January 1998

JCT

JOURNAL OF COATINGS TECHNOLOGY

ICE '97 Convention Wrap-Up Issue

1997 Mattiello Memorial Lecture

Reducing Product Development Cycle Times Without Increasing Risk

First-Place Roon Paper

Oxidative Crosslinking of Alkyd Resins Studied with Mass Spectrometry and NMR Using Model Compounds

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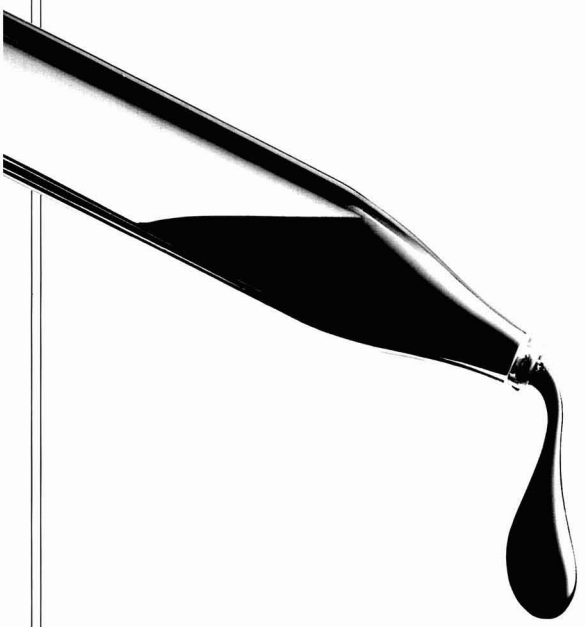

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Technical Articles

Open Forum

Federation News

Departments

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JCT
JOURNAL OF COATINGS TECHNOLOGY

Guide for Authors

GENERAL

The JOURNAL OF COATINGS TECHNOLOGY is published monthly by the Federation of Societies for Coatings Technology for its membership of approximately 7,000 in 27 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*Open Forum* and *Technology Forum,* and *Letters to the Editor.* All manuscripts will be assumed to be previously unpublished writing of the authors, not under consideration for publication elsewhere. When review papers contain tables or graphs from copyrighted articles, the authors will be required to obtain permission for use from the copyright holders. When the organization with which the authors are affiliated requires clearance of publications, authors are expected to obtain such clearance before submission of the manuscript. Papers presented to associations other than the Federation must be released by written communication before they can be considered for publication in the JOURNAL OF COATINGS TECHNOLOGY. Authors are obligated to reveal any exceptions to these conditions at the time a manuscript is submitted.

The JOURNAL OF COATINGS TECHNOLOGY has first right to the publication of papers presented at the Annual Meeting of the Federation and at local regional meetings or symposia of the Constituent Societies.

Papers in which proprietary products or processes are promoted for commercial purposes are specifically not acceptable for publication.

SUBMISSION OF MANUSCRIPTS...

...for the Journal

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

Letters to the Editor: The JOURNAL will consider for publication all correspondence relevant to the coatings industry and to the contents of the JOURNAL. When a letter concerns an article appearing in the JOURNAL, the original author is usually given an opportunity to reply.

...by Constituent Societies For Annual Meeting Presentation

Ten complete copies of the manuscript are required for committee review. The set of copies should be addressed to Mike Bell, Director of Educational Services, FSCT, 492 Norristown Rd., Blue Bell, PA 19422.

...for Roon Foundation Award Competition

Ten complete copies of the manuscript are required, and should be submitted to Mike Bell at the address previously listed. (For complete details, see "Roon Awards" section of the JOURNAL in the January 1998 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: Original research papers are the main technical content of the JOURNAL OF COATINGS TECHNOLOGY. 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 need not be research papers and may be non-technical in nature, dealing with any aspect of the coatings industry. The subject may be approached informally. Editors encourage submission of manuscripts, including articles dealing with business and policy issues, that constructively address industry problems and their solutions.

Technology Forum: 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 this 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 must 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 must 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.

Electronic submissions are requested as a supplement to the hard copies and original figures normally required. The text should be submitted on 3.5" disk formatted for IBM or Apple Macintosh (or compatible system). Text files should be saved in the word-processing format in which they were prepared. The file on disk MUST exactly match the accepted hard copy version. Graphics (figures, drawing, etc.) should be in a separate file. Submitted disks must be labeled with the author's name, paper title, computer platform type (e.g., IBM compatible), software (and version) used, and file names. Complete instructions for electronic submission can be obtained from the Editor.

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' Affiliation and Address

Give complete names, company or institutional affiliations, mailing address and e-mail address (if available) for all the authors on the title page of the manuscript.

Abstracts

A 75–100 word abstract must be part of the manuscript, and should be a concise statement of the key methods and findings or teachings of the work described in the paper. The abstract should not repeat the title or include reference numbers, nor should it duplicate the Conclusion or Summary.

Text

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

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

Only as much review as is necessary to set the work in context and to make clear the significance of the work presented should be given as an introduction to the subject; the main burden for extensive background should be placed on the list of references.

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

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

Metric System

Metric system units should be used wherever applicable with the equivalent English units shown afterwards in parentheses. The ASTM Metric Practice Guide, E 380-72 (American Society for Testing and Materials, 100 Barr Harbor Dr., W. Conshohocken, PA 19428-2959) is a convenient reference.

Tables, Graphs, Drawings, and Photographs

Tables, rather than descriptive text, should be used only when they are genuinely helpful. Each table should be typed on a separate sheet, rather than included in the text, and appended to the manuscript. Each table should be numbered and have a descriptive caption. Tables should be referenced in the text (e.g., "See *Table* 1"). In numerical data in tables, numbers less than one should have a zero before the decimal point.

Graphs should be on good quality white or nonphotographic blue-lined 8 1/2 x 11 inch paper. Each graph should be drawn on a separate sheet, numbered, and the captions listed on a copy of the original graph.

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 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, slides, and graphics are generally not acceptable, but the selective use of color will be considered on a case-by-case basis when required for unambiguous presentation of scientific information.

When illustrations are secured from an outside source, the source must be identified and the Editor assured that permission to reprint has been granted.

Nomenclature

Whenever possible, generic names should be used in preference to trade names. When trade names must be used to avoid ambiguity, and the name is a registered trademark, the symbol R, in a circle or parentheses, should be given immediately following, and the manufacturer listed as a footnote. In general, trade names should be used only in footnotes or in an appendix, rather than in the text.

If special nomenclature is used, include a nomenclature table giving definitions and dimensions for all terms.

Nomenclature of chemical compounds should conform to the style of *Chemical Abstracts* and the IUPAC rules. For oligomeric or polymeric materials, characteristics such as molecular weight, polydispersity, functional group content, etc. should be provided.

Equations

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

Summary

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

Acknowledgment

If used, it should follow the summary.

References

These should be listed in the numerical order in which they are cited in the text, and should be placed at the end of the manuscript. Names of authors may or may not be shown in the text with reference numbers. If possible, include titles of articles referenced in the literature. The following are examples of acceptable reference citations for periodicals, [1,2,3] books, [4] and patents.[5]

(1) Pascal, R.H. and Reig, F.L., "Pigment Colors and Surfactant Selection," *Official* DIGEST, *36*, No. 475 (Part 1), 839 (1964).

(2) Davidson, H.R., "Use and Misuse of Computers in Color Control," JOURNAL OF COATINGS TECHNOLOGY, *54*, No. 691, 55 (1982).

(3) Stephen, H.G., "Hydrogen Bonding—Key to Dispersion?," *J. Oil & Colour Chemists' Assoc.*, *65*, No. 5, 191 (1982).

(4) Patton, T. (Ed.), *Pigment Handbook,* Vol. 1, John Wiley & Sons, Inc., New York, 1973.

(5) Henderson, W.A. Jr. and Singh, B. (to American Cyanamid Co.), U.S. Patent 4,361,518 (Nov. 30, 1982).

OTHER INFORMATION

Galley proofs will be sent to the author for checking about six weeks prior to publication.

Reprints may be purchased in quantities of 100 or more. Authors will receive price quotations. Each author will receive a complimentary copy of the JOURNAL issue in which his or her paper was published.

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FSCT Board of Directors—1997-98

COMMENT

Quo Vadis, FSCT?

What is happening with the FSCT? The answer to that question is pretty simply; it is change with a capital "C." What drives change? I believe that there are three aspects: People, Technology and Knowledge.

People drive change because there are more of us every year. Over the past 100 years the population of the earth has increased 10-fold. People make stuff; they come up with new ideas. And the more people there are the more stuff they make and the more ideas they have.

Technology has also increased at a geometric rate. Eighty percent of the technological advances in the world have come since 1900. Technology breeds new technology.

The knowledge and information boom follows the same pace. The amount of knowledge available is doubling every five years.

The conclusion is inescapable: more information plus more people plus better technology equals more change at a faster rate. One can either embrace change or wake up one day and wonder how the world passed you by.

One doesn't have to ponder long to think of the many changes recently that have affected this industry: new technology; regulations; fewer number of suppliers; fewer number of coatings manufacturers. The surviving companies are looking beyond their own borders to "think globally but act locally.' Attitudes and expectations have changed; the traditional work ethic, volunteerism, and employer/employee loyalty are being questioned.

Finally, we must realize that time has become a more important commodity than money.

If the FSCT is to accomplish its mission to provide technical education and professional development to its members and the industry, how is it to respond to the vast changes occurring in our industry and in society as a whole?

Extensive discussions held by the FSCT over the past five years yielded significant insight into what the Federation is and where it needs to be going to support its members. Conclusions were reached in three major areas:

A. To protect and grow our current base, the FSCT must:
   1. Increase its marketing effectiveness;
   2. Seek out and develop alliances with other industry organizations;
   3. Increase the value of the FSCT to its members, the FSCT needs to: Enhance the annual meeting program by developing a technology conference and increasing the quality of technical program presentations; Continue to strengthen the quality of the JCT by broadening its editorial policy to include information useful in day-to-day work.

B. To increase its international presence, the FSCT must:
   1. Co-sponsor technical programs and exhibits for the Mexico and South and Central American industry;
   2. Co-sponsor a technical program and exhibition for the Asia-Pacific industry;
   3. Continue its active involvement with Coatings Societies International.

C. To respond on a timely basis to constant changes and challenges, the FSCT must:
   1. Revise how it accepts new members;
   2. Institutionalize the planning process;
   3. Expand Board representation on the Executive Committee;
   4. Streamline the FSCT committee structure;
   5. Institute budget and financial controls.

I personally view the FSCT as having an operating committee consisting of the Executive Committee, Key Committee Chairs, and Staff, that is responsible for the day-to-day operation of the Federation, receiving its direction and being accountable to the FSCT Board. The Board, in turn, provides direction through the approval of an annual operating plan and budget.

Change is a bumpy process, but with constructive dialogue and debate we can move forward to focus all of our energies on providing the support and services our members deserve.

My year as President will be challenging, but no more so than my predecessors. It is my privilege to serve you. I am proud of our industry and the Federation's place in the industry. My sincere thanks to the dedicated volunteers who give sacrificially of their most valuable commodity—their time—to serve as Board Members, Committee Chairs and Members, etc., both with the FSCT and the Societies. Thanks to all of you we now have the opportunity to lay a few more bricks on the road that leads to a bright future for our next seventy-five years.

THOMAS E. HILL
FSCT President, 1997-98

Technical Abstracts

Due to unforeseen circumstances, the Spanish translations do not appear in this issue.

Reducing Product Development Cycle Times Without Increasing Risk—F.L. Floyd

JCT, Vol. 70, No. 876, 70 (Jan. 1998)

Both market forces and the regulatory climate are causing companies to seek ways to accelerate the product development process. Unfortunately, shortening development times usually increases the risk level that a company is forced to live with. Historically, R&D has exercised the role of risk manager in corporations by testing prospective products extensively over long times and under varied conditions to insure that there will be no significant failures, once commercially introduced. Today, this style of risk management is untenable—it simply takes too long and costs too much, without delivering commensurate success. The field of reliability theory offers guidance on how to better understand the sources of risk, and how to quickly assess their magnitude, all on a time scale that allows far more rapid innovation than currently enjoyed in the coatings industry. Better yet, it offers insight on how to accomplish this without increasing the total risk experienced by a company.

Oxidative Crosslinking of Alkyd Resins Studied with Mass Spectrometry and NMR Using Model Compounds—W.J. Muizebelt et al.

JCT, Vol. 70, No. 876, 83 (Jan. 1998)

The cobalt-catalyzed oxidative crosslinking of alkyd resins has been studied using ethyl linoleate and methyl ricinoate as model compounds. The reaction was followed with time using quantitative ^{13}C NMR. It was established that ether- and peroxy-crosslinks were formed in roughly equal amounts. Linoleate double bonds become conjugated and react away thereafter because of epoxy formation and ß-scission into aldehydes. The double bond concentration was followed independently by titration with iodine monochloride and correlated quantitatively with NMR data. Further oxidation of aldehydes leads to carboxylic acid formation. After five days the epoxy signal reaches a maximum, virtually disappearing after 100 days possibly due to reaction with acids. Crosslinking of the conjugated methyl ricinoate causes a similar decrease of double bonds and epoxy signal. A stronger ether crosslink signal was seen after 100 days of reaction.

Oligomerization was followed with a modified SIMS technique; it was found that dimers through pentamers were formed having included several oxygen atoms. Reduction of peroxide (crosslinks) with stannous chloride resulted in a decrease of the oligomers containing the higher number of oxygen atoms. In the NMR spectrum of the reduced material, peroxide and epoxide signals completely disappeared.

Oligomer formation was next studied with electrospray ionization mass spectrometry (ESI-MS) and found to be in agreement with SIMS results. The high resolution of the mass spectra obtained permitted conclusions regarding the detailed mechanism of crosslinking. The non-conjugated ethyl linoleate was found to crosslink by combination of radicals: dimers were having masses 2(M-1). The conjugated methyl ricinoate crosslinks via addition to the double bond and disproportionation, yielding masses 2M as well as 2(M-1). (M-mass of ethyl linoleate or methyl ricinoate, respectively, including several oxygen atoms). Formation of higher oligomers involves addition to the double bond for both types of fatty acids, probably because dimers contain a large proportion of conjugated double bonds. ESI-MS of oligomers dissolved in deuterated methanol enabled estimation of exchangeable hydrogens from OH and OOH groups and the fraction of oxygen atoms used for crosslinking, epoxide, and endoperoxide formation.

Step-Growth Polymerization of Unsaturated Aldehydes with Diaminodiphenylmethane—Anton Sebenik

JCT, Vol. 70, No. 876, 95 (Jan. 1998)

Step-growth polymerization of diaminodiphenylmethane and unsaturated aldehydes (crotonaldehyde, cinnamaldehyde) proceeded easily in toluene at reflux temperature. Resins with molecular weights up to 1,500 g/mol were formed. In the first step of the reaction, the amino and the aldehyde groups reaction were predominate while the double bonds dominated to a lesser extent. The portion of unreacted monomers was under one percent. The resins consisted of oligomers with –CHNH–, –CH=N–, and –CH=CH– groups, which further reacted to form highly crosslinked resins. Kinetic data, the heat of the addition, the heat of condensation, and the activation energy were calculated.

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FSCT Membership

Offers The Right Mixture for Success

PUBLICATIONS

- A **Complimentary subscription** to the *Journal of Coatings Technology* is included with your membership dues. The JCT, published monthly, is respected around the world for the quality of its technical information. Each issue features papers on the cutting edge of technology, as well as information covering regulatory updates, people in the news, new products, etc.
- The Year Book, the **Who's Who in the Coatings Industry** provides names, addresses, phone and fax numbers of over 7,400 coatings professionals. Included with dues, the spiral-bound desk reference lists FSCT's 27 Constituent Societies and Affiliated members. (a $150 value)
- FSCT's reference materials including the *Coatings Encyclopedic Dictionary*, *SciQuest*, and the *Series on Coatings Technology* are available to members at discounted prices - you can **save up to 25%** .

EDUCATIONAL PROGRAMS

- Gain **useful ideas and methods** to implement on the job by attending FSCT's regional seminars.
- Network with industry peers at the **FSCT Technology Conference** featuring training sessions and courses for both veterans and beginners in the coatings industry.
- Evaluate the newest trends in technology at the **International Coatings Expo (ICE)**. Held in conjunction with the Technology Conference, the Expo is the largest international trade show for the coatings industry.
- Receive **mailings on FSCT programs**, including updates on the ICE and other FSCT- sponsored events.

SERVICES

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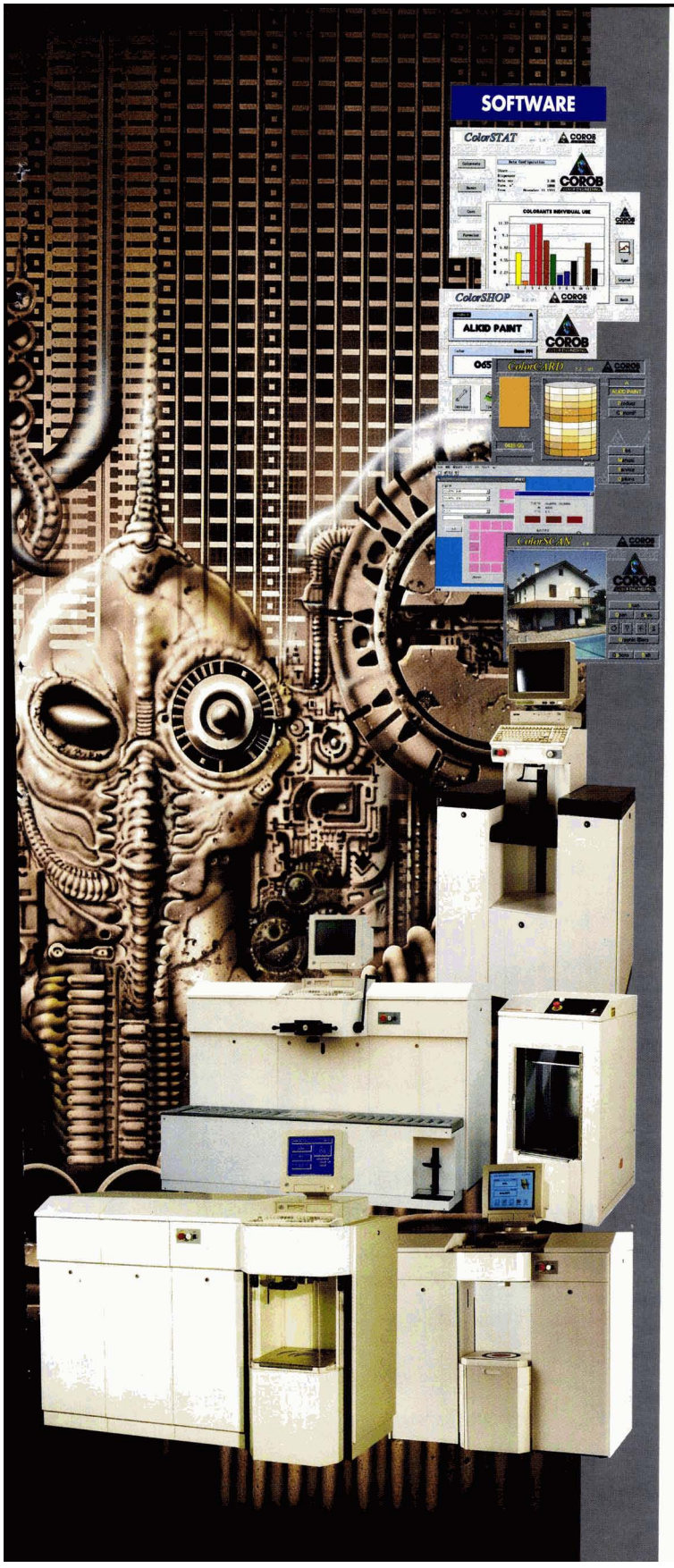

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1998 Roon Awards Competition Underway Entries Invited; Awards Total Up to $4,000

FSCT Roon Awards Committee Chairman Clifford Schoff of PPG Industries, Inc., Allison Park, PA, has announced a Call for Papers for the 1998 competition. Prospective authors have the opportunity to earn up to $4,000 in cash prizes for outstanding papers.

The annual awards are sponsored by the Coatings Industry Education Foundation (CIEF) and were established to honor the late Leo Roon, founder of Nuodex Products Co., with support funds coming from the Roon Foundation. The awards will be presented at the Federation of Societies for Coatings Technology's Annual Meeting, on October 14-16, 1998, in New Orleans, LA.

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

All of those interested in entering the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract by April 15, 1998 to: Roon Awards Competition, c/o FSCT, Attention: Michael G. Bell, Director of Educational Services, 492 Norristown Rd., Blue Bell, PA 19422.

Entries that arrive after the April 15 deadline will be considered for the 1999 competition.

1997 Roon Award Winner

FIRST PLACE—"Oxidative Crosslinking of Alkyd Resins Studied with Mass Spectrometry and NMR Using Model Compounds"—W.J. Muizebelt, J.J. Donkerbroek, N.W.F. Nielen, J.B. Hussem, M.E.F. Beimond, R.P. Klaasen, and K.H. Zabel, Akzo Nobel Coatings Research

(See page 83 of this issue).

Principles Governing the Roon Awards

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

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

The principles governing the awards are as follows:

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

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

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

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

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

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

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

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

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

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

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

(Continued on next page.)

Student Papers Invited for 1998 A.L. Hendry Awards Competition

Student authors are encouraged to submit entries in the 1998 Southern Society for Coatings Technology Alfred L. Hendry Award Competition.

This year's award features cash prizes to both the student author (or authors) and the author's sponsoring lab. The student receives a $1,000 cash award and expenses covering attendance at the FSCT Annual Meeting and International Coatings Expo in New Orleans, LA, on October 14-16, 1998, to receive the honor and a suitably inscribed certificate for the best paper submitted for the competition. In addition, the laboratory of the sponsoring school will also receive a grant of $500.

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

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

Those wishing to enter the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract, by March 13, 1998 to: Hendry Awards Committee, c/o FSCT, 492 Norristown Rd., Blue Bell, PA 19422-2350. The deadline for receipt of manuscripts is July 3, 1998.

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

Principles Governing the Roon Awards (cont'd)

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

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

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

(14) Those planning to submit a paper in 1997 must advise the Chair through FSCT Headquarters (contact Michael G. Bell, Director of Educational Services, Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422) by April 15, 1998. FSCT must receive 10 publication manuscripts by July 3, 1998.

(15) The 1998 Awards and accompanying engraved plaques will be presented during the FSCT Annual Meeting, on October 14-16, 1998, in New Orleans, LA.

Corrosion Committee Outstanding Paper Award Competition Announced

The FSCT Corrosion Committee has announced a Call for Papers for the 1998 Corrosion Committee Outstanding Paper Award competition. Prospective authors have the opportunity to earn up to $1,000 in cash prizes for outstanding papers.

The annual awards are sponsored by the FSCT Corrosion Committee and were recently revised to encourage the solicitation of more corrosion related papers for the Journal of Coatings Technology. The award will be presented at the FSCT Annual Meeting in New Orleans, LA, on October 14-16, 1998.

The award consists of one or two cash prizes totaling $1,000 and an engraved plaque. To submit a paper for the competition, the following rules must be observed: (1) the paper must describe original work related to corrosion protection not previously published or presented; (2) it must reflect a step forward in real scientific contribution in the area of corrosion resistant coatings; (3) it must be accompanied by a clearance for publication. The paper must also be prepared by someone associated with the organic coatings industry, including raw material suppliers and educators. The papers will be judged on originality, scientific importance, and practical value.

All of those interested in entering the competition must send a letter of intent, along with the title of the proposed papers, and a brief abstract by May 1, 1998 to: Outstanding Corrosion Paper Award Competition, c/o FSCT, Attn: Michael G. Bell, Director of Educational Services, 492 Norristown Rd., Blue Bell, PA 19422, or you may fax the information to (610) 940-0292. The final manuscripts are due on July 15, 1998.

Entries that arrive after the May 1 deadline will be considered for the 1999 competition.

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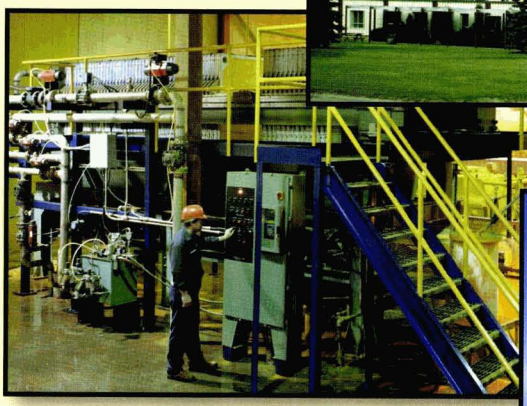

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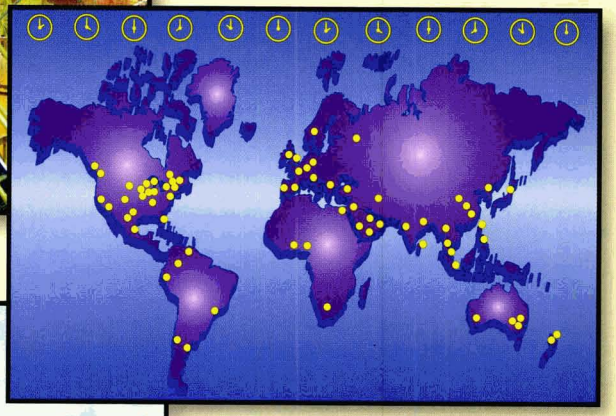

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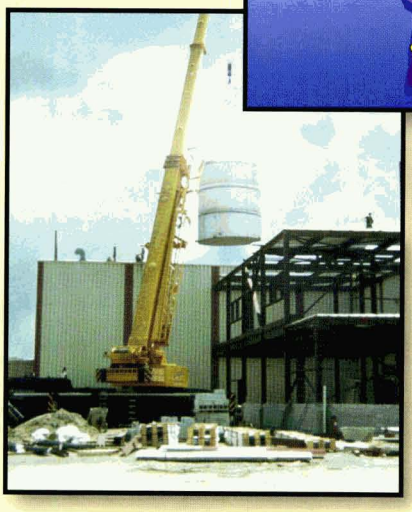

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The Federation of Societies for Coatings Technology is sponsoring ICE Latinoamerica '98 to be held on April 15-17, in Miami, FL. Co-located with Plasticos de las Americas, ICE Latinoamerica focuses on the South and Central American/Caribbean coatings industry needs.

To date, the following exhibitors have reserved space in ICE Latinoamerica '98:

Akzo Nobel Resins
Ashland Chemical Co.
BYK-Gardner, Inc.
Ciba Specialty Chemicals—Pigments
Corob North America Div.
Creanova Inc. (Hüls America Inc.)
Ebonex Corp.
Gretag Macbeth
Halox Pigments
William Harrison Corp.
HERO Industries Ltd.
Inmark, Inc.
International Specialty Products
Italtinto S.R.L.
Kelly Chemical Corp.
Kenrich Petrochemicals
King Industries
Ronningen-Petter
Tikkurila Inc. (Kemira)
Vorti-Siv
Western Equipment Co.

For exhibit information, please contact FSCT Exhibit Management, Steve Kettelkamp, EMI, 10425 Old Olive Street Rd., Ste. 103, St. Louis, MO 63141-5940; Tel. (314) 994-9640; Fax. (314) 994-9650; or e-mail: expomanage@aol.com.

AMENDMENTS TO THE FSCT BYLAWS

In this month's "Comment" *[see pg. 7]* President Tom Hill reviews the Federation's strategic plan and the FSCT's new direction and activities. To achieve these goals several revisions to the FSCT's Bylaws and Standing Rules were proposed at the Spring and Fall 1997 meetings of the Board of Directors.

The proposed amendments encompass several areas: (1) to make it easier to attain and retain members; (2) to revise the current FSCT Committee structure; (3) to expedite the legislative process for consideration of future amendments to the bylaws and standing rules; (4) to assign responsibility for the creation of a three-year operating plan and budget; (5) to better define the responsibilities and accountability of the Executive Committee and Board of Directors; and, (6) to increase the Board's representation on the Executive Committee.

At the November 2, 1997 meeting of the Board the amendments to alter the membership process gained final approval at Second Reading. It should be noted that a Task Force composed of Society Membership Chairs will develop an implementation plan for the revised membership procedure. It is expected that the new procedure will be in force by July 1, 1998.

At their First Reading the amendments to create a three-year operating plan and budget and to revise the FSCT Committee structure were also passed. These amendments will have their Second Reading at the April 26, 1998 meeting of the Board. In addition, an amendment to the FSCT Articles of Incorporation and the Bylaws that would expedite the legislative process was approved at First Reading. This will also undergo Second Reading in April.

Not passed at First Reading in November were amendments proposed that would increase the size of the Executive Committee and to revise the duties of the Board and Executive Committee. These proposals will be reintroduced for First Reading at the April meeting.

The following details the amendments to the Bylaws and Standing Rules that were considered by the Board at the November 2, 1997 meeting. *[To compare the revisions with the original text, please see the 1997 edition of the Federation Membership Directory.]*

Passage and Final Approval at Second Reading

Amendment to Remove Dues Amount from Bylaws and Add to Standing Rules

Bylaws
ARTICLE XII
Dues

The Board of Directors shall establish the amount of the annual dues applying to all classes of membership to be paid to the Federation.

Standing Rule
ARTICLE SR IX
Dues

A. Active and Associate Members

Each Constituent Society shall pay to the Federation office annual dues of twenty-five dollars ($25.00) in U.S. funds per capita for each Active and Associate Member of the Constituent Society.

B. Affiliated Members

Affiliated Members shall pay to the Federation annual dues equal to the nonmember subscription price of the Journal of Coatings Technology applying to the address of the Affiliated Member.

C. Educator and Student Members

Each Constituent Society shall pay to the Federation annual dues of twelve and one-half dollars ($12.50) in U.S. funds per capita for each Educator and Student Member of the Constituent Society.

D. Retired and Society Honorary Members

Each Constituent Society shall pay to the Federation office annual dues equal to one-half the amount established for Active Members, for each Retired and Society Honorary Member of the Constituent Society.

(All subsequent Standing Rules are renumbered)

Amendment to Change the Membership Year

Bylaws
ARTICLE XIII
Fiscal Year and Membership Year

The Fiscal Year of the Federation shall end on December 31. The Membership Year of the Federation and the Constituent Societies shall end on June 30.

Resolution to Eliminate Elections for New Constituent Society Members

Bylaws
ARTICLE III
Constituent Societies

E. Procedural Matters

The organizing of Constituent Societies, Constituent Society boundaries, and membership acceptance in Constituent Societies are subject to the provisions of the Standing Rules of the Federation.

Standing Rule
ARTICLE SRII
Membership in Constituent Societies

(Standing Rule ARTICLE SR II; Section C has been renamed from "METHOD OF ELECTION TO MEMBERSHIP" to "METHOD OF ATTAINING MEMBERSHIP.")

(1) An applicant for Active, Associate, or Educator and Student class of membership must be approved by the Constituent Society Membership Committee that verified the eligibility of said applicant for the class of membership proposed. The application, bearing the Constituent Society Secretary's certification of eligibility, shall be forwarded to the Executive Vice President of the Federation, who will sign and return it to the Society.

(2) An applicant for Retired Membership, after recommendation by the Membership or other appropriate committee of the Constituent Society, shall be processed in the same manner as an application for Active Membership.

(3) An application for the transfer of an Active Member or an Associate Member from one firm to another within the same Constituent Society shall be processed in the same manner as an application for Retired Membership. It is expressly provided, however, that an Associate Member may not assume Active Membership in another firm by means of the transfer procedure. Any Constituent Society may require any applicant for transfer to be subject to the full procedures as if application were being made for a new membership, in accordance with such requirements as may be included in the Constituent Society Bylaws.

(4) An application for a new Active, Associate, Educator and Student, or Retired member can be accepted by the Federation. If the proposed member resides or is employed, or performs services within the territorial boundaries of a Constituent Society, the application will be forwarded to that Constituent Society's Membership Committee for processing in accordance with ARTICLE SR II Section C (1) and C (2) of the Standing Rules. The Federation will collect the appropriate Constituent Society's dues at the time of application. The Constituent Society's portion of that amount for the proposed member will be forwarded when the Federation receives the certified application back from the Society. If the application is not certified by the Constituent Society, the collected dues will be returned to the proposed member. During the processing of the application, the proposed member may exercise the same rights as an Affiliated Member. If the proposed member does not reside or is not employed, or does not perform services within the territorial boundaries of a Constituent Society, the application will be processed for Affiliated Membership in the Federation under ARTICLE II Section A (4) of the Bylaws.

Resolution to Allow the FSCT to Collect Constituent Society Dues

Standing Rule
ARTICLE SRII
Membership in Constituent Societies

F. MEMBERSHIP RENEWAL

At the option of each Constituent Society, the Constituent Society's dues may be collected by the Federation. On a monthly basis, the Federation will forward a roster of Constituent Society renewals along with the collected dues, less the appropriate Federation dues. If a Constituent Society elects this option, it will be the Constituent Society's responsibility to inform the Federation in writing of any dues structure change at least 120 days prior to the date the change takes effect.

Passage at First Reading

The following proposed amendments to the Federation's Bylaws passed First Reading at the November 2, 1997 meeting of the Board of Directors, and will be considered at Second Reading at the April 26, 1998 meeting of the Board in Cleveland, Ohio.

Resolution to Create an Annual Operating Plan and a Three-Year Strategic Plan

ARTICLE IV
Organization

B. BOARD OF DIRECTORS

j. Approve an annual operating budget plan and three year strategic plan presented by the Executive Committee.

(All subsequent lines of this section are relettered.)

C. OFFICERS

(3) *Secretary-Treasurer.*

b. Be responsible for all funds of the Federation and the books and records relating to the same.

d. Serve as custodian of the corporate seal and affix, or cause to be affixed, the seal to all documents, the execution and delivery of which are duly authorized.

e. Record, or cause to be recorded, the minutes of all meetings of the members and of the Board of Directors and give, or cause to be given, all notices of such meetings in accordance with the Bylaws.

The Secretary-Treasurer shall be bonded at the Federation's expense for an amount determined by the Executive Committee.

(All lines in this section are relettered.)

D. EXECUTIVE COMMITTEE

c. Develop and submit to the Board of Directors 60 days prior to the Fall Meeting of the Board of Directors at which adoption of the operating budget plan and three-year strategic plan are to be considered, a proposed annual operating budget plan and three-year strategic plan. Such plans shall be consistent with fiscal guidelines as may be developed from time to time by the Board of Directors or Executive Committee.

(All lines in this seciton are relettered.)

Resolution to Allow for the Rearrangement of Federation Committees

Article IV
Organization

E. Society Representative

d. Serve on Federation Committees when appointed by the President.

Article VIII
Committees

B. BYLAWS COMMITTEE

The President shall appoint the Chair and members of the Bylaws Committee.

C. OTHER COMMITTEES

All other Committees which may be required to conduct the business of the Federation shall be established by the Executive Committee. The President shall appoint the Chair of

each such Committee. The Chair, in turn, shall appoint the members of the Committee with the prior approval of the Executive Committee.

Resolution to Expedite the Legislative Process

ARTICLES OF INCORPORATION

9. The Articles of Incorporation of the corporation may be altered, amended, or repealed by a two-thirds vote of the membership of the Board of Directors of the corporation present. This action must be taken at two successive regular or special meetings of the Board of Directors. At least 45 days notice of such a proposal shall have been given before each such meeting by publication in the Journal of Coatings Technology and direct mailing at least 60 days prior to the President and Secretary of each Constituent Society and the members of the Board of Directors of the corporation.

Bylaws ARTICLE XV Amendments

B. PROCESSING

(2) The Executive Vice President shall forward the report of the Bylaws Committee to the President and Secretary of each Constituent Society and the entire membership of the Federation Board of Directors at least 60 days prior to each such regular or special meeting of the Board at which the proposed amendments are to be considered, and shall cause to be published in the Journal of Coatings Technology such report at least 45 days prior to each such regular or special meeting of the Board at which the proposed amendments are to be considered.

C. CONSIDERATION BY FEDERATION BOARD OF DIRECTORS

Resolutions to alter, amend, or repeal these Bylaws, having been subject to consideration by the Bylaws Committee, must be approved by a two-thirds vote of the members of the Board present. This action must be taken at two successive regular or special meetings of the Board. The approved amendments shall become effective immediately, or at a time specified in the resolution.

The following proposed amendments to the Federation's Bylaws will be reintroduced for First Reading at the April 26, 1998 meeting of the Board of Directors

For First Reading

Resolution to Increase the Board Representation on the Executive Committee

WHEREAS the responsibilities of the Executive Committee have been expanded to provide for the development of a continuing three-year business plan and operating budget, and to provide for greater representation on the Executive Committee by the Board of Directors, be it therefore

RESOLVED that the following proposed amendments to these Bylaws be placed before the Board of Directors for First Reading at its meeting of April 26, 1998. (Note: Revisions are marked as follows: *[Deletions]* **Additions**).

1) ARTICLE IV. "ORGANIZATION," Section B. "Board of Directors" (1), of the Bylaws, be amended to provide for the addition of two Board Members to the Executive Committee.

B. BOARD OF DIRECTORS

(1) The duties of the Board shall be to:

c. Elect the *[three]* **four** Society Representative members **and the one Director-at-Large** member of the Executive Committee.

g. Fill vacancies occurring among the elected officers, the Past-Presidents, Directors-at-Large of the Board of Directors, and **the** Society Representatives **and Director-at-Large** on the Executive Committee.

2) ARTICLE IV. "ORGANIZATION", Section D. "Executive Committee," of the Bylaws, be amended to provide for the increase in Board representation on the Executive Committee.

D. EXECUTIVE COMMITTEE

The Executive Committee shall consist of *[seven]* **nine** members: the President, President-Elect, Secretary-Treasurer, immediate Past-President or most recent available Past-President, *[and three]* **four** Society Representatives, and a **Director-at-Large.**

(3) *Quorum.* A quorum shall consist of *[five]* **six** members, at least two of whom must be officers.

3) ARTICLE VII. "NOMINATIONS AND ELECTIONS", of the Bylaws, be amended to provide for the nomination and election and to define the terms of office for additional Board representation on the Executive Committee.

A. NOMINATIONS

(1) The Nominating Committee shall prepare a slate nominating the following: President-Elect; Secretary-Treasurer; Directors-at-Large on the Board of Directors; Past-Presidents on the Board, except the Immediate Past-President; and Society Representatives and **Director-at-Large** on the Executive Committee. Should the Immediate Past-President be unable to serve, the Committee shall determine the most recent available Past-President.

B. ELECTION

(1) The Voting Members of each Constituent Society shall elect one Society Representative every third year

who shall be an Active Member of *[said Society]* **the Federation**, and serve as its Society Representative to the Federation Board of Directors for a three-year term, beginning at the close of the Annual Meeting of the year in which he or she is elected.

(2) The Board of Directors shall elect the President-Elect; Secretary-Treasurer; Directors-at-Large on the Board of Directors; Past-Presidents on the Board, except the immediate Past-President; and Society Representatives and **Director-at-Large** on the Executive Committee.

C. TERMS OF OFFICE

Members of the Board of Directors and Executive Committee shall be elected to serve the following terms:

(1) The four Directors-at-Large on the Board of Directors shall be elected for *[two-year]* **three-year** terms. The terms of *[two]* **at least one** of the four Directors-at-Large shall expire each year.

(4) The *[three]* **four** Society Representatives on the Executive Committee shall be elected for three-year terms. The term of **at least** one of the Society Representatives shall expire each year. The term of any of the *[three]* **four** Society Representatives shall terminate automatically upon ceasing to be a regularly qualified Society Representative.

(5) The Director-at-Large on the Executive Committee shall be elected for a three-year term. The term of any member of the Executive Committee shall terminate automatically upon such member ceasing to be a regularly qualified member of the Board of Directors.

(and re-number items in this section.)

Resolution to Change Duties of the Board of Directors and Executive Committee

WHEREAS the successful operation of the Federation is dependent on the timely reaction to business situations by the Executive Committee of the Board of Directors, be it therefore

RESOLVED that the following proposed amendments to these Bylaws providing for increased responsibility by the Executive Committee be placed before the Board of Directors for First Reading at its meeting of April 26, 1998. (Note: Revisions are marked as follows: *[Deletions]* **Additions**).

1) ARTICLE III. "CONSTITUENT SOCIETIES," Section C. "Mutual Interest," of the Bylaws, be amended to provide for the timely consideration by the Executive Committee of matters regarding Federation Committee actions and requests, and potential Society actions regarding specifications.

C. Mutual Interest

(1) No Constituent Society shall independently take final action upon matters involving the interests or policies of the industry as a whole. Such matters, with the recommendation of the Constituent Society, shall be referred by the Constituent Society to the Federation *[Board of Directors]* **Executive Committee for consideration.**

(2) All contemplated action by Constituent Societies with regard to specifications shall be referred to *[appropriate committee of]* the Federation **Executive Committee for consideration.**

2) ARTICLE IV. "ORGANIZATION," Section B. "Board of Directors," (1) of the Bylaws, be amended to provide for reporting responsibility by the Executive Committee and Society Representatives to the Board.

B. BOARD OF DIRECTORS

(1) The duties of the Board shall be to:

n. Receive written reports on their activities from the Federation Officers, **the Executive Committee (including the annual operating plan),** Committee Chairmen, and the President of the Coatings Industry Education Fund semiannually; and *[from Constituent Societies]* **on the activities of the Constituent Societies from the Society Representatives** annually.

3) ARTICLE IV. "ORGANIZATION," Section D. "Executive Committee," of the Bylaws, be amended to allow the Executive Committee to conduct business for the Federation between meetings of the Board, and to define the fiscal limitations and responsibility of the Executive Committee.

D. EXECUTIVE COMMITTEE

(1) The duties of the Executive Committee shall be to:

a. Act on behalf of the Board of Directors between meetings of the Board of Directors.

g. Hold a minimum of *[two]* **four** meetings each year at times and places to be designated by the President.

(and re-letter items in this section.)

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

(2) During any fiscal year, the Executive Committee is authorized to expend funds for non-budgeted items only if the total of the proposed non-budgeted expenditures, less non-budgeted related income to be received in the same fiscal year, does not exceed a loss for an amount equal to 1% of the operational budget for the year. Authorization of greater expenditures must be made by the Board of Directors.

4) GENERAL, of the Bylaws, to re-name the term "Member-at-Large" to "Director-at-Large":

Whenever the term "Member-at-Large" or "member-at-large" (or the plural thereof) appears in the Bylaws, there shall be substituted the term "Director-at-Large" (or plural thereof).

OSHA Extends Methylene Chloride Compliance Deadline 18 to 30 Months for Several Sectors

The Halogenated Solvents Industry Alliance (HSIA), Inc. , Washington, D.C., has reported that the Occupational Safety and Health Administration (OSHA), Washington, D.C., has again postponed the deadlines for compliance with the 25-ppm permissible exposure limit (PEL) in the methylene chloride standard for many industry sectors. This latest interim extension (until August 1998) provides OSHA the time needed to publish and take final action on a proposal to grant even longer delays for the identified sectors. As a result, OSHA is expected to delay compliance with the 25-ppm PEL until between April 1999 and April 2000 for companies in the identified sectors.

The delay in the compliance deadline for the 25-ppm limit (using either respirators or engineering controls) applies to companies in the construction, foam manufacturing, furniture stripping, product formulation, and small aircraft stripping sectors, and to companies using methylene chloride-based adhesives for foam fabrication, boat, and RV manufacture, upholstery, and van conversion. The extensions also apply to the installation of engineering controls to comply with the 125-ppm short-term exposure limit (STEL) within these sectors.

Companies in these sectors with 20 or more employees were urged to comply with the STEL (using respirators or other means) and meet the medical surveillance and other requirements by December 21, 1997. Companies in these sectors with fewer than 20 employees will have until April 1998 to comply with the STEL and to meet the other requirements. OSHA will not grant an extension of the compliance deadlines for companies outside the identified industry sectors beyond the 75 days (i.e., until December 21) that OSHA has already provided as a result of discussions with HSIA.

The changes that OSHA will propose in early 1998 were included in a joint motion for reconsideration from HSIA and the United Auto Workers. The motion, which OSHA has indicated that it is inclined to accept, requests an additional 18 to 30 months from the original compliance deadlines for companies in the identified sectors. For the listed sectors other than foam manufacturing and foam fabrication, companies with fewer than 50 employees will have until April 2000 to comply with the 25-ppm PEL or to install engineering controls to comply with the STEL (April 1999 for companies with 50 or more employees). For foam fabrication, the employee-size cutoff will be 150, instead of 50 employees. All flexible foam manufacturers, regardless of their size, will have until October 1999 to comply with the 25-ppm PEL or to install engineering controls.

Hüls America Inc. Renamed Creanova Inc.; Silanes and Silicones Unit Becomes Sivento Inc.

Hüls America Inc., Somerset, NJ, has changed its name to Creanova Inc.

The name change is a part of a global fitness program whereby Hüls AG, headquartered in Germany, will be transformed into a strategic holding company with 12 global operating subsidiaries.

Dr. Klaus Burzin, currently President and Chief Executive Officer of Hüls America Inc., will head up one of these operating units, Creanova Spezialchemie GmbH, in Marl, Germany. In addition, Dr. Wolfgang Minnerup, currently Vice President and Business Controller of Hüls America, will become President and Chief Executive Officer of Creanova Inc.

Coinciding with the global fitness program, the silanes and silicones business group—including construction products—of Hüls America Inc. will be established as a separate company with the name Sivento Inc.

Sivento Inc., as a Hüls group company, will continue to share office space and certain administrative services in the current headquarters at 220 Davidson Ave., in Somerset, NJ.

Ciba's Pigments Division Opens Lab Complex; Purchases Prochimica's Photoinitator Facility

The Pigments Division of Ciba Specialty Chemicals, Newport, DE, recently opened a new 18,000 square foot research and development laboratory complex. The new laboratory complex consists of five new laboratories and offices for lab personnel.

Research in the new labs will focus on developing new pigments for coatings, plastics, inks, and fibers and improving the performance properties of existing pigments to meet customer requirements. Chemists and scientists will concentrate on developing new pigments based primarily on quinacridone and diketo-pyrrolo-pyrole chemistries, as well as improving synthesis routes and manufacturing processes. Both families of pigments are manufactured in Newport.

In other news, Ciba Specialty Chemicals Inc., Basel, Switzerland, and Prochimica S.R.L., Mortara, Italy, have signed an agreement under which Ciba will purchase Prochimica's photoinitiator production facilities in Italy. Terms of the agreement were not disclosed.

The completion of the transaction is subject to clearance by Italian regulatory authorities and will be finalized following the completion of reorganization projects that Prochimica is carrying out.

Ciba will buy two production sites in Mortara and Trivolzio that currently produce intermediate and final products for Ciba's photoinitiator range. As Ciba Specialty Chemicals is Prochimica's primary customer in the area of photoinitiators, the acquisition will not impact Ciba's sales.

Cabot Acquires Fumed Silica Manufacturing Facility

Cabot Corp., Boston, MA, through its subsidiary, Cabot GmbH, has acquired 100% ownership of a fumed silica manufacturing facility in Rheinfelden, Germany. Cabot, which previously held 50% ownership interest in the plant, purchased the remaining interest from Hüls AG, whose parent company is the Veba Group, Germany.

The Rheinfelden facility produces some 8,000 tons of fumed silica a year.

Price Adjustments

Air Products and Chemicals, Inc.
Allentown, PA
PRODUCT: Urethane-acrylic hybrid dispersion product lines for all markets
INCREASE: $.05 per pound
EFFECTIVE: January 15, 1998

Degussa AG
Frankfurt am Main, Germany
PRODUCT: Furnace carbon blacks
INCREASE: 8%
EFFECTIVE: January 1, 1998

PRODUCT: Lamp and gas blacks
INCREASE: 4%
EFFECTIVE: January 1, 1998

Degussa Corp.
Ridgefield Park, NJ
PRODUCT: Corax® rubber grade carbon blacks
INCREASE: 5%
EFFECTIVE: January 1, 1998

UCB Chemicals Corp.
Radcure Business Unit
Smyrna, GA
PRODUCT: Acrylated epoxy oligomers
INCREASE: $.09 per kilo
EFFECTIVE: February 15, 1998

SPI Report Reveals Growth for Plastics Resins in 1997

According to year-end estimates released by The Society of the Plastics Industry, Inc. (SPI), Washington, D.C., production and sales of plastics resins experienced healthy growth in 1997.

Sales and captive use of plastics resins are expected to reach 90.4 billion pounds, a 4.7% increase from 1996. Estimated resin production will reach 88.7 billion pounds in 1997, up 5.2%.

Commodity plastics, represented by the polyolefins, polystyrene, and polyvinyl chloride, represent almost 70% of all resin sales and captive use. In 1997 this group of plastics rose 4.6% in resin sales and captive use. Sales and captive use for all thermoplastic resins was up 4.4 %, with production up 5.2%.

Sales and captive use of thermosetting resins rose 6.6% and engineering resins were up 5.6%. Production for thermoset and engineering resins was up 6.4% and 4.3%, respectively.

The 1997 year-end projections are based on nine-month data as compiled by Association Services Group, LLC for SPI's Committee on Resin Statistics.

Companies Sign Distributor Agreements

Dowd and Guild Inc., San Ramon, CA, and **Witco Organosilicones Group** have entered into an agreement to market the CoatOSil® and Silwet® organosilicones products to the coatings and ink markets in California, Arizona, Washington, and Oregon. In addition, Dowd and Guild Inc. will market the Silquest® line of silanes to the same market and territory.

Synergistic Performance Corp., Oakland, CA, has been appointed exclusive distributor for **Franklin Industrial Minerals'** mica product line in Northern California and the Pacific Northwest.

Day-Glo Color Corp., Cleveland, OH, has appointed **Dorsett and Jackson, Inc.,** as the company's sales agent in Southern California, responsible for the Day-Glo line of fluorescent products.

Quackenbush Co., Lake Zurich, IL, has appointed **Hahn Northwest, Inc.,** Tukwila, WA, as a grinding media representative covering Washington, Oregon, Idaho, and Alaska.

SC Johnson to Lease New Distribution Center

SC Johnson Polymer, Racine, WI, will lease a new distribution and warehouse facility in Renaissance Park located near the company's Waxdale manufacturing complex in Sturtevant, WI. Construction is anticipated to begin in March 1998.

The distribution center will include 153,000 square feet of warehouse space and an additional 7,500 square feet to house office requirements for SC Johnson Polymer customer service and distribution personnel on the 14.34-acre site. An additional 91,000 square feet is available for future expansion as required. The project is expected to be completed in October 1998.

Eastern Training Conference II Slated for May 11-14, 1998 in Valley Forge, PA

The Philadelphia Society for Coatings Technology will present the Eastern Training Conference II and Show at the Valley Forge Convention Plaza, King of Prussia, PA, on May 11-14, 1998.

The conference provides an introductory course aimed at an increased understanding of coatings for both technical and non-technical personnel. Those in allied industries such as adhesives, inks, and plastics will also benefit from the course. Not only will lab technicians and formulators find it useful, but purchasing agents, sales, production, and manufacturing personnel will also benefit. The schedule for the four-day event is as follows:

May 11

"Resins: Oils, Alkyds, Rosins, and Phenolics"—Jeff Danneman, Reichhold;

"Resins: Acrylic, Vinyl, and Styrene"—Dick Burns, Union Carbide;

"Resins: Two Component Systems"—Dick Hergenrother, Bayer Corp.;

"Solvents"—Don Sullivan, Shell; and

"Pigments: Inorganic"—Herb Zaborsky, Heucotech Ltd.

May 12

"Pigments: Organic"—Jim Delaney, Ciba Geigy;

"Pigments: Extender"—Ashok Khokhani, Engelhard;

"Additives: Part I"—Sam Morell, S.P. Morell Co.;

"Additives: Part II"—Bill Buttrick, Union Carbide; and

"Formulating for Application Requirements"—George Schmitz, Reichhold

May 13

"Anatomy of a Latex Paint"—Ed Schaller, Rohm and Haas;

"Manufacturing and QC"—Neil Shearer, Andek and Sue Nielsen, Best Brothers;

"Paint Calculations"—Harold Haag, Hercules;

"Performance Testing"—Saul Spindel, D/L Laboratories; and

"Application Techniques"—Norman Roobol, Author/Professor/Consultant

May 14

Field Trip to Rohm and Haas Test Fence—Bill Hill, Rohm and Haas.

In addition to the conference, over 100 supplier companies to the coatings manufacturing industry will be on hand to discuss their newest products and services. A variety of raw materials, production equipment, containers, filling equipment, laboratory apparatus, and testing devices for the paint and coatings producer will be featured.

The registration fee for the conference is $275. For more information on registration, contact Wayne Kraus, Hercules Incorporated, Research Center, 500 Hercules Rd., Wilmington, DE 19808; (302) 995-3435.

Additional information and speakers abstracts are also available on the FSCT web site: http://www.coatingstech.org

(See registration form on opposite page.)

