be held on Thursday afternoon, October 22.

Potential Activities: The committee will be meeting this summer to discuss several potential activities, including: an international conference on corrosion; and a corrosion newsletter.

MANUFACTURING COMMITTEE

The Manufacturing Committee met on November 6, 1991, during the Annual Meeting in Toronto, at which time it toured the ICI Paints plant in Vaughan, Ontario. It met again on February 24-25,

Timothy Donlin (Golden Gate) and Arthur McDermott (Houston)

1992 in Houston, TX, and toured the Devoe and Raynolds and the Monarch Paint plants, both in Houston. The committee is working on the following projects.

Manufacturing Digest: The committee developed a timeline and assigned tasks in order to complete the project. The committee hopes to have outlines and authors for the project and will begin the process of tying the project together at its meeting in Chicago, during the Annual Meeting.

Annual Meeting Seminar: The committee will conduct a seminar at the 1992 Annual Meeting. The theme is "Employee Involvement—Overcoming the Obstacles to Empowerment."

Golden Impeller Award: The committee has selected its nominee for the 1992 Golden Impeller Award, to be presented at the Annual Meeting by Morehouse Industries.

Evaluation of Committee Structure: The committee reviewed its role within the Federation and determined a need to serve the Constituent Societies. The committee will be evaluating several structures in order to devote more time to the needs of the members. This process should be completed in the next year.

Annual Meeting Program Committee

The Annual Meeting Program Committee met on Tuesday, December 10, 1991, in Detroit, MI, to plan the 1992 event. The theme of this year's program is, "New Directions for a Changing World." The following sessions are among those tentatively scheduled for the program: "Merging/Emerging Technologies"; "Formulation Factors for the Design of Corrosion-Resistant Direct-to-Metal (DTM) Coatings"; "Advanced Topics"; "Waste Minimization", and "Employee Involvement—Overcoming the Obstacles to Empowerment."

The committee has received over 20 abstracts as a result of the Call for Papers it issued and plans to have at least two sessions of these papers.

The 1992 event will also feature a Poster Session, designed to encourage individuals working on research projects to display their progress or results. There will be cash awards for the top three posters in the session. The Poster Session will be held on Thursday, October 22, 1992.

Miscellaneous

Taping of Mattiello Lecture—Arrangements are being made to tape the 1991 Mattiello Lecture, delivered by Loren Hill of Monsanto and entitled, "Structure/Property Relationships of Thermoset Coatings."

List of Talks Available—Currently working on the copy of the 1992-93 publication, which gives each Constituent Society a list of potential speakers for monthly meetings. The 1991-92 publication included the names of over 100 speakers.

Committee Guidelines—Working on a Committee Guidelines sheet for each FSCT committee utilizing information from the By-Laws and Standing Rules. This data will be helpful when recruiting new committee participants, since it will give them a thumbnail sketch of the committee. This sheet will include, but not be limited to, information such as: who appoints committee members; what, if any, is the length of term; how many meetings does the committee hold; and what is the purpose of the committee. This project should be completed by late summer.

Roon and AP&CJ/Voss Awards—Providing liaison to both of these awards, which are presented at the Annual Meeting.

Society Visits—Attended the following Constituent Society Meetings since the Annual Meeting: Tuesday, November 12—New York Society; Thursday, November 21—New England Society; and Tuesday, April 7—Northwestern Society.

Michael G. Bell,
Director of Educational Services

Annual Report on Statement of Income and Expense for Year Ending December 31, 1991

The following Statement of Income and Expense for the year ending December 31, 1991 was reviewed in depth by Executive Vice President Ziegler and Controller Schmidt and approved by the Board of Directors at its meeting of May 17, 1992.

It is presented here in accordance with the Articles of Incorporation under the laws of the Commonwealth of Pennsylvania.

BALANCE SHEET

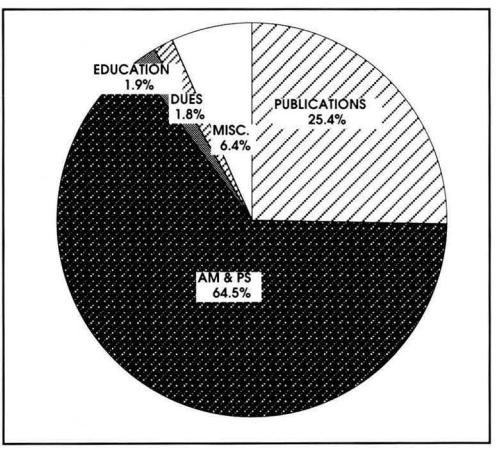
December 31, 1991
Final-Audited

	YTD 1990	YTD 1991
Assets		
Current		
Cash	159,166	25,156
Investments-Mellon Money Market	121,122	27,482
Hendry Southern Soc. Award	25,542	25,951
Accounts Rec.—Trade	91,630	137,708
Accounts Rec.—OCCA	—	—
Inv-Dictionary (12/31)	19,682	18,169
Inv-Infrared Books (12/31)	15,228	118,816
Prepaid Expense	52,361	43,053
Prepaid Expense—Life Ins. Premium	—	6,339
Prepaid Pension Expense	—	68,242
Total Current Assets	484,731	470,916
Non-Current		
Investments-Mellon Bank	1,458,596	1,460,372
Investments-Vanguard MM	124,646	332,200
Land	287,478	287,478
Building Net of Depreciation	1,203,036	1,253,509
Furniture & Equipment, at Cost, Net of Accum. Depreciation	114,447	102,249
Computer Equipment	124,847	149,434
Res for Deprec.—Computer Equip.	<73,264>	<92,856>
Exhibit Equip.—FSCT Booth	30,000	30,000
Res. for Deprec.—FSCT Booth	<30,000>	<30,000>
Total Non-Current Assets	3,239,786	3,492,386
Other Assets		
Advances & Deposits	5,030	6,862
Value—Deferred Compensation	132,027	141,706
	137,057	148,568
Total Assets	3,861,574	4,111,870
Liabilities and Fund Balance		
Current		
Accts Pay.—Trade	77,894	57,252
Accts Pay.—OCCA	3,485	3,510
Accts Pay.—Hendry Award	30,608	31,473
Accrued Payroll	—	12,985
Accrued and Withheld Taxes	—	5,494
Mortgage Payable	100,000	100,000
Sales Tax Payable	—	31
Deferred Income	357,148	531,357
Total Current Liabilities	569,135	742,102
Non-Current		
Deferred Income	6,994	8,319
Deferred Compensation Liability	85,333	93,333
Pension Liability	—	—
Mortgage Payable	441,667	441,667

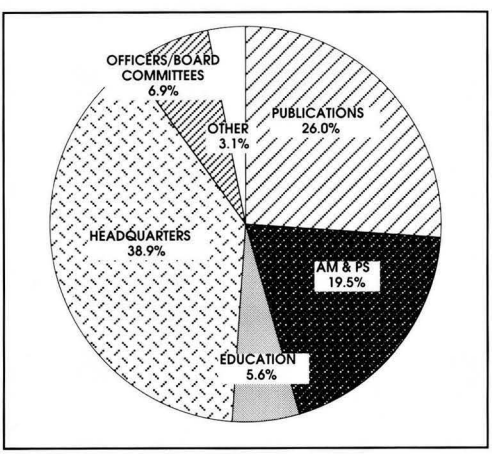
Total Non-Current Liabilities	533,994	543,319
Total Liabilities	1,103,129	1,285,421
Fund Balance	2,758,445	2,826,449
Total Liabilities and Fund Balance	3,861,574	4,111,870

Statement of Income and Expense

Income	1990	1991
Publications	741,283	684,097
Membership Dues	47,506	47,454
Annual Meeting & Paint Show	1,649,919	1,736,669
Other Educational Activities	100,296	49,646
Misc. (incl. investment interest)	154,188	173,455
Total Income	2,693,192	2,691,321



1991 FSCT Income as Percentages



1991 FSCT Expense as Percentages

Expense		
Headquarters/Office		
Staff Administration	931,935	1,031,842
Publications	596,498	689,555
Annual Meeting & Paint Show	541,149	518,491
Officers/Board & Exec. Comm.	195,267	183,685
Educational Activities	175,483	149,002
Miscellaneous	35,516	81,576
Total Expenses	2,475,848	2,654,151

(signed) William F. Holmes, FSCT President
(signed) John A. Lanning, FSCT Secretary-Treasurer

(On a motion by Mr. Van Zelm, seconded by Mr. Donlin, the 1992 Statement of Income and Expense was approved as reported.

Messrs. Ziegler and Schmidt presented a review of the 1992 Operating Budget as approved by the Finance and Executive Committees at their meetings of January 24, 1992, showing a balance set at $2,765,000. On a motion by Mr. Hoeck, seconded by Mr. Alvin, the 1992 Operating Budget was approved.)

Coatings Industry Education Fund

The Trustees of the CIEF met on Tuesday, November 5, 1991 at the Toronto Sheraton Centre, and again on Thursday, January 23, 1992 at the FSCT Headquarters in Blue Bell.

The Joseph A. Vasta Memorial Scholarship Fund—The Vasta Scholarship Fund, which has received gifts (as of December 31, 1991) of $44,583, is in excellent shape, and already beginning to acquire a degree of recognition normally reserved for older, more established scholarships. The 1991 scholarship was awarded to Eastern Michigan University, and will go to Kent State University in 1992. Thanks to changes made in the reporting method, it is now quite easy to determine the total amount of contributions, interest, and expenses involved with the administration of this important scholarship fund.

Establishment of the "Coatings Industry Remembrance Fund"—The Trustees, acting upon a proposal from Colin Penny, voted to establish a new fund—with the working title of "Coatings Industry Remembrance Fund (CIRF)"—which is intended to provide an opportunity for individuals, corporations, and coatings societies and associations to honor those individuals in the coatings community, both living and dead, who have contributed to the advancement of their industry. Gifts in any amount will be recognized annually in the JOURNAL OF COATINGS TECHNOLOGY, and will be divided into several categories, reflecting the level of giving. (Two gifts, totalling $1,100, have already been received). All gifts to the CIRF will be tax deductible to the extent that the law allows, and may be made as a direct gift to the Fund, as a gift in honor of a living person, or as a gift in remembrance of one who is deceased. Examples: The Acme Corporation; The Acme Corporation, in honor of Margaret Q. Browning; or Mr. and Mrs. Pierre Lundquist, in remembrance of John Z. Edwardson.

The principal of this fund will be established in perpetuity, and—when the income from the fund is sufficient—the CIEF Trustees will use the earnings for educational assistance in the form of scholarships, grants, and fellowships at colleges and universities with coatings programs. This is a bold new venture which will enable every individual, corporation, and society associated with the coatings industry to really "make a difference," by helping to

further the educational efforts of the CIEF, and also by recognizing specific individual's contributions to our industry. The establishment of this Fund was reported at the January 24th meeting of the FSCT Executive Committee, which passed a unanimous resolution of support. Details will be finalized at the May 18th Trustees meeting, followed by an announcement in *JCT* (see July 1992, *JCT*, page 7), and letters to the Presidents of the Constituent Societies.

Establishment of CIEF Fellowship at NDSU—The Trustees voted to establish a Graduate Fellowship in Coatings, in the Department of Polymers and Coatings at North Dakota State University, in the amount of $12,500. It will cover the academic year 1992-93, will be designated "The CIEF Fellowship in Coatings Science," and will carry the option for annual renewal—such renewal to be dependent upon satisfactory reports to the CIEF Trustees, detailing the achievements and usefulness of the Fellowship. The Fellowship is to be strongly identified with the CIEF, and will be used in NDSU's recruiting literature, as well as in other articles and publicity where its inclusion would make sense, so that the CIEF Fellowship—and the support that it implies—will be highly visible. It will also be mentioned whenever the person holding the Fellowship is an author or co-author of a technical paper or presentation—for example, "Hubert P. Bellows, CIEF Graduate Fellow in Coatings Science."

Equipment Grant to EMU—The Trustees authorized a one-time, $10,000 grant to Eastern Michigan University for the purchase of coatings-related equipment, to be installed in the new Coatings Laboratory in Sill Hall. This grant requires that EMU match the CIEF funds on a 1:0.5 matching basis, that is, EMU will also provide $5,000 in matching funds for equipment purchase. The new laboratory will be used primarily for polymer synthesis and characterization and—insofar as it is possible to do so—the Trustees have requested that the CIEF funds be used for purchase of those pieces of equipment which would be specifically identified with polymers and/or coatings. EMU will also acknowledge the CIEF role in equipping this laboratory by installing a plaque on the entrance, reading:

POLYMERS AND COATINGS LABORATORY
Equipped, in Part, With a
Generous Gift
from the
COATINGS INDUSTRY EDUCATION FUND

Renewal of Waterloo Scholarship Fund—Based on a thorough and detailed report (from Professor Alfred Rudin) regarding the excellent use of the 1991 CIEF Grant by the Institute for Polymer Research at the University of Waterloo, the Trustees voted to renew the $6,000 Scholarship Grant for academic year 1992-93. This renewal reflects the CIEF's continuing faith in the past, current, and future importance of the Waterloo program, and its impact on both the Canadian and U.S. coatings industries.

Pending Requests for Funding—The Trustees have received requests for funding from the following two institutions: California Polytechnic State University at San Luis Obispo—$60,000 for equipment and/or personnel. This was tabled at both the November 5th and January 23rd meetings, and—unless some type of response to the CIEF President's letter and telephone conversations with Cal Poly has been received by the May 18th Trustees Meeting—this program may be dropped from consideration; and North Dakota State University—an unspecified grant toward the purchase of new equipment to update and expand their coatings laboratory. Both of these requests will be taken under consideration at the May 18th meeting of the Trustees.

Administrative Changes in CIEF—Due to recent changes in the focus of the Federation's overall educational efforts, the CIEF has basically emerged as the "funding arm" for these efforts. This involves certain changes in the by-laws and objectives, which are currently being investigated, and which will hopefully be approved at the Trustees meeting on May 18th. *(Proposed revisions to the By-Laws appear in this issue on page 16.)* This is an exciting concept, and one which the Trustees feel will give a very clear focus—and renewed vigor—to the educational efforts of both the FSCT and the CIEF. To best serve the overall goals of this new concept, the Trustees have approved a motion that all future Trustees should be appointed "at large," with the only automatic appointment being the Secretary-Treasurer of the Federation, who will function in the same capacity on the board of the CIEF. In order to stagger the terms of office, the Trustees will ask incoming FSCT President Colin Penny to appoint, at the 1992 Annual Meeting, two Trustees to serve a three-year term, one Trustee to serve a two-year term, and one Trustee to serve a one-year term. Recommendations will be forwarded to Mr. Penny following the May 18th Trustees meeting.

CIEF "Rules and Regulations" Published in FSCT Guide to Coatings Courses—So that as much information as possible is available to the coatings community, regarding the goals and objectives of the CIEF—as well as the criteria and deadlines required for requests—an article was submitted to Mike Bell for inclusion in the "FSCT Guide to Coatings Courses, Symposia and Seminars," which appeared in the February 1992 issue of the JOURNAL OF COATINGS TECHNOLOGY.

GEORGE R PILCHER,
President

Norman A. Hon (Kansas City) and Jan P. Van Zelm (Los Angeles)

Dan Dixon (Southern) and Arthur Hagopian (Toronto)

Forrest Fleming (Piedmont) and William Spangenberg (Pittsburgh)

Review of Actions of Executive Committee

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

The actions of the Executive Committee of November 6, 1991 and January 24, 1992 were included with the minutes mailed previously to the Board Members. The actions of May 16, 1992 were distributed at the meeting).

NOVEMBER 6, 1991

That the budget for staff salaries for 1992 be increased four per cent.

(On a motion by Mr. Geiger, seconded by Mr. Hon, the actions of the Executive Committee of November 6, 1991 were unanimously approved.)

JANUARY 24, 1992

That the Federation support the action of the Coatings Industry Education Fund to establish a CIEF-sponsored "Coatings Industry Remembrance Fund," and that the FSCT publicize and promote donations through the JOURNAL OF COATINGS TECHNOLOGY.

That, in order to control expenses, members travelling on reimbursible fares to Federation meetings utilize the Federation's Travel Desk, serviced by UNIGLOBE Wings Travel.

That the Pittsburgh Society proposal to institute a "Fellow" classification of Federation Membership be respectfully declined.

That assistance in funding the Cleveland Society's corrosion study be made through the FSCT Corrosion Committee, which will monitor the study and make recommendations for future funding.

That President and Mrs. Holmes represent the Federation at the June 15-19, 1992 FATIPEC Congress, in Amsterdam.

That the Executive Vice President represent the Federation at the March 17-18 Conference and Exhibition of the Oil & Colour Chemists' Association, in Harrogate, England.

That the 1992-93 President and spouse, Colin and June Penny, represent the Federation at the November 4-6, 1992 International Conference on Colour and Materials of the Japan Society of Colour Materials, in Osaka, Japan.

That the Federation Controller attend Spring Board of Directors Meetings to discuss year-end financial statements and current year budgets.

That the 1992 Annual Meeting Program Committee proposal to include a Poster Session be approved.

That the Professional Development Committee proposal for the 1992 Statistical Process Control Seminar schedule and registration fees be approved.

That the request by Eastern Michigan University for FSCT support of its High School Chemistry Teacher Workshop be approved with a $1,000 grant, and that matching funds be provided for any monies donated by the Detroit Society.

That *JCT* classified advertising be made available to unemployed Federation Members at no cost.

(On a motion by Mr. Kraus, seconded by Ms. Lein, the actions of the Executive Committee of January 24, 1992 were unanimously approved.)

MAY 16, 1992

That the First Quarter 1992 Financial Statement be approved, showing Income at $1,817,006, and Expense at $533,253.

That the proposal by Elsevier Publishing Company to purchase the JOURNAL OF COATINGS TECHNOLOGY be respectfully declined.

That the Federation Membership Services Committee comment or make recommendations for By-Laws revisions with regards to the results of its survey of Society Membership Chairpersons.

That the 1994 Spring Week meeting be held in Minneapolis, MN, on May 11-15.

That members of the National Association of Printing Ink Manufacturers attending that organization's meeting in Chicago October 18-21, be given reduced registration fees of $25 for one-day attendance at the 1992 Paint Industries' Show.

(On a motion by Mr. McDermott, seconded by Mr. Passeno, the actions of the Executive Committee of May 16, 1992 were unanimously approved.)

Nominations

The Nominating Committee proposes the following slate of candidates for positions on the 1992-1993 Federation Board of Directors:

President-Elect—John A. Lanning (Louisville Society), Courtaulds Coatings, Inc., Porter Paint Division (One-year term).

Secretary-Treasurer—Joseph P. Walton (Cleveland Society), Jamestown Paint & Varnish Co. (One-year term).

Mexico Society Representative Arturo Ita, Membership Committee Member Joanne Monique, Philadelphia Society Representative Wayne Kraus, Detroit Society Representative William Passeno, and FSCT Director of Membership Services Victoria Graves

Executive Committee—Larry Brandenburger (Northwestern Society), The Valspar Corp. (Three-year term).

Board Members-At-Large—Darlene Brezinski (Chicago Society), Consolidated Research (Two-year term); Peter A. Hiscocks (Toronto Society), Ashland Chemicals (Two-year term).

(Board of Directors Past-President Member)—John C. Ballard (Louisville Society), Burgess Pigment Co. (Two-year term).

I thank the members of the Nominating Committee (Past-Presidents John Ballard and Carlos Dorris, and Society Representatives Richard Hille and Maureen Lein) for their assistance.

KURT F. WEITZ,
Chairman

(There were no nominations from the floor. Elections will take place during the October 20, 1992 Board Meeting, in Chicago, IL.)

Society Business

AWARDS TO SOCIETY MEMBERSHIP CHAIRPERSONS

FSCT Membership Committee member, Joanne Monique, announced that awards of appreciation for exemplary membership increases during the year 1991-92 were won by the Membership Chairpersons of Detroit, Philadelphia, and Mexico Societies. The Detroit Society (Jane Allen, Chair) increased its membership by 10%, Philadelphia (A. Marshall Jones, III, Chair) by 11%, and the Mexico Society (Isabel Martinez, Chair) by 38%, within their respective size categories. Honorable Mentions went to Chicago (7%) and New England (7%) Societies. Ms. Monique congratulated these Societies and presented Certificates of Appreciation to the Detroit, Philadelphia, and Mexico Representatives attending the meeting.

(President Holmes individually polled the Board Members for comments. The highlights follow:)

BIRMINGHAM

Mr. Gough reported on the Club's project to institute an exhibit of a small turn-of-the-century paint manufacturing/retail store at the Ironbridge Gorge Museum, near Birmingham. The museum, which has a number of industrial-related exhibits is noted for its authenticity in reproducing the era of the industrial revolution. The paint exhibit has gained the support of British coatings organizations. Scheduled for opening by spring 1993, the exhibit is envisaged as a one-story structure of approximately 750 sq. ft. Mr. Gough noted that the cost of the project is $40,000 (U.S.) with most of the funding coming from local industry. He requested that the Federation donate a grant of $8,000 toward the project.

(Following discussion of the proposal, Mr. Pawsey moved that the proposal be referred to the Executive Committee for consideration. Seconded by Mr. Geiger and unanimously approved. Subsequently, at its meeting following the Board Meeting, the Executive Committee gave its unanimous approval of the $8,000 grant.)

CHICAGO

Mr. Hille related that the Society Technical Committee's project on development of a CD-ROM data base of raw material MSDSs is progressing and that a prototype may be available for display at the 1992 Paint Show.

DALLAS

Mr. Alvin advised that the 50th Southwestern Paint Convention will be held at the Four Seasons Hotel, in Dallas, on March 16-18, 1993.

LOS ANGELES

Mr. Van Zelm noted that the 1993 West Coast Symposium and Show will be held March 23-25 at the Disneyland Hotel, in Anaheim. He also suggested that Societies monitor the news and counteract adverse publicity with letters to the editor, articles, etc., to local news media.

NEW ENGLAND

Ms. Lein thanked the Federation for choosing Boston for the current meetings and noted that the Society was sponsoring a tour of the city that day for accompanying persons. She also reported that the Society will be sponsoring a symposium in May 1993.

NORTHWESTERN

Mr. Brandenburger thanked the Federation and Board of Directors for selecting Minneapolis as the site of the 1994 Spring Week events, and extended a welcome for all to visit the city.

PACIFIC NORTHWEST

Mr. Shackelford noted that the Society's manufacturing newsletter "Pacific Nortwest Paintmaking" (published in the *JCT*) was in need of articles and requested that articles, especially on TQM relating to manufacturing personnel, be forwarded to Valerie Braun, of the PNW Society.

PHILADELPHIA

Mr. Kraus reported that the Society's Technical Committee project on developing a software data base for raw materials is in progress, with a section on "resins" expected to be completed completed by August 1992.

PIEDMONT

Mr. Fleming reported that the Society is publishing a Technical Committee newsletter for its membership and is planning to sponsor a March 1993 mini-trade show. The Society also sponsors student scholarships and a summer student intern program.

Gerald Ivancie (Western New York) and FSCT Past-President Deryk R. Pawsey (Pacific Northwest)

PITTSBURGH

Mr. Spangenberg reported that the Society was actively pursuing educational programs in schools, mini-symposiums, career awareness days, with particular attention given to junior achievement and minority programs.

New Business

Student Annual Meeting Registration—Mr. Hagopian moved that full-time students be allowed to register on-site at the FSCT Annual Meeting at a rate of $10. *(Seconded by Mr. Passeno, and unanimously approved.)*

Year Book Roster Deadlines—Mr. Dixon reported that the Southern Society has experienced difficulty in renewing a significant portion of its membership within the time allowed prior to the deadline for submission of the Society's roster to Federation Headquarters. The Society believes that the current deadline of November 15 does not allow sufficient time due to the unique organizational structure of the Society, which has five sections which meet separately. Mr. Ziegler noted that the majority of Societies do not experience a problem and that a change of policy to delay the receipt of rosters would significantly delay the publication of the Membership Directory. Following discussion, mutual agreement was reached between staff and the Southern Society in which the Society's most complete roster would be submitted by November 15 with late renewals being forwarded by December 31; late renewals being those received after November 15.

FSCT/NPCA Joint Meeting—Mr. Hille reported on the progress of meetings with members of the National Paint and Coatings Association on exploring areas of possible cooperation. Mr. Hille, Co-Chairman of the committee, discussed the purpose of the group, saying that areas, such as committee activity, annual programming, communications, etc., will be examined to see if cooperative efforts would be advantageous to the organizations and the industry. Although several Board Members expressed concern over this topic, Mr. Hille gave assurances that the best interests of the FSCT would be followed.

Old Business

Society Representative Reimbursement to Fall Board Meeting—Mr. Alvin noted that the topic of reimbursement of transportation expenses to the fall Board of Directors Meeting was discussed several years ago, with the result being that such expenses are not reimbursable. The Dallas Society requested that the background information regarding this decision be forwarded to the Society.

Committee Reports

ANNUAL MEETING HOST

The following individuals comprise the 1992 Host Committee: Chairman—Theodore J. Fuhs, Tru-Test Manufacturing; Registration Area—Patricia J. McGrath, Ashland Chemical; FSCT Hospitality Suite—Thomas P. Yates, United Coatings; Information Services—Natu C. Patel, Ace Hardware Paint Division; FSCT Exhibit—Victor M. Willis, Ace Hardware Paint Division; Program Operations—Karl E. Schmidt, Premier Coatings; and Spouses' Program—Cynthia K. Fuhs.

Subcommittee responsibilities have been revised and each subcommittee chairman has started to recruit their staff members. The Spouse's Subcommittee has started soliciting for "goody" bag promotional items and other appropriate donations. Suggestions for the Spouse's Tour include the Chicago Art Institute and the Shedd Aquarium. All Host Committee members will be distinguished by wearing white fedoras with red identification bands.

THEODORE J. FUHS,
Chairman

ANNUAL MEETING PROGRAM

On November 4, 1991, the 1992 Annual Meeting Program Committee held its first meeting in Toronto. Strong participation by the membership led to consensus that "New Directions" should be the focus for the 1992 Program. Merging and Emerging Technologies were suggested as key ingredients in the program.

At the second meeting held in Detroit on December 10, 1991, the committee quickly established the theme "New Directions for a Changing World." New Directions would include adopting merging and emerging technologies to drive innovation, developing environmentally friendly products and processes, and embracing total quality systems to effectively complete in a global market.

The committee will develop several sessions dealing with the theme to assume that it will be adequately addressed in the programming. The following topics and responsibilities were assigned: Merging Technologies Session—Rose Ryntz and Dale Cheever; Poster Session—Cliff Schoff; and a session on Quality Improvement—Roger Woodhull to coordinate through the Professional Development Committee.

The committee has received 22 abstracts for possible inclusion in the program. These prospective presenters have been asked to submit papers to the committee by May 15, 1992. Each committee member will assist in reviewing the papers.

Other FSCT Committees are involved in putting together half-day sessions for the 1992 program. The Corrosion Committee is planning a session entitled "Formulation Factors for the Design of Corrosion-Resistant Direct-to-Metal (DTM) Coatings." The Manufacturing Committee is planning a session on "Employee Involvement—Overcoming the Obstacles to Empowerment."

For the remaining sessions, we expect to have a number of Society and Roon Papers. The program is expected to be in place by July 1, 1992. The committee is enthusiastic to be able to present programming which addresses the issues of our changing world.

JOHN A. LANNING,
Chairman

CORROSION

The Corrosion Committee's efforts have been focused in several major areas over the last six months. Our primary focus has been the corrosion conference planned as the technical program for this year's Spring Week. The conference planning is complete and the committee is looking forward to a successful program.

Another main area of focus has been the 1992 Annual Meeting Program. The theme of this year's corrosion session will be "Formulation Factors for the Design of Corrosion-Resistant Direct-to-Metal (DTM) Coatings." The committee plans to meet again on June 23 to finalize the Annual Meeting Program.

Additionally, at the request of the Executive Committee, the Corrosion Committee has taken over the responsibility of monitoring the Cleveland Society's project on corrosion testing. Since the requested funding will be coming from the Corrosion Committee's budget, we have taken the following actions:

(1) Appointed a committee member to participate and monitor the project at the local Society level.

(2) Requested that the Cleveland Society submit a budget, proof of expenditures, and semi-annual progress reports to the Corrosion Committee.

M. JAY AUSTIN,
Chairman

EDUCATIONAL

Since our last report to the Board, we have been implementing the formal changes adopted at last fall's Board Meeting forming the Educational Coordinating Committee. This committee has met twice (in Cleveland, OH, on December 3, 1991, and in Orlando, FL, on March 14, 1992) and has defined its membership, and is defining its role in a broader, more proactive Federation policy towards education.

In addition, we have been monitoring and supporting the work of our "test drilling" subcommittees as they work to implement our strategy. The Federation and its Executive Committee have shown great foresight in adopting a policy which allows the educational efforts to be well defined *before* their execution. It is truly an exciting time for us, as the pieces of the Federation educational policy come into place.

Educational Coordinating Committee: Composition and Duties: This committee, its composition and duties, was formed by last year's Board actions. In creating the Coordinating Committee, terms of office and other prerequisites were stated. As three-year terms were specified in our organization, we adopted the following roster and end of initial terms:

Carl Knauss, Cleveland	1992
John Oates, New York	1992
Sid Lauren, New England	1993
Paul Baukema, Louisville	1993
Gerry Mattson, Southern	1994
Melinda Rutledge, Los Angeles	1994

The duties of this committee include overseeing and coordinating Federation educational policy, actively listening to the constituent Societies, and sponsoring meaningful projects to meet identified needs. This committee will no longer recommend scholarship funding to the Executive Committee, as that job will now pass to the Coatings Industry Education Fund (CIEF). We will continue to administer the Southern Society Alfred L. Hendry Award. We will be listening and organizing programs and projects which will help the individual Societies to better fulfill their educational programs.

Educational Project "Test Drilling": Two of the six project areas which had been identified at the last meeting of the full Educational Committee (on June 11, 1992, in Baltimore, MD) have been singled out for attention. Focus topics were Society meeting programs and development of general awareness/educational materials concerning the paint industry.

The first is concerned with finding ways to improve monthly meetings of the Constituent Societies. With John Oates and Carl Knauss as champions/organizers, this subcommittee has developed an action plan which includes gathering of information from the incoming Society Officers at Spring Week in Boston, MA, on May 16, 1992, and further feedback to the full Educational Committee meeting in Pittsburgh, PA, May 29, 1992. Brainstorming from the subcommittee itself and input from last years' full Educational Committee meeting will give a broad spectrum of potential aids. The process of developing a program will then be undertaken.

Project definition has been more difficult for the second committee, working to put together a set of materials to be used for general community education about the paint industry. We are looking to revitalize its mission by recruiting additional interested members at the upcoming meeting of the full Educational Committee.

Larry Brandenburger (Northwestern) and William Shackelford (Pacific Northwest)

Scholarship Funding—1993-94: In order to provide continuity in our university scholarship program, the Educational Coordinating Committee recommended programs at the following schools to the Executive Committee for funding: California Polytechnique Institute at San Luis Obispo; Eastern Michigan University; Kent State University; University of Missouri-Rolla; North Dakota State University; and University of Southern Mississippi

Administration of the Federation undergraduate programs will now pass to the CIEF, as it undertakes its role as our interface with colleges and universities.

Hendry Award: We have received one and have two other proposals for Hendry Award papers so far this year. We have undertaken to change the orientation for this award towards undergraduate or beginning chemist papers, rather than full blown research papers. It is our hope to use the Hendry Award as a tool to interest young scientists in a career in the coatings industry.

NPCA Interaction: Survey to Define Technical Manpower Needs: A response from the NPCA to our letter suggesting a joint effort to survey industry leadership to better understand future manpower needs in the coatings industry has been received. We are currently in contact with the NPCA Management Information Committee. They will be helping us to find the appropriate way of questioning their membership as to technical manpower needs in our industry in the future.

Videotaping of the Mattiello Memorial Lecture: The Educational Coordinating Committee, in addition to the Professional Development Committee (PDC), has identified video presentations as a meaningful opportunity for technical communication and education. We and PDC recommended that the 1991 Mattiello Memorial Lecture be considered for videotaping. The Executive Committee requested that the Technical Advisory Committee consider the presentation and give their opinion, which was favorable. Loren Hill's excellent presentation will be taped in the near future.

