

Fifth International Printing and Graphic Arts Conference: a joint success

John W. Mercer

Scheduling anything in Vancouver in November might seem to guarantee a rainy, dreary outcome. Not so in 1990, though, as the Fifth International Printing and Graphic Arts Conference convened at the Hyatt Regency in Vancouver, B.C. This conference, held Nov. 5-8, 1990, was treated to mostly clear and sometimes sunny weather. Nearly 200 registrants from Canada, the United States, and six other countries attended the conference.

A little background might be in order. These conferences are jointly sponsored by the Technical Section of the Canadian Pulp and Paper Association (CPPA) and TAPPI. The Printing and Imaging Committee of the Coating and Graphic Arts Division is the primary technical group within TAPPI responsible for the conference. The conferences are held every other year and alternate between Canada and the United States. The host country's association is responsible for the meeting arrangements and hosting of the conference.

The emphasis of this conference is on the technical content of the papers, with every effort made to gather together the highest level of expertise in the graphic arts field. There are no hospitality suites at these conferences. This absence, however, is more than compensated for by the small group interaction and discussions which are fostered in such an environment and by the spontaneous social functions that follow, sometimes late into the night.

Entropy, fuzzy set theory, neural networks, and fractals are concepts not usually associated with printing and graphic arts, but the application of these terms and more were presented during the conference.

Committees

The TAPPI Printing and Imaging Steering Committee got an early start by meeting on Sunday, November 4. The usual committee business was conducted: review of outstanding Committee Assignments, discussion of test methods, and viability of subcommittees. On Monday, November 5, 20 people attended a general TAPPI Printing and Imaging Committee meeting, held immediately after the CPPA Technical Section Printing and Graphic Arts Committee meeting. Plans were made for participation in the 1991 Coating Conference, and preliminary plans were made for the 6th International Printing and Graphic Arts Conference, to be held in Pittsburgh, Pa., in October 1992.

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Local arrangements

Lawrence Dunfield of MacMillan Bloedel did an excellent job as local arrangements chairman. In addition to providing for good weather, he arranged a tour of the MacMillan Bloedel Research Laboratories and also of Pacific Press on Monday, November 5, the day before the conference officially began. This tour was oversubscribed almost from its announcement. Attendees were pleased with what they saw, and committee chairmen were pleased that the tourists were delivered back to the hotel in time for the afternoon committee meetings. Attendees were treated to the conference reception on Tuesday evening, and most attendees were able to attend the conference dinner, held Wednesday night. A hospitality suite was provided for spouses and guests each morning of the conference.

Technical program

The technical program contained six full sessions comprising 30 papers and two panel discussions. There was no keynote speech in order to present as many papers as possible. The proceedings of the conference are available from the Technical Section of CPPA, telephone (514) 866-6621. No overlapping technical sessions were scheduled so that conference attendees were able to attend all sessions.

Conference Chairman Patrice Mangin of the Pulp and Paper Research Institute of Canada (Paprican) briefly welcomed everyone to open the conference, and Program Chairman John Mercer of the U.S. Bureau of Engraving and Printing introduced the session chairmen.

Effect of papermaking and printing on print properties

Mark Recher led the first session, which could have been titled, "How does what we do (in papermaking and printing) affect what we get in printed work?"

Ian Thorburn of Diachem Industries led off the discussion with his comments on "Print-Through Minimization by Specialty Pigments," in which he said that it is necessary to differentiate the major components of print-through, suggesting that the ink vehicle - pigment component dominates. His proposed remedy was a surface coating of high-specific-surface precipitated pigments.

Gerry Davis of Huyck Canada presented photographic evidence of density differences in twin- and top-wire formers operating in Canada. Although considerable differences were noted, they can be controlled with the correct selection of fabric designs.

Eero Palokangas of Enso-Gutzeit Oy spoke on hot soft calendering, an evolving technology which offers an opportunity to produce new paper grades with increased surface properties and printability.

John Lind of the Graphic Arts Technical Foundation described his work on dot gain in sheetfed lithography. He suggested a poor correlation between dot gain and paper grade (which is mostly brightness based) and most other paper properties. His work supports the idea that most dot gain arises from press mechanical reasons prior to the print nip.

H. Wilson Cunningham of ANPA talked about the development of flexographic process color ink standards for newspaper printing. He concluded that flexography is capable of consistent color quality, with a comparable visual appearance to other newspaper printing processes. Printing conditions continue to influence the color response more than the ink formulation.