March Seminar to Focus on Inherently Conductive Polymers

An "International Seminar on the Technology of Inherently Conductive Polymers" is scheduled for March 2-4, 1998 at the Crown Plaza Resort, Hilton Head Island, SC.

The first part of the seminar will feature a tutorial on the properties and processing for coatings and films, and applications including ESD, EMI shielding, corrosion control, electronic, and electrochemical device applications.

The second half will consist of lectures by scientists from several companies involved in the development of such technology.

This seminar is designed for engineers and scientists involved in the R&D as well as design of a variety of electrical and electronic applications and devices.

For more information, contact M. Aldissi, Advanced Polymer Courses, 6 Striper Lane, E. Falmouth, MA 02536.

Courses/Events Sponsored by North Dakota State University Dept. of Polymers & Coatings

CALL FOR PAPERS
NDSU Coatings Symposium
May 27-30, 1998

Sponsored by NDSU, NSF Industry/University Cooperative Research Center in Coatings, and Industrial Sponsors. Chaired by Dr. Doug Wicks (Bayer) and Dr. Ray Fernando (Armstrong World). Symposium gathers leading scientists throughout the world presenting papers on the most recent advances in coatings science. THEME: New Visions in Coatings Science for the XXI Century. LOCATION: Area resort. Deadline for submitting titles and 200-300 word abstracts is January 31, 1998. Telephone registration deadline is April 15, 1998. Direct all correspondence to NDSU Coatings Symposium, NDSU, 54 Dunbar Hall, Fargo, ND 58105.

Summer Coatings Science Course
Date: June 1-12, 1998
Location: NDSU, Fargo, ND

➜For individuals interested in enhancing their current level of knowledge in coatings and paints➜For those who seek a broader perspective, understanding of fundamentals of coatings science➜For newcomers.

Environmentally Compliant Coatings Course
Date: January 19-22, 1999
Location: Ft. Myers, FL

➜For individuals who have experience in coatings research, but want to learn about recent developments ➜Water-reducible, latex, high-solids, powder coatings, radiation curing, analysis of coatings.

Information is available concerning registration, accommodations, and course content from the Program Coordinator Deborah Shasky (tel: 701-231-7633; fax: 701-231-8439; e-mail: nupoly@plains.nodak.edu).

Philadelphia Society for Coatings Technology presents

Eastern Training Conference and Show

Training Conference: May 11-14, 1998
Show: May 12-13, 1998

Valley Forge Convention Plaza
King of Prussia, PA

Purpose and Overview

An introductory course aimed at an increased understanding of coatings for both technical and nontechnical personnel. The course will cover the essentials of coatings technology, and chart the course the industry is taking in its accelerated evolution towards an exact science. Attendees will learn the language of the industry and further their understanding of how raw materials function in both architectural and industrial finishes. Topics will range from simple calculations and basic formulations all the way to the driving forces that influence coating compositions.

Who Should Attend?

Anyone in the industry who wishes to gain a comprehensive understanding of its products and trends. Not only will lab technicians and formulators find it useful, but purchasing agents, sales, production, and manufacturing personnel will also benefit. The informal style of presentation encourages full class participation. No chemistry background is required but is always helpful. Attendees will benefit from the opportunity to network with others in the industry with whom they can share problems and solutions in class and for years to come.

Registration

Registration fee for the Eastern Training Conference and Show is $275.00 per person.

$ 275.00 X_____ Total Enclosed = _____
Registrations

Registration is limited to 150 on a first come, first served basis.

Registration fee includes luncheons. Complimentary materials consist of a compilation of notes on the subject matter presented.

The Show will take place in a nearby hall with tabletop displays. Over 100 supplier companies to the coatings manufacturing industry will be present to discuss their newest products and services. A wide variety of raw materials, production equipment, containers, filling equipment, laboratory apparatus, and testing devices for the paint and coatings producer will be displayed.

Registration Application

Please Print

Name_____

Company_____

Address_____

City_____ State _____ ZipCode_____

Phone Number _____ Fax:_____

Make Checks Payable to: **Eastern Training Conference and Show**

Mail registration and check to: Mr. Sam Firestone, S.E. Firestone Associates, 101 Surrey Rd., Melrose Park, PA 19027-2931.

For additional information, contact: Wayne A. Kraus, Hercules Incorporated, (302) 995-3435.
For registration and exhibit rental information, contact: Sam Firestone, S.E. Firestone Associates, (215) 635-1366.

Eastern Michigan University and Detroit Society to Conduct Course

Eastern Michigan University, Ypsilanti, MI, in cooperation with the Detroit Society for Coatings Technology, will conduct a course on "Polymers for Coatings" for 14 consecutive weeks beginning January 12, 1998 through April 20.

This course is designed to expand the knowledge of attendees for better informed interaction and cooperation between paint scientists and polymer chemists or suppliers. The course schedule is as follows:

Jan. 12—Polymer Fundamentals, J. L. Gardon, EMU and Akzo Nobel;

Jan. 19—Chain Growth Polymerization, D. Nordstrom, DuPont;

Jan. 26 —Emulsion Polymerization, J.L. Gardon;

Feb. 2—Polymers for Aqueous Coatings, J.L. Gardon;

Feb. 9—Polyesters and Alkyds, D. Nordstrom;

Feb. 16—Urethanes, T. Potter , Bayer;

Mar. 2—Epoxies, H.Q. Pham, Dow;

Mar. 9—Amino/Melamine Crosslinkers, F. Jones, EMU;

Mar. 16—High Solids Coatings, J. Baghdachi, EMU;

Mar. 23—Powder Coatings, J. Woo, EMU;

Mar. 30—Radiation (UV and EB) Cure A. Scranton, MSU;

Apr. 6 —Polymer Characterization, D. Bauer, Ford;

Apr. 13 —Summary of Lectures, J.L. Gardon, D. Nordstrom, and F.N. Jones; and

Apr. 20—Examination

The course will provide two credits either towards a B.S. or an M.S. degree in Polymers and Coatings at EMU or for a DSCT Certificate of Completion.

The course will consist of 12 two-hour lectures by industrial and academic experts; printed lecture texts; one two-hour summary session covering the 12 lectures; and one two-hour examination. The examination will be on a lower level for B.S. Degree credit or a Certificate, and on a higher level for those studying towards an M.S. Degree.

The course tuition is $500 (check payable to DSCT). More information is available from Trude Naschak at (248) 637-8503. Class size is limited to 30 students.

Program Announced for Louisville Society's "Spectrum of Coatings 1998" on April 15

The Louisville Society's "Spectrum of Coatings 1998" will be held on April 15, 1998 at the Executive West Hotel, in Louisville, KY. This year's symposium will feature two concurrent sessions.The following topics will be discussed:

Room One

"Pigment Intermix Systems for Industrial Coatings"—Romesh Kumar, Clariant Corp.;

"New Chemical Modification Technology Offers Breakthrough in Black Pigments for OEM Coatings"—Mary Heithaus, Cabot Corp.;

"The Chemistry and Protection of Metal Surfaces from the Costly Effects of Electrochemical Corrosion"—Walter J. Conti Jr., Buckman Laboratories International Inc.;

"Analytical Sciences and Customer Support or Customers, Conundrums and You"—Keith Cannon, Red Spot Paint and Varnish;

"Challenges of Obtaining an Alkyd Paint Rheology with Waterborne Latex Paint"—Mark Zody, Süd Chemie;

"Silicone Additives in Coatings Applications"—Lori Stark-Kasely, Dow Corning Corp.;

"Improved Paint Film Fungicide Performance with the Use of Potentiators"—Amanda L. Harkins, Buckman Laboratories International, Inc.;

Room Two

"Crosslinker Blends in Two-Component Waterborne Polyurethane Coatings Systems"—William O. Buckley, Air Products and Chemicals;

"New 2K Wood Coatings Comprised of a Hydroxy Functional Acrylic Emulsion and a Water-Dispersible Polyisocya-nate"—Vic Stanislawczyk, BFGoodrich;

"Veova Vinyl Esters for Latex Coatings"—Ed Hoozemans, Shell Corp.;

"Rapid Circulation Milling for Pigment Dispersion"—Herman H. Hockmeyer, III, Hockmeyer Equipment Corp.;

"Horizontal Mill-Zinger"—Epworth Manufacturing Co., Inc.;

"Principles of Filtration with Disposable Media and Filtration Management of Disposable Media"—Dan Koats, NorthEast Filter & Equipment Co.; and

"Vibrating and Self-Cleaning Filtration"—John Edwards, Russell-Finex, Inc.

Contact Ilona Nemes-Duvall, Red Spot Paint & Varnish Co., Inc., 1107 E. Louisiana St., Evansville, IN 47711; (812) 467-2337 for additional information.

The Detroit Society for Coatings Technology presents

The 23rd Annual FOCUS Conference

"Innovative Coatings: Practical Solutions for Global Demands"

April 21, 1998

Michigan State University
Management Education Center
800 East Square Lake Rd.
Troy, MI 48089

Keynote Speaker—Darlene Brezinski, Paint and Coatings Industry Magazine

FOCUS features two tracks of expert speakers on coatings technology. Presentations are geared to a technically oriented audience of chemists, engineers, and others with an interest in leading edge technologies for the coatings of the future.

This year's FOCUS conference will also feature a separate tutorial short course "Painting and Processing Plastics."

For more information, please contact: Rosemary Brady, Akzo Nobel Coatings Inc., (248) 637-8565.

UMR Coatings Institute Releases 1998 Course Schedule

The Coatings Institute at the University of Missouri-Rolla (UMR), Rolla, MO, has released it schedule of coatings courses for 1998.

The "Basic Coatings for People in the General Industry, Sales and Marketing" course is schedule for February 23-25 and July 13-15. It emphasizes paint composition and will cover the composition of coatings, relationships between composition and performance characteristics, and customers' specifications and testing techniques as related to formulation criteria. This course will be held in St. Louis, MO.

A course titled "The Basic Composition of Coatings" will be offered on March 23-27 and September 14-18 on the Rolla campus. This course will introduce the newcomer, as well as those involved in raw material manufacture, sales and technical service, to the technical aspects of paint manufacture, testing, and use. Topics to be discussed include the history of paint, materials used in manufacture, simple formulating techniques that you can put to immediate use, introduction to the equipment used to make and test modern protective coatings, modern chemical instrumentation as applied to coatings, and simple cost accounting.

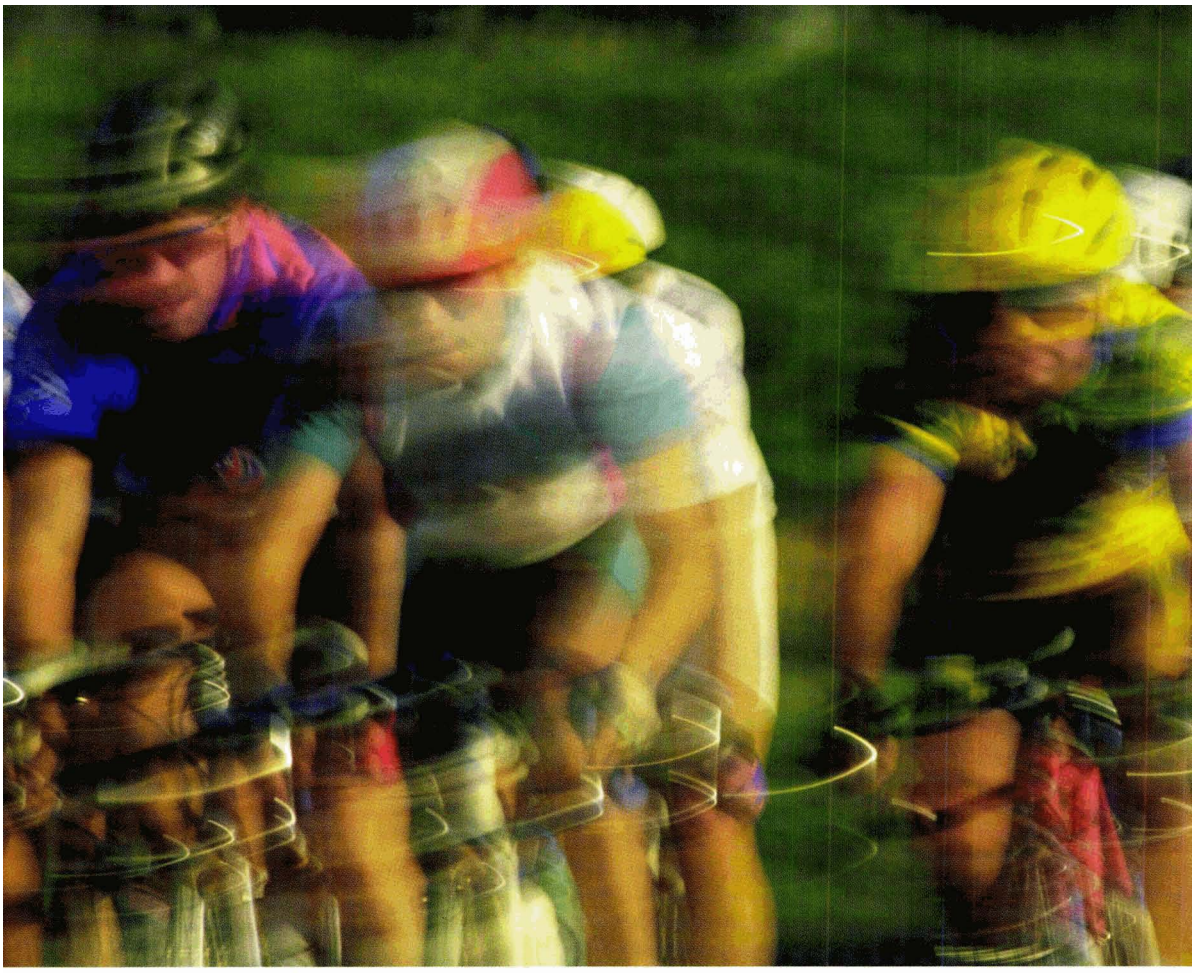
"Introduction to Paint Formulation" will be held on April 20-24, June 8-12, and September 28-October 2, on the Rolla campus. This intensive five-day course will take the attendee through the basic steps of paint formulation, from understanding the process to an actual laboratory formulation. Through study and work in a laboratory, the student can learn to formulate paints to meet specific requirements. In addition, participants will have the opportunity to study and experiment with basic raw materials and their influences on the performance of the finished coating and to formulate and test coatings in the laboratory.

The "Physical Testing of Paints and Coatings" course is slated for May 18-22 on the Rolla campus. This course is designed to improve quality control protocol for paints and coatings. Attendees will learn how to better measure the quality of paint. The course will explore instrumental methodology, i.e., rheology, chromatography, thermal analysis and spectroscopy as well as some others. All tests are based on ASTM methods.

"Introduction to Coatings" is scheduled for November 2-4, in St. Louis, MO. This course is designed to give an end user or a newcomer without technical training an introduction to paint. This general descriptive course will give the participant a better understanding of the terms used and typical uses for various coatings.

The course fee for "Introduction to Coatings" and "Basic Coatings for People in the General Industry, Sales and Marketing" is $745. The cost for "The Basic Composition of Coatings" is $875 and the fee for "Introduction to Paint Formulation" and "Physical Testing of Paints and Coatings" is $975.

For more information on attending these courses, contact Karen K. Markley, Coordinator, UMR Coatings Institute, University of Missouri-Rolla, 1870 Miner Circle, 236 Schrenk Hall, Rolla, MO 65409-0010; (573) 341-4419.



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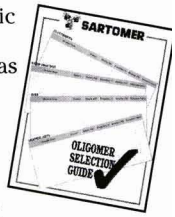
Free *Oligomer Selection Guide*

It recommends specific oligomers for each major market as well as detailed performance properties for each oligomer.



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ice '97 International Coatings Expo
Annual Meeting • Technology Conference

Federation of Societies for Coatings Technology

FSCT 75 Years

Tradition . . . Discovery . . . Opportunity

Convention Wrap-Up

ice
INTERNATIONAL
COATINGS EXPO

Atlanta

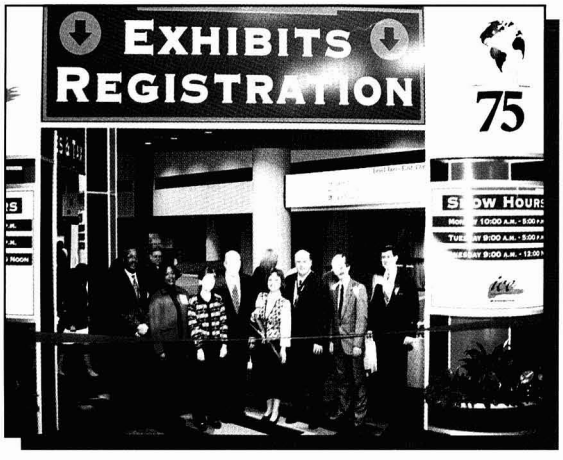
November 3-5, 1997

Georgia World Congress Center

Coatings Industry Celebrates 75th Anniversary of FSCT As 8233 Meet in Atlanta for ICE '97

From the Welcoming Address by FSCT President Jay Austin to the busy exhibits at the International Coatings Expo to the variety of educational opportunities available at the Technology Conference and the Annual Meeting sessions, attendees at ICE '97 in Atlanta knew this year was something special. Celebrating its 75th year of service to the coatings industry, the Federation of Societies for Coatings Technology hosted the industry's premier event at the Georgia World Congress Center on November 3-5 in Atlanta, GA. And what an event it was! Representing a truly international audience, 8233 attendees travelled to Atlanta to take part in ICE '97. A record number of exhibitors—332 companies in over 96,800 sq ft of exhibit space— introduced innovative technologies and solutions to current challenges.

At ICE '97, programs keyed to the theme, "75 Years: Tradition . . . Discovery . . . Opportunity," provided a fascinating look back to the Federation's beginnings and offered attendees insights into the coatings industry as it moves into the future. Some techniques for achieving success in the future were shared in the Keynote Address presented by noted science and technology forecaster, Daniel Burrus. Burrus emphasized the need for companies to develop strategies for adapting to quickly changing realities. Throughout ICE '97, these changing realities were in evidence, particularly at the International Technology Conference, held in conjunction with the Expo and Annual Meeting. Offered for the second year, the popular Technology Conference offered practical information and training in nine one-day and four two-day courses. Annual Meeting technical sessions offered attendees additional sources of information, with a variety of papers on coatings topics. Kicking off the Annual Meeting was the Technical Focus Lecture, "Progress Towards Solvent-Free Polyisocyanate Based Coatings," given by Douglas Wicks, of

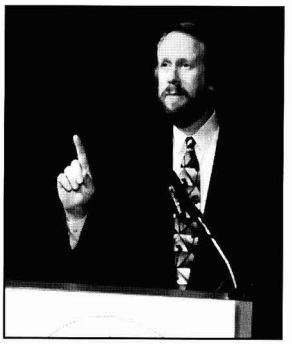


Kathy Austin (with scissors) officially opens ICE '97 with the traditional ribbon cutting ceremony. Assisting are (from left): Secretary/Treasurer Forest Fleming; Terri Fleming; Lyn Hill; President-Elect Thomas Hill; Kathy Austin; President Jay Austin; Incoming Secretary-Treasurer Gerry Gough; and Executive Vice President Bob Ziegler

Bayer Corp. A highlight of the Annual Meeting was the 1997 Mattiello Memorial Lecture given by F. Louis Floyd, "Reducing Product Development Cycle Times *without* Increasing Risk."

The success of this event is credited to the efforts of the exhibiting companies and their personnel, the attendees, ICE Sponsors (ANGUS Chemical Co., Halox Pigments, SC Johnson Polymer, and New Way Packaging Machinery Inc.), and all of the FSCT Committee members who worked so hard to provide the highest quality event. The FSCT extends special thanks to the members of the Southern Society who, under the leadership of Jeff Schubert, served as Host Society for the meeting.

On behalf of the Southern Society, Eve Irvine welcomed attendees to Atlanta for the 75th FSCT Annual Meeting



At the Annual Meeting Opening Session, Technology Forecaster Daniel Burrus shared some strategies for success in the 21st Century

FSCT Recalls Days Past with Historical Display

In Atlanta, the FSCT celebrated its proud heritage with a historical display, highlighting those who contributed so greatly to the organization's success. The FSCT's multifaceted display invited attendees to "walk back through time" and view many of the instruments, photographs and artifacts which have characterized the coatings industry from its earliest days. With contributions from Constituent Societies, Paint Show exhibitors, and affiliated organizations, the FSCT "History Walk" even included a one-ton paint mill!

ICE '97—Record-Setting Number of Exhibitors

Building on the success of the last year's International Coatings Expo, ICE '97 broke all previous records set for supplier companies. Among the companies represented in Atlanta, 10 received awards for outstanding exhibits.

The record-setting number of supplier companies—332—filled 96,800 square feet of exhibit space with state-of-the-art raw materials, equipment, and services for the coatings industry. Of these, 49 companies were first-time exhibitors. The previous record was set in 1996 when 320 supplier companies were represented in Chicago, IL.

The judging committee, headed by Tim Zeffiro, of J.M. Gillen Co., selected the following companies to be recipients of the 1997 Flynn Awards: Amoco Chemicals; Brookfield Engineering Laboratories, Inc.; CB Mills; Clawson Container Co.; HunterLab; SC Johnson Polymer; King Industries, Inc.; Micro Powders, Inc.; Poly-Resyn, Inc.

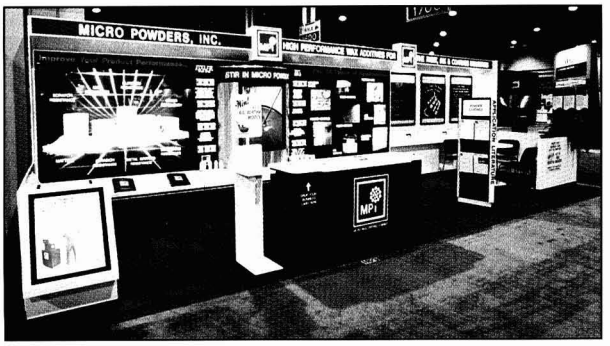
Award-Winning Booths at International Coatings Expo

The following companies were recipients of the 1997 International Coatings Expo Awards. These awards are presented to the companies sponsoring outstanding exhibits in the Expo on the basis of technical excellence, educational value, attractiveness, and novelty. The awards are divided into four categories: Raw Materials (single booth, double, 3-5, 6-9, 10+); Production Equipment (single, double, and 3+); Service Industries; and Laboratory and Testing Equipment. The Federation congratulates the award winners.

An exhibitor for 16 years, SC Johnson, Racine, WI, won in the category of Raw Materials—10+ Booths. Accepting the award is (from left): Kris Grauer, Wilson Nesom, Tarja Ahlgren, Michael Verwey, Kurt Moll, and Al Ditucci.

King Industries, Inc., Norwalk, CT, took the prize for Raw Materials—6-9 Booths. They have been an exhibitor for 14 years. Accepting the award are (from left): Pat Barczak, Rui Gloria, Bob Coughlin, Larry Gallagher, Suzanne Derivan, Rich Shain, Carol Gilly, Kathy King, and Bob Burk.

International Coatings Expo



A 13-year exhibitor, Micro Powders, Inc., Tarrytown, NY, was the recipient of the Raw Materials—3-5 Booth award. Pictured receiving the plaque are David Gittleman, Deena Strauss, Phyllis Strauss, and Warren Pushaw.

Amoco Chemicals, Chicago, IL, an 11-year exhibitor, took the prize for Raw Materials—Double Booth. Accepting the plaque and ribbon are Ron Anderson, Ray Behrends, and Tom Webster.

An exhibitor for 13 years, Poly-Resyn, Inc., Dundee, IL, won in the category Raw Materials—Single Booth. Staff members of Poly-Resyn accepting the award are Karen Schaden and Jeff Schreurs.

International Coatings Expo

An 38-year exhibitor, CB Mills, Buffalo Grover, IL, was the recipient of a Production Equipment award. Pictured receiving the award are Bruce Krumholz, Mark Drukenbrod, and Al Krumholz.

HunterLab, Reston, VA, took a prize for Production Equipment. They have been exhibiting in the Expo for 36 years. Presented with the plaque and ribbon are Randy Thesken and Hal Good.

Brookfield Engineering Laboratories, Inc., Stoughton, MA, a 28-year exhibitor, took a prize for Production Equipment. Accepting the plaque and ribbon are Diane Beltran, Sherman Caswell, and David DiCorpo.

International Coatings Expo

An exhibitor for 13 years, Clawson Container Co., Clarkston, MI, was the recipient of the Service Industries Award. Accepting the award are Ed Moskwa, Don Anderson, and Matt Conti.

Winning in the category Laboratory and Testing Equipment was BYK-Gardner. The 44-year exhibitor is located in Columbia, MD. Accepting the award on behalf of the company are Brett Walburn, Gabi Kigle-Doeckler, Jim MacDonald, and Ken Marsh.

New Exhibitors

The Federation was pleased to welcome the following new exhibitors to the 1997 FSCT International Coatings Expo.

Acetex Enterprises
Allied Colloids
Automation USA
Avestin Inc.
Avila-Agnelo Editora E Comercio Ltda- Paint & Pinturas Magazine
Bericap GmbH & Co.
Cambridge Applied Systems, Inc.
Cellulose Filler Factory Corp.
Chemidex, Inc.
CIBA Specialty Chemicals- Fluoro Chemicals
Custom Aerosol Packaging
Degen Oil & Chemical Co.
Delta Colours
Dixie Poly-Drum Corp.
Easy Lift Equipment Co., Inc.
Eckart America
Electrotechnology Applications Center
Esprit Chemical Co.
Estron Chemical, Inc.
First Ten Angstroms
Florida Drum Co.
Franklin Industrial Minerals
Georgia Marble Co.
Gilson Co., Inc.
ICI Paints North America
Iimak
Imation Enterprises Corp.
Independent Capital Corp. (ICC)
Industrial Copolymers Ltd.
INOUE USA
Italtinto America Inc.
Jevic Transportation Inc.
Kelly Chemical Corp.
Neste OXO AB
Paint Research Associates
Pall Filtron Corp.
Polypack, Inc.
R-Tech Manufacturing, Inc.
Readco Manufacturing, Inc.
Revelli Chemicals Inc.
Reynolds Industries, Inc.
S & G Technologies
Smurfit Plastic Packaging, Inc.
Startech Inc.
Stony Brook Scientific, Ltd.
Testing Machines, Inc.
Utah Clay Technologies, Inc.
Vinavil Americas

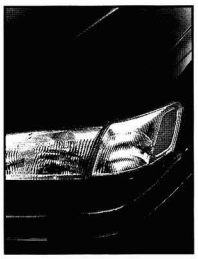
International Coatings Expo

A.P. Dataweigh Systems
ABC Dispensing Technologies Inc.
Acetex Enterprises
Aceto Corp.
ACT Laboratories
Adhesives Age/Intertec Publishing
Advanced Software Designs
Air Products & Chemicals, Inc.
Akzo Nobel Resins
Alar Engineering Corp.
Allied Colloids
AlliedSignal Specialty Chemicals
Alnor Oil Co., Inc.
Ambrose Co.
American Chemical Society
American Colors, Inc.
American Paint & Coatings Journal
Amoco Chemicals
ANGUS Chemical Co.
Anker Labelers USA Inc.
Aqualon, A Div. of Hercules Inc.
ARCO Chemical Co.
Argus Business Media
Arizona Instrument Corp.
Ashland Chemical Co./Drew Ind. Div.
Atlas Electric Devices Co.
Atotech USA Inc
Automation USA
Avestin Inc.
Avila-Agnelo Editora E Comercio Ltda-Paint & Pinturas Magazine
Aztec Peroxides, Inc.
B.A.G. Corp.
Barry-Wehmiller Co.
Barry-Wehmiller Packaging Systems
BASF Corp.
BatchMaster Software Corp.
Bayer Corporation
Bericap GmbH & Co.
Blacoh Fluid Control, Inc
Borden Chemical, Inc.
Boss Bulk Systems, Inc.
Bowers Process Equipment Inc.
Brookfield Engineering Labs., Inc.
Buckman Laboratories, Inc.
Buhler Inc.
Bulkcon Systems Int'l (USA) Ltd.
Burgess Pigment Co.
BYK-Chemie USA
BYK-Gardner, Inc.
Cabot Corp., CAB-O-SIL & Special Blacks Divs.
Calgon Corp.
Cambridge Applied Systems, Inc.
Cardolite Corp.
CB Mills
Cellulose Filler Factory Corp.
Celotex-Testing Services
CEM Corp.
Chemical & Engineering News
Chemical Marketing Reporter
Chemical Week
Chemicals Incorporated
Chemidex, Inc.
Chemir/Polytech Laboratories, Inc.
Ciba Specialty Chemicals (Additives, Pigments, & Polymers Divs.)
CIBA Specialty Chemicals- Fluoro Chemicals
Cimbar Performance Minerals
Clariant Corp.
Clawson Container Company
CMI International
Coatings Magazine
Coatings World/Ink World Magazines
Coldec Inc.
Color Communications, Inc.
Color Corporation
Color Instruments, Inc.
ColorTec
Columbian Chemicals Co.
Cook Composite & Polymers (CCP)
Corob North America Div. of Taotek NA, Inc.
Corrosion Control Consultants & Labs
Cortec Corp.
CR Minerals Corp.
Crosfield Company
Cuno, Inc.
Custom Aerosol Packaging
Cytec Industries Inc.
D/L Laboratories
Daniel Products Co., Inc.
Datacolor International
J. De Vree & Co. N.V.
DeFelsko Corp.
Degen Oil & Chemical Co.
Degussa Corp.
Delta Colours
University of Detroit Mercy
Disti-Kleen, Inc.
Dixie Poly-Drum Corp.
Dominion Colour Corp.
Dover Chemical Corp.
The Dow Chemical Co.
Dow Corning Corp.
Draiswerke GmbH -"Drais Mannheim"
Draiswerke, Inc.
Dry Branch Kaolin
DuPont Nylon Intermediates
DuPont Performance Chemicals
Eagle Zinc Company
Eastern Michigan University
Easy Lift Equipment Co., Inc.
Ebonex Corporation
ECC International
Eckart America
Eiger Machinery, Inc.
Electrotechnology Applications Ctr.
Elf ATOCHEM North America, Inc.
EM Industries, Inc.
EMCO USA (Epworth Morehouse-Cowles)
Engelhard Corp.
Engineered Polymer Solutions (EPS)
Esprit Chemical Co.
Estron Chemical, Inc.
European Coatings Journal
Exxon Chemical Co.
Fawcett Co.
Federation of Societies for Coatings Technology
Fillite North America, Inc.
First Ten Angstroms
Fischer Technology Inc.
Florida Drum Co.
Fluid Management
Formation Systems, Inc.
Franklin Industrial Minerals
FSI—Filter Specialists, Inc.
Fuji Silysia Chemical, Ltd.
H.B. Fuller Co.
G A F Filter Systems
Gamry Instruments, Inc.
Paul N. Gardner Co., Inc.
Georgia Marble Co.
Georgia-Pacific Resins, Inc.
Gilson Co., Inc.
The BFGoodrich Co., Spec. Chems.
The Goodyear Tire & Rubber Co.-Chemical Div.
Gorman-Rupp Co.
Grace Davison/W.R. Grace & Co.
Graco, Inc.
Gretag Macbeth (formerly Macbeth)
Halox
J.W. Hanson Co.
Harcros Pigments Inc.
Henkel Corp.-Coatings & Inks Div.
HERO Industries Ltd.
Heucotech Ltd.
Hi-Mar Specialties, Inc.
Hilton Davis Co.
Hockmeyer
Horiba Instruments Inc.
J.M. Huber Corp. Engineered Minerals Div.
Huls America, Inc.
HunterLab
Huntsman Corp.
ICI Paints North America
ICI Surfactants
Ideal Mfg. & Sales Corp.
IGT Reprotest Inc.
Iimak
Imation Enterprises Corp.
Indco, Inc.
Independent Capital Corp. (ICC)
Industrial Copolymers Ltd.
Industrial Paint & Powder Magazine
Inmark, Inc.
INOUE USA
Inpra-Latina
Intellution. Inc.
Interfibe Corp.
International Compliance Center Ltd.
International Speciality Chemicals
International Specialty Products (ISP)
Italtinto America Inc.
ITT Marlow/ITT A-C Pump
Jevic Transportation Inc.
S.C. Johnson Polymer
K-T Feldspar Corp.
Kelly Chemical Corp.
Kenrich Petrochemicals, Inc.
King Industries, Inc.
Kline & Company, Inc.
KRONES, Inc.
KTA-Tator Inc.
Labelmaster
Laponite Rheological Additives
Laporte Inc.
Laporte Pigments North America
LaQue Corrosion Services
Lawter International, Inc.
The Leneta Company
Liquid Controls
Littleford Day Inc.
Longview Fibre Company
The Lubrizol Corporation
Luzenac America
3M Specialty Additives
3M Performance Chemicals & Fluids
Macbeth (see Gretag Macbeth)
Mallinckrodt Inc.
Malvern Minerals Co.
Manufacturing Business Systems
Mapico
Michelman, Inc.
Micro Powders, Inc.
Microfluidics International Corp.
Micromeritics
Micromet
Microview USA, Inc.
Mid-States Eng. & Mfg.
Mineral Pigments
Ming-Zu Chemical Industries
MiniFibers, Inc.
Minolta Corporation
Mississippi Lime Co.
University of Missouri-Rolla
Mitsubishi Chemical
Modern Paint & Coatings
Monsanto Co.
Morton International, Inc.
Muetek Analytic Inc.
Myers Engineering
Nacan Products Ltd.
Nagase America Corp.
Nametre
Neste OXO AB
Netzsch Incorporated
Neupak, Inc.
New Way Packaging Machinery
Nichem Corp.
Norman International
North American Oxide
North Dakota State University
Nyco® Minerals, Inc.
Occidental Chemical Corp.
Ohio Polychemical Co.
Olin Corp.
Omega Recycling Technologies Inc.
Omnimark Instrument Corp.
Paar Physica
Paint & Coatings Industry Magazine
Paint Research Associates
Paint Research Association-PRA (UK)
Pall Filtron Corp.
Parasol Systems, Inc.
Parker Hannifin
Particle Sizing Systems
Peninsula Polymers, Inc.
Pfaudler, Inc.
Phenoxy Specialties
Pioneer Packaging Machinery, Inc.
Polar Minerals Inc.
Poly-Resyn, Inc.
Polypack, Inc.
PPG Industries, Inc.
PQ Corporation/ Potters Industries
Precision Dispensing
Premier Mill Corp.
Purity Zinc Metals
Q-Panel Lab Products
Quackenbush Co., Inc.
K.J. Quinn & Co., Inc.
R-Tech Manufacturing, Inc.
Raabe Corporation
RadTech International North America
Ranbar Technology, Inc.
Readco Manufacturing, Inc.
Reichhold Chemicals, Inc.
Revelli Chemicals Inc.
Rexam Mulox, Inc.
Reynolds Industries, Inc.
Rheox, Inc.
Rhone-Poulenc
Rhopoint Instrumentation Ltd.
Rohm and Haas
Ronningen-Petter
Charles Ross & Son Co.
Russell Finex, Inc.
S & G Technologies
San Esters Corp.
Sartomer Co., Inc.
Schenectady International, Inc.
Schlumberger Industries
Schold Machine Co.
SEPR Ceramic Beads & Powders
Shamrock Technologies, Inc.
Sheen Instruments, Ltd./TAK Fluid Power, Inc.
Shell Chemical Co.
Sherwin-Williams Chemicals
Silberline Mfg. Co., Inc.
Singleton Corp.
Smurfit Plastic Packaging, Inc.
Sonoco Industrial Containers
Southcorp Packaging USA, Inc. NAMPAC/ Bennett
Southern Clay Products, Inc.
University of Southern Mississippi
Specialty Minerals, Inc.
Spencer Machine & Tool Co., Inc.
Spraymation, Inc.
Startech Inc.
Startex Chemical, Inc.
The Society for Protective Coatings
Stony Brook Scientific, Ltd.
Stretch-O-Seal Corp.
Sud-Chemie Rheologicals
Summit Precision Polymers Corp.
Tech Pak, Inc.
Teemark Corporation
Tego Chemie Service
Testing Machines, Inc.
Thiele Engineering
Thomas Scientific
Tikkurila/McWhorter/Kemira
Toyal America Inc.
Troy Corporation
U.S. Aluminum, Inc.
U.S. Zinc Corporation
UCB Chemicals Corp./Radcure
Union Carbide Corp.
Union Process Inc.
United Mineral & Chemical Corp.
United Soybean Board
Utah Clay Technologies, Inc.
Van Waters & Rogers, Inc.
VanDeMark Group
R.T. Vanderbilt Co., Inc.
Versa-Matic Pump Company
Vianova Resins Inc.
Victaulic Co. of America
Vinavil Americas
Vorti-Siv Division MM Industries, Inc.
Wacker Silicones Corp.
Western Equipment Company
Wilden Pump & Engineering Co.
Witco Corp.
WSI Chemical, Inc.
X-Rite, Incorporated
Zeiss Optical Systems, Inc.
Zemex Industrial Minerals
Zeneca Biocides
Zeneca Resins

ICE '97 Exhibitor Showcase

This feature will be offered periodically as a service to FSCT trade show exhibitors.

Cabot Corp., Special Blacks Division



The Special Blacks Division of Cabot Corp., Billerica, MA, has developed Emperor™ S90B pigment black. The pigment uses a patented chemical modification of the carbon black surface that reportedly increases the speed and stability of the pigment's dispersion in solvent paints. The product can cut dispersion time in half and reduce the amount and need for dispersants and other additives.

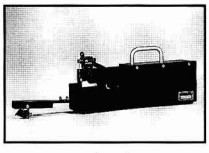
Ciba Specialty Chemicals

The Performance Polymers Division of Ciba Specialty Chemicals, Brewster, NY, has announced the extension of its current matting agents line for powder coatings applications. The complete line of products, Matting Agents DT 125-1 and DT 3329-1 US, and Matting Hardeners DT 3355, DT 3357, and DT 3368, was designed to cover the gloss range (0-100%) for pure epoxy, epoxy/polyester hybrid, and (30-100%) for TGIC binder systems. They can also be used in acrylic hybrids and IPDI polyester systems.

GretagMacbeth

The new 2.0 ProPalette, a Windows™-based color formulation system is now available from GretagMacbeth, New Windsor, NY. Designed for single hit matching capabilities at all levels of opacity, ProPalette 2.0 is suited for color formulation in the plastics, textiles, paint and coatings, and ink industries. The new version 2.0 features a unified database format that lets users create file association or folders such as a job or customer folder for fast, easy formula storage and retrieval.

Atlas Electric Devices Co.



Atlas Electric Devices Co., Chicago, IL, offers the MT-1 Mar Tester to determine the mar resistance of automotive and high-gloss topcoats. Designed to meet Ford Laboratory test method, Mar Resistance Determination for Automotive Coatings, the Mar Tester checks mar resistance on smooth flat surfaces. This portable device offers the flexibility to check the mar resistance and related cure state of a finish while the automobile is on the production line.

Engelhard

Engelhard Corp., Iselin, NJ, has introduced Mearlin® Sparkle and Hi-Lite Sparkle pearlescent pigments. Sparkle pigments encompass five metallic colors: gold, bronze, copper, russet, and blue russet and are titanium dioxide-coated mica. Hi-Lite Sparkle pigments are available in gold, orange, red, red, violet, blue, and green and are iron oxide-coated mica. Both product lines have a particle size that averages 47 microns and range from 16 to 128 microns.

Solutia Inc.

Three new Resimene amino crosslinkers are now available from Solutia Inc., formerly Monsanto Co., St. Louis, MO. Resimene 7111 and 7112 were formulated to improve cure response in solvent-borne and high-solids coating systems in the OEM auto plastics, general metal, coil and exterior container industries. Resimene 7103 is a high performance crosslinker with optimized low viscosity. It may be used in a variety of general metal coatings and for coatings specifically in the OEM auto and metal office furniture industries.

Dow Corning

Dow Corning, Midland, MI, has introduced Dow Corning® 1-0543 Resin, a silanol functional resin specially formulated for high temperature powder coatings. The 100% silicone resin reportedly improves heat stability and weatherability in powder coatings for barbecue grills, wood-burning stoves, and other finished products that must withstand high temperatures or ultraviolet radiation exposure. It can also be used as a blending resin in solvent-based formulations to reduce VOC and improve film properties.

ICI Surfactants

ICI Surfactants, Wilmington, DE, has developed new lines of high-performance dispersants and emulsifiers for the paint and coatings industry. The dispersant line, marketed under the Zephrym™ brand name, will include polymeric dispersants formerly called Hypermer®. The company's new line of optimized phosphate esters will be marketed under the Atphos® brand name. Zephrym dispersants can be used for dispersion of organic and non-organic pigments in both solvent- and water-based formulations. Atphos phosphate esters are based on traditional nonylphenol ethoxylates, as well as esters of aliphatic alcohol ethoxylates.

Vianova Resins

Vianova Resins, Charlotte, NC, has introduced Daotan VTW 6470, a hydroxy functional polyurethane resins. As a water-based urethane, Daotan may be formulated down to VOC compliance. Daotan 6470 is hard and slick, with a pencil hardness of 5H, 160 inch pounds of direct and reverse impact, and a 60° gloss of 98. Recommended applications include metal or concrete.

Brookfield Engineering Laboratories, Inc.

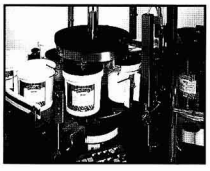
The KU-1+ Digital Viscometer is now available from Brookfield Engineering Laboratories, Inc., Stoughton, MA. This instrument provides direct display of viscosity in Krebs Units or grams. Resolution of 0.1 KU is provided on a bright LED display which facilitates measurement of paints, coatings, inks, oils, pastes, and other related materials. Measurement range of the KU-1+ is 40 to 141 KU. Accuracy is to ±1% of range, and reproducibility is to ±0.5% of range.

Dow Chemical Co.

Dow Chemical Co., Midland, MI, has added acrylic latexes for interior and exterior architectural coatings, light industrial maintenance and general metal coatings, wood coatings, and traffic paints to its line of acrylic emulsion binders. DA 42NA acrylic latex has been introduced for use in general architectural coatings. DL 430, DL 432S, and DL 434 were introduced in North America for use in low-odor, solvent-free coatings. For hardboard coating applications, DW 110NA is suitable for primer formulations, and DW 61NA is used for topcoat formulations. DM 99NA, DM 171NA, and DM 166NA have been added to the line for metal coating applications. For traffic paint application, Dow has introduced DT 250NA.

Krones

The Pail Labeler, available from Krones, Inc., Franklin, WI, offers container control when applying body front labels onto round pails. With handle orientation, the rotary labeler accurately applies labels at speeds of up to 25 pails per minute; without, the labeler operates at speeds of 50 pails per minute. The system uses a full-glue pattern on the labels and can accommodate pail diameters ranging from 190 to 310 mm.



Cytec Industries, Inc.

A new, VOC and APE free proprietary sulfosuccinate surfactant blend has been introduced by Cytec Industries Inc., West Paterson, NJ. Aerosol® OT-NV surfactant has surface active properties including low surface tension, rapid equilibrium and dynamic wetting and better electrolytic stability. The new product has applications in paints, printing ink, overprint varnish systems, emulsion polymerization, textile, paper, mining, multi-purpose cleaning solutions, and in anti-stat/softening agents.

Lubrizol Corp.

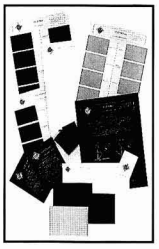
Lanco™-Flow P10 has been developed by The Lubrizol Corp. This product is a flow modifier adsorbed onto a silica carrier and reportedly improves flow and leveling of the coating during the curing process. It performs in a variety of thermosetting powder coating formulations, including: polyester TGIC, polyester urethane, epoxy/polyester hybrid, and Primid™ systems. In addition, it complies with FDA Regulation 21 CRF 175.300.

Air Products and Chemicals Inc.

Air Products and Chemicals, Inc., is offering Adura™ 100 polyol for high-performance waterborne coatings. This product is a high-solids dispersion that can be cured with conventional aliphatic isocyanate crosslinkers. Coatings formulated with Adura 100 polyol have good pot life and can be applied under a broad range of environmental conditions. It is not recommended for clear exterior coatings.

Color Communications, Inc.

Color Communications, Inc., Color Standards Division, Poughkeepsie, NY, has introduced a new color tolerance system that improves upon the existing tools used for color control. New production techniques assure that no variation in their target colors between tolerance sets and color control panels will occur. Because the identical batch of standards is used for both products, differences in color, gloss, or texture within the system are virtually eliminated. Another upgrade to the new system is the layout of the color standards on the charts.



Rhône-Poulenc

Rhône-Poulenc, Cranbury, NJ, has announced two product developments in the area of urethane technology. XWD2 is an aqueous dispersed crosslinker for single component polyurethane coatings. This blocked isocyanate product is designed to produce low-VOC coatings and has demonstrated greater stability and shelf life over current aqueous systems. The company has also developed an IPDI monomer for urethane systems. This high-purity, low hydrolyzable chlorine monomer is used in the preparation of highly weatherable polyurethane coatings for OEM automotive, refinish, and other transportation and powder finishes.

FSCT 75th Annual Meeting

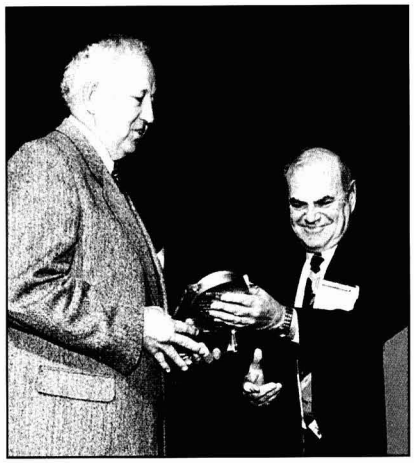
Celebrating the organization's 75th Anniversary, the Annual Meeting of the Federation of Societies for Coatings Technology was held in Atlanta's Georgia World Congress Center on November 3-5. Highlights of the meeting included key technical presentations geared to the theme of "Tradition . . . Discovery . . . Opportunity." From the Keynote Address given by technology futurist Daniel Burrus to the Mattiello Memorial Lecture presented by F. Louis Floyd, the Annual Meeting offered attendees many opportunities to learn of the latest innovations in the world of coatings technology. The Annual Meeting also enabled the FSCT to acknowledge the recipients of the organization's significant honors and awards. These are detailed in the following pages.

James McCormick Receives 1997 George Baugh Heckel Award at Federation's 75th Annual Meeting

James A. McCormick, Managing Director of Enhansco, Ponte Vedra Beach, FL, was the recipient of the Federation's highest honor, the George Baugh Heckel Award, for 1997.

Mr. McCormick, a Past-President of FSCT, received the award during the Opening Session of the Federation's Annual Meeting, on November 3.

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



James McCormick (left) receives the George Baugh Heckel Award from Heckel Award Committee Chair Saul Spindel.

President of the FSCT from 1978-79, Mr. McCormick's contributions to the organization include involvement on many Federation committees. He served as Chairman for the Finance, Nominating, Bylaws, Planning, Joint Education, Public Relations, and Membership Services Committees. In addition, Mr. McCormick was a member of the committee responsible for the site selection of the FSCT headquarters building in Blue Bell, PA.

Currently a member of the Southern Society for Coatings Technology, Mr. McCormick was associated for many years with the Baltimore Society. He served as a Chairman for most of the Society's committees.

Other Annual Meeting Awards Presented

Distinguished Service Award

The FSCT Distinguished Service Award was presented to Jay Austin, of the Chicago Society, in grateful recognition of his valuable contributions to the progress of the Federation while serving as President of the organization in 1996-97. Mr. Austin is Vice President/General Manager of Halox Pigments, Hammond, IN.

Jay Austin (right) is presented with the FSCT Distinguished Service Award from incoming President Tom Hill.

Armin J. Bruning Award

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

This year the award was presented to Calvin McCamy, retired from Macbeth, Division of Kollmorgen, New Windsor, NY. The award recognizes Mr. McCamy's outstanding contributions to the science of color in the field of coatings technology.

Mr. Austin (left) presents the Armin J. Bruning Award to Calvin McCamy.

Roon Foundation Awards

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

First Prize ($2,500)—"Oxidative Crosslinking of Alkyd Resins Studied with Mass Spectrometry and NMR Using Model Compounds"—W.J. Muizebelt, J.J. Donkerbroek, M.W.F. Nielen, J.B. Hussem, M.E.F. Biemond, R.P. Klaasen, K.H. Zabel, of Akzo Nobel.

Dr. Muizebelt (right) accepts the Roon Foundation Award from George Pilcher.

Alfred L. Hendry Award

Sponsored by a grant from the Southern Society of the Federation, this Award of $1,000 is for the best undergraduate student paper submitted for competition. The 1997 competition was won by Kip Sharp, of The University of Southern Mississippi, for the paper "Evaluation of the Degree of Cure of a Coating."

Melinda Rutledge presents the Alfred L. Hendry Award to Kip Sharp.

Society Secretaries Awards

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

Criteria for these awards include content, organization of details, readability, and summary of technical presentations given at monthly meetings. Awards for 1997 were presented to:

FIRST PRIZE ($500)—Joseph C. Reilly (JCR Enterprise), Secretary of the Los Angeles Society.

SECOND PRIZE ($250)—Chris Lockhart (Reynolds Metals Co.), Secretary of the Louisville Society.

Society Secretaries Awards were presented to James Hall (Los Angeles) who accepted on behalf of recipient Joseph C. Reilly, and Andy Traister (Louisville) who accepted for Chris Lockhart.

Society Speaker Awards

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

FIRST PRIZE ($250)—Amir Niroomand (Rhône-Poulenc Inc), New York Society.

SECOND PRIZE ($100)—Ben Carlozzo (DCA Coatings), Cleveland Society.

Mary Benke, Editor of the *American Paint & Coatings Journal*, presents Cleveland Soceity members Ben Carlozzo (center) and Fred Anwari with First Prize in the A.F. Voss/APJ Awards.

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

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

FIRST PRIZE ($600)—"Correlation of Accelerated Exposure Testing and Exterior Exposure Sites, Part IV: Three-Year Results," Cleveland Society.

SECOND PRIZE ($400)—"Reactive Diluents for Two-Component Polyurethane Coatings," New York Society.

On behalf of the New York Society, Amir Niroomand (center) and Rudy Berndlmaier accept Second Prize in the A.V. Voss/APJ Awards from Mary Benke.

CSI Award

The Coatings Societies International (CSI) sponsored an award honoring outstanding technical achievement in the presentation of papers at the Annual Meeting. The award, first presented at the XXIII FATIPEC Congress, is given at selected annual congresses of CSI-member organizations. The award is a polished bronze medallion, inscribed with the CSI logo.

The 1997 recipient of the CSI Medallion was Kalyan Ghosh and Patricia Garcia, of Shell Development Co., for their paper entitled, "Recent Advances in Epoxy Curing Agent Technology for Low Temperature Cure Coatings."

Corrosion Committee Publication Award

A cash prize of $1,000 was presented for the best corrosion related paper published in the JOURNAL OF COATINGS TECHNOLOGY from July 1996 to June 1997. Papers in the competition were judged by the Federation's Corrosion Committee. Equal emphasis was given to originality, scientific importance, and practical value.

The 1997 award was won by M. Kendig and S. Jeanjaquet, of Rockwell Science Center and R. Brown and F. Thomas, of Rockwell SVI S.A., for their work entitled, "Rapid Electrochemical Assessment of Paint," which was published in the December 1996 issue of the JOURNAL OF COATINGS TECHNOLOGY.

Annual Meeting Poster Session

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

FIRST PRIZE ($300)—"Linseed and Sunflower Oil Alkyd Ceramers"—Rob Sailer, North Dakota State University.

SECOND PRIZE ($200)—"Stratification Processes During Urethane Crosslinking Spectroscopic Studies"—C.L. Allison and M.W. Urban, of North Dakota State University.

Golden Impeller Award

This annual award, offered by Morehouse Industries, Inc., for outstanding achievement in dispersion technology, was presented at the Annual Meeting to William D. Hawkins, of Lilly.

F. Louis Floyd Presents Mattiello Memorial Lecture

Focusing on recent work in the area of reducing product development cycle times, Mr. F. Louis Floyd, presented the Joseph J. Mattiello Memorial Lecture, on November 5, during the FSCT 75th Annual Meeting. In his 30 years' experience in industrial R&D as both a scientist and manager, Mr. Floyd has been involved in activities ranging from basic research through product development, to strategic business planning. Chosen from among those who have made outstanding contributions to science, Mr. Floyd's presentation was on "Reducing Product Development Cycle Times Without Increasing Risk."

(See page 70 of this issue.)

Jay Austin presents F. Louis Floyd with a plaque commemorating his 1997 Mattiello Memorial Lecture presentation.

FSCT Officers — Past and Present

Incoming President Tom Hill (right) receives the Presidential Gavel from Jay Austin.

Elected to serve on the Federation's Executive Committee for the year 1997-98 are (from left): J. Dick Mullen, Gerry J. Gough, Forest Fleming, Terry Gelhot, Jay Austin, Van S. Evener, and Thomas E. Hill.