Annual Meeting of the Full Educational Committee: The Coordinating Committee has scheduled a meeting of the full Educational Committee, comprised of each Constituent Society's Educational Chairman or a representative, for May 29, 1992, in Pittsburgh, PA. We will use this opportunity to report on the progress of our test drilling work focused on Society meeting programs. We will also revisit the short list of identified educational issues raised last year. We will be looking for additional input and commitment as we move programs to address these issues forward. We hope your Society Representative plans to attend. We feel that we are addressing the needs of our Societies in education and we need input and energy.

Bruce Alvin (Dallas) and William Passeno (Detroit)

It is an interesting and exciting time for educational programming in our Federation. Methods for focusing on meaningful projects in education and communication are underway. The Federation attitude towards education is becoming much more proactive. We of the Educational Coordinating Committee and the full Educational Committee are looking forward to these expanded opportunities.

DONALD W. BOYD,
Chairman

ENVIRONMENTAL AFFAIRS

The Environmental Affairs Committee (nine members plus the chairman) continues to edit the legislative and regulatory update information we receive from the National Paint & Coatings Association. We had planned to present a program on "Waste Minimization" at the Annual Meeting in October but received only two abstracts. Unless other abstracts of talks are received, the program will be cancelled.

SIDNEY J. RUBIN,
Chairman

MEMBERSHIP SERVICES

The FSCT Membership Services Committee met on Monday, November 4, 1991.

Committee members in attendance included: Brenda L. Carr, Chair, Cleveland Society; Joanne E. Monique, New England Society; and Kevin Pelling, Toronto Society. Also in attendance was Victoria Graves, Director of Membership Services, FSCT.

Topics of dscussions include the following:

—Sometimes confusing titles for membership categories (specifically active and associate memberships). Some members think active means "active" and associate means "inactive."

—Shortening the method of election to membership: The Southern and Northwestern Societies specifically requested that the Membership Services Committee review the method of election to membership.

The current method is as follows: "An applicant for Active Membership must be proposed by a Voting Member and be endorsed by another Voting Member. If the application is approved by the Constituent Society Membership Committee, it shall be submitted to the membership of the Constituent Society for first reading at a regular meeting of the Society, subject to election vote at a regular meeting of the Society not earlier than the meeting subsequent to that of the first reading. At the discretion of the Constituent Society Membership Committee, the Society Secretary may submit to the Society membership written notice of the pending application, in lieu of first reading. Such notice shall be mailed not less than 10 days prior to the regular meeting designated for voting upon the subject application. Election to membership shall be by a two-thirds favorable vote of the Voting Membership present and voting at a regular Society meeting. If the applicant is elected to Society membership, both copies of the application, bearing the Constituent Society Secretary's certification of election, shall be forwarded to the Executive Vice President of the Federation. He will sign the original and return it to the Society."

An applicant for Associate, Educator/Student, and Retired membership are processed in a similar manner.

There were two suggestions for shortening the lengthy process: (1) The omission of the first reading or written notice requirement. This would shorten the process by as much as one month in some cases or a minimum of 10 days in others; and (2) The elimination of the voting process altogether. This would allow the Membership Chairman to approve an application and immediately submit it to the Federation Office for approval and inclusion to the *JCT* subscription list.

Benefits of Membership Brochure: The weight of the brochure is cost prohibitive when used in mailings. It should either be printed on lighter weight paper or a simplified brochure should be designed for mailings.

Membership of Employment Search Personnel: These people are usually excluded from membership; however, there is no statement in the Constitution and By-laws about their exclusion. It was the committee's feeling that the Board should consider such a statement if this exclusion is of their directive, thereby giving the Membership Chairman support.

Required "Endorsed By" and "Proposed By" Signatures on Applications: It was the feeling of the committee that these required signatures are handled rather casually. If Membership Chairpersons continue to require these signatures, then meaning should be attached to them. If there is no longer real meaning to them, they should be eliminated.

Membership Packets: These packets contain several brochures and flyers, rather impressively showing the benefits of membership in FSCT. They have attracted a lot of attention from several Societies and committee chairs. They should be an excellent demonstration tool for membership drives, especially when targeting companies who have not been particularly supportive.

Members from Academia: Some discussion was spent on how to increase the number of members from academia. No real suggestions were brought forth at this time.

After further discussion in January 1992, it was the decision of the committee to prepare a survey for Society Membership Chairmen. This survey would include the questions brought up at the November meeting. The survey was mailed March 1, 1992. The results of this survey will be reported at the May 17, 1992 Board of Directors Meeting.

Membership information was once again sent to all non-member attendees at the FSCT Annual Meeting and Paint Industries' Show as part of the annual membership drive. It looks to be another successful year.

BRENDA L. CARR,
Chairman

PROFESSIONAL DEVELOPMENT

The Professional Development Committee (PDC) submits this report of its 1991-92 activities to date to the Federation Board of Directors:

Quality Management Series—The PDC offerings in Statistical Process Control will be broadened in 1992 to include a three-day

course entitled, "How to Implement Total Quality Management and Secure ISO-9000 Series Certification," and a two-day course titled "Gauge/Measurement Process Assessment and Improvement." These will be offered in Philadelphia, PA, on June 8-12, 1992. The traditional SPC offering, including SPC Level I and SPC Level II, will be presented in Atlanta, GA, on September 14-18, 1992. The expansion of offerings caused the PDC to change the overall seminar title to the Federation Quality Management Series, to present a unified theme for these different programs, and to tie in possible future offerings of a broader perspective. Dr. Peter Hunt , of Productivity Management Consultants, will be speaking at the 1992 Annual Meeting Program session on Quality, to be presented on October 21, and will be able to make reference to future seminars in the series, providing publicity for quality management series offerings to be made in 1993. The committee recognizes its role to give individuals the tools to perform their jobs and to develop skills for the future.

PDC Symposium at the 1992 Annual Meeting—The PDC will again sponsor "Advanced Topics in Coatings Research," the symposium on "cutting edge technology" at the 1992 Annual Meeting. Committee members Peter Hiscocks and Fred Schwab are preparing the program, which will be presented on October 21. A new Area of Interest Survey Card will be developed for the Annual Meeting Session, updating the format and offering several subheadings under "New Technologies."

Spring Week 1993 Seminar—The PDC will offer a seminar entitled, "Influence of Substrates and Application Methods on Architectural Coatings Performance," at the 1993 Spring Week in Houston, TX. The two-day seminar will focus virtually on all substrates of concern to architectural coatings. Two sessions will explore the effects of application tools and methods on coatings performance, incorporating "hands-on" demonstrations by manufacturers. The Joint Coatings/Forest Products Committee will sponsor the sessions dealing with wood and wood composites, and will provide speakers.

Membership Survey—The results of the 1990 Membership Survey have been published in the March 1992 issue of JOURNAL OF COATINGS TECHNOLOGY. The committee will begin planning for the next survey, tentatively scheduled for 1994, during the coming year, in order to develop scheduling deadlines to shorten turnaround time for publication.

ROGER W. WOODHULL,
Chairman

PUBLICATIONS COMMITTEE

Thomas J. Miranda retired as Technical Editor of the JOURNAL OF COATINGS TECHNOLOGY and as Chairman of the Publications Committee in February 1992. The undersigned assumed both of these roles at that time.

The *JCT* continues to receive many high-quality papers, and the supply of accepted papers is large. This provides the opportunity for the Editorial Advisory Board to be even more selective in the papers accepted for publication. The March issue of the *JCT* was a special issue on critical pigments volume concentration, and contained six papers selected by John C. Weaver.

Dr. Miranda continues to serve as Co-Editor of the *Federation Series on Coatings Technology*. Two titles were published in 1991, bringing the total of titles now available to 19.

The fourth edition of the respected *Infrared Spectroscopy Atlas for the Coatings Industry* was also released in 1991. The Infrared Working Committee and their editor, Darlene Brezinski, are to be praised for bringing this work to publication. This standard reference book now comprises two volumes containing more than 2500 spectra, each of which was recorded on high resolution Fourier Transform spectrophotometers.

The Publications Committee is scheduled to meet on June 25 in Arlington, VA. The Editorial Review Board customarily meets in alternate years, and no meeting is planned this year.

The chairman appreciates the magnificent support he has received in his new responsibilities from the Federation Staff. He also welcomes comments about the work of the committee from the Board of Director and others.

ROBERT F. BRADY, JR.,
Chairman

TECHNICAL ADVISORY

The Technical Advisory Committee (TAC) met with the Society Technical Chairpersons on October 3-4, 1991 in Montreal. All TAC members were in attendance. Seventeen Technical Society Chairs were in attendance. Guests included Federation President-Elect William Holmes, Tom Brown, Horace Philipp, and Bruce Bridges.

On October 3, the TAC received updates on several activities including:

Joint Coatings/Forest Products Committee—Steve Bussjaeger (Kansas City) reported that the monograph publishing project was on schedule with monographs to be published in the spring 1992 issues of the *American Painting Contractor*. In addition, a brochure compiled in conjunction with the National Forest Products Association entitled, "Finishing Exterior Wood Products," was displayed.

Corrosion Committee—Horace Philipp reported that the committee was preparing for its seminar for 1992 Spring Week in Boston.

In addition, the TAC reported on its activities which included:

Collaborative Testing Services (CTS)—The TAC subcommittee reported that it met with CTS to discuss new tests and procedures for testing for the upcoming CTS year. The subcommittee surveyed the Technical Chairs for further input on which tests should be included.

National Institute of Building Sciences—Edward Ferlauto reported that this program to develop national guide specifications for testing and abatement of lead-based coatings was stalled due to lack of government support. However, ASTM was meeting to discuss similar topics and suggested that the TAC attend those meetings.

Chairman Gail Pollano introduced the Adoptive Society Program. This program groups geographical Societies together and assigns a TAC member to a group. The objective is to facilitate the

Thad Broome (Southern) and Berger Justen (Southern)

flow of information from the Societies to the Federation and encourage joint Society work wherever possible.

William Holmes, Federation President-Elect, addressed the attendees. He discussed the focus of the Federation and urged the Societies to become involved in new activities and keep abreast of new technical advances and regulations. In addition, Mr. Holmes challenged the attendees to understand the needs of their Societies, and recruit new members. His motivational talk was well received.

During the Brainstorming Session, each group was asked to select a topic and to document the necessary steps to undertake the project. This was an exercise in project design. The results were excellent as the topics were actual considerations of some Societies.

On October 4, 1992, the group toured the KRONOS titanium dioxide facility in Varennes, Quebec. The KRONOS staff was outstanding and the tour received excellent reviews.

The TAC met again on March 13, 1992 in Orlando to discuss the next joint meeting. All but two TAC members were in attendance. Several tour sites were suggested and are being investigated. Discussions regarding the progress of CTS was tabled for a later meeting, however, it was reported that an additional test, Pencil Hardness, was incorporated into the CTS program.

Ed Ferlauto reported that the ASTM meeting regarding the testing and abatement of lead-based paints was informative and suggests that the Federation maintains its contact with ASTM regarding this matter. Mr. Ferlauto mentioned that legislation is currently before the Minnesota legislature regarding taxing all paint because of the lead problem. Mr. Ferlauto has contacted the Baltimore Society as they have some further information regarding independent testing for lead.

GAIL POLLANO,
Chairman

The next meeting of the FSCT Board of Directors will be held on October 20, 1992, during the FSCT Annual Meeting, at the Chicago Hilton Hotel

THIS PAPER WAS AWARDED FIRST PRIZE
IN THE 1991 ROON AWARDS COMPETITION

Latex Film Formation At the Molecular Level: The Effect Of Coalescing Aids on Polymer Diffusion

Mitchell A. Winnik and Yongcai Wang
University of Toronto*

Frank Haley
ICI Canada†

An energy transfer technique is described which allows one to use fluorescence decay measurements to follow the extent of polymer diffusion in annealed latex films. These are poly(butyl methacrylate) (PBMA) films prepared from latex dispersions containing a mixture of 100 nm PBMA particles labeled, respectively, with donor and acceptor fluorescent dyes. From the data analysis, diffusion coefficients for the polymer molecules can be calculated.

These diffusion coefficients are enhanced when the latex dispersions are pre-equilibrated with small amounts of organic solvents commonly used as coalescents. Their effect can be described quantitatively in terms of the Williams-Landel-Ferry (WLF) equation. Some coalescents (e.g., diethyleneglycol butyl ether) show deviations from simple WLF behavior. These deviations follow the behavior expected for solvent evaporation from the film by a Fickian diffusion process.

Energy transfer studies on the nascent films allow one to assess the extent of particle deformation and wetting, and are sensitive to the presence of voids on the 10-50Å scale between the deformed particles in the dried film.

INTRODUCTION

Over the past several years, concern for the environment has generated many instances where there is a need to turn from a more polluting technology to one that is more benign. Since these changes are driven by factors outside the technology, this can have the result that the new system has poorer performance characteristics than the technology being replaced. Under these circumstances, it becomes an important research objective to understand the origins of good performance, so that adequate or even improved performance can be achieved with a new technology that is safer to the environment.

One current example of this situation is the impact on coatings technology of stricter regulation of volatile organic compound (VOC) emissions. Because of these restrictions, the use of waterborne latex-based coatings is expanding into areas, such as automotive and industrial coatings, traditionally reserved for organic solvent-based systems. The industrial and automotive markets have resisted this change because the waterborne latex coatings are as yet unable to achieve the same high level of performance as the traditional solvent-based systems.

In solvent-based coatings, the polymer molecules are entangled and fully interpenetrating as they are applied to the surface. Solvent evaporation leaves a uniform film of low permeability. In latex coatings, the polymers are packaged in discrete (latex) particles which must coalesce during drying and subsequent aging to form a protective film. Such films are more permeable, especially to moisture, than corresponding solvent-based films[1]; these films provide poorer protection of the underlying substrate. There are many reasons for the differences in properties between the two types of coatings, but it is clear that the "quality of coalescence" of latex coatings has a dramatic effect on final film properties. This process of coalescence is one of the most important aspects of film formation of latex-based coatings. An understanding of the

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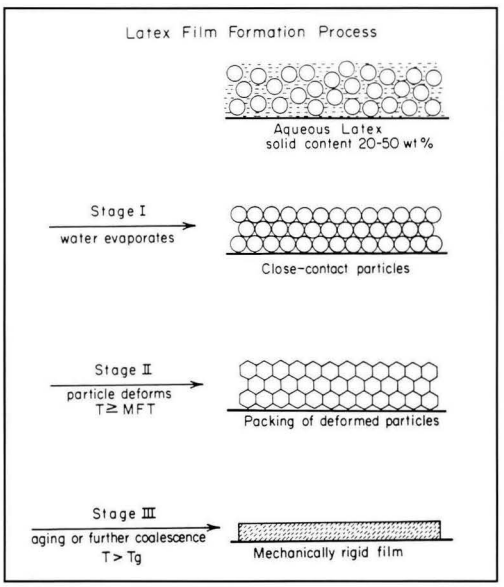


Figure 1—The various stages in the formation of a film during the drying of an aqueous dispersion of a soft latex

mechanism by which coalescence occurs is crucial for further advances in this area.

Latex paints, like all coatings, consist of binder, pigment, solvent, and additives.[2] Unlike organic solvent-based coatings, the majority of the solvent is water. However, these emulsion paints normally contain volatile organic liquids.[2] These additives have many functions. They serve as coupling solvents, rheology modifiers, freeze-thaw stabilizers, dispersing aids, wetting agents, and coalescing aids. While the origin of these various functions is not understood in any detail, there is a pressing need to develop a deeper understanding of their role in promoting coalescence during film formation. It is this role of the organic solvent additives which is to be examined in this paper.

Film Formation Process

When an aqueous dispersion of soft latex particles is coated onto a substrate, and the water is allowed to evaporate, a transparent void-free film is formed. This process can be divided into several steps[3,4] which are depicted in cartoon form in *Figure* 1. Once sufficient water has evaporated, the particles come into contact and begin to deform. Deformation is driven by a combination of surface and osmotic forces, and resisted by the elastic modulus of the latex.[3] For film formation to be successful, the film must be formed at or above the minimum film forming temperature (MFT). This is normally taken to be the minimum temperature at which the dry film is transparent and crack-free.[3,5,6]

One of the most interesting and pertinent features of latex films is the evolution of film properties long after most of the water has evaporated. The nascent film is normally very weak. Its mechanical properties such as tensile strength improve with time, often requiring days or weeks to reach the final film properties.[7,8] It is commonly believed that the enhancement of tensile strength is a consequence of polymer diffusion across the particle-particle interface in the film.[8]

Role of Coalescing Aids

The coalescent in a latex paint is added to improve the filming properties of the coating.[9] To the formulator, this means that the additive increases the ease of film formation and also promotes subsequent improvements in film properties. The most likely mode of action for the coalescent is as a plasticizer both for the latex particles and for the polymer film formed.[9-12] It lowers the MFT at which the dispersion will form a film upon drying.[12,13]

In bulk polymer samples, plasticizers lower the glass transition temperature (T_g).[14] Since the elastic modulus of a polymer decreases by several orders of magnitude as the temperature is raised above T_g, the effect of the plasticizer is to shift the entire log modulus curve to lower temperatures as is depicted in *Figure* 2.[14] Thus, the plasticizer promotes the ease of polymer deformation. In latex film formation, particle deformation occurs while the particles are still in contact with the aqueous medium. The appropriate modulus and T_g values for the deformation stage of film formation are those for the individual latex particles in the presence of water. These values are difficult to measure because they depend upon the amount of water in the particles, and they depend upon the partitioning of the coalescent between the aqueous and particle phases.[12]

The solubility of the coalescent in the latex compared to its solubility in water is also important from another point of view. On porous substrates, coalescents which have high-water solubility, will be lost to the film before they have a chance to be effective. Thus, Hoy[12] has

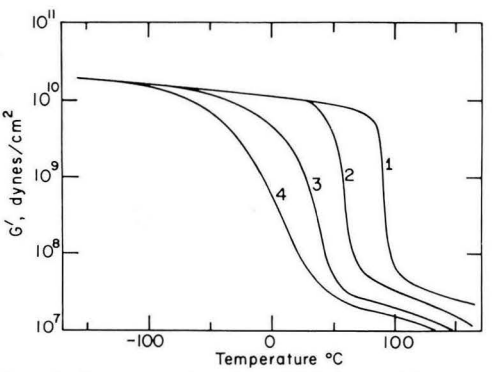


Figure 2—A representation of the shift in log modulus curve for a polymer sample containing increasing amounts of plasticizers. The data are taken from Ferry[14] and pertain to poly (vinyl chloride). The sample described by curve 1 contains no additive; curves 2, 3, and 4 indicate increasing plasticizer content

Table 1—Poly(butyl methacrylate) Latex Characteristics

Property	Sample	
	Phe-PBMA	An-PBMA
Diameter (nm)	135	116
Variance	6	12
M_w	6.3×10^5	5.5×10^5
M_w/M_n	2.5	3.2
Fluorophore content (monomer mol%)	1.1	1.0

emphasized that the plasticizing efficiency of these reagents depends upon the amount used, their distribution between the aqueous and polymer phase at the critical time during film formation, and the T_g of both polymer and coalescing aid.

Volatility is another important consideration.[15,16] The coalescent must serve as a fugitive plasticizer. To be effective, it must remain in the film for a certain period of time. If it evaporates too quickly, its effectiveness at long times will be reduced. If it evaporates too slowly, however, the film will remain soft, with a T_g too low for the intended application.

From a practical point of view, the application conditions place great demands on the formulating chemist's choice of coalescent. A prime example of this difficulty is in the area of house paints, where humidity and temperature extremes can be drastic. A fast evaporating solvent may give rise to poor flow and possibly film blushing (moisture condensation). On the other hand, a coalescent which remains in the film too long leads to lower hardness and decreased block resistance, as well as other defects associated with a film which is open for too long a time.

In order to overcome many of these problems and to learn how to optimize the performance of a wide variety of coatings formulations, one needs a deeper understanding of the coalescence process itself and of the effects of organic additives on this process. The essential feature that one needs to understand is the role of interparticle polymer diffusion once the water has evaporated and the nascent film has formed. Until recently, it was not possible to measure polymer diffusion during latex film formation. More recently, with the advent of neutron scattering[4,17,18] and nonradiative energy transfer[19-21] (fluorescence) studies of latex film formation, these kinds of measurements have become straightforward. They provide an essentially routine methodology for following polymer diffusion during latex film formation, and make it possible to investigate, for example, the effect of coalescents on polymer diffusion in nascent and aged latex films.

In this paper, we examine the influence of several organic liquids commonly used as coalescing aids on polymer diffusion in latex films. The solvents chosen for study include several glycol ethers and one aliphatic hydrocarbon ester. We employ a model system consisting of two separate batches of 100 nm poly(butyl methacrylate) (PBMA) latex dispersions, one labeled to a small extent (1 mol%) with phenanthrene groups (Phe, the energy donor), the other labeled (1 mol%) with anthracene groups (An, the energy acceptor).[19,20] Films prepared from a 1:1 mixture of these particles were subjected to fluorescence decay measurements of the extent of direct nonradiative energy transfer (DET) occurring within the films. From data obtained by these measurements, the extent of polymer diffusion and the polymer diffusion coefficients (D) were calculated. By repeating these measurements on dispersions pre-equilibrated with organic coalescents, the effect of these additives on polymer diffusion could be evaluated.

EXPERIMENTAL

Materials

Labeled PMBA latex samples were prepared by semicontinuous emulsion polymerization. Comonomers (9-phenanthryl)-methyl methacrylate and 9-anthryl methacrylate, respectively, were incorporated into the monomer feed to produce Phe- and An-labeled particles. Particle size and size distribution were determined by quasi-elastic light scattering using a Brookhaven BI-90 particle sizer. Molecular weights were determined by gel permeation chromatography in tetrahydrofuran (THF) on freeze-dried samples of the latex subsequently dissolved

Table 2—Coalescing Solvents and Some of Their Properties

Abbreviation	Solvent	M	T_g[a] (τ)	Evaporation Rate[b,c]	$10^4\alpha$[c,d]	K_p[a,e]
DM	Diethyleneglycol methyl ether	120.1	—[f]	0.02	8.8	>200
EB	Ethyleneglycol butyl ether	118.2	—	0.06	9.2	—
EB-Ac	Ethyleneglycol butyl ether acetate	160.2	−112°	0.03	10.4	0.054
DB	Diethyleneglycol butyl ether	162.2	—	0.003	8.5	—
DB-Ac	Diethyleneglycol butyl ether acetate	204.3	−100°	0.002	10.0	0.13
TPM	2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate (Texanol™)	216.3	−80°	0.002	10.0	0.050

(a) Data from Hoy, reference (12).
(b) Relative to n-butyl acetate = 1.0.
(c) Data from Eastman Solvent Selector Chart, Eastman Kodak Publication No. M-167P, November 1989.
(d) Thermal expansion coefficient, in per °C at 20°C.
(e) The partition coefficient $K_p = C_w/C_L$, where C_w is the solvent concentration in water at equilibrium and C_L is that in the latex. We have chosen data from Hoy[12] for partitioning between water and an all-acrylic latex.
(f) Note that for DE, $T_g = -103$°C and for DE-Ac, $T_g = -95$°C[a].

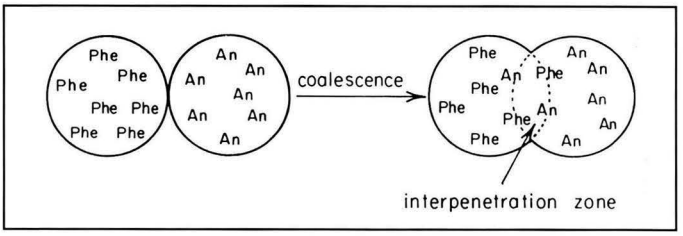


Figure 3—A cartoon depicting how the diffusion of polymers leads to mixing of donor (Phe) and acceptor (An) labeled polymers, which were detected by energy transfer measurements

in THF. The columns were calibrated with poly(methyl methacrylate) standards. The use of dual detectors (refractive index, fluorescence) ensured that all of the fluorescent dye present was covalently bound to the latex polymer. Chromophore content was determined by UV spectroscopy on THF solutions of the polymers. Latex characteristics are summarized in *Table* 1.

Sample Preparation

Weighed quantities of coalescent were added to measured volumes of the dispersion (37 wt% solids) and stirred gently for 48 hr at 22°C to foster equilibration of the system.

Films (ca. 30 to 50 μm thick) were prepared by placing a few drops of each mixture on quartz plates ca. 5 mm × 10 mm × 1 mm in size and allowing the water to evaporate. In some instances, the quartz plates were placed on a hot plate at temperatures between 25 to 36°C to raise the temperature at which water evaporation occurred. The plates were covered with an inverted petri dish to slow the evaporation rates, which took approximately 1 hr at 36°C. Fluorescence decay profiles were measured for these air dried samples. Following this, the quartz plates were placed on a solid aluminum shelf in a microprocessor-controlled forced-circulation oven preheated to 90°C. The oven was kept filled with nitrogen gas. From time-to-time, samples were removed, cooled to room temperature, placed inside quartz test tubes then sealed with a septum cap, and flushed briefly with argon gas. After the fluorescence decay measurements, the film samples were returned to the oven. The coalescing solvents used and some of their pertinent properties are listed in *Table* 2.

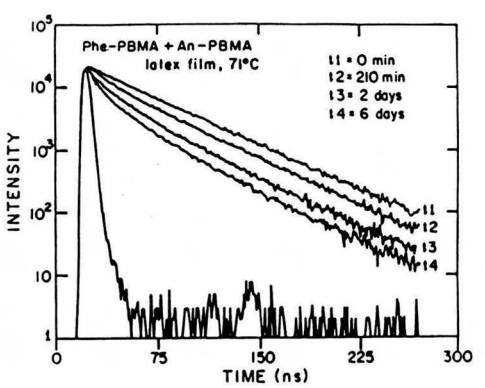


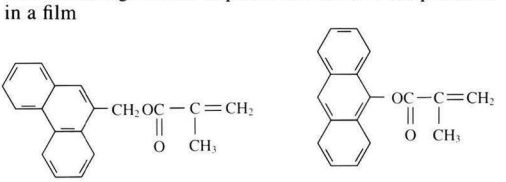
Figure 4—Fluorescence decay profiles of a latex film sample annealed for the times indicated at 71°C. The measurements were carried out at room temperature

Measurements

Fluorescence decays were measured by the single-photon timing technique.[22] The phenanthrene (donor) decay profiles [I_D (t)] were fitted to the models described in the text.

MEASURING POLYMER DIFFUSION

Measuring polymer diffusion during latex film formation requires labeled latex particles. The small angle neutron scattering method requires that some of the particles in a film



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be composed of deuterated polymer.[17,18] The DET method[19-21] requires a mixture of particles labeled with appropriate fluorescent groups, with a dye such as phenanthrene which can act as an energy donor, and the other with a dye such as anthracene which can act as an energy acceptor. The energy transfer process can be represented as the reaction

$$\text{Phe}^* + \text{An} \xrightarrow{k_{ET}} \text{Phe} + \text{An}^*$$

where Phe* is the excited phenanthryl group produced upon excitation with UV light at 300 nm, and k_{ET} is the rate coefficient for energy transfer. In our experiments, we used the polymerizable methacrylate derivatives 1 and 2 previously shown to prepare our labeled particles by emulsion polymerization.

The film formation process is depicted in *Figure* 1, and the molecular aspects of polymer diffusion across the particle-particle boundary are shown in cartoon form in *Figure* 3. As long as the Phe and An dyes are in separate particles, energy transfer can only occur across the particle interface. One of the interesting features of energy

transfer via the dipole-dipole (Förster) mechanism is that it can occur over distances which are large compared to the chromophore dimensions and small compared to the particle diameters. The characteristic distance (R_o) for each pair of chromophores is determined by their individual spectroscopic properties (oscillator strength, fluorescence quantum yield, fluorescence lifetime, and the overlap of the donor emission spectrum with the acceptor UV-vis absorption spectrum). Förster[23,24] established that k_{ET} varies as (R_o/r),[6] where r is the interchromophore distance. For the Phe-An combination employed here, R_o = 23Å.[20] There is also an orientation factor.[23,24] Taken together, these factors tell us that energy transfer is essentially instantaneous when r is much smaller than $R_o/2$, and immeasurably slow when $r > 2\ R_o$. Energy transfer between Phe and An is a kind of spectroscopic ruler for measuring mixing on a distance scale of 10 to 50Å.

We use the fluorescence decay method to measure the extent of energy transfer. According to *Figure* 3, after a certain amount of polymer interdiffusion, the system contains a "mixed" domain where energy transfer occurs, and "unmixed" domains containing only donor- or acceptor-labeled polymer. The fluorescence decay profile of the donor chromophore in this system can be described by the expression

$$I_D(t) = B_1 \exp\left(-\frac{t}{\tau_D} - p\left(\frac{t}{\tau_D}\right)^{1/2}\right) + B_2 \exp\left(-\frac{t}{\tau_D}\right) \quad (1)$$

The derivation of equation (1), and a full discussion of the assumptions made, are described in reference 20. In equation (1), the B_2 term describes the donor Phe decay in the unmixed domains and τ_D is the unquenched donor decay time. The B_1 term describes the extent of Förster energy transfer. The key simplifying assumption made in deriving equation (1) is that one can neglect the detailed shape of the concentration profile of Phe- and An-labeled polymers in the interdiffused region and treat the system as though there were a sharp separation of space into mixed and unmixed domains. In practice, this assumption is very effective and allows consistent and meaningful results to be obtained. Nevertheless, it represents a point to be examined in more detail in future work.

We are particularly interested in the volume fraction of mixing, f_m. This parameter is related to the extent of energy transfer, and we define the apparent fraction of mixing for a film annealed for a certain time t, $f_m'(t)$ as

$$f_m'(t) = \frac{B_1}{B_1 + B_2} \quad (2)$$

In nascent films, $f_m'(0)$ measures the extent of interfacial energy transfer across the particle boundaries, and $f_m'(\infty)$ measures the extent of energy transfer in fully intermixed films. The volume fraction of mixing for an annealed film is then given by the expression

$$f_m(t) = \frac{f_m'(t) - f_m'(0)}{f_m'(\infty) - f_m'(0)} \quad (3)$$

As a model for $f_m'(\infty)$, we use solvent casting to prepare film samples completely mixed at the molecular level. We freeze dry a sample of the mixture of Phe- and An-labeled latex, dissolve the polymers in ethyl acetate, and cast a film. In these solvent-cast films, values of $f_m'(\infty)$ in the range of 0.96 to 1.0 are obtained, which is what one would expect. For films prepared from 100 nm diameter latex, we find $f_m'(0)$ values of ca. 0.15. This turns out to be a very useful measure of particle deformation during film formation at temperatures close to the MFT. Incomplete particle deformation leads to smaller values of $f_m'(0)$ and provides Å scale sensitivity to the presence of voids between particles.

The fluorescence decay profiles from one set of film formation measurements is shown in *Figure* 4. There are two time scales to consider, the annealing time (hours) and the fluorescence decay time (nanoseconds). In the nascent film (top curve), the log I vs t plot is linear to the eye, and the $f_m'(0)$ value is small. This film sample was heated in an oven at 71°C. It was removed periodically, cooled to room temperature, and its fluorescence decay profile was measured. *Figure* 4 shows that with increased annealing, the fluorescence decay profiles become steeper at early times, indicating an increase in the extent of energy transfer. At long times (200 ns), the decays are essentially parallel. In this time domain, it is the fluorescence of Phe from the unmixed domains which makes the largest contribution to the signal.

This polymer diffusion rate is very sensitive to temperature, and at 22°C no significant polymer diffusion occurs in these films even on the time scale of months. Removing film samples from the oven is sufficient to cause polymer diffusion to cease, and the fluorescence decay profile provides a snapshot of the extent of mixing in the sample. *Figure* 4 emphasizes that we use a measurement on the time scale of nanoseconds to follow diffusion processes which occur on a time scale of hours to days.

