

Sixth International Printing and Graphic Arts Conference

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The Golden Triangle city of Pittsburgh, PA proved to be golden to the over 200 attendees of the Sixth International Printing and Graphic Arts Conference, held Oct. 18–21, 1992. The conference is a joint production of the Printing and Graphic Arts Committee of TAPPI's Coating and Graphic Arts Division and the Technical Section of the Canadian Pulp and Paper Association (CPPA). Thyagaraj Sarada, Pitney-Bowes, was the conference chairman and Joseph Aspler, PAPRICAN, was the technical program chairman.

The conference was held amid the ornate, elegant Italian Renaissance and Art Deco style of the Westin William Penn hotel.

Both Stuart Alexander, TAPPI Board of Directors, and Dave Paterson, head of the Technical Section of CPPA, welcomed the attendees. Ray Prince, GATF, provided the keynote speech entitled "Looking toward the Year 2000." Wendell M. Smith, chairman and CEO of Baldwin Industries, provided the Wednesday conference luncheon speech entitled "Process control in the printing industry."

This conference was notable for the substantial role of women. Over three dozen of the 201 conference registrants were female including the conference chair, Thyagaraj Sarada, two of the nine session chairs, and over 25% of the speakers.

Another notable event was the student poster session. Patrice Mangin, PAPRICAN, organized this eight-presentation session, which generated many favorable comments.

Local arrangements

Local Arrangements Chairman John Lind did an excellent job in arranging two tours for the conference attendees, to the Graphic Arts Technical Foundation and to Westinghouse.

Coated paper

Session Chair Bob Bergmann, Engelhard, chaired the first session. Susan Robie, S.D. Warren, led off with a paper entitled, "The impact of ink-coated paper reactivity on density in offset printing." She concluded that the multicolor offset press rapidly re-equilibrates with respect to print density when presented with major shifts in paper properties related to the immobilization of ink.

J.S. Van Wagner, Domtar Research, presented "A laboratory test to predict offset printability problems with coated papers." The method is capable of evaluating ink holdout, wet pick, and

water interference on a limited quantity of sample, with one relatively rapid test.

In "The effect of coating structure on ink absorption mottle," Toshi Inoue, Nippon Zeon, concluded that Croda ink density variations correlated better overall with coat weight variations than with surface latex concentrations.

Lois Settlemyer, Dow Chemical, spoke on "Topography and the corresponding effect on gloss as detailed with the scanning electron microscope." This method is especially applicable when typical gloss measurements do not agree with visual perception.

Anna Maija Leskinen, Jaakko Poyry Consulting, concluded the first session with a paper entitled, "Quality differences between North American and European coated papers." This survey concluded that different approaches may be taken to satisfy the printers' needs.

Printing theory

Patrice Mangin, PAPRICAN, chaired the afternoon session. Yuri Bery, Mead, presented the first paper, on the "Nature of ink film splitting." Relating the splitting and subsequent leveling processes and paper surface characteristics, Bery concluded that printing roughness is a better predictor of web offset print quality than paper roughness, but that added together, the two indicators have predictive accuracy better than 95%.

Tsutomu Hayashi, Chiba University, spoke on the "Dynamics of transfer and splitting of emulsified ink." Both video and acoustic measurements were made. The power density decreases with increasing water content of the ink, and ink filament length is reduced with increasing water content.

Nam Nguyen, PAPRICAN, described "Measurements of ink filament splitting patterns by image analysis." Overlap of ink filament droplets frustrates routine counting algorithms. The algorithm described in the paper shows linear increase of coverage and decrease of droplet number as the weight of the transferred ink film increases from 1 g/m² to 5 g/m².

Pertti Moilanen, Technical Research Centre of Finland (VTT), presented "Surface energy measurements of printing papers using the signal analysis." Fast contact-angle measurements, including dynamic and tilt-angle studies, are used to correlate roughness factors and surface absorptivity with surface energy levels.

Marie Wickman, Institute for Surface Chemistry, spoke about "Adsorption of ink binders on paper surfaces." Adsorption of

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Keshav Sharma, Claude Caloca, Bruno Chabot, Wanna Sananpanichkul, and Jean Rosinski (left to right), students who participated in the poster sessions, are presented with an honorarium by Thyagaraj Sarada and Patrice Mangin (far right).

Thyagaraj Sarada presents John Mercer with a plaque in recognition of his leadership during the 1988 and 1990 International Printing and Graphic Arts Conferences.

Photo by Susan Stevenson, *Pulp & Paper Canada*

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alkyd resins is favored by high molecular weight and low fatty-acid content and oil length. Dispersants negatively affect adsorption.

Yong-Hua Zang, PAPRICAN, presented "Asymmetric splitting and ink transfer: a new ink transfer model." New in this case means the addition of a splitting function that allows for a variable ink splitting ratio, depending on the amount of ink on the plate.