The Swearing In . .

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

FSCT Past Presidents in attendance included (from left): William F. Holmes (1991-92); John A. Lanning (1993-94); James A. McCormick (1978-79); Honorary Past-President Frank J. Borrelle; Kurt F. Weitz (1990-91); A. Clarke Boyce (1982-83); James E. Geiger (1988-89); Darlene Brezinski (1995-96); Colin D. Penny (1993-94); J.C. Leslie (1974-75); and Deryk R. Pawsey (1987-88).

CIEF Receives Funds from Industry

During the Federation's Industry Breakfast, the Coatings Industry Education Foundation was the recipient of four donations for "Project Tomorrow," a funding program which supports coatings education. Grace Davison, a Unit of W.R. Grace & Co., Conn., Crosfield Chemical Co., and J.M. Huber Corp., have each committed $5000 a year for a five-year period. Their representatives presented their annual contribution to CIEF President, Mary Brodie, at the Breakfast.

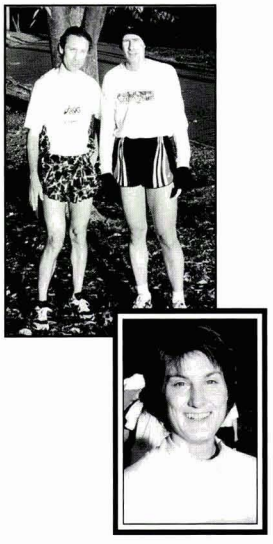
A Corporate Supporter of "Project Tomorrow," Troy Chemical Corp. contributed $2,000 to CIEF. The donation by Troy is given annually with proceeds from the Troy Fun Run, a five-kilometer fitness run held during the International Coatings Expo (ICE). Since the inaugural run in 1987, Troy has donated over $16,000 to the educational activities of the CIEF.

For a full listing of "Project Tomorrow" contributors, see the Education feature in the February 1998 issue of JCT.

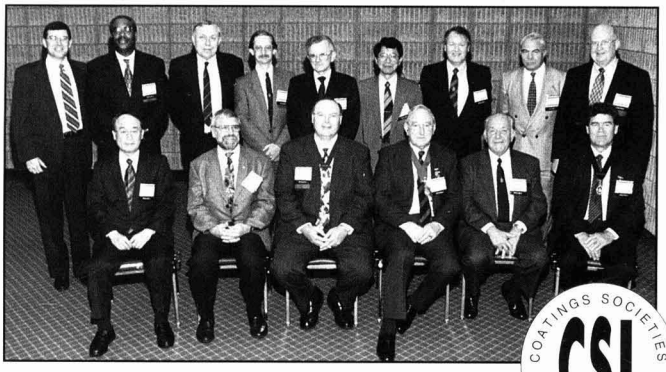
Ms. Brodie accepts CIEF contributions totalling $17,000 from (left to right) Jim Chwirut, of Grace Davison; Ian Roberts, of Crosfield Chemical Co.; Robert Edmonds, of J.M. Huber Corp.; and Don Williams, of Troy Corp.

ICE Participants Run for Fun

Nearly 70 participants gathered in Piedmont Park in Atlanta on a brisk November morning to compete in the 10th Annual Troy 5000. Crossing the finish line for a first place tie were (at right) Joe Sarver, of Cerdec Corp., and Paul Varga, of Degen Oil and Chemical Co. with a winning time of 18:23. Leading the female finishers was Trish Koman, of the U.S. Environmental Protection Agency. All registration fees were donated to the Coatings Industry Education Foundation.



Coatings Societies International



Attending the traditional reception and lunch hosted by the FSCT for visiting dignitaries of the Coatings Societies International organizations were Front Row: Katsuhiko Matsuo, Vice-President, JSCM; Dr. Hans Rüfenacht, President, FATIPEC; Jay Austin, President, FSCT; Roland Staples, President, OCCA; John Samios, Past-President, SCAA; Brian Greenall, President, SCANZ. Back Row: Robert Ziegler, Executive Vice President, FSCT and CSI General Secretary; Forest Fleming, Secretary-Treasurer, FSCT; Michael Symes, Past President and General Secretary, SLF; Gerry Gough, Secretary-Treasurer-Elect, FSCT; Christopher Pacey-Day, General Secretary, OCCA; Mr. Matsuo's interpreter; Fred Morpeth, Past-President, OCCA; Francis Borel, General Secretary, FATIPEC; Thomas Hill, President-Elect, FSCT.

FSCT/OCCA Press Conference

At a press conference held during ICE '97, the FSCT and the Oil Colour Chemists' Association (OCCA) announced that the organizations will co-sponsor the Pacific Paint Show and Technology Conference, in Singapore in September 1999.

FSCT President Jay Austin, OCCA President Roland Staples and Fred Morpeth, Managing Director of SURFEX Ltd., a wholly owned subsidiary of OCCA, stated that the cooperation between the two coatings technical groups in the production and promotion of the Singapore event constitutes a major commitment to provide quality exposition and educational programming for the Asian coatings community.

Roland Staples (left) and Fred Morpeth (center) listen as Jay Austin details plans for the Pacific Paint Show and Technology Conference to be held in Singapore in 1999.

FSCT Receptions, etc.

President's Reception

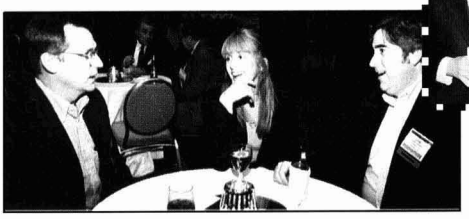
International Reception

CIEF Luncheon

International Breakfast

President's Reception

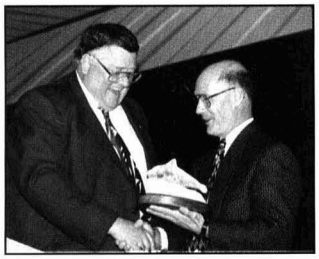
Social Guest Welcome Social



Exhibitors Reception

50th Anniversary Canadian Luncheon

The Canadian paint industry celebrated the 50th Anniversary of one of its greatest traditions at the ICE '97—the Canadian Luncheon. The luncheon was held on November 4 at the Marriott Marquis and attracted close to 270 people. *Coatings Magazine* founder Barry Kay was honored for his many years of service to the Canadian paint industry. Dave Stock, President of Stochem Inc., presented Mr. Kay with a sculpture and placque to a standing ovation.



Barry Kay (left) receives his award of recognition from Dave Stock.

Held each year at ICE, the Canadian Luncheon provides a meeting place for all Canadian exhibitors, suppliers, and delegates at the Expo.

International Coatings Technology Conference

Returning for its second year was the popular International Coatings Technology Conference. The Conference, which drew 495 registrants to its four two-day and 10 one-day programs, featured sold-out attendance at two of its offerings: "Executive Forum I: Strategically Effective New Product Development: An Enterprise-Wide Approach from Concept Through Commercialization" and "Surfactant Chemistry."

Technical presentations were also an important part of the FSCT Annual Meeting. From the E.W. Fasig Keynote Address give by one of the nation's leading science and technology forecasters Daniel Burrus to the Mattiello Memorial Lecture presented by F. Louis Floyd, the Annual Meeting offered attendees many opportunities to learn of the latest innovations in the world of coatings technology.

Course Titles

- Executive Forum I: Strategically Effective New Product Development: An Enterprise-Wide Approach From Concept Through Commercialization
- Effective Employee Motivation Strategies: Take This Job and Love It—Creating an Inspired and Motivated Workforce
- Effective Technical and Scientific Writing Workshop
- Introduction to Radiation Curing
  Co-Sponsored by RadTech International
- Methodology of Evaluating Corrosion Resistance
  Developed by FSCT Corrosion Committee
- Back to Basics: Resins, Pigments, Solvents & Additives
- Polymer Chemistry for the Coatings Formulator
  Developed by FSCT Professional Development Committee
- Winning Technical Presentations
- Effective Negotiating Skills
- Creative Decorating
- Surfactant Chemistry and Application
- Industry Leadership with Product Stewardship
- Spray Applications Workshop
- Chemistry and Formulation of Powder Coatings

Participants learn hands-on decorating skills at the Creative Decorating course.

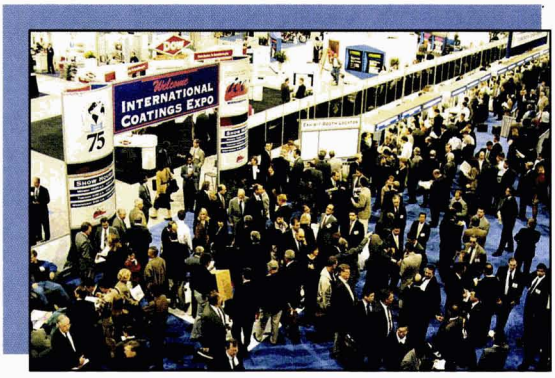
Participants of the Polymer Chemistry for the Coatings Formulator course gained a fuller understanting of this area.

Attendees of the Back to Basics: Resins, Pigments, Solvents & Additives course.

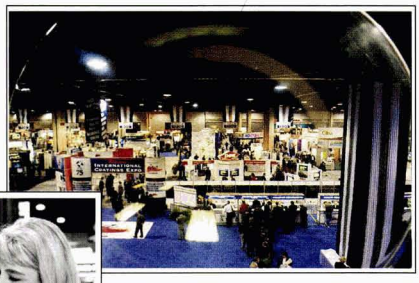
FSCT Program Committee

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

Welcome to ICE



ice
INTERNATIONAL
COATINGS EXPO



Fall 1997 Board of Directors Meeting

Thirty-four members and 19 guests attended the Fall Meeting of the Board of Directors of the Federation of Societies for Coatings Technology, on November 2, 1997, in Atlanta, Georgia.

The following persons were in attendance:

Officers

President ..... M. Jay Austin
President-Elect ..... Thomas E. Hill
Secretary-Treasurer ..... Forest Fleming

Society Representatives

Baltimore ..... Debar Allen
Birmingham ..... Gerry J. Gough
C-D-I-C ..... William Hollifield
Chicago ..... Evans Angelos
Cleveland ..... Brenda Carr
Dallas ..... Charles Kaplan
Detroit ..... Van Evener
Golden Gate ..... Patricia Shaw
Houston ..... Guy Sullaway
Kansas City ..... Mark Algaier
Los Angeles ..... James Hall
Louisville ..... Andy Traister
Mexico ..... Marina Estevez
Montreal ..... Horace Philipp
New England ..... Maureen Lein
New York ..... George Amrich
Northwestern ..... Larry Brandenburger
Pacific Northwest ..... Yvon Poitras
Philadelphia ..... Donald Denny
Piedmont ..... Gary Marshall
Pittsburgh ..... William Spangenberg
Rocky Mountain ..... J. Dick Mullen
St. Louis ..... Terry Gelhot
Southern ..... James Geiger
Toronto ..... David Jack

Other Members

A. Clarke Boyce ..... Toronto
Darlene Brezinski ..... Southern
William Holmes ..... Dallas
Donald Boyd ..... Pittsburgh
Ronda Miles ..... Dallas
George Pilcher ..... C-D-I-C

Guests

Federation Past-Presidents John Lanning; J.C. Leslie; James McCormick; Deryk Pawsey; Colin Penny; Joseph P. Walton; and Kurt Weitz. (Board members Geiger, Boyce, Brezinski, and Holmes are also Past-Presidents of the FSCT.)

FSCT Committee Chairs Freidun Anwari (Bylaws); Steve Hodges (Program); Romesh Kumar (ISCC); and Melinda Rutledge (Educational).

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

Robert Athey, Contributing Editor, American Paint & Coatings Journal.

Joe Brown, President, Birmingham Club.

Frank Borrelle, former FSCT Executive Vice President.

Sandy Dickinson, President, Los Angeles Society.

Richard M. Hille, Incoming CIEF Trustee, Cleveland Society.

Drs. Gerald Mattson, Robert Lochhead, and Robson Storey, The University of Southern Mississippi.

Federation Staff Members Michael Bell, Director of Educational Services; Victoria Graves, Director of Meetings & Conventions; Joseph Pontoski, Controller; Patricia D. Ziegler, Director of Publications; and Robert Ziegler, Executive Vice President.

Following a roll call of members, on a motion by Mr. Philipp, seconded by Mr. Jack, the report of the Spring 1997 meeting of the Board of Directors was approved as published in the August 1997 issue of the JOURNAL OF COATINGS TECHNOLOGY.

Reports of the Officers and Staff

President Austin

The pace of Federation business has not slowed down since I reported to you at the May Board Meeting in Birmingham.

In late May and early June, Kathy and I had the pleasure of representing the Federation at the SLF Congress in Norway. It was an excellent time to renew old friendships and make some new ones. Later in June, we attended the Society Officers Training. This was the most successful session that I've been involved in to date. For the first time it was held in Blue Bell, and was separated from the traditional Spring Week activities. It was a real plus for the Society Officers to see Headquarters and interact with staff. Also, both the staff and FSCT Officers were able to do a more focused program not having this session immediately following the Spring Board Meeting.

In September, I traveled to Atlanta to meet with the Host Committee. My thanks to the Host Committee and the Southern Society for all their preparations towards a successful 75th

From left: Secretary-Treasurer Forest Fleming (Piedmont), Executive Vice-President Robert F. Ziegler, President Jay Austin (Chicago)

anniversary celebration. Following the meeting with the Host Committee, we held an Executive Committee Meeting and a day long meeting with the Committee Chairs. Both meetings were quite productive and the Committee Chairs Meetings helped to start the transition for incoming President Tom Hill. I again want to thank the Committees for their hard work and support this last year.

In addition to these scheduled meetings, I spent several days meeting with staff in the months of June and August.

Before the Annual Meeting, I plan to attend NDPA's Annual Meeting in late October. We will specifically be interested in finding some common areas in which our two organizations can partner. I also plan to meet with the University of Southern Mississippi and to meet with staff one final time.

A considerable amount of time has been spent on trying to move the strategic planning process forward. The most important of which is the re-organization proposal. If we are to succeed at planning, we have to re-define ourselves so that form follows function. At least two solid work weeks were put in on preparing the proposal for dissemination to the Societies and helping to prepare the enabling Bylaw revisions between the May Board Meeting and the end of June. I'm excited about what this proposal will mean to the operations of the Federation. One of the most important results will be the definition of roles and responsibilities in the planning process. This will insure that planning becomes institutionalized into the culture of the Federation. It is that cultural change that will guarantee our future success, not so much the ideas that come from the people doing the planning.

Two projects that are natural results of the planning process have been job descriptions and a staff compensation program. President-Elect Tom Hill accepted the task of drafting the compensation program. Not only does this program help to contain long-term salary costs, but it also provides an incentive plan for achieving our strategic goals. Job descriptions have to start at the top and work their way down. I've started this process with staff and the Committee Chairs, but specifically with the Executive Vice President. This will continue for the rest of the staff, but they are not the only ones that need to fully understand what is expected of them or what their obligations are to the Federation. This needs to include the Board, Executive Committee, and also the Societies. In an attempt to begin this process at the Board level, I've invited our legal counsel to address the Board in Atlanta concerning this matter.

Finally, I want to address a somewhat controversial issue: that is the JCT's policy of first refusal. Let's attempt to separate the people issues and deal with the policy. In the past, this policy has not been a problem because the vast majority of papers given that fell under the policy would never have been published in the JCT. It's not a coincidence that the JCT's policy became a problem at the same time that the Publications Committee (with Board approval) decided to change the editorial policy of the JCT. Now many of these papers may well find their way into the JCT, this presents a problem for competing magazines; they will no longer have free access to them. It also coincides with the fact that we have become much more aggressive in soliciting advertising for the JCT, an endeavor that is proving to be quite successful. Another problem for competitors! In order to continue to grow our advertising base, the JCT must provide state-of-the-art information to a wide variety of special interest groups. That can only be done through a steady supply of articles.

Now, it can be argued that our policy of first refusal was somewhat unclear and that may be true. In order to clear any further misunderstanding in the future, I have asked the Publications Committee to review the policy and make recommendations on what it should be. They presented their recommendations to the Executive Committee in September and were approved. This policy is a Federation asset, an asset that we would be remiss in our fiduciary responsibilities to ignore.

This will be the last report that I have the privilege to submit to this Board as a Federation Officer. The last three years have certainly been interesting and certainly never boring. I want to thank the staff, numerous Board members, and the Executive Committee for making this last year one of progress. I hope that in some small way I've been able to contribute to the Federation's success over the next 75 years.

M. JAY AUSTIN,
President

[President Austin reported on a recent visit to the University of Southern Mississippi to meet with Dept. of Polymer Science personnel regarding several issues, including the status of the Waterborne Symposium, JCT's policy of first refusal, and potential cooperative topics. He advised that discussions were cordial and that he believed good communication was established. Agreement was reached to continue discussions at a later date.

Dr. Robert Lochhead, Chairman of the Dept. of Polymer Science, USM, noted that due to changes in Mississippi tax laws, co-sponsorship of the Waterborne Symposium by the Southern Society was no longer necessary.]

President-Elect Hill

It is difficult to believe that my year as President-Elect of the Federation is over. One year seems such a long time when it begins and at the same time it is so short as it passes. For me, the time between our Spring meeting in Birmingham and now has been spent as follows:

Identifying and selecting the chairs of our various committees for 1997-1998.

Participating on the Finance Committee.

Working with staff to develop a proposal for an incentive compensation plan for headquarters employees that links to our strategic plan.

Representing the Federation at the Japan Society of Colour and Material's 70th Anniversary Conference.

Phone calls and teleconferences too numerous to summarize.

Continuing the Strategic Planning implementation process as we coordinate committee and staff activity to the plan.

I know that each officer appreciates the numerous volunteers who make the committee work of the Federation succeed. As I get to know in more detail how we actually work, I find the blend of volunteers supported by the exceptional people at the staff level truly unique. I thank each of you for your efforts.

We at the Federation need to respond to a changing world and I believe that in the last several years we have responded. Responding to change does not necessarily mean that we throw

out the old to make room for the new. I believe the strength of the Federation is diversity of backgrounds that we represent. While we may approach a specific issue from different perspectives, we all share a common objective that supported by mutual respect, will permit us the opportunity to find the best answer.

Thank you for the opportunity to serve the Federation as President-Elect and I look forward to next year as we continue to work the plan.

THOMAS E. HILL, III,
President-Elect

Secretary-Treasurer Fleming

Last year when I was sworn in as the 1996-97 Secretary-Treasurer of the Federation of Societies for Coatings Technology, I knew that the challenges and the task of restructuring the Federation through the implementation of the Strategic Plan was paramount to the longevity and success of the Federation and its constituent societies.

Visiting with the various societies, committees and organizations, I stressed the importance of the Strategic Plan and how it will strengthen the Federation and the local societies.

Following the Spring Board Meeting in Birmingham, England, I participated as a workshop team leader at the Incoming Society Officers Training Meeting in Blue Bell, PA. This workshop gave the officers and staff an opportunity to meet the future Federation leaders, and it also allowed us time to discuss and address key issues concerning the Federation, their society and the Strategic Plan.

Also, in June I attended my third Coatings Industry Education Foundation (CIEF) meetings. As I stated in my May 18, 1997 Report to the Board, the CIEF Trustees are making some significant strides with the "Project Tomorrow" fundraising campaign. The funds raised through contributions are used to provide scholarships and to support the CIEF sponsored universities and other educational activities. I am a firm supporter of CIEF sponsored universities and other educational activities. I am a firm supporter of CIEF and I hope we will do all we can to support this Educational Foundation in the coming years.

As an *ex officio* member of the Professional Development Committee (PDC), I am delighted with the enthusiasm and success of this committee. I have attended three PDC meetings and have participated in three conference calls. This committee is very active and truly dedicated to the goal of providing continuing educational programs and to the professional development of our members, which is reflected in the successful technical symposiums that they have sponsored this year.

Regarding the Federation's Financial Report for the first half of 1997, we are very close to budget in all major areas of revenues and expenses. As in previous years, the success of the International Coatings Expo, along with the Technical Conferences, will be the determining factor in meeting our budget this year. Bob Ziegler, Joe Pontoski and the Federation staff are committed to controlling ICE expenses while increasing the revenues from this Exposition.

On August 5, 1997 the Finance Committee met and developed a preliminary budget for 1998 that was forwarded to the Executive Committee for review. The 1998 budget will include revenues and expenses for Expositions in Miami and Mexico City, along with an Incentive Wage Plan for a Bonus Program. These are the major additions to the 1998 preliminary budget.

As I reflect back on the past and then gaze into the future, I am very fortunate to have had the opportunity to work and learn from some of the most talented people in our industry and to serve as Secretary-Treasurer under the leadership of FSCT President Jay Austin. I am also thankful for the outstanding support and assistance that Bob Ziegler and the Federation staff have given me for so many years. I look forward to next year's challenges, knowing that we have dedicated professionals who will support the Federation's mission and our Strategic Plan.

FORREST G. FLEMING, II,
Secretary/Treasurer

Executive Vice President Ziegler

The past year has been one filled with various aspects of the Federation's transition according to the strategic plan. In this regard, the Board in Atlanta will consider considerable additions and amendments to the bylaws. In addition, the Board will also consider the establishment of the first new Constituent Society to the FSCT in 20 years, the Arizona Society for Coatings Technology.

The FSCT has wisely adopted a step-wise approach in the changes being implemented: First, the refinement of its method of governance, with the expansion of representation on the Executive Committee; Second, to facilitate the method of accepting and retaining of members; Third, the development of an annual operating plan which will set forth future activities of the FSCT and establish a clearly defined role for the Board, Executive Committee, FSCT committees, and staff; and, Fourth, the establishment of common interest groups, to broaden the scope and activities of the FSCT; and Fifth, the continuing efforts to promote joint venture projects with allied industry organizations.

In celebrating its 75th year of service the FSCT faces numerous challenges in operating in a world much different than that in which it was conceived. The leadership of the FSCT has recognized that as with all organizations the Federation must grow, change, and reinvent itself if it is to be of viable service to the industry today and into the next century. Transition and changes are never easy, but with the consensus, cooperation, and support of the Board and its Constituent Societies, the FSCT will continue to face and overcome these challenges.

The following information supplements the many reports provided to the Board from Officers, Committee Chairs, and Staff to detail the major activities of the past year and to provide information on the future direction being taken.

FINANCIAL

The third-quarter report shows income at $2,910,441 and expenses at $2,519,776 with a net excess of $390,665. Year-end financial projections indicate that with anticipated registrations at the 1997 ICE, the FSCT will break-even.

The Finance Committee met on August 15 and the Executive Committee at its September 12 meeting reviewed its report. Copies of the proposed budget showing an income at $3,971,000, expense at $3,963,500, and net surplus of $7,500, have been forwarded to all Board members for their review prior to discussion at the Fall meeting.

President-Elect Thomas Hill (Western New York), Horace Philipp (Montreal), and Maureen Lein (New England)

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

Publications

This year saw a major effort by the Publications Committee in the review of existing publications and in outlining a procedure for the development of new publication resources. The *Journal of Coatings Technology* has found increased acceptance by advertisers and with the second publication of the annual Buyers' Guide, will continue to provide to the FSCT members/readers an invaluable resource, both of technical and practical use. Meanwhile, the overall content of the JCT has been enhanced with the addition of day-to-day practical articles and the continued publication of the refereed technical articles.

The *Series on Coatings Technology* is undergoing a stage-by-stage review by the Committee, which has taken on the responsibility of overseeing the direction of this valuable publication series. Currently standing at 27 booklets, both revised and new titles will be forthcoming in the future.

The Publications Staff has worked long and hard to produce a totally revamped edition of the well-known ICE Program Book distributed at the annual convention. The 1997 edition, the *ICE Convention Guide*, is a special 75th Anniversary publication reviewing the history and significant milestones achieved by the FSCT. Historical articles, photos and a unique "timeline" are juxtaposed with the current and timely topics outlined in this year's technical program and Technology Conference. This "keepsake" edition will for the first time ever, be distributed not only at the convention site, but also to attendees at participating hotels and will be mailed to all Federation members following the convention.

Our co-marketing agreements with allied industry organizations, such as ACS, PDCA, and ASTM, allow the Federation to offer a more complete and extensive line of publications to its members at reasonable costs.

We sincerely thank the members of the Publications Committee (Brenda Carr, Chair; Cleveland Society) and to Dr. Ray Dickie, JCT Technical Editor (Detroit Society) for their selfless service and dedication to FSCT communications.

Marketing & Promotion

Marketing and promotion for the ICE convention, expo and technology conference programs have featured the development and placement of advertising, the design and production of promotional mail brochures, and the refinement of mailing list use based on success rates experienced from 1996. All were accomplished within budget.

Considerable effort was made in the planning and development of a major history display that will be featured during ICE '97. Included in the display will be artifacts from the FSCT, its Constituent Societies, and the manufacturing and supplier companies.

In a planned effort to expand the Federation's interests into other areas of the industry, the FSCT will exhibit at several allied shows in late 1997, including the SSPC show and the Powder Coatings show. A redesigned FSCT exhibit will be featured in both events.

As seen in the numbers relating to advertising in the financial statements, the management and guidance of advertising sales efforts showed considerable success in 1997, with an increase of 107% over 1996 results.

The Federation's website (http://www.coatingstech.org) is being updated monthly and plans are underway to expand this useful resource with a publications database. We especially invite the Societies to feature information that promotes their local activities on the web.

Membership

Prior to the November Society update, the current membership total is 7,293 broken down into the following categories: 4,252 - Active; 2,270 - Associate; 638 - Other (Educator, Student, Honorary, Retired); 133 - Affiliate. During the same period last year the total stood at 7,428. In part, this decrease can be attributed to the actions of one company's withdrawing its support of employee membership in some Societies. This situation only underscores the need for the FSCT to provide services and benefits to the individual member worthy of individual support.

Annual Meeting/International Coatings Expo and Technology Conference

The Program Committee (Steve Hodges, Chair) has produced an outstanding array of presentations underscoring the theme, "75 Years: Tradition, Discovery, Opportunity." The three days' of Annual Meeting technical programming in conjunction with the Technology Conference provides a broad selection for anyone involved in the development, manufacture, or application of coatings. Many aspects of the program will also be of interest to supplier technical service representatives as well.

Exhibit space in the International Coatings Expo is currently sold out with a waiting list. Presently the show stands at 95,800 paid sq.ft. and a record number of 326 exhibitors (96,600 paid sq.ft. and 320 exhibitors participated in the FSCT's largest show to date, in 1996, Chicago). Advance registration is on target and it is expected that overall budget goals will be reached.

As noted above, considerable effort has been made in developing suitable plans to celebrate the Federation's 75th Anniversary. In some areas these plans exceeded budget, but it is expected that the long-term promotional and marketing benefits more than outweigh the additional costs.

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

Latin American Expos

In the footsteps of the FSCT's successful 1996 venture into Mexico, the Pan American Coatings Expo, the Federation is planning to sponsor two events for the Latin American coating industry in 1998. On April 15-17, in a joint venture, the FSCT will host "ICE Latinoamerica '98" in Miami Beach. Directed to the South and Central American coatings industry, it will co-locate with "Plasticos de las Americas," a show directed to Latin American plastics manufacturers. On July 23-24 the FSCT will return to Mexico City with the second Pan American Coatings Expo. This event, co-sponsored with the Mexico Society and ANAFAPYT, will be held for the first time at the World Trade Center, a state-of-the-art facility catering specifically to

tradeshow/convention needs. Promotion for these events has already started and supplier interest is encouraging.

HEADQUARTERS

A new addition to staff, Donna Whitig, Director of Information Systems, brings to the Federation a considerable background in information systems management. Most recently, Donna served as the main trainer for implementing the FSCT's membership database management program. Her initial task will be a thorough survey of headquarters hardware/software requirements and, most importantly, an in-depth review of the systems' management and use throughout the various staff departments. Her findings and her knowledge in this area will allow the FSCT staff to work more productively and efficiently.

Donna joins the following dedicated individuals which make up the Headquarters Staff: Michael Bell, Director of Educational Services; Victoria Graves, Director of Meetings and Conventions and Membership Services; Patricia Ziegler, Director of Publications; Lyn Pollock, Director of Marketing; Joseph Pontoski, Controller; Kathleen Wikiera, JCT Managing Editor; Jonna Coachman, JCT Associate Editor; Audrey Boozer, JCT Subscription Manager; Lisa McGlashen, Secretarial Assistant to the Executive Vice President; Mary Sorbello, Secretarial Assistant to the Director of Educational Services; Marie Wikiera, Meetings Coordinator; Linda Madden, DTP Operator; Meryl Simon, Order Dept.; and Dorothy Kwiatkowski, Secretary/Receptionist.

On behalf of the Staff, I wish to thank the Officers, Committees, and the many volunteers who have made 1997 both exciting and successful.

ROBERT F. ZIEGLER,
Executive Vice President

Director of Educational Services Bell

COMMITTEE LIAISON

Educational Coordinating Committee—The Educational Coordinating Committee met once since the last meeting of the FSCT Board of Directors, on May 29, 1997 in Dallas, with the Constituent Society Education Chairs. The next meeting is tentatively scheduled for February 1998 in Detroit, which will be held with the Technical Advisory Committee.

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

The committee has been involved with several projects:

Science Kit—The ECC devoted a significant amount of time at its Dallas meeting to strengthening the Science Kit, both by seeking new experiments and enhancing the ways the kit is utilized by the Societies. The committee has spent a considerable amount of time investigating ways to make this a more viable resource for FSCT.

InterSociety Polymer Education Council (IPEC)—The committee had Gordon Hahn attend the meeting in Dallas. Hahn is a high school teacher from Glasgow, MT who is active in the Polymer Ambassador program run by IPEC. The program trains teachers in polymer chemistry and provides funding for these teachers to attend "In-Service" programs and train fellow teachers on polymer chemistry experiments to be used in the classroom. The IPEC interaction should be a way for the ECC to continue its outreach programs in an effective manner. Melinda Rutledge and Mike Bell serve on the Board of Directors of IPEC.

Distinguished Lecture Series—The Distinguished Lecture Series has continued to generate requests from Societies for speakers since the spring meeting of the Board of Directors. The program was discussed during the Society Officers Meeting and information has been sent to the Societies about the program. The program is comprised of recognized coatings speakers available for monthly meetings of the Societies, at FSCT expense. The committee is hoping to expand the program for the next year.

Brenda Carr (Cleveland) and Evans Angelos (Chicago)

A.L. Hendry Award—The committee received two papers for the 1997 competition. The committee has tried some new techniques to announce the award, such as via electronic mail on the Internet, and hope to continue this in the future.

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

The committee also continues to work on reviewing the applications and distributing funds for the FSCT Small Society Scholarship program, which provides matching educational funds for the Societies.

Technical Advisory Committee—The last meeting of the Technical Advisory Committee was held on August 6-8, 1997 in Ontario, CA. The next meeting is tentatively scheduled for February 1998 in Detroit, with the Educational Coordinating Committee.

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

The Mission Statement of the TAC is as follows:

"The mission of the FSCT Technical Advisory Committee is to establish guidelines, facilitate projects and encourage Constituent Societies to participate in programs in a way that will advance understanding in coatings and related areas so that

William Holmes (Dallas), A. Clarke Boyce (Toronto), and Darlene Brezinski (Southern)

there will be a continuity of technical projects resulting in the presentation of a technical paper at the Annual Meeting and publication in the *Journal of Coatings Technology.*"

The committee is currently investigating its mission and trying to determine the best way it can service the Technical Chairs of the Constituent Societies. It hopes to provide a revised mission after reviewing it at its next meeting.

The committee is currently working on the following projects:

Society Technical Committees—The TAC Adoptive Society program remains the direct line between the Societies and the Committee. Each committee member has assigned responsibility to maintain contact with the Technical Chairs of several Societies. In addition to assisting in meeting notification, this program gives each Society a resource contact on the TAC for project development and committee management information. The high attendance at the August meeting with the Society Technical Chairs is directly attributed to the work the committee did utilizing the Adopted Society Program.

The TAC held its 1997 meeting with the Society Technical Chairs in Ontario, CA in August. The meeting was the best attended meeting with the Chairs in recent memory.

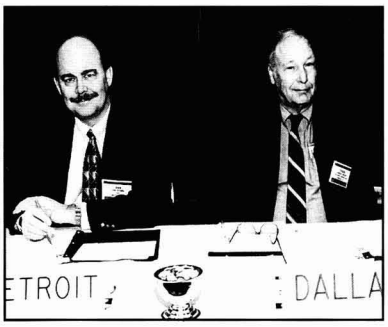
APJ/Voss Award—These awards are presented for the outstanding Society papers submitted for the Annual Meeting Technical Program. The TAC has spent a considerable amount of time evaluating and enhancing the program to improve the quality of the papers developed for the competition, and the methods to secure these papers. There were five submissions for the 1997 competition.

Society Speakers Program—This award is given to the best presentations of Society Technical Papers at the Annual Meeting. As with the Voss Award, the committee has reviewed its performance as the award's administrator and also provided the participants with constructive feedback aimed at improving the presentations in the future.

Joint Coatings/Forest Products Committee—The last meeting of the Joint Coatings/Forest Products Committee was held in Minneapolis, MN on September 4, 1997. The next meeting will be held in March in Madison, WI.

The committee continues to prepare articles on pertinent topics. Titles currently being developed are: Changing Wood Resources, Finishes Checklist, Mildew, Log Structure Finishing and Maintenance, Finishing Shakes and Shingles, Clear Exterior Finishes, Deck Cleaners and Restorers, Common Questions and Misconceptions and VOC Compliant Finishes. Each of the papers is prepared by a task group of participants, with representatives from both the wood and coatings portions of the committee.

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



Van Evener (Detroit) and Charles Kaplan (Dallas)

Corrosion Committee—The Corrosion Committee has not met since the spring Board of Directors meeting.

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

The committee is currently involved with the following projects:

1997 International Coatings Technology Conference—The committee developed a two day course, "Methodology of Evaluating Corrosion Resistance," for the 1997 Conference in Atlanta. The course will be held on Monday and Tuesday, November 3-4, 1997.

Interaction with Corrosion-Related Societies—The committee continues to maintain contact with the following related organizations: NACE International, Steel Structures Painting Council (SSPC), ASTM and the Electrochemical Society. It has been working hard in the last few months to learn more about the types of projects these organizations are involved with that are compatible with the work of the committee.

Corrosion Committee Publication Award—The committee revised the rules for the award and hopes to announce the new competition during the 1997 Annual Meeting. The award will be given to the best submitted paper for the competition. The committee will give its traditional Publications Award, for the best corrosion-related paper in the JCT, for the last time in 1997.

Manufacturing Committee—The Manufacturing Management Committee last met on September 30 - October 1-2, 1997 in Denver, CO.

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

The committee has been operating in unison with the Manufacturing Management Committee of NPCA for three years, which has been beneficial to both organizations.

Professional Development Committee—The Professional Development Committee has met once since the last Board of Directors meeting, on September 24, 1997 in Irvine, CA. The purpose of the meeting was to develop the programming schedule for 1998.

The Chair of the PDC is Ronda Miles of the Dallas Society.

The Mission Statement for the PDC is as follows:

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

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

1997 International Coatings Conference—The committee is preparing an encore presentation of the program "Polymer Chemistry for the Coatings Formulator" on Monday and Tuesday, November 3-4, 1997 in Atlanta, GA. In 1996, this was the highest drawing two-day event during the conference.

"Practical Paint Formulation for the Raw Material Supplier"—This two-day course, another first time offering, was held on June 25-26, 1997 in Philadelphia, PA and drew 57 attendees. The PDC also presented a favorite from the 1996 International Coatings Technology Conference, "Winning Technical Presentations" on Friday, June 27, 1997 at the same location. This drew ten attendees.

"Computer Uses in the Coatings Industry"—The PDC had planned to present this course in September 1997 in Irvine, CA. This course was canceled due to inadequate response.

Annual Meeting Program Committee—The 1997 Annual Meeting Program Committee has spent the last year developing the conference and technical programs for the 1997 Annual Meeting in Atlanta. The theme of this year's event is "75 Years ... Tradition ... Discovery ... Opportunity" which acknowledges FSCT's 75th anniversary and looks ahead to the future of the organization and the industry.

The committee has selected 15 seminars and courses for the 1997 conference. The event will include two Executive Forums, nine one-day courses and four two-day courses, which will be held over the three days of the event.

Additionally, the Annual Meeting Technical Program will include International Papers, APJ/Voss Award Papers, Roon Award Competition Papers, and new this year, the Women In Coatings Forum. The program will begin with the Technical Focus Speaker on Monday afternoon and conclude on Wednesday with the Mattiello Lecture. The CSI medallion, which honors outstanding technical achievement in the presentation of papers, will be given during the Annual Meeting. This award is given at selected annual congresses of CSI-member organizations.

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

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

Technical Focus Lecture—This again will be held as the initial technical presentation during the Annual Meeting Technical Program. This speaker is selected annually by the Chairs of the Educational Coordinating, Professional Development, Technical Advisory and Annual Meeting Program Committees.

List of Talks Available—This again has been made available to the Societies. The list has become a valuable resource for Societies when planning monthly meeting presentations. The 1997 edition has been sent to all Societies.

Roon Award—The committee received three entries for this year's competition. These were judged during the summer and the award will be presented at the 1997 Annual Meeting.

FSCT Travel—In addition to the above mentioned committee meetings, I attended the IPEC Board of Directors meeting in September, and participated in the Society Officers training held in Blue Bell in June and the Annual Meeting Host Committee meeting in Atlanta.

MICHAEL G. BELL,
Director of Educational Services

Comments of FSCT Counsel McQuiston

In consideration of the current amendments to the Federation Bylaws, FSCT legal counsel, Robert McQuiston, of Ballard, Spahr, Andrews & Ingersoll, provided background information on the legal status of the FSCT as an incorporated entity as well as the legal and financial responsibilities of the members of the Board.

Mr. McQuiston said that under Pennsylvania Corporation law the FSCT is an independent, freestanding, non-profit entity. As such, its relationship with its member constituent societies is separate, but that the bylaws provide for some overlap. Notably, that the Societies appoint members to the FSCT Board.

Marina Estevez (Mexico), James Hall (Los Angeles), and Andrew Traister (Louisville)

In explaining the legal responsibility of the Board, he noted that the Board Members are the decision-makers of the FSCT and not delegates of the Societies. Their responsibilities include: 1) being familiar with and understanding the issues; 2) participating in a direct debate of the issues; 3) making decisions in the best interests of the FSCT; and 4) ensuring that the decisions rendered by the Board are implemented.

With regard to the FSCT Executive Committee, he said that this is a committee subject to the Board that functions on behalf of the Board between meetings.

Regarding the FSCT relationship with Societies, he indicated that while Societies are legally separate from the FSCT, and that the overall relationship is by mutual agreement between the FSCT and the Societies.

[Following a lengthy question and answer session, the Board directed Mr. McQuiston to provide his comments in writing for distribution to the Societies.]

Review of Third Quarter 1997 Financial Statement; 1998 Operating Budget

Secretary-Treasurer Fleming and Controller Pontoski reviewed the 1997 third quarter financial results showing income at $2,910,441; expenses at $2,519,776, for a net surplus of $390,665.

Secretary-Treasurer Fleming and Controller Pontoski reviewed the proposed operating budget for FY '98 that showed income of $3,971,000; expense of $3,963,500, for a budgeted net surplus of $7,500. Included in the review was a discussion of the proposed staff compensation plan that allows for standard compensation tied to the consumer price index minus that portion of the CPI provided by the FSCT as part of the employee benefits (i.e., health insurance). The plan also provides for incentive compensation tied to FSCT's performance/over-performance to budget and achievement of strategic plan goals.

[Following a lengthy discussion of line-item accounts, including staff compensation, convention services and investments, on a motion by Mr. Mullen, seconded by Mr. Jack, the operating budget was approved by a vote of 26-6.]

Elections

The following individuals having been placed before the Board for election at the meeting of November 2, 1997, were unanimously elected to their respective offices:

President-Elect—Forest Fleming (Piedmont Society), Akzo Nobel Coatings, Inc., High Point, NC (One-Year Term)

Mark Algaier (Kansas City), Guy Sullaway (Houston), and Patricia Shaw (Golden Gate)

Secretary-Treasurer—Gerry J. Gough (Birmingham Club), ICI Packaging Coatings, Holden Surface Coatings Ltd., Birmingham England (One-Year Term)

Executive Committee—Van Evener (Detroit Society), BASF Corp., Whitehouse, OH (Three-Year Term)

Board of Directors/Members at Large—(Two-Year Terms each), Gail Pollano (New England Society), Zeneca Resins, Wilmington, MA; and Valerie Braund (Pacific Northwest Society), General Paint Ltd., Vancouver, B.C.

Board of Directors/Past-President Member (Two-Year Term), James A. McCormick (Southern Society), Enhansco, Ponte Verde Beach, FL.

Establishment of an Arizona Society for Coatings Technology

Having fulfilled all requirements as established in Article I, Sec. A. of the FSCT Standing Rules, and there being no objections by any Society on which it borders, be it therefore

Proposed, that there be established the Arizona Society for Coatings Technology with boundaries which include the States of Arizona, Nevada, and that portion of the State of Texas encompassing El Paso and Hudspeth counties (El Paso, TX area).

[On a motion by Mr. Mullen, seconded by Mr. Philipp, the resolution to approve the establishment of the Arizona Society for Coatings Technology was approved by a vote of 33-0, with Mr. Hall abstaining.]

Bylaws

The following proposed amendments to the Bylaws passed First Reading at the May 18, 1997 meeting of the Board of Directors. They were considered for Second Reading and final passage at the meeting of November 2, 1997.

For Second Reading and Final Passage

Amendment to Remove Dues Amount from Bylaws and Add to Standing Rules

The proposed amendment removes from Bylaw Article XII, "Dues," the amount of the actual annual dues. It adds to the Article a statement giving the Board of Directors authority to establish the amount of dues.

The proposed amendment adds to the Standing Rules, Article IX, "Dues," which details the amount of annual dues for each category of membership, i.e., Active, Associate, Affiliated, Educator & Student, and Retired and Society Honorary.

[On a motion by Mr. Geiger, seconded by Ms. Shaw, the above proposed amendment to the FSCT Bylaws and Standing Rules was unanimously approved.]

Amendment to Eliminate the NPCA Representative Position

The proposed amendment to Bylaw Article IV, "Organization," would eliminate the seat on the Federation Board of Directors for the representative of the National Paint & Coatings Association.

[Following consideration of the recommendation of the Executive Committee and discussion, on a motion by Ms. Carr, seconded by Mr. Hall, the Board disapproved the amendment at its Second Reading by a vote of 1 for, 30 against, with 3 abstentions.]

Amendment to Change the Membership Year

The proposed amendment to Bylaws Article XIII, "Fiscal Year," would establish that the FSCT Membership Year would end June 30 annually. The Fiscal Year would remain as ending on December 31 annually.

[On a motion by Mr. Boyd, seconded by Mr. Hollifield, the above proposed amendment was unanimously approved at Second Reading.]

Amendment to Eliminate Elections for New Constituent Society Members

The proposed amendments to Bylaws Article III, "Constituent Societies," and to Standing Rule Article II, "Membership in Constituent Societies," eliminate the requirement of "Election" to membership by the Constituent Societies.

The responsibility and authority for approving membership to the Constituent Societies is provided to the Constituent Society Membership Committee, which will review applications and verify an individual's eligibility for membership.

[On a motion by Mr. Hall, seconded by Mr. Gough, the above proposed amendment was unanimously approved at Second Reading.]

Amendment to Allow the FSCT to Accept New Constituent Society Members

The proposed amendment to Standing Rules Article II, "Membership in Constituent Societies," allows acceptance of initial application for membership by the FSCT directly, with final approval being made on a timely basis by the Constituent Societies.

[On a motion by Mr. Hall, seconded by Mr. Gough, the above proposed amendment was unanimously approved at Second Reading.]

Amendment to Allow the FSCT to Collect Constituent Society Dues

The proposed amendment to Standing Rules Article II, "Membership in Constituent Societies," allows collection of Constituent Society annual dues by the FSCT directly, on an optional basis. The FSCT would remit to the Constituent Societies the Societies' portion of the annual dues on a timely basis.

[On a motion by Mr. Hall, seconded by Mr. Gough, the above proposed amendment was unanimously approved at Second Reading.]

For First Reading

Amendment to Increase the Size of the Executive Committee

The proposed amendment to Bylaws Articles IV, "Organization," and VII, "Nominations and Election," provide for increasing the Executive Committee of the Federation from seven to nine persons. Proposed is one (1) additional Society Representative and one (1) Member-at-Large of the Board. The proposal revises the "Quorum" required from five (5) to six (6) persons, and sets the terms of office on the Executive Committee to three (3) years for the Society Representative and Director-at-Large members.

[Following discussion, on a motion by Ms. Carr, seconded by Mr. Hall, the proposed amendment failed due to a lack of the required two-thirds majority in favor (21-8, with 4 abstentions).]

Amendment to Revise Duties of the Board of Directors and Executive Committee

The proposed amendment to Bylaws Article III, "Constituent Societies," and IV, "Organization," provided authority for the Executive Committee to conduct business on behalf of the Board of Directors between meetings of the Board. The proposed amendment also provided for fiscal control of expenditures made by the Executive Committee without Board approval.

[Following discussion centering on the concern of some members of the Board regarding placing limitations on Executive Committee actions, on a motion by Ms. Lein, seconded by Mr. Denny, the proposed amendment failed due to a lack of the required two-thirds majority in favor (20-9, with 3 abstentions).]

Amendment to Create an Annual Operating Plan and a Three-Year Strategic Plan

The proposed amendment to Bylaws Article IV, "Organization," gives responsibility to the Executive Committee to develop an annual Operating Plan and a three-year Strategic Plan for consideration by the Board of Directors. The proposal redefines the responsibilities of the Secretary-Treasurer.

[On a motion by Mr. Fleming, seconded by Mr. Traister, the above amendment was passed at First Reading by a vote of 33-1.]

Amendment to Revise the Federation Committees

The proposed amendment to Bylaws Article IV, "Organization," and VIII, "Committees," eliminates "Standing Committees," provides for Presidential responsibility to appoint Bylaws Committee, and provides the Executive Committee responsibility to appoint all other committees deemed necessary to conduct Federation business.

[On a motion by Mr. Hall, seconded by Mr. Pilcher, the above amendment was passed at First Reading by a vote of 32-0, with 1 abstention.]

Amendment to Expedite the Legislative Process

The proposed amendments to the Federation Articles of Incorporation and Bylaws Article XV, "Amendments," revises the length of time for notification of proposed amendments to the Bylaws from 90 to 60 days, and provides for a two-thirds majority approval of Board members present required for passage.

[On a motion by Mr. Hall, seconded by Mr. Hollifield, the above amendment was passed at First Reading by a vote of 26-2, with 2 abstentions.]

Review of Actions of the Executive Committee

One of the duties of the Board of Directors is to approve or disapprove the actions taken by the Executive Committee. The Board considered the following actions of the Executive Committee for its meetings of September 12 and November 1, 1997:

SEPTEMBER 12, 1997

That the FSCT sponsor the Pan American Coatings Expo in Mexico City for August 5-6, 1998, and to schedule an expo for Mexico for the year 2000.

That annual Membership Dues be increased $5 to $30 per year for 1998-99 and that this increase be allocated for the financial account "Membership Dues."

That the non-Member subscription rate for the Journal of Coatings Technology be increased to $120 per year for 1998.

That the proposed staff incentive plan be approved.

That the 1998 Operating Budget be proposed at Income—$3,971,000; Expense—$3,963,500 (or $7,500 surplus).

That the Educational Coordinating Committee proposal to limit Small Society Scholarships to Societies only be respectfully denied.

That the proposal to change FSCT bank accounts from Mellon to Commerce Bank be approved.

That FSCT/OCCA cooperative plans for joint activities, including a 1999 expo in Singapore and co-participation in educational conferences continue.

That the Publications Committee's proposal for a new protocol in implementing the JCT "right to first refusal" be approved.

[On a motion by Mr. Evener, seconded by Ms. Lein, the above actions of the Executive Committee for September 12, 1997 were approved by a vote of 29-0, with 1 abstention.]

NOVEMBER 1, 1997

That the job description for the Executive Vice President for FY 1998 be approved for presentation to the Board of Directors for consideration and comment.

That a Corporate Resolution for conducting Federation business during 1998 be approved for presentation to the Board of Directors.

George Amrich (New York), Larry Brandenburger (Northwestern), and Yvon Poitras (Pacific Northwest)

Donald Denny (Philadelphia), Gary Marshall (Piedmont), and William Spangenberger (Pittsburgh)

That Staff has approval to initiate mutual website links with other industry organizations, manufacturers, and suppliers when in the FSCT's best interests and at reasonable costs.

That it is the consensus of the Executive Committee that the Board reconsider the vote for second reading of the proposed bylaws amendment to eliminate NPCA Representation on the Board of Directors.

[On a motion by Mr. Fleming, seconded by Ms. Lein, the above actions of the Executive Committee for November 1, 1997 were unanimously approved.]

Committee Reports

Armin J. Bruning Award

The Armin J. Bruning Award Committee has selected Mr. Calvin S. McCamy as the recipient of the 1997 Armin J. Bruning Award. Mr. McCamy, who is currently a consultant, retired as the Vice President for Research of the Macbeth Division of Kollmorgen Corporation. He has been a leader in the standardization of color science, photography and color printing since 1957. Mr. McCamy's research has been published in over a hundred scientific papers, encyclopedia entries and book chapters. He has lectured around the world. McCamy serves on the advisory board of the Munsell Color Science Laboratory of the Rochester Institute of Technology.

Corrosion

The Committee established the following goals for 1997, all of which have been completed successfully:

Develop a Program for the 1997 ICE Conference;

Revise the Corrosion Committee Outstanding Paper Award, establish procedures to begin granting the award in 1998; and

Oversee the completion of the Cleveland Society Corrosion Exposure Test Project.

Corrosion Exposure Test Project: The FSCT Corrosion Committee followed and oversaw a three-year project which is being conducted by the Cleveland Society Technical Committee. The goal of this project was to determine how various accelerated corrosion test methods (e.g. salt spray, immersion, Procession®) correlate with exterior exposures. Initial results were reported in the JOURNAL OF COATINGS TECHNOLOGY (JCT) in October 1994. That report covered the first six months of exposure and detailed the experimental design of the entire project. The one-year exposure results were detailed in Part II of the study. That report was published in the July 1996 JCT. Part III detailed two full years of exterior exposure and attempted to correlate those results to the accelerated test originally run at the beginning of the study. This report is being finalized for submission to the JCT.

Part IV of the report series is the final report and covers the third year of exterior exposure. With the completion of the exposure study, gloss measurements on cleaned panels were performed, and correlation between sites and accelerated exposures were investigated. The results of a study that investigates the effects of panel storage time on accelerated testing are reported. A brief review of the original test protocols, as well as a comparison of the results to date is also included. This report also is being prepared for submission to the JCT and it will be presented as part of the Voss Awards during ICE '97.

1997 International Coatings Technology Conference (ICTC): The Corrosion Committee once again is contributing to the FSCT annual technical gathering. The Committee organized a two-day session entitled "Methodology of Evaluating Corrosion Resistance." This course was designed to review what corrosion is, its mechanisms, methods of prevention and a discussion of standardizing the process of testing for corrosion resistance. Instructors were selected from a wide spectrum of the coatings and corrosion technology communities. Attendees will learn important details of corrosion, the principles of protection, accelerated test methods and evaluation techniques, and project management and statistical approaches to corrosion study. This program will attract up to 125 attendees at ICE '97.

Corrosion Committee Publication Award: The Corrosion Committee is in the process of evaluating papers for the 1997 award selection which will be presented at the ICE '97. The Committee has revised the award selection process that will be implemented in 1998. At that time, original, unpublished papers will be solicited and considered for the award competition. The Corrosion Committee will evaluate and select winners according to criteria based on originality, scientific importance and practical value. FSCT Headquarters will issue a call for papers for the 1998 competition shortly. Winning papers will be submitted to the JOURNAL OF COATINGS TECHNOLOGY Editorial Review Board to be reviewed for publication. Submissions also may be presented at the FSCT ICE Technology Conference at the discretion of the Program Committee for that event.

Support of the Corrosion Control from Coatings Conference: The Technical Committee of the Los Angeles Society hosted a conference on Corrosion Control from Coatings in September 1997. The Corrosion Committee provided guidance on current topics at the forefront of this technology related to corrosion along with suggested speakers.

Interaction with Corrosion-Related Organizations: The Committee continues to maintain contact with the following organiza-

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

tions: NACE International, Steel Structures Painting Council (SSPC), American Society for Testing and Materials (ASTM), American Chemical Society (ACS), and the Electrochemical Society. A formal dialogue has been established to keep these organizations aware of FSCT Corrosion Committee activities.

The committee has established the following goals for 1998:

Develop a presence on the Internet for corrosion; and
Develop a two-day educational program.