A complete discussion of the errors, both random and parasitic, associated with the calculation of $f_m'(t)$ and $f_m(t)$ is given in reference 20. For repeated fluorescence decay measurements on a single polymer film, one standard deviation in $f_m'(0)$ is ± 0.01. Film-to-film variations can be as large as $\pm$ 0.02, and for annealed films the exact values of f_m determined depend sensitively on the thermal history of the sample.

COALESCENTS AND POLYMER DIFFUSION

In order to test the effect of coalescing solvents on the extent of polymer diffusion in latex films, we treated two samples of a PBMA latex dispersion (37 wt% solids) with different amounts of 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate [TPM, Texanol™ (Eastman Kodak)]. This substance was chosen because of its relatively low volatility and its strong tendency to partition into the latex phase. The dispersions were stirred for 48 hr at room temperature to allow the additive to equilibrate within the sytem, and films were cast onto quartz plates. Once dry (1 hr), the films were subjected to fluorescence decay measurements to determine $f_m'(0)$ and then were placed in an oven under nitrogen at 95°C. For comparison purposes, a film was prepared from the same latex dispersion with no TPM added. The results of these experiments are shown in *Figure* 5.

In these films, one observes significant polymer diffusion on the time scale of 30 min, which is much more

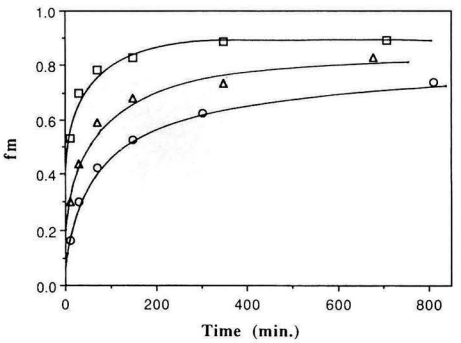

Figure 5—A plot of f_m vs time for films prepared from PBMA latex pre-equilibrated with TPM and annealed at 95°C. 0—no additive; Δ—3 wt% TPM; and □—6 wt% TPM

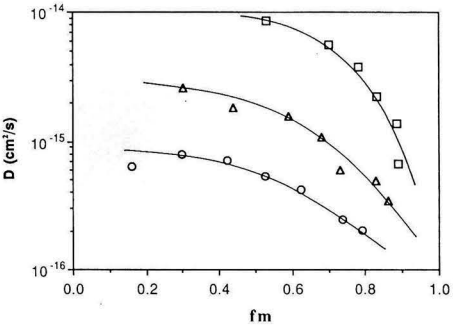

Figure 6—D values calculated from the data in *Figure* 4. PBMA films containing: 0—no additive; Δ—3 wt% TPM; and □—6 wt% TPM

pronounced in the presence of the additive (upper two curves in *Figure* 5) than in its absence. The amount of TPM added is 3 wt% (based upon latex solids) in the sample yielding the middle curve and 6 wt% in that giving the upper curve. These values correspond to 3.3 and 6.6 vol% of the additive.

The parameter of most interest and of greatest theoretical significance is the mean translational diffusion coefficient for the polymer chains in the latex. These diffusion coefficients can be obtained by fitting the f_m data to a diffusion model. Some choices must be made about the diffusion model to use. Here we assume that the molecular mixing satisfies Fick's laws of diffusion.[25] The choice of a Fickian diffusion model is discussed in detail in reference 20. In the nascent film, the particle interfaces are locally planar. As a consequence, one might employ a model for tracer diffusion across a plane. At longer times, the mass diffusion out of a particle will approach spherical symmetry. Here, a spherical diffusion model is more appropriate.[26] Fortunately, both models make identical predictions for diffusion over distances up to that of the particle radius[20] as long as one recognizes that, in the planar diffusion model, one still has independent diffusion in three dimensions, and that the diffusion coefficient is related to the mean-squared diffusion distance as $<1^2>/6$.

In the spherical model, the concentration C(r,t) at radius r and time t is given by

$$C(r,t) = \frac{C_0}{2}\left(\mathrm{erf}\left(\frac{R+r}{2\sqrt{Dt}}\right) + \mathrm{erf}\left(\frac{R-r}{2\sqrt{Dt}}\right)\right) - \frac{C_0}{r}\sqrt{\frac{Dt}{\pi}}\left(\exp\left(\frac{(R-r)^2}{4Dt}\right) - \exp\left(\frac{(R+r)^2}{4Dt}\right)\right) \quad (4)$$

M_t, the amount of substance which has diffused across the boundary at time t, can be calculated through equation (5) provided D is known:

$$M_t = M_\infty - \int_0^R C(r)4\pi r^2 dr \quad (5)$$

where $M_\infty = 4/3\pi R^3 C_0$. Experimentally, we determine f_m at different times t, set this value equal to M_t/M_∞, and carry out a numerical integration to find the best D value which satisfies equation (5).

In *Figure* 6 we plot D as a function of f_m for the three samples shown in *Figure* 5. One sees that diffusion coefficients in the range of 10^{-14} cm^2 s^{-1} to 10^{-16} cm^2 s^{-1} are readily determined by the DET method. The dynamic range is significantly larger, and D values from 10^{-12} cm^2 s^{-1} to 10^{-19} cm^2 s^{-1} can be determined. These correspond to rms diffusion distances ($<1^2>$) of 100Å/sec to 10Å/day.

A second feature is that the D values decrease with increasing time. The D values obtained from equations (4) and (5) are cumulative D values; the instantaneous values must decrease even further. A reasonable explanation for this change in D has its origin in the molecular weight dependence of D ($D \alpha M^{-2}$ for entangled chains), and the molecular weight polydispersity of the latex. In this case, the diffusion of the low molecular weight components dominates the interface healing process at early times. As time evolves, the diffusion of polymers of increasing molecular weight contributes to the measured enhancement in energy transfer.

The third feature is the influence of TPM on the polymer diffusion coefficients. At early times, 3.3 vol% TPM leads to a three-fold increase in D, and 6.6 vol% TPM leads to an order of magnitude increase in D. In *Figure* 7 we see that the diethylene glycol derivatives DB and DB-Ac also enhance polymer diffusion in annealed latex films. These two substances seem to lose their effectiveness long before mixing is complete. These differences in behavior are very interesting, and, as we will establish in a later section of this paper, are related to the more rapid evaporation of DB and DB-Ac from the films.

COALESCENTS AND PARTICLE DEFORMATION

One of the most prevalent methods to assess film formation from latex dispersions is the determination of the MFT. In this technique, one spreads a strip of the dispersion onto a thermal gradient bar and allows the film to dry. The MFT is defined to be the minimum temperature at which the film is clear and continuous. It is worthwhile

to distinguish the crack-point MFT, the temperature at which the film becomes continuous and free of cracks, from the somewhat lower temperature where one observes the disappearance of turbidity in the film. At the crack-point MFT, the film has achieved a certain extent of mechanical continuity due to interparticle adhesion, whereas turbidity indicates the presence of interparticle voids of a size large enough to scatter visible light.

The turbidity one observes in an MFT experiment is due to voids of several hundred Ångstroms in size between particles that have not undergone full deformation during water evaporation. Polymer diffusion across the particle boundary requires interface-interface contact ("wetting" in the physicist's language) on a much finer scale. To understand the early stages of adhesion between particles, particularly at times and temperatures where little polymer diffusion occurs, one needs to be able to detect the presence of much smaller voids, tens of Ångstroms in size, between the deformed particle surfaces.

Fluorescence decay analysis of films formed from labeled particles provides this kind of resolution. The full power of the technique for this specific purpose remains to be explored. Even at the simplest level of data interpretation, however, this technique provides new information on the role of coalescents at promoting particle adhesion at temperatures near the MFT.

In the analysis of polymer diffusion previously presented, the term $f_m'(0)$ was used to correct the amount of energy transfer observed in the nascent films. In our experience, films formed well above the MFT but at temperatures below 40°C, for 100 nm diameter PBMA particles, always gave $f_m'(0)$ values in the range of 0.14 to 0.17. We ascribe the energy transfer contribution to $f_m'(0)$ to interparticle energy transfer, that is, energy transfer across the newly formed interface in nascent films. For the Phe/An pair, DET can occur over distances up to 50 Å. We note that the fraction of the particle volume corresponding to a spherical shell R_o (26 Å) thick at the surface, is approximately 0.15. For such particles, pressed flat to form a continuous interface, we would

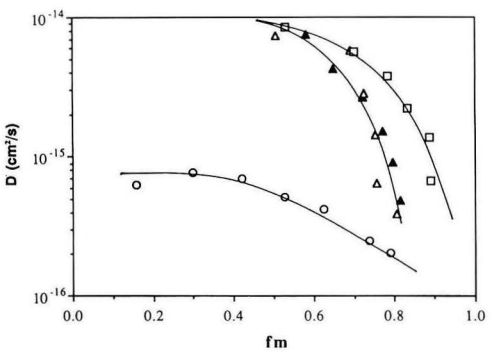

Figure 7—D values calculated from fluorescence decay studies of diffusion in PBMA latex films annealed at 95°C containing: 0—no additive; ▲—4.4 wt% DB; Δ—5.6 wt% DB-Ac; and □—6 wt% TPM

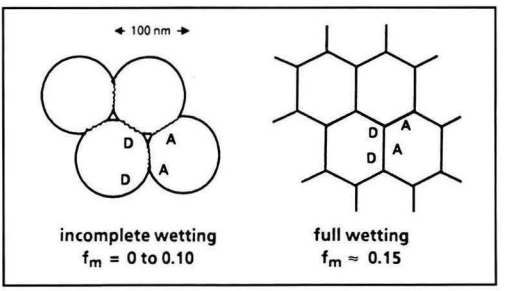

Figure 8—A cartoon indicating how voids between the latex particles can lead to a decrease in interparticle energy transfer

expect this same magnitude of interparticle energy transfer. This is a point that can be studied in more detail in the future, both by mathematical modeling and by examining the effect of particle size on $f_m'(0)$.

Small voids between the surfaces will suppress the extent of interparticle energy transfer at the interface. We depict this effect in *Figure* 8 and present supporting data in *Table* 3. For PBMA itself, film formation at 22°C leads to small values of $f_m'(0)$. These range from 0.03 to 0.07, and this span of values may be real or they may simply reflect current limitations in fitting curves showing only small deviations at early times from an exponential decay profile. The essential point is that in these films, which show some cloudiness to the eye, continuous interfaces have not fully developed.

When additives are present and films are formed at 22°C, the films are all transparent and $f_m'(0)$ values increase (*Figure* 9). Most of the additives we examined (e.g., DB, DB-Ac, EB-Ac, and TPM) yield nascent films with $f_m'(0)$ values close to 0.16. One exception is DM, where the film remains cloudy, and $f_m'(0)$ actually decreases. To the extent that this decrease is real, it suggests that the polar DM molecules reside at the interface and decrease the overall intimacy of particle-particle contact.

For films formed at 36°C, one obtains $f_m'(0)$ values close to 0.16 in all cases. These films were allowed to age for 90 hr at 36°C in order to establish whether there would be any significant polymer diffusion at this temperature. The data in *Table* 1 indicates that some polymer diffusion does occur. In comparison with that measured at 90°C,

Table 3—Values of f_m for Films Dried at 22°C and at 36°C, and for Films Dried and Aged at 36°C

		f_m		
		Drying Temperature		
Additive	Conc. g/100g	22°C	36°C	36°C (90 hr)
(PBMA)	0	0.07	0.16	0.18
DM	9.2	0.03	0.19	0.26
DB	8.1	0.17	0.16	0.31
DB-Ac	5.4	0.17	—	—
EB	8.1	—	0.14	0.26
EB-Ac	8.1	0.14	0.14	0.19
TPM	3.0	0.15	—	—
TPM	6.0	0.26	—	—

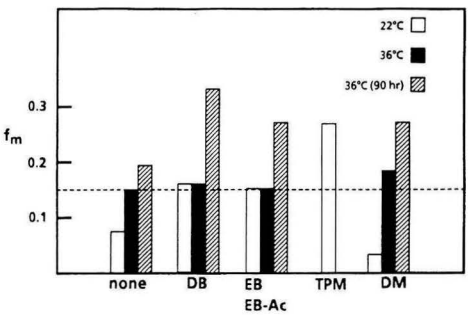

Figure 9—A bar graph indicating the influence of various coalescing aids on the intimacy of interface contact (wetting) and interparticle polymer diffusion in latex films. The dashed horizontal line represents the f_m value anticipated for void-free films with negligible polymer interdiffusion

however, the amount of interparticle diffusion is not large. This effect is shown somewhat more vividly in *Figure* 9. The dashed horizontal line in *Figure* 9 indicates the approximate value of f_m expected for intimate interparticle contact in the absence of interdiffusion. One sees indications of a small extent of interdiffusion ($f_m > 0.15$) for PBMA films without a coalescent, aged 90 hr at 36°C. A larger extent of interdiffusion occurs in the presence of 8 wt% DB, EB, and EB-Ac, with DB being somewhat more effective. For TPM, the data are not shown because the effect is so large that the bar would be off the scale. For samples containing 8 wt% TPM, f_m approaches 1.0 after 90 hr at 36°C; interdiffusion is nearly complete.

One of the most striking features of the data is the effect of DM at 36°C. It seems to promote some polymer mixing during the formation of the film (as does 6 wt% TPM at 22°C), and is as effective as DB-Ac in promoting polymer diffusion during the next 90 hr. An unexpected

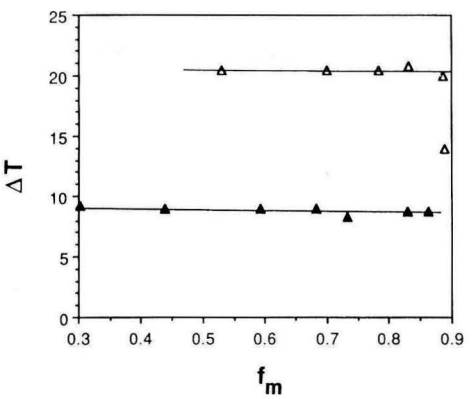

Figure 10—A plot of ΔT values calculated from equation (9), as a function of f_m, for PBMA latex films containing: ▲—3 wt%; and Δ—6 wt% TPM

conclusion from these experiments is that in spite of its unfavorable water/polymer partition coefficient, DM is remarkably effective at plasticizing the surface layer of polymer in the vestigial particles which form the film.

A MODEL FOR THE PLASTICIZING EFFECT OF COALESCENTS

The Model

In order to quantify the effect of coalescing aids on polymer diffusion during aging of latex films, we construct a simple model based upon the Williams-Landel-Ferry (WLF) equation.[14] For diffusion coefficients referred to a given reference temperature T_o, the WLF equation is expressed in the following form:

$$\log\left(\frac{DT_o}{D_oT}\right) = \frac{C_1(T - T_o)}{C_2 + T - T_o} \tag{6}$$

In this expression, C_1 and C_2 are parameters characteristic of a particular polymer for viscoelastic or diffusive properties referred to a particular T_o. We have established the validity of equation (6) for polymer diffusion in PBMA latex films.[19] Choosing T_o = 373°K, we found C_1 = 15.5 and C_2 = 254°K very close to values obtained by Ferry from viscoelastic measurements on PBMA.[27] For the discussion that follows, it will be helpful to choose T_o = 368°K (95°C). For PBMA at this temperature, C_1 and C_2 are recalculated to take the values 15.5 and 249°K, respectively.

For a PBMA latex film containing a small amount of a coalescing aid, equation (6) should be modified. The introduction of the coalescent aid will increase the film-free volume, and the polymer segments may be expected to be more mobile in the presence of the diluent. The effect will be the same as raising the temperature to T′, where $T' = T + \Delta T$, and ΔT can be called the effective temperature shift. The WLF equation then becomes

$$\log\left(\frac{D(w_1)T_o}{D_o(T + \Delta T)}\right) = \frac{C_1(T + \Delta T - T_o)}{C_2 + T + \Delta T - T_o} \tag{7}$$

Here, the $D(w_1)$ is the measured diffusion coefficient at temperature T and concentration of coalescing aid w_1. Equation (7) says that the introduction of a small amount of coalescing aid is equivalent to an increase in the temperature for diffusion by ΔT.

Combining equation (6) and (7) gives

$$\log\left(\frac{D(w_1)T}{D(T + \Delta T)}\right) = \frac{C_1(T + \Delta T - T_o)}{C_2 + T + \Delta T - T_o} - \frac{C_1(T - T_o)}{C_2 + T - T_o} \tag{8}$$

Equation (8) can be simplified further when the diffusion temperature T is equal to the reference temperature T_o. For our experiment, $T = T_o$ = 368°K.

$$\log\left(\frac{D(w_1)T}{D(T + \Delta T)}\right) = \frac{C_1\,\Delta T}{C_2 + \Delta T} \tag{9}$$

We do not wish to suggest that ΔT represents some fundamental property of theoretical significance. Rather, it represents a parameter whose magnitude is easily determined, and whose value can be used as a measure of the effectiveness of a plasticizer in promoting polymer dif-

fusion. Changes in ΔT as a consequence of annealing provide a very useful means of monitoring the loss by evaporation of the coalescent from the film.

Data Analysis

In *Figure* 5 we observe that the effect of adding 3 and 6 wt% TPM to PBMA is to increase the magnitude of D. The model developed previously suggests that the three curves shown in *Figure* 5 can be shifted to generate a single composite curve, and the shift term necessary can be calculated from equation (9). The values of ΔT calculated in this way are plotted in *Figure* 10 as a function of f_m. The fit of the data to equation (9) is excellent. This not only supports the validity of the model, it also indicates that no significant evaporation of TBM from the films occurs during the annealing of these films.

Equation (9) can also be applied to PBMA latex films containing small amounts of DB and DB-Ac. The ΔT values so obtained are plotted in *Figure* 11 as function of f_m for films containing 6 wt% TPM, 5.6 wt% DB-Ac, and 4.4 wt% DB. These films were prepared to contain the same amount of coalescent in moles per gram of polymer, here 2.8×10^{-4} mol/g. In contrast to the data obtained for TPM, we see a marked decrease in ΔT value for the films containing DB and DB-Ac. This decrease indicates a decreased efficiency of the coalescing aid molecules in promoting polymer diffusion at longer annealing times. Such a decrease in effectiveness is unexpected unless it is due to evaporation of the additive from the film. We will return to this point later.

In addition to promoting polymer diffusion, the coalescent also depresses the T_g of the latex film. Various models have been proposed to describe the change in T_g of a polymer in the presence of a low-T_g plasticizer. According to Ferry,[13] small amounts additive depress T_g in proportion to their concentration,

$$T_g' = T_g - k_g w_1 \tag{10a}$$

or

$$\Delta T_g = (T_g - T_g') = k_g w_1 \tag{10b}$$

where w_1 is the weight fraction of diluent, and k_g is a coefficient describing its effectiveness at depressing T_g. For various solvents in polystyrene, k_g has been found to have values in the range of 200 to 500°.[14]

We have carried out a number of DSC measurements to assess the validity of equation (10). For example, we find for PBMA a decrease in T_g of 3°C per wt% TPM. These experiments are not as accurate as desired because of the small heat capacity change associated with T_g for PBMA. As a consequence, we take a somewhat different approach to comparing ΔT and ΔT_g. For example, assume that a plasticizing additive has an effect on polymer diffusion analogous to that described in equation (10). For small amounts of additive, this behavior would take the form

$$\Delta T = k_d w_1 \tag{11}$$

The two experiments described in *Figure* 10 yield k_g values of 300 and 340° for TPM. For DB-Ac and DB, calculating ΔT from diffusion coefficients obtained at

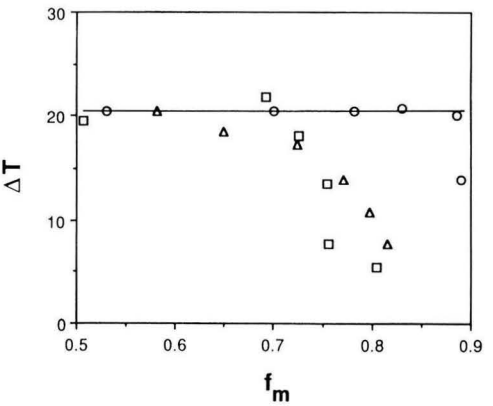

Figure 11—A plot of ΔT values calculated from equation (9), as a function of f_m, for PBMA latex films containing: 0—6 wt% TPM; Δ—5.6 wt% DB-Ac; and □—4.4 wt% DB

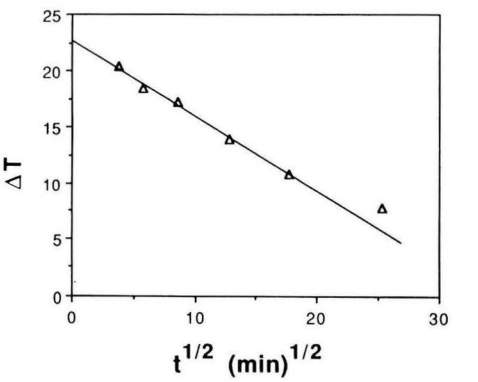

Figure 12—A plot of ΔT vs $t^{1/2}$ for the data in *Figure* 9 for PBMA latex films containing 5.6 wt% DB-Ac

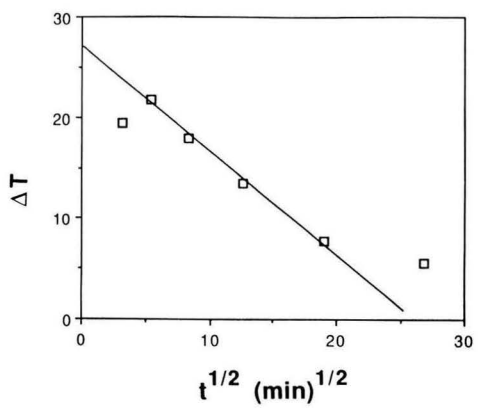

Figure 13—A plot of ΔT vs $t^{1/2}$ for the data in *Figure* 9 for PBMA latex films containing 4.4 wt% DB

low extent of mixing, we find k_g values of ca. 330° for DB-Ac and ca. 460° for DB. This result suggests that on a per weight basis, DB introduces more free volume into PBMA than the other two additives.

We now have the tools necessary to examine how evaporation of the additive affects polymer diffusion in latex films. Sullivan[15] has shown that volatile additives which can be presumed to be uniformly distributed in an acrylic latex film evaporate in accordance with Fick's laws of diffusion, with weight loss proportional to the square-root of annealing time. This analysis neglects the increase in T_g which accompanies the loss of solvent. For a film of thickness L, the amount of additive per unit area remaining at time t is $w_l(t)L$. This quantity should decrease as $t^{1/2}$. Thus, the idea of Fickian diffusion of the additive in conjunction with equation (11) leads to the prediction that

$$\frac{\Delta T(t)L}{k_d} = \beta t^{1/2} \qquad (12)$$

where $\Delta T(t)$ is the time change in ΔT caused by evaporation of the coalescent, and β, the volatility coefficient, measures its tendency to evaporate.

From this analysis we expect that ΔT would decrease linearly with $t^{1/2}$. To examine this point, we calculated ΔT values for films containing initially either 5.6 wt% DB-Ac or 4.4 wt% DB (cf. *Figure* 11) and plotted these values in *Figures* 12 and 13. The linear plots substantiate the idea of evaporative loss of solvent by a Fickian diffusion process.

SUMMARY

An energy transfer technique is described which allows the use of fluorescence decay measurements to follow the extent of polymer diffusion in annealed latex films. These are poly(butyl methacrylate) (PBMA) films prepared from latex dispersions containing a mixture of 100 nm PBMA particles labeled, respectively, with donor and acceptor fluorescent dyes. From the data analysis, diffusion coefficients for the polymer molecules can be calculated.

These diffusion coefficients are enhanced when the latex dispersions are pre-equilibrated with small amounts of organic solvents commonly used as coalescents. We have examined a series of such substances, including TPM, and a variety of ethylene glycol and diethylene glycol derivatives. For relatively nonvolatile coalescents such as TPM, its effectiveness as a plasticizer in enhancing polymer diffusion rates remains constant throughout the film annealing process. We can describe this effect quantitatively in terms of a modification of the Williams-Landel-Ferry (WLF) equation. Some coalescents (e.g., ethyleneglycol butyl ether and ethyleneglycol butyl ether acetate) show deviations from simple WLF behavior. These deviations follow the behavior expected for solvent evaporation from the film by a Fickian diffusion process.

A novel and unexpected result was obtained from careful examination of freshly prepared latex films prior to annealing. The energy transfer technique is able to assess the extent of particle deformation and the intimacy of interface contact (wetting), and is sensitive to the presence of voids on the 10-50Å scale between the deformed particles. Most coalescents improved wetting and suppressed voids for PBMA films formed at 22°C. One very interesting observation concerns diethyleneglycol methyl ether, normally considered a poor coalescing solvent. We find that it concentrates in the interparticle spaces for films formed at 22°C and suppresses molecular contact between adjacent particles. Upon warming these films to 36°, it plasticizes the latex surface and strongly promotes interpenetration of surface polymers.

ACKNOWLEDGMENTS

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Simultaneous Assessment of Influence On Hiding Power by Several Compositional Factors: Taguchi Approach

V.S. Vaidya and V.M. Natu
Asian Paints (India) Limited*

In addition to the obvious compositional factors such as the scattering-absorbing pigment content and the pigment-binder volume ratio, other indirect factors such as micronized extender, rheological additive, dispersing agent, and alkaline earth metal soap are concomitantly examined for their influence on the hiding power of a glossy white alkyd enamel. Taguchi's Orthogonal Array (OA) Design is employed advantageously to quantify the effect of seven compositional factors on scattering and absorption coefficients through trials of eight different combinations. Among other interesting results, particularly notable are the promise of the micronized extender and the ineffectiveness of the chosen dispersing agent. More importantly, it is demonstrated that the application of the Taguchi OA strategy in coating research could lead to better "optimums" and increased "productivity" of research and development efforts.

INTRODUCTION

To a paint technologist, an investigation of the hiding power of coatings is as much a subject of interest as the quest for efficient methodologies of experimentation in the course of developmental work. This paper attempts to address both these areas.

The optimization of hiding power by monitoring inputs has been an area of constant concern because the coverage and hiding of paints are important performance parameters; while the cost is governed by the efficiency with which compositional inputs are exploited.[1-3] It has been widely recognized that, apart from direct opacifying inputs, many other compositional factors could have a significant impact on the resulting hiding power. The difficulty traditionally has been faced with respect to precise quantification of hiding power of a given paint, which by itself has been an area of on-going research. However, this has been standardized considerably in recent times with methods like ASTM-2805,[4] or its many variants employing reflectance spectrophotometry and computations based on the Kubelka-Munk theory. The availability of these quantitative methods makes it possible and imperative for a researcher to investigate the quantitative contribution of various direct and indirect compositional factors to the ultimate hiding power of a pigmented coating. In addition to direct factors like scattering-absorbing pigment and the pigment-binder volume geometries, numerous other factors, such as physical spacing among dispersed pigment particles,[5] the effect of additives on pigment-binder interfaces, and rheological considerations, are believed to influence the hiding power. In this paper, the previously mentioned factors are investigated for a white glossy enamel based on semi-drying long-oil alkyd and rutile pigment.

If the conventional "one variable at a time" approach to design of experiments is employed, then the optimum combination and interactive influences of factors could be missed. Alternatively, if all possible combinations of factors and levels are attempted, then the experimental volume could be unmanageable and uneconomical. Hence, it is necessary to consider a strategy that does not suffer from both of these disadvantages. Taguchi's Orthogonal Array (OA)[6,7] approach has been resorted to in this paper. This statistical design is based on the mathematical concept of orthogonal arrays wherein error degrees of freedom have been imaginatively traded for the assessment of controllable factors (or interactions) leading to a considerable reduction in the number of experi-

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Table 1—Factors Selected and Their Levels

No.	Factor	Level 1	Level 2
1	Pigment content (rutile)	23.0%	20.0%
2	Dispersion space index	6.5	7.5
3	Micronized extender	0.0%	5.0%
4	Dispersing agent	1.0%	0.0%
5	Calcium naphthenate content (solution as supplied)	1.1%	0.3%
6	Thixotropic agent content	0.0%	0.2%
7	Toner content	0.5%	1.0%

ments to be performed. The properties measured or the responses are subjected to statistical analysis using the "Analysis of Variance" (ANOVA) technique, whereby cause-effect relationships between controllable factors and the property measured are established. This strategy has been advocated by Taguchi for product design so that, initially, the emphasis is placed on identifying the significant factors through minimum volume of planned experimentation. Subsequently, the identified factors can be optimized to specific levels so as to achieve the desired response or effect. This line of experimental design could be extremely useful in research and development work in general.

EXPERIMENTAL

Scope

The hiding power of an air-drying alkyd enamel based on rutile titanium dioxide and a semi-drying long-oil alkyd was thought to be influenced by many other factors in addition to the contributions made by the pigment used as an opacifier. The hiding power of the dried film would by affected synergistically by all those phenomena which govern the absorption or scattering of light by the system in its dry state. Hence, it is necessary to consider many factors which could possibly decide the ultimate state of dispersion in the dry film for which hiding power is being determined. For the purpose of this work, the following seven factors were selected for assessment. Some of these factors, like pigment content, dispersion space index (factor related to PVC), and toner content are obvious and direct, while the other factors are indirect and believed to be making significant contributions to hiding power, although this has not been firmly established. The mix of direct and indirect factors was chosen to assess the usefulness of the statistical design in bringing out the known cause-effect relationships quantitatively, while other indirect factors are also examined simultaneously. This approach also helps in knowing the relative effect of the indirect factors to the direct factors in the system.

PIGMENT CONTENT: Pigment content is the basic variable and was chosen particularly to study its quantitative relationship with hiding power. The direction of change of this variable was deliberately kept opposite the other known factors in order to examine the extent of compensation provided by the other factors to the reduction in the principal factor. Pigment content levels of 23% and 20% were studied.

DISPERSION SPACE INDEX: This term signifies the resin volume in dry film available for pigment particles to remain dispersed and separated. Mathematically, it is the ratio of volume of binder solids to pigment volume. Although this term is mathematically related to PVC, it was felt that expressing it as "Dispersion Space Index" clearly brings out its relationship with the scope for ultimate state of dispersion in the dry film.

This factor was studied at the 6.5 and 7.5 levels (i.e., PVC values of 13.33% and 11.76%, respectively). This factor has been calculated exclusive of micronized extender content.

MICRONIZED EXTENDER: A number of research papers[2,3,5] have been published propounding a theory that micronized extenders could serve as physical spacers for TiO_2 particles preventing their flocculation or crowding. This is expected to enhance the scattering power, thus contributing to hiding power. However, this phenomenon has not been very firmly established. Hence, it was thought necessary to examine this factor. The 0.0% and 5.0% levels were chosen.

DISPERSING AGENT: It is generally believed that wetting and dispersing agents help in the segregation and stabilization of pigment particles dispersion in a resin system. This leads to a finer state of dispersion with minimum crowding in the dry state, thereby contributing to hiding power. Some workers in the field believe that dispersing and wetting agents do not contribute at all to the dispersion of modern rutile grades in a long-oil semi-drying oil alkyd resin. To check out the exact position in this regard, the 1.0% and 0.0% levels of a combination of wetting-dispersing agents were chosen for study. Here, the aim was to determine if elimination of these additives resulted in significant loss of hiding power.

CALCIUM SOAP CONTENT: Some researchers in the field of dispersion of TiO_2 in alkyd resins believe that the calcium drier content causes flocculation of TiO_2 particles, thereby leading to the loss of hiding power. To know whether reduction in calcium drier content brings about any improvement in hiding power, we selected calcium naphthenate levels of 1.1% and 0.3% in this present work (corresponding to calcium metal content of 0.033% and 0.009%, respectively).

Table 2—Taguchi Orthogonal Array—L8[6]

Trial No.	Factors						
	1	2	3	4	5	6	7
1	1[a]	1	1	1	1	1	1
2	1	1	1	2[a]	2	2	2
3	1	2	2	1	1	2	2
4	1	2	2	2	2	1	1
5	2	1	2	1	2	1	2
6	2	1	2	2	1	2	1
7	2	2	1	1	2	2	1
8	2	2	1	2	1	1	2

(a) 1 and 2 indicate two different levels of each factor.

