

2006 TAPPI Coating & Graphic Arts Conference

4/24/2006 - 4/27/2006

Marriott Marquis

Atlanta, GA

4/24/2006
Session: 1

4:30:p.m. - 6:00:p.m.
Opening Session and Keynote Speaker

Keynote Speaker

Keynote Speaker: Samir A. "Mr. Magazine" Husni, Ph.D., Chair, Professor and Hederman Lecturer, Department of Journalism, The University of Mississippi

Dr. Husni is the author of the annual "Samir Husni's Guide to New Consumer Magazines". He has been called "the country's leading magazine expert", "the nation's leading authority on new magazines", and "the planet's leading expert on new magazines".

4/25/2006
Session: 2

8:00:a.m. - 9:30:a.m.
Understanding Print Quality

Moderator

John Roper, Dow Chemical

A Re-Evaluation of Factors Controlling Print Rub on Matt and Silk Coated Papers

Catherine Ridgway, OMYA Development AG, Speaker
Patrick A. C. Gane, and Thoralf Gliese, OMYA Development AG

Print rub, or ink scuff, remains one of the greatest challenges for the successful development of matt and silk matt offset coated papers. Using a recently proposed method for evaluating print rub, involving a non-slip pressure and friction-induced stress contact between a printed and unprinted sheet, this work seeks to test a newly-formulated hypothesis that the ability to improve print rub resistance is a function of coating surface capillarity (absorption) and adsorption properties, in combination with the roughness and compressibility/conformability of the basepaper-coating composite on the fibre-floc scale. A series of coated papers have been tested, ranging from woodfree single to multicoated grades, including the evaluation of compressibility and stretchability under pressure and shear both individually (pre-rubbing), to simulate external real-up, calendaring and converting processes, and in combination with the aged and conditioned printed surface. The findings are used to illustrate the corner points of an hypothesis, from which is deduced that the most resistant surface to print-rub is a combination of high capillarity and high surface area of the pigmented coating, aiding absorption and adsorption, together with a uniformly compressible basepaper-coating composite structure, such that contact shear forces are minimised. Under conditions of compromise, such as a coating surface exhibiting low capillarity, an incompressible/non conforming sheet can help reduce print rub due to minimised contact area. The evidence tends to suggest that a too rigid coating-basepaper combination, such as developed by many modern paper machines together with multi-coating, is exacerbating performance difficulties in this paper sector.

UV-Inks, Substrates and Wetting

Marian Rebros, Western Michigan University, Speaker
Paul Fleming and Margaret K. Joyce, Western Michigan University

Presently, it is desirable that one type of ink be suitable for printing on various substrates with different properties. Hence, the emphasis on new models and methods of printability prediction is necessary. The main objective of this work was to study and find correlation between physical properties of printing ink and substrate and finally how these properties can affect printability. For this purpose, contact angle measurement, surface tension measurement, rheology, and various methods for surface characterization of substrates were used.

Application of Imaging Reflectometry to Studies of Print Mottle on Commercially Printed Coated Papers

Janet S. Preston, IMERYS Minerals Ltd., Speaker

Anthony G. Hiorns, IMERYS Minerals Ltd.

Nick J. Elton, Surfoptic Ltd.