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

Develop a Two-Day Educational Program: Topic to be established. One possible topic is the correlation between accelerated and natural weathering effects on coatings and substrates. Another suggested topic is the effects of stress(es) on coating failure. It is well recognized that internal and external stresses cause failure of coatings in real-world applications. Stresses can cause catastrophic immediate failure, or they can cause small increments of accumulated damage which lead to failure over a long term. The effects of stress, the mechanical response to stress in inherent coating systems, and the mechanistic forms of failure have not received appropriate attention to resolve the problems and avoid coating failure. A proposal has been made that the committee consider that this issue is related to corrosion.

The committee maintains the following Mission Statement: "The mission of the FSCT Corrosion Committee is to educate and inform FSCT members and the industry on all corrosion related issues."

CHARLES HEGEDUS,
Chair

Educational Coordinating

The Educational Coordinating Committee (ECC) develops projects and resources necessary to further the educational and informational work of the educational committees of the constituent societies. We request and administer Federation funds for identified educational resources. Another role is the management of the small Society scholarship program. Finally, we administer the annual A. L. Hendry Award.

We continue to be proud of the enthusiastic members who serve on the ECC. They are: Mike Bell, FSCT Staff; Harvest Collier, University of Missouri-Rolla; Walter Fibiger, ITE Consultants; Mark A. Harley, Jr., PPG Industries; Herman Mustapha Bacchus, Valspar Corporation; DeVilla Moncrief, Sherwin-Williams; and Melinda Rutledge, Rheox, Inc.
The ECC met at the annual meeting of the Society educational chairpersons in Dallas. The meeting was held on Friday, May 30, 1997.

The attendance at the Dallas meeting was disappointing, with only half of the societies being represented. We regret not contacting all of the societies by telephone to assure their attendance. The enthusiasm of those who did attend was good. There were morning talks on distance learning, using the coatings/science resource binder effectively, and the uses of computers in the coatings industry. The "hit" of the meeting was a talk given by Gordon Hahn, a high school teacher from Glasgow, Montana. Gordon is a polymer ambassador through the Intersociety Polymer Education Counsel (IPEC). His enthusiasm for

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

coatings is tremendous! As a review, we officially joined the IPEC. The IPEC is a joint educational effort of several membership organizations and learning institutions such as: the American Chemical Society, the Society of Plastics Engineers, the University of Wisconsin-Stephen's Point, and the Society of the Plastics Industry. The purpose of the IPEC is to significantly increase student interest and participation in science and technology subjects by incorporating the teaching of polymers and polymeric materials into K-12 curricula. This is done through the combined resources of the participating organizations.

Updates of our current activities are detailed below:

Coatings/Science Resource Binder—Our educational science kit, "Presenting Science Through Coatings: A Spectrum of Possibilities," continues to grow with additional experiments having been added. Membership in the IPEC will help in the distribution and use of the science kits.

The FSCT Distinguished Lecture Series—This successful project continues to improve the quality of technical presentations at monthly society meetings. New speakers will be contacted to add to the list for 1998.

The Southern Society A. L. Hendry Award—Two papers were submitted that met the final criteria. The winner will receive the prize at the FSCT Annual Meeting in Atlanta.

Joint Meeting with Technical Advisory Committee (TAC) / Transition Period—The time has come to "retool" our committee. Other committees could absorb many of our responsibilities. The Awards Committee could handle the A.L. Hendry Award, the scholarship grants delegated to CIEF. A joint meeting of the TAC and ECC is planned. The family structure of our members has changed considerably since the early years of developing FSCT committees. Time away from family for meetings is not easily sacrificed. Another consideration is the growing importance of the annual program at ICE. This has placed additional responsibilities on staff for shared help. Our committee has reached an impasse in its present structure. The focus of our next meeting will be to fuse our educational activities along with the activities of TAC in the new *Society Support Committee.*

We have term limits in place on our committee to guarantee an influx of new members to ensure the vitality of fresh issues. We thank you for your continuing support and guidance.

Next Meeting Date and Location—The next meeting of the FSCT Educational Coordinating Committee will be held on February 19 and 20, 1998, in Detroit, Michigan.

MELINDA K. RUTLEDGE,
Chair

George Baugh Heckel Award

The George Baugh Heckel Award Committee is pleased to announce that the 1997 recipient of this award is James A. McCormick.

Jim has served the Federation with distinction for over 20 years in a variety of capacities, including serving as President of the Federation in 1978-79. He is presently a member of the Planning Committee.

Jim is the 46th recipient of this distinguished award.

SAUL SPINDEL,
Chair

1997 Annual Meeting Host

The 1997 Annual Meeting Committee was formed as soon as I was asked to act as Committee Chairman. I immediately appointed the six sub-committee chairmen. They began to recruit workers. The committee was able to get together at the regular meetings of the SSCT and at the Society's Annual Meeting. Out of town Host members received phone calls, so the committee stayed in touch throughout the year. I maintained a list of volunteers. As sub-committee chairmen began to fill their rosters requirements, they passed along names of persons willing to work.

When the meeting is in Atlanta we never seem to run out of people willing to work. It is a real pleasure for the Southern Society to Host the 75th annual meeting.

It is a bit harder to staff the New Orleans meeting, that follows the Southern Society annual meeting and it will be important that the Incoming President appoint a Chairman as quickly as possible to begin preparation for 1998. I suggest involving as many people from the Dallas and Houston Societies as possible, so there will be a smooth transition from New Orleans to Dallas.

JEFF SHUBERT,
Chair

Professional Development

The Professional Development Committee has worked this year to provide an additional number of programs and seminars to benefit the FSCT membership. The committee has made this one of its primary goals for 1997 and as a result the coatings industry will have had the opportunity this year to attend Professional Development programs on crosslinking, making technical presentations, formulating for the raw materials supplier, computer applications, and polymer chemistry for coatings. The committee has developed some of these courses with the idea that they could be offered on a regular basis. Eventually, the PDC wants to have a "stable" of quality short courses that can be repeated as needed. These courses, along with new programs developed each year, will result in the FSCT sponsoring more professional development opportunities throughout the year for the coatings industry. The committee has also been discussing ways of tying these short courses into other services offered by the FSCT and the local Societies, including monographs and regional symposia .

The first short course presented this year by the Professional Development Committee was titled "Crosslinking for the Coatings Chemist: Understanding Crosslinking for Improved Performance" and was held on April 23-25 in Orlando, FL. The purpose of the course was to provide information on the chemistry of crosslinking to formulators, polymer chemists, and those involved in architectural, automotive, and industrial applications. The seminar had 105 attendees, the highest attendance ever at a PDC seminar, and resulted in net income of approximately $12,000. Feedback from the course participants was very positive, with subject matter being the primary reason for attendance. The location was also sited as a positive. The success of this course will probably result in a repeat offering of it in 1999. Responses from the attendees also indicated an interest in an even more advanced course on this topic. The PDC is currently considering this as an option for a course in 1998.

As a result of the survey that the FSCT conducted in 1996, the Committee has tried to broaden the appeal of FSCT seminars this year by offering a wide range of topics in appropriate geographical locations. Therefore, on June 24-25th in Philadelphia, the PDC presented another new short course developed by the Committee, "Practical Paint Formulation for Raw Material Suppliers" followed immediately the next day by "Winning Technical Presentations." "Practical Paint Formulation" was taught primarily by experienced personnel from coatings companies and directed towards coatings chemists at raw material suppliers. The Philadelphia location was chosen specifically for its proximity to several major raw material suppliers. "Winning Technical Presentations" was presented to address the need for more non-technical professional development. Attendance for the formulating course was 60 while 10 attended the presentation course. Net income on these two courses combined was $5,000. Feedback on the courses was generally positive, and plans are to repeat the formulating course in the future with some changes based on audience feedback.

On September 25-26, 1997 the PDC plans to present a short course on "Computer Applications for the Coatings Industry" in Irvine, CA. This topic was again chosen based on input received from the survey. The course is designed to provide the latest information on the effective use of computers and software for coatings applications. However, as of the first week in September, registration for this course has been very low.

Finally, the PDC will be presenting "Polymer Chemistry for the Coatings Formulator" at the FSCT annual meeting in Atlanta this year. This course was successfully given in Chicago last year, and attendance exceeded expectations. However, attendees were primarily from the local region, so the Atlanta location should attract a new audience. A few minor changes in speakers will be made; however, no major revisions are expected due to the excellent feedback received from the Chicago participants.

The PDC will be meeting in September of this year to plan the calendar of seminars for 1998 and to begin to establish plans for 1999. One of the challenges of the committee will be for the volunteer members to meet the aggressive schedule of programs that we would like to establish for the next two years.

The development of these seminars would not have been possible without the hard work of the members of the Professional Development Committee. I would like to close by acknowledging their efforts and expressing my appreciation for the time they spend on PDC activities and the results that they have achieved.

RONDA K. MILES,
Chair

1997 Annual Meeting Program

Since the last report on May 18, 1997, the 1997 Annual Meeting Program Committee met to finalize this year's Technical Conference and Program. This meeting was held on July 29 & 30 in Las Vegas, NV and all committee members were in attendance.

At this meeting, all the remaining details of this year's Conference were determined and ownership and completion dates were established based on the program time line. To date, all Conference and Program deadlines set by the committee have been met.

The committee was also successful in the development of a mission statement and committee structure as requested at the January 1997 joint meeting of the FSCT Committee Chairs, Staff, and Executive Committee. We feel this is significant in ensuring the continued success of the annual ICE Technical Conference.

The establishment of an aggressive time line for development of the annual Technical Program has allowed this committee to become proactive in its approach instead of reactive to the process. An excellent example of this is the progress that was made toward the development of the 1998 ICE Technical Conference by the committee at our July meeting. We were able to brainstorm technical topics for the next year's program due to the changes in the format of the Technical Program, as well as the program development process. This proactive process, coupled with the new committee structure, should help eliminate the transition problems that existed in the past with new committee members.

Additional accomplishments include the establishment of a selection committee and criteria for presentation of the CSI Medallion at this year's Annual Meeting. We have also successfully transferred the ownership of the poster session held at the Annual Meeting from the Annual Program Committee to the Technical Advisory Committee.

In summary, I would like to recognize the committee members for their commitment and hard work over the past two years: Suzanne Farnsworth, Andrew Gilicinski, Thomas Johnson, Gail Pollano, Latoska Price, and Beverly Spears. I would also like to thank Mike Bell for his support and efforts in helping make this year's technical conference a success.

STEVE A. HODGES,
Chair

Publications

The Committee plans on a much needed JCT Readership Survey. We hope to have the following questions answered by this survey:

a. What are the readers interest and needs?
b. What Department(s) do they read the most?
c. What would they like to see in the Journal?
d. How do they view the JCT; Industry magazine, Journal, or Membership magazine?
e. What should the future direction and content of the JCT be? Target date for doing the survey is February or March.

Also in the works is a Salary and Benefits Survey. The purpose is to provide information on the economic and employment status of members of the Federation. The target date for publishing the results will be in July 1998.

JCT Direction and Policy of First Refusal—It is our intent to keep the JCT the "Technical Voice" of the FSCT. The First Refusal Policy is the best way to acquire papers, both original research and practical/educational articles, from our membership. This policy gives the JCT the first right to publish papers presented at the Annual Meting of the Federation and local regional meetings or symposia of the Constituent Societies. The JCT acts as the archive of the FSCT and its Constituent Societies: therefore, we want to publish the best papers from all FSCT & Constituent Society sponsored events.

We recognize that the JCT is the premier technical journal to the coatings industry, the journal of choice when researchers wish to publish papers, the first choice when performing a literature review on coatings technology issues. While the JCT will publish as many papers as possible, we can not publish all papers and some papers may not be suitable for publication in JCT. For this reason releases are and will continue to be granted on a case by case basis.

As you know we have had a recent problem with the First Refusal Policy. A Waterborne Symposium paper showed up in a recent issue of PCI. (The Waterborne Symposium is co-sponsored by the Southern Society and the University of Southern Mississippi). We hope to receive the support of the Executive Committee and Board in defense of this policy. The Committee feels this policy is right, fitting, and appropriate. It is not an uncommon policy for a technical organization, and is clearly stated in our FSCT Standing Rules and in each issue of the JCT.

The Committee is working on a new procedure for reminding/informing members, authors, editors, and constituent societies of the First Refusal Policy. We hope to have it prepared for the Executive Committee and Board to review in Atlanta.

Availability of Papers for Publication—The Publications Committee is concerned with the lack of papers available for publication in JCT. Some organizations such as NACE and ASTM have First Refusal Policies such as ours. The Gorden Conference has moved to meeting every other year rather that every year. ACS papers most often lean towards polymer science rather than paint & coatings. ICE has shifted its program to a Technical Conference, with a course format. The feeling is that the Federation is missing out on an opportunity. People who want to publish need a venue and the JCT needs the papers. If the Federation would select a theme and begin soliciting papers as soon as ICE 97 is over, it could have quite a nice program next year. (Previous complaints about the Annual Meeting Program were that the papers have no rhyme or reason to them.) We have heard that CIGs will help with papers, but this may not be the case. Programs put on by CIGs at the Annual Meeting may be more like courses with several presenters and not original research papers. Either way, we don't think that we can wait three to four years to find out. If the Executive Committee and BOD wants us to be competitive, this is something we feel must be done. The Publications Committee is willing to work with the Program Committee, Editorial Review Board, JCT Editor & JCT Technical Editor to bring this to fruition in 1998.

Committee Members—Brenda L. Carr, Chair; R. Edward Bish; Dr. Ray Dickie; Dr. Jeffrey Hinkle; Latoska Price; John Stauffer, and Roger Woodhull.

BRENDA CARR,
Chair

Roon Award

I am very concerned about the future of the Roon Awards. The number of papers submitted for the awards has dropped sharply from an average of about 12 for a number of years to four last year, then three this year. The committee members feel

Membership certificates were presented to the Society Representatives whose Societies showed the largest increase in membership for 1996-97 (from left): Yvon Poitras (Pacific Northwest), William Hollifield (CDIC), James E. Geiger (Southern), and Mark Algaier (Kansas City)

that the quality has dropped as well. The cause of the change probably involves a number of factors, including: (1) the fact that research (especially of the Roon Award type) is being done by paint manufacturers and suppliers; (2) when such research is done, management is less apt to allow it to be published; and (3) the new Federation Annual Meeting format makes people think of things other than papers. I probably did not help matters by making an executive decision and making only one award in 1996, although the voting and comments of the committee members did point in that decision. Therefore, we have a problem. If anyone has any ideas for publicizing the awards, finding ways to get people to submit papers, or suggestions for changing the awards and the way in which the winners are chosen, please contact Mike Bell or me. I will be asking each member of the committee to find/invite one paper in 1998, but that may not turn up very many. We need help.

CLIFFORD SCHOFF,
Chair

Technical Advisory

During 1997, the Technical Advisory Committee:

Received two papers for presentation at 1996 ICE. The Society speakers award was won by Latoska Price of the Detroit SCT with her presentation "An Investigation of the Effects of Formulation on Selected Properties of UV Curable IPN Coatings." Max Wills of the Los Angeles SCT finished second with his presentation "Direct VOC Analysis of Water-Based Coatings by Solid Phase Micro Extraction and Gas Chromatography." Both papers were entered in the A.F. Voss/APCJ competition. LASCT's paper won, while DSCT's paper placed second. A letter was sent to each Society giving constructive feedback from the judge's comments.

The committee received five papers for presentation at 1997 ICE and A.F. Voss/APCJ competition.

Held a meeting on February 19 and 20 in Louisville, KY to plan the joint TAC/Society Technical Committee Chair's meeting. The TAC attended the LSCT monthly dinner.

A second meeting was held on August 6 to finalize the joint meeting on the following two days. Highlights of the joint meeting include:

1) A tour of Silvercrest Homes, a manufacturer of prefabricated housing;

2) Reports were received from each attending Society;

3) Several motivational training sessions presented by M. Bell (FSCT) and S. Hodges (Chicago) on volunteerism, putting together a committee and organizing an event; and

4) An interactive session to apply the principles discussed during the training.

During the interactive session, a scenario was presented:

—Several new companies have located in your Society's region;

—The chemists at these companies are unfamiliar with coatings technology; and

—The management of these companies has approached you to help solve this dilemma.

The Technical Committee Chairs, divided into four groups, were given the assignment to design an event to address this problem. Each group then gave a small presentation on their proposal. This meeting was a departure from previous joint TAC/Society Chairs meetings in that it concentrated on training the Chairs on administrative roles rather than providing a forum for technical advice. Also, the meeting addressed the main function of many local Society Tech Chairs to develop programs rather than papers.

Developed an "Industry Experts List" which was presented to the Technical Committee Chairs at the joint meeting. The individuals on this list have agreed to field nonproprietary questions from Technical Committee Chairs to help develop research projects. Each expert's name, address, phone number and area of expertise appear on the list.

Outlined a proposed TAC-Educational Committee merger. The purpose of this new committee would be "to provide training and support to develop and maintain leaders and administrators for the FSCT and its Constituent Societies." The plan was presented to the FSCT Executive Committee and discussed with the TAC and M. Rutledge, Chair of the Educational Committee. Ms. Rutledge attended the joint TAC/Society Chairs meeting to observe the TAC's new direction in training. It was agreed that the TAC and the Educational Committee would hold a joint meting in February to plan a joint TAC/Educational Committee/Society Technical and Educational Committee Chairs meetings for the summer of 1998.

FREIDUN ANWARI,
Chair

Society Reports

Baltimore

Eight monthly meetings, consisting of six technical presentations sponsored by the Manufacturing, Educational, and Technical Committees, drew an average attendance of 46. Two additional special meetings were held...February's meeting featured a plant tour of General Motors' Baltimore, MD, facility...Twenty-two participants attended the Society's basic coatings technology course held at Catonsville Community College...At the annual awards banquet, Connie Sauer, of Duron Paints, Inc., and Al Holder, of the U.S. Navy, received merit citations.

Birmingham

Membership totaled 164...The Club hosted the FSCT Spring Board of Directors in May. In conjunction with this event, a two-day symposium, "Transatlantic Coatings Technology—Diverging or Converging," was held...Eight technical meetings drew an average attendance of 66, of whom approximately 73% were members...The Technical Committee has completed the project on "Solvents Physical Characteristics and VOC Wallchart."...In addition, the "Paint Museum" project has been revived since the Black Country Museum, the host site, has received funding. The Club is finalizing details of the design and construction of the building with museum authorities...The Technical Committee's "Technical Outing" featured a visit to the British Steel coil and coating line at Gorseinon, South Wales...Technical Committee Chair Roland Staples, of Nortax, was elected President of the Oil and Colour Chemists' Association.

CDIC

Nine monthly dinner meetings were held with an average attendance of 50...The Society took advantage of the FSCT Distinguished Lecture Series by having Kenneth Hoy present his paper on "Decompressive Atomization: A New Spray Technique."...Dennis Nie, of Perry & Derrick Co., received a $900 scholarship from the Scholarship Committee. The FSCT donated $400 to this scholarship...The golf outing was successful.

Cleveland

Membership has increased slightly to 425...Averaging 60 attendees per meeting, eight monthly meetings featured technical presentations...Ed Bish, of Jamestown Paint Co., was awarded Honorary Membership in the Cleveland Society...One hundred eighty people attended the 40th Annual Technical Symposium, "Waterborne Coatings: Sink or Swim," on May 22-23 at Case Western Reserve University.

Dallas

Membership for 1996-97 totaled 138...The 54th Southwestern Paint Convention was held on April 2-4. The meeting, themed "Aim for the Future Now," consisted of technical, management, and manufacturing sessions, and was followed by an executive panel discussion...Opportunities for paint industry professionals, Society members, and potential members, included a newly activated Technical Committee and an Educational Scholarship Program.

Detroit

Eight meetings were held with the Society and DPCA sponsoring monthly meetings every other month. FOCUS has replaced the April meeting...Under the excellent supervision of Rosemary Brady, FOCUS (Future of Coatings Under Study) set a record for attendance. Mr. Gabe Gabriel continues to run an excellent program with seven courses offered through the University of Detroit Mercy...Research and educational awards of about $8,000 were presented in area schools and universities, with $700 going to Eastern Michigan University for a teacher's workshop...The Technical Committee, under the direction of Latoska Price, has continued running an excellent technical program over the past year...The committee's ongoing project on IPN's has concentrated on radiation cure...Marianne Mitkus and Stephanie Hobson served as Membership Co-Chairs...DSCT assisted DPCA on the Picture It Painted project...The Detroit Society continued their combined effort with the DPCA, including the annual golf outing...The annual collection of donations for "Toys for Tots" was held in November and December...The November meeting consisted of "Bingo Night"...The Society regrets the loss of John Ayers, who died this past year.

Golden Gate

A 50-year pin was awarded to Elwood Tom, of Synergistic Performance Corp. Twenty-five year pins were awarded to Rita Rassmussen, of L&H Paint, Stephen Chang, of Oakland Paint Center, and Roy Blackburn, of The Flecto Co....The Educational and Scholarship Committees, chaired by Margaret Hartmann, of Jones-Hamilton and Ray Benedetti, of Triangle Coatings, respectively, awarded scholarships to six Society members...The June Manufacturing Committee Meeting included plant tours of Kelly-Moore and Rohm and Haas. Following the tours, a suppliers exposition was held...The Western Coatings Societies' Symposium and Show will be held February 16-18, 1999 at John Ascuaga's Nugget in Reno, NV...Dennis Owen, of P.T. Hutchins, set up a web page for the Society...Socially, the Society held a Christmas dinner dance in December, and a tailgate party prior to the Giants game in July...Officers from the Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies met in June. The Societies welcomed the new Phoenix Society for Coatings Technology.

Kansas City

Following a nine percent increase in 1996, membership continued to increase from 125 to 140, an 11% increase...Several

George Pilcher (CDIC), Ronda Miles (Dallas), and Donald Boyd (Pittsburgh)

educational meetings were held and included John Massingill, of Eastern Michigan University speaking on "Development of Low Cost, Active Diluents for High-Solids Technology," and Steve Beamer, of the North Kansas City police department discussing "Handling the Mass Media in a Crisis." Two social events were also planned...The Educational Committee worked actively with local schools by demonstrating "How to Make Paint."...The Committee also served as judges for the regional Science Fair...The Society pledged support for FSCT's Strategic Plan.

Los Angeles

The Western Coatings Societies 23rd Biennial Symposium and Show was held at the Disneyland Hotel and Convention Center February 18-20, 1997. Attendance was down slightly, but booth space sold out and the Show was profitable. The technical talks were well attended...The Scholarship Committee awarded $11,250 to college students pursuing degrees. Another $1,000 was awarded to members who were pursuing continuing education...The Board of Directors also awarded a $2,500 grant from the Continuing Education Fund to Cal Poly, Pomona, in support of a Corrosion Control through Coatings Conference cosponsored by the Society. Attendance for FSCT members was discounted...The long-running Paint Technology course continues under the tutelage of Frank Peters. He is trying out various co-teachers as he is looking to retire...Membership is growing, it stands at 624...LASCT hosted the Western Coatings' Societies annual joint board meeting in June. The WCS has invited the Arizona Society to join this group...The LASCT, at the request of the California Paint and Coatings Association, has exchanged the organization of the Spring Folic for the Christmas Party...The Christmas Party was a success...Dinner meetings are now being held at Maggies Pub in Sante Fe Springs... Meeting schedules and talk topics are published in the *Year Book* as well as in monthly bulletins mailed to all members.

Louisville

Once again the Technical Program featured a speaker from the FSCT Distinguished Lecture Series: Sam Morell, of S.P. Morell & Co., discussed "The Role of Acetylenic Glycols in Waterborne Coatings."...Manufacturing Night featured a presentation on dispersion devices and principles...The Technical Committee sponsored the Spring Symposium "Spectrum of Coatings." Approximately 125 participants attended the event, which provided the attendee with the opportunity to choose eight out of 16 topics of interest...There were not any applications received for the Educational Grant. Therefore, two grants will be available this year...The Educational Committee sponsored two science fairs in area high schools. At the Louisville Regional Science Fair, the Committee awarded a total of $250

to a senior division winner and junior division winner. LSCT also contributed $100 to a local science fair...The Fall and Spring Joint Golf Outing with the LPCA drew over 200 golfers.

Mexico

Membership has decreased seven percent to 136 members...The Technical Program consisted of nine presentations with an average attendance of 75, the Annual Dance-Party with 160 attending, and 24 Society Executive Committee Meetings...Ten technical presentations were given during the technical conferences at the Hacienda Jurica Hotel, in Queretaro, Qro. Mexico and attracted 120 attendees...The Coatings Graduate at Universidad Autonoma de Mexico was held...The Mexico Society Library consists of 745 technical books, 8 audiovisual products, 70 subscriptions to different technical publications, and 34 videos from technical symposia. The library is fully automated.

Montreal

The Technical Committee conducted a one-day seminar covering safety regulations and environmental VOC determinations...A one-week session on the basics of paint formulation is being planned for next fall...A French version of the Los Angeles Society's graffiti booklet has been produced...In addition, articles on Ecologo and green paints, including definitions of terms associated with VOCs were published in local newspapers...A project relating measured physical and optical properties with DIY painter evaluations has begun...The Educational Committee is planning a five-day course on architecture or trade sales coatings based on the text developed by Clarke Boyce and Walter Fibiger...Concern over the absence of volunteers for positions on the executive committee and attendance at general meetings was expressed by members...The membership database has been updated.

New England

Membership has increased slightly...Because of the variety of timely technical and educational programs put together by the Program committee, the attendance at monthly meetings has increased to approximately 45 members...Six technical meetings were held along with three social functions...One meeting was held in central Massachusetts to accommodate members in Connecticut and western Massachusetts...The NESCT continues its relationship with the University of Massachusetts at Lowell, which offers an M.S. degree in Coatings and Adhesives as part of its Plastics Engineering Program. Five of these degrees were completed in 1997...The University continues to expand its evening course offerings.

New York

Membership stands at 574, an increase of 40 members over last year...Seven regular dinner meetings were held...The Technical Committee completed a paper on "Reactive Diluents for Two-Component Polyurethane Coatings." It will be presented at the FSCT Annual Meeting in Atlanta, GA...The Committee organized a third biannual symposium "Recent Advances in Additives and Modifiers for Modern Coatings"...The Joint NYSCT/MNYPCA Legislative Update Meeting was held in February with talks by industry experts from New York, New Jersey, and national regulatory organizations...George Schmitz, Educational Committee Co-Chair, presented two, one-semester courses at Fairleigh Dickinson University...The Mattiello Scholarship was presented to Gun Young Choi, The Melvin M. Gerson Memorial Scholarship was awarded to John Lau, and the NYSCT Scholarship was presented to Jamie Lipskin...Al Sarnotsky, of Spraylat, received the President's Service Award and Irwin H. Young, of Jesse S. Young Co., was the recipient of the PaVaC Award...Mildred Leonard was bestowed with Honorary Membership...The Society expressed concern over the decline in meeting attendance and with proposed changes at the Federation level.

Northwestern

Regular monthly meetings consisted of both technical and general interest presentations...The 26th Annual Symposium, themed "Paint Industry Instrumentation," was held in March..."Education Night" was the focus of the April meeting, with students from local colleges and universities in attendance. A check for $2,500 was presented to Dr. Marek Urban, of North Dakota State University, to be used toward scholarships in the school's coatings program...The Environmental Committee has been working with the Minnesota Paint Council tracking bills through the Minnesota Legislature that could have an impact on local paint manufacturing companies...Ed Ferlauto, who chaired the Technical Committee for several years, resigned this position. Ron Adkins will serve as the new Committee Chair...The Committee is currently studying the effect of acid rain on various coatings and they have just retrieved panels that were exposed for five years. The members will examine the panels for gloss and pH changes, as well as ions present in washings of the surfaces...The 4th Annual Springfest was held in April and the Summer Golf Outing took place in June.

Philadelphia

Eight monthly meetings featuring technical presentations were held...A joint meeting with the Philadelphia Paint and Coatings Association was successful as was the annual golf outing...A special award for meritorious service over the past years was made to Samuel Firestone. The Society Technical Award was given to Neil Shearer. The Liberty Bell Award was presented to outgoing President Tom Brown. The Ben Franklin Award was not given this year...Membership remains at over 300...The Technical Committee is being revitalized under the direction of the incoming Chair, Tom Brown. His plans for 1997-98 include the completion and publication of two papers. There was no spring seminar in 1997...The Eastern Training Conference will be held May 11-13, 1998 at the Valley Forge Convention Center, in King of Prussia, PA. Wayne Kraus, of Hercules, is the Committee Chair.

Piedmont

Membership remained high at 280, despite recent company mergers and continued membership resistance from some paint manufacturers...The Mini-Technical and Exhibition Show drew 400 attendees and 67 exhibitors...The college scholarship program has been temporarily suspended for re-evaluation. This is due to the limited number of recent graduates gaining entry into the coatings field.

Pittsburgh

Nine regular meetings with technical speakers were held...A Christmas social and golf outing were additional highlights to the year. The golf outing provides matching funds to support two continuing scholarships awarded to future coating chemists...The Society joined the Cleveland Society in support of their waterborne conference and industry show. Plans are to continue this cooperative effort...Pittsburgh representatives appeared at several local high schools career nights...The Society supports the local Science Fair with awards and participating judges and provides speakers and leaders in the B.S.A. Career Awareness Program.

Rocky Mountain

Membership stands at 132...Six technical presentations were delivered to the members...John Delmonico reconditioned an old stone mill and submitted it to be displayed in the FSCT History Walk at ICE '97 in Atlanta, GA.

St. Louis

The Society adopted the theme of "Change" for 1996-97. The meeting sites changed and the time schedule was modified...Membership attendance increased 10-15%...For November's "Bosses Night," special invitations were mailed to company presidents, vice-presidents, technical directors, etc. These special guests observed how their staff benefits from membership in the organization...The Educational Committee awarded four scholarships for one of the short courses on paint and coatings offered by the University of Missouri-Rolla, to Debbie Rickerman, of Walsh and Associates, Inc.; Paul Roeder, of U.S. Paint Corp.; Stephen Rose, of Carboline Co.; and John Trease, of Carboline Co....The Joint SLSCT and SLPCA Regulatory Affairs Committee held their Annual Regulatory Seminar in April...Hosted the Joint St. Louis/Kansas City Lake of the Ozarks Meeting. The theme for the 44th Annual Joint Meeting was "Painting the Bridge to the Future."...The Joint Association/Society Holiday Party was held in December and the Joint Society/Association Social Outing took place in March.

Toronto

Total membership was 481, a three percent increase...Mike Molnar has left the Executive Baord since he was transferred to Switzerland... Clarke Boyce was elected to the FSCT Board of Directors...Incoming Society President Natalie Janowsky is the first female President of the Society...Five members received 25-year membership pins...The Society has severed ties with George Brown College of Applied Arts and Technology and will run the coatings course on its own...Eight candidates graduated from the coatings course. Twenty are enrolled for the next semester...The Educational Committee presented a "Latex Seminar" designed for chemists and technicians who are involved in formulating and production of latex paints and adhesives. Fifteen participants attended the course...The annual symposium, titled "Future of Pigment Technology: Year 2000," drew 125 attendees. A mini-symposium on "Architectural Coatings-Year 2000 and Beyond," attracted 80 attendees...The second meeting with the Oil and Colour Chemists of Ontario focused on "Organic Pigments"...The Toronto Society utilized the FSCT Distinguished Lecture Speakers Series with a presentation by Richard R. Eley, of The Glidden Co....Society Officers attended a specially convened meeting to discuss the FSCT strategic plan...The traditional toy donation to the CHUM City Children's Christmas Wish Foundation, the Christmas Luncheon, Spouses Night, and the Annual Golf Tournament were successful.

The next meeting of the FSCT Board of Directors will take place on Sunday, April 26, 1998, at 9:00 am, at the Renaissance Cleveland Hotel, in Cleveland, OH.

Annual Meeting of the Stockholders of the Coatings Industry Education Foundation

I. The Joseph A. Vasta Memorial Scholarship—The Joseph A. Vasta Memorial Scholarship for 1997 is being awarded to Matt Parson of Eastern Michigan University. Mr. Parson is an outstanding young man in his fifth year of a five-year program of study to earn a dual major degree in Professional Chemistry and Polymers and Coatings Technology.

Donations to the Vasta Fund through June 30, 1997 were $64,833; the fund balance was $61,092. Interest earned in 1997 should be adequate to cover the annual scholarship of $2500.

II. The Trigg-CIEF fund—The Trigg-CIEF fund had a major infusion of money in 1996 through transfers of stock and cash from the Trigg Foundation and the Cefalu Estate. The balance as of 6/30/97 was $146,077. The interest earned in 1997 is projected to be adequate to fund the two annual scholarships that total $5,000.

The Trigg-CIEF Fund was placed in the "Restricted" category in the first CIEF financial report as a foundation (1996). CIEF has requested reconsideration of this designation based on NPCA correspondence (1994) describing the status of the Trigg money transferred to CIEF.

III. The Coatings Industry Honor and Remembrance Fund—The Coatings Industry Honor and Remembrance Fund has grown from a balance of $20,505 at the end of 1995 to a 6/30/97 balance of $24,371. Donations so far in 1997 total $250. Donations since June 1992 equal $21,480.

IV. CIEF General Fund Transfer to the Roon Fund—The CIEF General Fund was strongly impacted by a transfer of money to the Roon Fund. This was apparently due to a previous mistaken classification of earnings that should have been credited to the Roon Fund. It was corrected at the end of 1996 resulting in a deficit of $30,558 for the CIEF General Fund leaving a balance of $68,975 as of 6/30/97.

As a result, the Roon Fund as of 12/31/96 had an adjusted value of $133,048 and earned $3,317 in interest for the first half of 1997. The balance as of 6/30/97 was $136,365. Of this amount $100,000 is permanently restricted and $36,365 is temporarily restricted. The $36,365 can be used to maintain the Roon Awards.

V. Review of Recipient University Programs—Mr. Thad Broome reviewed the California Polytechnic State University program in February 1997. He met with both faculty and students and assessed the program content and came away very impressed with the quality of the people and the program. He reported that it was definitely worthy of CIEF support.

VI. Investment of CIEF Funds—A portion, i.e. $200,000, of CIEF funds have been designated long term and have been invested to increase the return without taking undue risk. These funds were placed with two investment advisory firms who handle institutional investing. Each has proposed a portfolio of mutual funds. One firm uses asset allocation to select these investments while the other bases its choices on an acceptable beta (risk). Both firms were used as a further method of diversification. The investments will be monitored regularly.

VII. Project Tomorrow—Project Tomorrow's solicitation campaign began in April 1997 as planned. To date, (excluding Grace-Davison), CIEF has received commitments for donations of $13,500 from a total of seven companies. There was resistance to the amount requested ($5,000/year) and the length of the requested commitment (5 years). Consequently, CIEF has modified its approach to solicit the level and length of giving that a particular company feels appropriate for them and has broadened the donation categories to fit the situation. These categories are outlined in *Table 1*. Solicitation and follow-ups are continuing with an eye to 1998 budgets.

VIII. Educational Grants for Academic Year 1997-98—Requests for funding for 1997-98 totaled $139,500 that was $82,500 greater than the amount the CIEF Trustees could provide, namely $57,000. The Trustees had to refuse 59% of the requested funding. This is alleviated somewhat by the $7,500 provided by the ongoing Vasta and Trigg scholarships which brought the total CIEF Grants to $64,500 or 46% of total requests. *Table 2* summarizes the funding requests and the total CIEF dollar commitments.

VIII. Recommendations for Appointment to the Board of Trustees—The Trustees have recommended to incoming President Thomas E. Hill the following candidates for three-year appointment to the CIEF Board:

Current Trustees	Recommended Successors
Donald W. Boyd	Richard M. Hille
George R. Pilcher	Rose Ann Ryntz
Thad T. Broome	Thad T. Broome

Mr. Broome was an added Trustee in 1997 and is now eligible for a full term.

MARY G. BRODIE,
President

Table 1—Project Tomorrow

	Donation Categories
Charter Corporate Sponsor	$5000/year, for five-year commitment*
Corporate Sponsor	• Platinum Level *(gifts of $3000 or greater for a multi-year commitment period) • Gold Level (gifts of $1000-$2999 for a multi-year commitment period*) • Silver Level (gifts of $500-$999 for a multi-year commitment period*)
Corporate Supporter	• Platinum Level (gifts of $3000 or greater) • Gold Level (gifts of $1000-$2999) • Silver Level (gifts of $500-$999)
Patron	• Gifts up to $499

* (Note: This commitment period is not binding; we are asking for your intent, to assist the Trustees in planning long-term project expenditures)

Table 2—Type of Request

Institution	Scholarship	Fellowship	Capital Grant	Research Grant
California Polytechnic State University	$6,000	—	—	—
DePaul University	—	$8,000	$3,000	$2,000
Eastern Michigan University	$15,000	—	—	—
University of Missouri-Rolla	$14,500	$12,000	—	—
North Dakota State University	$15,000	$12,000	—	—
The University of Southern Mississippi	$15,000	$12,000	—	—
Sub-Totals	$65,500	$44,000	$28,000	$2,000

TOTAL FUNDS REQUESTED: $139,500
TOTAL FUNDS COMMITTED:$64,500

Scholarships $49,000
Fellowships $8,000
Capital Grants ..... None
Research Grants ..... None
Vasta Scholarships $2,500
Trigg Scholarships $5,000

In Memoriam

We report with deep regret the passing of the following members during the past year

Baltimore

Royal A. Brown ..... (Retired) Southern Varnish Corp.

Birmingham

Alan Bridges ..... Croda

CDIC

Jim Kirkwood ..... (Retired)
Harry Poth ..... (Retired)

Chicago

Owen Carpenter ..... no company listed
Alan Cowley ..... Brandt Technologies
Margaret A. "Margo" Ciez ..... Morton Universal Color Dispersions
John Price ..... EZ Painter
Wally Wierzwinski ..... Zarco Industrial Finishes
John Rooney ..... (Retired)
Society Past President
James Patterson, Jr. ..... (Retired)
Society Past President
Fred Hirte ..... Ace Hardware

Cleveland

Merle D. Held ..... (Retired) Cyprus Mines Corp.

Dallas

Phillip Harbaugh ..... (Retired) Akzo
Society Past President

Detroit

John S. Ayers ..... (Retired) Consultant
Society Past President
Society Honorary Member

Golden Gate

Carlton H. Rose ..... (Retired) National Lead Co.
FSCT Past President
Society Past President
FSCT Honorary Member
FSCT 50-year Member
Rose La Febre ..... CSA
Joe Vola ..... F.W. Dunn Co.
Hal Carmona ..... Carmona Chemical
Al Henry ..... Triangle Coatings

Houston

Albert L. Rocklin ..... (Retired) Shell Development Co.
Larry Garness ..... (Retired) PPG

Kansas City

John Russell Griswold ..... Charles Paint Research, Inc.
Society Past President
Leslie Jerome Perrine ..... (Retired)
Brice Anderson ..... (Retired) Valspar Corp.

Louisville

Phillip Harbaugh ..... (Retired) Akzo
Society Past President

New York

Carlton H. Rose ..... (Retired) National Lead Co.
FSCT Past President
Society Past President
FSCT Honorary Member
FSCT 50-year Member
Royal A. Brown ..... (Retired) Southern Varnish Corp.
Arthur I. Nortman ..... Arthur I. Nortman and Associates
C. Richard Swenson ..... (Retired)
William L. Lawrence ..... (Retired)
Clarence Silleck ..... (Retired)

Northwestern

Robert Van Stone ..... Horton Earl Co.
Robert J. Eriksen ..... Viking Paint

Pacific Northwest

Douglas John Kier ..... Asahipen America, Inc.
John Lees Riddell ..... St. Lawrence Chemical, Inc.
Robert J. Sheehan ..... Farwest Paint Mfg.
Sidney C. Rassmussen, Jr. ..... Rassmussen Paint Co,

Philadelphia

Carl W. Fuller ..... (Retired) Reichard Coulston
Society Past President

Piedmont

Dr. E.O. Cummings ..... High Point University
Bill Tate ..... Retired
Terry Keel ..... Retired

St. Louis

Henry Markowski ..... P.D. George Co.

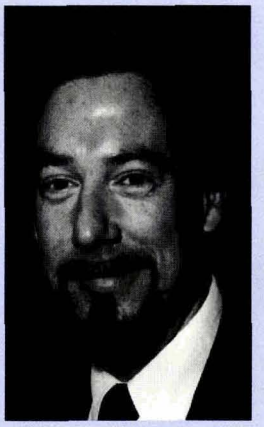
Southern

Royal A. Brown ..... (Retired) Southern Varnish Corp.

F. Louis Floyd

In his 30 years' experience in industrial R&D as both a scientist and manager, Mr. Floyd has been involved in activities ranging from basic research through product development, to strategic business planning.

He started his career with the Rohm and Haas Company in 1967, where he spent five years engaged in the R&D of latex polymers. In 1972, he joined the Glidden Company, now owned by ICI, in the newly formed Coatings Research Department. Over the next 21 years, he held various scientific and managerial positions. In 1993, he joined Duron, Inc., where he is currently Vice President for Technology.



His managerial accomplishments include the development of R&D post-evaluations to determine what controls its success rate, as well as development of multi-disciplinary teams within corporate structures to enhance this success. In addition, Mr. Floyd improved commercialization success rate in research from 10% to >50%, and reduced product development time by 50% without increasing risk. He established principles for effective supplier-customer interactions, and effective university-industrial interactions.

Mr. Floyd holds four Roon Awards from the FSCT and was the Technical Focus Speaker at the FSCT Annual Meeting in 1996.

Contributing an international range of publications and presentations to the field, Mr. Floyd has patents on latex synthesis and no-VOC coatings. He has led teams which developed the technology for such items as no-VOC/low odor latex paints, microvoid opacity, latex systems with exceptional corrosion resistance, phase behavior of waterborne systems, particle packing issues in pigment utilization efficiency, and models to predict the cracking tendency of consumer paints.

Active in six professional organizations, Mr. Floyd was a member of the Editorial Review Board of the Journal of Coatings Technology *from 1975 to 1996. A member of the Baltimore Society, he served as a Member-at-Large on the FSCT Board of Directors from 1995-96.*

He has been a lecturer at short course programs for Lehigh and Kent State Universities, and served as Chairman of the Gordon Research Conference on Coatings and Films, and is active in the American Chemical Society. Mr. Floyd is one of the founding members of the NIST consortium on Service Life Prediction for Coatings.

* *1997 Mattiello Memorial Lecture* *

Reducing Product Development Cycle Times Without Increasing Risk

F. Louis Floyd—Duron, Inc.

INTRODUCTION

Time Pressures

When I joined the coatings industry in 1967, it was a healthy, but slow-moving industry. It consisted of about 2,000 companies, and significantly sized research departments prospered in over 100 of them. At that time, it took typically 10 to 15 years to bring a new exterior architectural product to market, and most management literature claimed that this was just and right.

Thirty years later, the situation is quite different. The number of paint companies has declined from 1,200 a decade ago to about 800 in 1996.[1] The total employment in our industry has declined by 4.2 million jobs from its 1989 peak, even while the total coatings market continues to grow in dollars at about five percent per year (twice as fast as the economy as a whole).[2] Today, it takes about five to seven years to bring a new exterior architectural product to market, and most management literature claims that this is far too long and non-competitive.

As if that weren't enough, the regulatory community has become a major influence in our lives and is continually pushing us to abandon older technologies in favor of more socially-acceptable ones. This causes us to deal increasingly with technology that has limited field history to draw on, resulting in higher risk than we are accustomed to facing. And as our society has become increasingly litigious, the penalty for error in product design or manufacture has also risen steadily.

As a result, the time required to develop and take a new product to market has become a crucial competitive issue. It is no longer financially viable to research and test product concepts and prototypes for years to determine their suitability for the marketplace. *It is essential that we find some reliable means to predict both performance and longevity of new products based on short term laboratory tests.* Until now, this has been a largely unsuccessful effort on the part of the paint industry.[3]

Both market forces and the regulatory climate are causing companies to seek ways to accelerate the product development process. Unfortunately, shortening development times usually increases the risk level that a company is forced to live with. Historically, R&D has exercised the role of risk manager in corporations by testing prospective products extensively over long times and under varied conditions to insure that there will be no significant failures, once commercially introduced. Today, this style of risk management is untenable—it simply takes too long and costs too much, without delivering commensurate success. The field of reliability theory offers guidance on how to better understand the sources of risk, and how to quickly assess their magnitude, all on a time scale that allows far more rapid innovation than currently enjoyed in the coatings industry. Better yet, it offers insight on how to accomplish this without increasing the total risk experienced by a company.

Quality Pressures

Along with time pressures, our customers are obliging us to strive for ever higher levels of quality in the goods and services supplied to them and to reduce our response time to their needs. For our purposes, quality can be viewed as consisting of three elements[4]:

APPROPRIATENESS: A quality product is one that meets a customer's needs. That may not necessarily be the highest performing product available or one equivalent to those of competitors in the marketplace.

Presented at the 75th Annual Meeting of the Federation of Societies for Coatings Technology, on November 5, 1997, in Atlanta, GA.

All communications regarding this paper should be sent to the author at Duron, Inc., 10410 Tucker Street, Beltsville, MD 20705, E-mail: Lou.Floyd@duron.com

ROBUSTNESS: Given that the conditions under which a product or service will be used are highly variable, a reasonable expectation on the part of the customer is that the product be robust enough in its design to accommodate such variation and still perform adequately.

CONSISTENCY: Consistency here means unvarying performance over time, and is viewed by most people as being the largest component of quality. Implicit in this is that no product changes will be made without the notification and involvement of the customer in the process.

These two pressures create the ***business goals*** we are faced with today:

(1) provide products which are appropriate for their intended use, which are robust enough to accommodate the environment in which they will be utilized, and which contain no unexpected failures or side effects; and

(2) provide such products in quick response to the expression of customer needs, at a sufficient profit to the company to permit continued investment and growth for the future.

It is this author's view that our industry has done a commendable job of developing technology to meet all the competing demands placed on it over the past 30 years. However, it has been less successful in improving the ways in which we manage that technological process. The thesis of the following discussion is that the main obstacle to getting to the marketplace faster lies in the way we manage risk today; and that by managing risk differently, we can both speed up our development process and lower our risk.

THE DIMENSIONS OF RISK

Risk Perception

Studies[5] have shown that people's perception of risk can differ significantly from analytical assessments of risk. *The level of perceived risk seems to be inversely related to the level of involvement one has in the decision process for taking the risk, and directly related to the degree of surprise.* Thus, people who have a decision imposed on them view the risk associated with that decision as being higher than people who participated in the decision making process. And people who are surprised to learn that they are at risk see that risk as being even higher. In addition, *risks with a catastrophic potential are seen as more severe than those with damage spread over a longer period of time.* For example, nuclear power is seen as far more risky by the general public than cigarette smoking, even though overwhelming evidence exists to the contrary.

To complicate matters further, *these opinions appear to be impervious to any scientific evidence which is contrary to people's personal beliefs.* For example, many persons confuse risk with outcome, believing that the absence of a failure in a given circumstance means that the alleged implicit risk is either non-existent or exaggerated.

Considerable corporate energy goes into discovering the risks inherent in a given decision or activity and developing contingency plans to deal with the problems when they arise. Unknown risks deny this opportunity, so when such a failure occurs, the attending staff are surprised and have no prepared responses available to them. People responding to surprise situations commonly make mistakes and can compound the problem with even more mistakes in their efforts to correct the problem. This can escalate a small problem into a serious situation and challenge a corporation. Therefore, *an unknown (undefined) risk is considered to be far worse than a known risk.*

Conservative Response to Risk

Business risk deals with the probability that a given decision will result in financial harm to the company. (Moral and ethical issues are not considered here.) In both frequency of occurrence and size of actual impact, the most common form of business risk is that a business decision will fail to produce its desired profitability. Product liability risks are less of an actual problem for corporations today because businesses expend huge efforts to avoid and prevent unexpected catastrophic failures. This paper is limited to issues related to product failure.

A good example legitimizing the concern for risk is the recent problem that auto manufacturers were having with basecoat/clearcoat technology being used for automotive coatings. Tens of millions of cars and trucks manufactured in the U.S. between 1985 and 1990 were finished using this new technology, which was subsequently found to experience peeling failures. The price tag for correcting this failure could easily exceed a billion dollars. The problem: a new mode of failure (delamination between base and clearcoat) with the new system.[6]

While small entrepreneurial companies tend to take big risks (and have commensurate failure rates), major corporations are distinctly risk-averse. In particular, major corporations abhor the catastrophic potential of unknown (undefined) risk. Managers and researchers in such organizations learn early in their professional lives that putting their company at unknown risk will jeopardize their careers.

Separate from specific financial claims, there is also the risk that product failures will erode a corporation's credibility to the point that customers prefer to deal with their competitors. Whole markets can be lost without necessarily paying out a lot of claims.

Actual Sources of Product Failures

ORIGIN OF RELIABILITY THEORY: At the close of World War II, the military establishments of the world were quite concerned about the fact that none of them could ever keep more than about 50% of their equipment in service at any one time.[7] The rest were off-line, being repaired. As bad as this was, the statistics became even worse as we entered the missile and electronics eras simultaneously. The typical time-between-failures for a given missile was on the order of a few days, and only about 10% of total equipment was operational at any given time.[8] This resulted in the launching of massive

military programs to improve the service life of complex military equipment among the major countries.

At the same time, the civilian sector became aware of similar reliability issues. After the British aircraft firm, De Haviland, experienced a number of disastrous crashes with its first post WW II commercial jet aircraft, Boeing recognized that the market for commercial aviation would be severely limited unless this reliability problem could be solved. They developed both quality and durability assurance programs, which effected a preference for their equipment in the world aviation market. And this preference persists today, some 40 years later.

As a consequence of these early studies, three clear problems have emerged: (1) materials, components, and systems are incredibly complex, making it far more likely that failures will occur (the failure of any component causes the whole system to fail); (2) our collective mindset is limited regarding how to deal with the issues statistically; and (3) we have no effective techniques for either measuring or dealing with risk. The first is a reality of life. The second and third have spawned a reliability theory.

The use of reliability theory has had remarkable success in dealing with highly complex systems and has achieved an impressive record in the electronic, aerospace, nuclear, and medical industries (in addition to the military).[9] Over the past decade, a few researchers have attempted to apply the same techniques to the field of coatings, but as of this writing, the coatings industry has not utilized these techniques in practice to any significant extent.

Sources of Product Failure: By collecting and plotting large amounts of failure data over many years, reliability theory has shown that most materials, components, and systems fail by one of three failure modes, depending on the age of the product: [10-15]

(a) Early in a material's life, the failure frequency is high, but declines rapidly with age. These kinds of failures are frequently referred to as infant mortality (biological) or burn-in (electronics) failures.[16] Such early failures can be caused by design flaws or manufacturing errors but are more frequently associated with flaws or defects in the way a material is installed or applied. For example, failure to properly prepare the substrate prior to painting is by far the most common cause of exterior architectural paint failures. *Most product liability claims occur during this early interval.*

(b) After a brief time, the hazard rate drops to a low level, and remains there for a long period of time. Failures during this interval are usually associated with accidental damage, rather than material deficiencies. Coatings examples include storm damage, construction accidents, and normal household wear-and-tear. (This is why touch-up is an important property in architectural coatings.) *Very few product claims originate in this region.*

(c) All materials have the common characteristic that they *ultimately fail due to accumulated damage.* This accumulated damage is the summation of small incremental damage events, each one of which is insufficiently small to cause failure, and often not readily detectable. After long times in service, sufficient damage is accumulated that materials start to fail by a wearing-out process. This kind of failure can be truly described as characteristic of the life expectancy of the material. This manifests itself as a steady increase in hazard rate. Relatively few product claims result from this interval, because current product testing and corporate attention are focused strongly on this point.

Hazard rate is defined as the conditional probability of failure in the next time interval, given survival up to time ***t***. When hazard rate is plotted against time, a universal graph of these three failure modes takes on the form of a bathtub (*Figure* 1).[10]

The hazard rate plot illustrates three definitions relating to service life issues:

(1) The ***risk*** of a given situation is largely related to the quantity and nature of early failures occurring during period A.

(2) A product is considered to be ***robust*** if it does not exhibit early failures.

(3) The *normal lifetime* for the product, absent freak accidents or improper installation or usage, can be defined as the end of period B. This is commonly referred to as the ***capability*** of a given product in service in a given environment.

A real life example is shown in *Figure* 2. The rate of fatal traffic accidents vs. age of driver is high at early age (immature judgment and inexperience), low and constant for several decades (random chance), then rises

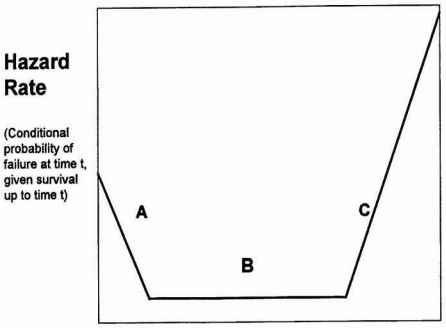


Figure 1—Bathtub-shaped curve of hazard rate vs. total lifetime of population.