Table 3—Experiment Matrix—L8 with Actual Factors & Levels

	Factors						
Trial No.	Pigment Content (Rutile) % 1	Dispersion Space Index 2	Micro-nized Extender % 3	Dispersing Agent % 4	Calcium Naphthen-ate Content % 5	Thixotropic Agent % 6	Toner Content % 7
1	23	6.5	0	1.0	1.1	0	0.5
2	23	6.5	0	0.0	0.3	0.2	1.0
3	23	7.5	5	1.0	1.1	0.2	1.0
4	23	7.5	5	0.0	0.3	0	0.5
5	20	6.5	5	1.0	0.3	0	1.0
6	20	6.5	5	0.0	1.1	0.2	0.5
7	20	7.5	0	1.0	0.3	0.2	0.5
8	20	7.5	0	0.0	1.1	0	1.0

RHEOLOGICAL ADDITIVE: It was hypothesized that the alteration in rheology of the paint would influence the dispersion/setting of pigment particles in the resin which could lead to changes in hiding power. Rheological additives of the organo-clay type significantly increase the low-shear viscosity of the paint which corresponds to phenomena like settling, flocculation, and cohesive movements between pigment particles. Hence, it was felt that incorporation of a Bentone® (NL Chemicals) type thixotropic additive could aid in keeping the pigment particles in a suspended and segregated state, thus contributing to their effectiveness in the scattering of light and hence hiding power. Bentone SD1 was used at the 0.0% and 0.2% levels.

TONER CONTENT: Obviously, the extent of coloring or absorbing pigment would have a significant influence on the hiding power. This factor was selected to assess its quantitative impact on hiding power. Red-violet organic colorant was used at 0.5% and 1.0% levels.

The factors and their respective levels are shown in *Table* 1.

Design

An attempt to study the previously detailed seven factors by conventional experimental technique "one factor at a time," would prevent one from detecting the effects which result from the interaction of various changing factors. The ability to assess the influence of a factor on system dynamics and hence the important information which is valuable for optimization of product design could be lost. On the other hand, if the experimenter chooses to examine all possible combinations of factors and levels, then the number of experiments would be prohibitively high, for example, $2^7 \times r = 128 \times r$ (r = replicates). Hence, there is a need for an efficient strategy like Taguchi's OA Design to compare the performance of the system at different factor-level combinations.

According to Taguchi,[7] orthogonal arrays can be looked upon as a distillation mechanism through which the researcher's experimentation passes. Its great power lies in its ability to separate the effect each factor has on the average and dispersion of the experiment as a whole. By exploiting this ability to sort out individual effects, experimenters may track a large number of factors simultaneously in a multi-experiment run without confusion, thereby obviating the need to perform all possible combinations or to wait for the results of one experiment before proceeding with the next one.

Depending upon the number of factors and levels to be studied, Taguchi offers[6] a choice among various model OAs, viz., L4, L8, L9, L16, L27, etc. Model L8 OA was selected because it permits assessment of seven different factors at two different levels by conducting only eight trials. *Table* 2 shows the L8 OA wherein each row corresponds to one trial combination of levels of seven different factors. The condition of orthogonality, that all columns provide four tests under the first level and four tests under the second level of the factor, is satisfied.

Corresponding to OA L8 as per *Table* 2 and the chosen factors and their levels as per *Table* 1, the trial experiments would consist of eight different combinations as shown in *Table* 3. It can be seen that all seven columns available have been assigned to factors making it a "saturated" design, so that factor effects are confounded with interaction effects as well. This way, Taguchi believes, the effect of controllable factors can be assessed, each inclusive of the interactions, without separately assessing the interaction effects. Assignment of factors to such a saturated design is fairly simple since no separate evalua-

Table 4—Composition of Trial Experiments

	Ingredients									
Expt. No.	Rutile Pigment	Blanc Fixe Micro	Red-Violet Toner	Long Oil Alkyd Resin NVM = 70%	Dispers-ing Agent	Calcium Naph-thanate	Bentone SD1	Driers (Cobalt, Lead)	White Spirits (Including MEK Oxime)	Total
1	23.00	0.0	0.5	55.4	1.0	1.1	0.0	1.85	17.15	100
2	23.00	0.0	1.0	55.4	0.0	0.3	0.2	1.85	18.25	100
3	23.00	5.0	1.0	63.9	1.0	1.1	0.2	1.85	2.95	100
4	23.00	5.0	0.5	63.9	0.0	0.3	0.0	1.85	5.45	100
5	20.00	5.0	1.0	48.2	1.0	0.3	0.0	1.85	22.65	100
6	20.00	5.0	0.5	48.2	0.0	1.1	0.2	1.85	23.15	100
7	20.00	0.0	0.5	55.6	1.0	0.3	0.2	1.85	20.55	100
8	20.00	0.0	1.0	55.6	0.0	1.1	0.0	1.85	20.45	100

Each of the above eight experiments performed in duplicate.

Table 5—Input-Output Format. Determination of Absolute Hiding Power

Input		
1. Mass of wet paint film	=	gm
2. Area of the paint film	=	sq cm
3. Density of the paint	=	kg/L
4. Substrate reflectance on white	=	
5. Sample reflectance over black	=	
6. Sample reflectance over white	=	
7. Specify contrast ratio (optional)	=	
8. Specify spreading rate (optional)	=	sq m/L
Output		
1. Hiding power at CR = 0.98	=	sq m/L
2. Contrast ratio of the drawdown	=	
3. Reflectivity of the paint, R inf.	=	
4. Scattering coefficient, S	=	sq m/L
5. Absorption coefficient, K	=	sq m/L
6. Spreading rate at specified CR	=	sq m/L
7. Contrast ratio at specified spreading rate	=	

tion of interactions is to be provided for by leaving specific columns vacant.

A design model as per *Table* 3 has been further translated into compositional details concerning ingredients as shown in *Table* 4. Trial experiments as shown in *Table* 4 were performed in duplicate, thus bringing the total number of paints prepared to 16.

Procedures

PREPARATION OF PAINT SAMPLES:

Apparatus— (1) High speed laboratory disperser (Dispermat F105 with media mill arrangement, vessel capacity 1L)
(2) Ottawa sand (0.8 to 1.2 mm diameter)
(3) Analytical balance
(4) Density cup

Materials— (1) General purpose Rutile (R-900 of Dupont)
(2) Long oil alkyd resin based on semi-drying oil (NVM = 70%)
(3) White spirits
(4) Combination violet-red toner (predispersed liquid colorant) based on dioxazine violet and quinacridone red pigments
(5) Blanc-fixe micro (Sachtleben, W. Germany)
(6) Organoclay gellant (Bentone SD1)
(7) Composite dispersing agent containing soyalecithin and a monoglyceride of non-drying oil
(8) Calcium naphthanate, 3% Ca
(9) Lead, cobalt driers
(10) MEK oxime

Procedure—Eight different samples were prepared as per *Table* 4, each in duplicate, thus the total number of samples prepared was 16. These 16 paints were prepared in perfectly random order, each as per the following procedure:

Weigh accurately part of the resin solution (appropriate for mill base consistency), white spirits, and dispersing agents, and transfer into the media mill vessel. Add organoclay gellant powder as required and run the disperser for 5 min at 100 rpm. Add weighed quantity of micronized extender while stirring slowly. Also add the required quantity of pigment (Rutile) while stirring. Add the Ottawa sand and increase the speed to 4000 rpm. Continue dispersion for 10 min. Check the fineness of grind on Hegman Gauge. Continue dispersion until 7+ HG reading is obtained. Add balance resin solution, toner, and white spirits while stirring at 1000 rpm for 5 min to stabilize the dispersion. Add driers. Check if HG reading is 7+.

Check the NVM of this paint after filtering out the sand. Compensate for losses due to solvent evaporation by adjusting the NVM as per the formula by addition of calculated quantity of white spirits. Recheck the %NVM. Check the density of the paint to be as per the formula expectation. Keep the paint sample in a tightly closed container and determine the hiding power as per the following procedure in duplicate for each of the 16 paints.

DETERMINATION OF HIDING POWER: Hiding power is defined as the area of the substrate (in square meters) over which a unit volume of liquid paint (liter) can be uniformly spread to produce a contrast ratio of 0.98 in the dry state. Thus, hiding power is expressed as sq m/L.

This method not only determines hiding power in sq m/L, but also calculates the scattering coefficient and absorption coefficients in sq m/L.

Sixteen paint samples as described previously were tested in duplicate (totally, 32 drawdowns) by this method.

Apparatus— (1) Black and white opacity charts (Leneta 3B)
(2) Automatic drawdown applicator with wire-wound rods (K-Control coater from RK Print Coats, UK)
(3) Top loading electronic balance
(4) Reflectance Spectrophotometer (Applied Color Systems, Princeton, NJ)
(5) Personal computer
(6) Computer program based on Kubelka-Munk equations[4] (inhouse written)

Table 6—Experimental Results (Responses)

Trial No. As Per L-8	Hiding Power In sq m/L				Scattering Coefficient In sq m/L				Absorption Coefficient In sq m/L			
	Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2	
No.	1	2	1	2	1	2	1	2	1	2	1	2
1..	15.83	15.95	15.97	15.64	109.4	110.1	111.3	107.9	2.19	2.21	2.15	2.17
2..	18.58	18.54	18.60	18.54	106.8	106.5	106.5	106.7	4.05	4.05	4.04	4.06
3..	20.94	20.68	20.71	21.04	122.3	120.9	120.8	122.9	4.40	4.30	4.36	4.14
4..	17.69	17.59	17.77	17.86	124.9	124.2	124.5	125.4	2.30	2.29	2.36	2.36
5..	16.32	16.40	16.77	16.64	91.1	91.4	94.0	93.4	3.79	3.83	3.86	3.82
6..	13.18	13.03	13.41	13.38	86.7	85.2	87.2	87.2	2.08	2.10	2.18	2.17
7..	13.66	13.76	13.90	13.97	90.3	91.0	91.7	92.3	2.13	2.14	2.18	2.18
8..	17.19	17.33	17.67	17.55	96.4	97.2	99.4	100.1	3.97	3.96	3.96	3.99

Table 7—ANOVA Summary for Hiding Power

No.	Factor	Sum of Squares SS	Degrees of Freedom n	Variance Vf = SS/n	F-Ratio F = Vf/Ve	Remarks	C %	Average Effect of Factor on Response: Level 1 Mean X1	Level 2 Mean X2	Av.Eff. X2-X1 % = ___ × 100 / X1
1	Pigment content	71.52	1[a]	71.52	3576.0	Significant	41.28	18.25	15.26	(−)[b] 16.38
2	Dispersion space index	15.90	1	15.90	795.0	Significant	9.18	16.05	17.46	(+)[c] 8.79
3	Micronized Extender	3.59	1	3.59	179.50	Significant	2.07	16.42	17.09	(+) 4.08
4	Dispersing agent	0.00	1	0.00	0.00	No effect	0.00	16.76	16.74	(−) 0.12
5	Calcium naphthenate content	0.26	1	0.26	13.00	Significant (Small)	0.15	16.84	16.66	(−) 1.07
6	Thixotropic agent	0.58	1	0.58	29.00	Significant (Small)	0.33	16.89	16.62	(−) 1.60
7	Toner content	80.90	1	80.90	4045.0	Significant	46.70	15.16	18.34	(+) 20.98
	SS (Sum)	172.75	7				99.71			
	SST (Total)	173.23	31							
	SSe (Error)	0.48	24	0.02(Ve)			0.28			

(a) F ratio from F table F(1,24) at CL = 99% is 7.82.
(b) (−) indicates decrease.
(c) (+) indicates increase.

Procedure—Measure the green reflectance of the white portion of the Leneta opacity chart and weigh the chart accurately on the electronic balance. Place this chart on the automatic drawdown applicator. Use a wired-rod of nominal wet film thickness rating of 50 microns. After placing this rod on the carriage, keep a fixed quantity of paint, with the help of a syringe, under the rod such that the start of the drawdown is a straight line (i.e., the drawdown is rectangular in shape). Make a drawdown by activating the motor. As soon as the drawdown is over, weigh the chart very quickly inside the closed box to minimize the losses due to evaporation. It has been found that, with some practice, a skilled operator can perform application of the drawdown and its quick and accurate

Table 8—ANOVA Summary for Scattering Coefficient

No.	Factor	Sum of Squares SS	Degrees of Freedom n	Variance Vf=SS/n	F-Ratio F=Vf/Ve	Remarks	C %	Average Effect of Factor on Response: Level 1 Mean X1	Level 2 Mean X2	Av. Eff. X2-X1 % = ___ × 100 / X1
1	Pigment content	4418	1[a]	4418	2539	Significant	77.70	115.7	92.20	(−)[b] 20.30
2	Dispersion space index	832.30	1	832.30	478.30	Significant	14.60	98.80	109.0	(+)[c] 10.30
3	Micronized extender	192.10	1	192.10	110.40	Significant	3.40	101.50	106.4	(+) 4.80
4	Dispersing agent	0.72	1	0.72	0.41	No effect	0.01	103.80	104.1	(+) 0.30
5	Calcium naphthenate content	0.72	1	0.72	0.41	No effect	0.01	104.10	103.8	(−) 0.30
6	Thixotropic agent	176.7	1	176.70	101.60	Significant	3.10	106.30	101.6	(−) 4.42
7	Toner content	23.1	1	23.10	13.30	Significant (Small)	0.40	103.10	104.8	(+) 1.60
	SS (Sum)	5643.6	7				99.22			
	SST (Total)	5685.3	31							
	SSe (Error)	41.7	24	1.74(Ve)			0.78			

(a) F ratio from F table F(1,24) at CL = 99% is 7.82.
(b) (−) indicates decrease.
(c) (+) indicates increase.

weighing in a reproducible manner. The whole operation is performed in an air-conditioned laboratory at about 22°C. Calculate the weight of the liquid paint deposited. Allow the applied film to dry overnight. Measure the reflectance of the film over black and white areas, using a reflectance spectrophotometer (Tristimulus value "Y"). Determine density of the paint and calculate the volume of the liquid paint deposited. Measure the area of the rectangular drawdown film. Using the computer program based on the Kubelka-Munk equation, calculate the hiding power, scattering coefficient, and absorption coefficients for the paint sample. The input-output format of the computer program used is given in *Table* 5.

RESULTS

For each of the eight trials, paint preparation was performed in duplicate and each of the 16 paints thus produced was tested for hiding power in duplicate. Effectively, four observations of hiding power are available for each trial as per L8. The same is applicable to scattering coefficients and absorption coefficients. The consolidated results are presented in *Table* 6.

These results for hiding power, scattering coefficient, and absorption coefficient are subjected to the statistical analysis technique ANOVA, wherein the total variance in the results is split and assigned to each factor and the residual is assigned to "error." The extent of variance due to each factor relative to "error variance" indicates the probability of influence due to that particular factor. *Tables* 7-9 present detailed ANOVA for each of three responses measured.

In *Tables* 7-9 each of the factors' sum of squares (SS) for 32 observations is calculated using a mean of 16 observations for each of the two levels (X1 and X2). Similarly, the total sum of squares (SST) is calculated all 32 observations about their overall mean. The sum of squares due to error (SSE) is computed by subtracting SS for all seven factors from SST. Since each factor is studied at two levels, the degrees of freedom for each factor would be one and hence variance would be equal to SS. In case of (SSE) the sum of squares due to error, the degrees of freedom = (total number of observations –1– number of factors) $32 - 1 - 7 = 24$. Hence, the variance estimate for error would be (SSE/24). Next, the F ratio for each factor is calculated by dividing the variance due to factor by error variance. This F ratio for each factor can be compared against the F values in statistical tables, and against corresponding degrees of freedom for the numerator and the denominator, at the chosen confidence level. The F value from tables corresponding to 1 and 24 degrees of freedom and 99% confidence level is 7.82 as indicated. The F-values higher than this indicate that the factor has significant effect on the response (see Remarks Section). In the column under heading C, the percentage contribution by each factor to the total variation is given. This indicates the contribution of the factor to dispersion of the response values of the system. The average effect on the response caused by change in levels of a given factor can be computed by $\frac{X2 - X1}{X1} \times 100$ as shown. The symbol (−) indicates decrease and (+) indicates increase in the response value when the factor is changed from level one to level two.

It is noted in *Table* 7 (as well as in *Tables* 8 and 9) that the sum of the squares and variance due to error is very small. This indicates that the experiments are extremely sensitive in that the detection and estimation of very small changes in a response caused by a factor are possible. The

Table 9—ANOVA Summary for Absorption Coefficient

No.	Factor	Sum of Squares SS	Degrees of Freedom n	Variance Vf = SS/n	F-Ratio F = Vf/Ve	Remarks	C %	Average Effect of Factor on Response: Level 1 Mean X1	Level 2 Mean X2	Av. Eff. X2-X1 % = ___ × 100 X1
1	Pigment content	0.298	1[a]	0.298	149.0	Significant	1.08	3.214	3.021	(−)[b] 6.00
2	Dispersion space index	0.161	1	0.161	80.5	Significant	0.58	3.047	3.189	(+)[c] 4.66
3	Micronized extender	0.0260	1	0.026	13.0	Significant (Small)	0.09	3.089	3.146	(+) 1.85
4	Dispersing agent	0.000	1	0.000	0.000	No effect	0.00	3.116	3.120	(+) 0.12
5	Calcium naphthenate content	0.025	1	0.025	12.5	Significant (Small)	0.09	3.146	3.090	(−) 1.78
6	Thixotropic agent	0.056	1	0.056	28.0	Significant	0.20	3.076	3.160	(+) 2.73
7	Toner content	26.997	1	26.997	13498.5	Significant	97.75	2.199	4.036	(+) 83.53
	SS (Sum)	27.563	7				99.79			
	SST (Total)	27.618	31							
	SSe (Error)	0.055	24	0.002(Ve)			0.21			

(a) F ratio from F table F(1,24) at CL = 99% is 7.82.
(b) (−) indicates decrease.
(c) (+) indicates increase.

Table 10—Factors and Their Effects

Sr. No.	Factor	Hiding Power: Contribution to Variation % C	Hiding Power: % Av. Effect	Scattering Coefficient: % C	Scattering Coefficient: % Av. Effect	Absorption Coefficient: % C	Absorption Coefficient: % Av. Effect	Interference
1....	Toner content	46.70	(+)20.98	0.40	(+)1.60	97.75	(+)83.53	Obviously significant effect. As is well known, toner content contributes to hiding through absorption only.
2....	Pigment content	41.28	(−)16.38	77.70	(−)20.3	1.08	(−)6.00	Again an obvious and significant factor effect on hiding power, primarily through change in scattering power.
3....	Dispersion space index	9.18	(+)8.79	14.60	(+)10.3	0.58	(+)4.66	Significant factor effect. Contribution to hiding power through improved scattering and absorption due to segregation of particles.
4....	Micronized extender	2.07	(+)4.08	3.40	(+)4.8	0.09	(+)1.85	Significant factor effect. Contribution to hiding through improved scattering, by spacing of pigment particles. Small contribution through absorption as well.
5....	Thixotropic agent	0.33	(−)1.60	3.10	(−)4.42	0.20	(+)2.73	Small effect. Organoclay gellant reduces hiding power through loss of scattering power probably due to flocculation. This loss is partly offset by increase in absorption coefficient (or color).
6....	Calcium naphthenate content	0.15	(−)1.07	0.01	(−)0.3	0.09	(−)1.78	Small effect. Reduction in the level of calcium naphthenate decreases the hiding power particularly through reduction in absorption coefficient.
7....	Dispersing agent	0.00	(−)0.12	0.01	(+)0.3	0.00	(+)0.12	Insignificant factor. Surprisingly, it is found that presence or absence of dispersing agent makes no difference in hiding power of this system.

word "significant" has been used in these tables in the statistical sense, implying existence of an effect without any regard to the size of the effect. Thus, an effect in a given case could be "significant" but "small." *Table* 7 shows six factors as having a significant effect on hiding power; *Table* 8 shows five factors which have a significant effect on scattering; and *Table* 9 shows six factors which significantly influence absorption.

The chosen seven factors have been presented in decreasing order of their effect on hiding power in *Table* 10 along with the inferences.

DISCUSSION

Factor Effects on Hiding Power (see *Table* 10)

(1) As expected, pigment (rutile) content and toner content have a predominant effect on the hiding power. Experimentation methodology has not only validated this but has also shown the large contribution made to hiding power through change in scattering coefficient and absorption coefficient, respectively, by these two factors.

The percentage average effect of these two factors on hiding power serves as a scale for assessing the other factors. It is noteworthy that rutile content has some effect on absorption as well, while the toner has a small effect on scattering.

(2) Dispersion space index contributes to hiding significantly due to the avoidance of crowding of scattering and absorbing particles, and to a lesser extent, to increased color of the film due to higher resin content.

(3) The micronized extender was found to make a definite contribution to hiding power by acting as a physical spacer between rutile particles, thereby enhancing the scattering power. To some extent, it also increases the absorption coefficient, perhaps through improvement in toner performance.

In order to confirm the effect of the micronized extender, confirmatory experiments as shown in *Table* 11(A) were performed. Here experiments 1 and 2 differ only in the content of the micronized extender. The other factors were kept at "mean" levels one and two used in the OA experiments. Hiding power results given in *Table* 11(B) show that, as expected, the presence of the micronized

Table 11—Effect of Micronized Extender (Confirmatory Experiments)

11 (A)—Composition

Expt. No.	Rutile %	Resin NVM–70%	Additives[a] %	Solvent %	Micronized Extender	Total
1	21.5	55.74	6.13	16.63	0	100
2	21.5	55.74	6.13	11.63	5	100

(a) The additives include dispersing agent, rheological agent, driers, toner, and anti-skinning agent.

11 (B)—Results

Expt.	Hiding Power (sq m/L)			Scattering Coefficient (sq m/L)			Absorption Coefficient (sq m/L)		
No.	1	2	Mean	1	2	Mean	1	2	Mean
1 ...	16.22	16.20	16.21	94.88	95.25	95.07	3.40	3.35	3.38
2 ...	17.23	17.12	17.18	101.09	100.52	100.81	3.58	3.55	3.57
Average Effect			(+)6.0%			(+)6.0%			(+)5.6%

extender increases the hiding power to the extent of about 6%. This validates the effect observed through OA design wherein the average effect of the micronized extender on hiding power is (+)4.08%. There is a good agreement for the effect on scattering as well, while the effect on absorption is found to be more pronounced in confirmatory experiments. (Since confirmatory experiments were based on different lots of raw materials, no attempt should be made at comparison of absolute hiding power values between OA experiments and confirmatory experiments.)

(4) The thixotropic effect of organoclay gellant was expected to reduce the crowding of pigment particles due to resultant very high, low-shear viscosity and, thereby, increase the scattering power of rutile and the absorption power of toner. However, the net effect on hiding power is small and negative; there is a reduction in scattering power, probably due to flocculation of rutile, and a smaller increase in absorption coefficient which may be partly due to possible improvement in the toner performance caused by the gellant.

(5) A decrease in Ca drier content was expected to increase hiding power through reduction in the flocculation of pigment particles. This hypothesis seems to have been invalidated by the absence of any effect on the scattering coefficient. However, a small decrease in hiding power is observed with a decrease in Ca content, mainly due to reduction in absorption coefficient.

(6) Interestingly, it is seen that the dispersing agent used has absolutely no effect on hiding power, which is quite contrary to the widespread belief among the workers using this dispersing agent for many years.

Taguchi OA Strategy: General Applicability

It is evident from the present work that only 16 experiments (8 × 2 replicates) have yielded information; which would have taken 256 experiments (2^7 × 2 replicates) to cover all possible combinations of seven factors at two levels. Moreover, simultaneous assessment of various factors in an interactive environment has been helpful in gauging the effects of various factors (inclusive of interactions) relative to one another. This demonstrates the potential of the Taguchi OA methodology as a powerful experimentation tool. The major reduction in experimental effort would enable the researcher to examine a greater number of factors possibly influencing a given system, which was not possible previously due to the high volume of experimental work involved. The newer cause-effect relationships thus established would lead to better optimization of products and processes in terms of cost and performance. We feel that the application of this technique in various areas of coatings research would also bring about quantum increase in the productivity and capability of research and development units.

CONCLUSIONS

Concomitant quantitative assessment of influence of various direct and indirect compositional factors on hiding power has been made efficiently using the Taguchi Orthogonal Array Technique. The known effects of direct factors have been quantitatively validated. The positive contribution to hiding power by micronized extenders has been established. It is found that organoclay gellant and Ca soap have very small influence on the hiding power of the system, while the chosen dispersing agent has absolutely no effect. The influence of each of the factors on absorption, as well as scattering, has been studied through high sensitivity experimentation, whereby deeper and firmer understanding of the phenomena has been achieved. The cause-effect relationships have been found useful in product development.

Taguchi OA strategy has been shown to provide considerable economy of experimental effort which should encourage its wider application in coatings research. Potentially, use of this technique could lead to better "optimization" of products and processes, as well as an increase in "productivity" of research laboratories.

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Color Variation of Automotive Metallic Finishes

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Mechanisms of color variation by changes in spraying parameters have been studied by measuring the variation of aluminum flake orientation in wet films with time, and by evaluating the content and size of the flakes in paint droplets and films.

It was confirmed that the color variation resulted from the differences not only in the flake orientation, whose mechanism is provided in our previous paper, but also in the flake content and size in the film.

The differences in the content and size are caused by the nonuniformity of flake allotment to the paint droplets, which is attributed to the flake size being not sufficiently smaller than the droplet size, and by the selective deposition of the droplets. Small droplets contain only fine flakes or no flakes, and cannot deposit on the substrate easily. Therefore, the promotion of paint atomization results in the increase of both the content and average size of aluminum flakes in the film. Also, the suppression of small-droplet deposition by decreasing applied voltages has the same effects.

INTRODUCTION

The use of metallic finishes is very popular in the automotive industry because of their attractive appearance marked by sparkling and flip-flop effects.[1] These effects result from the reflection of light by aluminum flake pigment. For automotive metallic finishes usually applied in a basecoat/clearcoat painting process, aluminum flake pigment is contained in the basecoat.

The metallic color (especially the lightness) involving the amplitude of flip-flop effect is varied by spraying equipment and/or spraying parameters,[2] even when the same basecoat and clearcoat are used. This color variation disturbs color control in the automotive painting process. For example, it causes color differences between bodies, and between a body and off-line-coated plastic parts. In addition, the color variation makes it difficult to repair damaged coatings.

The orientation of aluminum flakes in the basecoat is one of the causes of the color variation. In our previous paper,[3] we evaluated the variation of aluminum flake orientation in wet metallic films with time, discussed the relation of the orientation to the nonvolatile concentration and thickness of the wet film, and provided the mechanism of aluminum flake orientation.

Bell and Hochberg[4] found in the electrostatic spraying of metallic paints that small paint droplets contained essentially no aluminum flakes, while large ones did. This led to our consideration that the flake content in a film would be changed by the spraying equipment and/or

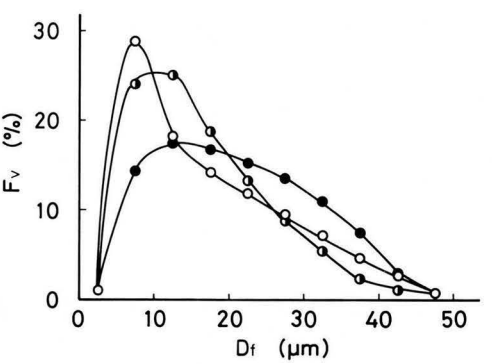

Figure 1—Relationship between aluminum flake diameter D_f and flake volume fraction F_v, measured with coulter counter. Flake mean diameter: ○—16 μm (Paint E), ◑—20 μm (Paint D), and ●—22 μm (Paints A, B, and C)

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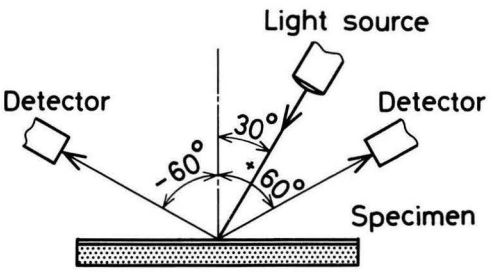

Figure 2—Schematic diagram of colorimeter for ratio R measurement

spraying parameters, resulting in the color variation. Inkpen and Melcher[5] showed that the content and size distributions of the flakes in metallic films were different between the mechanical and the electrostatic spraying, and inferred that these differences caused the color variation. Elmoursi and Lee[6] confirmed that flake content was dependent on spraying parameters in the electrostatic spraying, and agreed with Inkpen and his co-worker. However, the inference of Inkpen and Melcher on the causes of color differences needs to be verified once more, because in both Inkpen's and Elmoursi's studies, the flake orientation in the films was not measured. It was possible that the flake orientation resulted in the color differences between the mechanical and the electrostatic spraying.

With our developed colorimeter, the effect of the content and size on the color variation can easily be distinguished from that of the orientation. This paper describes each of the effects, and provides the mechanisms of color variation in the spraying of metallic topcoats.

EXPERIMENTAL PROCEDURE

Metallic Paints

Five silver metallic paints, A to E, were prepared for this work. They were formulated with the same thermosetting acrylic melamine resin, but in different pigmentations. Paint A was a commercially available basecoat for automobiles, containing 9.4% by weight aluminum flake pigment in the nonvolatile. The flake pigment was of a mean diameter of 22 μm, at which the cumulative volume of the flakes reached 50%. Paints B and C contained 7.5 and 10.8%, respectively, of the same flake pigment as paint A. Paints D and E were equal to paint A in the pigment content, but differed in the size of aluminum flake pigment, as shown in *Figure* 1; their mean diameters were 20 and 16 μm, respectively.

Measurement of Color Variation

The color variation of metallic coatings was estimated by the ratio R of two L-values,[3] which were measured with our developed noncontact-type colorimeter shown in *Figure* 2. This is because for metallic coatings, especially for silver metallics, the L-value variation accounts for most of the color variation.[2] The colorimeter is equipped with a light source at an illuminating angle of 30°, and two detectors at the viewing angles θ_r of -60 and $+60°$, and prints out L−, a−, and b− values of Hunter's color scales. The L−, a−, and b-values at $\theta_r = -60$ and $+60°$ approximately correspond to the highlight color and shade color, respectively. The ratio R of L-values at $\theta_r = -60°$ to $\theta_r = +60°$ was calculated. The increase of R indicates the increase of the L-value at $\theta_r = -60°$ (highlight color lightness) and the decrease of the L-value at $\theta_r = +60°$ (shade color lightness),[3] that is, the increase of the flip-flop effect.

The aluminum flake orientation in metallic coatings was also evaluated by the ratio R. When the pigment composition in the film is the same, the increase of R indicates that aluminum flakes lie more parallel to the film surface.[3] This is because the L-values at $\theta_r = -60$ and $+60°$ are dependent on the amounts of aluminum flakes which make angles of about -8 and 27° with the horizontal, respectively, in the resin with a refractive index of about 1.5.

Evaluation of Ratio R, Thickness, and Nonvolatile Concentration

The five metallic paints were applied in one coat to an undercoated panel and seven stainless steel strips, arranged as shown in *Figure* 3. The undercoated panel consisted of a gray surfacer, a cathodic electrodeposition coating, a zinc phosphate coating, and a cold-rolled steel sheet, which were available for automotive applications. The panel had been wet-sanded with AA-400 waterproof abrasive paper, and degreased with petroleum benzine. Each stainless steel strip had also been degreased and weighed.

The paints were sprayed under various spraying parameters using a Ransburg automatic electrostatic air spray gun equipped with a No. 6 cap in a conveyor line arrangement. Typical spraying parameters are shown in *Table* 1. An adequate spray booth temperature was chosen to maintain acceptable coating appearance. Also, several

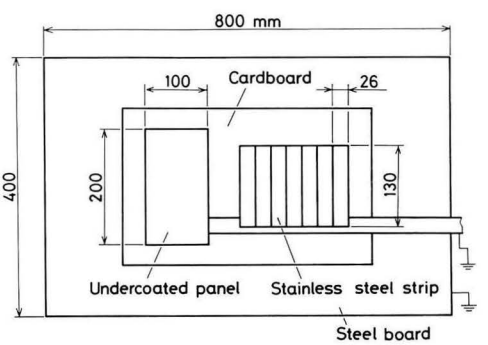

Figure 3—Preparation of specimens for measuring variations of ratio R, thickness, and nonvolatile concentration of wet film with time t after spraying. The steel board is carried toward the left with conveyor

conveyor speeds were selected to produce different film thicknesses.