Göran R. Ström, STFI

It has been well documented that homogeneous coating structures are necessary for obtaining good, mottle-free printed papers. Point to point variation in porosity or chemistry can lead to differences in ink immobilisation and transfer and can produce either a print gloss or a print density mottle, which impairs the printed image. Measurement and quantification of surface porosity has proved difficult in the past. Methods such as mercury intrusion porosimetry are widely used in the paper industry, but will deliver a bulk porosity measure, which contains contributions from both the surface layers and the bulk of the coating. Various stain techniques such as the K&N or red wipe test have also been used to obtain a measure of surface porosity, but are also influenced by the roughness features of the substrate. Indeed, the question is often raised concerning the differentiation between a surface roughness feature and a pore. One way of assessing the surface porosity is to measure its effective refractive index (RI). The RI is a property of a material related to its composition and physical internal structure. In mixtures of materials the refractive index is usually a linear combination of the refractive indices of the individual components (Meeten & North1). In the case of microporous materials, RI often correlates directly with surface porosity (because the RI measured is a combination of the material refractive index and air). In this work, the refractive index, gloss micro and macro roughness distributions for three papers coated with PCC, kaolin and GCC were mapped using an imaging reflectometer. The data were then treated with a mathematical transform in order to be able to quantify the degree of variation that was taking place at each length scale. The coefficient of variation (COV) is the standard deviation divided by the mean, was used to quantify the variations in the coated paper and print properties. These results were then compared to the print mottle, which was evident after both lab scale printing and full scale sheetfed printing of the pilot coated papers. The commercial mottle was quantified both visually and using the DOMAS system (Digital Optical Measuring and Analysis System), and there was a reasonable correlation between these two methods. The degree of mottle and the rankings of the samples differed depending upon the area of print observed. The mottle in the black half tone areas was more severe than in the cyan full tone print. In the half tone area, the PCC had the worst mottle followed by the GCC paper and the kaolin coating had the least mottle. In the full tone area, the PCC coating was clearly the worst and the GCC was slightly better than the kaolin coating. In the halftone printed area, the propensity for mottle correlated with the COV of the coated paper RI. The scale of the variation which appeared to be most important was between 0.4 and 3.2 mm. This indicates that the surface porosity variation is responsible for unevenness of the final print. However, the rankings for the full tone print areas better correlated with the short time water absorbency of the coatings. The PCC coating had the slowest rate of water absorption at very short time-scales (<2s) and the highest non-uniformity in water absorption. This, in combination with a fast ink setting rate may have led to water interference mottle in the solid printed area. The non-uniformity in water absorption was defined as the COV of absorption time of point to point of flattered micro sized drops having a contact area of just below one hundred of a square millimetre. The COV obtained in this way also correlated with the DOMAS print mottle observed on the cyan printed papers A similar FFT band-pass analysis was performed on reflection images from both the basepaper and a burn out test on the coating layer. The same spatial distribution of unevenness occurred in the basepaper, coating layer and printed areas.

4/25/2006
Session: 3

8:00:a.m. - 9:30:a.m.
Overcoming Hurdles to Curtain Coating

Moderator

Robert W. Carlson, MeadWestvaco Corporation

A Study for the Statistical Optimization of a High Speed Curtain Coater

Peeyush Tripathi, Western Michigan University, Speaker

Margaret K. Joyce, Paul D. Fleming, Do Ik Lee, Western Michigan University

Masahiro Sugihara, Mitsubishi Heavy Industries Ltd.

High-speed curtain coating is an emerging technology trying to gain commercial acceptance by the paper industry as a non-impact coating process. Curtain coating could offer enormous economic and process advantages over conventional coating methods, due to its non-impact and excellent coverage at reduced coat weights. Due to its contour nature, it enables excellent coating coverage, resulting in equal coverage at lower coat weights than needed with contact metering coating methods, i.e., rod and blade. Due to non-impact and non-contact type of coating operation, curtain coating will operate with fewer sheet breaks or the strength requirements of the base sheet can greatly reduced. Being a contour coater, there is no film split patterning, and scratching. This results in the production of a defect-free coated surface. It is a versatile coating process, in that it enables a wide range of coating viscosities and coat weights to be applied with a single coater head. In the current study, process and material parameters were varied through a Taguchi OA (first phase) and D-optimal (second phase) design of experiments (DOE), to stabilize a pilot curtain coater at high speeds. The statistical DOE, enabled us to recognize contribution of variables to the curtain stability and optimized them in a relatively few number of trials. The variables studied were curtain height, steam flow rate of a steam substitution system, measures of coating rheology, surfactant dosage, coat weight, web speed, base sheet roughness and base sheet sizing. Trials were conducted at Mitsubishi Heavy Industry's state of the art coating research center in Hiroshima, Japan. The role of boundary layer air removal system was found to be critical to the stability of the curtain, especially at high speeds. Base sheet roughness, in combination with the parameters of the coating formulation, was found to be very important. Coating coverage improved with the smoothness of the base sheet and excellent coating coverage was possible at low coat weights. Higher curtain height and shear thinning coating rheology was favored for obtaining curtain stability at high speeds. The sizing of the base sheet impacted coverage and curtain stability at high speeds due to its impact on the wettability of the base sheet by the liquid curtain. The role of surfactants, although good theoretical understanding exists, was inconclusive.

Multilayer Curtain Coating: An Enabling Method For New Paper Functions

Robert Urscheler, Dow Europe GmbH, Speaker

Francis Dobler, Dow Europe SA

Jouni Haavisto, Metso Paper, Inc.