Caption:

Region A: early failures can be due to design deficiencies or manufacturing errors, but are more frequently related to improper installation, deficient training or capabilities of operators, or using for inappropriate purposes. This can be seen as a lack of robustness on the part of the product.

Region B: failures are random, caused by "freak" events such as storms or accidents.

Region C: failures represent the normal "wearing-out" process; indicative of end-of-life. These can be termed as related to the capability of the product.

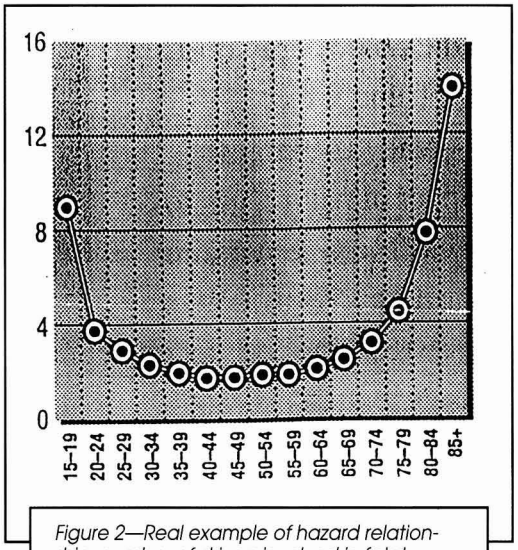


Figure 2—Real example of hazard relationship: number of drivers involved in fatal accidents for every hundred million miles driven

Source: Wall Street Journal study of Department of Transportation fatal-accident reports and mileage statistics for 1990.

again in old age (slowed response time). The type B accident rate is considered the "normal" or background rate, absent the special circumstances of types A and C.[17]

Managing Risk

Over the years, corporations have evolved a variety of ways to minimize the inherent risks of doing business. They start by taking only moderate risks, and follow with a whole plethora of tests, checks, and balances designed to insure that no major risk goes unrecognized, unchallenged or unquantified. Decisions are frequently delayed by efforts to develop more information to reduce risk. In fact, the single largest determinant of how fast a corporation can move is determined by how it deals with risk. (Chemists call this the "rate-limiting step." Planners call this the "critical path.") Therefore, *the best place to look for economies lies within the realm of risk management if one desires to significantly reduce the costs and time inherent in the product development cycle.*

The **role of risk manager** (minimizer) for product issues naturally falls on the shoulders of R&D personnel, because they originate the product and have the resources and skills to carry out detailed testing and quantification of the elements of risk (a long-time-frame process). Unfortunately, R&D personnel are often led to believe that this risk-reduction part of their jobs is an intrusion on their "true" mission of designing new products. This misconception can come from both general and R&D management, especially if they have a limited understanding of the overall risk management process.

The potential failures with which R&D deals include:

- Inability to manufacture expected product;
- Product fails to meet initial expectations;
- Product fails in service; and
- Failures outside of R&D's control (improper application, fraud, poor substrate quality, poor substrate preparation, number of coats, product actually used).

Table 1 summarizes the range of issues addressed during testing. One clear implication: during product development, R&D effectiveness is more important than efficiency, because all the efficiency in the world cannot correct for a faulty goal.

CURRENT PRODUCT DEVELOPMENT PROTOCOL

Note: Before product development can occur, R&D must first have an on-going program of formulating and testing alternatives from the wide variety of possible raw materials and technologies available. This development-of-options is a key step which must precede product development, and operates on a long time scale of years-to-decades.

As an example of our current development and testing process, let us consider the development of a new archi-

Table 1—Risks Addressed During Testing

A. Product (formulation) Design

1. Liquid state

a. Package stability (shelf, heat, F-T, roller): viscosity change, syneresis, seeding, skins, lumps, grit, color non-uniformity, settling, can rusting, changes in application or appearance properties.

b. Application: atomization, spatter, leveling, wetting, cratering, pinholes, crawling, sagging, dripping, roller matting, clogging spray guns, uniformity of film, equipment clean-up, hiding, color, roller and brush transfer, brush drag, film build.

2. Solid State

a. Film Durability

1. mechanical insult: impact, scratch, mar, burnish, scrub
2. photodegradation: chalk, gloss, color, change of appearance
3. loss of protection: erosion, mildew, blistering, peeling, cracking
4. hardness: block, dirt, stain resistance, stain removal

b. Appearance: color, gloss, leveling, hide, uniformity, block, stain resistance and removal, water resistance, chemical resistance

B. Process Design

(1) Inability to scale
(2) Inability to make
(3) Lack of reproducibility
(4) RM problems
(5) Adjustments to batches
(6) Off-grade — recycling/reprocessing costs
(7) Off-grade — not reclaimable — disposal costs
(8) Product recalls
(9) Right first time: large contributor to productivity, manufacturing cost, manufacturing capacity.

tectural paint intended for exterior use on commercial and residential construction. The approach involves a number of sequential steps, which cycle back in an iterative fashion until success is achieved:

(1) Marketing specifies a target cost and performance balance for a new product. This is usually a fast response to a specific market-place opportunity. [time scale: hours to days]

(2) R&D develops candidate coatings selected from the options developed previously plus the totality of prior formulating experience in the corporation. Only enough testing is conducted to determine if key properties can be obtained within the specified cost constraint. [time scale: weeks]

(3) Extensive formulation studies follow, to guarantee that over 200 properties are simultaneously achieved, within the specified cost parameters. This usually involves numerous iterations. [time scale: quarters]

(4) Extensive panel exposure studies are initiated on test fences, involving different orientations and locations, to determine if the candidate is *capable* of withstanding the natural weathering process. Accelerated testing is run simultaneously, to build a database of comparative information. Unexpected results may occur during this step, usually in proportion to the degree of departure from known systems. [time scale: years]

(5) Formulation studies continue to refine the application (liquid state) and appearance properties of the candidate, and to correct any solid state property deficiencies uncovered in step 5. [time scale: months]

(6) After the completion of a year or two of fence testing, and a lot of accelerated testing, test houses are painted to check real-world application and performance of candidate products. This may uncover deficiencies in robustness, which require further formulation revisions, followed by further testing. [time scale: years]

(7) At the conclusion of house testing, the process is scaled up, production scale batches are made, and the product is test marketed in a narrow geographical region (field testing). This allows one to move forward in the commercialization process with controlled risk. It is here that most problems of insufficient robustness to varying conditions are uncovered. [time scale: quarters]

(8) Once the test marketing is successfully concluded, the product is introduced across the entire market with full fanfare.

The total cycle time for this process is on the order of five to seven years, and can be depicted graphically in *Figure* 3. Here we are plotting the relative amount of learning (risk reduction) achieved (Y-axis) vs. calendar time (X-axis). This is plotted as a cumulative function, so that each stage adds onto the results of the preceding stage. The judgments which go into the decision to move on to the next stage are governed by the preceding discussion on risk.

The reader should note that, in our current product testing protocol, we commonly create a test environment such that: all paints being tested are colloidally stable as liquids; all paints have been applied to properly-prepared substrates; all paints have been properly applied; and all films have been properly formed (fused). In other words, issues of robustness are largely removed from consideration in the spirit of "controlling variables."

It should also be noted that while ***testing does lower risk***, it can do so ***only within the context of current knowledge and experience***. Previously unknown and unexpected modes of failure with new technologies can remain undetected throughout this entire process. Therefore, the greatest risk will always lie with new technologies. And both regulations and competition inexorably push our industry into new technologies.

HOW CAN WE SAVE TIME?

Referring back to *Figure* 3, each stage shows a spurt of learning, followed by a more gradual increase. This tendency to plateau after an initial spurt is frequently referred to as reaching diminishing returns. *Figure* 4 suggests that by reducing these areas of diminishing returns, one can move more swiftly through the development process. The author further suggests that by dealing with robustness issues in the lab, even more time can be saved.

A Fast Cycle Time Example

Perhaps the best way of describing how one might save time is through a concrete example. Recently, my own firm was put into an extremely difficult situation when a supplier announced that it would discontinue the manufacture of a key raw material used in half of our products, including *all* of our exterior paints (total: 175 products). The supplier assisted us by making stockpiles of the raw material, and our own plant stockpiled finished goods. As a result, we were able to create an 18 months' cushion, in which time we had to accomplish a complete conversion of the affected products.

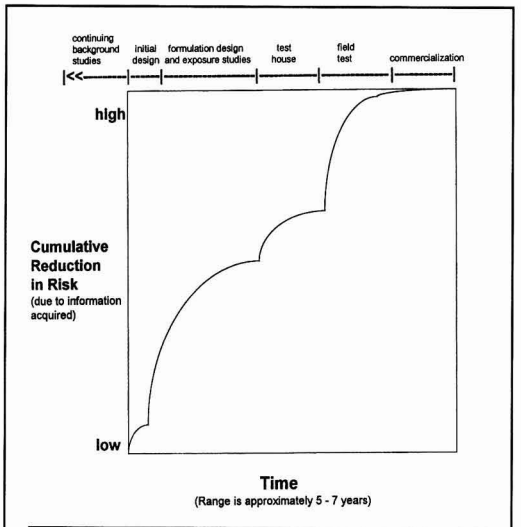


Figure 3—Cumulative value of information generated at various stages of product development.

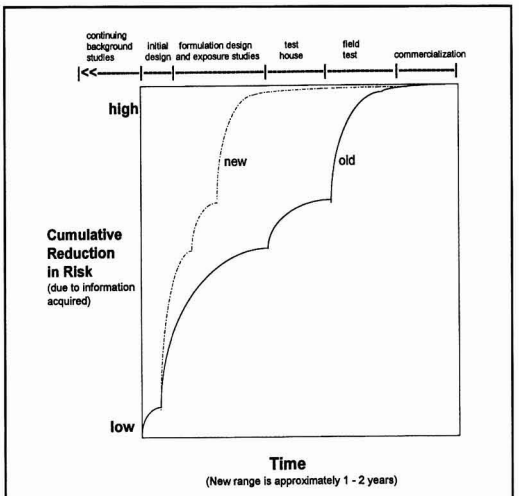


Figure 4—Time savings possible by minimizing periods of diminishing returns.

Conventional thinking suggested that this task was impossible in the time frame imposed. But by focusing on robustness issues and minimizing time losses in diminishing returns, we were able to accomplish this task in 18 months. This also required diverting all existing manpower to the task, plus adding some temporary employees for the duration. While the author is certainly not recommending this kind of crisis management as a routine way-of-life, the experience certainly does suggest that there are ways of economizing efforts without compromising the quality of results. Following is a discussion of how we accomplished this:

GOAL: The most important step is defining the commercial goal, since no amount of effort will compensate for being on the wrong track.[18] The goal of every reformulation was carefully defined as making a suitable replacement. *We vigorously resisted mission-creep*, only allowing exceptions for those few cases where the existing product was no longer competent in the current marketplace.

AUTOMATE, AUTOMATE, AUTOMATE!: At all times, we seized every opportunity to save time and increase accuracy by automating manual procedures. Automation speeds up processes by streamlining them. The increased accuracy saves time by eliminating the need to repeat experiments several times in order to filter out the high experimental error.

CAPABILITY: We dealt with the exterior durability issue by choosing only candidate replacement materials which suppliers had already demonstrated to be durable. In other words, we accepted their results in terms of *capability*, as defined earlier in this paper. Since our formulation activities could inadvertently compromise the capability of the product, we ran reality checks on ourselves in an accelerated weathering device which contained both UV light and freeze-thaw cycle capability (precedence existed for simulating cracking tendencies by using wet-freeze-thaw-dry cycles[19]). We found that within six weeks, we could detect any significant reduction in either photochemical or cracking resistance of paint films over bare wood. In fact, this turned out to be a more sensitive test for choosing coalescent level than the traditional minimum film formation or low temperature film formation (vs. coalescent level) tests. This testing was usually run concurrently with scale-up efforts, so it did not contribute to the length of the critical path of the program. This risk of having to cycle back in the development process in the event of failure was far outweighed by the increase in speed in the event of success.

EXPEDIENCY: FIRST SUCCESSFUL CANDIDATE WINS: We could not afford to survey all available alternatives, and engage in lengthy comparative evaluations. Instead, we prioritized our candidate list based on the combined knowledge available to us, and focused on a short list of absolute requirements. We converged on the first candidate which met our requirements within reasonable cost constraints.

In our case, we replaced the discontinued material with several alternatives, each in circumstances appropriate to its choice. We did not take the time to find one single product, and then learn how to formulate it over the same breadth of previous useage. In only one case did we have to abandon the first chosen candidate in favor of a second one. That was due to a lack of performance latitude and robustness, which was readily detected by our testing protocol.

CRITICAL PROPERTIES: Complete testing of a single product would have involved investigating about 200 properties, requiring at least six months to complete. And this doesn't include proving exterior exposure. We chose instead to focus on a list of about a dozen properties which constituted our critical screening list (see *Table* 2). This list was used to develop the prototype formula that possessed the critical features. It was common for a formulator to go through numerous formulation iterations during this process.

COMPLETION PROPERTIES: Once we had developed a successful candidate from the critical screening, we immediately proceeded to our expanded list of about 50 properties as our proof-of-completion (similar to *Table*

Table 2—List of Critical Screening Properties

Film Properties:

Opacity (1.5 and 3 mil contrast ratio)
Gloss (all angles)
Color accuracy (if factory color)
Wet adhesion to glossy and chalky surfaces
Water resistance (softening, blistering, blushing)

In-Can Properties:

Viscosity (all shear rates)
Package stability (oven, roller, syneresis)
Color acceptance (most were tint bases)

Application properties:

Low temperature film formation (40°F)
Handling (brush, roll, airless spray)
Touch-up (next day overlay on previous coat)

Cost (within constraint)

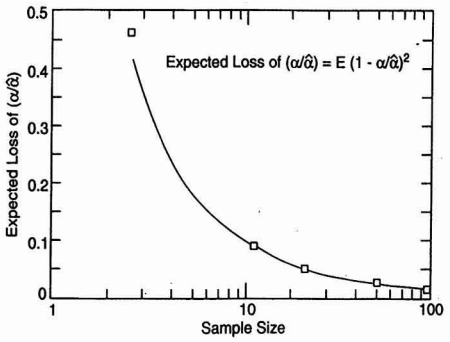


Figure 5—Effect of number of replicates on curve-fitting error.[3,9]

1). This work led to the usual refinements in quantities, order of addition, and sometimes to substitution with an alternative raw material. It is at this stage that most iterations occurred, as the formulator was required to balance all the competing properties and stay within reasonable cost constraints.

Tinting Formulas: 80% of all paint we sell is tinted in some form. Half of that is done in the stores, and half in manufacturing as plant (ready-mix) colors. Therefore, we utilized our Color Systems Department to verify the actual color (factory colors), or color acceptance (tint bases) before proceeding further. Once color acceptance was obtained, tinting formulas were then developed and 100% verified for each new tint base, since they tinted differently from their predecessors.

By conventional techniques, this color task would have taken about six man-months per base. We were able to compress this to two man-months, and have since compressed it further to about two man-weeks of work. We accomplished these compressions in time by purchasing automated filling and tinting equipment, by developing revised software for characterizing tint bases and for generating electronic formula books, and by improving our lab technique for characterizing tint bases. It is our view that even further compressions can be made via more radical improvements in our color software.

Application Testing: Experience had taught us that the most common form of early failure with new architectural paints is in application properties. We therefore instituted a step in our approval process which required application testing by a disinterested party. We were fortunate to have people in our company who had worked previously as contractors. They were willing to give us an honest appraisal of how the liquid paint handled. Their satisfaction with the application properties was mandatory before it could proceed to scale-up. A day or two spent here could save several months later during field testing.

Scale-Up: All products developed during this program were systematically scaled-up through a Process Development Department, which we had created about three years earlier. This department uses a fully instrumented high speed mixer capable of making batches from quart to 10-gallon size. By monitoring torque and power consumption during processing, plus numerous visual observations, it was possible to make revisions at the five gallon level to insure success at the 1,000 gal level in production. Numerous discussions were held between process, product development, and production personnel to insure that process adjustments achieved production viability without compromising the essential performance features of the product.

During this stage, it was common to recycle back frequently to the formulator. We estimate that over half the formulas required revision as a result of our scale-up studies. But the good news was that success at the scale-up stage usually resulted in a success in manufacturing. A post evaluation of this step for 1996 showed a 90% success rate from scale-up to production: 45% were right first time; 45% needed only one adjustment (typically in viscosity); 10% were recycled back to process development (or product development) for further work. Prior to implementing this process development step, our success rate in going to production was on the order of 20%. We estimate that this scale-up process saved us months of time, and tens of thousands of gallons of paint, while typically costing only a few days for process study (far less than the delay of adjusting a single unsuccessful production batch).

First Batch Production: Factory production of the first batch was always monitored by personnel from the Process Development Department. When possible, they followed the first three batches to establish that our plant could make the product as formulated, without unexpected manufacturing sensitivities appearing in the process. The first production batch was then used for whatever "beta" testing has been selected.

Beta Testing: Following the lead of the Japanese, the instrument industry has adopted the practice of "beta"

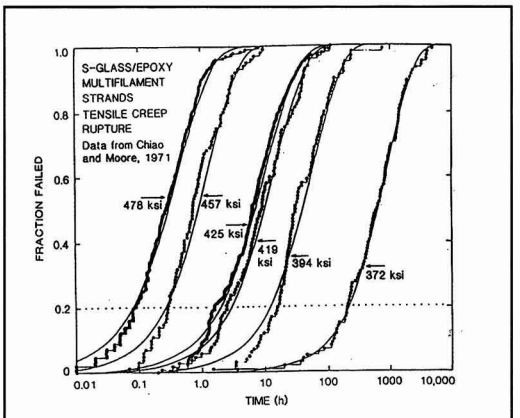


Figure 6—Example of time savings possible by early termination of experiments plus curve-fitting.[31]

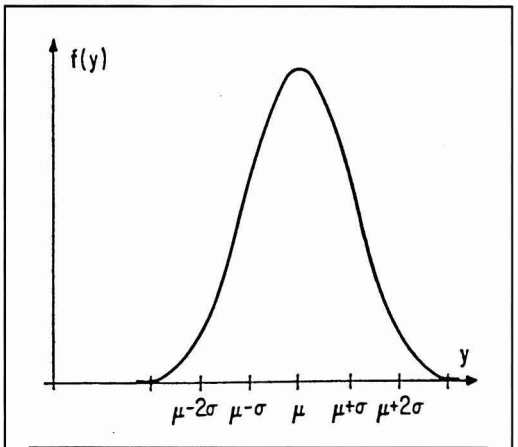


Figure 7—Differential distribution of replicate results.

testing of products before releasing them for commercial production. Their terminology refers to all the laboratory testing described up to this point as "alpha" testing, and (in coatings parlance) test houses, field testing, and market testing cumulatively as "beta" testing. The distinction is that alpha testing is in our hands, while beta testing is in the hands of our customers.

Up to the point where a product is put into the hands of the customer for regular use, all testing for robustness is inherently biased! The reason is simple. The people conducting the tests are controlling variables, and hence risks. It is only when real people use our products in the real world that we find out about robustness issues for certain. Of course, only competent prototypes should get this far. Customers should only be involved in testing product features, not basic performance or competency.

We painted test houses with critical products in each line, reasoning that their performance would be representative of the rest of the line (because of design similarities). Because we focused on robustness issues in our lab protocol, we encountered relatively few problems during this phase of testing. Under previous protocols, most of our new product offerings needed to be redesigned as a result of this test phase, and recriminations were common.

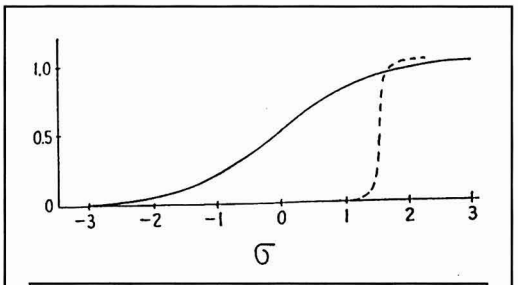


Figure 8—Cumulative distribution of replicate results.

Decision-Point Discipline: To insure that we were not allowing anything to fall through the cracks, we instituted a series of three formally documented decision-points: (1) Ready for Scale-up, (2) Ready for First Production Batch, and (3) Ready for Unlimited Production and Commercialization. At each step, signatures of all responsible parties were required (and the documents were required in-hand) before proceeding to the next step. This eliminated a whole plethora of excuses for common oversights, and minimized the time spent waiting for someone else to perform their assigned tasks.

Post Evaluation: Of the 175 products developed and commercialized during this 18 month period, only 10 required revisions that took them all the way back to product development, and one experienced product complaints in the field. Compared to our previous experiences, this represented a substantial reduction in our risk level, while simultaneously cutting our product development cycle time in half.

HOW CAN WE SAVE EVEN MORE TIME?

Figure 4 illustrates that the time frame for product development can be significantly compressed by a variety of strategems which are designed to reduce the "plateau regions" in the learning curve, as discussed in the previous section. But there are even more substantial improvements that can be made, if we are willing to invest in developing improved experimental techniques and alter some traditional roles and relationships in the industry.

Improving our Experimental Techniques

In 1996, Martin et al., published "Methodologies for Predicting the Service Lives of Coatings Systems" as a booklet in the *Federation Series on Coatings Technology*.[3] This booklet describes the key issues which need additional research in order to achieve reliable prediction of the service life of coatings. These issues also form the agenda for a joint industry-government research Consortium on the Service Life Prediction for Organic Coatings which he manages at the National Institute for Standards and Technology (NIST). Following is an overview of some key issues raised in that publication:

Quantification of Failure: One large barrier to achieving correlation between test methods is the use of imprecise data, frequently based on judgment ratings (e.g. ASTM 10 point scale). NIST is using image analysis techniques to apply absolute numbers to visually observable failures, and using instrumental techniques to quantify failures not directly visible (e.g. infrared imaging to see under-film corrosion). Doing so has been shown to sharply increase the precision of results, and enhance the ability to see cause-effect relationships.[20-21]

Replication Deficit: No matter how much is written on the subject, the coatings industry persists in employing inadequate replication of results. Experiments have shown that about 20 to 30 replicates are necessary to achieve the same precision as an infinite set[22] (*Figure* 5).

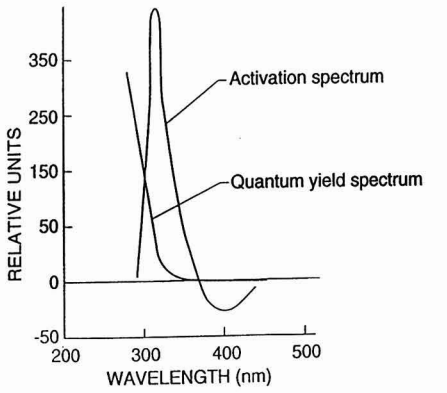


Figure 9—Polymer degradation as a function of UV wavelength (aka "Action Spectrum").[32]

However, the experiment needs to be run only till about 20% to 30% of the replicates fail, in order to reliably reconstruct the entire cumulative distribution curve mathematically[14] (*Figure* 6). Thus additional hours of work up front can save months of calendar time in reaching a conclusion.

Since we are interested in the causes of early failure, we should also shift our attention away from the differential distribution of experimental results (the bell-shaped curve, *Figure* 7) and concentrate instead on the cumulative distributions (the S-shaped curve, *Figure* 8). Bell-shaped curves focus attention on overall average performance as a measure of expected lifetime, and de-emphasize data extremes as "outliers." However, it is really the outliers (early failures) that cause most product claims. In *Figure* 8 the dashed line represents the desired goal: eliminate causes of early failure, which also has the effect of increasing mean lifetime.

Life testing Analysis: To develop lab tests that reliably predict the effect of the actual environment on coatings, one must first determine the environmental factors which cause degradation, and then quantify those causes in terms of dose-response relationships. While past research has given us a good qualitative understanding of the causative factors in degradation during weathering, we certainly lack a quantitative understanding.[3]

For example, we already know that paints fail in appearance properties due to photochemical degradation from the UV portion of sunlight.[23] But we need spectral UV information, both in terms of what is in the natural environment, and in terms of the dose-response degradation of coatings as a function of wavelength. *Figure* 9 illustrates this point by showing that the actual damage spectrum ("action spectrum") is a product, at each wavelength, of (1) the amount of light from the sun, (2) the fraction absorbed, and (3) the fraction of the absorbed light which causes degradation ("quantum efficiency"). The Smithsonian Institution and NIST are collaborating on the development of narrow band-width monitors which will quantify the UV flux in natural sunlight as a function of both time and wavelength.

We also need to learn the interaction of photochemical degradation with temperature and humidity, both as a continuum and as a threshold phenomenon (where minimum levels have to be attained before an effect is observed). A protocol for accomplishing this has been proposed by Martin, *et al.*[24] and the U.S. Global Climate Research Program of the National Science Foundation.[25]

We know that cracking behavior can be simulated by cyclic environmental changes (hot/cold, freeze/thaw, wet/dry).[14] But we need to know more precisely the effects of temperature, humidity, and cycle frequency on such behavior, in order to construct meaningful lab tests. Rychtera[26] showed success with this approach with electrical equipment failures in adverse environments.

Correlation with Exterior Results: Of course, the biggest barrier to developing a lab test protocol which will correlate with natural weather is that ***weather itself is not reproducible***! (*Figure* 10) Burroughs, in his 1992 book on *Weather Cycles: Real or Imaginary*, concluded succinctly:

> *"In truth, almost everything they have studied so closely over the past few centuries is little more than the random noise of an immensely complicated system—full of sound and fury, signifying nothing."*[27]

An identical, if less succinct, conclusion was expressed by the National Research Council in their 1995 report on climate variability[28]

A solution to this problem is suggested by reliability theory, which points out that failure occurs as the result of accumulated damage. Thus the proper scale for comparison is not time, but cumulative damage events. A given number of damage events (whether photons of a certain wavelength, or number of freeze-thaw cycles) should cause the same degree of degradation, regardless of their source. This means that monitoring needs to be done, both in the lab and in nature, to quantify the number of damage events which have occurred during each observation interval.

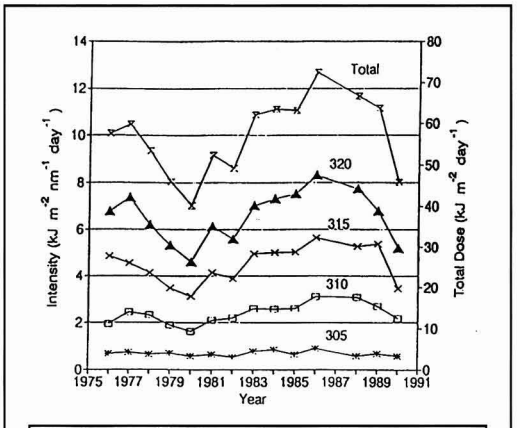


Figure 10—Long-term variations in spectral UV flux at earth's surface.[33]

Table 3—Comparison of Conventional vs. Reliability-Based Designs

Issue	Conventional	Reliability
Initial work	modest	significant
Replication	few	many
Test duration	long	short
Service life information	limited	substantial
Early failures	***unknown***	quantified
Knowledge of risk	***little***	significant
Future direction	indicated	clarified

Shift in Traditional Roles and Relationships

ROLE OF EXPOSURE (PANEL, FENCE) TESTING: To this author, exterior fence testing should play a role in determining product life expectancy, but not in (paint) product development. Fence testing should be done by suppliers to establish the capability of their products under controlled conditions. It should also be conducted by paint companies to establish a record of their own capabilities against which failure complaints can be judged. But fence testing can say very little about robustness-in-use. It is simply too controlled a process, and takes too long to produce results. Properly conducted lab testing is actually better suited to testing for robustness than exterior exposure testing.

ROLE OF LAB TESTS: Only after life testing analysis is done, can meaningful lab tests be constructed and run. We need to largely revise our methods of laboratory testing, both instrumentally and procedurally. Instruments must be developed which allow us to determine the extent of photodegradation as a function of wavelength. Fatigue tests must be developed which measure the retention of mechanical integrity during cyclic stresses (hot/cold, freeze/thaw, wet/dry). Bio-fouling tests must measure the decay in resistance as a function of weathering factors. Tests must be devised which simulate the accumulation of "dirt" (and bio nutrients) during exposure. All these need to accommodate any interactions which may exist among themselves, or with other factors in nature such as temperature and humidity.

ROLE OF SUPPLIERS: In this author's view, it should be the role of suppliers of paint ingredients to provide basic studies to tell us

- the *capability* of their products, and of finished goods containing their products;
- the *robustness* of their products when used in conjunction with all the other ingredients normally used in finished paints.

The military started such a relationship with its suppliers in the early 1960s, one result of which is the tabulation of the reliability of all electronic components in a handbook[29]

SOME FINAL THOUGHTS

By recognizing and dealing with the extensive permeation of risk avoidance throughout an organization, not only can considerable time be saved in getting to the marketplace, but this can be achieved with lower overall risk than is currently experienced. (*Table* 3 summarizes the relative merits of conventional vs. reliability-based approaches to the product development process.)

Accomplishing this will require a substantial investment in continual training of the entire staff of a company in order to effect some fundamental changes:

- R&D must become fully integrated with other corporate functions in order to be effectively utilized (difficult because of the different time scales of the various functions).
- R&D must learn to communicate risk issues effectively to the rest of the corporation.
- The other functional groups in a corporation must learn how to share in the risk management process. Failure to do so will prevent any significant reduction in product development cycle times.

"In the future, it will not be the **big** companies who eat the **small** ones; it will be the ***fast*** competitors who devour the ***slow*** ones.[30]

ACKNOWLEDGMENTS

The author would like to acknowledge the contributions of the following people:

- Dr. Jonathan Martin (NIST) and Prof. Sam Saunders (Washington State Univ.), who introduced me to the tenants of reliability theory, on which this paper is based.
- Milton Arnold, Bill Higgs, Jim Roberts and Martin Welsh (all of Duron, Inc.) who implemented the time-saving elements described in this paper in their respective areas of responsibility with distinction, which in turn created the real-life example of how this process can work.
- James Capitano (Duron, Inc.), for arranging to stockpile finished paint in order to buy us more time for product development, and for his support of an interactive process with R&D to rapidly scale up new products and solve production problems.
- Dr. Robert Feinberg (Owner and CEO of Duron, Inc.), for his willingness to take the risks inherent in the new ideas which we implemented in his company, and for his patience when we stumbled.

DEDICATION

Every researcher stands on the shoulders of others. During my professional lifetime, I have had the great fortune to know and learn from a number of exceptional people who had the common attribute of being able to "think outside the box." I would like to dedicate this paper and this award to these people who have been pivotal to me during my career:

Walter Asbeck (Sherwin Williams, and later at Union Carbide), essentially started the field of coatings research and technology, in which I have spent my entire professional life. I have had the privilege of knowing Walt, and consulting with him over the years.

Ken Hoy (Union Carbide) has been a constant source of excitement about the plethora of possibilities always facing a technical person in the coatings industry. His counsel has always been insightful, and frequently unexpected in content.

Andrew Mercurio (Rohm & Haas) first taught me to take myself seriously as a scientist.

Walt Kooch (Rohm & Haas) taught me to not take myself so seriously that I couldn't communicate effectively with others.

E. Bruce Euchner (Glidden) taught me that R&D was a fundamentally human enterprise, which required the proper environment to flourish, and that it was the job of R&D management to provide that environment.

Steve Bowell (Glidden, deceased) provided continuous rigorous intellectual challenges to me during my early years at Glidden, which contributed substantially to my enjoyment of my profession.

Theodore Provder and *Richard M. Holsworth* (Glidden) taught me that properly-used characterization equipment and studies can substantially accelerate any R&D process by replacing speculations with facts. They also taught me that obtaining funding for capital equipment was an art form in itself.

Robert J. Seidewand (Glidden, now Zeneca Resins) was a stalwart colleague during my earlier years at Glidden, as we learned to do amazing things with emulsion polymerization. It was during this time that I learned to clearly distinguish between polymer issues and paint issues.

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Ray A. Dickie (Ford Research) provided guidance and encouragement during the decade I spent on corrosion control via paint.

Prof. Irvin Krieger (Case Western Reserve Univ.) taught me how to effectively navigate the industrial-university interface, and actually accomplish something in the process.

Jonathan W. Martin (NIST) proved to me that government labs can make a very positive contribution to industry's competitive health, if we just put forth the necessary effort to learn how. In addition to being an incredibly productive researcher, and a stimulating colleague, John has been a patient guide as I learned how to avail myself of the resources at NIST.

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* First Place Winner 1997 Roon Awards Competition *

Oxidative Crosslinking of Alkyd Resins Studied with Mass Spectrometry and NMR Using Model Compounds

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R.P. Klaasen and K.H. Zabel—Akzo Nobel Coatings Researcht

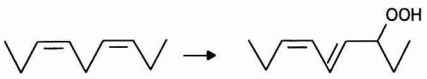
The crosslinking of alkyd resins has been studied using ethyl linoleate and methyl ricinoate as model compounds. With quantitative ^{13}C NMR it was established that ether- and peroxy-crosslinks were formed in roughly equal amounts. Double bonds reacted to give epoxides, endoperoxides, and β-scission into aldehydes. Using SIMS it was established that dimers through pentamers were formed having included several oxygen atoms. After reduction of peroxide (crosslinks) with stannous chloride, the higher oxygen homologues decreased. In the NMR spectrum of the reduced material, peroxide and epoxide signals completely disappeared. High resolution electrospray ionization mass spectra (ESI-MS) yielded evidence regarding the crosslink mechanism. The non-conjugated linoleic acid was found to crosslink by combination of radicals: dimers were having masses 2(M-1). The conjugated linoleic acid crosslinked by addition of radicals to the double bond and disproportionation, yielding masses 2M as well. (M = mass of ethyl linoleate or methyl ricinoate, respectively, including several oxygen atoms.) EIS-MS of oligomers after isotopic exchange enabled estimation of OH and OOH groups.

INTRODUCTION

The oxidative crosslinking of alkyd resins has been the subject of many studies. IR and solid state NMR may be used for actual coatings; the chemistry of the reactions involved may better be studied using model compounds. During drying these compounds remain liquid and can be dissolved in various solvents. Usually methyl or ethyl esters of the unsaturated fatty acids linoleic, linolenic, and ricinoic acid are being used.[1-28] However, even more simple model compounds such as 2,5-undecadiene,[29] 3,6-nonadiene,[30] and 4,7-heptadiene[3] have been used.

During drying of alkyds, large amounts of oxygen are being taken up. Thus it stands to reason that crosslinking involves carbon-oxygen bonds.[1-3] Less unambigiousness exists in the literature with respect to the type of crosslink involved (ether, peroxy) or whether any C-C crosslinks are formed as well. Recently, using POMMIE NMR,[38] we have established that crosslinks are mainly of the ether and peroxy type and C-C links are formed in minor amounts.[12,13] In addition to the crosslinks, many of the functional groups formed during oxidation were identified using 3,6-nonadiene[30] as a model compound. Reported oxidation products are: hydroperoxides, endoperoxides, epoxides, alcohols, aldehydes, carboxylic acids, and ketones.

The first step in the oxidation is formation of the hydroperoxide via the resonance-stabilized pentadienyl radical,[31,32] the double bonds becoming conjugated because this product is energetically more stable.



No double bonds disappear in this reaction. However, double bonds react away in later stages of the oxidation,

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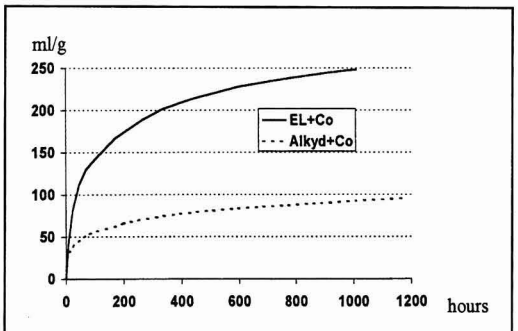


Figure 1—Oxygen uptake of EL and alkyd resin during drying with cobalt catalyst.

mainly as a result of the following reactions:

- Formation of epoxides and endoperoxides:

- ß-scission reactions,[33] cleaving the linoleate molecule into aldehydes:

$EtO_2C-(CH_2)_7-CH=CH-CH_2-CH=CH-(CH_2)_4-CH_3 \rightarrow$
$EtO_2C-(CH_2)_7-CH=O + O=CH-(CH_2)_4-CH_3 + CO_2$, formic acid.

The latter reactions are inherent to alkyd crosslinking. The resulting hexanal and other fragmentation products will inevitably contribute to volatile organic content (VOC). Crosslinking occurs via cobalt-catalyzed degradation of the previously mentioned hydroperoxides into alkoxy and peroxy radicals:

$$ROOH + Co^{2+} \rightarrow RO\bullet + OH^- + Co^{3+}$$
$$ROOH + Co^{3+} \rightarrow ROO\bullet + H^+ + Co^{2+}$$

These radicals may dimerize mutually or with alkyl radicals (R•) formed in H-abstraction reactions:

$$2\ R\bullet \rightarrow RR$$
$$R\bullet + RO\bullet \rightarrow ROR$$
$$2\ RO\bullet \rightarrow ROOR$$
$$2\ ROO\bullet \rightarrow ROOR + O_2$$

Also addition to double bonds may lead to crosslinking.

EXPERIMENTAL

Materials

The alkyd resin used was made from sunflower oil and contained about 50% linoleic acid, pentaerythritol and trimellitic acid. Ethyl linoleate (EL, 98% purity) was purchased from Fluka. NMR analysis revealed mainly hydroperoxide impurities. Methyl ricinoate (MR) was prepared from 70% pure ricinoic acid (containing 30% linoleic acid, cis, trans and cis, cis) by acid-catalyzed esterification with methanol and distilled (b.p. 185°C/1.5 mm Hg). Experiments with 100% conjugated materials (made by isomerization) gave similar results.

Crosslinking of Ethyl Linoleate and Methyl Ricinoate

EL and MR were mixed with cobalt drier (0.06%) or Co/Ca/Zr (Nuodex APB) and allowed to react with air in a Petri dish in a layer of about 0.5 mm thickness under ambient conditions (20°C, 50% RH). After two days the oligomer mixture obtained was analyzed.

Double bonds were determined[34] by reacting with an excess iodine monochloride for one hour using mercuric acetate as a catalyst. The excess iodine monochloride was back-titrated with 0.1 N sodium thiosulphate solution. Hydroperoxides were determined[35] by addition of an excess potassium iodide and back-titration with 0.005 N sodium thiosulphate solution.

Size-Exclusion Chromatography

Size-exclusion chromatography (SEC) was carried out using a 60 cm × 7.5 mm PL-500 column (Polymer Laboratories, Church Stretton, U.K.) and a mobile phase of tetrahydrofuran (stabilized with BHT)/0.1% acetic at 1 mL/min. The injection volume was 50 µL and detection was accomplished by refractive index.

Quantitative ^{13}C NMR

Oxidation reactions were followed with time by recording quantitative composition proton pulse decoupled ^{13}C NMR spectra from fairly concentrated solutions (250 mg/mL) on a Bruker AM400 NMR spectrometer. In such spectra all resonance signals are recorded as singlet lines with a relative intensity directly proportional to their number of carbon atoms present in the molecule. Nuclear Overhauser Effects perturbing this linearity in

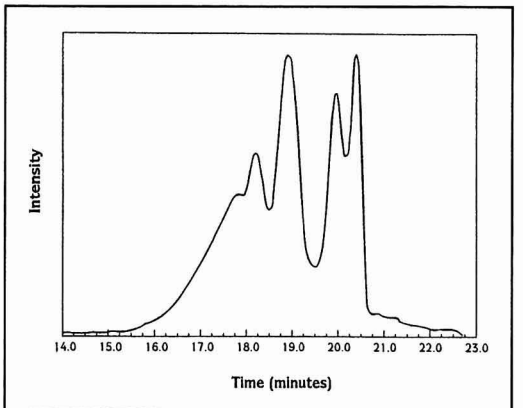


Figure 2—Size exclusion chromatogram of EL+Co after two days of drying. EL=r.t. 20.4; ELOOH=r.t. 20.0; dimer=19.0, trimer=18.2 min. After longer drying times, peak occurs at r.t.=21 min due to formation of degradation products.

commonly recorded ^{13}C NMR spectra are eliminated in the quantitative ones by relaxation times of eight seconds. In addition, excitation pulses approach 90°. Acquisition parameters used are: time domain = 8 KW, SI = 16KW, indicating a zerofilling of 8 KW; acquisition time = 0.3 sec (max. value); spectral width = 25000 Hz (250 ppm); number of scans >7000. The last parameter implies data acquisition periods of at least 16 hours.

Mass Spectrometers

Desorption chemical ionization (DCI) was carried out on a Finnigan (Bremen, Germany) MAT model 900 double focusing mass spectrometer. Pneumatically assisted electrospray (ESI) was done on a Fisons (Altrincham, U.K.) VG organic model platform quadrupole mass spectrometer. Secondary ion mass spectrometry (SIMS) spectra were recorded using a VG instrument, equipped with a Poschenrieder type energy focusing analyzer under static conditions. The primary ions are generated by a (pulsed) liquid Ga ion (–30 keV) source with a maximum repetition rate of 20 kHz.

Methods

DCI-MS: The sample was dissolved in tetrahydrofuran (stabilized with BHT) and 2 mL (8 µg) was applied to the DCI wire, and the solvent was allowed to evaporate at room temperature. The CI reagent gas was ammonia from Ucar (Westerloo, Belgium), adjusted to yield a source pressure of approximately 1×10^{-4} mbar. The DCI wire was programmed from 0 to 1600°C within four minutes, the magnet was scanned from 250 to 2000 Da at 2.4 s/decade and the resolution was 2300.

SIMS: The spectra were obtained from thin films cast from solution onto a silver foil substrate previously cleaned and etched with dilute nitric acid.

ESI-MS: The sample was diluted hundredfold with methanol and 50 microliter was injected into a 10 µl/min flow of methanol, provided by an Applied Biosystems (Foster City, CA) model 140 B solvent delivery system. The electrospray capillary was held at 3.5 kV, the HV lens at 0.28 kV and the cone voltage at 35 V, the source temperature was 60°C. The quadrupole was operated at unit resolution, scanned from 220 to 3000 Da in 10 sec, and data were acquired in the MCA mode

RESULTS AND DISCUSSION

Oxygen Uptake

Figure 1 illustrates the oxygen uptake of ethyl linoleate (EL) containing 0.06% Co (octoate). The amount of 250 mL/g taken up after three weeks is equivalent to 3.2 moles O_2 per mole linoleate. A high-solids alkyd resin containing 50% by weight of linoleic acid absorbs 95 mL of oxygen in the same period (2.2 mole O_2/mole linoleate). The similarity in oxygen uptake behavior suggests that the model compound reactions are reasonably representative for actual coatings.

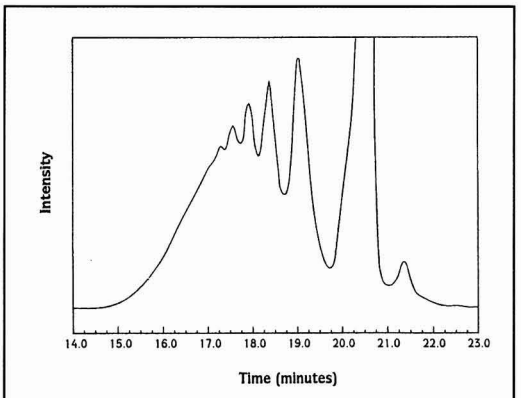


Figure 3—Size exclusion chromatogram of MR+Co after two days of drying. MR+MROOH=r.t. 20.4, dimer=r.t. 19.0, trimer=18.3 min etc.

Size Exclusion Chromatography

Oligomer formation can be demonstrated with size exclusion chromatography (SEC). *Figure* 2 shows the EL oligomers mixture after two days of drying. Besides starting material hydroperoxide, dimers, trimers, and higher oligomers can be seen. SEC after longer drying times[13] indicates the formation of ß-scission products. *Figure* 3 gives the similar SEC chromatogram of methyl ricinoate (MR). It can be seen that higher oligomers are formed than in the case of EL.

Quantitative ^{13}C NMR

In order to obtain quantitative information on crosslink formation of ethyl linoleate and methyl ricinoate, we have studied the various oxidation reactions taking place during drying with quantitative ^{13}C NMR. In *Figure* 4 a spectrum is depicted taken after five days of reaction with Co catalyst.

From right to left: methyl (14 ppm), methyl (22-35 ppm), endoperoxide and/or C–C crosslinks (36-50 ppm), epoxides (55-59 ppm), ester CH_2 (60 ppm), ether crosslinks and OH groups (70-76 ppm), ($CHCl_3$ signal),

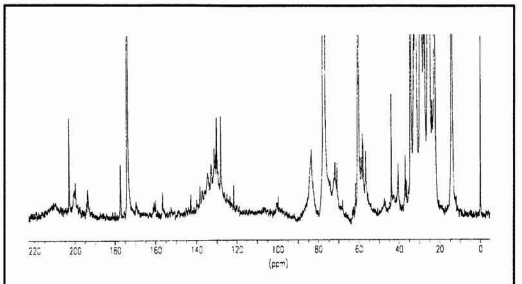


Figure 4—Quantiative ^{13}C spectrum of EL+Co after five days of drying.

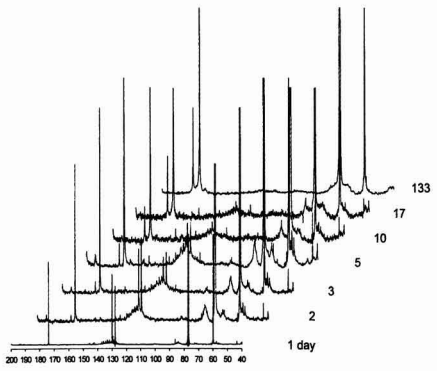


Figure 5a—Quantitative 13C NMR spectra (40-200 ppm) during Co-catalyzed drying of ethyl linoleate showing decrease of linoleate double bonds at 128 and 130 ppm and development of conjugated double bonds at 130-140 ppm. Ether- and peroxy-crosslinks give signals around 70 and 85 ppm, respectively. The increase of the 178 ppm peak is due to carboxylic acid formation resulting from ß-scission of the linoleate chain.

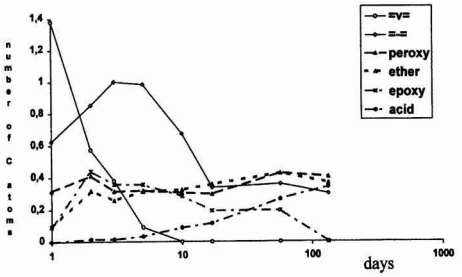


Figure 5b—Plots of functional groups and crosslinks (NMR integrals of spectra in Figure 5a) during oxidation of EL.

peroxy crosslinks (80-90 ppm), conjugated double bonds (120-140 ppm). Note the peaks at 128 and 130 ppm which are related to some remaining nonconjugated double bonds of EL. The small peaks at 155-160 ppm are probably from double bonds conjugated with carbonyl groups (ketones). The carbonyl peak at 174 ppm is from the ethyl ester. The 178 ppm carbonyl peak increases with time and points to carboxylic acid formation from aldehydes (190-210 ppm). The aldehydes in turn are being formed by ß-scission of the linoleic acid chain. *Figure* 5a illustrates changes in the ^{13}C NMR spectra with time. The integrals of the various resonances have been plotted in *Figure* 5b.

The main features of the reaction are:

- decrease of the linoleate double bonds to zero in one week;
- intermediate formation of conjugated double bonds decreasing to low levels after two months;
- formation of peroxy- and ether-crosslinks (80 and 70 ppm, respectively) in roughly equal amounts;
- considerable epoxide formation decreasing to virtually zero in two months; and
- extensive ß-scission on longer reaction times yielding aldehyde and acids.

Figure 6 gives the variation of the NMR integrals for MR. The observed phenomena are very similar. However, as MR has conjugated double bonds their signal decreases only.

The evidence from the NMR spectra for C–C crosslinking is not very convincing. Two small peaks occurring at 40.5 and 44 ppm may be ascribed to the >CH–CH< carbons. However, the methylene group of endoperoxides[30] also gives a signal in this region. (Octanoic acid from the drier has resonances below 40 ppm). Earlier evidence pointed to a few percent C–C links.[13] Ultimate proof for this type of crosslinking comes from mass spectrometry (see in the following).

Using the ester CH_2 group as an internal standard, the number of crosslinked carbons (peroxy and ether each) is about 0.4 mole/mole EL. Titration of non-crosslinked hydroperoxides yielded values with a large scatter, but amounted to about 0.2-0.3 mmole/g = 0.08 mole/mole EL. Thus there are about 0.3 peroxy crosslinked carbons per molecule. If it is assumed that there are about an equal number of hydroxy groups (see in the following, ESI-MS), the number of ether crosslinked carbons per molecule is also about 0.3. Initially EL conversion is incomplete and a crosslink density of 0.6/molecule may be reasonable. In later stages of the reaction, full EL conversion occurs. However, crosslink density does not increase apparently because considerable material is being lost to ß-scission. The increasing signal at 177 ppm indicates about 30% scission of the linoleate chain into nonanoic acid. Thus linoleic acid undergoes ether-, peroxy-crosslinking and ß-scission in about equal proportions.

Double Bond Titration

The decrease of the olefinic carbon signals can be checked by means of double bond titration using iodine monochloride[34] (Wijs method). In *Figure* 7 the total olefinic signal both for the original isolated double bonds of EL as well as the conjugated bonds formed as intermediates has been plotted vs. time. An unreacted EL mixed with the drier has iodine number 160, dividing by a factor of 40 converts the iodine number into the number of olefinic carbon atoms. It is seen that the titration result is very well in agreement with the NMR data. Apparently, after about one to two months, all double bonds react away be means of the side reactions mentioned previously.

Mass Spectrometry of Oligomers

The formation of oligomers as demonstrated with size exclusion chromatography is difficult to detect using conventional mass spectrometry. The commonly used

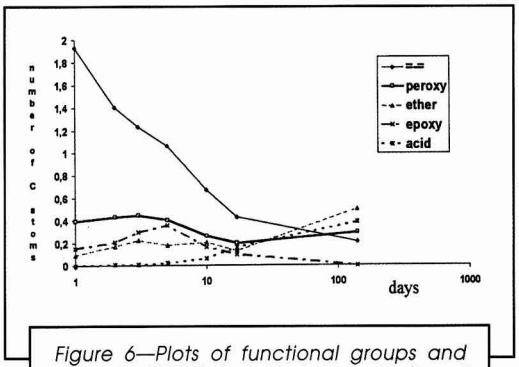


Figure 6—Plots of functional groups and crosslinks (NMR integrals) during oxidation of MR.

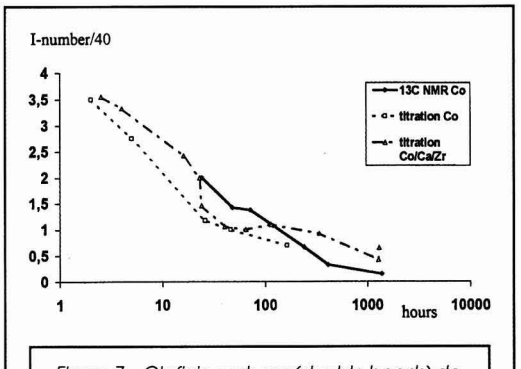


Figure 7—Olefinic carbons (double bonds) determined with NMR and titration compared.

EI-MS (electron impact ionization) appeared to cause complete fragmentation of oligomers owing to their thermally labile peroxide and ether bonds. However, more gentle forms of MS[14] may lead to little or no degradation yielding spectra showing almost exclusively the so-called parent peaks of the oligomers. The first oligomer spectrum was obtained in our laboratory using SIMS of a sample applied in a thin layer onto silver foil.[36] The spectrum shows oligomeric peaks most of which are cationized with silver (*Figure* 8). Groups of peaks are observed for the monomer through the pentameter which is in good agreement with the SEC chromatogram of *Figure* 1. For each oligomer a number of oxygen homologues can be seen as lines 16 m/z units apart.

The spectrum obtained for MR oligomers is very similar (*Figure* 9). However, more oligomers can be seen (up to the heptamer) which is quite in agreement with the size exclusion chromatogram. Also, within one oligomer, less peaks are seem for the various oxygen homologues.

The SIMS spectrum of EL in *Figure* 8 was taken after two days of crosslinking. In *Figure* 10 this spectrum (a) is compared with the same spectrum (c) after 60 days of reaction. It is seen that appreciable detail is lost with time. The dimer signals are reduced considerably and degradation products with masses intermediate between mono and dimers are being formed. The formation of low molecular weight products is also visible as a baseline sloping upward towards lower MWs. This phenomenon becomes even more evident on longer reaction times. It is probably related to ß-scission in the same way as the increasing signal at 177 ppm in the ^{13}C NMR spectra after longer reaction times. Also in the SEC chromatogram, an increase of low MW material with time can be observed.[13]

Reduction of Peroxides and Epoxides with $SnCl_2$

Peroxides may be reduced with stannous chloride[37] to alcohols and epoxides ring-opened to form diols in the presence of water. *Figure* 10b depicts the SIMS spectrum taken of the material of *Figure* 10a after reduction with stannous chloride in THF. It is seen that the higher oxygen homologues are decreased in relation to the spectrum in *Figure* 10a. The phenomenon is very clear for the dimer but can also be seen with the trimer. The peaks decreasing on reduction with stannous chloride are therefore related to peroxides. It may be concluded that the method of ionization using silver foil is apparently gentle enough to leave even the peroxide(-crosslinked) oligomers intact.