The variation of the ratio R with time t after spraying was measured using the panel placed in a horizontal position, since in our preparatory study, horizontally-placed panels did not show different results from those of vertically-placed ones. The panel was given a flash period of 15 min after spraying, and subsequently baked for 30 min at 140°C (284°F). The ratio R was measured from 1 min (t = 1) to 15 min at an interval of 30 sec during the flash period, and also after baking.

The variations of the nonvolatile concentration and thickness with time t were measured using the seven stainless steel strips by weighing the strips at the predetermined time (t = 1, 2, 3, 5, 7, 10, and 15 min, respectively) during the flash period, and after baking (140°C, 30 min). The nonvolatile concentration NV at time t was determined from the following equation,

$$NV = 100 \cdot W_d / W_w \quad (1)$$

where W_d and W_w are the film weights after baking and at time t, respectively. The thickness T at time t was determined from the following equation,

$$T = 100 \cdot T_d \cdot \rho_d / (NV \cdot \rho_w) = T_d \cdot W_w \cdot \rho_d / (W_d \cdot \rho_w) \quad (2)$$

where T_d is the film thickness after baking, ρ_d and ρ_w are the film densities after baking and at time t, respectively. In this work, T was underestimated 5-10% because of the approximation of $\rho_d = \rho_w$.

The transfer efficiency E_t was also determined from the following equation,[7]

$$E_t = 10^4 \cdot W_d \cdot L_s \cdot S_c / (Q_p \cdot \rho_p \cdot NV_p \cdot A) \quad (3)$$

where Q_p, ρ_p, and NV_p are the volume flow rate, density, and nonvolatile concentration of the paint, respectively; L_s is the length of stroke of reciprocator; S_c is the conveyor speed; and A is the film area on the previously-mentioned stainless steel strip.

The ratio R_o, thickness T_o, and nonvolatile concentration NV_o of the wet film immediately after spraying were obtained by extrapolating the curves of R, T, and NV vs time t to t = 0, respectively. ΔR is the difference between R_d (R after baking) and R_o.

Determination of Aluminum Flake Content

The aluminum flake content in the dry film on the previously mentioned stainless steel strip was determined by inductively coupled plasma emission spectroscopy. The procedure was as follows: the metallic film was isolated from the strip with an appropriate solvent, and dissolved with a mixture of sulfonic and nitric acids. The solution was subjected to determination of aluminum content by spectroscopy.

Each paint was shared on a stainless steel strip, and baked for 30 min at 140°C. The aluminum flake content in the dry paint was also determined by spectroscopy.

Observation of Aluminum Flake in Paint Droplets

The distribution of aluminum flakes in paint droplets was observed using a metallograph. The droplets were caught on a glass slide with a grounded conductive sur-

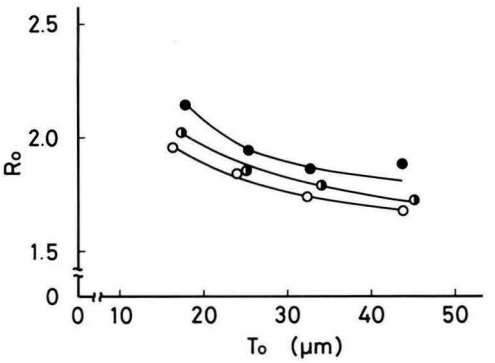

Figure 4—Relationship between R_o (R at t = 0) and T_o (T at t = 0) for paints with different aluminum flake contents. Flake content: ○—7.5% (Paint B), ◑—9.4% (Paint A), and ●—10.8% (Paint C)

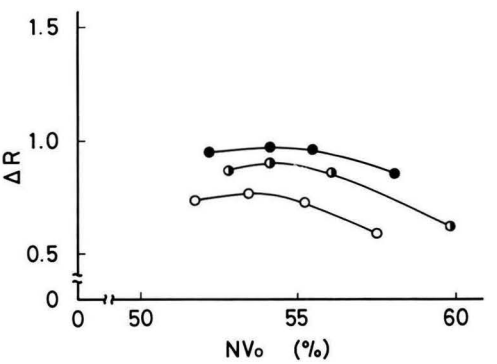

Figure 5—Relationship between ΔR and NV_o (NV at t = 0) for paints with different aluminum flake contents. ΔR is the difference between R_d (R after baking) and R_o. Flake content: ○—7.5% (Paint B), ◑—9.4% (Paint A), and ●—10.8% (Paint C)

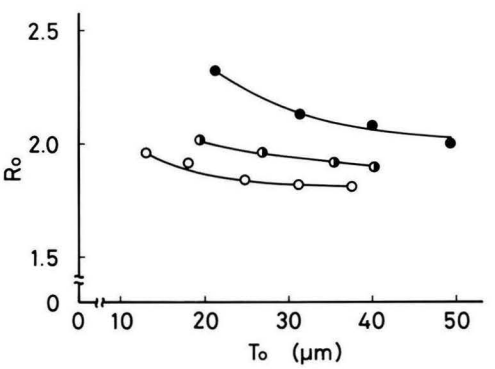

Figure 6—Relationship between R_o and T_o for paints formulated with aluminum flakes of different mean diameters. Flake mean diameter: ○—16 μm (Paint E), ◑—20 μm (Paint D), and ●—22 μm (Paint A)

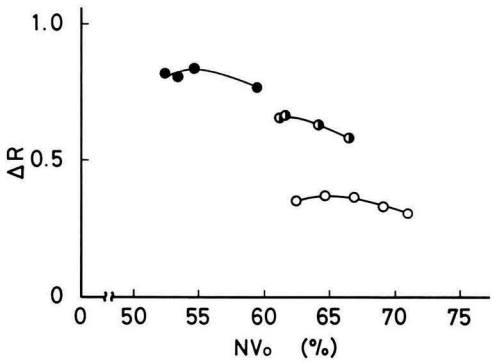

Figure 7—Relationship between ΔR and NV_o for paints formulated with aluminum flakes of different mean diameters. Flake mean diameter: ○—16 μm (Paint E), ◑—20 μm (Paint D), and ●—22 μm (Paint A)

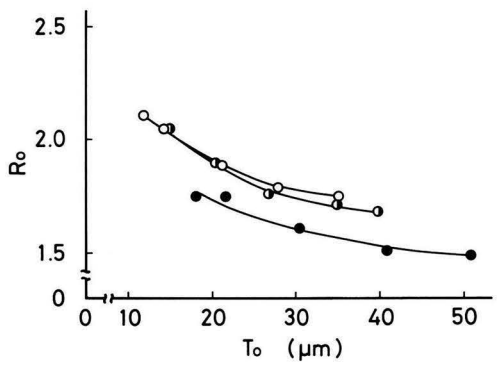

Figure 8—Relationship between R_o and T_o for Paint A sprayed at different spray viscosities. Spray viscosity: ○—1.7 × 10^{-2} Pa·s, ◑—2.4 × 10^{-2} Pa·s, and ●—3.8 × 10^{-2} Pa·s

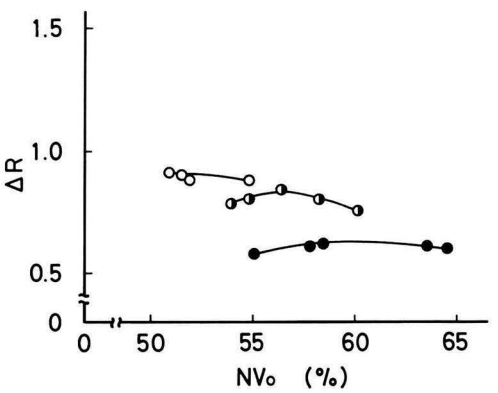

Figure 9—Relationship between ΔR and NV_o for Paint A sprayed at different spray viscosities. Spray viscosity: ○—1.7 × 10^{-2} Pa·s, ◑—2.4 × 10^{-2} Pa·s, and ●—3.8 × 10^{-2} Pa·s

Table 1—Typical Spraying Parameters

Spray viscosity	2.4 × 10^{-2} Pa·s (20 s Ford No. 3 cup)
Nonvolatile concentration at spray viscosity	20%
Paint flow rate	690 mL/min
Air flow rate	690 L/min
Open rate of air adjusting valve	5 rotations
Applied voltage	60 kV
Gun distance	30 cm
Length of stroke of reciprocator	1.4 m
Number of strokes of reciprocator	26/min
Conveyor speed	2.5 m/min
Number of coatings	1
Flash time	15 min
Spray booth temperature	25°C

face which traversed the spray pattern at a constant speed, and photographed at back-illuminating. The diameter and flake content were manually estimated for about 500 paint droplets on the slide. The flake content was defined as the area ratio of the flakes contained in a droplet.

RESULTS AND DISCUSSION

Effects of Aluminum Flake Pigmentation On R_o and ΔR

The effects of the content and size of aluminum flakes in metallic films on R_o and ΔR are distinguished from those of the orientation by plotting R_o and ΔR against T_o and NV_o, respectively. This is because R_o and ΔR depend on T_o and NV_o, respectively,[3] when only the flake orientation is different.

The relation between R_o and T_o for three silver metallic paints with aluminum flake contents of 7.5, 9.4, and 10.8% is shown in *Figure* 4. R_o increases as the flake content increases, and as T_o decreases. This implies that the highlight color lightness of the wet film immediately after spraying increases, and the shade color lightness decreases as the flake content in the film increases, and as T_o decreases.

The dependence of R_o on T_o is attributed to the orientation of aluminum flakes during spraying,[3] because the data for each paint are obtained by spraying the same paint at different conveyor speeds; actually, the content and size distribution of aluminum flakes in the film were unchanged. Immediately after spraying, aluminum flakes in wet film are oriented more parallel to the film surface or the substrate surface as the wet film thickness T_o decreases. The parallel orientation results from the spreading out of paint droplets on the substrate surface during spraying, that is, the parallel orientation occurs only when the wet paint film is thin enough to allow the droplets containing the flakes to penetrate and impinge on the substrate.

The relation between ΔR and NV_o for the three paints is shown in *Figure* 5. At a given NV_o, ΔR increases with aluminum flake content. This means that both the increment of the highlight color lightness and the decrement of the shade color lightness throughout the film drying process increase with the flake content in the film. All three

curves reach their maximum values at almost the same nonvolatile concentration NV_o of 53-55%.

The dependence of ΔR on NV_o can be explained in terms of competition between the parallel flake orientation and random orientation during drying.[3] Parallel orientation is caused by film thickness shrinkage due to the evaporation of the volatile from the wet film, while random orientation is caused by the disturbed movement of aluminum flakes under effects such as gravity and evaporative convection.[8] In the range above the critical nonvolatile concentration of 53-55%, the decrease in the nonvolatile concentration NV_o promotes only parallel orientation. This is because immediately after spraying, the film viscosity, which increases with NV_o,[3] is high enough to prevent the disturbed movement of aluminum flakes. However, in the range below the critical nonvolatile concentration, the decrease in NV_o favors random flake orientation over parallel orientation. This is because immediately after spraying, the film viscosity is not sufficiently high.

The relationship between R_o and T_o for three silver metallic paints formulated with aluminum flakes having mean diameters of 16, 20, and 22 μm is shown in *Figure* 6. R_o increases with increase in flake size and decrease in T_o.

The relationship between ΔR and NV_o for the three paints with different flake sizes is shown in *Figure* 7. ΔR increases at every NV_o with the flake size. Three curves of the paints reach their maximum values at different nonvolatile concentrations NV_o. The dependence of ΔR on NV_o is also interpreted in terms of the flake orientation during drying, as stated previously. The critical nonvolatile concentration which gives the maximum of ΔR decreases as the flake size increases. This suggests that the nonvolatile concentration, namely the film viscosity at which random orientation excels parallel orientation during drying, decreases as the flake size increases.

The effects of the content of the flakes in the films on R_o and ΔR cannot be distinguished from those of the flake size by plotting R_o and ΔR against T_o and NV_o, respectively. This is because both effects are almost the same as mentioned previously. However, they do not have to be differentiated, since changes in spraying parameters essentially result in the variations of both content and size in the films, as will be described in a later section.

Effects of Spraying Parameters on R_o and ΔR

The relationship between R_o and T_o for paint A under three spray viscosities is shown in *Figure* 8. R_o increases as T_o decreases. This is because parallel flake orientation is promoted during spraying. Also, R_o increases with decrease in spray viscosity. This is explained in terms of the increase in flake content, because the contents of aluminum flakes in the films applied at spray viscosities of 1.7×10^{-2}, 2.4×10^{-2}, and 3.8×10^{-2} Pa·s were 12.5, 12.0, and 10.9% by weight in the nonvolatile, respectively.

The relationship between ΔR and NV_o for these three spray viscosities is shown in *Figure* 9. The maximums occur at different nonvolatile concentrations NV_o. The dependence of ΔR on NV_o is interpreted in terms of the

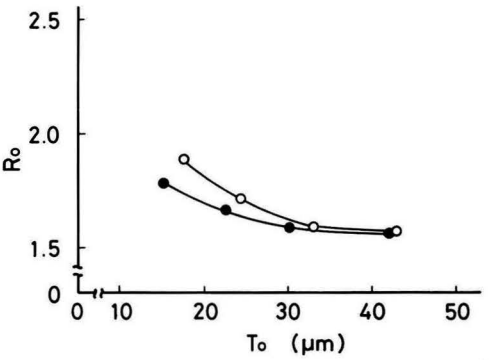

Figure 10—Relationship between R_o and T_o for Paint A sprayed at different applied voltages. Applied voltage: ○—0, and ●—60 kV

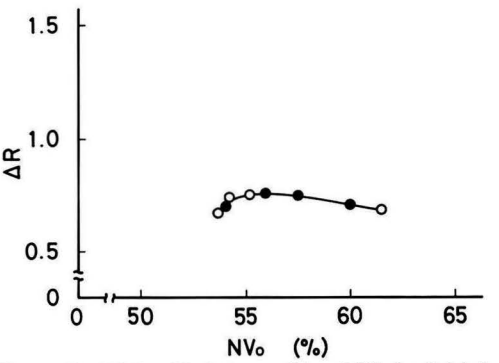

Figure 11—Relationship between ΔR and NV_o for Paint A sprayed at different applied voltages. Applied voltage: ○—0, and ●—60 kV

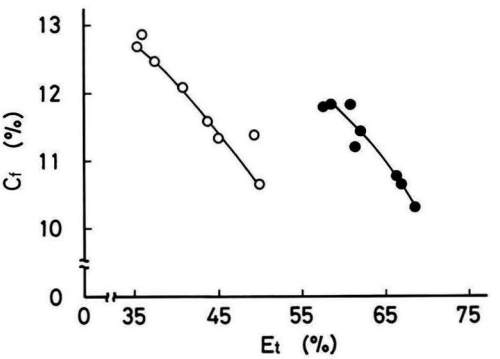

Figure 12—Relationship between aluminum flake content C_f in dry film and transfer efficiency E_t at different spraying parameters. Applied voltage: ○—0, and ●—60 kV

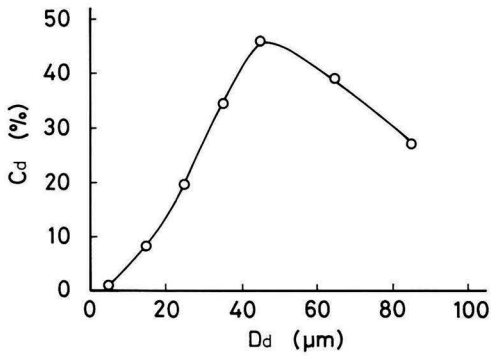

Figure 13—Relationship between averaged aluminum flake content C_d in paint droplet and paint droplet diameter D_d

previously mentioned flake orientation during the film drying process. ΔR increases at most of NV_o and the critical nonvolatile concentration decreases as the spray viscosity decreases. These correspond with the results obtained by the increase in the flake size rather than in the flake content, though the flake content in the film increases as stated. This suggests that not only the content, but also the size of the flakes in the film increases as spray viscosity decreases.

The relation between R_o and T_o for two applied voltages is shown in *Figure* 10. R_o increases due to the promotion of parallel flake orientation as T_o decreases. Also, the curve for the applied voltage of 0 is above that of 60 kV. This seems to be attributed to the increase in flake content, because the flake contents in the films sprayed at applied voltages of 0 and 60 kV were 12.2 and 11.5% by weight in the nonvolatile, respectively. It is possible that the increase in the size of the flakes in the film also contributes to the increase in R_o, since the increase in the content is essentially accompanied with that in the size, as will be described later.

The relationship between ΔR and NV_o for the previous two applied voltages is shown in *Figure* 11. The curves of the two applied voltages reach the maximum of ΔR at almost the same nonvolatile concentration of about 55%. The dependence of ΔR on NV_o is explained in terms of the flake orientation during drying. However, ΔR is almost independent of the applied voltage, though the flake content varies between 11.5 and 12.2% as mentioned previously. This is inconsistent with the result that the ΔR change is detected even when the flake content of only 0.5% is changed with spray viscosity. This may be because the effect of the content on ΔR is smaller than that of the size, and the size variation by change in applied voltage is too small for the variation of ΔR to be detected.

Effects of Spraying Parameters on Content of Aluminum Flakes in Film

The flake content in a dry film was evaluated by spraying paint A under various spray viscosities, paint flow rates, air flow rates, and applied voltages. The flake content in the dry film is always higher than that in the dry paint (9.4% by weight), as shown in *Figure* 12. This means that the flakes are concentrated in the film by spraying. The flake content in the film increased as the spray viscosity, the paint flow rate, and the applied voltage decreased, and as the air flow rate increased. Moreover, these changes in the spraying parameters resulted in decreasing the transfer efficiency, that is, increasing small droplets unable to deposit on a substrate.

The relation between the flake content C_f in the dry film and the transfer efficiency E_t is shown in *Figure* 12. The flake content increases as the transfer efficiency decreases. However, when the transfer efficiency is the same, the flake content is dependent on the applied voltage. Though all of the four spraying parameters influence the transfer efficiency, there is a difference between the effects of spray viscosity, paint flow rate, and air flow rate on the flake content and those of the applied voltage. The difference seems to be concerned with paint atomization; the former spraying parameters remarkably affect the paint atomization, but the latter, the applied voltage, hardly does.[9]

Distribution of Aluminum Flakes in Paint Droplets

The relation between the averaged flake content C_d in a paint droplet and the paint droplet diameter D_d is shown in *Figure* 13. The flake content has a maximum at a droplet diameter of about 45 μm. A micrograph of paint droplets shown in *Figure* 14 indicates that not only the content but also the size of the flakes in the droplet depends on the droplet diameter. The distribution of flakes in the droplets is roughly classified into three groups by the droplet diameter. Small droplets (D_d much smaller than 45 μm) contain only fine flakes or no flakes, and are very low in the flake content. Medium-sized droplets (D_d around 45 μm) usually contain coarse flakes, and are high in the flake content. Large droplets (D_d much larger than 45 μm) contain flakes of various sizes, but are not high in the flake content. These results provide evidence that good paint atomization, which forms medium-sized droplets and lots of small droplets,

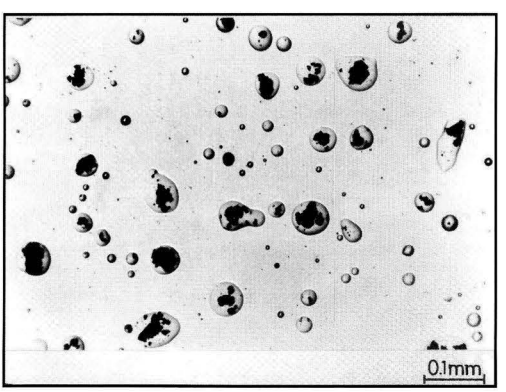

Figure 14—Distribution of aluminum flakes in paint droplets

instead of large droplets,[10] promotes the separation of the flakes and the vehicle. Also, the results prove that the flake content variation in the film is always accompanied with flake size variation. The nonuniformity of flake allotment to droplets is attributed to the flake size being not much smaller than the droplet size. This is supported by the fact that in the case of nonmetallic paint formulated with titanium dioxide (TiO_2) pigment of about 0.3 μm diameter, the TiO_2 content in the film is always equal to that in the paint;[11] if the TiO_2 allotment to droplets were not uniform, the TiO_2 content in the film would be different from that in the paint, and dependent on spraying parameters.

SUMMARY

Mechanisms of color variation in the spraying of metallic paints have been studied by measuring the variation of aluminum flake orientation in wet films with time, and by evaluating the content and size of aluminum flakes in paint droplets and films. The orientation was determined by the ratio R of the two L-values measured with a noncontact-type colorimeter equipped with a light source and two detectors at appropriately selected angles. The flake content in the film was evaluated by inductively coupled plasma emission spectroscopy. The distribution of the flakes in the droplets was estimated using a metallograph.

The integrated effects of the content and size in the films on color variation are distinguished from those of the orientation by plotting R_o and ΔR against T_o and NV_o, respectively. Here, R_o, T_o, and NV_o are the ratio R, thickness, and nonvolatile concentration of the wet film immediately after spraying, respectively; ΔR is the difference between the ratio after baking and R_o.

It was confirmed that the color variation by changes in spraying parameters resulted from the differences not only in the flake orientation, whose mechanism is provided in our previous paper, but also in the flake content and size.

The differences in the content and size of aluminum flakes are caused by the dependence of flake allotment to paint droplets on the droplet diameter, which is attributed to the flake size being not much smaller than the droplets size, and by the selective deposition of the droplets onto a substrate. Small droplets contain only fine flakes or no flakes, and cannot deposit on the substrate easily. Therefore, the promotion of paint atomization results in increase of both the content and average size of aluminum flakes in the film. Though the decrease of the applied voltage is almost ineffective against paint atomization, it suppresses small-droplet deposition, also resulting in the increase of both the content and average size of the flakes.

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OPEN FORUM

How to Start a Quality Program—Focus on Top Management And Total Employee Involvement

R. Edward Bish
Jamestown Paint & Varnish Co.*

Meeting present and future challenges in quality improvement will require management to take some new directions. The historical ways they have been approaching the quality improvement process have proven to be inadequate. They must start now to chart new courses. Where management and employees formerly faced many controlled situations, they are now facing an increasing number of situations that are complex and uncertain.

The purpose of this paper is to explore some directions which can be taken by a coatings manufacturer to combat these new and difficult challenges. Use of a proposed program and defining some principles of a continuous quality improvement program are used to convey possible new directions. Its goal is to outline a new course which will provide a framework for implementing continuing discussions about this complex problem.

Introduction

High quality performance and continuous improvement of products and services are the natural expectations of top management in any industry. Managers understand that they must have a quality product or the company will not exist for long. But, quite frankly, that statement does not set management's sights high enough. For it talks only about existing—about being a survivor, and this is not what management really wants. They want to be more than a survivor—they want and need to be winners. They want and need an effective business strategy which provides for business success and continuous improvement of product quality and services which exceeds that of their closest competition.[1]

In the mid 1980s, it was possible to find theories that would list the main ingredients for business success. An officer of the Dexter Corporation once said: "There are three main ingredients for manufacturing and also business success." There must be capital to provide for adequate facilities, and enough technology resources to efficiently perform the work in a favorable manufacturing environment. There must be people to efficiently use the fruits of the capital investment to produce the product. And, finally, quality must be achieved to assure that the resulting product will satisfy the expectations of the ultimate consumer on whose support the success of the business depends.

If companies are going to be successful, be winners, as they all desire to be, managers will need a completely different perspective of what is required for business success than what has come before. To effectively lead their company towards total continuous quality improvement, managers must know how to balance and respond to the voice of their customers, their employees, and their work environment.

"Yesterday's thinking in today's fast moving economy becomes obsolete very quickly."

—Abel Banov,
American Paint and Coatings Journal

Quality, it has been said, is never out of style. True enough, but in today's economic climate, it may be more accurate to say: Quality—consistent quality—is the basis on which we compete. Historically, many theories for business success placed quality—consistent quality—in the background or omitted it completely from a company's business plan. Many of the past quality programs were dull and boring to employees. Constant attention to details of processes and problems which appeared to yield low failure rates went against employees inherent desire for policies which required action or showed immediate results. Employees wanted to be heroes, they wanted to be winners.

Striving for continuous quality improvement cannot be allowed to become boring or routine. Management's challenge

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in today's economic climate is to create a work environment in which all employees will become more involved, more productive, and become winners. What managers need to provide is a continuous quality improvement process in which there are no boundaries, no fixed rules, no departmental restrictions, and where no one performs as the originator of all policies. For continuous quality improvement is not a department, nor a function, nor an organizational chart, but it is an attitude, a journey, a never-ending quest.

"Success is more attitude than aptitude."

—Bits and Pieces

We are all in favor of tradition and the proven way of doing things, but the past will not provide the answer to every situation. Often, top management is determined to "follow the book" for every procedure, no matter how great is the cry for innovation. While the familiar way of approaching problems may be right many times, it's never the right one all the time. People promoted to top management have shown their ability to navigate unchartered waters—to handle situations that have never existed before. Continuous quality improvement will not begin unless top management becomes involved. Management has to look around the corner in anticipation of the good things that await them once they develop a never-ending quest for excellence in employee involvement. They need to open more doors, strike better deals, invite their employees to work with them, if they want their organization to produce quality—consistent quality—in products and services.

Forming a company-wide program of quality improvement requires a change in old concepts. Instead of planning for survival, managers need to start planning for the following:[2,3]

(1) Training-education
(2) Teamwork
(3) Developing mission statements
(4) Pursuing meaningful goals

"You can clutch the past so tightly to your chest that it leaves your arms too full to embrace the future."

—Jan Glidewell

As the main ingredients for business success, earlier theories listed such items as the following:[2,3]

(1) Cost-effective purchasing
(2) Employing good people
(3) Having high technology
(4) Producing products
(5) Producing quality products
(6) Capturing market shares
(7) Excellent facilities
(8) Communications
(9) Customer satisfaction

What do these do? Are these goals?

Today, these should not be considered by management as goals, but as essentials for running a business successfully and as the means for achieving the goal of every company. They enable the company to make MONEY! But a company makes money because of its employees and their ability to produce quality—consistent quality—in products and services. Managers must work to embody the concept of continuous quality improvement within the total work environment.

Excellent quality, however, is not enough if management looks at it only as a destination—a plateau—a home run or a touchdown—where the process is complete. True excellence isn't a destination, it's an environment—a process of continuous implementation towards an ever-improving standard of excellence.

"Start by doing what's necessary, then what's possible, and suddenly you are doing the impossible."

—St Francis of Assisi

With global competition, sophisticated consumers, and a shrinking American work force, increasing employees' productivity and performance is one of the most critical responsibilities of top management. Managers who can empower employees to these higher levels of performance will be indispensable to their organization. Is there a common thread found in such indispensable managers? Is there a model to follow? Are there specific habits of these leaders that can be duplicated? The answer to these questions is an unequivocal YES. Exhaustive studies of good managers show that they are often unique, but they often share five particular qualities. These qualities have become the basic habits for indispensable managers.[4] They:

(1) Are goal driven
(2) Have good communication skills
(3) Act with a caring attitude
(4) Seek employee contributions
(5) Embody total commitment and involvement.

History has proven that the strongest leaders are the ones who exhibited the most clearly defined mission and that all of their motivation was self-motivation. Their actions have shown that you can't motivate another person to achieve. All you, as a manager, can do is create an environment that stimulates self-motivation.

"The only way of discovering the limits of the possible, is to venture a little past them into the impossible."

—A.C. Clark,
Profiles of the Future

To develop such a process, a plan of attack is needed, for top management will, of necessity, need to become "peak performers" themselves. An action plan, adapted from *The Secrets of Super Achievers* by Charles A. Garfield, of the University of California Medical Center in San Francisco, has been developed and is being proposed as the format for this plan of attack:

(1) Envision a Mission—"Peak Performers" have a long-range goal that inspires commitment and action.

(2) Be Results Oriented—be committed to results; work towards goals that contribute to the mission.

(3) Tap Your Internal Resources—develop the ability to see and use the expertise and knowledge of your employees.

(4) Enlist Team Spirit—get others to contribute to your performance.

(5) Treat Setbacks as Stepping Stones—there are always other avenues to explore—other ideas to test.

❶ Action Number One: Envision a mission. Have a long range goal.

The goal for any successful business is to make money, but it is necessary to look deeper into what are the circumstances which allow a company to meet this goal—to envision a mission.

"Whether a company is large or small, long-range strategic planning is one of the most important functions of its leader(s). If you don't know where you want your company to go, it certainly will never get there."

—Dr. Carl H. Hess,
Pennsylvania Leader
of the Year, 1988

The best results, when developing this concept, can be achieved by directly interbreeding total employee involvement with top management's quality program. When management starts with a broad statement of the company's mission, it should include

the basis for a continuous quality improvement program. This statement will identify broad strategic objectives for the corporation, which in turn will allow for goals and objectives for each department to be defined. There is a need for a mission statement that will inspire commitment and action. Several statements may be needed to adequately envision the mission. The following mission statements are examples of ones that convey the concept of the "action plan."

Our people are our most important resource—all of us will work diligently to ensure a stimulating and enjoyable environment in which our people can search for personal excellence and job satisfaction. The quality of our products (and services) is our second most important resource—all of us will work diligently to constantly improve that quality to ensure total satisfaction for our customers.

This new environment of employee oriented quality system will require a fundamentally different organization to work from that which has come before, as well as a different work force within that organization. The historical arrangement in which a few well trained individuals planned, implemented, and maintained the quality system does not meet the requirements of these mission statements.

The historical model (*Figure* 1) illustrates how new company policies were passed down to the employees and the buck stopped at the bottom. The employee was responsible for implementing a new policy without sufficient understanding and resources to produce what management desired. In many instances, employees would respond with indifference, confusion, and defiance. Why would employees respond favorably to policies in which they did not have any input, did not understand, or perhaps did not see the need for the company or themselves.

In this setting, employees could look forward to working at jobs that only required them to be able to learn some relatively simple tasks which would be repeated over and over—every job classification was rigid and employees performed like robots.[5]

"People need responsibility, they resist assuming it, but they cannot get along without it."

—John Steinbeck,
The Saturday Review

❷ Action Number Two: Be results oriented; be committed to results; work towards goals that contribute to the mission.

From this type of approach, it will be possible to translate objectives and tasks into key performance indicators or results. These can be displayed and monitored which will keep the employees informed about their progress in achieving an objective. These results will provide ready answers to two very basic questions regarding a continuous quality improvement program.

Are we doing what we said we would do?

How do we know that we are, indeed, getting better?

Some examples of key performance indicators which can be used to answer these questions are: schedule, budget, productivity, quality of work life, innovation, profitability, and growth. One such indicator can be a chart of the number of gallons produced on a monthly basis which is posted in the employees lunchroom. Another could be the total sales on a monthly basis.

By emphasizing the "bottom line," continuous quality improvement will have a clear purpose. Success can be measured, and this will make excellence in quality a legitimate activity within the confines of a company's budget. Posting quality performance indicators will provide a visible sign that top management considers quality to be an important part of the business. Quality issues do not just belong in the Quality Control Department where they have been pigeonholed in the past. To become a winner, to break through to higher and higher levels of excellence in quality, results must contribute to the mission. Personal participation by top management in setting up a budget for these activities will allow these concepts to be flushed out and implemented.

Think of your employees as an extension of your family—you're coach, motivator, manager, disciplinarian, and authority figure all in one, committed to developing all employees to their full potentials. "Goals are the prerequisite to achievement," says Louis Scott, Senior Vice President of Corporate Development with Management Recruiters in Cleveland, OH. "The astute leader helps people set goals compatible to those of their organization and then provides the tools for achievement."

Breaking goals into monthly, weekly, and daily activities helps reduce these overwhelming concepts. Activities help set exact job requirements of each person which in turn drives goals to completion.