Dave McDowell, Eastman Kodak, concluded the afternoon with a survey of "Standards activity in the graphic arts." This talk explained the relation of the American National Standards Institute (ANSI) to the International Standards Organization (ISO) and to the four standards groups, particularly the Committee for Graphic Arts Standards (CGATS), within the United States that report to ANSI. He noted a trend away from "restricting" standards to "enabling" standards.

Four color offset printing: an umbrella project

Hans Heintze, Domtar, chaired the first Tuesday morning session, which contained four reports on different aspects of an extended full-scale printing trial. Åge Hansen, PFI, described the overall test operation in "Trial run methodology." Norske Skog Teknikk coordinated 27 full-scale print trials, over two years, at the Dagblad-Trykk newspaper in Oslo, Norway. Linting tendency, print quality, and roll/web behavior were measured during ordinary production.

Elisabeth Berli, PFI, presented "Part II: print quality evaluation by subjective comparison and image analysis." Image analysis techniques were developed that were linear with the subjective evaluation in evenness of solid print, evenness of 50% halftones, and print sharpness.

Erik Lindem, PFI, presented "Part III: linting in four colour offset printing." Linting of the 27 newsprint papers was quantitatively and qualitatively characterized. None of the predictive methods correlated well with blanket lint deposit quantities, although the GFL and VTT methods correlated well with paper sidedness.

Simon Papworth, Norske Skogg Teknikk, presented "An analysis of roll quality," which covered the trials and subsequent studies. The primary cause of out of roundness was roll position in the winder, but the primary cause of the form of the out of roundness was roll clamping.

ISO 9000

Session Chair John Mercer moderated the presentation of information about ISO 9000 and its effect on papermakers and suppliers. The panelists represented suppliers, a papermaker, consultants, and trained assessors experienced in the ISO 9000 field. A lively discussion followed the formal presentations by the panel members.

Raymond Lejuez, lead assessor, Det Norske Veritas, keynoted the discussion with an overview of the ISO 9000 certification process. He cited the EEC origins of the system and noted that quality system certification lays down principles that require interpretation. There are five standards in the series, ISO 9000–9004, whose U.S. counterparts are ANSI/ASQC Q90–94. The three substantive standards are nested: ISO 9001 is most stringent; ISO 9002 is somewhat less stringent and is the most used; ISO 9003 covers only product final inspection and testing and will likely be phased out soon. Standards ISO 9000 and ISO 9004 are guidelines for selection and use of the system. Certification procedures and follow-up audits were discussed.

Dennis Rose, Arkansas Eastman, cited 10 steps to ISO registration. These are: determining management commitment to registration, understanding the ISO guidelines, determining the scope of the company to be registered, setting up the implementation team, assessing the company systems against the chosen standards, improving needed systems and documentation, preparing the quality manual, training everyone involved, setting up an initial assessment, and submitting the company's manual to the registration body in preparation to host the assessment audit.

Marshall Grace, Engelhard, stated that compliance was market-driven. He noted five benefits from ISO registration in the areas of management involvement, enforced organizational disci-

Assistant Program Chairman, **Ted Waech**, Conference Chairman, **Thyagaraj Sarada**, Technical Program Chairman, **Joe Aspler**, and Local Chairman, **John Lind** (left to right) were the officers for the conference committee.

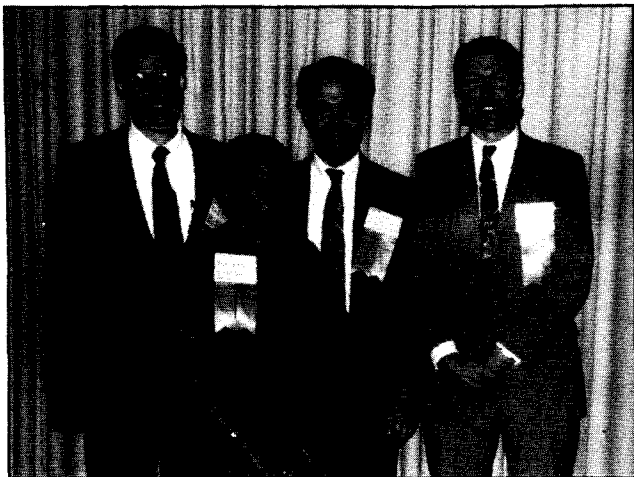


Photo by John Mercer

pline, training, communication, and provision of a consistent framework for quality improvement. However, he noted that ISO registration itself will not improve product quality or reduce costs. ISO registration can form an excellent basis for TQM or SPC programs. ISO 9000 certifies the quality system; it does not guarantee the results.