The reaction with stannous chloride of the peroxy and epoxy groups may also be followed with NMR. For this purpose the material was dissolved in DMSO-d6 and an excess $SnCl_2$/DCl added. In *Figure* 11 the POMMIE NMR spectra[38] of the same materials are depicted before and after reduction with $SnCl_2$. It can be seen that the peroxide and epoxide signals at 80 and 60 ppm, respectively, have disappeared completely by the $SnCl_2$ reaction. Hydroxy groups formed as products of the reduction cause an increase of the 70 ppm signal. The signals in the 140-160 ppm range are probably due to conjugated ketones.

Electrospray Ionization-MS

Electrospray ionization-MS gives a spectrum very similar to SIMS. However, cationization is with Na^+ present in methanol solution rather than with silver. Another feature of ESI-MS is that resolution is much

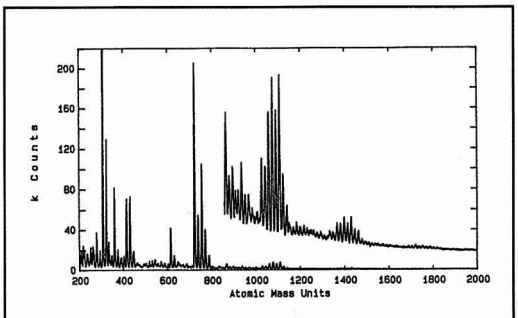


Figure 8—SIMS spectrum of EL+Co after two days of drying.

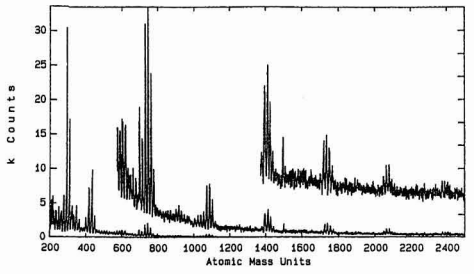


Figure 9—SIMS spectrum of MR+Co after two days of drying.

higher making mechanistic conclusions possible. The dimer region of the EL spectrum, depicted in *Figure* 12, consists of a series of lines 16 m/z units apart, representing the various oxygen homologues. In the spectrum of the MR dimer (*Figure* 13) most lines are doubled with a separation of 2 m/z units. This difference may be interpreted in terms of different crosslinking mechanisms which will be described later.

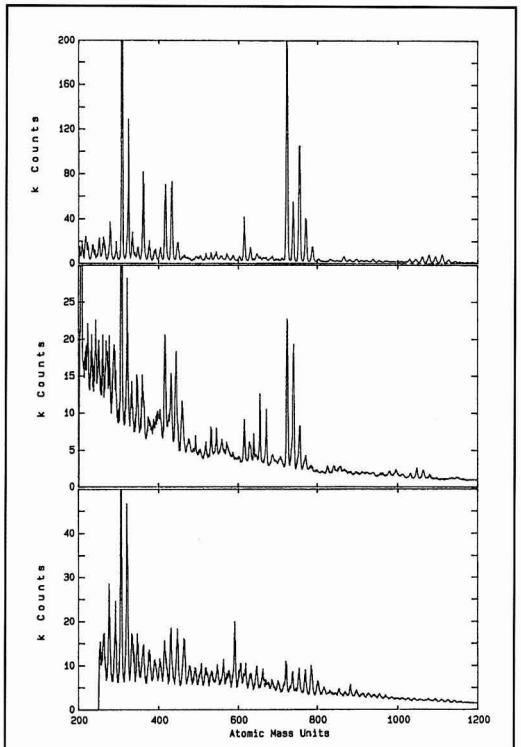


Figure 10—SIMS spectrum of EL reacted with cobalt and air: (a) after two days of drying (detail of Figure 8); (b) after reduction with $SnCl_2$ in THF; and (c) after 60 days of drying.

Exchangeable Hydrogen of Oligomers

The titration of hydroperoxides, described previously, will not determine solely the monomeric linoleate hydroperoxide but comprise oligomeric hydroperoxides as well. In order to get an impression of these groups present in the oligomers, mass spectrometry after isotopic exchange has been applied.

By carrying out ESI-MS of an oligomeric mixture in deuterated methanol it is possible to determine the number of exchangeable hydrogens in an oligomer due to oxidation into OH and OOH groups. The remainder of the oxygen atoms is then used for ether or peroxy crosslinks, epoxide or endoperoxide groups. *Figure* 14 shows the ESI-MS spectrum of the dimers dissolved in deuterated and non-deuterated methanol. It is seen that the peak for the dimer with 1O (m/z-653.5) is accompanied by its ^{13}C satellite at 654.5. The ratio is virtually the same in both solvents, indicating no significant exchange. Thus the O atom is used for the dimer's ether crosslink. In principle, the O atom could also be part of an epoxide group in a C–C linked dimer. However, this seems less likely. The next dimer (2 O atoms, m/z-669.5) has a 670.5 peak that is larger in CH_3OD. Correction for the ^{13}C satellite in the CH_3OH-spectrum gives 26% exchange. Therefore this dimer is peroxy-linked or ether-linked with an epoxy group. Dimers having three to five oxygens appear to contain an increasing number of molecules with two OH or OOH groups. *Table* 3 summarizes the results. If the exchangeable hydrogens are divided by the total number of oxygens incorporated, about 12-13% of the oxygens lead to OH or OOH groups.

The exchange experiment was repeated using DCI-MS and NH_3 and ND_3 as reaction gas. Masses of the peaks are M+18 by complexation with NH_4^+. If ND_3 is used instead, masses obtained are M+22 ($+ND_4^+$). However, if the molecule contains an exchangeable hydrogen atom such as in OH, it will yield mass M+23 ($OD+ND_4^+$). *Figure* 15 depicts the spectra obtained for the dimer.

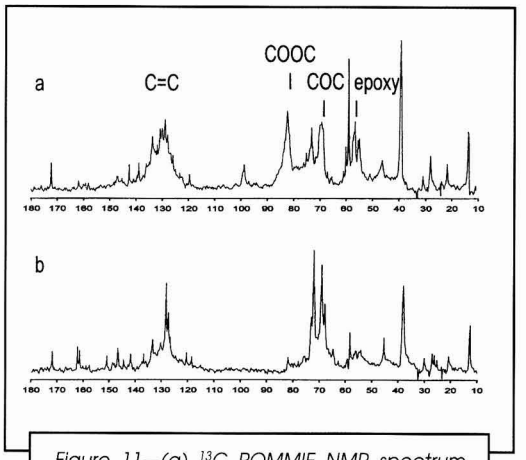


Figure 11—(a) ^{13}C POMMIE NMR spectrum (methine carbons only, ref. 38) of EL reacted for 25 days; and (b) after reduction with $SnCl_2$ in DMSO-d6.

Table 1—Masses of EL Oligomers Observed in ESI-MS Spectra Compared with Calculated Masses for Radical Combination Mechanism: nEL – 2n + 2 + mO + Na.

nEL = Mass of n Ethyl Linoleate Units (n*308); 2n – 2 = Number of H-Atoms Abstracted (=Mass); mO = Mass of m O Atoms (m*16); Na = 23

EL mO	Obs. Dimer	Calc. Dimer	Obs. Trimer	Calc. Trimer	Obs. Tetramer	Calc. Tetramer
0	637	637				
1	653	653				
2	669	669				
3	685	685	992	991		
			993			
4	701	701	1008	1007		
5	717	717	1025	1023		
6	733	733	1040	1039		
			1042			
7	749	749	1057	1055	1363	1361
8			1072	1071	1380	1377
			1073			
9			1089	1087	1398	1393
			1092			
10			1105	1103	1413	1409
11					1429	1425
12					1446	1441
13					1461	1457

The ND_3 spectrum, besides being shifted 4 m/z units to higher masses, shows additional peaks due to isotopic exchange. Except for the dimer containing five O atoms the percentage of O(O)H groups calculated (*Table* 4) is very well in agreement with the results obtained with ESI-MS (*Table* 3). The percentage of dimers estimated to contain two O(O)H groups is somewhat higher, however. One reason may be that the error in this estimation is becoming rather large. Also, DCI-MS may lead to more fragmentation than ESI-MS resulting in more OH groups. The main conclusion from the exchange experiments, however, is straightforward: most oxygen atoms taken up during drying are used to form (ether and peroxy) crosslinks and O(O)H groups amount to no more than 15%.

Another conclusion from the exchange experiments is that the hydroperoxide titration receives a significant (but difficult to quantify) contribution of oligomeric hydroperoxides. This means that monomeric hydroperoxide concentration is also significantly lower than the 0.2-0.3 mmole/g titrated.

Mechanistic Implications

Cobalt-catalyzed oxidation of linoleic acid takes place via a radicals generated from the fatty acid RH in a hydrogen atom abstraction reaction.

$RH + X\bullet \rightarrow R\bullet\ XH$ (X• = initiating species)

As R• is being formed here, this step is an *initiation* reaction.

R• reacts with oxygen in a chain *propagation* reaction:

$R\bullet \rightarrow ROO\bullet$

$ROO\bullet + RH \rightarrow ROOH + R\bullet$

ROOH reacts with cobalt in an important *initiation* reaction (see Introduction section):

$ROOH + Co^{2+/3+} \rightarrow RO\bullet + ROO\bullet + H_2O$

Crosslink formation may now occur by addition to the double bond or by means of combination of radicals:

$2\ R\bullet \rightarrow R\text{–}R$ (C–C— linked dimer)

$R\bullet + RO\bullet \rightarrow ROR$ (ether-linked)

$R\bullet + ROO\bullet \rightarrow ROOR$ (peroxy-linked)

$2\ RO\bullet \rightarrow ROOR$

As radicals are being destroyed here, these steps are termination reactions. The formation of peroxy- and ether-crosslinks is seen in the NMR spectrum (80 and 70 ppm, respectively). Whether C–C crosslinking occurs is not quite clear from the quantitative carbon spectra. Evidence for this type of crosslinking has been derived from small peaks in our POMMIE NMR spectra, further quantified by high temperature gas chromatography,

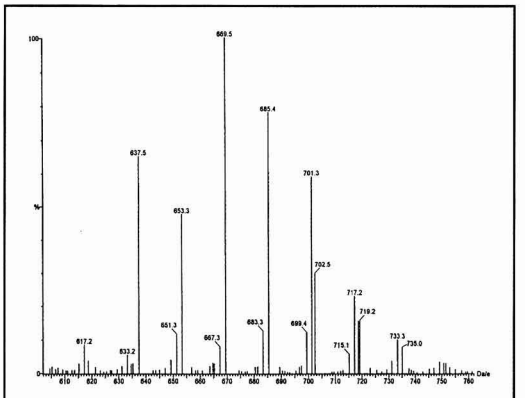


Figure 12—ESI spectrum of EL dimer after two days of drying.

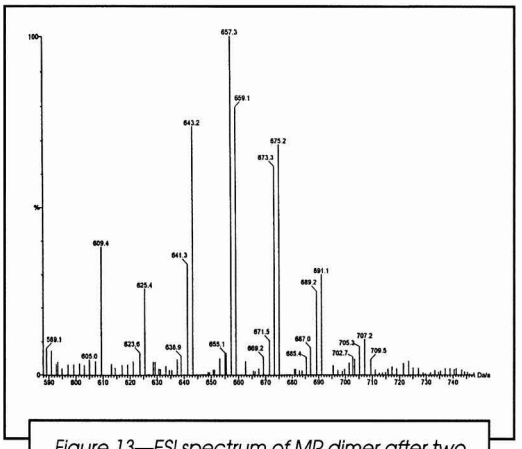
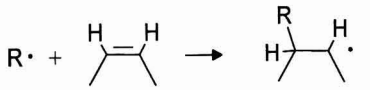


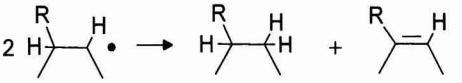
Figure 13—ESI spectrum of MR dimer after two days of drying.

degrading all oligomers except the C–C linked ones.[13] However, final proof of C–C linked oligomer formation is given by the SIMS, ESI-MS, and DCI-MS spectra which all include peaks from dimers, trimers, and higher oligomers not including additional oxygens. As mass spectrometry is not quantitative, we have estimated the share of C-C crosslinking at about 5% on the basis of the methods described previously.

The single lines in the EL dimer spectrum indicate that dimerization occurs by combination of radicals as indicated previously. The doubling of most lines in the dimer spectrum for MR, which has conjugated double bonds, indicates crosslinking by addition to the double bond:



As this radical is not yet an end product, it may become so by disproportionation, which is also a termination reaction. A hydrogen atom is transferred between two radicals, yielding two end products differing two hydrogen atoms:



explaining the double lines m/z apart.

It is seen that the first two lines (representing the C–C linked dimer and a dimer containing 1O) are not doubled. This shows that a carbon radical does not easily add to a double bond. The most likely explanation for this may be that the carbon radical is the resonance-stabilized pentadienyl radical. Because of its stability it is relatively unreactive towards addition. Oxygen-centered radicals, however, may have the structure –CH=CH–CH=CH–O• with spin density localized on the O atom. Their resonance stabilization will therefore be less, resulting in faster addition. Because radical combination is generally diffusion controlled, radical stability has little effect on its reaction rate. Thus the relative stability of the carbon radicals will prevent addition but allow combination to occur.

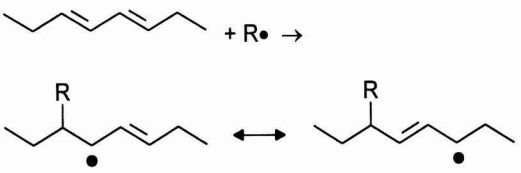
Table 2—Masses of MR Oligomers Observed in ESI-MS Spectra Compared with Highest Calculated Masses for Radical Addition Mechanism (most saturated compound resulting from disporportationation, nMR+mO+Na).

nMR = Mass of n Methyl Ricinoate Units (n*294); mO = Mass of m O Atoms (m*16); Na = 23

MR mO	Dimer Obs.	Calc. Add	Trimer Obs.	Calc. Add	Tetramer Obs	Calc. Add	Pentamer Obs	Calc. Add
0	609	611						
1	625	627						
	626							
2	643	643	935	937				
	645							
3	657	659	951	953				
	659							
4	673	675	967	969				
	677							
5	691	691	984	985				
6	707	707	999	1001	1295	1295		
			1001					
7			1017	1017	1311	1311		
					1312			
8			1033	1033	1327	1327		
					1328			
9			1047	1049	1342	1343	1637	1637
					1344		1638	
10					1359	1359	1653	1653
					1361		1655	
11							1669	1669
							1670	
12								1685
13							1701	1701

On the basis of this evidence, it may be concluded that linoleate-based coatings crosslink via combination of radicals. Although radical combination reactions are generally diffusion controlled, diffusion in a hardening paint will be slow. Moreover, radical combination being a termination reaction is inherently slow. For each crosslink formed two radicals are destroyed which must be generated anew in the initiation step, explaining the relatively slow cure rate of alkyds. Nevertheless, radical combination is apparently the preferred reaction even though addition to the double bonds of the unreacted fatty acid would be far more likely owing to their much higher concentration.

The reason for addition to occur in the case of ricinoic acid may be that this fatty acid contains conjugated double bonds. Addition to a conjugated system yields a resonance-stabilized allylic radical. This makes addition energetically more favorable here leading to enhanced reaction.



In contrast with combination, addition is a propagation reaction which may occur a number of times before disproportionation ends the radical chain. Perhaps for this reason formation of higher oligomers for MR than with EL can be seen in their SEC chromatograms and SIMS spectra.[13] The same phenomenon may underlie the use of ricinoic acid to increase the drying rate of an alkyd.

The distinction between the two crosslinking mechanisms is less obvious if one considers the masses observed for the trimers and tetramers. For combination reactions these masses are described as 3M-4 (trimers) and 4M-6 (tetramers). (M=mass of EL or MR, including several oxygen atoms.) The actual values are seen in *Table* 1.

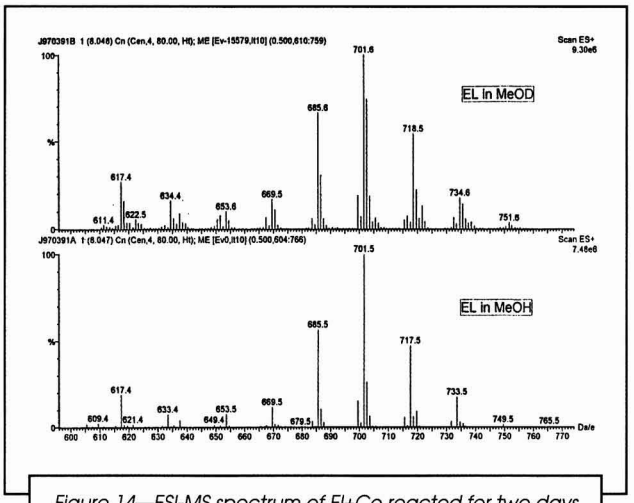


Figure 14—ESI-MS spectrum of El+Co reacted for two days using CH_3OH and CH_3OD as solvents, respectively.

It can be seen that unlike the dimer, the higher oligomers do not quite obey the combination formulas, masses observed are two higher for the trimers and four higher for the tetramers. Apparently these oligomers are formed from the dimer by addition of a monomeric radical, probably because the linoleate double bonds have become conjugated in the dimers.

Table 2 lists the masses observed with ESI-MS on the MR oligomers compared to what may be expected if addition is the crosslinking mechanism. For reasons of clarity, only the mass of the most saturated product resulting from disproportionation has been listed. It is seen that the agreement is generally very good. Thus is may be concluded that addition is generally the mechanism of oligomerization here.

One possible way to linoleate dimer formation by addition would be addition of radicals to the conjugated double bonds of the monomeric hydroperoxide. However, the hydroperoxide concentration as determined by

Table 3—Fraction of Exchangeable H-Atoms in Dimer (OH or OOH Groups) Calculated from Figure 14

ESI-MS	0	10	20	30	40	50	
NE	100	93	74	64	53	5	No exchange
OH		7	26	30	37	62	1H →1D
2 OH				6	10	33	2H →2D

Table 4—Fraction of Exchangeable H-Atoms in Dimer (OH– or OOH–Groups) Calculated from Figure 15

DCI-MS	0	10	20	30	40	50	
NE	100	76	56	50	49	44	No exchange
OH		14	26	30	33	36	1H →1D
2 OH		10	17	20	18	20	2H →2D

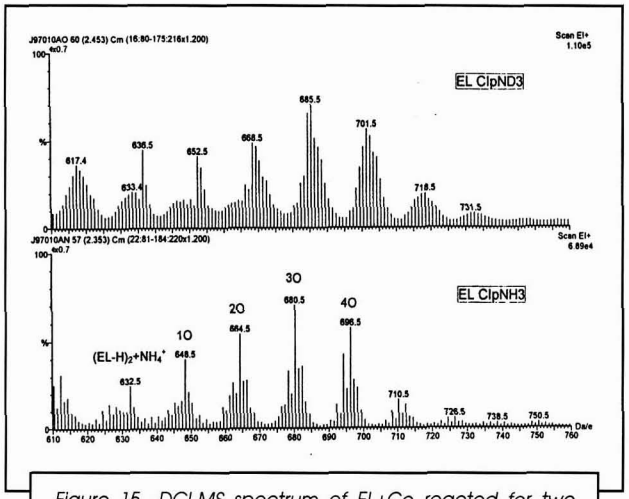


Figure 15—DCI-MS spectrum of EL+Co reacted for two days using NH_3 and ND_3 as reaction gases, respectively.

titration is rather low. Moreover, the exchange experiments indicated the presence of OH and OOH groups in the oligomers. This means that the monomeric hydroperoxide concentration is appreciably lower than that determined by titration. Thus addition is limited to the higher oligomers.

Relevance to Coatings Systems

The crosslinking mechanism, including the cleavage reactions, is likely to apply to real alkyd coatings as well. As the linoleate concentration in alkyds is appreciably lower than in neat ethyl linoleate, crosslinking will imply mainly dimerization via a radical combination reaction. Virtually no higher oligomers will be formed. The fact that crosslinking of alkyds takes place via a termination reaction readily explains the slowness of the drying. For each crosslink two new radicals must be formed by cobalt-catalyzed cleavage of hydroperoxide. Coatings containing ricinoic acid will also crosslink by addition of radicals to the conjugated double bonds. As addition is a propagation reaction, the use of ricinoic acid as drying improver may be understood on the basis of this mechanistic difference.

The degradation (ß-scission) of linoleate observed with NMR during drying is pretty serious: about 20-30% of the linoleate chains are cleaved in a few months. In addition to this a real alkyd coating will degrade by weathering. However, unlike model systems alkyds become solid on drying. This will slow down any reaction appreciably and degradation reactions such as the ß-scission or photochemical weathering may be retarded considerably in the solid state. Therefore it looks as if this factor is decisive for a practical durability of alkyd coatings.

CONCLUSION

The model compound work described here indicates that drying of alkyds takes place mainly by ether- and peroxy-crosslink formation. A hydrogen atom of the methylene group separating the double bonds of linoleate is abstracted. The resulting radical after reaction with oxygen yields a hydroperoxide with conjugated double bonds. Using quantitative ^{13}C NMR it was established that the conjugated double bonds decrease owing to epoxide formation and ß-scission (cleavage) into aldehydes and acids. The double bond concentration could be followed independently with iodine monochloride titration. Epoxide and acids may react to form esters compensating for the loss of crosslink density due to cleavage. However, this could not be seen with NMR. Mass spectrometry (SIMS, ESI-MS) indicates the homologous oxygen derivatives comprising the various oligomers. ESI-MS gives a high-resolution spectrum enabling mechanistic interpretation. Generally it appears that combination of radicals occurs in linoleate crosslinking and addition to double bonds with ricinoate. However, the formation of higher oligomers takes place via addition in both systems presumably because the double bonds have become conjugated in the dimers. Using ESI-MS of a sample dissolved in deuterated methanol, it was established that about 15% of the oxygens is included in the oligomers as OH or OOH groups. The majority of the oxygen is therefore used to form ether- and peroxy-crosslinks as well as epoxides and endoperoxides.

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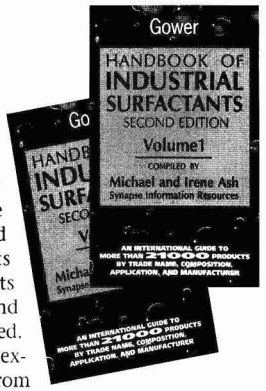

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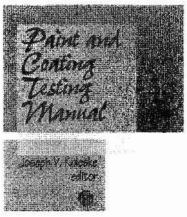

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Step-Growth Polymerization of Unsaturated Aldehydes with Diaminodiphenylmethane

Anton Sebenik—University of Ljubljana*

Step-growth polymerization of diaminodiphenylmethane and unsaturated aldehydes (crotonaldehyde, cinnamaldehyde) proceeded easily in toluene at reflux temperature. Resins with molecular weights up to 1,500 g/mol were formed. In the first step of the reaction, the amino and the aldehyde groups reaction were predominate while the double bonds dominated to a lesser extent. The portion of unreacted monomers was under one percent. The resins consisted of oligomers with –CHNH–, –CH=N–, and –CH=CH– groups, which further reacted to form highly crosslinked resins. Kinetic data, the heat of the addition, the heat of condensation, and the activation energy were calculated.

INTRODUCTION

Aromatic segments which are incorporated in the polymer chain, increase the mechanical and thermal properties of the polymers. These segments can be included through ether, ester, or imid bonds. These types of resins are usually crosslinked and are insoluble in organic solvents. Crosslinking depends on the functionality of the monomers used and on the type of the functional groups that can undergo further reactions. Among such monomers are four functional aromatic diamines and three functional unsaturated aldehydes. The first step of the reaction between them is the addition of amino or imino groups to the aldehyde groups and, to a lesser extent, the reaction of the double bonds. The products formed are low molecular weight oligomers which can undergo further crosslinking with the formation of non-melting and insoluble resins. The rate of the reaction, the structure of the formed resins, and crosslinking of the resins depend on the type of aromatic diamines and on the type of unsaturated aldehydes. The structure also depends on the molar ratio between both monomers, on the catalyst, on the course and temperature of the reaction, and on the solvents used for the reaction.[1-11]

The aim of this work was to carry out a controlled synthesis and characterisation of the resins synthesized from diaminodiphenylmethane and two unsaturated aldehydes. The course of the reaction was followed by determining individual reactive groups using nuclear magnetic resonance spectroscopy (NMR), and by determination of molecular weights by gel permeation chromatography (GPC). The heat evolved in the addition and condensation reaction was measured by differential scanning calorimetry.

EXPERIMENTAL

Materials

Diaminodiphenylmethane (DADPM), (A), was a product of Merck. Crotonaldehyde (C_r) and cinnamaldehyde (C_a) were used as unsaturated aldehydes. As the crosslinking agent, 1,3,5-tri(isocyanate hexamethylene) isocyanurate, which is three-blocked with methyl ethyl ketoxime, was used. The aldehydes were products of Merck. The monomers were purified and dried before use.

Synthesis of the Resins

The best properties of the resins for further crosslinking were achieved under reaction conditions described in *Table* 1. The reactions were carried out in toluene as a 50 wt% solution at reflux temperature. The molar ratio between DADPM and unsaturated aldehydes was from 1:1 to 1:3. For GPC and NMR analysis, the samples were withdrawn from the reaction vessel at time intervals. The concentration of monomers was measured as a function of the reaction time by measuring the intensity of signals of the aldehyde groups at 9.5 ppm and of the amino groups at 3.5 ppm in ^{1}H NMR spectra (*Figure* 1). The reactions were quenched by cooling when the con-

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Table 1—Reaction Conditions of Step-Growth Polymerization of Unsaturated Aldehydes and Diaminodiphenylmethane

Synthesis	Monomers	Molar Ratio	Reac. Time (°C)	Reac. Time (min)	Yield (%)	Hydroxyl Equivalent (mmolOH/g)	Rate Const. (l/mol.s), 90°C
1	DADPM/CR	1:1	106	300	98.0	2.2	0.056
2	DADPM/CR	1:2	103	300	98.5	2.8	0.052
3	DADPM/CR	1:3	103	300	98.7	3.9	0.045
4	DADPM/CA	1:1	105	360	97.8	2.0	0.035
5	DADPM/CA	1:2	100	360	98.4	2.6	0.041
6	DADPM/CA	1:3	100	360	98.8	3.6	0.049

centration of aldehydes dropped under one mol%. The yield, hydroxyl equivalent, the quantity of water, the average molecular weight and the distribution of molecular weight, and the fraction of –CH=CH– and –CH=N– bonds were determined. The hydroxyl equivalents were measured by potentiometric titration with KOH. The water formed in the resins was determined by the Karl Fischer methods. Elemental analyses for some chosen samples were also carried out.

Determination of the Heat of Addition and Condensation

Both reactants were mixed in bulk at selected molar ratios. The heat of the addition and condensation were measured in a Perkin-Elmer DSC 7 in the temperature range of 20 to 275°C using high pressure reaction pans. The heating rate was 5°/min.

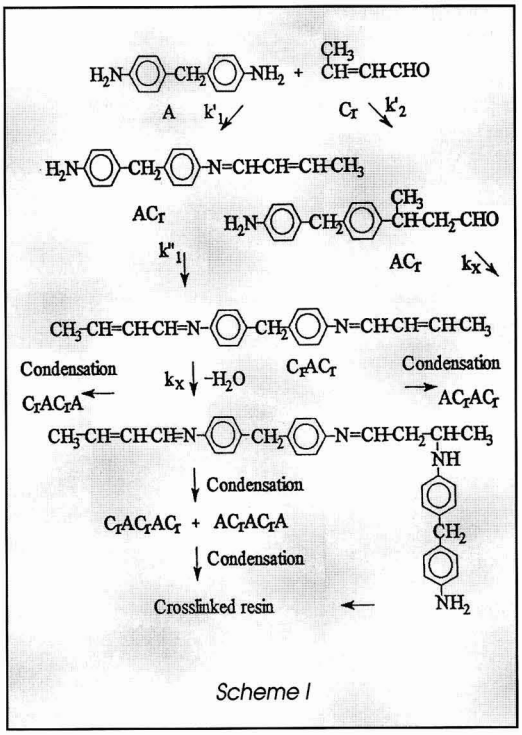
Composition of Resins

The structure of samples was determined using ^1H and ^{13}C NMR spectroscopy in one- and two-dimensional techniques. Chloroform-d_1 was used as the solvent. The structure of the crosslinking products after condensation was determined by cross polarization magic angle spinning, CP MAS NMR spectroscopy. All signals were quoted on tetra methylcilane, TMS as the internal standard. The molecular weights were determined by GPC using PL-gel columns with pore sizes 5 and 10 nm. THF was used as the solvent.

RESULTS AND DISCUSSION

Structure of the Resins

In a previous paper,[10,11] the mechanism of the reaction between aliphatic diamines and unsaturated aldehydes was described. In the first step of the reaction between DADPH and unsaturated aldehydes, the addition of a nucleophile to an α,β-unsaturated aldehyde took place on both electropositive C_1 and C_3 atoms as 1,2-addition or direct addition to the C_1 of the carbonyl bond and 1,4-addition or conjugated addition to C_3 of the double bond.[12] In the present work, ^1H and ^{13}C NMR spectra in a one- and two-dimensional technique, and attached proton test, APT spectra for the determination of structure of the resins from DADPM and unsaturated aldehydes were used. The reaction mechanism is very similar to the reaction of aliphatic diamines and unsaturated aldehydes. The similarities are in the chemical shift positions and in the concentration of individual group signals (*Table* 2). In the first step of the reaction, the aldehyde groups react intensively with the amino groups to form –N=CH– groups. The concentration of the –N=CH– groups increases with increasing molar ratio between DADPM and unsaturated aldehydes. Simultaneously the reaction of the double bond of the unsaturated aldehyde with amino groups takes place to form –NH–CH– groups. In the next step of the reaction, the oligomers formed react to higher molecular weight compounds with different reaction mechanisms. The following overall reaction scheme can be posited:



Scheme I

The formation of water increased with increased molar ratio and with increased temperature of the reaction.

At the selected reaction conditions, the yield of reactions and the content of unreacted DADPM and unsaturated aldehydes were almost independent of the molar ratio (*Tables* 1 and 3). The very reactive $-NH_2$ and the aldehyde groups reacted between themselves, by double

bonds or by imino groups. In all molar ratios, some reactive groups are in surplus. At a lower molar ratio, these are the amino groups, while at a higher molar ratio these are the aldehyde groups. Therefore, both monomers always participate in the formation of higher oligomers, according to one of the paths given in *Scheme* 1.

Molecular Weight of Resins

The distributions of molecular weights for two resins are given in *Table* 3. In sample 1 (molar ratio DADPM : C_r 1:1), the following oligomers with molecular weight C_rAC_r (M_{cal}=290 g/mol, M_{meas}=310 g/mol), AC_rA (M_{cal}=470 g/mol, M_{meas}=500 g/mol), $C_rAC_rA_2$ (M_{cal}=624 g/mol, M_{meas}=629 g/mol), and $2C_rAC_rAC_r$ (M_{cal}=1055 g/mol, M_{meas}=1040 g/mol) are the predominant products. Besides these, higher oligomers are also formed. The elemental analysis of sample 1 gave 80.56% C, 7.25% H and 11.57% N. The measured hydroxyl equivalent was 1.8 mmol OH/g. The portion of formed water that azeotropically distilled was 1.8% while the portion that remained in the reaction product was 0.9%.

At the molar ratio between DADPM and cinnamaldehyde 1:2 (sample 5) oligomer C_aAC_a

Ph-CH=CH-CH=N-Ph-CH_2-Ph-N=CH-CH=CH-Ph

is dominant and represents 32.1% of the total. This is in satisfactory agreement with the calculated (M = 426 g/mol) and measured (M = 428 g/mol) molecular weights. The difference is due to calibration of PL-gel columns with PS standards. The measured molecular weights of other oligomers in the same samples are in good agreement with the calculations. The elemental analysis of sample 5 gave 79.44% C, 7.15% H, and 11.18% N.

Kinetics of Addition

From the dependence of the concentration of monomers on the reaction time at a constant temperature, the exact overall rate constants for the first step of addition were calculated. The reactions were run in NMR tubes at 90°C. At time intervals of 10 min the spectra of reaction mixtures were taken. The intensity of the signal of aldehyde groups, double bonds, and amino groups was followed. The kinetics were calculated as a second order reaction:

$$\frac{d[CHO]}{dt} = -k_1[NH_2]\cdot[CHO]$$

$$\frac{d[CH=CH]}{dt} = -k_2[NH_2]\cdot[CH=CH]$$

$$\frac{d[NH_2]}{dt} = -\{k_1\cdot[CHO] + k_2\cdot[CH=CH]\}\cdot[NH_2] \qquad (4)$$

$$\text{and} \quad [NH_2] = x[CHO] + x[CH=CH] = c \qquad (5)$$

where k_1 and k_2 represent the rate constants of the addition of amino groups to aldehyde and to double bonds for all reactions of oligomers with the mentioned reactive groups ($k_1=k'_1+k''_1+...$). c represents the concentration of amino groups, which is proportional (x = molar ratio) to the concentration of the sum of aldehyde and double bonds. At the beginning of the reaction, the probability of formation of lower molecular weight oligomers, which are represented by k_1 and k_2, is higher than the probability of formation of higher oligomers. From the ratio of the concentration of double bonds and aldehyde groups of any oligomers with the mentioned groups, and from the slope of the concentration d[CHO]/d[CH=CH], the ratio between k_1/k_2 was calculated.

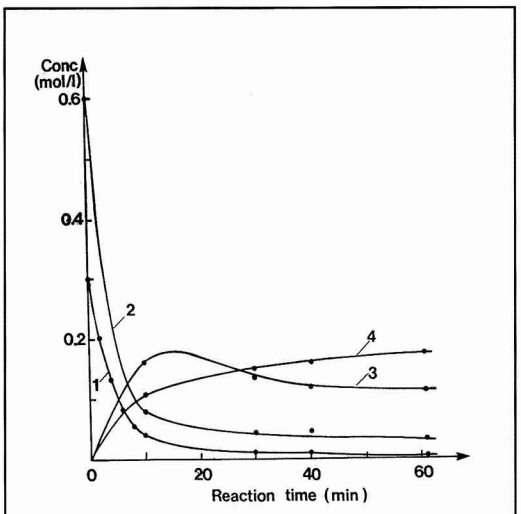


Figure 1—Dependence of concentration of monomers and oligomers on reaction time: (1) DADPM; (2) C_a; (3) oligomer AU; and (4) oligomer UAU.

$$\frac{d[CHO]}{d[CH=CH]} = \frac{k_1}{k_2}\cdot\frac{[CHO]}{[CH=CH]}$$

This ratio was 4.8 and was almost independent of the initial molar ratio. The overall rate constants (k_1+k_2)

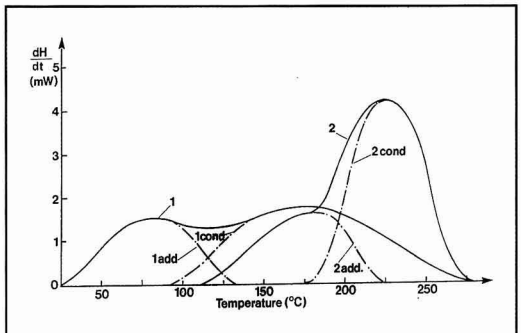
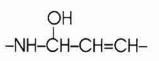
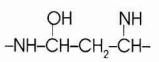
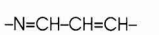
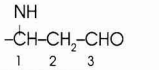


Figure 2—Thermograms of the resins from (1) DADPM/C_r; (2) DADPM/C_a.

Table 2—^1H and ^{13}C Chemical Shifts of Main Groups of Reaction Products DADPM (D) and Unsaturated Aldehydes (U)

Types of Oligomers	Type of Groups		Chemical Shifts (ppm) ^1H Observed	^{13}C Observed	^{13}C Calculated
DU		1	4.7-5.1	64-70	65.3
		2	5.8-6.8	125-133	132.1
		3	6.0-7.2	141-148	146.2
UDU		1	4.7-5.1	64.70	65.2
		2	2.5-4.0	32-41	37.4
		3	2.5-4.0	43-61	52.5
DU, UDU		1	8.1-8.3	160-163	162.3
UDUD		2	5.3-6.8	127-131	129.6
DU, UDU		1	5.5-6.5	41-63	57.6
		2	2.5-3.5	30-40	35.3
		3	9.4-9.6	192-194	192.6

were determined from the plots of $\Delta(1/c\text{-}1/c_o)$ versus time. Both amino and carbonyl groups or the double bond reacted in the first addition step with individual monomers or oligomers.

Due to different reactivities of the amino and imino groups of DADPM, the rate constants decrease with increasing molar ratio between DADPM and unsaturated aldehydes (*Table* 1). In the case of molar ratio DADPM : C_r and DADPM : C_a 1:1.5, unsaturated aldehydes reacted with amino groups only. At a higher molar ratio, the carbonyl groups were in surplus to amino groups and were forced to react also with the formed imino groups. Due to the slower rate of reaction of imino groups with aldehyde groups, the overall rate constants of samples with higher molar ratios are smaller.

The Heat of Reaction

The reactivity of DADPM with unsaturated aldehydes decreases with increasing molecular weights of the used monomers.[1] Since the two unsaturated aldehydes used have relatively high boiling points, it is easier to process them. By DSC the heat of the addition (Q_a) and the heat of condensation (Q_c) were measured (*Figure* 2). The thermograms show two, partly overlapped peaks in the range of 20 to 120°C and 120 to 275°C. However, in the thermograms of DADPM and C_r or C_a it was possible to separate the two peaks to the heat of the addition and the heat of condensation (*Table* 4). The total heat of the reaction was expressed as the sum of the addition and of the condensation heats.

$$Q_t = Q_a + Q_c \qquad (2)$$

The measured heat of the addition and condensation is given in *Table* 4.

The Heat of Addition (Q_a)

The heat of the addition can be expressed in three different ways:

The first way is to calculate the heat of the addition based on the concentration of both monomers. In this case, the heat of the addition gently increases with the increasing ratio between the two monomers (*Table* 4, col. 6). The evolved heat is proportional to the number of substituted amino and imino protons and of carbonyl or double bonds on the other side. Since DADPM has four, and C_r and C_a have three reactive positions, the ratio between reactive groups was 4:4.5 when the molar ratio was 1:1.5, 4:6 when the molar ratio was 1:2, and 4:7.5 when the molar ratio was 1:2.5. In all cases some reactive groups remained unreacted. For example, when the molar ratio was 1:1.5, the imino groups of DADPM and the double bonds of unsaturated aldehydes, as well as when the molar ratio was 1:2.5, the double bonds of unsaturated aldehydes did not react completely. In all cases all aldehyde and amino groups reacted completely to form –N=CH– groups. This conclusion was made on the basis of the dependence of the concentration of amino and aldehyde groups of the formed resins on the reaction time, where no amino or aldehyde groups can be seen, and on the basis of values for the hydroxyl equivalent of formed resins (*Table* 1) which increase with increasing molar ratio. Due to the almost constant ratio between the reactive groups, the heat evolved is nearly constant for all molar ratios.

Table 3—Molecular Weight Distribution of the Products between DADPM and Unsaturated Aldehydes (mol%)

Synthesis	Monomers	Molecular Weight 300-600	600-1000	1000-1500	>2000	M_W
1	0.8	21.4	15.1	27.5	35.9	1740
5	0.3	32.1	30.0	19.2	18.5	1130

Table 4—Heat of Addition and Condensation of DADPM and Unsaturated Aldehydes (KJ/mol)

Monomers	Molar Ratio	Heat of addition calculated on DADPM	CR	CA	Amin+ Aldehyde	Heat of Condens.	Total Heat
DADPM/CR	1:1	53.0	53.0	—	26.5	39.8	66.3
DADPM/CR	1:1.5	70.2	46.8	—	28.1	42.2	70.3
DADPM/CR	1:2	86.7	43.6	—	28.9	44.4	72.3
DADPM/CR	1:2.5	106.4	42.6	—	30.4	45.5	75.9
DADPM/CA	1:1	38.6	—	38.6	19.3	29.0	48.3
DADPM/CA	1:1.5	54.7	—	36.6	21.9	32.8	54.7
DADPM/CA	1:2	72.6	—	36.3	24.2	36.3	60.5
DADPM/CA	1:2.5	87.1	—	34.7	24.9	37.4	62.3

Another way of expressing the heat of the addition is calculation on the basis of concentration of DADPM. This is a useful manner for observing the influence of the part of reacted amino and imino protons on the heat of the addition. The evolved heat increases intensively with increasing molar ratio between DADPM and C_r or C_a (*Table* 4, col. 3) which is proportional with the increase of the quantity of aldehyde groups for individual reaction mixtures. Due to the high reactivity of carbonyl groups, almost all amino and some imino groups reacted with the increased quantity of aldehyde groups and evolved heat. The double bonds reacted slowly and did not contribute very much to Q_a. This can be concluded from the kinetic measurements of the reaction, where the concentrations of amino and imino groups rapidly decrease with increasing molar ratio, while the concentration of the double bonds increases. In the case of a higher molar ratio between DADPM and unsaturated aldehydes and at temperatures over 80°C, the formation of –N=CH– groups and water is very fast, which decreases the concentration of imino groups. The influence of elimination of water on the heat of the addition still remains unclear.

The third way is calculation on the basis of the portion of unsaturated aldehydes. In this case the heat evolved slightly decreases with increasing molar ratio between DADPM and unsaturated aldehydes (*Table* 4, col. 4 and 5). Even at a higher molar ratio, the amino and imino protons are in surplus to the aldehyde groups. For molar ratio 1:2.5, the ratio between amino and aldehyde groups is 2:2.5. The aldehyde groups, which are five times more reactive than the double bonds, react immediately with amino and partly with imino groups, while a number of double bonds remain unreacted. The double bonds react more intensively when the molar ratio is 1:1.5. In this case, the amino groups are in surplus to aldehyde groups and the double bonds are forced to react with the more reactive amino groups.

At 99% conversion the heat of the addition of DADPM to C_r is by 28.4% higher than in the addition of DADPM to C_a (45.2 KJ/mol for C_r and 35.2 KJ/mol for C_a) (*Figure* 2 and *Table* 4). This is due to the resonance stabilization of the C_a aldehyde group with the double bond and with the benzene ring. In the case of C_r, the aldehyde group is resonance stabilized only with the double bond. Another reason is a lower reaction rate of C_a compared to C_r. Products with a lower share of reacted groups have lower molecular weights of resins and lower heat evolved (*Tables* 2 and 4).

The Heat of Condensation

The second peak of the thermograms in the range of 120° to 275°C belongs to the heat of condensation (Q_c). The thermograms of individual resins are given in *Figure* 2 while the total calculated heats for the addition and condensation (Q_t) are given in *Table* 4. The total heat of the addition and of condensation (Q_t) is for DADPM and C_r from 66.3 to 75.9 and for DADPM and C_a from 48.3 to 62.3 KJ/mol. The difference of 13.6 KJ/mol is due to the resonance stabilization of C_a with five conjugated double bonds.

Due to the constant number of reactive groups, the second peak (Q_c) is almost constant regardless of reaction conditions. With the value for the heat of addition and condensation, the analysis of Borchardt and Daniels[13-15] for the determination of activation energy and reaction order of the condensation can be used. By applying the Arrehenius equation and a corresponding equation of the rate constant,[13] the following equation is obtained:

$$-\frac{E_a}{R}\cdot\frac{\frac{1}{T_2}-\frac{1}{T_1}}{\ln\frac{A-a_2}{A-a_1}} = \frac{\ln\frac{d_2}{d_1}}{\ln\frac{A-a_2}{A-a_1}} - n \qquad (6)$$

Table 5—The Dependence of the Adhesion to the Glass and Metal Substratum and Hardness of the Film

Part of Crosslinking Agent (%)	Adhesion of Substratum (%) a	Adhesion of Substratum (%) b	Adhesion to Metal Substratum (%) a	Adhesion to Metal Substratum (%) b	Hardness of the Film (s) a	Hardness of the Film (s) b
0	45	50	55	60	70	65
5	60	65	70	70	80	80
10	90	90	85	90	100	100
15	100	100	100	100	115	115

Crosslinking time was three hours at 130°C. Synthesis 2 (a); synthesis 5 (b). Adhesion determined according to DIN 55151. Hardness determined by Konig pendulum (DIN 53157).

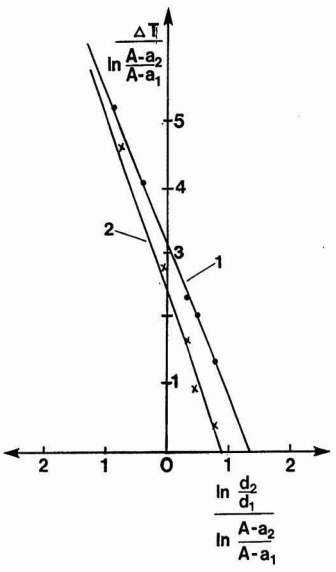


Figure 3—Plots used for calculation of activation energies of addition (1) and condensation (2) and reaction order.

where E_a is the activation energy, A the total heat evolved, T_1 and T_2 any temperatures within the temperature range of reaction, a_1 and a_2 the corresponding areas, and d_1 and d_2 the corresponding curve-baseline distances. By plotting the left-hand side of equation (6) vs. $(1/T_2\text{-}1/T_1)/\ln(A\text{-}a_2/A\text{-}a_1)$, the activation energy is obtained from the slope of the resulting straight line; its intersection with the axis of the abscissa gives the reaction order. The activation energy calculated from the plot in *Figure* 3 for the addition is 34.7 KJ/mol for DADPM/C_r and 31.5 KJ/mol for condensation. For DADPM/C_a it is 30.5 KJ/mol for the addition and 34.3 KJ/mol for the condensation. The lower activation energy for cinnamaldehyde can be explained with the resonance stabilization of aldehyde groups with the double bond and with the benzene ring. The reaction order is 0.9 for the addition and 1.5 for the condensation. Due to the series of parallel and consecutive reactions, the reaction order is not a whole number.

Crosslinking of Resins

The quantity of individual reactive groups depends on the reaction conditions, on molar ratio, and on the type of the monomers used for the synthesis. To obtain insoluble elastic film, we tried various types of crosslinking agents. The best results were obtained with three-blocked isocyanates, which after deblocking, reacted with the free reactive groups. The films were elastic and highly adhesive on metal or glass substratum. The adhesion to the glass and metal substrata determined according to DIN 55151 increased with the increasing part of crosslinking agents (*Table* 5). The hardness of the film determined by Konig pendulum (DIN 53157) reaches the highest value with 15% of crosslinking agent.

CONCLUSION

The reactions between DADPM and unsaturated aldehydes predominate over the reaction of aldehyde and amino groups to form oligomers with molecular weights up to 1500 g/mol. The kinetics of the reactions were calculated. The heat evolved is lower for cinnamaldehyde in which the carbonyl bond is resonance stabilized by benzene ring and by double bond. The heat evolved calculated on the basis of DADPM increases with increasing ratio between DADPM and unsaturated aldehydes. The crosslinked films are insoluble and elastic and exhibit a high adhesion to metal or glass substratum.

ACKNOWLEDGEMENT

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OPEN FORUM

Hazardous Materials Transportation Issues in Our Industry

Lawrence W. Bierlein—Swidler & Berlin, Washington, D.C.

A number of materials transported in the paint, ink, and adhesives industries meet the definition of a "hazardous material" under regulations implemented by the U.S. Department of Transportation (DOT). Although these regulations reach nine generic classes of hazard, the most frequently encountered in our business are the flammable liquid (Class 3) and corrosive materials classifications. If a product is shipped as an aerosol, it will fit with the class for compressed gases (Class 2).

Regulatory obligations related to the transportation of these materials include hazardous materials (HAZMAT) employee training, materials classification, description, packaging, marking, labeling, and shipping documents. Generally speaking, the regulations are based upon United Nations recommendations and are similar if not identical in most industrial nations. The DOT regulations are found in 40 CFR Parts 100-189.

Routine production distribution seems to pose few difficulties in our industry. An area of increasing concern, however, is the occasional shipment of paint-related materials aboard aircraft. More cities are served by passenger air carriers than all-cargo. In addition, specialized package carriers such as UPS and FedEx usually insist upon materials being authorized and prepared for transportation aboard passenger-carrying aircraft. Since the loss of ValuJet Flight 592, increasing regulatory scrutiny is being given to materials offered to or carried aboard passenger planes.

Within our industry, certain situations have arisen more than once and have resulted in major civil penalty actions against the companies and the individuals involved. Yes, the regulations apply to people and not just their employers.

A material having a flash point of 60.5° (141°F) or less, or having the capability of corroding aluminum or steel at a rate of at least 0.25" per year or the potential to cause full thickness destruction of human tissue, is regulated in air transportation. Such a material is regulated regardless of the quantity in the package. Smaller packages may benefit from reduced requirements, but virtually all flammable liquids and corrosive materials are covered.

In the aviation mode of transportation, in addition to routine packaging, additional precautions must be taken because of rapid changes in atmospheric pressure and temperature. Paint-related materials that may be packaged in full compliance with the land transportation regulations may be in violation of the rules for air. Specifically one must review the regulations in 49 CFR 173.27 with respect to closures, cushioning, and absorbent materials.

Many of the observed difficulties have arisen with samples, and more often with the need for just a little bit more paint to finish a job. When such a product is offered to an air carrier as undeclared hazardous material, even with a limited number of units in a box, the FAA considers it to be in violation of the basic regulations on training and identifications, and they also will cite a couple of dozen specific requirements that have not been met. It is common, therefore, for the FAA to count more than 20 violations for a single undeclared shipment. Each violation is punishable by a civil penalty of up to $27,500. Penalty actions beginning at over $100,000 are becoming more common.

It behooves everyone in our business to recognize the applicability of the DOT hazardous materials regulations to a number of paint-related products. Anyone offering or carrying a material in air transportation must be aware of the hazards of this unique mode of commerce. Only cargo facilities should be used, not checked in or carry-on baggage. Every regulated shipment must be declared to the air carrier as a hazardous material, and the package must bear appropriate mark or labels. The shipment must be accompanied by paperwork, certified by the shipper, the material has been classified, described, packed, marked, labeled, and documented and is in proper condition for transportation aboard the aircraft. The penalties are steep, and the risk to passengers and crew are very serious, so everyone involved with shipment of paint samples, R & D materials, and expedited shipments should be conscious of these regulatory obligations.

WinSNAP

ADVANCED SOFTWARE DESIGNS

WinSNAP software is available to the paint, chemical, ink, and specialty chemical industries from Advanced Software Designs. This product features a Formula Management Module that reduces R&D time and streamlines formula management with automatic calculations of all raw material property and costing information. An integrated Regulatory Compliance Module with automatic MSDS generation keeps you up-to-date with hazardous reporting regulations.

Circle No. 53 on Reader Service Card

Evaporation Calculation Software

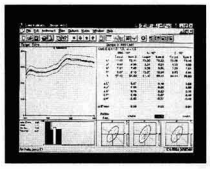
JLM SOLUTIONS

JLM Solutions has developed a software system that allows the user to compute the evaporation profile of a coating—the time to evaporate 10%w, 20%w,...90%w of the volatiles and the composition of the unevaporated volatile portion at each of these weight percents. Evapuni2 enables the user to assess the effect of changes in relative humidity on the evaporation profile of aqueous coatings.

Circle No. 54 on Reader Service Card

Quality Control Software

MINOLTA CORP.



Minolta Corp. has introduced SpectraMagic™, the latest addition to its line of quality control Windows™ software for benchtop and portable spectrophotometers. This software allows users to configure their screens to be as complex or as simple as needed. Extensive statistical reports and charts make it simple to develop trend charts, bar charts, and histograms to analyze the sample population using the mean standard deviation and variance.

Circle No. 55 on Reader Service Card

Filter Selection Software

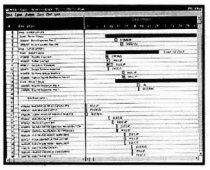
PARKER HANNIFIN CORP., PROCESS FILTRATION DIV.

Parker Hannifin has introduced *inPHorm*™ software for filter selection. The CD-ROM package features a format that walks users through product selections, performs math calculations, compares costs, generates complete drawings, and prints custom selection summaries, detailing inputs, and *inPHorm*-calculated values. It also allows users to access the company's filtration reference library, request drawings and quotes, and add part numbers to orders.

Circle No. 56 on Reader Service Card

Gantt Scheduling Interface

SUMMIT SOFTWARE SYSTEMS, INC.