John Harkness of Engelhard presented a dynamic talk on the optical and printability parameters of thermomechanical and secondary-fiber newsprint pulps. He concluded that as more secondary fiber is used brightness will decrease and opacity will increase, burst strength will decrease, and print-through will decrease. The influence of kaolins was also reported. Calcined kaolin provides superior optical and printing properties compared to delaminated kaolin. Filler pigments may be necessary to compensate for deficiencies associated with recycled pulps. Calcined kaolins may be preferred for this, since they provide for maximum optical performance at low addition levels.

Paper and print quality evaluation methods

Fer de Vos of Reprint North America chaired the print quality test methods session.

J. F. LaFaye of the Centre Technique du Papier in Grenoble spoke on predicting rotogravure print quality through calendering. Among his many conclusions were that rotogravure print quality is achieved by smoothness, compressibility, and ink absorption; that delaminated clays, calcined clays, and talc increase the distance to the 20th skipped dot, as measured by the Heliotest, relative to conventional clays; and that prediction of rotogravure print quality is possible through laboratory testing, either through Bekk smoothness or the new soft Heliotest procedure.

Debora Jeske of Union Camp described work in which she modified a hammer-and-anvil-type impulse press to simulate a gravure print nip. Her work supports a mechanism for gravure ink transfer on a high-speed gravure press, based on the degree of contact between the ink and paper and the ability of the ink to wet the paper. Neither the capillary nor hydraulic forces appear to play a major role in ink transfer in the nip of a high-speed gravure press.

Joe Aspler of Paprican described his work on the contribution of newsprint to fill-in of flexographic printing plates. He found that the amount of lint on the flexo plates correlated well with offset linting propensity and with pick strength. He proposed a two-step mechanism, in which the first step is linting. Lint on the plate acts as a trap for ink. Further, high linting tendency combined with low pH and high alum concentrations is particularly undesirable.

Ted Waech (left) and Alkis Karnis participated in what was probably the swan song for panel discussions on linting at this meeting.



Photo courtesy of Pulp and Paper Canada

R. J. Kerekes (left) of the University of British Columbia Pulp and Paper Centre, Omar Aschim (center) of Weyerhaeuser in Prince Albert, Sask., and Dean DeCrease of Weyerhaeuser in Tocomo, Wash., were among attendees participating in the spirited discussions during the conference.



Photo courtesy of Pulp and Paper Canada

Laszlo Szanyi of MacMillan Bloedel Research described the development of the MacMillan Bloedel Print Indicator™9, which provides a direct measurement of the ink hold-out properties of the paper, as well as a precise method of assessing two-sidedness of the sheet with respect to printability. Present applications are limited to uncoated mechanical pulp papers, but work is being done on a version suitable for coated stock.

H. Saarelma of the Helsinki University of Technology concluded the second session with a discussion of the characterization of color printing by entropy. Entropy in this case is defined as the mean value of self-information. Increasing luminance was found to improve rendering of yellow colors. Contrary to common understanding, the simulations showed that halftone printing is not necessar-

Taking time out from a busy conference schedule are (R-L) Local Arrangements Chairman **Lawrence G. Dunfield**, Conference Chairman **Patrice Mangin**, and speakers **Ulf Lindqvist**, **Pirkko Oittinen**, and **Joseph Aspler**.



Photo courtesy of Pulp and Paper Canada

ily capable of reproducing all luminance levels between paper luminance and solid ink luminance at the hue of the solid ink.

The nonimpact challenge

Steven Bares of Hewlett-Packard chaired the third session, on nonimpact printing.

Walter Crooks kicked off the Wednesday morning session with a tutorial on nonimpact printing technologies. He concluded that the advent of the computer fueled development of the nonimpact printer. He indicated that electrophotographic printers dominate the high-and medium-range market, while the ink-jet and thermal technologies share the low range.

George Imperial of International Paper presented a related discussion on the same topic but more from the paper side. He indicated that there is an inexorable trend toward "plain paper" xerographic copy paper as the one grade suitable for most applications. Obviously, most facsimile units and dielectric printers will continue to need specially coated papers.

Peter Lim of Boise-Cascade spoke on the application of fuzzy set theory to the evaluation of nonimpact printing image qualities. Paired comparisons were used to evaluate nonimpact printing qualities. The fuzzy mathematical approach was found to be useful to quantify human panel response data on a nonnumeric scale. Consistency of each panel member was measured by use of the eigenvalue computation.

John Gaston of Weyerhaeuser spoke on designing products to meet changing customer needs. He identified requirements that the paper be capable of good performance on both impact and nonimpact applications, be good for both black and white and color, be defect-free, have good image permanence, and be environmentally friendly. He projected increased dependence on electronic imaging,

increased demand for color hardcopy, and evolution of new market niches.

Eric Hanson of Hewlett-Packard looked at future trends in nonimpact printing. He pointed out that as electronic memory costs continue to fall and electronic processing speed continues to rise, new levels of print and image quality, requiring more data per page, will become feasible. He identified the key question about color electrophotography as how continued technological innovations will affect the price-quality trade-off.