Persis Luke, Westvaco, observed that the coming of ISO did not necessarily mean changing quality systems, just writing them down in formalized documentation. She emphasized that the choice of ISO registering organization is critical to the value of the registration certificate to both the company and its customers. Regular internal reviews are important, and biannual surveillance audits are required to maintain certification. Westvaco's Covington, VA, mill was the first U.S. paper mill to become registered. She concluded that ISO certification is a solid, no-nonsense business decision with far-reaching benefits.

John Berk, Princeton Associates, noted that choice of ISO registrar may be driven by a company's markets: if there is a lot of business in the U.K., get a U.K.-based registrar. He cautioned that the reputation and experience of any ISO consultant or registrar be carefully considered, since not all ISO experts are equal. Registration may not be needed at all if a firm has no business need to do so. Registration can be by product line, manufacturing process, plant, or division. Depending on the scope of registration, the costs can be appreciable. However, he observed that the most significant expense is the internal cost of coming into compliance, because of training employees, documenting procedures, implementing required changes, conducting internal audits, and maintaining accurate records and files.

Testing methods

Dave Miller, Champion International, chaired the Tuesday afternoon session on testing methods, always one of the most popular topics at the IPGAC. Hans Heintze, Domtar Research, presented "The measurement of printed ink film thickness by X-ray fluorescence." The method is rapid, accurate, and precise and has been used in ink levels as high as 12 g/m². Inks must contain

Attendees enjoy viewing Torbjorn Helle's 3-D slides.

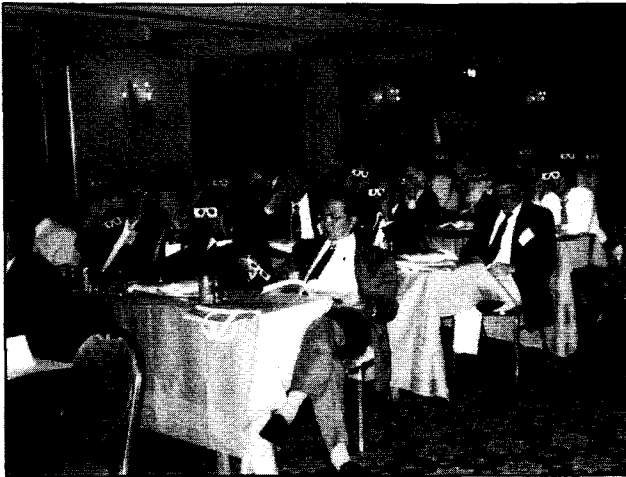


Photo by John Mercer

a material such as Prussian blue that gives a strong XRF signal.

Marie-Claude Béland, PAPRICAN, spoke on "A new image analysis method for fiber-rising measurement." "Fiber-rising" refers to the paper surface roughening that occurs when water and paper interact in offset or flexographic printing. This technique uses low-angle double-beam illumination to calculate a raised fiber index that correlates well with gloss for both coated and filled papers.

Recent Ph.D. Pia Wågberg, SCA Research, presented "A correlation between results achieved with an optical profile tester, conventional paper evaluation and printability." Noncontact, surface topography measurements made on unprinted and flexo printed linerboard show good correlation between regular evaluation methods and optical evaluation.

Raj Kumar, U.S. Postal Service, presented "Characterization of paper for printing of postage stamps," which detailed the development of a specification for postage stamp paper that includes a phosphor coating on the print surface.

David Lee, Weyerhaeuser Paper, spoke on "Ink jet image quality of plain papers." Theory, measurement, and performance of three image quality merit factors were compared.

Hitoshi Isono, Mitsubishi Heavy Industries, spoke on "Effects of paper structure on print quality." Freeze-section tomography is used to evaluate the structure of the base paper, coating, and ink. Variations in basis weight are of primary importance to observed print quality.

Torbjorn Helle, University of Trondheim, added a whole new dimension to the conference when he presented "Printing ink distribution on paper as studied by SEM techniques." 3-D slides vividly portrayed the capabilities of digital image manipulation applied to the SEM.

Gravure and flexography

Debora Jeske, Union Camp, chaired Wednesday's opening session. Joe Aspler, PAPRICAN, presented "Transfer and setting of water-based ink, part II: pH, water absorbency, and uncoated paper structure." Ink transfer increases with water absorbency,

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yet water absorbency does not affect ink penetration, except in extreme cases. Ink transfer is slightly more on acidic papers.

Steve Cushner, Du Pont, presented "A statistical approach to flexographic printing." This report described the formation of the Flexographic Quality Consortium, a group dedicated to add science to the rapidly changing flexographic printing industry. Factors leading to improved print quality were discussed.

Jean Rosinski, Western Michigan University, described "The role of ink and paper chemistry in water-based publication gravure." Acidic inks were shown to have reduced gloss and tonal response compared with alkaline inks. Contact angles and surface energies were discussed. Paper surface roughening, presumably due to water diffusion in the fibers, is a serious problem for water-based gravure.