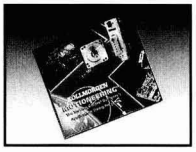


Summit Software Systems, Inc., has introduced the new Gantt style scheduling interface to M-PET, the Maintenance Productivity Enhancement Tool. Work orders and events are shown as colored bars which can be dragged, stretched, and shortened to modify start dates and durations. This interface also delivers tight integration with the rest of the system so work order processing can be accomplished from the Gantt Interface Screen.

Circle No. 57 on Reader Service Card

Motion Control

KOLLMORGEN MOTION TECHNOLOGIES GROUP

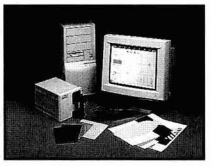


Kollmorgen has released new software that allows the motion control designer to choose an application, define a motion profile, and select the optimum servomotor, amplifier, and power supply. The Motioneering™ database of motor types includes: DC servo, brushless servo, direct drive linear, direct drive rotary, and vector AC. A key feature is the "project" approach where multiple axes of motion and their product solution are combined.

Circle No. 58 on Reader Service Card

Quality Assurance Software

X-RITE, INCORPORATED



X-Rite, Inc., has developed the QA-Lite™ Windows™ 95-based quality assurance software package for displaying, analyzing, and storing spectral color data. The software is designed to help quality assurance professionals ensure that color specifications are being accurately maintained. QA-Lite features "Genies," for performing color comparison and shade sort routines. It comes with instruction manual, tutorial and helpfile, and cabling.

Circle No. 59 on Reader Service Card

Easy Hazchek™

SOFTRAK SYSTEMS INC.

Easy Hazchek Version 3.0 is now available from Softrak Systems Inc. This database has been expanded to include the Section 112 Hazardous Air Pollutants and the Risk Management Program's Threshold Quantities (TQs). Other regulatory data includes OSHA and ACGIH exposure limit data, carcinogen ratings, the current SARA 313 and California Proposition 65 lists, and more. Information can be accessed by the CAS number, first four letters of the substance name, or the string search method.

Circle No. 60 on Reader Service Card

OPEN FORUM

Computers in the Coatings Industry—The Next 10 Years

Charles Rooney and Charles E. Bangert, Jr., Orr & Boss*

How will the coatings industry use computers over the next 10 years? How will that differ from the way it uses them now? Clearly, nobody can answer these questions authoritatively. However, by looking at trends that have persisted over the last 20 years, we can make some reasonable predictions.

The easiest way to illustrate these trends is to compare three identical consulting projects that Orr & Boss undertook in coatings companies in 1980, 1988, and 1997. The projects all aimed at improving on-time delivery and cutting inventory. All three involved product line rationalization, sales forecasting, scheduling, and inventory control. All the clients were achieving similar levels of service and inventory; roughly four turns with more than 95% of output shipped on time.

We do not need to consider computer systems to make our first prediction. It will continue to be difficult to turn improved computer systems into improved business results. The client in 1997 had far more capable forecasting, inventory control and scheduling systems than the client in 1980, but inventory and service levels were no better. The reason was the behavior of the people using the systems, in other words, the business process that the systems supported. Only the companies that redesign their business processes to take advantage of system capabilities will get real benefits from their investment in hardware and software.

Although the objectives of the three assignments were identical, the approach was completely different. In 1980, sales data for key products was only available on old copies of monthly sales reports, on paper. To develop sales forecasting models, we had to write forecasting programs in basic to run on what was then called a microcomputer. The sales data had to be keyed in from the paper reports. The forecasting and scheduling systems developed during the project were implemented on a timesharing mainframe which provided the client's MIS support. The systems never communicated directly with each other or with the inventory records. Each stage of the scheduling process needed manual intervention. In addition, many routine calculations, for example splitting a batch between several sizes and labels, were carried out by hand.

By 1988 the picture had changed considerably. Hardware was cheaper and the client owned its own mainframe. Much more data was stored electronically; sales history, in detail, was available on disk for many years. The PC had been introduced and become popular. File and physical disk formats had standardized, and the mainframe was able to write a file that a PC could read. As a result there was no need to re-key the sales data to develop forecasting models. Software packages had also moved forward. Spreadsheets had become available so sophisticated mathematical manipulation was possible without programming knowledge. We were able to use Lotus 1-2-3 for all the sales forecasting and scheduling calculations. Management confidence in PCs had grown, so the final system resided on the production and inventory control manager's lap top. This system communicated with the mainframe inventory and sales records by passing disks back and forth.

Comparing 1980 and 1988 we can see four trends. First, falling hardware prices allowed companies to keep more data in electronic forms. Second, communication between computers was improving—we could transfer data between radically different systems. Third, computing power was becoming more widely distributed. Sophisticated, capable software packages and cheap, powerful PCs made it reasonable to decentralize systems to the departments that used them. Fourth, it was becoming clear that a PC could do anything a mainframe could do. It was just slower. In addition, PC packages were incomparably more user friendly than mainframe software.

The 1997 project has confirmed these four trends and added a fifth. The volume of available data has grown immensely. For example, sales history at the current client includes daily sales data for every product and shipping point for several years. Data communication has improved, there is a company wide PC network that has on-line access to all the mainframe inventory and sales data. Computing power is even more widely distributed than before. Everyone in the offices has a PC on their desk. The advantage in flexibility and ease of use of PC software has continued. In order to analyze data or prepare management reports, everyone downloads data from the mainframe and manipulates it in Excel or Access. The fifth trend is the increased functionality of business software. It has finally moved beyond simple arithmetic and recordkeeping to doing useful

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calculations. The client in the 1997 project has sales forecasting software (Demand Solutions) that produces excellent forecasts, measures their accuracy and sets safety stock levels. They have a sophisticated scheduling system (proprietary, written in house) with every feature necessary to schedule well.

The 1997 project has not been concerned with computer systems. It has focused on how those systems are used, in other words, the behavior of the people. It has been driven by the search for answers to a number of key questions: What makes the manager of a distribution center order more of slow moving products than the sales forecast requires? Why do plants increase batch sizes beyond the economic batch quantity? How can we change the incentives and organizational pressures that drive people to ignore the computer system and make bad decisions? What business processes must we set up to ensure the company optimizes cost, inventory, and service?

These projects have shown us six continuing trends:

- Hardware is getting cheaper;
- Communication between computers is becoming faster and easier;
- The recognition is spreading that PCs can do any computation that a mainframe or minicomputer can handle, the only difference is that they are slower;
- Computing power is becoming more widely distributed through the business;
- Standard software packages are becoming more useful and easier to use;
- To get benefit from their computers, companies are having to design their business processes and computer systems to work together.

These trends have been in place for more than a decade. They have already had a considerable impact. The most obvious change they will produce in the next 10 years is an extension of proven uses of computers into more widespread applications. There will be unexpected innovations, but the applications we discuss below are almost certain to occur. Nearly all of them are commercially available now and in use in other industries. A few are prototypes at equipment manufacturers or in beta testing.

First, cheaper hardware will mean that computers will appear as controllers on more pieces of equipment. This will affect the plant and the lab. In the lab, computers will appear on simpler pieces of equipment. We already have them on spectrophotometers, GCs, and other complex measuring devices. We can expect them to appear in simpler measurements such as viscosity, solids, weight per gallon, and pH. In some cases they will make it possible to use radically different measurement techniques. In others they will merely automate measurement by the current process. In every case, the computer will remove human error from the measurement, and therefore improve accuracy to some extent. Unfortunately they will not improve sample preparation, e.g., tempering in viscosity measurement. As our studies always show that sample preparation is a major source of overall measurement error, computerized lab equipment does not do as much as first appears for overall accuracy.

In the plant, cheaper hardware and better communications should make recipe driven, computer controlled dispensing of bulk materials much more common. This is old technology. Downloading a formulation from a database to a PC that controls metering or weigh cells is commonplace in food manufacturing and large architectural paint plants. The reason it is not universal has nothing to do with computers. It is driven by the way we formulate. Computer dispensing gives the greatest savings when we formulate to control raw material diversity.

There will be many other applications of computers in process control. Three promising ideas we have seen in paint and pigment plants are:

1. Computer control of mixing and HSD times using manufacturing instructions downloaded from a formulation system;
2. Computer control of media mills, including control of the flow rate and number of passes without operator intervention;
3. Continuous control of viscosity and other physical parameters by monitoring them downstream of an in-line mixer and using the computer to control injection of additives upstream of the mixer.

This kind of change has the potential to cut labor costs dramatically in industrial and specialty coatings manufacture. It will also improve product consistency, quality, and cycle time.

The improvement in communication between computers and the growing realization that PCs can do almost any job a mainframe can do, but at a significantly lower cost, will lead to increased use of LANs. This trend will also be driven by the superior performance and ease of use of PC software.

The recent experience of one of our clients illustrates the cost effectiveness of PC based systems even in fairly large installations. In the early 90s they introduced an integrated enterprise management information system to support two plants, R&D, and head office functions. The system cost over $3 million and took two years to introduce. It never worked well. This year they replaced their expensive customized system with an LAN based package called Adage. They completed implementation, including sourcing hardware, installation, and training, in three months. The total cost was $1 million. Best of all, they are using the standard package virtually without customization and the system runs well. This case shows that PCs can be used to run a network with sites separated from each other by hundreds of miles. That is a breakthrough suggesting that mainframes and minicomputers will be displaced in almost every area of all but the largest businesses.

As the power of LANs increases, we expect standard, PC based

packages to dominate the integrated management information systems market. An integrated management information system is one that handles all the major computing needs of the business. That includes formulation, order entry, market information, sales data, forecasting, inventory control, scheduling, manufacturing, and finance—in fact, the whole puzzle illustrated in *Figure* 1.

The logic behind the use of these integrated suites of programs is that data need only be entered once to be available for all the functions of the business. For example, the creation of the formulation in the lab establishes the bill of materials for purchasing and the manufacturing instructions for the plant. Entering an order builds the database of sales by market segment, end use, and geographical sector for marketing to analyze. That cuts costs and ensures that the whole company is using the same facts.

There are a number of packages in this market. For mainframes the main contender is SAP. Several of the giants of the industry, e.g., BASF, DuPont, and Akzo, are already implementing SAP. As with most mainframe packages, implementation is a multi-year process costing many millions. For companies with smaller budgets and fewer sites there are several PC based packages. They include Batchmaster, Snap, Prochem and Adage. The packages have different strengths and weaknesses.

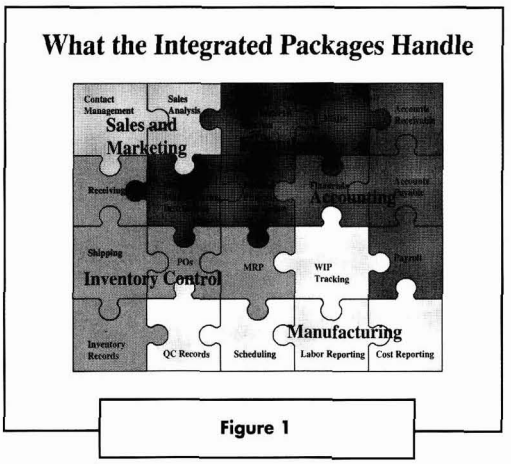

Figure 1

Batchmaster has perhaps the best formulation suite. Snap is strong in inventory control and sales management. None of the programs has a completely satisfactory scheduling function. However, the strengths and weaknesses of the software are almost irrelevant. As *Figure* 2 shows, the typical company barely scratches the surface of the capabilities of the software. It is one of the clearest examples of the need to marry computer system and business process to get the full benefit from the investment.

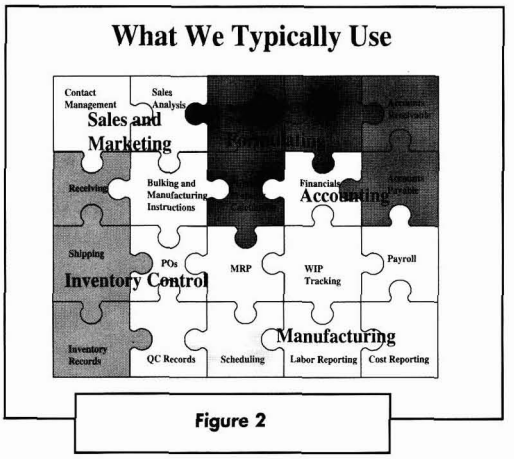

Figure 2

Improved communications and cheap hardware will also drive the expansion of bar coding. The advantage of bar coding is that it cuts data entry costs and improves data accuracy. There are inexpensive, PC based inventory control systems that do the job well. These systems are so effective that even small retail establishments receive, control inventory, and sell product by bar code. No manual records or data entry are ever necessary. Many coatings companies bar code finished goods. Some are beginning to use bar codes to track raw materials from the dock to the mixer. They are discovering tremendous benefits. Bar coding reduces clerical costs in shipping, receiving, and accounting. It gives more accurate inventory, leading to better service, reduced inventory levels, and in one case the elimination of all physical inventory checks (including cycle counts).

As companies of all sorts shrink their inventories still further, a significant proportion of the total will be in transit. Easy communications, bar coding, low cost computers and global positioning systems will make it possible to tell exactly where every order is and how soon the customer can expect it. The technology is already available. Federal Express has proven it. Whether or not we see it implemented in coatings will depend purely on economics.

Another area that computers and data communication will surely impact is order entry and placing purchase orders. Electronic ordering direct from the customer's inventory control system to the supplier's is commonplace in retail. Commercially available PC packages will:

- Scan the entire inventory and compare it with sales;
- Recommend an order quantity for approval;
- Transmit the approved order, over standard phone lines, to a supplier;
- Check the order against the supplier's inventory and order what is available;
- Receive confirmation of the order;
- Repeat the cycle with the remainder of the order at second, third, etc. suppliers.

Using this sort of system at one of our clients, a single part-time clerk handles daily replenishment

of an inventory of 70,000 skus. How many paint companies order their materials as economically as that?

The way that the capabilities of standard software packages are improving suggests that we will soon all be using computers to do any calculation, analysis, or writing we need. That change is almost complete now. Ask yourself how many of your colleagues bulk formulations by hand, prepare business plans without a spreadsheet package, or write letters by hand for someone else to type.

The computer systems described in this article all exist now. Most of them are in commercial use, some are in use in the coatings industry. Between them, they have the ability to cut inventory in half, take one-third out of clerical costs, cut manufacturing and shipping costs, and make the whole business run smoothly and responsively. There is plenty of economic incentive to introduce them.

All of the features and functions are available in PC-based systems. We can be sure that PC computing power will continue to increase and price to drop. As system power increases, larger and larger companies will use LANs. Remember LANs already have the power to serve all the needs of $100 million multi-site companies. As system prices drop, they will become attractive to smaller and smaller businesses. Integrated management systems, inventory management, bar coding, and electronic ordering are already priced at a level that is attractive to $1 million retailers.

The distinguishing feature of the coming decade is likely to be the spread of standard PC/LAN based computer packages into businesses of all types and sizes. This will be an expansion of current technology rather than anything really radical. This change will be driven by economic arguments too strong to resist. Paint companies of all sizes will make money by implementing tested systems that deliver clear business benefits. The limiting factor in this expansion is most likely to be companies' capacity to change their procedures and business processes to take advantage of the computer capabilities that are already available.

OPEN FORUM

The Editors invite submissions of articles for Open Forum. Topics for this category need not be research papers and may be non-technical in nature, dealing with any aspect of the coatings industry. The subject may be approached informally. We encourage submissions of manuscripts, including articles dealing with business and policy issues, that constructively address industry problems and their solutions. Opinions expressed in the Open Forum are those of the authors and do not necessarily reflect the views of the JCT.

Submit manuscripts to: Editor, Journal of Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422. Please specify paper category as Open Forum.

CDIC—OCTOBER

"Adhesion of Coatings"

Manufacturing Committee Chair Dave Sellers, of PPG Industries Inc., reported on the potential study of a benchmark program to plot a company's performance versus the industry in areas such as productivity.

Mr. Sellers announced that the Louisville Society's Spring Seminar will be held on April 15 and will feature manufacturing topics.

Society Representative Bill Hollifield, of D&L Paint Co., requested guidance concerning the proposed restructuring of the FSCT. Mr. Hollifield was instructed to vote as he sees fit.

In general, the membership expressed the opinion that a greater length of time be required for a change in the Bylaws than the time proposed. In addition, a two-thirds majority should be required for approval of proposed Bylaws changes. No more than one representative from any given Society should sit on the Executive Committee, and all representatives should be Society Representatives. The members voiced concern that too much autonomy of spending will rest at the Executive Committee's disposal under the proposed guidelines, and this is discouraged.

Educational Committee Chair Laura Miller, of Perry & Derrick, announced that the January meeting will be "Educational Night." Three speakers have been lined up for the meeting.

Scholarship Committee Chair Andy Nogueira, of Hunting Industrial Coatings, announced that applications are being accepted for the Lew Larson Grant. He stated that the grant can be applied towards the International Coatings Technology Conference courses in 1998.

The evening's technical speaker was Krishnan C. Sehgal, of UCAR Emulsion Systems. He spoke on "Adhesion of Coatings to Different Substrates."

According to Mr. Sehgal, adhesion is the key to fulfilling the purpose of a coating, whether that purpose is protective or decorative. The need to accommodate various substrates in industrial and trade applications presents a challenge in achieving adhesion to the formulator. Mr. Sehgal stated that formation of a bond is greatly dependent upon the thermodynamic and mechanical interaction of surfaces. Rupture of a bond is dependent upon variables surrounding the surface and viscoelastic properties.

The speaker broke down the characterization of substrates by surface energy measured in wettability, material composition, morphology as evaluated by electron microscopy, and degree of chalk as determined by ASTM chalk rating. Five test methods were quoted as determinants of strength of adhesion: direct pull off (ASTM D 5441), peel (Federal specification number), tape (ASTM D 3359), wet scrub, and shower stall.

Mr. Sehgal identified the distinctions between adhesion on non-chalky and chalky substrates, referencing topcoat over alkyd in an architectural scenario. Non-chalky substrates used were alkyd, polyolefinic, and acrylic coatings. Tests done on polyolefins including Teflon and polyethylene in which measurement of a drop of material's surface energy, cosine contact angle in relation to the surface was in contact with, revealed that the greater the angle, the greater the strength of adhesion. The speaker noted that strength of adhesion is then compounded with the introduction of rougher surfaces. An electron micrograph illustrated the smoother surface of polyethylene as compared to Teflon. As a result, Teflon provides greater means by which the mechanical bond can be enhanced. Weathered chalky surfaces were then addressed with the obvious point being that high chalkiness prevents penetration of a material to the substrate with which adhesion is desired. Likelihood of failure is greatly increased. Strength of adhesion becomes progressively worse as the chalk layer thickness increases thus preventing penetration.

In conclusion, Mr. Sehgal stated that proper balance of interfacial surface and mechanical components is required for optimum performance maximized through proper porosity, topcoat wetting, and base polymer cohesive strength.

Brian Marzano, *Secretary*

CLEVELAND—OCTOBER

"Rheological Additives"

Jim Currie, of Jamestown Paint Co., presented Rich Mikol, of Tremco, Inc., with a Past-President's Pin.

Bob Van Doren, of Rheox, Inc., discussed "New Developments in Rheological Additives for Zero VOC, and 100% Solids Systems."

Mr. Van Doren stated that the blending of rheological additives such as is done in aqueous systems is also possible in aliphatic, aromatic, oxygenated, zero VOC, and 100% solids systems. The primary thixotropes utilized are polyester amides and organoclays.

The speaker stated that by using the castor-based organic thixotropes as a benchmark, the blends of polyester amides and organoclays can be formulated together to provide the excellent thixotrophy, flow and leveling, sag control, efficiency, and gloss control obtained with the castor-based organic thixotropes. In addition to obtaining the best features of the castor based thixotropes, the blends of amides and organoclays do not have the sensitivity to heat as do the castor thixotropes.

According to Mr. Van Doren, the polyester amides are low molecular weight oligomers with carboxy and hydroxyl functionality and include four primary types. Type 1 is designed for aliphatic systems; Type 2 for aromatics, esters, and oxygenated systems; Type 3 for zero VOC; and Type 4 for 100% solids. Types 3 and 4 are designed prima-

Officers for 1997-98 of the newly formed Arizona Society include (from left): Society Representative—Jarry Moore, Ribelin Sales, Inc.; Treasurer—Gary Raley, Sunlife Premium Paints; Secretary—Mike O'Neill, KM Coatings Mfg. Inc.; Vice President—Ed Lind, Ribelin Sales, Inc.; and President—Mike Sylvester, Spectrum Paint Co., Inc.

Baltmore Society Officers for 1997-98 include (from left): Vice President—Mary Somerville, Bruning Paint Co.; Treasurer—Charles Ayres, The Valspar Corp.; Secretary—Stephanie Rothenberg, Thornley Co.; Society Representative—Debar Allen, Bruning Paint Co.; and President—Colin Crowley, ChemCentral Corp.

rily for industrial applications and are not suitable for aromatic systems.

When blended with organoclays, the formulator is able to obtain intermediate rheology profiles and can tailor the rheology to the system being made. Manufacturing with the blends provides enhanced throughput due to the lack of temperature restrictions.

These blends tend to work best in poor wetting systems but will also work well in good wetting formulations. They provide good efficiency as the PVC of the system increases in fact, they will not work in non-pigmented systems.

Based on the trial batches, Mr. Van Doren noted that the best order of addition is resin, solvent, organoclay, pigments, then the polyester amides. Using this order of addition listed earlier, a manufacturer is able to obtain a 30-40% reduction in manufacturing time since the finished product can be finished and filled off hot.

The speaker stated that the use of the blends provides rheology stable systems since the amides will not thicken on aging as do the castor-based and organoclays by themselves.

In conclusion, a synergistic effect is derived from the use of organoclays and polyester amides when blended together in a paint system. The blends can provide a system that has a tailored viscosity profile, enhanced performance in sag resistance and gloss properties, efficiency in high PVC systems, reduced costs in manufacturing, and an ease of incorporation into the batch.

PATRICIA WAGLE, *Secretary*

GOLDEN GATE—OCTOBER

"Biocides"

Bob Backlin, of Hüls America Inc., presented the Hüls Gavel to incoming Society President Don Mazzone, of Western Equipment Co.

Mr. Mazzone introduced the officers for 1997-98. They are: Vice-President—Harold Harlan III, of Harlan and Associates; Treasurer—Timothy Specht, of The Flecto Co.; Secretary—Gene Arbatin, of The Sherwin-Williams Co.; and Society Representative—Pat Shaw, of Radiant Color.

Technical Committee Chair Robert Athey, of Athey Technologies, announced that the Committee is seeking volunteers.

Scholarship Committee Chair Ray Benedetti, of Triangle Coatings, Inc., reported that scholarship funds are available; however, the scholarships are for tuition only.

Educational Committee Chair Marnie Hartmann, of Jones-Hamilton Co., announced that a new book titled *Experiments that Kids Would Do*, and a technical handout *Presenting Science through Coatings: A Spectrum of Possibility* have been added to the Redwood City Library collection.

Computer Committee Chair Dennis Owen, of P.T. Hutchins Co. Ltd., announced that companies can sponsor the Society's web page for $50.00 per year.

New York Society member Alan Alda, of Hüls Biocides presented "BIOCIDES FOR THE PAINT AND COATING INDUSTRY."

Mr. Alda stated that biocides prevent microbial spillage and are used primarily as an in-can preservative to prevent bacterial growth. Fungicides and algaecides are used to protect the dry film materials.

According to the speaker, mercury used to be the most effective form of biocide because it killed bacteria and prevented fungus and enzyme growth. It also served as an effective housekeeping deterrent for bacterial growth. However, it was outlawed by the government for its relative toxicity. To replace the function of mercury, a three-component replacement system needs to be initiated; for example, in-can preservative, effective housekeeping; and fungicide. This biocide package should effectively prevent bacterial growth.

Mr. Alda said that oxazolidine, BIT, isothiazoline, and folpet are the most widely used biocides in the coatings industry.

Incorporating these biocides would be difficult since they would cause discoloration, yellowing and other film defects. Therefore, it was ascertained that the use should be prioritized accordingly. In essence, there should be a balance during the formulation and incorporation of these biocides.

According to Mr. Alda, the following fungicides are used widely in the coatings industry: chorothalonil—non-leaching, long-term usage, and powder form; IPBC—long-term usage, liquid form, can cause yellowing; and 2-n-octyl-4-isothiazolin-3-one—good compatibility, fair efficacy, and stability.

In conclusion, Mr. Alda noted that proper plant housekeeping should be implemented to resolve the problem. He recommended washing dirty areas, disinfecting affected areas, drying wet areas, inspecting the plant frequently, and controlling bacterial growth.

GENE ARBATIN, *Secretary*

KANSAS CITY—SEPTEMBER

"Dispersion"

A moment of silence was observed for the passing of Jerry Perrine and Brice Anderson.

Past-President Randall Ehmer, of Walsh & Associates, handed the President's gavel over to Incoming Society President Curry Sanders, of Tnemec Co., Inc.

Technical Committee Chair Kyle Frakes, of Tnemec Co., Inc., reported that work on the Society's web page is progressing.

Randy Ehmer announced that the St. Louis/Kansas City Societies will meet on June 5-6, 1998 at Lake of the Ozarks.

Chicago Society member Michael Boerner, of Hockmeyer, discussed "DISPERSION."

Mr. Boerner stated that dispersion and deagglomeration take place at 5,200 fpm or greater, while mixing and blending occurs at around 3,500 FPM.

According to the speaker, blade depth and diameter are also important considerations when dispersing. He recommended that the blade diameter should be one-third the diameter of the tank.

Mr. Boerner highlighted the advantages of single and dual shafts. The dual shaft can process material at 50,000 CPS up to 1,000,000 CPS. He stressed that it is important to pick the right media and not overgrind the material.

Basket milling, vapor recovery units, and washing tanks were also explained by Mr. Boerner.

TOM HILTON, Secretary

KANSAS CITY—OCTOBER

"Corrosion Resistance"

A moment of silence was observed for the passing of Ted Terherst, of Abner Hood.

Bill Porter of, Hillyard Industries, Inc., has agreed to serve as Society Historian.

Yasmine Sayed Sweet, of Cook Composites and Polymers, distributed a survey seeking information on topics for technical presentations. She also asked for subject ideas for a paper that could be submitted to the JOURNAL OF COATINGS TECHNOLOGY.

It was reported that the Educational Committee has identified two schools at the sixth grade level to present the "How Paint is Made" demonstration.

Chicago Society member Mike Wildman, of Engineered Polymer Solutions (EPS), spoke on "HIGH GLOSS CORROSION RESISTANCE EMULSIONS."

According to Mr. Wildman, ASTM 117 5% NaCl at 35°C is not relevant to real-world conditions. He also stated that cyclic prohesion-ASTM D 5894-96 has slower results than salt fog, but is more relevant.

Mr. Wildman said that the preferred method of testing is test fences around the country, however the results may take two to 20 years. He noted that pigments, vehicle choice, PVC, pH, coalescing solvents, dispersants, and surfactants all play vital roles.

As a starting point, Mr. Wildman recommended adhering to the suggested formulation as published by the resin manufacturer.

TOM HILTON, Secretary

LOS ANGELES—OCTOBER

"Synthetic Silica Flatting Agents"

Scholarship Committee Chair James Hall, of ICI Paints, reminded members that scholarship applications are available.

Constituent Society Meetings and Secretaries

BALTIMORE (Third Thursday—Martin's West, Baltimore, MD). STEPHANIE ROTHENBERG, Thomley Co., 1500 E. Newport Pike, Ste. 204, Wilmington, DE 19804.

BIRMINGHAM (First Thursday—Strathallan Hotel, Birmingham, England). GRAHAME W. FOWKES, Technivelopments Co., 14 Wells Close, Chippenham, Wilts. SN14 0QD, England.

CDIC (Second Monday—Location alternates between Cincinnati, Columbus, Dayton, and Indianapolis). BRIAN P. MARZANO, Sun Chemical Corp., 5020 Spring Grove Ave., Cincinnati, OH 45232.

CHICAGO (First Monday—Sharko's Restaurant, Villa Park, IL). SUSAN A. SIMPSON, Chemcept Services, 2 South 902 Heritage Glen Ct., Batavia, IL 60510-5100.

CLEVELAND (Third Tuesday—Monthly meeting site to TBA). PATRICIA WAGLE, The Flood Co., 1212 Barlow Rd., Hudson, OH 44236.

DALLAS (Second Thursday following first Wednesday—Dallas Medallion Hotel, Dallas, TX). JOSEPH HILBUN, The Sherwin-Williams Co., 2802 W. Miller Rd., Garland, TX 75041.

DETROIT (Second Tuesday—meeting sites vary). NAOMI SUSS, PPG Industries, Inc., 5875 New King Ct., P.O. Box 3510, Troy, MI 48007.

GOLDEN GATE (Monday before third Wednesday—alternates between Francesco's in Oakland, CA, and Bertolucci's in S. San Franscisco, CA). TIMOTHY G. SPECHT, Flecto Co., 1000 45th St., Oakland, CA 94608.

HOUSTON (Second Wednesday—Medallion Hotel, Houston, TX). STEVEN RAGSDALE, Intercoastal Paint, P.O. Box 38114-433, Houston, TX 77238.

KANSAS CITY (Second Thursday—Cascone's Restaurant, Kansas City, MO). THOMAS HILTON, Weskem-Hall, Inc. 1424 Atlantic Ave., N. Kansas City, MO 64116.

LOS ANGELES (Second Wednesday—Maggie's Pug, Santa Fe Springs, CA). DARIN EVERHART, Behr Process Corp., 3400 W. Barry St., Santa Ana, CA 92704.

LOUISVILLE (Third Wednesday—Executive West Motor Hotel, Louisville, KY). CAROL WINSLOW RAPP, Dar-Tech, Inc., 101 Glenmill Rd., New Albany, IN 47150.

MEXICO (Every fifteen days—Gabriel Mancera, Mexico City, Mexico). MANUEL MAESTRO NAVARRO, DuPont, S.A. de C.V., Km. 9.5 Via Dr. Gustavo Baz, Col. Barrientos, 54110 Tlalnepantla, Edo de Mexico, Mexico.

MONTREAL (First Wednesday— Restaurant Le Bifthèque, St. Laurent, Quebec). ROBERT BENOIT, Kronos Canada Inc., 3390 Marie Victorin, Varennes, Que., J3X 1T4 Canada.

NEW ENGLAND (Third Thursday—Best Western TLC, Waltham, MA). GARY SMALL, Zeneca Resins, 730 Main St., Wilmington, MA 01887-3366.

NEW YORK (Second Tuesday—Landmark II, East Rutherford, NJ). E. ROBERT CARDIN, Rohm and Haas Co., 16 Meadowview Dr., Colts Neck, NJ 07722.

NORTHWESTERN (Second Tuesday—Jax Cafe, Minneapolis, MN). ROBIN L. NORCUTT, George C. Brandt, Inc., 2975 Long Lake Rd., St. Paul, MN 55113.

PACIFIC NORTHWEST (PORTLAND SECTION—Tuesday before third Wednesday—Saylors Old Country Kitchen; SEATTLE SECTION—Third Wednesday—All City Diner; VANCOUVER SECTION—Thursday after third Wednesday—Abercorn Inn, Richmond, B.C.). KELVIN HUGET, Imasco Minerals, Inc., 19287 98A Ave., Surrey, B.C. V4N 4C8, Canada.

PHILADELPHIA (Second Thursday—Doubletree Guest Suites, Plymouth Meeting, PA). NEIL R. SHEARER, Andek Corp., P.O. Box 392, Moorestown, NJ 08057.

PIEDMONT (Third Wednesday—Ramada Inn Airport, Greensboro, NC). RANDOLPH G. COX, Akzo Nobel Coatings Inc., 1431 Progress St., P.O. Box 2124, High Point, NC 27261.

PITTSBURGH (Second Monday—Montemurro's Restaurant, Sharpsburg, PA). JOHN GILLEN, J.M. Gillen Co./Van Horn, Metz & Co., 681 Millers Run Rd., P.O. Box 428, Cuddy, PA 15031.

ROCKY MOUNTAIN (Monday following first Wednesday—DelMonico Hall, Denver, CO). GEORGETTE SIPARSKY, TDA Research, 12345 W. 52nd Ave., Wheat Ridge, CO 80033.

ST. LOUIS (Third Tuesday—The Salad Bowl Restaurant, St. Louis, MO). NICHOLAS HALL, U.S. Paint Corp., 831 S. 21st St., St. Louis, MO 63103.

SOUTHERN (GULF COAST SECTION—third Tuesday; CENTRAL FLORIDA SECTION—third Thursday after first Monday; ATLANTA SECTION—third Thursday; MEMPHIS SECTION—bimonthly on second Tuesday; and MIAMI SECTION—Tuesday prior to Central Florida Section). DALE KENKNIGHT, Akzo Nobel Coatings Inc., 6369 Old Peachtree Rd., Norcross, GA 30071-1780.

TORONTO (Second Monday—Speranza Restaurant & Banquet Hall Convention Centre, Brampton, Ont., Canada). FRANS GROOTVELD, Ciba Pigments, 6860 Century Ave., Mississauga, Ont., L5N 5N3, Canada.

Western New York—Marko Markoff, 182 Farmingdale Rd., Cheektowaga, NY 14225.

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CD-ROM	GOW-RMCD1	$495.00	$495.00
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Col. Del Valle, 03100 Mexico, D.F., Mexico

Birmingham Club Officers for 1997-98 include (seated from left): Treasurer—Susan Roy, Runneymede Dispersions Ltd.; Secretary—Grahame Fowkes, Technivelopments Co.; President—Brian Fowler, Resiblend Services Ltd.; Society Representative—Joe Brown, Blagden Chemicals Ltd. Standing: FSCT Secretary-Treasurer—Gerry Gough, ICI Packaging Group (Holden Surface Coatings Ltd.); Membership Committee Chair—Bernard Myatt, H.B. Fuller Coatings Ltd.; David Morris, PPG Industries (UK); Steve Turvey, Crosbie Coatings Ltd.; and Technical Committee Chair—Roland Staples, Nortax.

The evening's technical speaker, Thomas Newman, of Crosfield Co., discussed "STRUCTURE FUNCTION RELATIONSHIPS OF SYNTHETIC SILICA FLATTING AGENTS IN SURFACE COATINGS."

Mr. Newman illustrated the physical properties of synthetic silica flatting agents that reduce gloss in coatings and explained the gloss reduction mechanism.

Mr. Newman reviewed the key features, benefits, and liabilities of four different types of silica: precipitated, fumed, hybrid, and gel process.

The speaker then discussed how to choose the best flatting agent for a formulator's needs. According to Mr. Newman, the following items make a difference in product selection: gloss target, film shrinkage during cure, dry film thickness, viscosity, performance expectations, cost considerations, and significance of efficiency and consistency.

DARIN EVERHART, *Secretary*

LOS ANGELES—NOVEMBER

"Industrial Applications of UV/EB Curing"

A moment of silence was observed in remembrance of Jean McFerren and the mother of Society member Ken Edwards.

Environmental Committee Chair Dave Muggee, of E.T. Horn reported that the OSHA Process Safety Management Standard no longer extends to stored flammables in atmospheric tanks, even when connected to a process within the definition of the standard. Until the standard is revised, OSHA will abide by the decision, except to offer coverage for flammable liquids and documentable hazards that involve serious risk to workers.

The National Toxics Program (NTP) did not report any manufacturing processes as being carcinogenic in its recent report. This includes painters occupational exposure.

NTP has reclassed 1,3-Butadiene as a known human carcinogen. 1,3-Butadiene is used in the manufacture of synthetic rubber and latexes.

Society Secretary Joe Reilly, of JCR Enterprises, won the Society Secretaries Award at the 75th Annual Meeting of the Federation.

Sandra Dickinson, of Tri-iso, Inc., announced that scholarship applications are still being accepted.

Kurt Willard, of UCB Chemicals/Radcure, spoke on "INDUSTRIAL APPLICATIONS OF UV-EB CURING."

Mr. Willard explained UV/EB curing and the chemistries involved. The most common chemistry used is free radical, accounting for over 90% of the UV/EB market. The second chemistry involved is cationic curing.

The speaker noted the strengths and weaknesses of both chemistries. Free radical chemistry can be inhibited by oxygen, polymerizes fast and the process stops once exposure to UV/EB is complete. Cationic curing is not inhibited by oxygen and polymerizes even after exposure is complete. In addition, free radical can shrink in excess of 10%, while cationic curing shrinks at three percent.

Mr. Willard reviewed the types of materials in typical UV/EB formulas. Free radical types use resin or oligomers, mono-functional or multi-functional monomers, photoinitators, and additives. Cationic curing types use cycloaliphatic epoxies, hydroxy functional modifiers, photoinitiators, vinyl ethers, and additives.

Mr. Willard identified the application areas for UV/EB curing: coatings, adhesives, and inks. He also reviewed the application techniques that can be used. These include revere, flexo, roll coating, spin coating, spray, vacuum pump, and dye coatings.

Q. Wouldn't cationic UV-cured films shrink and embrittle as much as free radical types at the same density?

A. No. Because the polymerization process is a ring opening process, there will be significantly less shrinkage.

DARIN EVERHART, *Secretary*

LOUISVILLE—OCTOBER

Manufacturing Night

Technical Committee Chair Ilona Duvall, of Red Spot Paint and Varnish, announced that the Spring Symposium will be held April 15, 1998, at the Executive West Hotel.

New York Society member Jeffrey Hinkle, of Hüls America Inc., delivered

Kansas City Society Officers for 1997-98 include (from left): Society Representative—Lawrence Murphy, Tnemec Co., Inc.; Past-President—Randy Ehmer, Walsh & Associates, Inc.; Treasurer—Theodore F. Golden, Hillyard Industries, Inc.; President—Curry Sanders, Tnemec Co., Inc.; Vice President—Debbie Koss, Davis Paint Co.; and Secretary—Thomas Hilton, Weskem-Hall, Inc.

the evening's technical presentation. He discussed "GOOD HOUSEKEEPING PRACTICES IN WATERBORNE COATING PLANTS."

Dr. Hinkle defined an anti-microbial as anything that controls microorganisms. In-can preservatives and fungicides are types of anti-microbials. Anything with water that is organic needs an in-can preservative. In addition, anything in a waterborne paint can be a food source or a source of contamination. Gas, odor, and viscosity loss are associated with microbial contamination. A reduction in the food source can affect the results.

According to the speaker, the enzymes the bacteria generate is what really causes the problems, and non-mercurial biocides have not really addressed this. Ideal conditions for bacteria growth are generally found in most plants: water, degradable organics, pH between six and eight, and temperature between 25-37° C. Microbial prevention is more difficult with lower VOC coatings where there is more water present and thus more susceptibility. For example, ethylene glycol is better at controlling bacteria than propylene glycol that is more VOC compliant.

The speaker highlighted sources of contamination including air dust, people, raw materials, and equipment. Tap water can be very heavily contaminated versus sterile water; tap water because it is closest to the agar in a petri dish.

Dr. Hinkle recommended the following to prevent spoilage: (1) limit contamination during manufacture; (2) use an anti-microbial additive to control contaminants; (3) use a cover on mixing equipment; (4) eliminate water residue in equipment; and (5) keep manifolds and lines clear, including the filling line.

Dr. Hinkle stated that it is probably better not having a dust filter at all versus a dirty filter, since growth can occur there and contaminate the paint. Disposable transfer containers are also helpful. Also, hang up transfer lines to drain the hoses and place incoming bulk lines at a slant for easy draining. Plant inspections are a good idea to aid in the prevention of spoilage.

The speaker recommended steam under pressure as a good way to disinfect a plant. Bleach is not recommended due to possible contamination, but other chemical disinfectants are good. The ideal preservative is compatible, cost effective, low order of toxicity, easily handled, and stable over long-term storage. Recovery of spoiled material is not generally recommended because the material is not in its original form anymore.

Louisville Society Officers for 1997-98 include (from left): Society Representative—Andrew Traister, Courtaulds Coatings, Inc.; President—Dan Fortney, American Dispersions, Inc.; Membership Committee Chair—Julie Routt, Courtaulds Coatings, Inc.; Vice President—Paul Baukema, Akzo Nobel Coatings Inc.; Secretary—Carol Winslow Rapp, Dar-Tech, Inc.; Treasurer—Chris Lockhart, American Dispersions, Inc.; Manufacturing Committee Chair—John Lanning, Courtaulds Coatings, Inc.; and Former Society Representative—Larry Pitchford, retired.

LOUISVILLE—NOVEMBER

"EPA Clean Air Act Initiatives"

Chris Lockhart, of American Dispersions, Inc., reported that two $1,000 scholarships are available.

Ilona Duvall, of Red Spot Paint and Varnish, was congratulated for presenting the paper "Pearl and Aluminum Pigments in Waterborne Coatings: What Variables Determine Optimum Performance?" in the APJ/Voss Award Competition and Chris Lockhart was also recognized for receiving second place in the Society Secretaries Competition during the FSCT Annual Meeting in Atlanta.

It was announced that applications for the LSCT Outstanding Service Award are still being accepted. Send nominations to Louis Holzknecht.

Ron Stout, of Eastman discussed "UPDATE OF THE EPA CLEAN AIR ACT INITIATIVES IMPACTING SOLVENTS."

Mr. Stout highlighted the following four sections of the Clean Air Act: Title I—Emissions of VOCs; Title III—HAPS; Title V—Air Quality Permits; and Title VI—Stratosphric Ozone Protection.

According to Mr. Stout, the goal of Title I is to reduce ozone in non-attainment areas. This section categorizes the United States into five categories for VOC control: (1) marginal—greater than 0.121 ppm ozone level; (2) moderate—greater than 0.138; (3) serious—greater than 0.160; (4) severe—greater than 0.180; and (5) extreme—greater than 0.280.

In addition, the speaker discussed the recent changes in the atmospheric ozone

Mexico Society Officers for 1997-98 include (seated from left): Aurora Carmona, Reacciones Quimicas S.A. de C.V.; Marina Estevez, El Nervion S.A. de C.V.; Carmina Medina, Cia. Sherwin-Williams S.A. de C.V.; and Jose L. Ramirez, ANAFAPYT. Standing: Society Representative—Marcelo Herrera, Du Pont S.A. de C.V.; Jose Manuel Chavez, Pinturas Texturados, S.A. de C.V.; Humberto Cortez, and Francisco Rodriguez, National University of Mexico.

Pacific Northwest Society Officers for 1997-98 include (from left): Society Representative—Yvon Poitras, Horizon Chemicals Ltd.; Treasurer—Deb Severson, Miller Paint Co.; Secretary Kelvin Huget, Imasco Minerals, Inc.; President—Ken Wenzel, Chemical Distributors, Inc.; Vice President—Beverly Spears, Synergistic Performance Corp.; and Financial Secretary—Curt Bailey, Bailey and Associates, Inc.

Philadelphia Society Officers for 1997-98 include (first row from left): Society Representative—Robert D. Thomas, Consultant; Educational Committee Chair—Richard Granata, Lehigh University; Membership Committee Chair—Daniyel Firestone—S.E. Firestone Associates; and Vice President—J. Brian O'Connor, E.W. Kaufmann Co. Second row: Technical Committee Chair—Thomas G. Brown, Consultants Consortium; Assistant Treasurer—Brian T. Gilbert, E.W. Kaufmann Co.; and Junior Member at Large—William Chelak, Arco Chemical Co. Third row: Honorary Director—Don Fritz, retired; Secretary—Neal R. Shearer, Andek Corp.; and President—Particia M. Peterson, Arco Chemical Co.

St. Louis Society Officers for 1997-98 include (from left): Technical Committee Chair—Brandon Hunt, U.S. Paint Corp.; Educational Committee Chair—LaShawn Johnson, Carboline Co.; Mike Hefferon, Walsh & Associates, Inc.; President—Bob Phelps, P.D. George Co.; Vice President—Lou Voit, Cemsac Chemicals Corp.; Treasurer—Floyd Thomas, III, Thomas & English Inc.; Secretary—Nick Hall, U.S. Paint Corp.; and Society Representative—Terry Gelhot, Carboline Co.

standard. EPA mandates the following four items listed under Title I: revise and update old CTGs, promulgate new CTGs, publish ACTs, and promulgate BACTs. There are three options to comply: capture VOCs, destroy VOCs, and change coating technology.

Title III is a national rule designed to reduce emissions of HAPs. Currently, there are 188 compounds on EPA's list; for example, xylene, esters, MEK, ethylene glycol, and toluene.

Mr. Stout stated that Title V addresses operating permits for major sources including: EPA must approve state programs; fees of at least $25/ton for regulated pollutants; and greater civil and criminal penalties for violation.

Title VI addresses stratospheric ozone protection. It contains a provision that eliminates the production of materials that harm stratospheric ozone.

CAROL WINSLOW-RAPP, *Secretary*

MONTREAL—OCTOBER

"Particle Size Effects on Film Properties"

President Jean-Pierre Cote, of L.V. Lomas Ltd., announced that a course on architectural and trade sales coatings has been planned for the future.

The meeting's speaker was Sarah Eckersley, of Dow Chemical Canada. She discussed "MECHANIC CONSIDERATIONS OF "PARTICLE SIZE EFFECTS ON FILM PROPERTIES OF HARD/SOFT LATEX BLENDS."

According to Dr. Eckersley, blends of hard (T_g = 60°C) and soft (T_g = 0°C) were studied as a function of particle size (R_{soft}/R_{hard}) and blend ratio (mass soft phase/mass hard phase). Addition of hard phase latex to soft film-forming latex significantly improved block resistance, even at blend ratio as low as 70/30.

Dr. Eckersley stated that films were not sacrificed, except at high concentration of hard phase (50/50). For a given blend ratio of 70/30, the block resistance of a blend with R_{soft}/R_{hard}=4.0 was equivalent to that of a control latex having the same overall composition, but with a minimum film temperature 20°C higher than the blend.

The phenomenon can be explained in terms of the bulk and surface contributions to adhesion. The presence of the hard phase increased the elastic modulus (G') of the bulk film. Increasing (Rsoft/Rhard) resulted in a corresponding increase in G', an effect that is consistent with percolation theory. The effect of particle size ratio on the surface contribution to adhesion can be explained by particle packing visual mod-

els. They indicate that a high surface concentration of hard particles would be expected for a large value of R_{soft}/R_{hard}. This effect was confirmed by scanning electron microscopy.

HORACE PHILIPP, *Society Representative*

NORTHWESTERN—NOVEMBER

"Understanding Water-Based Dispersions"

It was announced that Jeff Gundry, of Horton Earl Co., will Chair the Manufacturing Committee.

Mike Coad, of McWhorter Corp., and Tim Swales, of Imation Corp., will Co-Chair the Spring Symposium. The topic has not been determined.

Society Representative Larry Brandenburger, of The Valspar Corp., reported on the FSCT Board of Directors Meeting held during the FSCT Annual Meeting in Atlanta.

Piedmont Society member Jan Weernink, of Zeneca Pigments and Additives, was the meeting's technical speaker. He presented "UNDERSTANDING WATER-BASED DISPERSIONS."

According to Mr. Weernink, the paint industry operates in a very competitive market, where raw materials and production costs account for a high proportion of the total cost of the finished product. Any method of reducing raw materials cost, or increasing productivity, will produce immediate economic benefit.

An effective way of achieving these two aims is to be more efficient in the dispersion and stabilization of pigments. This can be achieved by utilizing specific hyperdispersants which have been designed to give optimum performance even on pigments of different surface chemistries.

However, in an aqueous environment, many parameters affect the dispersion: the hydrophobic character of most pigments, neutralization of water-soluble resins, etc. The presentation addressed the previously mentioned subjects for a better understanding of water-based dispersions.

ROBIN NORCUTT, *Secretary*

PHILADELPHIA—NOVEMBER

"Assessing Technology"

Technical Committee Chair Tom Brown, of Consultants Consortium, reported on the progress on the project to study adhesion to plastics. He said that some new data recently published will be incorporated into the program.

The "Perception of Rheology" study group now has thousands of pieces of data and needs to analyze this thoroughly. An interest in the possible investigation of oil absorption measurement techniques and relationship to particle size and distribution was expressed. Mr. Brown reminded everyone that all members are invited to attend.

John Little, of Arthur D. Little, Inc., discussed "ASSESSING TECHNOLOGY TO ACHIEVE COMMERCIAL SUCCESS IN THE COATINGS INDUSTRY."

Mr. Little stated that regulations stimulate technological developments requiring investment in long-term research efforts. The speaker cited a coatings manufacturer who expects far greater sales of solvent-based coatings, but these expectations were not achieved due to VOC regulations. Only companies capable of foreseeing future technology achievements can expect commercial success. A need to shorten the product development process exists. Competing technologies require analysis of potential practicalities.

Four major questions need to be considered: (1) Is it technically feasible? (2) Can the technology be implemented? (3) Is there a market for the products? (4) Is there a competitive edge?

Mr. Little said that it is important to use "out of the box" thinking to optimize quality assessments to maximize output. Viewing the technology as a functionality can open up new commercial opportunities. One should increase your fact to opinion ratio and treat your outcome as a hypothesis. It is also important to look for disconnects in the analysis and to do a best case, worse case most likely analysis. Finally, a good assessment provides a course of action for technology implementation.

NEIL R. SHEARER, *Secretary*

PIEDMONT—OCTOBER

"Energy Cure for Wood Applications"

Ron Obie, of Wood Coatings Research Group, announced that a course titled "Applied Polymer Science" will be held during the spring 1998 semester at UNC-Greensboro.

President Alex Blahnik, of The Valspar Corp., reported that the Educational Committee has requested $400 from the FSCT for the education fund.

The speaker for the evening was Piedmont Society member Roy Modjewski. He presented "ENERGY CURE FOR WOOD APPLICATIONS."

Mr. Modjewski focused on the advantages of UV coatings on wood substrates and the application and markets for these finishes.

RANDY COX, *Secretary*

ROCKY MOUNTAIN—OCTOBER

"Synthetic Silica Flatting Agents"

John Baker volunteered to serve on the FSCT Manufacturing Committee.

The Los Angeles Society has requested that a member of the Rocky Mountain Society serve on the committee that oversees the education at Cal Poly. Christine LesCamela, of Kwals-Howell Inc., volunteered to serve on this committee.

Thomas Newman, of Crosfield Co., discussed "STRUCTURE FUNCTION RELATIONSHIPS OF SYNTHETIC SILICA FLATTING AGENTS IN SURFACE COATINGS."

GEORGETTE SIPARSKY, *Secretary*

Future Society Meetings

Baltimore

(Feb.)—Joint Meeting with Baltimore Coatings Association.
(Mar. 19)—"Opaque Organic Pigments—Good Alternatives for Heavy Metal Pigments for the Coatings Industry"—Romesh Kumar, Clariant Corp.
(Apr. 16)—"Organic Silicone Paint Additives"—Kimberly Kucinski, Dow Corning Corp.
(May 21)—Manufacturing—Speaker to be Announced.

Birmingham

(Feb. 6)—"Additives for Aqueous and Radiation Curing Systems"—Susanne Struck, Tego.
(Mar. 6)—"Pigments—Heavy Metal Alternatives"—Jeff Nixon, Shepherd
(Apr. 3)—"Powder Coating Resins"—Garry Kubera, McWhorter
(Apr. 19)—Ladies Night Dinner and Dance.
(May 1)—68th Annual General Meeting.

Chicago

(Feb. 2)—"Non-Toxic Anticorrosive Pigments"—Sara Robinson, NYCO Minerals, Inc.
(Mar. 2)—"Ultra High Gloss Latex and Crosslinking Technology"—Gerald Vandezande, Union Carbide Corp.
(Apr. 6)—"A Comparison of Waterborne Epoxy and Solvent Epoxy Systems"—Jim Aloye, Henkel Crop.; and "Formulating Waterborne Epoxies"—Ernie Galgoci, Shell Chemical Co.
(May 8)—Annual Awards Banquet.

Cleveland

(Feb. 17)—"New Waterborne Phenoxy Resins"—Mark Hnang, Phenoxy Specialties.
(Mar. 17)—"The Role of Surface Modifiers in High-Solids Coatings"—W.R. Pistillo, The Lubrizol Corp.
(Apr. 21)—"Water Reducible Resins and Their Application in Industrial Systems"—Rikki Gogna, Schenectady Chemicals Canada.
(May 19)—"Colorful Art Painting"—Kenneth Be, Cleveland Museum of Art.

Golden Gate

(Mar. 16)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 13)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 18)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Kansas City

(Feb. 12)—Web Page & Program.
(Mar. 12)—SSPC/NACE Night. "Current Topics in Cyclic Corrosion"—Glen Bebie, Q-Panel Lab Products.
(Apr. 9)—"Interaction of Associative Thickeners with Surfactants in Latex Paints"—Harold Haag, Aqualon.
(May 14)—Education Night.
(June 5-6)—Joint Meeting with St. Louis Society. Holiday Inn, Lake of the Ozarks, MO.

Los Angeles

(Mar. 11)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 8)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 13)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Montreal

(Feb. 4)—"Trade Sales Paint: Feedback from Architects and Professional Painters."
(Mar. 4)—"Principle of Corrosion and Prevention"—Speaker from Wayne Pigment Corp.
(May 6)—"Post-Consumer Paint: Status on Proposed Legislation"—CPCA.