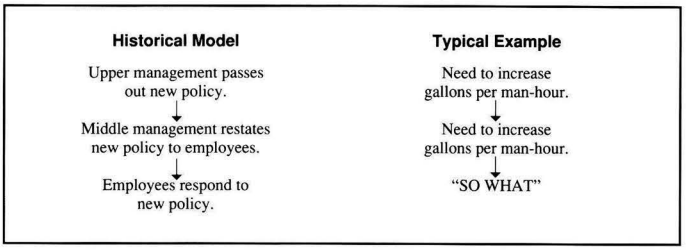

Figure 1—Historical Model

❸ Action Number Three: Tap your internal resources—have the ability to see and use the expertise and knowledge of your employees.

It needs to be recognized that the technologies upon which the coatings industry must continuously improve, and the customer needs to which they must continuously respond, are changing so rapidly that no chosen set of decision makers at the top can hope to keep up. Much of the relevant information lies below—among production people, middle management, R&D people, sales people, and all others who are in direct contact with the customers. There is just not enough time for all the relevant information to be collected, digested, and then passed down again in the form of new policies. With so much of the relevant information and expertise dispersed throughout an organization, top management cannot hope to be able to solve all the problems all the time. They need to provide an environment which causes individuals to be motivated to bigger and better things.

Individuals must motivate themselves and this will not occur in an environment where they feel threatened. All employees want a work environment where they can "do their thing." They want an environment that allows them to be appreciated while doing interesting work and being consulted about matters that affect them.

This new environment must include some essential concepts if top management wants to motivate employees and bypass their resistance to change.

Underlying Principles

EMPLOYEES WANT TO DO A GOOD JOB: Employees are the industry's most valuable resource, and they respond positively because they want to, not because someone tells them to.

PERSONAL INTEGRITY AND HONESTY WILL DICTATE ON-THE-JOB PERFORMANCE: Quality improvement is rooted in honesty. Employees should be charged with the responsibility of their individual conduct.

EVERYONE IS A SUPPLIER, PRODUCER, OR CUSTOMER: It must be stressed that all em-

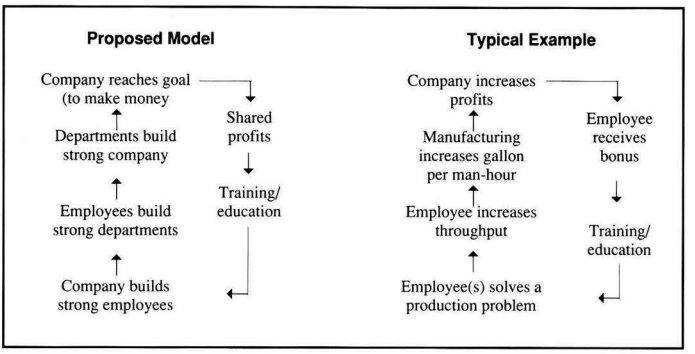

Figure 2—Proposed Model—"Quality in Motion"

ployees understand and believe in this concept from both an internal and external perspective.

THE NEEDS OF THE CUSTOMER WILL BE CONSIDERED ABOVE ALL OTHERS: This principle must be applied internally and externally. When employees are asked to respond to a question—to complete a task—to take responsibility, they are expected to respond in the same manner in which they would like others to respond to them.

EMPLOYEE TRAINING/EDUCATION MUST BE UNIVERSAL AND CONTINUOUS: Management should perceive employee training/education with a new perspective—that of total quality awareness. As key quality policy changes are undertaken, training must be provided to support employee involvement.

INCENTIVE PROGRAMS ARE USED TO SUPPORT ACHIEVEMENT: Incentive programs, as part of the quality program, must be structured to recognize every employee's achievements and contributions equally. These will help create enthusiasm, visibility, and the involvement process.

NEW DIRECTION IN THE PURSUIT OF EXCELLENCE IN QUALITY MUST BE ACCEPTED BY ALL: Improving excellence in quality is an attitude that places emphasis on the individual contributing to a team effort. This must be conveyed by management in such a manner that allows it to be universally accepted.

DEVELOPMENT OF A HIGH LEVEL COMMUNICATION SYSTEM: Establish an open-door policy at all times and talk with each employee personally and consistently. Challenge employees by using the "praise, discipline, praise" method of communication. Above all, management must act as a role model.

❹ Action Number Four: Enlist team spirit—get others to contribute to your performance.

Ideally, this new environment will allow individual skills to be integrated into groups, where the collective capacity to innovate becomes something greater than the sum of the parts. The net results of these many small scale adaptations is to propel the organization forward and, at the same time, make the employees more cohesive, more quality oriented, more involved, and more productive. Never before has the pressure for teamwork to solve problems and improve quality been so prevalent in the economy. Customers want it, and employees look at teams as a way to have their voices heard.

In an attempt to visualize this concept, a model was developed (*Figure* 2). As illustrated by the model, policies and procedures are in a constant state of motion—"Quality in Motion." There is no place for the buck to stop, but there are many places for employee opportunities and involvement. There is a new movement in quality improvement and it starts at the bottom with the employee. To recognize such opportunities, all employees must be trained-educated to think rather than just repeating learned information. Responsibilities must be pushed downward to the lowest level of competence. Employees must be permitted to formulate problems and questions and be allowed an active role in creating and proposing solutions.

The purpose of training is not simply to impart knowledge, but also to change employees' behaviors. Organizations can no longer rely solely on technological innovations to increase employee productivity. Successful training programs must teach participants new behaviors, thereby enabling them to join the team and to better perform their assigned tasks. Before an organization implements a training program, it should thoroughly assess its training needs. It is very important to keep in mind that training and education needs are not limited to production employees. For example:

(1) Top management training should address employee motivation, middle management informational needs, company missions, and the activities of its closest competitors.

(2) Middle management and supervisors training should address management skills necessary for promotions, informational needs, goals, and objectives of the company.

(3) All other employees need a general overview of how all jobs are related to their own, the functions of other departments and how they relate to one another, and why their jobs are important to the activities of the organization.

Creating this value-added employee relies on management accepting and improving their contributions. For top management, this will mean continually training or educating all employees for more complex tasks, automating in ways that cut out the majority of robotic tasks, enhancing employee flexibility and creativity, diffusing responsibilities for innovation downward, taking seriously employees' concern for job security, and giving employees a stake in improved productivity via profit-linked bonuses and awards for their contributions. For employees, this will mean they must accept flexible job classifications and work rules, agree to wage scales that are linked to profits and productivity improvements, and generally take responsibility for the soundness and efficiency of their role in the company.

"The world is moved not only by the mighty shoves of the heroes, but also by the aggregate of the tiny pushes of each honest worker."

—Helen Keller

Since the proposed model relies heavily on employee contributions, it is necessary for management to make some real commitments to the development of this new environment and the enlistment of team spirit. Management must:[6]

(1) Allow the program to flourish and grow.

(2) Allow employees to talk freely with management.

(3) Implement employee suggestions, thus maintaining their involvement.

(4) Improve employees' quality of life.

(5) Improve employees' knowledge in all relevant areas.

(6) Improve employees' personal gain through profit sharing.

(7) Maintain a low turnover rate of good, experienced employees, for they produce a stable quality of work habits.

❺ Action Number Five: Treat setbacks as stepping stones—there are always other avenues to explore—other ideas to test.

Management must provide help for the employees in gaining experience of work-

ing through problems and discovering underlying principles that will help them define and solve related problems. An employee who discovers the underlying principles and patterns of problem-solving techniques will be able to discover other relevant information. This stepping stone will give the new information added content and meaning, which, in turn, permits deeper insight into other principles and patterns.

Today, a higher portion of employees are prepared for more productive lives than ever before, but there are still a large number who cannot do simple calculations, understand written directions, or read signs or charts. Whatever the cause for these learning deficiencies, it is a challenge for management to raise their level of productive competence. Achieving basic numeracy and literacy is only one small stepping stone for employees. They must also be prepared to take advantage of whatever opportunities present themselves for improvement in product and service. They will need to learn how to seek out and accept criticism from their fellow workers, to solicit help and, whenever appropriate, to give credit to others. They will need to learn to negotiate—to articulate their own needs, to discover what others need, to see things from another perspective, and to discover mutually beneficial outcomes. They need to become trained in a structured approach to problem solving, to use their setbacks as stepping stones to a more productive future.[7]

"Because of the absolutely crummy job that we're doing in education, our kids aren't getting the tools they'll need to compete, and we'll pay a stiff competitive price for that for a lot of years to come."

—Lee A. Iacocca

In developing and supporting a structured approach to problem solving, management imposes a discipline which helps employees avoid some frustrating detours. An employee-originated solution will not succeed if it turns out that it was based on false assumptions. In this way, management makes the trip a little shorter—fewer stepping stones. A learned sequence of steps to follow in problem solving greatly enhances the solution to a problem. One such sequence of steps, as adapted from the Juran Institute, is:[8]

(a) Prove that there is a need.
(b) Identify the problem.
(c) Plan to guide the project to solution.*
(d) Determine causes.
(e) Put new policy in place.
(f) Overcome resistance to change.
(g) Operate at the higher level of quality.

* A project is a problem scheduled for solution.

"The difference between the impossible and the possible lies in a person's determination."

—Tommy Lasorda

Conclusion

The concept, as shown in the proposed model, is easy, but the implementation will prove to be difficult. Management's involvement will change the way an organization operates. Communication will need to be improved, individual and team ideas will need to be implemented, and employee training on problem solving techniques will need to be developed.

Obtaining middle management's commitment to the new policy will be a real challenge, for although commitment can be merely verbal, involvement requires action. It cannot be allowed to be passed on to others and it cannot be allowed to be legislated. Middle management must overcome their inherent fear that they will be losing authority.

Management can help middle management and others grow by telling them what they are doing wrong and give constructive criticism by using the following five phrases (adapted from Karen Jorgensen, Jorgenson and Associates, La Crescenta, CA):

- I See—describe specifically their actions.
- I Feel—specify the impact or results of their actions.
- I Want—request assertively what you want done differently in the future.
- You Feel—pause to listen to what they say and paraphrase what you hear.
- We Need to Because—establish the consequence, monitor, and follow-up.

Top management must come to the realization that they are the cohesive force which binds this program together. They must also realize that obtaining significant results will take time. There will be very few near-term payoffs to encourage them, but rather, gradually, employees will see that they do make a difference.

To start eliminating the problems, the following are suggested as the initial actions:

(1) Develop mission statement(s)—get everyone involved.
(2) Rewrite business plan to include mission statement(s).
(3) Provide training for middle management.
(4) Provide training-education for all employees.
(5) Organize problem solving teams.
(6) Set goals; corporate, departmental, and individual.
(7) Use employee evaluations to determine improvements.
(8) Identify the performance indicators.
(9) Provide awards for innovation or suggestions.
(10) Share profits with employees based upon meeting goals.
(11) Provide quarterly meetings with top management for employees.

Indispensable quality management is a mind-set, an inner game played within every peak performer, every high achiever. A manager's willingness to allow the quality program to grow, to get personally involved, to invest the needed time and money, and to be totally focused on performance is not found in any book. Therefore, before any changes in an organization can occur, total commitment coupled with an action plan is a must.

It should be noted that organizations implementing a quality program admit that the process evolves over time. From meager beginnings, the program matures through refinement and expansion to integrate with the very core of an improving organizational mission. Ultimately, these organizational improvements are reflected in improved products and services.

Top management must envision a mission, they must have long-range goals that inspire commitment and action. Most of all, they should realize that employees will respond, once they prove by example that they are involved, that the company is willing to invest what is necessary to accomplish the challenge at hand, and demonstrates that they are willing to be patient.

Does your top management have the will to make the needed investments and undertake the necessary changes? Will they put "Quality in Motion"? Will they become a "Peak Performer"? Much will depend on the extent to which they consider themselves an organization which is not just a survivor but a winner. In making this decision, they should remember that only winners are going to be the survivors.

"Improve Quality... You automatically improve productivity... You capture the market with lower prices and better quality... You stay in business and you provide jobs... So simple."

—W. Edwards Deming[9]

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Society Meetings

BALTIMORE ..... APR.

"Media Mills"

The meeting's speaker, Ron Starkey, of CB Mills, presented a talk on "MANUFACTURING IN CLOSED SYSTEMS IN MEDIA MILLS TO MEET VOC REGULATIONS."

Mr. Starkey stated that manufacturing higher viscosity mill bases and VOC emission reduction at the point of manufacture are two concerns which have been brought about by low VOC coatings.

The speaker explained the many reasons for choosing a specific media. Examples of media discussed were sand (inexpensive, abundant, and relatively spherical), glass (spherical, easy on mill parts, and easy to clean up), ceramics (spherical, aggressive, and a compromise between glass and steel), zirconium-oxide (dense and expensive), steel shot (dense, cheap, and may discolor or gray), and steel balls (dense, spherical, and expensive) Mr. Starkey said the rule of thumb is to choose the smallest, lightest media that will get the job done. This type of media is generally the least expensive.

Mr. Starkey reported that because of their higher viscosity, low VOC coatings typically require higher density media.

An explanation of the open vertical mill and the media size were discussed in detail.

The speaker stated that the reduction of VOC emissions at the point of manufacture is important. He reported that attempts have been made to enclose the open vertical mill. Fume guards and covers, vapor recovery, and seal kits are examples of attempts to reduce the emission of VOCs.

Mr. Starkey said another alternative is horizontal mills, which provide intense grinding because they have fixed chamber volumes and the ability to operate with higher disc speeds. Furthermore, all horizontal mills are sealed and can handle higher viscosity and thixotropic formulations. He explained that this type of mill can pay for itself by reducing or eliminating multiple passes or by getting extra mileage out of expensive pigments.

The speaker discussed a piece of equipment designed to ease environmental problems in the factory.

JOHN S. KURNAS, *Secretary*

BIRMINGHAM ..... APR.

"Powder Coating"

Yves Merck, of U.C.B. Ltd., Belgium, spoke on "POWDER COATING—A RESIN PRODUCER'S APPROACH."

Dr. Merck began his presentation with an historical background of powder coatings, and an overview of the toxicological effects of TGIC. He stated if proper industrial practices are observed TGIC does not pose a risk to workers. He explained the results from invitro and invivo testing.

The speaker said that alternatives to TGIC powder coatings are available. He then compared four of these TGIC alternatives. Included among the performance characteristics discussed in detail were gloss, weathering, and color.

In conclusion, Dr. Merck said that TGIC, for the time being, will retain its position in the market place. This is because the toxicological data on most of the alternatives is insufficient and they have no proven track record.

Also, he cautioned that different applications may require different systems.

DAVID C. MORRIS, *Secretary*

CDIC ..... MAY

"Defoamers"

The Nominating Committee slate of officers for the 1992-93 year was announced by N. Jay Huber Jr., of Paint America Company. Elected to serve as Society Officers for the upcoming year are: President—Alipio R. Rubin Jr., of Rubin Dispersions; Vice President—Paul R. Guevin Jr., of P.R. Guevin Associates; Secretary—Jeffery I. Buchman, of Akzo Coatings, Inc.; and Treasurer—Alan L. Machek, of Dow Corning Corporation.

Elected to serve as Society Representative to the Federation's Board of Directors is Bill M. Hollifield, of Perry & Derrick Company, Inc.

The meeting's technical program speaker was Philadelphia Society member Kenneth Breindel, of Henkel Corporation. Mr. Breindel's topic was "DEFOAMERS—THEORY AND PRACTICE."

The presentation included overhead transparencies depicting the mechanism by which a surfactant stabilizes a foam and, more important, the mechanism by which a defoamer interferes with those stabilizing forces and, thereby, defoam.

Next, Mr. Breindel explained some of the common-sense guidelines, rules, and chemistry for breaking bubbles.

According to the speaker, the principle function of defoamers is to accelerate the rate of drainage of water from the bubble wall and initiate rupture of the bubble. He stated that a defoamer can do this in a number of ways.

Mr. Breindel said that defoamers compositions have three components: a primary liquid such as mineral oil or silicone; an emulsifier/wetting agent; and a tertiary component, a catch-all. He reported that a defoamer must be insoluble in the system to function. Also, defoamers have low surface tension, but exhibit high interfacial tension.

The speaker explained the five mechanisms by which defoamers work. They include the use of a hydrophobic solid, such as a silica that has been treated with a silicone; competition for a surfactant by a second liquid phase; the use of an antagonistic surfactant, such as an ester or negative beta coefficient or interaction coefficient; an *in-situ* hydrophobic solid formation, such as a fatty acid; and low surface tension liquids, such as alcohols.

Q. Do you have a mechanism theory for an antifoam activity or a defoamer?

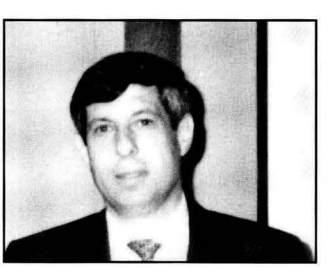
A. When two bubbles in the bulk start to coalesce, they form a larger bubble that rises to the surface due to buoyancy and breaks. This activity is referred to as an antifoam activity as there is a lack of a generation of foam. All mechanisms described previously come into play.

Q. Is there a preferred way to store defoamers?

A. We recommend recirculating defoamers or stirring them in drums while being stored.

The meeting's educational speaker was Wade Allen, of the Dayton Museum of Natural History. Mr. Wade's talk focused on "A VOYAGE THROUGH THE SOLAR SYSTEM."

PAUL R. GUEVIN JR., *Secretary*



CDIC TECHNICAL SPEAKER—Kenneth Breindel explains "Defoamers" at the May meeting of the CDIC Society

CHICAGO SOCIETY PAST-PRESIDENTS—Attending the Society's Awards Night meeting are (from left): Theodore J. Fuhs, Richard M. Hille, Karl E. Schmidt, Carroll M. Scholle, Evans Angelos, Kevin Murray, Raymond Pfohl, Ross C. Johnson, Milton A. Glaser, Robert W. Zimmerman, Thomas J. Daly, Edward W. Boulger, Warren C. Ashley, James Patterson Jr., and Layton F. Kinney

CHICAGO ..... MAY

Awards Night

A total of 18 Society Past-Presidents attended this Awards Night meeting, including: Milton A. Glaser, Federation Honorary Member (1945-46); Warren C. Ashley, Consultant (1954-55); Carroll M. Scholle, Federation Honorary Member (1957-58); James Patterson Jr. (1961-62); Victor M. Willis, of Ace Hardware Corporation (1965-66); Edward W. Boulger, retired (1967-68); Raymond Pfohl, retired (1968-69); Thomas J. Daly, of Ace Hardware Corporation (1969-70); Robert W. Zimmerman, retired (1973-74); Gus W. Leep, of Seymour of Sycamore, Inc. (1975-76); Walter J. Krason, of The Valspar Corporation (1978-79); Richard M. Hille, of The Tru-Test Manufacturing Company (1980-81); Layton F. Kinney, of The Sherwin-Williams Company (1982-83); Ross C. Johnson, of The Valspar Corporation (1985-86); Evans Angelos, of OMYA, Inc. (1988-89); Kevin Murray (1989-90); Karl E. Schmidt, of Premier Coatings (1990-91); and Theodore J. Fuhs, of The Tru-Test Manufacturing Company (1991-92).

The new Society officers were introduced as follows: President—William W. Fotis, of The Valspar Corporation; Vice President—Gregory E. McWright, of Angus Chemical Company; Secretary—Patricia J. McGrath, of Ashland Chemical, Inc.; Treasurer—Natu C. Patel, of Ace Hardware Corporation; Membership Committee Chairman—C. David Stromberg, of Standard T Chemical Company; and Associate Representatives—Joseph J. Polak Jr., of Henkel Corporation, and Lori Hilson-Gaede, of T.H. Hilson Company.

Mr. Angelos will serve as the Society Representative to the Federation's Board of Directors.

Mr. Fuhs, Immediate Past-President, presented Mr. Fotis with the Society Gavel.

Gerald G. Kraft, of Kraft Chemical Company, was presented with his 50-Year Pin for a one-half century of dedicated service to the Society.

Mr. Schmidt presented the Society's Outstanding Service Award to Mr. Polak for his dedicated work on behalf of the Society. His Society service includes: Chairman of the Coating Course; Associate Representative; Past-Chairman of the Educational Committee; and a member of the Golf Committee and Golf and Tennis Outing Committee, and the Christmas Party Joint Committee.

Educational Committee Chairman Lori-Hilson Gaede awarded merit Scholarship Certificates and checks to Kevin Rudny and Michelle Max.

Mr. Krason presented grant-in-aide scholarships and checks, in behalf of the Chicago Paint and Coatings Association and the Chicago Society, to: Marc Rosenthal, Hansel Flores, April Truskowski, Sean Daly, and Michelle Miskewich.

CLIFFORD O. SCHWAHN,
Publicity

CLEVELAND ..... APR.

Art Restoration

The meeting was attended by 18 former Society Presidents. The group included: Sam Huey, Society Honorary Member (1949-50); Michael W. Malaga, Federation Honorary Member (1956-57); Robert M. Evans, retired (1960-61); Robert S. Taub, retired (1963-64); Kenneth C. Waldo Jr., retired (1965-66); Victor G. Sandorf, of Coatings Development Company (1967-68); Tom H. Keene, retired (1975-76); Fred G. Schwab, of Coatings Research Group, Inc. (1976-77); Helen Skowronska, Society Honorary Member (1977-78); Charles K. Beck, retired (1978-79); Paul J. Houck, of White Rubber Corporation (1979-80); Jack Malaga (1980-81); Carl J. Knauss, of Kent State University (1981-82); Harry A. Scott, retired (1983-84); Scott E. Rickert, of nanoFILM Corporation (1985-86); R. Edward Bish, of Jamestown Paint & Varnish Company (1988-89); Ilona Nemes-Nemeth, of The Sherwin-Williams Company (1989-90); and Richard J. Ruch, of Kent State University (1990-91).

The slate of nominated officers for 1992-93 is: President—Roy A. Glover, of The Mahoning Paint Corporation; Vice President—Freidun Anwari, of Coatings Research Group, Inc.; Secretary—Constance F. Williams, of The Glidden Company; Treasurer—Michael A. Wolfe, of Seegott, Inc.; Assistant Treasurer—Richard A. Mikol, of Tremco, Inc.; Member-at-Large—Robert L. Toth, of The Glidden Company; and Society Representative—Brenda L. Carr, of Coatings Development Company.

Dr. Ruch, Chairman of the Awards Committee, presented Mr. Bish the Society's Award of Appreciation in recognition of his valuable service in assisting in areas of routine operation of the Society.

Ms. Carr presented Royal E. Odell, of Kool Seal, Inc., with his 25-Year Pin signifying a quarter century of membership in the Society.

Bruce Christman, of the Cleveland Museum of Art, focused on "PEERING THROUGH THE HAZE."

The speaker discussed techniques in art restoration. He began his talk by stating the two major purposes of art conservation: preservation of art through relative humidity control, atmospheric cleanliness, and display case design; and restoration of art damaged due to accident or poor environment.

Mr. Christman then proceeded to describe the structure of paintings in the western tradition. He noted that the final step is coating the painting with varnish to add brilliance and gloss, and to provide protection.

The speaker stated that coatings defects can affect the way people interpret the art. He described several ways to repair damaged varnish layers. Mr. Christman explained that the most dramatic restoration technique is the removal of the entire varnish coat with a solvent that does not dissolve the underlying paint.

It was noted that often an artist's technique can hinder the restoration process.

Also, Mr. Christman pointed out that coatings can be used on other types of art objects.

In conclusion, the speaker stated that, ideally, restoration of art objects should always be reversible. A restored area will usually age and change appearance in a different manner than the original materials used by the artist. Subsequent restorations must be able to remove these areas to maintain the integrity of the original work.

Q. Does restoration of objects where the coating is an integral part of the object,

such as Chinese lacquerware, present problems?

A. Yes, the substrate, wood or cloth, can be affected by changes in relative humidity causing swelling and contraction which cracks the lacquer. Also, UV radiation will change the lacquer chemically so that it becomes more soluble.

Q. Do you think that the trend away from heavy metal pigments, for example, cadmium, will detract from future stability?

A. No, the newer pigments tend to be more light stable than older pigments such as copper arsenate which fades.

FREIDUN ANWARI, *Secretary*

GOLDEN GATE ..... APR.

"Waterborne Coatings"

The meeting's speaker was Northwestern Society member Rich Johnson, of Cargill, Inc. His topic was "NEW DEVELOPMENTS IN WATERBORNE COATINGS."

The speaker reported that today's VOC regulations and HAPS legislation mandates have led to continued research and development of reference toward zero VOC. New technology in waterborne resins, such as modified polyolefin resins, water dispersion technology, and higher solids (with lower VOC), was discussed. Also presented were formulation guidelines and performance limitations.

DONALD E. NOLTE, *Secretary*

LOS ANGELES ..... MAY

"Total Quality"

A moment of silence was observed in memory of Society member Geneva H. Wells, of H.M. Royal of California, Inc., who died recently. Ms. Wells was Chairman of the 1993 Western Coatings Societies' Biennial Symposium and Show.

Awards Committee Chairman Parker Pace, of Behr Process Corporation, presented 25-Year Pins to: Harry J. Smith, of John K. Bice Company, and Secretary Philip C. Bremenstuhl, of Ashland Chemical, Inc.

Members scheduled to receive their 25-Year Pins but not present at the meeting include: Adrian S. Adkins, of Schoofs, Inc.; Ronald E. Belanger, of Precision Labs.; Jim L. Elder, of Sequoia Paint Company, Inc.; Richard Hageboeck, of HAC, Inc.; Arnold H. Hoffman, retired; Emanuel K. Kejzlar, of BASF—C&I Division; Bob Renfro and Don Smith, of TCR Industries, Inc.; Joe Tamura, of Imperial Coatings Company; Jim F. Thomas, of Spectra-Tone; and Jonathan C. Woods, of Corechem Corporation.

Also, Mr. Pace presented Outstanding Service Awards for 1992 to the following members: Maurice Samson, retired, for his long and outstanding performance as the Audit Committee; Melinda K. Rutledge, of Rheox, Inc., for her dedicated service to the Society; and Dave Muggee, of E.T. Horn Company, for his service as Chairman of the Environmental Affairs Committee.

"SUPPLIER TOTAL QUALITY was the focus of a presentation delivered by Doug Smith, of McWhorter.

The speaker compared the quality of finished coatings to the quality of raw materials specified in the formula. He stated that some form of supplier quality program is needed at every company that manufactures a high quality product.

Mr. Smith described McWhorter's process goals, preferred supplier rating, performance certification aspect, and performance criteria.

Q. Give us an example of the five major quality control requirements you feel one of your polyester resins should meet.

A. Solids, viscosity, color, cure, and hydroxyl number should be reviewed regularly on polyester resins.

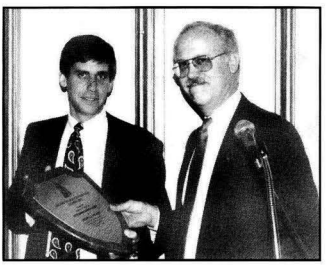
Q. How often must a supplier improve a product or get a cost savings in order to maintain his preferred status?

A. This is a process designed to establish partners who will work together closely on a continuous basis.

Q. Do you blend off-spec material into a fresh batch?

A. Yes, when the quality of the finished product will not be compromised.

PHILIP C. BREMENSTUHL, *Secretary*



OUTSTANDING SERVICE—Joseph J. Polak Jr. (left) accepts a plaque from Karl Schmidt in honor of being named recipient of the Chicago Society's Outstanding Service Award

NEW ENGLAND ..... APR.

"Thermoset Coatings"

Nominated to serve as Society Officers for the 1992-93 year are: President—Joseph H. Weinberg, of Stahl USA; Vice President—John P. Lukens, of D.N. Lukens, Inc.; Secretary—Charles Shearer, of ICI Resins US; and Treasurer—Joanne Monique, of Ashland Chemical, Inc.

Loren Hill, of Monsanto Chemicals, Inc., gave a presentation on "CHARACTERIZATION OF THERMOSET COATINGS BY DYNAMIC MECHANICAL ANALYSIS (DMA)."

Dr. Hill discussed the advantages of DMA, including: the separation of viscous and elastic responses, temperature, frequency, the establishment of structure property relationships, and automated instrument availability.

In conclusion, the speaker stated that DMA is useful for determining cure response, crosslink density, cure methods, and structure properties, including optimizer of oligomer structure and selection of coreactants.

Q. If you change the solvent to DMF from methylene chloride, what happens?

A. The swelling changes, but you come up with the same answer.

JOANNE MONIQUE, *Secretary*

FORMER PRESIDENTS OF THE CLEVELAND SOCIETY—Past-Presidents in attendance at the April meeting include, top (from left): Richard J. Ruch, Michael W. Malaga, Paul J. Houck, Carl J. Knauss, Charles K. Beck, Kenneth C. Waldo Jr., and Edward R. Bish. Bottom: Victor G. Sandorf, Helen Skowronska, Ilona Nemes-Nemeth, Robert S. Taub, Harry A. Scott, and Sam Huey

NEW YORK ..... APR.

"Powder Coatings"

Technical Committee Chairman Larry Waelde, of Troy Chemical Corporation, announced that papers are needed for the Society's Technical Symposium scheduled for May 1993, in Atlantic City, NJ.

Environmental Committee Chairman Sidney J. Rubin, of Empire State Varnish Company, Inc., reported on the local opposition to New York City's request for a waiver of pre-emption and a ban on Department of Transportation approved trucks from delivery and pick-up of flammable and hazardous materials.

By-Laws Committee Chairman Kenneth J. DePaul, of Whittaker, Clark & Daniels, Inc., presented the first reading of a number of amendments designed to reduce the inequities between Active and Associate members. A final vote was scheduled for the May meeting.

A talk by Charles Danick, of Cargill, Inc., on "POWDER COATINGS IN THE 90s" focused on powder coating chemistries in the U.S.

The speaker explained that these powder coating chemistries have resulted in the following technical advances: clear coatings, low-temperature-cure coatings, low-gloss coatings, exterior-durable coatings, and thin-film coatings. Mr. Danick said that the advances determine the direction of the markets in which powder coatings are used.

Also discussed were the recent growth of the powder coatings industry and the advances being made in particular coatings chemistries.

Mr. Danick explained the key advantages of powder coatings technology. They are: compliance with environmental requirements; disposability in landfills (with leachate testing); absence of solvent, odor, and fire hazards; absence of expensive hazardous waste disposal; reuse of overspray, resulting in a use efficiency of 90-95%; less oven exhaust, reduced energy, and lower labor costs; less rejects on lines that produce 400,000-500,000 lbs/yr; less housekeeping because of lower clean up costs (vacuuming); automated operation; expanding markets in the U.S. and Europe; and application in the appliances, auto finishing, and architectural markets. Other advantages include greater impact resistance, 1000 hour salt spray, etc. for formulations evolved from coil coatings.

It was stated that the primary polymer systems used in powder coatings are polyurethanes, and hybrids which are popular in Europe. The speaker defined hybrids as polyesters cured with epoxies; acrylics also can be included in this category.

Mr. Danick said that powder coatings are increasing at a rate of 12% per year compared to 2.4% growth rate for the conventional liquid coatings.

Also, he stated that advances are being made in areas of auto topcoats where polyesters are capable of five-year exterior durability without a significant loss in gloss.

In conclusion, Mr. Danick stated that new chemistries are being developed which will eliminate all VOC emissions. Also, significant advances are being seen in clear powder coatings. Another goal of the future is to eliminate petrochemicals completely and utilize biochemical feedstocks.

Q. Why are hybrids more popular in Europe that in the U.S.?

A. Since epoxy resins are much more expensive in Europe than in the U.S., other means of curing were needed. Also, hybrids have advantages in overbake resistance which is particularly useful in appliance coatings. They can even be used outdoors in northern Europe where there is less UV.

Q. What challenges are left for powder coatings?

A. One of the biggest problems is with organic pigments which cannot be wet in the powder system. Quinacridone, carbozol, phthalocyanine, etc. are very difficult to disperse pigments normally and are much more difficult in powders.