Offset printing

Ted Waech, Beloit Research, chaired the second Wednesday morning session. Waech was the assistant program chairman for this conference and will be the program chairman for the 1994 IPGAC in Halifax, NS. Richard Goodman, Polychrome, spoke on "Basic lithography and offset printing plates: impact on printing problems." The advantages of a chrome-aluminum plate were cited, many of which accrue from carrying less water on the plate.

John O'Rourke, Toray, presented "The waterless printing process: U.S. market considerations and applications." Environmental concerns about alcohol-based dampening solutions and waste disposal, as well as economic factors, are an impetus for change. Waterless offset printing has penetrated several niche markets and is poised to increase its market share.

Pertti Moilanen, Technical Research Centre of Finland, spoke on "Runnability requirements on the offset newspaper press set by the newsprint." Rapid developments in offset printing requirements have pushed paper manufacture to or beyond economic limits. Based on extensive trials, recommended roll and printing conditions were given.

Hans Heintze, Domtar, returned to the podium to present "The measurement of linting tendency in mechanical printing papers." The Domtar Lint Collector proved to be a simple, efficient means to measure lint on an offset press. Press trials correlated well with several laboratory methods, but the important thing is to "get out of the lab and study what happens on real presses," he said.

Dimensional stability

Fer DeVos, Research North America, chaired the first afternoon session on Wednesday. Marten Gomer, Swedish Graphic Arts Research Laboratory (GFL), led off with "Factors influencing newsprint expansion measured with a test method developed by GFL." Lateral expansion between 0.02% and 0.11% occurs when newsprint passes through an offset nip. Higher ink coverage and printing pressures, decreased press tension, fewer chemical additives, and perhaps increased recycled content increase expansion.

Waech, Beloit Research, presented "Newsprint curl induced by offset printing." This was measured with a template, copies of which were distributed and eagerly snapped up by the attendees. Printing curl can be influenced in the last stages of the paper machine dryer.

Nils Thalen, Stora Teknik, presented "The influence of printing conditions on curl phenomena in newspapers." Curl was found to be influenced by the number of colors on each side, the amount of water on each side, the type of ink used, the layout of the printed image, and the climate to which the newspaper is exposed.

Per-Olov Trollsås, Swedish Newsprint Research Center, spoke on "Determination of time dependence of dimensional changes in newsprint." The increase in web width is nearly proportional to the square root of time in the interval 0.3 to 2 seconds. Paper with a higher fiber orientation had greater web width increases.

Fine, alkaline, and deinked paper roundtable

Susan Robie, S.D. Warren Research, chaired the last session of the conference. Derek Wilson, Coates Electrographic, began by asking "Are special papers the answer for high-quality nonimpact printing?" An examination of two contrasting systems was done to determine the relation of the system parts. Special papers play an important part in enhanced image quality but advances in the other components may provide more cost-effective images.

Lesley Barker, American Cyanamid, presented "Effects of surface-size treatment on printability of alkaline paper in ink-jet print tests." Image analysis techniques were used to quantify the relationship between print quality and paper sizing.

Jon Peters, GATF, presented "Printing on alkaline paper." Alkaline papers are more permanent, tend to be brighter and more opaque, and are more environmentally friendly than acid papers. However, alkaline papers tend to have more fillers, less absorptivity, and drying and setoff problems.

In an excellent first-time presentation, Gita Grube, Beloit Research, presented "Flexographic newsprint deinking." Flexographic inks tend to disperse into very fine particles that depress the pulp brightness. Flotation can remove some of the flexo ink, but washing is necessary in all systems containing large quantities of flexographic print.

John Ballbach, Valspar, presented the last paper of the session and conference, "Deinking trials for RadTech International." Given the proper choice of conditions, all materials could be repulped into higher grades, with the possible exception of water-based ink and water-based coatings where very fine ink particle size caused unacceptable brightness loss.

The full conference proceedings are out of print. Individual paper reprints may be purchased from: Books on Demand, University Microfilms International, 300 North Zeeb Rd., Ann Arbor, MI 48106-1346. Or call Books on Demand at 1-800-521-0600 (U.S.) or 1-800-343-5299 (Canada), ext. 3492.

Plan ahead

The 7th International Printing and Graphic Arts Conference will be held in Halifax, NS, Canada, Oct. 18-20, 1994. Joe Aspler, PAPRICAN, has announced the conference theme as "Advancing Through Cooperation." The call for papers was in the March 1993 *Tappi Journal* (p.28) and the April 1993 *Tappi Journal* (p. 241). Deadline for abstracts is Jan. 10, 1994; send abstracts to the Program Chairman, Ted Waech, Beloit Corp., 1165 Prairie Hill Rd., Rockton, IL 61072-1595 USA, telephone 608-364-8538. For conference information, contact Dave Paterson at CPPA Technical Section, 514-866-6621. 