Phoenix

(Mar. 10)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 7)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 12)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Pacific Northwest

Portland Section

(Mar. 17)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 14)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 19)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Seattle Section

(Mar. 18)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 15)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 20)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Vancouver Section

(Mar. 19)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 16)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 21)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Rocky Mountain

(Mar. 9)—"In-Can Preservation of Coatings Systems"—Scott Brown, Zeneca.
(Apr. 6)—"Comparative Mills—How They Work, Who Should Use Them"—Mark Drunkenbrod, CB Mills.
(May 11)—"Performance Enhancements Through Control of Special Inter-Pigment Phenomena"—Edward Orr, BYK-Chemie.

Cleveland & Pittsburgh Societies Present

April 22—"Manufacturing Symposium"

For more information, contact James Currie, Jamestown Paint Co., 108 Main St., P.O. Box 157, Jamestown, PA 16134; 412-932-3101.

April 23-24—"Waterborne Coatings: Sink or Swim II." 41st Annual Technical Symposium

For more information, contact Vicki Fisher, Jamestown Paint Co., 108 Main St., P.O. Box 157, Jamestown, PA 16134; 412-932-3101.

BIRMINGHAM

Active

Flower, Kevin Charles—Holden Surface Coatings, Birmingham.
Horton, James Edward—Skylon Coatings, West Midlands.

CDIC

Active

Bhattacharya, Shubho—Honda of America, Marysville, OH.
Cao, Feng—Formulabs, Piqua, OH.
Dibble, Steven N.—Honda of America, Marysville.
Forbes, Probyn W.—Hüls America Inc., Lockland, OH.
Hoff, Douglas N.—Lilly Industries Inc., Indianapolis, IN.
Holt, Michael–Akzo Nobel Coatings, Columbus, OH.
Lockhart, Chris A.–American Dispersions Inc., Louisville, KY.
McComas, Gerald W.—Lilly Industries Inc., Indianapolis.

Associate

Dynes, Thomas B.—Ashland Chemical Co., Mason, OH.
Holly, Bruce E.—Hüls America Inc., Des Plaines, IL.

CLEVELAND

Active

Cervas, Eileen—Kalcor Coatings Co., Willoughby, OH.

Associate

Lambe, James M.—Cytec Industries, Inc., Bay Village, OH.
South, Timothy A.—Specialty Minerals, Eastlake, OH.

DALLAS

Active

Lynch, Roy J.—Pressroom Solutions, Fort Worth, TX.
Nowlan, Daniel—Pressroom Solutions, Fort Worth.
Woolery, Tim—Gemini Coatings, El Reno, OK.

Educator/Student

Chiang, Rex—Dallas, TX.

DETROIT

Active

Agarwal, Rajat K.—Henkel Surface Technology, Madison Heights, MI.
Felix, David O.—Red Spot Westland, Westland, MI.
Hanke, Steven P.—Betco Corp., Toledo, OH.
Kjellin, Tanya M.—Sherwin-Williams Co., Troy, MI.
Wargo, Joseph G.—The Cold Heading Co., Chesterfield, MI.

KANSAS CITY

Active

Franke, Sebastian—Hesse-Campbell Coatings, Kansas City, MO.
Lyne, Jeffrey S.—Nulyne Sales Inc., Wildwood, MO.

LOS ANGELES

Active

Benz, Richard W.—ICI Paints, Commerce, CA.
Garcia, Rod C.—Courtaulds Aerospace, Burbank, CA.
Jaojoco, Romeo S.—Vista Paint Corp., Fullerton, CA.
Jones, Timothy G.—Environmental Processes, Bullhead City, AZ.
Osborne, Robert G.—Surface Protection Industries Inc., Los Angeles, CA.
Pascual, Lourdes G.—Behr Process Corp., Santa Ana, CA.
Scarlata, Dana L.—Lilly Industries, Inc., Montebello, CA.
Song, Jin—Courtaulds Aerospace, Burbank.
Steinberg, Gery L.—International Coatings Co., Inc., Cerritos, CA.
Wood, William Matt—Dunn-Edwards Corp., Los Angeles, CA.

Associate

Balogh, Erica T.—Oxychem, Huntington Beach, CA.

LOUISVILLE

Active

Henricks, Heather J.—Engelhard Corp., Louisville, KY.
Witzel, William M.—Engelhard Corp., Louisville.

MEXICO

Active

Aramiz, Jose L.—Pinturas Valmex S.A., Zapopan, Jalisco.
Colin, Martha—Colin Y Lozano SRL, Mexico City.
Colin, Pedro—Colin Y Lozano S de RL, Mexico City.
Cruz, Angelica Ayala—TYP de Mexico, Leon, Guanajuato.
Egli, George A.—Probst SA de CV, Naucalpan.
Escobar, Francisco—Recubrimientos Tordia, Leon.
Flores, Guillermo—Solder de Mexico S.A. de C.V., Leon.
Flores, Jaime R.—Quimica Sumex, S.A. C.V., Mexico.
Flores, Marcelino—Productos Quimicos Y Pinturas, S.A. de C.V., Agricola Oriental.
Galvez, Rogelio R.—Schenectady Mexico, Mexico.
Igartua, Guillermo—Productos Igar S.A., Guadalajara.
Lozano Usblaga, Gabriel Antonio—Solder de Mexico, S.A. de C.V., Guanajuato.
Manzano, Patricia—Productos Quimicos Y Pinturas, S.A. de C.V., Argicola Oriental.
Marmolejo, Lourdes—PPG Industries, Tlalnepantla.
Medina, Migual Molina—Procutos Quimicos Y Pinturas, S.A. de C.V., Agricola Oriental.
Piotti, Corrado—Quimica Amtex S.A. de C.V., Lomas de Chapultepec.
Portillo, Arturo—PPG Industries, Tlalnepantla.
Rios, Jose Luis—Quimica Hoechst, Mexico City.
Vargas, Remedios—PPG Industries, Tlalnepantla.

Associate

Castellanos, Jose Manuel—Moca Y Compania, S.A. de C.V., Cuauhtemoc.
Castillo, Miguel A.—Tego Chemie Service, Mexico City.
Cota, Carlos—Quimica Hercules, Mexico.
Espinosa, Octavio—Zeneca Resins Mexico, Toluca.
Maroues, Javier Montiel—Moca Y Compania, S.A. de C.V., Cuauhtemoc.
Mayo, Javier C. Aranada—Productos Quimicos Y Pinturas, S.A. de C.V., Agricola Oriental.
Quiroz, Jesus—Pinturas Atlas Marlux—Mexico.
Rabago, Miguel A.—Pinturas Atlas Marlux, Mexico.

MONTREAL

Active

Cote, Serge—Progress Plastiques, Drummondville, Que.
Dumont, Nathalie—Produits Chemcraft Inc., Princeville, Que.
Gagnon, Marc—Colorspec Inc., Laval, Que.
Gupta, Ved—Chemor Inc., Montreal, Que.
Hebert, Ghyslain—Produits Chemcraft Inc., Princeville.
Hebert, Michel—GNR Technologies Inc., Lasalle, Que.
Lupien, Claude—Antoni Coatings Inc., Cornwall, Ont.
Parsons, Bill—Schmidt Printing Inks Ltd., St. Laurent, Que.
Rasjtelli, Alexandre—Laque International Inc., Anjou, Que.
St. Cyr, Daniel—Sico Inc., Longueuil, Que.
Turpin, Ed—Technical Coatings, Montreal, Que.

Associate

Benc, Marijan F.—Chemcentral, Brossard, Que.
Breau, Carl—Mecker Technologies Inc., Amqui, Que.
Chaks, Gary—Stochem Inc., Lachine, Que.
Condurache, Christina—Handy Chemicals Ltd., Laprairie, Que.

Doan, Peter H.—Iron & Titanium Inc., Montreal, Que.
Dulude, Sylvain—Produits Chimiques Techni-Seal Inc., Boucherville, Que.
Gabay, Auguste—Gabay Chemicals Inc., Dollard Des Ormeaux, Que.
Reid, Benoit—CNRC-NRC, Boucherville.

NEW ENGLAND

Active

Christuk, Christopher C.—Foilmark Inc., Newburyport, MA.
Ning, Hongjun—Camger Chemical Systems, Norfolk, MA.
O'Connor, Jerry—Albany International, Mansfield, MA.

Associate

LaPorte, Michael J.—Ashland Chemical, Farmington, CT.
Parks, W. Stephen—Corrpro Companies, Inc., E. Longmeadow, MA.

NEW YORK

Active

Amato, Steven W.—Cardre, Inc., S. Plainfield, NJ.
Carver, T. Granville—Polymer Dynamics, Allentown, PA.
Dudziec, Steve M.—Troy Corp., Cedar Knolls, NJ.
Jafary, Ishrat H.—Insl-X Products, Stony Point, NY.
McAloon, John G.—Consumers Union USA, Yonkers, NY.
Nguyen, Trach D.—Insl-X Products Corp., Stony Point.
Oliver, Kelly A.—Rhône-Poulenc Inc., Cranbury, NJ.

Associate

Becker, Scott T.—Daniel Products Co., Inc., Jersey City, NJ.
Connor, Margot S.—Columbian Chemicals, Jamesburg, NJ.
Ray, Jeremy P.—Pioneer Plastics, Auburn, ME.

NORTHWESTERN

Active

Bibelhausen, Peter J.—Werneke Ink, Plymouth, MN.
Donahue, Michael A.—Van Technologies Inc., Duluth, MN.
Fullington, Mark D.—Vance Brothers Inc., Ramsey, MN.
Holly, Bruce—Hüls America Inc., Des Plaines, IL.
Mismash, Brian—The Valspar Corp., Minneapolis, MN.
Shah, Sunil C.—ChemRex Inc., Shakopee, MN.
Zak, Leah M.—The Valspar Corp., Minneapolis.

Associate

Barta, Eric—Seegott Inc., Elgin, IL.
Costa, Michael B.—Chemcentral, Lakeville, MN.
Drayson, Philip—Whittaker, Clark & Daniels, Arlington Heights, IL.
Shulman, Peter—Air Products and Chemicals, Naperville, IL.

Educator/Student

Anderson, Chris O.—North Dakota State University, Fargo, ND.

PIEDMONT

Active

Lipsey, Richard D.—Valspar Corp., High Point, NC.

PHILADELPHIA

Active

Dougherty, William R.—Air Products and Chemicals, Inc., Allentown, PA.
Leathem, Theordore M.—Occidental Chemical, Cherry Hill, NJ.
Zadrozny, Arthur J.–Arco Chemical Co., Newtown Square, PA.
Zerfass III, Kenneth R.—Air Products and Chemicals, Inc., Allentown.

ST. LOUIS

Active

Samsami, Sholeh—Futura Coatings Inc., Hazelwood, MO.
Schulte, David J.—Dennis Chemical Co., St. Louis, MO.

Associate

Brauer, Stephen—Mozel Inc., St. Louis, MO.

Retired

Cardenas, Victor M.—Vanex Inc., Mt. Vernon, IL.

TORONTO

Active

Andrushko, Wendy S.—Dupont Canada Inc., Mississauga, Ont.
Brown, Sheila V.—ARCO Chemical, Scarborough, Ont.
Carlisle, Shelley M.—Hercules Canada Inc., Mississauga.
Kehoe, Bill—Tremco Ltd., Toronto, Ont.
Rusheleau, John H.A.—BASF Canada Inc., Rexdale, Ont.
Sprung, Anne E.—Centre of Forensic Sciences, Toronto.
Szitas, Andrew Kevid—Technical Coatings, Burlington, Ont.
Thorpe, Neil A.—Inortech Chimie Inc., Scarborough.

Associate

Persaud, Herman—Brampton, Ont.
Read, Philip L.—Applied Industrial Floor, Rexdale, Ont.

WESTERN NEW YORK

Associate

Friebr, Chelsea G.—Chemcentral, Tonawanda, NY.

K.A. Millard

The Drew Industrial Division of Ashland Chemical Co., Boonton, NJ, has named **Keith A. Millard** as Market Manager for the Chemical Additives business unit. In his new position, Mr. Millard will be responsible for marketing and product development support for the company's Drewplus® foam control agents, Amerstat® micro-biocides, Drewax® specialty waxes, Drewthix™ rheology modifiers, and Drewsperse® dispersants. He is a member of the New York Society.

Don Gibson has joined the staff of Amteco, Pacific, MO, as Technical Director. Mr. Gibson will oversee corporate research and product development for industrial OEM, maintenance, and architectural coatings. He is a member of the St. Louis Society.

Meng-Jiu Chen has joined Cardolite Corp., Newark, NJ, as a Polymer Chemist. Mr. Chen will assist the company's new product development group. He is a member of the Detroit Society.

Northwestern Society member **Robert A. Lidwin** has joined The M.F. Cachat Co., Cleveland, OH. Mr. Lidwin will provide specialty chemical technical sales and service to customers in Wisconsin, Minnesota, North Dakota, South Dakota, northern Illinois, and northern Iowa.

Farbe & Lack, Hannover, Germany, has awarded the *Farbe & Lack* Prize to **Michaela Gedan-Smolka**, a Scientific Assistant at the Institute for Polymer Science, Dresden, Germany. Dr. Gedan-Smolka was recognized for her original ideas on new types of crosslinking mechanisms for controlling film formation that she presented in her paper "Combined Curing of Powder Coatings."

Mitch J. Kassouf, Director of Engineering—General Industry, for the BetzDearborn Metals Process Group, Trevose, PA, has assumed additional responsibilities for oversight of MPG's Quality and Environmental/Regulatory Affairs functions. Mr. Kassouf directs the marketing of the company's Guardian™ phosphating programs in North America and certain European locations.

American Dispersions, Inc., Louisville, KY, has appointed **Chris Lockhart** to the position of Sales Manager. A member of the Louisville Society, Mr. Lockhart will be responsible for the company's raw material distribution business in southern Indiana, southern Ohio, and selected accounts in Kentucky.

Van Horn, Metz & Co., Inc., Conshohocken, PA, has appointed **John Nomelli** as Technical Sales Representative for the New England and New York area. Mr. Nomelli, a member of the Philadelphia Society, was previously employed by Wacker Silicones.

Elf Atochem North America, Inc., Philadelphia, PA, has announced the promotion of **Whitney B. Randall** to the position of Marketing Manager/Chemical Process Industry, Corrosion Engineering. In this capacity, Mr. Randall will be responsible for the marketing of corrosion-resistant coatings and linings to the chemical process industry.

Rod Hicks has joined the staff of Akzo Nobel Resins as Area Sales Manager. Based in Atlanta, GA, Mr. Hicks will be responsible for sales and distribution in Akzo Nobel Resins' southeast area.

R. Hicks

Keith Stricker has accepted the position of Sales Manager for Interfibe Corp., Portage, MI. Vice President of the Detroit Society, Mr. Stricker most recently served in sales and marketing positions for A.T. Callas Co.

Robert A. Post has been named Director of the additives business unit of Clariant Corp., Charlotte, NC. In his new role, Mr. Post will be responsible for sales, marketing, and business operations of the additives business.

C. Avallone

Christopher Avallone has accepted the position of Marketing Manager for Organosilanes for Degussa Corp., Ridgefield Park, NJ. Based at the company's Rubber Chemicals and Pigments Division, Mr. Avallone will be responsible for product management of Degussa's line of organosilanes.

Obituaries

Abel Banov, Editor of *Coatings World Report* and former Associate Publisher of *American Paint & Coatings Journal* (APCJ), died of complications following heart surgery on November 16, 1997. He was 82 years old.

After receiving a B.S. Degree from the College of Charleston, Mr. Banov taught high school English in Charleston, SC. From there, he spent several years in Puerto Rico, founding and editing the first English language portion of *El Mundo*. During World War II, Mr. Banov served as an intelligence officer in the Army Air Corps. In addition, he was a correspondent for the Associated Press during the Spanish Civil War.

The author of three books on paints and coatings, Mr. Banov was employed by APCJ for 33 years. He began a new venture in 1995 when he cofounded *Coatings World Report* for Rodman Publishing.

He is survived by his wife, Joan; daughter, Beverly Brown; and a granddaughter, Robin.

William von Fischer, former Head of the Department of Chemistry and Chemical Engineering at Case Institute of Technology, passed away on November 16, 1997. He was 87 years old.

Following his position at Case Institute of Technology, Mr. von Fischer became Vice President for Research and Development of what became the Glidden-Durkee Division of SCM Corp. and Technical Vice President of Day-Glo Color Corp. He retired as an administrator of the Metals Task Force at the University of Illinois in 1974.

A member of the Cleveland Society, Mr. von Fischer edited two books and wrote numerous articles on organic protective coatings and the technology of paint and varnish.

He is survived by two daughters; a son; 10 grandchildren; and a great grandchild.

The National Paint and Coatings Association (NPCA), Washington, D.C., has announced the names of the newly elected officers for a two-year term expiring in 1999. **Larry Larison**, of Columbia Paint & Coatings, Spokane, WA, and American Chemet Corp., Deerfield, IL, was named Chairman.

In addition, **E. Kears Pollock**, of PPG Industries, Inc., Pittsburgh, PA, was elected to the position of Vice Chairman and Treasurer.

Atlas Electric Devices Co., Chicago, IL, has appointed **Elizabeth Cichocki** to the position of Technical Sales Representative for the South Central region of the United States. Ms. Cichocki, who will be based in Chicago, brings 11 years of experience to her new position.

CVC Specialty Chemicals, Inc., Maple Shade, NJ, has appointed **Keith A. Johnson** to serve as Manager of Strategic Projects. Mr. Johnson will direct the company's acquisition, licensing and joint venture activities.

H. Rufenacht

Hans Rufenacht, Technical Manager of Rufenacht and Baumann SA, Tauffelen, Germany, was elected President of the Federation d'Associations de Techniciens des Industries des Peintures, Vernis Emaux et Encres d'Imprimerie de l'Europe (FATIPEC) for 1997-98. He will preside over the 24th FATIPEC Congress in Interlaken, Switzerland on June 8-11, 1998.

Richard Skudera has accepted the title and responsibilities of President/Sales and Marketing of Italtinto America, Inc., Hudson, NH. Mr. Skudera will handle the sales and marketing of the company's new TD-9000 automatic colorant dispenser to the North American paint and coatings industry. He brings more than 20 years of experience to this position.

Abel Banov (1915-1997)...

When I heard that Abel had died, I tried thinking back to the first time we met. I couldn't ... it seemed that he had always been there. Just as it seemed that he would always be there.

Of course no one lasts forever. Not even Abel.

If not indestructible, he was ubiquitous! There wasn't an industry meeting, convention, or symposium that was not grist for Abel's mill. From Vancouver to Tampa Bay; from L.A. to Boston, and beyond these shores to FATIPEC Congresses in Europe, Abel seemed to be everywhere.

We missed him at the Annual Meeting in Atlanta this past year. At 82, he was finally taking care of a medical problem that he thought would only momentarily slow him down.

Prior to joining the staff of the *American Paint & Coatings Journal* back in 1961, Abel worked, he said, for the legitimate press (read "newspaper"). He learned his craft well and his 36 years in the paint industry trade press, first with the *APJ*, and, finally, with *Coatings World*, was a blessing to us all.

He was, first and foremost, a reporter. He covered the industry, knew its personalities, its heroes, and its skeletons. It seems there wasn't a rumor that Abel didn't hear and that he didn't try to follow to its source.

Secondly, Abel not only reported on the meetings, by his presence he made them more enjoyable. With his diminutive stature, rosy cheeks, white hair and blue eyes, he was the mischievous leprechaun (albeit a Jewish one) that brought humor and good-natured fun to any event he attended.

Abel's support for the FSCT and its Societies was well-known. He never missed an opportunity to promote an organization in which he was a long time member; one in which he believed was greatly needed by the industry.

If a person is remembered for how they participated in the action and passion of their times, then dear Abel will be thought of often and well. —RFZ

Books/ Publications

Coil and Extrusion

A brochure available from PPG Industries, Inc., introduces the company's Kaleidoscope™ Workcell, a process for making coil and extrusion coatings in small batches from five to 1,000 gallons. The brochure describes how the Workcell's computer control and precision dispensing capabilities enable it to offer small batch coil and extrusion coatings. Benefits described include minimized variability of coatings from batch to batch; reduced lead time; reduced customer inventory and storage costs; and elimination of waste.

Circle No. 30 on Reader Service Card

Protective Tape Products

The 3M Industrial Tape and Specialties Division has published a brochure detailing automotive protective tape for a wide range of applications. This publication is divided into three color-coded sections: In-Plant Protection, In-Plant and Transit Protection, and Exterior Transit Protection. Readers will find information on tapes for horizontal exterior surfaces, fascias, vertical exteriors, side view mirrors and die-cut parts.

Circle No. 31 on Reader Service Card

Silicon Selector Guide

A new selector guide available from Dow Corning enables the user to select a silicon-based water repellent for any given formulation. The four-page color brochure uses easy-to-read charts to explain product properties and shows which products work best in formulations for specific substrates.

Circle No. 32 on Reader Service Card

Training Manual

The Powder Coating Institutes' Introductory Training Manual for Powder Coating Line Workers has been published. This manual covers powder coating materials and equipment, pretreatment, curing, application, operations, and safety issues. Each section contains an instructor's script, 35mm color slides to accompany the script, and handout materials and tests.

Circle No. 32 on Reader Service Card

Grinding Media Lab Report

A new report describes a controlled comparison between "Generation II" QBZ-64 and electrofused zirconium silicate grinding beads. The report, available from Quackenbush Co., Inc., can be used to aid in the decision on which type of zirconium silicate bead to use for dispersing pigments in coatings. Included in the report are electron microscope photographs that show how the surface of the beads are affected during the milling process.

Circle No. 34 on Reader Service Card

Materials Testing Newsletter

Sun Spots, the technical newsletter for the field of materials testing, celebrates its 25th Anniversary with the release of Issue 56. Published by Atlas Electric Devices Co., this newsletter has chronicled the technological milestones that have shaped the present-day materials durability industry. In addition, *Sun Spots* emphasizes a broad perspective on issues pertinent to natural and accelerated weathering, materials durability, and physical testing.

Circle No. 35 on Reader Service Card

Industrial Air Filtration

A new guidebook explains and helps purchasers evaluate types of collection and filtration technologies available to improve in-plant air quality. Published by Aercology, this guidebook discusses collection and filtration methods and assists the reader in assessing the supplier's service capabilities by providing a checklist of essential supplier capabilities and application-specific considerations.

Circle No. 36 on Reader Service Card

Plastics Careers

A new brochure that helps plastics companies promote careers in plastics has been developed by The Society of the Plastics Industry Inc. This publication is geared toward middle and high school students, their parents, teachers, guidance counselors, and school administrators. The brochure includes descriptions of job categories and information on resources where students can get listings of college and educational programs.

Circle No. 37 on Reader Service Card

Raw Materials

Phenyl Resin

A phenyl resin, recommended for high-performing, heat resistant powder coating applications has been introduced by Wacker Silicones Corp. Silres® 601, is a solvent-free, hydroxy functional solid phenyl polysiloxane. This product features a heat resistance up to 1,000°F, as a result of the resistance of the siliconphenyl bond to oxidation, and is compatible with organic polymers.

Circle No. 38 on Reader Service Card

Carbon Black

Degussa Corp. has manufactured Printex XE2 carbon black, that reportedly can be used at low loading levels to meet a wide range of conductive requirements, from the anti-static to conductive. Low loading levels facilitate processing and reduce the impact on mechanical properties of coatings. Applications include coatings for electrical parts, aerospace parts, conductive primers, and specialized coatings requiring anti-static characteristics.

Circle No. 39 on Reader Service Card

Flatting Agent

Syloid® C807, a new silica flatting agent for coil, extrusion, and general metal coatings, is available from Grace Davison. Designed for low gloss in thin films, this flatting agent reportedly offers effective and consistent gloss control, acid-catalyst compatibility, coating smoothness, weatherability, resistance to overgrind and application shear, and improved dispersability.

Circle No. 40 on Reader Service Card

Corrosion Protection

Cortec Corp. has developed M-370, a new liquid-concentrate corrosion preventive for all metals. It is soluble in virtually any water-based fluid and resists corrosion from environmental sources and from the water in water-based products. This product may be applied in several ways: (1) mixed with water; (2) added to water-based cutting fluids, lubricants, cleaners, and temporary coatings; or (3) added to water-based paints and coatings as a flash rust inhibitor.

Circle No. 41 on Reader Service Card

Epoxy Curing Agent

A new, fast cure epoxy curing agent for industrial flooring, coatings, concrete adhesives, and repair mortars is being offered by Air Products and Chemicals, Inc. Ancamine® 2481 curing agent is a modified aliphatic amine which imparts rapid cure and development of physical properties at ambient and low temperatures; excellent blush and waterspot resistance; and good set time-pot life balance to a variety of epoxy formulations.

Circle No. 42 on Reader Service Card

Powder Coating Resin

Ruco Polymer Co. has introduced Rucote 557, a carboxy terminated polyester. This product is designed to be formulated with equal amounts of epoxy resins (EEW 690-750) for fast- or lower-temperature curing hybrid finishes. Full cure of such hybrids can be achieved at bake temperatures (substrate) of 320°F (160°C) within 20 minutes.

Circle No. 43 on Reader Service Card

Final Seal Rinse

Brent ChemSeal® 3620 is a non-chrome final seal rinse that reportedly outperforms chrome for corrosion resistance. Compatible with all modern paint systems, this product may be applied by spray or immersion, and can be used on either cold-rolled or galvanized steel with an iron or zinc phosphate coating.

Circle No. 44 on Reader Service Card

Equipment

Pleated Bag Filter

Consler Corp. has developed a new pleated bag filter designed to improve contaminant removal from process streams over conventional non-pleated bag filters. With 25 square feet of pleated high-efficiency media in a #2-size bag, this filter reportedly yields up to 5,200 grams at 75 micron retention rating. Constructed of polypropylene supports and polyester media, this product withstands temperatures up to 175°F.

Circle No. 45 on Reader Service Card

Vibratory Screeners

The HK-8 and HK-17 vibratory screeners that utilize a new drive unit placement to increase throughput are now available from HK Technologies, Inc. These products are quiet, lightweight, and operable

in any environment. Vibration is isolated within the unit and is not transmitted to operating surfaces. All contact parts are constructed of polished 316 stainless steel for easy cleaning. Either model is available with multiple screening decks.

Circle No. 46 on Reader Service Card

Variation Packaging

Labelmaster now offers a new line of variation packaging products. Variation packaging can be used by anyone who wants to use their own inner containers to ship hazardous materials. The user fills the bottle or can and places it into the kits. The packages, the fiberboard box, tape and appropriate cushioning are UN tested and marked for the transport of hazardous materials.

Circle No. 47 on Reader Service Card

Metering Pump

Netzsch Inc. has introduced the Nemo® NM Series Metering Pump. Key features include: flow, ranges from 0.25 to 160 gph, pressure ranges 0 to 180 psi, low shear rate, non-pulsating flow and capacity change with rotor/stator change without affecting pump dimensions. Pumps are available as bareshaft or complete with constant or variable speed drives.

Circle No. 48 on Reader Service Card

Paints/ Coatings

Protective/Decorative Coatings

Dip Seal Plastics, Inc., manufactures transparent, non-toxic, hot-melt, strippable plastic protective coatings for metals, wood, glass, etc. Some of the company's products include: Type I Coatings—used to protect fine machine parts and tools; Type II Coatings—used in the machine tool , bottling, and plating industries; and Type IV Coatings—used as a general protective coating from furniture legs to liquor bottles. Dipping temperatures range from 290° F for Type II to 350°F for Types I and IV.

Circle No. 49 on Reader Service Card

Wood Coating

Finishes Unlimited has introduced a new water-based, wood coating that reportedly reduces grain raising and improves the surface durability of paint wood surfaces including particle board and pressed wood products. The formulation dries to a smooth, non-tacky finish. The new coating, which is available in a variety of colors, can be used as both a primer and finish coat.

Circle No. 50 on Reader Service Card

Teflon Surface Protector

The Finish reinforced with a Teflon surface protector has been introduced by Samuel Cabot Inc. This product is a washable, 100% acrylic low lustre paint for all siding, trim, and accent surfaces, *The Finish* can be applied to new wood, painted wood, vinyl, aluminum, metal, masonry and glossy surfaces without sanding. It is available in ready-mixed Ultra White and can be tinted to an unlimited palette of custom colors.

Circle No. 51 on Reader Service Card

High Performance Urethane

Sherwin-Williams Industrial and Marine Coatings group has developed a coating suited for aggressive environments. Poly-Lin® 1900, a two-component polyester-aliphatic urethane forms a hard, high gloss finish (90+ units @ 60°), that reportedly protects structures and surfaces subjected to prolonged exterior exposure, heavy abrasion, and general chemical context. It has a VOC emission level of 3.0 lbs/gal mixed.

Circle No. 52 on Reader Service Card

Calendar of Events

Federation Meetings

For information on FSCT meetings, contact Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422 (610) 940-0777, FAX: (610) 940-0292. Web site: http://www.coatingstech.org

1998

(Apr. 15-17)—ICE Latinoamerica '98. Miami Beach Convention Center, Miami, FL.

(July 23-24)—Pan-American Coatings Expo. World Trade Center, Mexico City, Mexico.

(Oct. 14-16)—ICE '98—FSCT Annual Meeting and International Coatings Expo and Technology Conference. Ernest N. Morial Convention Center, New Orleans, LA.

1999

(Oct. 20-22)—ICE '99—FSCT Annual Meeting and International Coatings Expo and Technology Conference. Dallas, TX.

Special Society Meetings

1998

(Mar. 25-27)—"New Nuts and Bolts to Keep Your Brushes Rolling." 55th Southwestern Paint Convention. Del Lago Resort and Convention Center, Conroe, TX. (Eric Stoeber, c/o Ribelin Sales Inc., 7786 Blankenship Dr., Houston, TX 77055; (713) 688-7722).

(Mar.30-Apr. 1)—Southern Society Annual Meeting. Marriott Grand Hotel, Point Clear, AL.

(April 15)—"Spectrum of Coatings." Symposium sponsored by the Louisville Society. Executive West Hotel, Louisville, KY. (Ilona Nemes-Duvall, Red Spot Paint and Varnish, 1107 E. Louisiana St., 47711; (812) 467-2337).

(April 21)—"Innovative Coatings: Practical Solutions for Global Demands." 23rd Annual FOCUS Conference sponsored by the Detroit Society. Michigan State University Management Education Center, Troy, MI. (Rosemary Brady, Akzo Nobel Coatings, Inc., P.O. Box 7062, Troy, MI 48007-7062).

(April 22)—"Manufacturing Symposium." Co-sponsored by the Cleveland Society and the Pittsburgh Society. (James Currie, Jamestown Paint Co., 108 Main St., P.O. Box 157, Jamestown, PA 16134; 412-932-3101).

(April 23-24)—"Waterborne Coatings: Sink or Swim II." 41st Annual Technical Symposium. Co-sponsored by the Cleveland Society and the Pittsburgh Society. (Vicki Fisher, Jamestown Paint Co., 108 Main St., P.O. Box 157, Jamestown, PA 16134; 412-932-3101).

(May 1-2)—"Maximizing Performance Properties and Minimizing Production Problems of Waterborne Coatings." 51st Annual Technical Symposium. Sponsored by the Pacific Northwest Society. Doubletree Inn at the Quay, Vancouver, WA. (Debra Severson, Miller Paint Co., 12730 NE Whitaker Way, Portland, OR 97230; 503-255-0190).

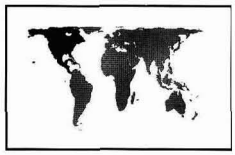
(May 11-14)—Eastern Training Conference II and Show. Sponsored by the Philadelphia Society. Valley Forge Convention Center, King of Prussia, PA. (Wayne Kraus, Hercules Incorporated, Research Center, 500 Hercules Rd., Wilmington, DE 19808; (302) 995-3435).

1999

(Feb. 16-18)—24th Biennial Western Coatings Societies' Symposium and Show. Sponsored by the Golden Gate, Los Angeles, Pacific Northwest, and Rocky Mountain Societies. John Ascuaga's Nugget, Sparks, NV.

(April 13-16)—Southern Society Annual Meeting. Hyatt Regency Hotel, Savannah, GA. (Dale Kenknight, Akzo Nobel Coatings, Inc., 6369 Old Peachtree Rd., Norcross, GA 30071-1780).

Other Organizations



1998—North America

(Jan. 17-20)—"The RCMA Express, A Journey to Creative Thinking and Opportunity." Conference and Expo sponsored by Roof Coatings Manufacturers Association (RCMA). Omni Tucson National Resort and Spa, Tucson, AZ. (RCMA, 6000 Executive Blvd., Ste. 201, Rockville, MD 20852-3803).

(Jan. 20-23)—"Environmentally Compliant Coatings." Course sponsored by The Department of Polymers and Coatings, North Dakota State University. Crowne Plaza Resort, Hilton Head Island, SC. (Debbie Shasky, Program Coordinator, North Dakota State University, Dept. of Polymers and Coatings, 54 Dunbar Hall, Fargo, ND 58105).

(Feb. 9-12)—"Composites '98 Manufacturing and Tooling Conference and Exhibits." Sponsored by Society for Manufacturing Engineers (SME). Hyatt Alicante, Anaheim, CA. (SME, One SME Dr., P.O. Box 930, Dearborn, MI 48121-0930).

(Feb. 13-14)—The Spring 1998 Paint and Decorating Show. Sponsored by the Paint and Decorating Retailers Association (PDRA). Opryland Hotel and Convention Center, Nashville, TN. (PDRA, 403 Axminster Dr., St. Louis, MO 63026-2941).

(Feb. 17)—1998 Technology Showcase. Exhibition sponsored by The University of Southern Mississippi (USM). New Orleans, LA. (Laura Fosselman, USM, Box 10076, Hattiesburg, MS 39406-0076).

(Feb. 18-20)—25th Annual International Waterborne, High-Solids, and Powder Coatings Symposium. Sponsored by The University of Southern Mississippi (USM). New Orleans, LA. (Robson F. Storey or Shelby F. Thames, WHS&PC Symposium, Dept. of Polymer Science, USM, Box 10076, Hattiesburg, MS 39406-0076).

(Feb. 18-21)—"The Future is Change: A Symposium for Business Leaders." Sponsored by the The Society of the Plastics Industry, Inc., Molders and Moldmakers Divisions. The Westin La Paloma, Tucson, AZ. (Sharon P. McGarvey, SPI Molders/Moldmakers Div., 1801 K St., N.W., Ste. 600K, Washington, D.C. 20006-1301).

(Feb. 22-24)—"Color and Design: 21st Century Technology and Creativity." Williamsburg Conference sponsored by the Inter-Society Color Council. Williamsburg, VA. (Robert T. Marcus, ISCC Publicity Chairman, D&S Plastics International, 100 S. Mitchell Rd., Mansfield, TX 76063).

(Feb. 23-25)—"Basic Coatings for Sales, Marketing, and General Personnel." Short course sponsored by University of Missouri-Rolla (UMR), St. Louis, MO. (UMR Coatings Institute, 236 Schrenk Hall, 1870 Miner Circle, Rolla, MO 65409).

(Feb. 24-25)—Hazardous Materials Training Seminar. Sponsored by the National Paint and Coatings Association (NPCA). San Francisco, CA. (Dorothy Brawner, NPCA, 1500 Rhode Island Ave., N.W., Washington, D.C. 20005-5597).

(Feb. 28-Mar. 1)—"Polymer Degradation and Stabilization." Conference sponsored by The Institute of Materials Science. Hilton Head Island, SC. (Angelos V. Patsis, The Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 1-4)—"Zinc: Protecting Your Future." Conference sponsored by the American Zinc Association. PGA National Resort and Spa, Palm Beach Gardens, FL. (American Zinc Association, Ste. 240, 1112 16th St., N.W., Washington, D.C. 20036).

(Mar. 2-4)—"International Seminar on the Technology of Inherently Conductive Polymers." Short course sponsored by Advanced Polymer Courses. Crown Plaza Resort, Hilton Head Island, SC. (M. Aldissi, Advanced Polymer Courses, 6 Striper Lane, E. Falmouth, MA 02536).

(Mar. 2-4)—"Polymer Stabilizers and Modifiers '98." Conference and Exhibition sponsored by The Institute of Materials Science. Hilton Head Island, SC. (Angelos V. Patsis, The Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 8-12)—"AIChE Spring National Meeting/Petrochem and Technochem '98." Sponsored by the American Institute of Chemical

Engineers (AIChE). Sheraton New Orleans, New Orleans, LA. (AIChE, 345 E. 47th St., New York, NY 10017).

(Mar. 9-11)—"Introduction to Emulsion Polymers/Polymer Colloids." Conference sponsored by The Institute of Materials Science. Hilton Head Island, SC. (Angelos V. Patsis, The Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 9-12)—"Pigment Dispersion: Science and Technology." Conference sponsored by The Institute of Materials Science. Hilton Head Island, SC. (Angelos V. Patsis, The Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Mar. 9-12)—"Introduction to Coatings Science." Short course sponsored by The University of Southern Mississippi. Hattiesburg, MS. (Shelby F. Thames or Debbie Ballard, The University of Southern Mississippi, Box 10037, Hattiesburg, MS 39406-0037).

(Mar. 9-12)—"Practical Emulsion Polymerization Technology." Short course sponsored by The University of Southern Mississippi. Hattiesburg, MS. (Shelby F. Thames or Debbie Ballard, The University of Southern Mississippi, Box 10037, Hattiesburg, MS 39406-0037).

(Mar. 16-17)—"Understanding Microbial and Chemical Contaminants in Buildings." Seminar sponsored by Air Quality Sciences, Inc. Atlanta, GA. (Pam Lackey, Air Quality Sciences, Inc., 1337 Capital Circle, Atlanta, GA 30067).

(Mar. 22-25)—Spring Convention. Sponsored by The Adhesive and Sealant Council, Inc. Buena Vista Palace, Orlando, FL. (The Adhesive and Sealant Council, Inc., 1627 K St., N.W., Ste. 1000, Washington, D.C. 20006).

(Mar. 22-26)—NPCA Spring Meeting and Architectural and Industrial Coatings Committee Meeting. Sponsored by the National Paint and Coatings Association (NPCA). Boca Raton Resort & Club, Boca Raton, FL. (Dorothy Brawner, NPCA, 1500 Rhode Island Ave., Washington, D.C. 20005-5597).

(Mar. 22-27)—"Corrosion/98." Sponsored by NACE International. San Diego Convention Center, San Diego, CA. (NACE International, P.O. Box 218340, Houston, TX 77218-8340).

(Mar. 23-27)—"Basic Composition of Coatings." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 236 Schrenk Hall, 1870 Miner Circle, Rolla, MO 65409).

(Mar. 24-26)—"Silicones in Coatings II." Sponsored by The Paint Research Association. Disney World Village, Orlando, FL. (Dip Dasgupta, Paint Research Association, 8 Waldegrave Rd., Teddington, Middlesex TW11 8LD United Kingdom).

(March 31-Apr. 1)—Hazardous Materials Training Seminar. Sponsored by the National Paint and Coatings Association (NPCA). Chicago, IL. (Dorothy Brawner, NPCA, 1500 Rhode Island Ave., N.W., Washington, D.C. 20005-5597).

(Apr. 14-17)—"Introduction to Coatings Technology." Short course sponsored by Kent State University. Kent, OH. (Carl J. Knauss, Director, Professional Development Institute, P.O. Box 1792, Kent, OH 44240).

(Apr. 18-19)—"Water Problems in Building Exterior Walls: Evaluation, Prevention, and Repair." Symposium sponsored by the American Society for Testing and Materials (ASTM) Committee E-6. Atlanta Hilton and Towers, Atlanta, GA. (ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959).

(Apr. 18-23)—"Vacuum Coating Manufacturing and Technology Issues." 41st Technical Conference. Sponsored by the Society of Vacuum Coaters. The Westin Hotel, Copley Place, Boston, MA. (Society of Vacuum Coaters, 440 Live Oak Loop, Albuquerque, NM 87122).

(Apr. 19-22)—RadTech '98 North America Conference. Sponsored by RadTech International North America. Hyatt Regency, Chicago, IL. (RadTech International North America, 60 Revere Dr., Ste. 500, Northbrook, IL 60062).

(Apr. 20-22)—ASTM Committee B-8 on Metallic and Inorganic Coatings. Sponsored by the American Society for Testing and Materials. West Conshohocken, PA. (ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428.

(Apr. 20-24)—"Applied Rheology for Industrial Chemists." Short course sponsored by Kent State University. Kent, OH. (Carl J. Knauss, Director, Professional Development Institute, P.O. Box 1792, Kent, OH 44240).

(Apr. 20-24)—"Introduction to Paint Formulation." Short course sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (UMR Coatings Institute, 1870 Miner Circle, Rolla, MO 65409).

(Apr. 21-24)—"Coverings." Exhibition organized by TSI, Inc. Orange County Convention Center, Orlando, FL. (TSI, Inc., 900 E. Indiantown Rd., Ste. 207, Jupiter, FL 33477).

(Apr. 22)—"Manufacturing Symposium." Co-sponsored by the Cleveland Society for Coatings Technology and the Pittsburgh Society for Coatings Technology. (James Currie, Jamestown Paint Co., 108 Main St., P.O. Box 157, Jamestown, PA 16134; 412-932-3101).

(Apr. 23-24)—"Protection of Materials and Structures from the LEO Space Environment." Conference sponsored by Canadian Space Agency and university of Toronto Institute for Aerospace Studies. (J.I. Kleiman, Institute for Aerospace Studies, 4925 Dufferin St., Downscview, Ontario, Canada M3H 5T6).

(Apr. 23-24)—"Waterborne Coatings: Sink or Swim II." 41st Annual Technical Symposium. Co-sponsored by the Cleveland Society for Coatings Technology and the Pittsburgh Society for Coatings Technology. (Vicki Fisher, Jamestown Paint Co., 108 Main St., P.O. Box 157, Jamestown, PA 16134; 412-932-3101).

(Apr. 27-29)—"Making Life Easier for the Epoxy Formulator—Technical Solutions." Conference sponsored The Society of the Plastics Industry Inc.'s Epoxy Resin Formulators Division. The Ritz-Carlton Kempinski, Montreal, Canada. (Tina Kierzek, SPI Epoxy Resin Formulators Div., Ste. 600K, 1801 K St., N.W., Washington, D.C. 20006-1301).

(Apr. 28-29)—44th Annual Technical Meeting of the Institute of Environmental Sciences and Technology. Phoenix Civic Plaza, Phoenix, AZ. (Institute of Environmental Sciences and Technology, 940 East Northwest Hwy., Mount Prospect, IL 60056-3422).

(Apr. 28-29)—Hazardous Materials Training Seminar. Sponsored by the National Paint and Coatings Association (NPCA). Baltimore, MD. (Dorothy Brawner, NPCA, 1500 Rhode Island Ave., Washington, D.C. 20005-5597).

(May 1-2)—51st Annual Technical Symposium. Sponsored by the Pacific Northwest Society for Coatings Technology. Doubletree Inn at the Quay, Vancouver, WA. (Debra Severson, Miller Paint Co., 12730 NE Whitaker Way, Portland, OR 97230; 503-255-0190).

(May 4-6)—"Adhesion and Coatings Adhesion: Theory , Applications, and Durability." Conference sponsored by The Institute of Materials Science. Orlando, FL. (Angelos V. Patsis, The Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(May 4-8)—"Adhesion Principles and Practice for Coatings and Polymer Scientists." Short course sponsored by Kent State University. Kent, OH. (Carl J. Knauss, Director, Professional Development Institute, P.O. Box 1792, Kent, OH 44240).

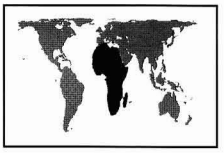
(May 5-6)—"Effects of Surface Finish on Corrosion Testing." Symposium sponsored by the American Society for Testing and Materials (ASTM). Atlanta, GA. (Pierre R. Roberge, Royal Military College of Canada, Department of Chemistry and Chemical Engineering, Kingston, Ontario K7K 5L0, Canada).

(May 11-14)—Eastern Training Conference II and Show. Sponsored by the Philadelphia Society. Valley Forge Convention Center, King of Prussia, PA. (Wayne Kraus, Hercules Incorporated, Research Center, 500 Hercules Rd., Wilmington, DE 19808; (302) 995-3435).

(May 11-14)—"Introduction to Powder Coatings Technology." Short course sponsored by The University of Southern Mississippi. Hattiesburg, MS. (Shelby F. Thames or Debbie Ballard, The University of Southern Mississippi, Box 10037, Hattiesburg, MS 39406-0037).

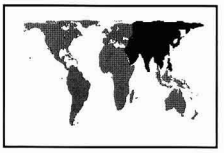
(May 11-15)—"Interpretation of IR and Raman Spectroscopy." Short course sponsored by The Fisk Infrared Institute. Vanderbilt University, Nashville, Tennessee. (Clara Craver, The Fisk Infrared

1998—Africa



(Mar. 6-8)—"Coatings for Africa '98." Sponsored by The Oil & Colour Chemists' Association's (OCCA) South African Division, the Natal Section, and Surfex Ltd. International Convention Centre, Durban, South Africa. (Christopher Pacey-Day, OCCA, 967 Harrow Rd., Wembley, Middlesex, England HA0 2SF).

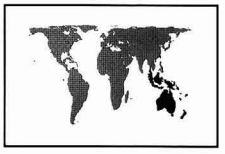
1998—Asia



(May 12-14)—Techno Trade '98. Sponsored by Singapore Confederation of Industries, Taiwan Association of Machinery Industry, and Taiwan Industrial Fasteners Institute. World Trade Center, Singapore. (Interfama Brooks Exhibitions Pte. Ltd., Forum Place, Hatfield, Hertfordshire AL1O ORN, United Kingdom).

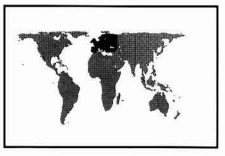
(May 26-30)—SPI/DOC Product Literature Center and the Gold Key Program. Sponsored by The Society of the Plastics Industry, Inc. and the U.S. Department of Commerce. Guangdong Province, China. (The Society of the Plastics Industry, Inc., Ste. 600K, 1801 K St., N.W., Washington, D.C. 20006-1301).

1998—Australia



(July 29-Aug. 1)—"Coatings for the Future." Second Trans Tasman Surface Coatings Conference. Co-sponsored by Surface Coatings Association, New Zealand, Inc., and Surface Coatings Association, Australia, Inc. The Carlton Hotel, Auckland, New Zealand. (98 Transtas Conference, P.O. Box 5192, Wellesley St., Auckland, New Zealand).

1998—Europe



(Apr. 1-3)—PCE '98. Conference and exhibition sponsored by the Journal Protective Coatings Europe (PCE). The Netherlands Congress Centre, The Hague, The Netherlands. (PCE '98, 2100 Wharton St., Ste. 310, Pittsburgh, PA 15203-1951).

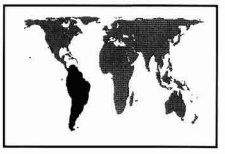
(Apr. 20-25)—Hannover Fair '98: World Center for Industrial Technology. Hannover Fairgrounds, Hannover, Germany. (Andrea Anderson, Hannover Fairs USA, Inc., 103 Carnegie Center, Princeton, NJ 08540).

(May 25-27)—11th International Symposium on Polymer Analysis and Characterization (ISPAC-11). Santa Margherita Ligure, Genoa, Italy. (Oscar Chiantore, Dept. of Chemistry IPM, University of Torino, Via Giuria 7-101025 Torino, Italy; Fax: +39 11 670 7855).

(June 22-24)—"SURFEX '98." Sponsored by The Oil & Colour Chemists' Association (OCCA). Harrogate, England. (Christopher Pacey-Day, OCCA, 967 Harrow Rd., Wembley, Middlesex, England HA0 2SF).

(June 28-July 2)—Third Oxford Conference on Spectrometry. Co-sponsored by the Council for Optical Radiation Measurement of the United States and the Ultraviolet Spectrometry Group of the United Kingdom. Royal Holloway College of the University of London, Egham, Surrey, United Kingdom. (Art Springsteen, Third Oxford Conference, c/o Labsphere, Inc., P.O. Box 70, Shaker St., North Sutton, NH 03260).

1998—South America



(Apr. 15-17)—ICE Latinoamerica '98. Miami Beach Convention Center, Miami, FL. (Lisa McGlashen, FSCT, 492 Norristown Rd., Blue Bell, PA 19422; (610) 940-0777, FAX: (610) 940-0292. http://www.coatingstech.org).

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Advertisers' Index

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Humbug from Hillman

Carl Rabinowitz wonders if he was being flattered when a friend complimented him on his beautiful alligator shoes when he was barefoot. - - - Not that he, any longer, has cause for concern but Carl read all of Lawrence Van Gelder's column in the *New York Times* devoted to suggestions for those who have been involuntarily departed from a job. For example:

—Consider Richard Carlton of White Plains, who once had a colleague known to be ripe for dismissal. Sure enough, one day the man was called into the boss' office. Minutes later he emerged cool and collected, a faint smile on his face.

He was asked what had happened.

"He told me I was fired," the man said, "and I told him he couldn't do that—it was Fire Prevention Week."

Mr. Carlton's colleague was fired the following week.

—And then there was the lawyer who decided to trade his long hours and daily pressures for the more genteel atmosphere of academic life.

In a speech at his farewell party before going off to teach in law school, he began by saying, "I have mixed emotions tonight: joy and . . ." —then come a long pause — "glee."

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Sid Rubin reports finding a flyer from a local Chinese restaurant announcing a luncheon special of only $43.00 each for "1. Fired Chicken; 2. Fired Chicken Wing (3 pies); 3. Fired Squid; and 4. Fried Pork Chops (2 pies)!" . . . Note those educated pork chops!

From Sid, as well, comes a story of the preacher who sermonized his congregation on and on for over an hour and a half. After the service, a man introduced himself as the producer of the well known TV program, Ted Koppel's "Nightline." The producer asked, "Tell me, sir, can you convey the essence of your sermon in two minutes?"

With thoughts of national television exposure dancing in his head, the preacher said of course he could. . . . "So why didn't you?" the producer said.

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Dick Kiefer sends me this contribution from his collection of "Real Stories of the Non-Technically Inclined."

Old accountants never die, they just lose their balance.

Old actors never die, they just drop apart.

Old bankers never die, they just lose interest.

Old basketball players never die, they just go on dribbling.

Old bosses never die, much as you may want them to.

Old electricians, never die, they just lose contact.

'Nuf for now!

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Dick Stewart writes:

A man and his wife went to the opera. They told Jeeves, their butler, that they would be back late so he could make himself at home. During the evening the wife was feeling poorly so she came home early leaving her husband to enjoy the opera alone.

When she arrived home, the butler said, "Why, madam, you're home early." "Yes," she said, "I told my husband that my stomach was upset and the master will not be home for some time. Please follow me."

She went upstairs and Jeeves followed. She walked down the hall and Jeeves followed. She went into her bedroom and Jeeves followed. She then locked the bedroom door and turned to him. "Jeeves, please take off my coat." He took off her coat — "Take off my shoes." He did. — "Take off my stockings." He did. — "Now, Jeeves, take off my dress." He did.

"Jeeves, the next time I catch you wearing my clothes, you're fired!"

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From Bob Athey, a few of Dr. Chlorophyll's laws for home gardeners:

—Jones' Law: A shrub that is vigorous and showy in your neighbor's garden will turn out scrawny and thin in yours.

—O'Clarke's Law: The heaviest frost of the winter will occur on the first night you forget to cover a tender plant.

—When you omit to water your potted plants, there will be a heatwave.

—Weed Axiom: Weeds can never be eradicated, only changed in form.

—Pest Principles:

1. All pests prefer desirable plants to weeds.
2. For every pest you can see there are hundreds you can't.
3. If the bugs can't get it, the fungus will.

—Herb Hillman, Humbug's Nest, P.O. Box 135, Whitingham, VT 05361.

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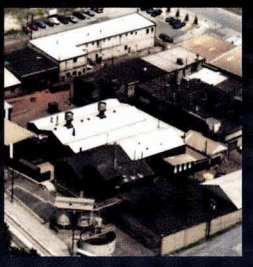

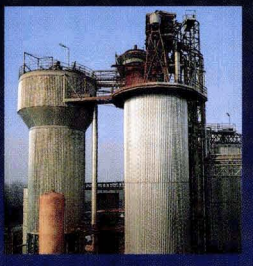

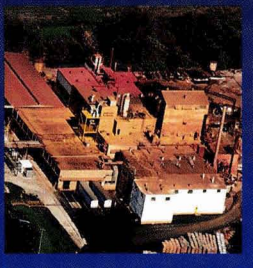

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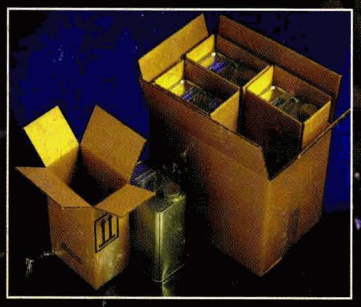

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