ARMAND J. STOLTE, *Secretary*

PAST-PRESIDENTS' NIGHT—A total of 19 former Society Presidents attended the New York May meeting. The group includes: seated (from left)—Alfred A. Sarnotsky (1975-76), George J. Dippold (1977-78), Moe Bauman (1958-59), Herman J. Singer (1968-69), John J. Oates (1961-62), and Marvin Wexler (1971-72); standing—Arthur A. Tracton (1989-90), William Singer (1976-77), Donald E. Brody (1981-82), Kenneth J. DePaul (1986-87), Raymond P. Gangi (1985-86), Michael Iskowitz (1984-85), Theodore Young (1982-83), Herbert Ellis Jr. (1983-84), Marvin J. Schnall (1980-81), Roger P. Blacker (1990-91), Saul Spindel (1978-79), Irwin H. Young (1988-89), and John W. Burlage (1987-88)

NORTHWESTERN ..... MAY

"Waterborne Polyurethanes"

The first speaker was Paul Hoffman, of Miles, Inc. His topic of discussion was "WATERBORNE POLYURETHANES."

The speaker focused on the three types of waterborne polyurethanes: dispersions, moisture cures, and two-component products.

It was reported that dispersions are based on fully reacted systems which are dispersed in water, and cured through coalescence. A characteristic of dispersions is low solvent or solvent-free, which makes them environmentally (or low VOC) acceptable. Other properties include relatively low viscosity at relatively high molecular weights, one-component application, low temperature physical drying, and typical polyurethane performance.

Detailed explanations on the most commonly used isocyanates used in dispersions, typical properties for polyurethane dispersions, the problems associated with using polyurethane dispersions, and applications for polyurethane dispersions were presented.

Mr. Hoffman described moisture-curing waterborne polyurethanes as water-dispersible polyisocyanates. He said they are aromatic, low in viscosity, and supplied at 100% solids. Their benefits include no VOC and water dispersibility.

According to the speaker, the introduction of two-component waterborne polyurethane technology is scheduled for late 1992. The overall properties of these products are very similar to conventional solventborne polyurethanes.

Q. What level of hydroxy functionality is necessary for the two-component products?

A. Polymers with molecular weights of 200 to 2500 have been looked at. A typical NCO/OH blending ratio is 2/1.

The second speaker was Edward Orr, of Byk-Chemie, who gave a talk on "IMPROVEMENT OF CORROSION PROPERTIES OF COATINGS USING WETTING AND DISPERSING ADDITIVES."

The speaker stated that 66% of additives cause a decline in corrosion resistance. However, 20% of additives improve corrosion resistance.

Mr. Orr said the primary purpose of additives is to make a mixture homogenous. During pigment dispersion, the goal is replacement of the gas (air)/solid interface with a liquid/solid interface.

The speaker discussed anticorrosive additives and their functions. He reported that anticorrosive additives are typically electroneutral or anionically controlled flocculating additives.

In conclusion, Mr. Orr stated that the improvement of corrosion resistance is system dependent. Also, it is necessary to optimize the dosage of additive used in a given product. He said that above the optimum level, a trade off of one property for another is realized. In general, anticorrosive additives have low molecular weight, possess acidic functionality, and have polar or hydrophilic structures.

SARAH E. OEBSER, *Secretary*

PIEDMONT ..... MAR.

"Quality Management"

Environmental Affairs Committee Chairman James E. Husted, of Husted & Associates, reported that the Air Toxic regulations are beginning to have an impact. He stated that reapplication must be made for air permits. According to Mr. Husted, many of the VOC emissions and calculations that are now supplied on MSDS sheets will not meet the new calculations of the states involved, and more specific numbers will be required. In conclusion, he said that formulations that are proprietary will have to be "eased up on" because certain data on air toxics must be released.

Russell Justice, of Eastman Chemical, presented a talk on "QUALITY MANAGEMENT."

Mr. Justice stated the quality management is aimed at customer satisfaction, which includes determining who the customer is and meeting the customer's needs. Exceeding the customer's needs is called customer delight.

The next step in quality management, according to the speaker, is to anticipate the customer's needs. After anticipating the customer's needs, discipline is required.

Mr. Justice explained the continuous improvement cycle. He stated that the real issue regarding this concept is the rate at which you are continuing to improve.

The speaker also focused on goals, measurement and feedback, and reinforcement.

In conclusion, Mr. Justice recommended three steps to build a reputation with customers: (1) meet with coworkers and decide what is to be done; (2) measure and provide feedback; and (3) find a way to reinforce people.

DENNIS C. GILLESPIE, *Secretary*

PIEDMONT ..... APR.

"Wood Coatings"

The meeting's technical speaker was Joel Schwartz, of Air Products and Chemicals, Inc. His topic was "THE INFLUENCE OF EQUILIBRIUM AND DYNAMIC SURFACE TENSION ON WOOD COATINGS."

The focus of the presentation was on the influence of equilibrium and dynamic surface tension in waterborne systems, and how to eliminate surface tension rhythm defects in waterborne coatings.

Mr. Schwartz explained how to make appropriate surfactant selection for waterborne systems, especially for waterborne coatings that get applied in high-speed application lines.

In addition, Mr. Schwartz used slides to demonstrate the actual equilibrium and dynamic surface tension (ENDST) data that were developed in various systems.

DENNIS C. GILLESPIE, *Secretary*

Elections

CDIC

Associate

Stephens, Chris S.—C.L. Zimmerman Co., Cincinnati, OH.

CLEVELAND

Active

Brunori, David J.—PPG Industries, Inc., Cleveland, OH.
Emmett, Duane D.—The Euclid Chemical Co., Euclid, OH.
Kale, Vasant D.—Master Builders Inc., Cleveland.
Kaminski, Victor V.—The Glidden Co., Strongsville, OH.

DETROIT

Active

Brooks, Goron D. Jr.—Tremco/BF Goodrich, Brighton, MI.
Case, Ward C.—Du Pont Co., Mt. Clemens, MI.
Colyer, E. Keith—BASF Corp., Whitehouse, OH.
Fowler, Arthur W.—BASF Corp., Whitehouse.
Isogami, Masayuki—IMRA America, Inc., Ann Arbor, MI.
Jabs, Mary C.—The Sherwin-Williams Co., Troy, MI.
Laginess, Thomas J.—BASF Corp., Whitehouse.
Lepkowski, Thaddeus J.—BASF Corp., Detroit, MI.
London, Dennis A.—BASF Corp., Detroit.
Parekh, Dhruv V.—Akzo Coatings, Inc., Troy.
Provenzola, Robert M.—Tremco/BF Goodrich, Brighton.
Robinson, Antonio—Akzo Coatings, Inc., Troy.
Salter, Keith L.—BASF Corp., Whitehouse.
Shepherd, H. Douglas—Seibert Oxidermo, Romulus, MI.
Steinmetz, Alan L.—BASF Corp., Southfield, MI.
Williams, Robert B.—Akzo Coatings, Inc., Troy.
Youngblood, Rebecca A.—Akzo Coatings, Inc., Pontiac, MI.

Associate

Erber, Eric A.—Matteson-Ridolfi, Inc. Riverview, MI.
Gallagher, William F.—Miles Inc., Troy, MI.
Kitchenmaster, Brian R.—Design & Finishing Consultants, Walled Lake, MI.
Leininger, Corbin R.—PPG Industries, Inc., Troy.
Mulligan, Michael R.—PPG Industries, Inc., Troy.
Rehm, Michael A.—Olin Corp., Bloomfield Hills, MI.
Richardson, Gerald L.—Monsanto Chemical Co., Auburn Hills, MI.
Toliver, Leatha M.—Eastman Chemical Co., Kingsport, TN.
Westerbeek, Scot A.—Matteson-Ridolfi, Inc., Riverview.

Educator/Student

Sabet, Ali A.—Eastern Michigan University, Ann Arbor, MI.

GOLDEN GATE

Active

Brunner, Kent A.—Frontier Coatings Co., Sacramento, CA.
Van Veen, Chris—Surtec, Inc., Hayward, CA.

KANSAS CITY

Retired

Henrickson, Russell M.—Gladstone, MO.
Warren, Richard D.—Sunrise Beach, MO.

MONTREAL

Active

Desrochers, Lise—Anfoni Coatings, Cornwall, Ont.

NEW YORK

Active

Baker, Robert A.—D/L Laboratories, Inc., New York, NY.
Calvano, Joseph A.—Letica Corp., Kendall Park, NJ.
Engel, Walter D.—Guard All Chemical Co., S. Norwalk, CT.
Fawer, Bruno—Armorguard Products Inc., Andover, NJ.
Holt, Mark S.—CIBA-GEIGY Corp., Ardsley, NY.
Lin, I-Chyang—CIBA-GEIGY Corp., Ardsley.
Waryold, John P.—Humiseal, Woodside, NY.

Associate

Baird, Robert L.—Polyesther Corp., Southampton, NY.
Kehmna, John M.—Hüls America, Inc., Piscataway, NJ.
O'Donnell, Thomas J.—RHEOX Inc., Hazlet, NJ.
Sakamoto, Koichi—Atom Chemical Paint, New York, NY.
Smerak, Lance P.—Color Technology Inc., Wayne, NJ.
Tuting, William J.—BYK-Gardner Inc., Mine Hill, NJ.
Valeri, Kenneth P.—Drew Chemical Corp., Boonton, NJ.

SOUTHERN

Active

Adamo, Joseph A.—Union Carbide Corp., Atlanta, GA.
Barnes, Maxwell L.—Du Pont Co., Naylor, GA.
Brammer, Thomas L.—Coastal Coatings Inc., Tampa, FL.
Caruso, Sam L.—FLR Paints Inc., Bradenton, FL.
Cifuentes, Mario A.—Mac Chem, Miami, FL.
Dunn, Larry D.—UCI Paint, Ft. Lauderdale, FL.
Jones, Jerry D.—Southern Coatings, Inc., Sumter, SC.
Kalbfleisch, Gordon F.—Coastal Coatings Inc., Tampa.
Randall, James M.—Union Carbide Corp., Conyers, GA.
Ray, Michael J.—Ribelin Sales, Inc., Atlanta.
Vaughn, James R.—Ross Chem Inc., Fountain Inn, SC.
Vruggink, Robert S.—Du Pont Co., Woodlands, TX.

Associate

Glover, Charles A.—W.M. Barr & Co., Inc., Memphis, TN.
Hasson, L. Martin—Ribelin Sales, Inc., Atlanta, GA.
Moudry, Francis T.—H.B. Fuller Co., Lilburn, GA.
Singleton, Arthur W.—Kemira, Inc., Kennesaw, GA.
Webb, Gary H.—ECC International, Atlanta.

WESTERN NEW YORK

Active

Hanaka, Jackie—Precision Scientific of New York, Kenmore, NY.

People

Ronald G. Spitzer has joined the staff of Troy Corporation, E. Hanover, NJ, as National Accounts Manager. Under this title, Mr. Spitzer will help direct corporate resources throughout North America in support of the company's regional sales managers. Prior to joining Troy, he was Sales Manager/Coatings with Caschem, Inc., Bayonne, NJ. Mr. Spitzer is a member of the Baltimore, New York, and Southern Societies.

R.G. Spitzer

T.V. Gilboy

In addition, **Thomas V. Gilboy** has been named Vice President and Chief Financial Officer for Troy. Mr. Gilboy will oversee all financial administration functions for the company as well as long-range business planning.

RHEOX, Inc., Hightstown, NJ, has appointed **Henry H. Basson** President/European Operations. Dr. Basson recently served as European Monomers Business Manager and General Manager for Rohm and Haas, Belgium. He will be located in Brussels, Belgium and have direct responsibility for all RHOEX business activities.

George F. Robbins has been named Sales Representative for Ranbar Technology Inc., Glenshaw, PA. Mr. Robbins' sales territory will include Missouri, Iowa, and southern Illinois. He was formerly employed with Robbins Varnish Company. Mr. Robbins is a member of the St. Louis Society.

Benjamin Moore and Company, Montvale, NJ, has elected **John J. Oberle** Vice President/Manufacturing and Technology. Mr. Oberle previously served as Corporation Operations Manager for the Central Laboratories' Corporate Purchasing and Production Department. He had held this position since 1990. Mr. Oberle is a member of the New York Society.

The Western Reserve Chapter of the National Management Association has named **Joseph P. Walton**, Executive Vice President of Jamestown Paint Company, the recipient of the association's Manager of the Year Award. The award recognizes Mr. Walton's dedication to the principles of the American enterprise system; his effective management in business, industry, government, or nonprofit operation; his community leadership through significant contributions; participation in outside professional and civic activities; and a reputation as a fair, impartial, and ethical manager in dealings with subordinates, peers, and associates. Mr. Walton was honored at a ceremony and dinner during National Management Week, June 1-5.

Mr. Walton has been nominated to serve as the Secretary-Treasurer of the Federation for 1992-93. He is a member of the Manufacturing Committee, and served as Chairman of the Committee from 1987-90. Mr. Walton also served as a member of the Annual Meeting Program Committee.

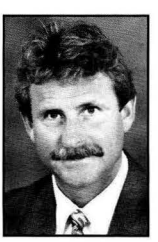
J.P. Walton

The promotion of **Andrew J. "Drew" Burke** to the position of Executive Vice President/Chemical Group has been announced by Degussa Corporation, Ridgefield Park, NJ. Mr. Burke will take over this position from **Michael H. Verbeek**, who is completing his tenure in the United States. Prior to this appointment, Mr. Burke served as Vice President and Chief Financial Officer and will continue to serve as a member of Degussa's Board of Directors and Executive Committee.

Dr. Verbeek has spent seven years here with Degussa, having served as head of the Chemical Group since 1987. He will return to Degussa AG at its Frankfurt, Germany headquarters.

Also, the Silica Division of Degussa, located in Dublin, OH, has promoted **Ted Herz** to Director of Marketing. His responsibilities will include the overall marketing of the company's AEROSIL® fumed silica. Prior to this, Mr. Herz served as a Regional Sales Manager for the firm.

Jim Pasternak has been named Resin Sales Manager for TCR Industries, La Palma, CA. In this position, Mr. Pasternak assumes sales and management responsibilities in California, Nevada, and Arizona. Prior to joining TCR, he was Western Regional Sales Manager for McWhorter, Inc. Mr. Pasternak is a member of the Golden Gate Society.



J. Pasternak

SCM Chemicals, Baltimore, MD, has made the following organizational appointments: **John W. Gibbs**—Industry Sales Manager/Coatings; **Raul M. Oteiza**—Industry Sales Manager/Paper and Plastics; **Jerry D. Bassett**—District Sales Manager/East; **James D. Clover**—Area Sales Manager/Los Angeles; **Gary L. Cianfichi**—Market Manager/Coatings and Export Markets; and **Jon A. Sikora**—Market Manager/Paper.

Mr. Sikora is a member of the CDIC Society.

Nabil Mustafa has been appointed Executive Director of the Canadian Plastics Institute (CPI), Toronto, Ont., Canada, by its Board of Governors. He succeeds **Barry Hercus** in this position. Prior to joining CPI, Dr. Mustafa spent 22 years obtaining plastics experience in manufacturing, consulting, and college and university teaching. He is the co-author of two books and has published numerous papers.

The Chemical Coaters Association International (CCAI), Cincinnati, OH, has announced its national officers and board of directors for 1992-93. **John Baller**, of Unitech Industrial Inc., will serve as President. The post of Vice President will be held by **G. Bruce Bryan, Jr.**, of Gema-Volstatic, and **Jim Malloy**, of Kolene Corporation, will remain as Secretary/Treasurer for another term.

Serving on the board of directors are: **William Baldwin**, of Evtech; **George Bryant**, of Briggs & Stratton; **James C. Egide**, of Modine Manufacturing; **Michael Fisher**, of Moline Paint Manufacturing Company; **Authur D. Godding**, of Heatbath Corporation; **Lawrence Melgary**, of Northern Coatings & Chemicals; **Robert New**, Consultant; **John J. O'Connor**, of Coral International; **Geoffrey A. Souter**, of H.B. Fuller Company; **Rodger Talbert**, of Rapid Engineering Inc.; **Robert Warren**, of Novamax Technologies; and **Rex Winemiller**, of Dove Equipment Company.

Jason C. Chai has joined the staff of the Organics Division of Witco Corporation, New York, NY, as Safety and Environmental Engineer. In this position, Mr. Chai will coordinate his efforts at the Organic Division with those of the firm's corporate safety, health, and environmental affairs department. He will be located at the company's Santa Fe Springs, CA, plant site.

The National Association of Corrosion Engineers (NACE), Houston, TX, has elected **Gerald M. (Jerry) Shankel** as its Executive Director. Mr. Shankel joins NACE with over 24 years of association management experience. He previously served as Associate Executive Director of Finance and Administration for the American Society of Mechanical Engineers in New York City.

Anthony Rindone has accepted the promotion to Director of Manufacturing/Resins, Central Manufacturing Department for National Starch and Chemical Company, Bridgewater, NJ. Mr. Rindone joined National in 1978 and most recently served as Senior Manufacturing Manager.

Akzo Resins, E. St. Louis, MO, has named **James B. Lindsley** Director of Sales and Marketing/Coatings Resins Operations in North America. In this position, Mr. Lindsley will be responsible for all sales and marketing functions of manufacturing sites located in Louisville, KY, and E. St. Louis. He will be based in Illinois. Mr. Lindsley is a member of both the Kansas City and St. Louis Societies.

J.B. Lindsley

Robert M. Baker has accepted the position of Technical Director of D/L Laboratories, New York, NY. Mr. Baker will help coordinate the research and testing programs conducted by the company, including studies carried out on long-range and short-range projects. He was most recently employed as a Technical Manager for the Packaging Group of The Valspar Corporation.

Ideal Manufacturing and Sales Corporation, Madison, WI, has named **Bob Whetstone** Vice President of Sales. In this capacity, Mr. Whetstone will oversee the sales of the company's line of liquid filling and sealing equipment for use in the paint, chemical, and food industries.

Luke R. Corbett and **C.C. Stewart, Jr.** have been appointed Group Vice Presidents of Kerr-McGee Corporation, Oklahoma City, OK. Messrs. Corbett and Stewart have been Senior Vice Presidents responsible for exploration, and oil and gas production operations, respectively.

Reporting to Mr. Corbett will be: **Michael G. Webb**—Vice President/Oil and Gas Exploration; **George R. Hennigan**—Senior Vice President and President/Kerr-McGee Chemical Corporation; and **George D. Christiansen**—Vice President/Minerals Exploration.

Those who will be reporting to Mr. Stewart include: **L.V. McGuire**—Vice President/Oil and Gas Production Operations; **Robert C. Scharp**—Senior Vice President and President/Kerr-McGee Coal Corporation; and **Ray A. Freels**—Senior Vice President and President/Kerr-McGee Refining Corporation.

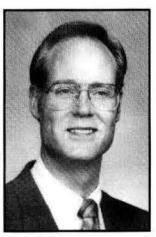
In addition, **James E. Warn** has been appointed Executive Vice President and Chief Operating Officer of Kerr-McGee Refining Corporation, Houston, TX. **Clark Johnson**, who had previously been named to this position, has resigned to accept employment with another company. Mr. Warn has been with the company since 1969.

Lee H. Leiner has joined the staff of Preservation Technologies, Inc., Glenshaw, PA, as Technical Director. Mr. Leiner previously served as Senior Research Scientist and Manager for Koppers Company, Inc./Thermal Products, Inc.

Akzo's George Pilcher to Present Keynote Address At Gesellschaft Deutscher Chemiker Annual Meeting

George R. Pilcher, Technical Director of Akzo Coatings Inc's Columbus, OH, and Birmingham, AL, laboratories, will deliver the Keynote Address at the Annual Meeting of the Paint and Pigment Division of the Gesellschaft Deutscher Chemiker, scheduled for September 22-24, in Freudenstadt, Germany.

His topic, "Towards the Year 2000: How Will Technology Triumph?," will address many of the hurdles which will confront the coatings industry worldwide over the next eight years. Also, options for overcoming these hurdles strategically, through current and emerging technologies and application techniques, will be discussed. Mr. Pilcher's address will be published in *Farbe + Lack*.



Each year the Paint and Pigment Division seeks lectures from scientists of international reputation who can bring a unique and authoritative perspective to the meeting. Speakers from six nations are included on the conference program. Papers on polyurethane chemistry, microgels, coating/substrate surface interactions, submicro colorant encapsulation, block copolymers, flexographic printing on LDPE, and several other areas are scheduled for presentation.

A member of the coatings community for 21 years, Mr. Pilcher has served the industry in the following capacities: 1988 Keynote Address to the Washington Paint Technical Group; member of the Scientific Advisory Board which established the First North American Research Conference on "Organic Coatings Science and Technology," held in 1990; Chairman of the 1991 Gordon Research Conference on the "Chemistry and Physics of Coatings and Films"; and founding Chairman of the Roy W. Tess Award in Coatings presented by the Polmeric Materials: Science and Engineering (PMSE) Division of the American Chemical Society. Currently, he serves as President of the Coatings Industry Education Fund of the Federation of Societies for Coatings Technology, is a member of the Mattiello Lecture and Roon Awards Committees, and Chairman-Elect of the PMSE Division of ACS. Mr. Pilcher also appears in several volumes of *Who's Who in America*.

For more information on the Gesellschaft Deutscher Chemiker Annual Meeting, contact Professor Dr. L. Derlog, p. Adr. Forschungsinstitut für Pigmente un Lacke e.V., Allmandring 37, 7000 Stuttgart 80, Germany.

Small Business Conferences Slated for Fall and Spring

The National Science Foundation and the Department of Defense are sponsoring three National Small Business Innovation Research Conferences at various locations.

NEW YORK SOCIETY SCHOLARSHIP—Michael C. Frantz (left), of Daniel Products Company, accepts the New York Society for Coatings Technology Scholarship from Scholarship Committee Chairman Raymond P. Gangi, of International Paint Company, Inc. Mr. Frantz accepted the award on behalf of his son Jonathan, who was completing his freshman year at the University of Massachusetts. The presentation took place at the New York Society May meeting

The dates and locations for the conferences are as follows: October 27-29, 1992—Washington, D.C.; November 17-19, 1992—Phoenix, AZ; and April 27-29, 1993—Minneapolis, MN.

Representatives from the Departments of Defense, Health & Human Services (including the National Institute of Health), Energy, Education, Transportation, Commerce, and NASA, National Science Foundation, the Environmental Protection Agency, and the Nuclear Regulatory Commission will discuss research and development opportunities at the agencies in seminars and one-on-one meetings.

Also scheduled to participate are representatives from more than 35 Fortune 500 companies, including: Boeing, General Dynamics, Martin Marietta, Motorola, TRW, Honeywell, IBM, Hughes, Texas Instruments, United Technologies, and Teledyne who are seeking licenses, joint ventures, and other teaming with small companies having relevant technology.

For more information, write Foresight Science & Technology Inc., 6064 Okeechobee Blvd., P.O. Box 170569, West Palm Beach, FL 33417.

CALL FOR PAPERS

"Plain and Simple: Compliance"

Symposium Sponsored by Piedmont Society for Coatings Technology Technical Committee

March 10, 1993
Holiday Inn Market Square
High Point, NC

The Technical Committee of the Piedmont Society for Coatings Technology invites all prospective authors to submit papers to be presented at their symposium on "Plain and Simple: Compliance," scheduled for March 10, 1993, at the Holiday Inn Market Square, in High Point, NC.

All papers on compliance and related areas are welcome. A one-page abstract, single spaced with one-inch margins on white bond paper is required. All abstracts are due no later than September 15. Authors of selected abstracts will be notified by November 1.

Also, a supplier exhibition is scheduled to run concurrently with the technical program.

For more information, or to submit an abstract, contact: Robert C. Matejka, Akzo Coatings Inc., 1431 Progress St., P.O. Box 2124, High Point, NC 27261; telephone: (919) 841-5111.

"Statistical Process Control and Its Application in the Coatings Industry" (SPC Level I)

SEPTEMBER 14-15, 1992

and

"Practical Application of Intermediate Statistics in a Total Quality Management System" (SPC Level II)

SEPTEMBER 16-18, 1992

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Hyatt Atlanta Airport at the Georgia International
Convention and Trade Center
Atlanta, GA

Sponsored by the
Federation of Societies for Coatings Technology
Professional Development Committee

For more information, contact
Michael Bell, Director of Educational Services,
Federation of Societies for Coatings Technology,
492 Norristown Road, Blue Bell, PA 19422
(215) 940-0777 • FAX: (215) 940-0292

OCCA Conference to Address Environmental Issues September 17-18, in Salford, England

The Manchester Section of the Oil & Colour Chemists' Association (OCCA), Manchester, England, will sponsor the symposium, "Challenges and Strategies for the 90s," on September 17-18, at the University of Salford, near Manchester.

The symposium, the fourth in a series of biennial events, will focus on the major challenges facing the coatings, inks, and allied industries in the 1990s, and the strategies which could be employed to meet these challenges.

The symposium has been designed for production, technical, and marketing personnel, as well as senior management.

The Keynote Address will be delivered by M.T. McMillan, of the Paintmakers Association.

A discussion on environmental issues will precede the Keynote Address.

Additional topics scheduled for presentation are as follows:

"Packaging Legislation—Its Impact on the Industry";

"Development and Progress on Eco-Labeling, Criteria for Paints and Varnishes"—Sue Armfield, of DTI;

"Environmental Legislation: A Taste of Things to Come"—H. Jotischky, of the Paint Research Association;

"Recyclability of Waste"—B.D. Hamill, of Gateway Technology Ltd.;

"Waste Strategies and Problems Facing a Paint Manufacturer"—A. Dunsmore, of Kalon Group Plc;

"The Changing Face of the Coatings Industry in the 90s—A Vision"—J. Richards, of PPG Industries (UK) Ltd.;

"Environmental Management"—M. Wilkinson, of Crown Berger Ltd.;

"Management through the Recession"—J. Gregory, of Ernst and Young;

"The Technical Response to the Challenges of the 90s";

"DTI Support for Environmental Innovation"—C. Regan, of DTI Environmental Unit; and

"Training for Survival"—H.T. Buls, of El Tec Ltd.

Selected papers from the symposium will be published in *Surface Coatings International*, the journal of OCCA.

For additional conference information, contact Yvonne Waterman, OCCA, Priory House, 967 Harrow Rd., Wembley, HA0 2SF England.

Powdex '92 Slated for Garden State in December

Powdex '92, the Powder Show for the Middle-Atlantic region, will take place on December 8-10, at the Garden State Convention & Exhibits Center, in Somerset (Newark), NJ. Powdex will serve the New Jersey, New York, and Pennsylvania tri-state area.

The show is dedicated to processing, handling, packaging, testing, instrumentation and control, transportation, and storage of dry particulate matter and bulk solids. The following industries will be represented at Powdex: chemicals; food; pharmaceuticals; rubber/plastics; petroleum/coal; stone/clay/glass; primary metals; fabricated; metals; paints, varnishes, and allied products; and paper and allied products.

The Powdex conference program will include a series of workshops and management seminars.

The Powdex '92 exhibition is expected to attract 2,000 attendees. The 25,000 sq ft show will feature products and services from over 130 exhibiting companies.

For additional information, contact Eileen Oswald, Group Vice President, Reed Exhibition Companies, 1350 E. Touhy Ave., Des Plaines, IL 60017.

Southern Mississippi and Missouri-Rolla To Cosponsor Coatings Science Mini-Course

The University of Southern Mississippi (USM), Hattiesburg, MS, and the University of Missouri-Rolla (UMR), Rolla, MO, will cosponsor the "Coatings Science" mini-course, on October 19-20, 1992, at the McCormick Center Hotel, Chicago, IL. The course will be held prior to the 1992 Paint Industries' Show, October 21-23, at McCormick Place North.

The course is under the direction of Dr. Shelby Thames, Distinguished University Research Professor and Professor of Polymer Science, at USM, and Dr. James Stoffer, Professor of Chemistry and Senior Research Investigator, Graduate Center for Materials Research, at UMR.

"Coatings Science" is designed to emphasize waterborne, higher solids, UV curing, and powder coatings. Also to be included among the course lectures are the following topics: the design, synthesis, and selection of acrylics, vinyls, polyesters, epoxies, urethanes, silicones, vinyl acrylics, and vynate polymers; and the development and critical evaluation of representative formulations of trade sales, industrial, powder, UV cure, and high solid coatings.

In addition, the function of the coating components (resin types, solvents, prime and extender pigments, and additives) will be discussed.

Formulation techniques and the mechanism of film formation will be explained via a format which the beginner will comprehend and the experienced person will find informative. Methods to formulate high solids, waterborne, and powder coatings which meet VOC regulations will be presented. Design parameters for optimizing coating properties will be discussed.

For more information, contact Dr. Thames or Debbie Ballard, Dept. of Polymer Science, USM, Southern Station Box 10076, Hattiesburg, MS 39406-0076.

Industrial Corrosion Problems Conference Scheduled for June 1993, in Norway

The National Association of Corrosion Engineers, Houston, TX, and the Norsk Korrosjonsteknisk Forening (NKF), will cosponsor the conference "Engineering Solutions to Industrial Corrosion Problems," on June 7-9, 1993, at the Rica Park Hotel, in Sandefjord, Norway.

The conference is designed to provide a cost orientation to engineering and problem-solving in industry-wide industrial corrosion problems. The future use of new materials will be highlighted with emphasis on the cost implications of certain approaches to corrosion control.

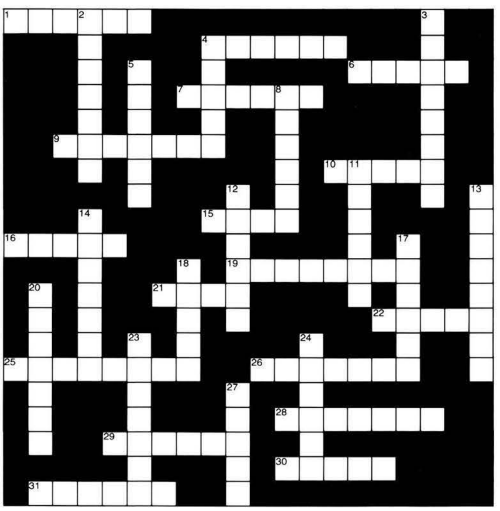
Topics to be covered during the conference include: materials selection and engineering in offshore applications; composites and nonmetallic solutions to materials problems; coatings and inhibitors; solutions to corrosion in the pulp and paper industries; and corrosion and its control in reinforced concrete structures.

All prospective authors are invited to submit papers for presentation. A 50- to 100-word abstract, in English, is due by September 1. Abstracts should be forwarded to: Professor R.N. Parkins, c/o NACE UK Representative, P.O. Box 47, Godalming, Surrey GU7 1TD, England.

For further details on the corrosion conference, write NKF, Rosenkrantzgate 7, 0159 Oslo, Norway.

CrossLinks

by Earl Hill



Solution
to be
Published in
September Issue

No. 49

ACROSS

1. Part of a tank; to confound
4. Kind of cake
6. Word with spray
7. Gloss (Syn.)
9. A resin from Australian grass trees
10. A type of "sandpaper"
15. Goes on a paint can
16. A complex solvent mixture derived from fermentation; an oil
19. An image printing process
21. Am I _____
22. Film defect
25. The bane of ship's bottoms
26. Thin protrusions on steel plates
28. To thin out, usually via brushing
29. A fruity type of oil
30. A decorative inlaid pattern or design
31. What is a face of a building called? (Arch.)

DOWN

2. Vegetable oil/sulfur reaction product
3. Fe_2O_3 from natural sources
4. A type of mill; rheological state
5. Referring to a wallpaper design
8. A protein that catalyses chemical reactions
11. A type of red pigment, L _____
12. A natural oil from the shells of nuts
13. Cobalt yellow (Syn.)
14. To hang out to dry, as wallpaper
17. Basic source of lanolin, D_____
18. _____ gray; construction material
20. Cyclohexanol (Syn.)
23. Kind of moss; type of $CaCO_3$
24. _____ printing
27. Ceramic gloss finish

Literature

Methane Sulfonic Acid

A 12-page, four-color brochure providing information on methane sulfonic acid (MSA) has been released. Graphs and table are presented. For a copy of the brochure entitled, "MSA Catalyzed Esterification and Alkylation," contact Organic Chemicals, Elf Atochem North America, Inc., Three Parkway, Philadelphia, PA 19102.