New approaches in paper and printed surface evaluation

Patrice Mangin of Paprican chaired the Wednesday afternoon session.

Pirkko Oittinen of the Helsinki University of Technology spoke on the microscale gloss of papers and prints. An experimental apparatus consisting of a goniospectrophotometer with spatial resolution was used to examine microscale gloss and density variations.

Henry Kent of International Paper spoke on the fractal dimension of paper surface topography. Fractal analysis of stylus profilometry surface roughness data shows that paper surface roughness exhibits fractal characteristics, although paper itself is not, strictly speaking, fractal.

Patrice Rioux of McGill University spoke on new parameters for surface evaluation: tortuosity, porosity, and correlation with print quality. Tortuosity is evaluated by combining the air permeability with the values of the porosity and specific surface obtained from the mercury porosimetry technique. Dot circularity is related to the ratio of the surface tortuosity to the surface porosity. During the question-and-answer period, a lively debate ensued between John Parker of Messmer and the speaker on the advantages of the method presented by the speaker and coauthor J. Silvy. The debate is still open, as the session chairman had to terminate the discussion so the remainder

Mark Recher (standing) served as a session monitor at this year's conference.



Photo courtesy of Pulp and Paper Canada

of the session could proceed.

L. G. Dunfield of MacMillan Bloedel spoke on the practical applications of surface profilometry to the evaluation of newsprint. Determination of quality differences, directionality of roughness, portability, and production of actual surface profiles were listed as advantages. Disadvantages were that new roughness parameters need to be developed for rougher newsprint surfaces, stylus dimensions limit resolution, tests are conducted in only one dimension of travel, and that incorrect stylus pressure can damage samples.

Joe Aspler of Paprican contributed his second paper of the conference, a discussion of newsprint contributions to ruboff of oil-based inks. Ruboff was found to increase with the amount of surface fines and with smoothness measured with an optical contact device. Contrary to previously published work, while surface fines may improve ink retention at the sheet surface, the presence of binder-free inks close to the surface apparently leads to easy ink removal as well.

Ulf Lindqvist of the Technical Research Center of Finland concluded the fourth session with a comparison of the stochastic textures. He proposed a microprocessor-based system for classifying paper formation as a class of textures, rather than by giving a measure of the paper. The learning and recognition involved are based on neural network principles.

The recycling challenge

V. N. Gupta of Canadian Pacific Forest Products chaired the Thursday morning session, which included the first of two panel discussions. This proved to be one of the most provocative and interesting sessions of the conference.

Jerry Powell, editor of *Recycling Magazine*, gave an overview of the nontechnical factors in the current paper recycling and printing industry. Among the many salient

Patrice Mangin, Martin Heyne, and John Mercer were also part of the panel discussion on linting.

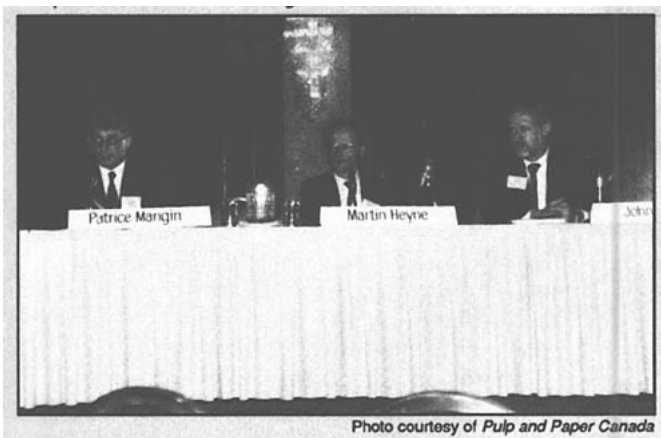


Photo courtesy of Pulp and Paper Canada

points Powell made were the politics of recycling, and that the politics affect the economics of recycling; that the government wants a stable market and that the market is responding; that new uses are being developed for recycled fiber; and that it behooves all citizens to become involved in the process of regulation so that the definitions and standards can be based on reasonable voices. This presentation alone was worth attendance at the conference. Powell spoke truly good common sense while stating the limits and possibilities of recycling.

A. Karneth of Beloit Research spoke on the effect of recycling on printing. He classified recycled printed material into two groups: easy to deink and difficult to deink. He spoke of recent technological changes in the printing industry that challenge the deinking industry. He concluded that the deinking technology available today is capable of producing virgin-pulp-quality deinked pulps.