Foam Control Agents

A line of organic defoamers and antifoam agents for a broad spectrum of industrial applications is described in a new 12-page bulletin. The publication contains charts detailing the typical properties and applications of each product. For a copy of the bulletin on Bubble Breaker Foam Control Agents, write the Organics Div., Witco Corp., 2701 Lake St., Melrose Park, IL 60160-3041.

Storage Tank

An above ground steel vertical storage tank within a concrete vault is the subject of a new four-page brochure. The bulletin describes and illustrates the features of the tank and provides specifications. Further information on the LIQUI-VAULT steel tank is obtainable from Clawson Tank Co., P.O. Box 350, 4545 Clawson Tank Dr., Clarkston, MI 48346-0350.

Shut-Off Valves

A line of two-way and three-way thermoplastic shut-off valves has been introduced through literature. These valves are designed for situations involving high-pressure requirements with highly corrosive or ultra-pure liquid systems. For further information, request a copy of catalog ASO from Plast-O-Matic Valves, Inc., 430 Rte. 46, Totowa, NJ 07512.

Photoinitiator

Data is obtainable on a new alpha cleavage photoinitiator. It is recommended for use in pigmented coatings, offset and screen inks, photoresists and solder masks, printing plates, and clear lacquers. For further details on Irgacure® 369 photoinitiator, contact Ann Tiefenthaler, CIBA-GEIGY Corp., Additives Div., Seven Skyline Dr., Hawthorne, NY 10532.

Weathering Testing

Laboratory instruments for weathering and lightfastness testing are highlighted in a data sheet. Self diagnostic controls, test cycle programming, constant irradiance control, and large specimen capacity are some of the features of the models. Write Atlas Electric Devices Co., 4114 N. Ravenswood Ave., Chicago, IL 60613, for more in-depth details on the Ci35A Xenon Arc Weather-Ometer® and Fade-Ometer®.

Video Measuring

A full-color brochure focusing on a video measuring system has been published. The illustrated four-page bulletin details the capabilities of the easy-to-use, high-performance measuring system. For a free copy of the brochure on the Nikon VM-1 system, write Nikon Inc., Instrument Group, Biomedical Dept., 1300 Walt Whitman Rd., Melville, NY 11747.

Mixing Solutions

Mixing solutions designed to lower waste emission levels are featured in a newsletter. The bulletin also describes a range of mixers for FGD absorber applications. For a free copy of *LIGHTNIN® Impeller*, Vol. 12, No. 1, contact Betty Felix, LIGHTNIN, 135 Mt. Read Blvd., Rochester, NY 14603.

Infrared Processing and Curing Systems

A product release detailing infrared processing and curing systems has been issued. The systems are available in over 50 standard oven configurations with optional conveyors, exhaust blowers, and vestibules. For further information on the Black Body™ Infrared Processing and Curing Systems, contact Debbie Armstrong, BBC Industries, Inc., 1526 Fenpark Dr., Fenton, MO 63026-2996.

Fire Science Products

The introduction of a fire science products line has been made through literature. The line is composed of a comprehensive range of instrumentation for the fire hazard testing industry. Contact Thomas D. Faulkner, Product Line Manager, Atlas Electric Devices Co., 4114 N. Ravenswood Ave., Chicago, IL 60613, for further details on the Fire Science Products line.

Liquid Analysis Instrumentation

A 12-page catalog presenting a complete line of liquid analysis systems such as, analyzers, electrodes, conductivity cells, and accessories has been printed. Also included in the literature is a list of reference publications describing solutions to liquid analysis problems. For a copy of catalog designated C2.0002-CA, write Leeds & Northrup, P.O. Box 2000, North Wales, PA 19454.

Heat-Stable Pigment

The introduction of a heat-stable pigment for the plastics industry has been made through a product release. Intended uses include styrenic polymers, engineering plastics, and polyolefines. For further details on Irgacolor® Buff 10415, contact Drakenfeld, CIBA-GEIGY Corp., West Wylie Ave., Washington, PA 15301.

NMR Processing Software

Off-line NMR processing software systems are highlighted in a product release. The systems are designed to run on a variety of industry-standard platforms including the IBM PC and compatibles, Apple Macintosh, SUN, SGI, etc. Write Bruker Instruments, Inc., Manning Park, Billerica, MA 01821, for more details on the WIN-NMR and UXNMR/P software systems.

SITUATIONS WANTED

Paint Chemist with 15 plus years. R&D in Industrial Paints. Job experience includes product development, marketing service, and plant service. Ronald Koo, 2 Tamerlane Ct., Etobicoke, Ontario M9B 6G4 Canada.

* * *

Production Plant Manager seeking growth oriented company. Have more than 30 years of technical and managerial experience in the manufacture of paints and coatings. Served in positions from Production Manager in a union environment to Plant Manager exercising control of several foremen. Product understanding is excellent and experience has been both contractor oriented and consumer oriented. Problem solving a specialty. Carl Addington, 2442 Fiji Way, San Leandro, CA 94577.

Controlled Stress Rheometer

A controlled stress rheometer available with accessories designed for material characterization at high shear rates has been introduced through literature. Applications include viscous materials such as polymer melts, adhesives, elastomers, and thermosetting resins. More information on the Bohlin CS Rheometer is obtainable by writing Bohlin Instruments, Inc., 2540 Route 130, Ste. 113, Cranbury, NJ 08512.

Epoxy Mastic Aluminum

A new high solids, high performance aluminum-filled polyamine bisphenol A epoxy coating is the topic of literature. The coating is designed especially for use on marginally prepared steel surfaces. Requests for additional information should be identified as "Epoxy Mastic Aluminum II (SWS-3687)," and sent to The Sherwin-Williams Co., c/o HKM Direct, 5501 Cass Ave., Cleveland, OH 44102.

Laboratory Mixer

Information is obtainable on a new high-speed laboratory disperser. The disperser's multiple configurations include rotor/stator homogenizer, high-shear blade, and duplex and simplex heads; all wetted parts are Type 316 stainless steel. For more in-depth details on the Model 90 disperser, write Premier Mill Corp., 1 Birchmont Dr., Reading, PA 19606.

Information System

A system designed to provide laboratories with cross-referenced regulatory, storage, disposal, DOT shipping information, MSDS, worker safety and emergency response information, as well as physical and chemical properties data on over 4,000 products has been introduced through literature. To obtain more information on the EM Science Chemical Information System (EMCIS), write EM Science, 480 Democrat Rd., P.O. Box 70, Gibbstown, NJ 08027-0070.

MEK Replacement

An environmentally safe replacement solvent for MEK and other solvents classified as hazardous air pollutants under the Clean Air Act of 1990 has been introduced through literature. The terpene-based solvent reportedly can be used for flushing paint lines and cleaning uncured coatings from equipment. For more in-depth details on Glidsafe® Paint Purge, write Glidco Organics, P.O. Box 389, Jacksonville, FL 32201.

Instruments

A catalog featuring descriptions of new test instruments such as paint adhesion testers, coating thickness gages, friction/wear testers, force gages, moisture measuring instruments, viscosity cups, surface tension meters, etc. has been printed. Also included in the brochure are instructions, specifications, and pricing. For a complimentary copy of mini-catalog #12, contact Paul N. Gardner, Sr., Paul N. Gardner Co., Inc., P.O. Box 10688, Pompano Beach, FL 33061-6688.

Coating Thickness Gages

The addition of two coatings thickness gages to a line of instruments has been reported. The first gage is designed to measure coating thickness over ferrous metal surfaces; the second reportedly measures the thickness of nonmagnetic coatings applied over nonferrous metal surfaces, including aluminum, copper, brass, etc. Both gages are pocket-sized and operate on a nine-volt transistor battery. For more information on the QuaNix 2200 and 2300 coating thickness gages, write KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275.

Resins

A company's complete line of resins is being detailed in a 22-page brochure. Solids content, solvents, acid value, viscosity dPa.s, type of oil, oil percent, phthalic anhydride percent, principle properties, and main applications are outlined. For a free copy of the publication, "Coating Resins: Delivery Program (Edition 1992)," write D. Versloot, PR & Marketing Communication Dept., DSM Resins bv, P.O. Box 615, 8000 AP Zwolle, Ceintuurbaan 5, Zwolle, The Netherlands.

Reference Guide

A catalog and reference guide listing over 75 GC chromatograms; GC, LC, and SPE reference information; SPE methods for clinical and environmental applications; and phase descriptions for every GC column, has been published. Also included are: GC and SPE manufacturers' cross reference guides; and a new capillary electrophoresis (CE) product line. For details on how to obtain a copy of the new "1992-93 J&W Product Catalog & Reference Guide," write J&W Scientific, 91 Blue Ravine Rd., Folsom, CA 95630-9928.

Aromatic Water Base Polyurethane Dispersion

A non-TDI, experimental polyurethane water base aromatic resin is the subject of a product release. The dispersion has been evaluated for wood coating applications. Product data, MSDS sheets, and samples of Q-Thane® LQW10-129-1 are available upon request from Jeannine Derba, Customer Service, K.J. Quinn & Co., Inc., 135 Folly Mill Rd., Seabrook, NH 03874-0158.

Hazardous Chemicals Database

The introduction of a hazardous chemical database and right-to-know label software has been made through a product release. The software reportedly searches the database for each ingredient in a chemical mixture, and when found, identifies its hazards, CAS number, DOT UN number, and identifies the other hazardous chemicals lists on which it is found. Anyone interested in EASY JERSEY Hazardous Chemicals Database should contact J.B. Ryan, Sales Manager, Softrak Systems, 3650 Nazareth Pike, Ste. 112, Bethlehem, PA 18017.

Books in Print . . .

PAW 2—Paint Address Worldwide: Asia-Pacific. List price: £75.00. Member price: £60.00. Mrs. Debbie Brett, Publications Dept., Paint Research Association, 8 Waldegrave Rd., Teddington, Middlesex TW11 8LD, England.

1992-93 Directory: A Guide to Leading Independent Testing, Research, and Inspection Firms in America. List price: $30.00. American Council of Independent Laboratories, Inc., Dept. D, 1629 K St., N.W., Washington, D.C. 20006.

Macromolecular Assemblies in Polymeric Systems, 355 pp. List price: $79.95. American Chemical Society, 1155 Sixteenth St., N.W., Washington, D.C. 20036.

Effect of Surface Contaminants on Coating Life. Steel Structures Painting Council, Publications Dept., 4400 Fifth Ave., Pittsburgh, PA 15213.

ANTEC 92—Shaping the Future: Proceedings from the 50th Annual Technical Conference of the Society of Plastics Engineers, 2,804 pp. List price: $265.00. Technomic Publishing Co., 851 New Holland Ave., Box 3535, Lancaster, PA 17604.

Catalysis in Polymer Systhesis, 292 pp. List price: $74.95. American Chemical Society, 1155 Sixteenth St., N.W., Washington, D.C. 20036.

Black Oxide Process

A new black oxide process for heat treated and hot-rolled steel parts is described in literature. The process reportedly provides a high-lustre black finish and improved corrosion resistance. Contact Cleveland Black Oxide, 836 Broadway Ave., Cleveland, OH 44115, for more information on the Black Onyx™ process.

VOC Abatement

Skid-mounted systems used in the removal of volatile organic compounds (VOCs) is the focus of a data sheet. The systems include a rotor concentrator, process fan, and concentrate incinerator. For further details on the skid-mounted Zeol Rotor Concentrators, write Munters Zeol, 79 Monroe St., Amesbury, MA 01913.

Drawing Compound

Data has been released on a line of environmentally compliant, nonhazardous drawing and stamping compounds. The six products in the series are formulated to draw and stamp all metal types, except galvanized, and to be used as manufactured, but can be cut with water. Write Man-Gill Chemical, 23000 St. Clair Ave., Cleveland, OH 44117 for further details on the Gil-Draw family of synthetic stamping and drawing compounds.

Striping Tips

Striping tips for airless paint spraying applications is the focus of a data sheet. Designed and manufactured especially for striping, the tips can be used for marking parking lines, road lines, athletic fields, and stenciling. Write Titan Tool Inc., 556 Commerce St., Franklin Lakes, NJ 07417, for more information.

Water-Based Coatings

A series of defoamers and dispersants for use in water-based coatings is highlighted in literature. The first defoamer is made with an emulsified processed oil and the second is specially formulated for high-gloss paints. The first of the two new dispersants is recommended for interior/exterior flat, sheen, and semi-gloss finishes, and the second is designed for use in high-gloss latex paints. For more information on Defoamer Colloid PH-54 and NN-32, and Dispersant Colloid 270 and 286, contact Dick Marsh or Bill Snyder, Rhône-Poulenc Inc., Paint, Inks, and Adhesives, 311 Marble Mill Rd., Marietta, GA 30060.

Coming Events

FEDERATION MEETINGS

For information on FSCT meetings, contact Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422 (215) 940-0777, FAX: (215) 940-0292.

1992

(Sept. 14-15)—"Statistical Process Control and Its Application in the Coatings Industry" (SPC Level I). Sponsored by Professional Development Committee. Hyatt Atlanta Airport, Atlanta, GA.

(Sept. 16-18)—"Practical Application of Intermediate Statistics in a Total Quality Management System" (SPC Level II). Sponsored by Professional Development Committee. Hyatt Atlanta Airport, Atlanta, GA.

(Oct. 21-23)—70th Annual Meeting and 57th Paint Industries' Show. McCormick Place, Chicago, IL.

1993

(May 16-19)—Federation "Spring Week." Board of Directors Meeting on the 16th; Incoming Society Officers Meeting on the 17th; Spring Seminar on the 18th and 19th. South Shore Harbour Resort and Conference Center, League City (Houston), TX.

(Oct. 27-29)—71st Annual Meeting and 58th Paint Industries' Show. World Congress Center, Atlanta, GA.

1994

(May 12-15)—Federation "Spring Week." Spring Seminar on the 12th and 13th; Incoming Society Officers Meeting on the 14th; Board of Directors Meeting on the 15th. Marriott City Center Hotel, Minneapolis, MN.

(Oct. 12-14)—72nd Annual Meeting and 59th Paint Industries' Show. New Orleans Convention Center, New Orleans, LA.

SPECIAL SOCIETY MEETINGS

1993

(Feb. 24-26)—20th Annual Waterborne, Higher-Solids, and Powder Coatings Symposium. Cosponsored by the Southern Society for Coatings Technology and the University of Southern Mississippi (USM). New Orleans, LA. (Robson F. Storey or Shelby F. Thames, Dept. of Polymer Science, USM, Southern Station Box 10076, Hattiesburg, MS 39406-0076).

(Mar. 17-19)—Southwestern Paint Convention. Dallas and Houston Societies. Four Seasons Hotel, Las Colinas (Dallas), TX. (Steve Stephens, Ribelin Sales, Inc., P.O. Box 461673, Garland, TX 75046-1673).

(Mar. 23-25)—Western Coatings Societies' 21st Biennial Symposium and Show. Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies. Disneyland Hotel and Convention Center, Anaheim, CA.

(Apr. 21-23)—Southern Society Annual Meeting. Opryland Hotel, Nashville, TN. (Mary Finnigan, McCullough & Benton, Inc., 2900 G Carolina Center, Charlotte, NC 28208).

(Apr. 29-May 1)—Pacific Northwest Society Symposium. Red Lion Hotel, Bellevue, WA. (Richard C. Tomczak, Van Waters & Rogers, Inc., 8201 S. 212th, Kent, WA 98032).

OTHER ORGANIZATIONS

1992

(Aug. 16-21)—"Polymer Chemistry: Principles and Practice." Seminar sponsored by The American Chemical Society (ACS), Washington, D.C. Marriott Inn, Blacksburg, VA. (ACS, Dept. of Continuing Education, Meeting Code VPI9203, 1155 Sixteenth St., N.W., Washington, D.C. 20036).

(Aug. 17-21)—"Formulating Coatings." Short course sponsored by The University of Southern Mississippi (USM), Hattiesburg, MS. (Deborah Theisen, PSC Coatings Short Course, USM, Southern Station Box 10076, Hattiesburg, MS 39406-0076).

(Sept. 7-11)—Corrosion Asia Conference. Cosponsored by the Japan Society of Corrosion Engineering, the Australasian Corrosion Association, the Chinese Society for Corrosion and Protection, the Malaysian Materials Society, the Materials and Corrosion Society of Thailand, and the Corrosion Engineering Association of the Republic of China. Hyatt Regency Hotel, Singapore. (National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218-8340).

(Sept. 14-18)—65th Introductory Short Course, "The Basic Composition of Coatings." Sponsored by University of Missouri-Rolla (UMR), Rolla, MO. Rolla Campus. (Norma Fleming, Sr. Coordinator, UMR, Continuing Education, 119 M.E. Annex, Rolla, MO 65401-0249).

(Sept. 17-18)—"Challenges and Strategies for the 90s." Symposium sponsored by the Manchester Section of the Oil & Colour Chemists' Association (OCCA). University of Salford, Salford, England. (Yvonne Waterman, OCCA, Priory House, 967 Harrow Rd., Wembley HA0 2SF, England).

(Sept. 24-25)—"Advanced Radiation (UV/EB) Curing Marketing/Technology." Seminar sponsored by Armbruster Associates Inc. Radisson Hotel, Newark Airport, Newark, NJ. (David Armbruster, Armbruster Associates Inc., 43 Stockton Rd., Summit, NJ 07901).

(Sept. 27-Oct. 2)—"High Performance Polymeric Adhesives and Composites." Short Course sponsored by the American Chemical Society (ACS). Virginia Tech University, Blacksburg, VA. (Pamela McInally, ACS, Dept. of Continuing Education, Meeting Code VPI9209, 1155 Sixteenth St., N.W., Washington, D.C. 20036).

(Sept. 28-Oct. 2)—25th Introductory Short Course, "Paint Formulation." Sponsored by University of Missouri-Rolla (UMR), Rolla, MO. Rolla Campus. (Norma Fleming, Sr. Coordinator, UMR, Continuing Education, 119 M.E. Annex, Rolla, MO 65401-0249).

(Oct. 5-8)—"Introduction to Coatings Technology." Short course sponsored by Kent State University (KSU), Kent, OH. (Carl J. Knauss, Director, Cooperative & Continuing Education-Chemistry, KSU, P.O. Box 5109, Kent, OH 44242-0001).

(Oct. 6-8)—Powder Coating '92. Sponsored by the Powder Coating Institute (PCI). Cincinnati Convention Center, Cincinnati, OH. (Goyer Management International, 8072 Beechmont Ave., Cincinnati, OH 45255).

(Oct. 14-16)—"Accelerated and Natural Weathering Techniques for Coatings and Polymers." Short course sponsored by Kent State University (KSU), Kent, OH. (Carl J. Knauss, Director, Cooperative & Continuing Education-Chemistry, KSU, P.O. Box 5109, Kent, OH 44242-0001).

(Oct. 18-21)—Workshop on "Polymer Surfaces and Interfaces." Sponosored by the Division of Polymer Chemistry, Inc., American Chemical Society (ACS). Sheraton Tara Hotel & Resort, Danvers, MA. (Division of Polymer Chemistry, Inc., ACS, Diane M. Morrill, 1103 Hahn Hall, Virginia Tech, Blacksburg, VA 24061-0212).

(Oct. 19-20)—"Coatings Science." Mini course cosponsored by University of Southern Mississippi and University of Missouri-Rolla. McCormick Center Hotel, Chicago, IL. (Shelby Thames or Debbie Ballard, Dept. of Polymer Science, USM, Southern Station Box 10076, Hattiesburg, MS 39406-0076).

(Oct. 19-21)—105th Annual Meeting of the National Paint and Coatings Association (NPCA). Palmer House, Chicago, IL. (NPCA, 1500 Rhode Island Ave., N.W., Washington, D.C. 20005).

(Oct. 20-22)—"Emission Inventory Issues" Conference. Cosponsored by the Air & Waste Management Association and the U.S. Environmental Protection Agency. Omni Durham Hotel, Durham, NC. (Marci Mazzei, Air & Waste Management Association, P.O. Box 2861, Pittsburgh, PA 15230).

(Oct. 25-30)—Fourth Corrosion and Protection Iberoamerican Congress and First Panamerican Congress on Corrosion and Protection. Mar del Plata, Argentina. (CIDEPINT, 52 entre 121 y 122, 1900 La Plata, Argentina, South America).

(Oct. 27-28)—Polypropylene '92 World Congress. Sponsored by Maack Business Services. Swissôtel Zürich, Zürich, Switzerland. (Maack Business Services, Plastics Technology and Marketing, Moosacherstrasse 14, CH-8804 Au/Zh, Switzerland).

(Oct. 27-28)—"Fundamentals of Corrosion and Its Control." Training course sponsored by LaQue Center for Corrosion Technology, Inc. Wrightsville Beach, NC. (Sherree Darden, LaQue Center for Corrosion Technology, Inc., P.O. Box 656, Wrightsville Beach, NC 28480).

(Nov. 4-6)—'92 International Conference on Colour Materials. Sponsored by the Japan Society of Colour Material. Osaka Sun Palace, Expo Park Senri, Osaka, Japan. (S. Tochihara, Chairman of Executive Committee of the '92 ICCM, c/o Japan Society of Colour Material, Kitamura Bldg. 5F, 9-12, 2-chome, Iwamoto-cho, Chiyoda-ku, Tokyo 101, Japan).

(Nov. 8-12)—Annual Conference 32. Sponsored by the Australasian Corrosion Association Inc., Hobart, Tasmania. (Conference Secretariat, Australasian Corrosion Centre, P.O. Box 250, Clayton, Victoria 3168, Australia).

(Nov. 14-20)—SSPC '92 National Conference and Exhibition. Sponsored by Steel Structures Painting Council (SSPC), Pittsburgh, PA. Kansas City Convention Center, Kansas City, MO. (Rose Mary Surgent, Manager of Conferences and Exhibits, SSPC, 4400 Fifth Ave., Pittsburgh, PA 15213-2683).

(Nov. 16-20)—"Fundamentals of Chromatographic Analysis." Short course sponsored by Kent State University (KSU), Kent, OH. (Carl J. Knauss, Director, Cooperative & Continuing Education-Chemistry, KSU, P.O. Box 5109, Kent, OH 44242-0001).

(Nov. 18-19)—Resins & Pigments '92. Sponsored by *Polymers Paint Colour Journal* and *Paint & Ink International*. Fiera Milano, Hall 20, Milano, Italy. (Jane Malcolm-Coe, PR & Publicity Mgr., FMJ International Publications Ltd., Queensway House, 2 Queensway, Redhill, Surrey, RH1 1QS, United Kingdom).

(Nov. 20-22)—National Decorating Products Show. Sponsored by the National Decorating Products Association (NDPA). McCormick Place North, Chicago, IL. (NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Dec. 5-7)—"Adhesion Measurement of Films and Coatings." International symposium sponsored by IBM Corporation. Cambridge/Boston, MA. (K.L. Mittal, Organizer, IBM U.S. Technical Education, 500 Columbus Ave., Thornwood, NY 10594).

(Dec. 6-11)—"Polymer Chemistry: Principles and Practice." Seminar sponsored by The American Chemical Society (ACS), Washington, D.C. Marriott Inn, Blacksburg, VA. (ACS, Dept. of Continuing Education, Meeting Code VPI9203, 1155 Sixteenth St., N.W., Washington, D.C. 20036).

(Dec. 7-9)—SP '92 World Congress. Sponsored by Maack Business Services. Swissôtel Zürich, Zürich, Switzerland. (Maack Business Services, Plastics Technology and Marketing, Moosacherstrasse 14, CH-8804, Au/Zh, Switzerland).

(Dec. 8-10)—Powdex '92. Exhibition sponsored by Cahners Exposition Group. Garden State Convention & Exhibits Center, Somerset (Newark), NJ. (Eileen Oswald, Group Vice President, Reed Exhibition Companies, 1350 E. Touhy Ave., Des Plaines, IL 60017).

1993

(Jan. 19-20)—"Accelerated and Outdoor Durability Testing." Symposium sponsored by ASTM Committee G-3 and Subcommittee D01.27. Ft. Lauderdale, FL. (Warren D. Ketola, 3M Co., Bldg. 553-A, 3M Center, St. Paul, MN 55144, or Douglas Grossman, The Q-Panel Co., 26200 First St., Cleveland, OH 44145).

(Jan. 20-22)—Pretreat '93 Conference. Sponsored by *Products Finishing*. Orlando Marriott, Orlando, FL. (Cindy Goodridge, Gardner Management Services, 6600 Clough Pike, Cincinnati, OH 45244).

(Feb. 21-26)—16th Annual Meeting of The Adhesion Society, Inc. Williamsburg Lodge, Colonial Williamsburg, VA. (Louis H. Sharpe, 28 Red Maple Rd., Hilton Head Island, SC 29928, or F.J. Boerio, Dept. of Materials Science and Engineering {ML 12}, University of Cincinnati, Cincinnati, OH 45221).

(Mar. 23-25)—International Symposium on Advanced Infrared Spectroscopy (AIRS). Sponsored by The Spectroscopic Society of Japan. Sanjo Conference Hall, The University of Tokyo, Tokyo, Japan. (Hirokazu Toriumi, AIRS Organizing Committee, Dept. of Chemistry, College of Arts and Sciences, The University of Tokyo, Komaba, Meguro, Tokyo 153, Japan).

(Apr. 13-15)—Surface Coating '93 Exhibition. Sponsored by Chemical Coaters Association International (CCAI). Grand Center Convention Facility and Amway Grand Hotel, Grand Rapids, MI. (CCAI, P.O. Box 54316, Cincinnati, OH 45254).

(Apr. 18-23)—"Durability of Coatings" Symposium sponsored by American Chemical Society, Division of Polymeric Materials: Science Engineering, Denver, CO. (Jonathan W. Martin, NIST, Bldg. 226, Rm. B348, Gaithersburg, MD 20879; David Bauer, Ford Motor Co., SRL-E3198, P.O. Box 2053, Dearborn, MI 48121; F. Louis Floyd, Glidden Research Ctr., 16651 Sprague Rd., Strongsville, OH 44136).

(Apr. 20-22)—Surface Treatment '93. "Computer Methods and Experimental Measurements for Surface Treatment Effects." International Conference sponsored by Wessex Institute of Technology. Novotel, Southampton, United Kingdom. (Sue Owen, Conference Secretariat, Wessex Institute of Technology, Ashurst, Southampton, Hants, United Kingdom So4 2AA).

(May 2-6)—RadTech Europe '93. Third Annual RadTech conference. Sponsored by RadTech Europe. Italian vessel T/S Eugenio Costa. (RadTech Europe, Business Office, Pérolles 24, CH-1700 Fribourg, Switzerland).

(May 4-6)—Hazardous Materials and Environmental Management Conference and Exhibition (HazMat West/Spring). Sponsored by Tower Conference Management Company. Long Beach Convention Center, Long Beach, CA. (Tower Conference Management Co., 800 Roosevelt Rd., Bldg. E—Ste. 408, Glen Ellyn, IL 60137-5835).

(May 4-6)—Plasticoat '93 Conference and Exhibition. Sponsored by *Products Finishing*. Drawbridge Estate & Convention Center, Ft. Mitchell, KY. (Cindy Goodridge, Gardner Management Services, 6600 Clough Pike, Cincinnati, OH 45244).

(June 7-9)—"Engineering Solutions to Industrial Corrosion Problems." Conference cosponsored by the National Association of Corrosion Engineers (NACE) and Norsk Korrosjonsteknisk Forening (NKF). Rica Park Hotel, Sandefjord, Norway. (NKF, Rosenkrantzgate 7, 0159 Oslo, Norway).

(Sept. 23)—Detroit Colour Council Meeting. Michigan State Management Education Center, Troy, MI. (James Hall, General Motors Corp., 30009 Van Dyke, Warren, MI 48090).

Advertisers Index

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'Humbug' from Hillman

I must turn back the calendar a bit to correct an embarrassing omission. The June column mentioned contributor Marty Miller but failed to include his contribution. I assume that in the rush to meet Humbug's important deadline it fell off the Editor's desk. So, to quote:—

"A student at a university was studying two majors, one was Music and the other was Computer Science. He was advised by the authorities that he would have to choose only one. So, he chose Computer Science, saying, 'My Bach was worse than my Byte'."

O.K., so it didn't rock you off your chair with hilarious glee but I've cleared my conscience and my desk.

I am pleased to offer, again, comments from Perrott (no, that's a different guy) Phillipps of the magazine, *Executive Travel* sent by our faithful Birmingham, England correspondent, David Heath. Mr. Phillipps writes:

The notice hanging by my bedside table in the Swan Cindic Hotel, Shanghai, was quite explicit. "If in danger," it read, "please pull." The question was: pull what? My leg presumably.

For more than an hour—in increasing alarm that danger might strike at any moment—I searched the room for something to pull. Not a thing.

In desperation, I phoned the desk. "So sorry," said the clerk. "Many people ask this. Please ignore notice. They came from another hotel of ours. Please read other side."

On the reverse was printed the message, "Have a good day."

Mr. Phillipps goes on to describe signs and notices that have confounded him and other travelers of his acquaintance, which either make no sense or leave one with a feeling of unease. Here are some examples.

—"Rest Area Ahead, No Rest Rooms"—a common sign on American motorways—succeeds in confounding and as to unease—??!!

—In rural England's Crookham Common, a notice in the window of the Travellers' Rest Inn perpetrates the perfect non-sequitur with, "No travellers allowed."

—Wisecrackers are rendered speechless by the official notice in the departure lounge of Mammoth Lakes Airport, in California. "No Joking," it warns sternly.

In the humorless hush for which the airport is renowed, I asked a gun-toting guard for the explanation. "Don't worry, Mac," he said with surprising joviality. "It's all that remains of a security warning we put up years ago."

The missing words were, "All threats will be taken seriously."

—I think I know what the sign in a store in Madrid meant when it said, "The lift is being fixed for the next day and during that time we regret you will be unbearable." And I get the drift of the restaurant warning in Durban, South Africa: "Knives and forks aren't like medicine—to be taken after meals."

—But what do you make of "Our wines leave you nothing to hope for," in a Swiss cafe, and the jolly supermarket in Hong Kong which announces, "For your convenience, we recommend courteous, efficient self-service"?

—Welf-Joachim Ebeling, the manager of the magnificent Breidenbacher Hof Hotel in Dusseldorf, told me of the guests at a British hotel who kept thwarting the household staff by meticulously cleaning their room each day and making their beds.

When finally cornered and asked why they were doing the work of the staff, the wife replied, "If says so here," and pointed at the notice on the doorknob which read, "Please make up the room."

—One dreads to think of the reactions of the compulsive cleaners to the neat, handwritten notice by my bedside in a hotel in Leipzig. "Because of the impropriety of entertaining guests of the opposite sex in the bedroom, it is suggested that the lobby should be used for this purpose."

Speaking of travel—Humbug's avid reading and well traveled friend, David Decker who, I am told, loves asparagus, found the following during his intensive library researches which I have abstracted somewhat. The source known only to David!

It was not that our male ancestors had no place to GO. There had always been areas and rooms allocated for their relief; the Palace of Versailles had many, as had the colleges of Oxford. The problem was to get gentlemen to use them. Gentlemen, endowed by nature with directional control, had developed over the centuries a tradition of using whatever was at hand rather than what was especially provided for the purpose. In the early years of the last century, Lord Byron was banned from Long's Hotel on Bond Street for relieving himself in a corner of the entrance hall rather than going to the bother of seeking out a necessary house.

. . . It seems that his male privilege is tolerated, under certain conditions, in the clubland of St. James where one gentlemen's club has a notice, I am told, reading, "During the asparagus season, members are requested not to relieve themselves in the hat-stand."

It was a simple matter for people who lived in the country to allocate a special place; they had plenty of room. Like the biblical hole in the ground which was well away from the tents, the hole they dug was well away and downwind. The next development was to put a hut around the hole, partly to stop the pig from falling in but also for protection against the weather. It came to be called the "privy." The countryman's privy was not only a convenient and fairly hygienic answer to the problem but was also a considerable asset to his kitchen garden.

—Overheard by Karen Saso on a street in Forest Hills, Queens, New York where one woman stops another in passing.

Woman one: I know you from physical therapy, right?

Woman two: No, stress management.

—Metropolitan Diary, *New York Times*

—Herb Hillman
Humbug's Nest
P.O. Box 135
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