L. Marchildon of the Universite du Quebec a Trois-

Rivieres reported on the use of hydrogen peroxide as a bleaching agent to obtain an adequately deinked pulp at proper tint. Hydrogen peroxide, together with higher pulper consistency, results in a higher final brightness. Brightness levels off at about 15% consistency. A balance must be struck between yellowing caused by residual hydrogen peroxide and the brightness gain due to the peroxide addition.

Richard Knight of Quebec and Ontario Paper spoke on the effect of flotation-deinked recycled fiber on newsprint quality. Newsprint containing varied levels of flotation-deinked recycled fiber was printed by the letterpress, offset, and flexographic processes. It was concluded that the printed matter showed negligible quality impact due to the recycled fiber content.

The panel discussion that followed included the four speakers as well as Jim Kline of Western Michigan University, H. Wilson Cunningham of ANPA, L. Bauer of Southeast Paper, J. Stevenson of Simpson Paper, and Norma Hill of Cal Ink Division of Flint Ink. The discussion was very lively and spirited.

"No deinked sheet need be second rate," said Lawrence Bauer, as he pointed out that his paper was all recycled, yet had won awards and was certified for use in *USA Today*. "Quality steps taken and maintained yield an excellent sheet."

"Recycled print quality is equivalent," said Wilson Cunningham. He hoped that the market would be allowed to set the parameters for use of recycled paper but predicted that by 1995 there will be mandatory Federal standards for newsprint—return on investment or logic notwithstanding.

Jim Kline described the physical changes in paper as a result of recycling. Among many observations, he noted that density increases as a reduction of fibrils, and that though there is less bond propensity, the strength of the sheet does not change.

"If the sheet is developed properly, printers shouldn't be able to tell the difference," said Jim Stevenson. He noted that recycling is not a fad, that it won't go away, and that landfill availability will be a driver for recycling.

Norma Hill noted that recycled paper had better lay and opacity for oil-based inks. She stated that flexo inks are still on the learning curve and that soy-based colors were difficult to remove. She felt that recycled printing requirements were a moving target, with technical and environmental changes constantly occurring.

The linting challenge

John Mercer of the U.S. Bureau of Engraving and Printing chaired the final session of the conference, on the challenge of linting. A. Karnis of Paprican led off the session by discussing the origin, nature, characterization, and measurement of lint. Wider use of heatset offset processes have made linting all-important. The type of lint has changed over the past 15 years, making changes necessary to the pulp linting propensity index. These changes focus primarily on fines fraction rather than the whole pulp.

Ted Waech of Beloit Corp. R&D spoke on lint reduction by high-temperature calendering. Linting of offset newsprint causes reduced press efficiency and print quality loss. Calendering of offset newsprint can either

increase or decrease linting, depending on the temperature of the raw stock. High-temperature calendering reduces linting by a factor of about four, while room-temperature calendering increases linting.

Martin J. M. Heyne of Ingenieursbureau Heyne in the Netherlands submitted a paper on the influence of correct blanket mounting on problems with paper in offset printing. Blanket packing, true-rolling cylinders, and paper take-off angles were discussed, with the understanding that many press parameters contribute to linting.

Patrice Mangin of Paprican concluded the presentation of technical papers with a genuine tour-de-force entitled "Offset Linting Studies: Part II, Further Contribution to Linting Theories." It concludes that lint accumulation models are largely descriptive and relate as much to the press and press conditions as to the actual linting propensity. Various forms of Stefan's Law are considered to describe fiber debonding models. Fiber removal is related to the bonding energy of the surface fiber, which is a paper property. Correction factors are proposed for testing artifacts related to accelerated velocity.

A panel discussion followed on the general topic of linting. Participants were the four speakers and the session chairman. It is hoped that this session, combined with other recent sessions on the topic of linting, will prove definitive, and that future conferences will move on to other, more deserving topics.

Next time

Speaking of future conferences, the Sixth International Printing and Graphic Arts Conference will be held at the Westin William Penn Hotel in Pittsburgh, Pa., on Oct. 18-22, 1992. The conference theme is "Visions and Missions for the '90s." As the paper and printing industries move into the '90s, their visions are broadened by global concerns, while their missions focus on quests for quality with cost effectiveness. T. Sarada of Pitney-Bowes is the conference chairman, and Mark Recher of Canadian Pacific Forest Products is the program chairman.

Tentative topics proposed for the conference are: image analysis techniques, measurements and causes of print nonuniformity, printing problems of offset papers, the relationship of printing and paper recycling, barcode printing and quality of computer/digital printing, printing on alkaline papers, print evaluation methods in the laboratory or pressroom, future trends in papermaking and printing, and ISO 9000 standards for paper and printing. Those interested in any of these topics are requested to start experimenting, get it in writing, and then submit your title and abstract to the conference or program chairman by Nov. 15, 1991. The call for papers is in the March issue, p. 259. □