John A. Roper, Dow Chemical USA

Jouni Haavisto, Metso Paper

Curtain coating is an emerging low-impact premetered application method for coated paper and paper board. Significant work to date and some production experience on specialty papers has focused on single layer curtain coating. However multilayer curtain coating creates high market interest with many proposed advantages over single layer curtain coating. One advantage of lower material cost though use of functional chemistry in confined layers where performance is optimized within the coating structure. Another advantage is the ability to generate such thin layers, that even expensive chemistry, not applicable for common coatings technologies, becomes economically feasible. This paper reviews the potential of multilayer curtain coating to create new paper/paperboard functions and provides several working examples. These examples demonstrate the utility of using thin functional layers to create barrier properties, the use of chemical reactions between or within unique layers and the combination of these concepts into multilayer coatings that cannot be applied by any other coating method.

4/25/2006
Session: 4

10:00:a.m. - 12:00:p.m.

Basestock Relationship to Coating Structure and Porosity

Moderator

James T. Brown, Rohm and Haas Company

The Correlation Between Coating Penetration and Coating Properties

Kenji Hirai, Nippon Paper Industries Co. Ltd, Speaker

Douglas W. Bousfield, University of Maine

The quality of a coating layer, and the efficiency of the coating, depends to a large part on the penetration of the coating into the paper. Rheology and coating solids are known to influence the final product quality, but the mechanisms are not clear. Coating rheology has been correlated with final coating void fraction,

but its influence on coating penetration has not been reported. The influence of pigment shape on coating penetration has not been well documented because an economical method to measure coating penetration has not been presented.

The relationship between coating color rheology, pigment type, and coating penetration is reported here. Coatings that contain different pigments and additives are characterized in terms of viscous and elastic properties and applied to paper. Coating penetration is characterized using a confocal laser scanning microscopy (CLSM) in conjunction with image analysis.

The results indicate that both elasticity and viscosity prevent the coating penetration for pigments with a moderate shape factor. This relationship must be related to the flow rate into a pore. Kaolin pigments with a high shape factor have less penetration than the low shape factor pigment and do not depend on coating rheology. The results suggest that high shape factor pigments can block pores preventing pigment penetration.

Investigating Paper Structure Using Light Scattering

Anthony G. Hiorns, IMERYS Minerals Ltd., Speaker

The structure of paper is critical in determining many important properties, such as strength, liquid absorption and optics. Although the size of the various components, such as the fibres and pigments, in a sheet are known, the overall structure and porosity can change depending on how they are assembled. Traditionally, the pore structure in paper has been estimated by using mercury porosimetry. However, this technique has many complications and does not always give reliable results. It is proposed that light scattering can be used to study changes in paper structure. Modern spectrophotometers allow the easy and quick measurement of light scattering at many different wavelengths. This may be exploited by using the knowledge that the negative gradient of a log/log plot of light scattering against wavelength depends on scattering size. The higher the gradient, normally referred to as the wavelength exponent, the smaller the scatter size. The illumination used in the spectrophotometer can affect the results, especially if UV-active species are present. Examples of changing scatter size are given for latices of different sizes in suspension, highly filled SC papers and coating systems produced from pigments of various particle sizes.

The Influence of Thickeners on the Surface Structure of Coatings Evaluated by Pair Distribution Analysis - Correlations to Structure and Porosity

Alexandra Wallström, Karlstad University, Speaker

Lars M. Järnström, Karlstad University

In this study, the relation between surface structure and porosity of coated layers was investigated. The main objectives were to investigate whether the surface structure correlates with the structure of the dry coated layers and if pair distribution function analysis can be used to give additional structural information compared with traditional methods. The pair distribution function, $(\rho(r))$, was used to measure the effects of thickeners on surface structure and to describe how added thickeners affect surface structure on dry coatings, e.g., in terms of ordered domains. The effects of three different water-soluble thickeners—carboxymethyl cellulose, polyvinyl alcohol, and an alkali-swellable emulsion—on surface structure and porosity were compared. Polystyrene particles were used as model pigments. It was found that the dry surface structure (in terms of ordered domains) was not automatically determined by the bulk structure. Thus, the pair distribution function was found to be a powerful tool to describe how added thickeners affect surface structure on dry coatings. The surfaces of the dry coated layers were characterized with respect to both smoothness (RMS roughness) and order/disorder (ordered domains). These two features seem to be governed by different mechanisms.

The Effect of Pigment Particle Size, Chemically Structured Kaolin, and Coating Pore Structure on Rotogravure Print Quality

Siva K. Devisetti, Thiele Kaolin Company, Speaker

Harry D. Cook, and Prakash B. Malla, Thiele Kaolin Company

Light Weight Coating (LWC) studies were conducted using a cylindrical laboratory coater (CLC) to determine the effects of pigment particle size, chemical structuring of kaolin, and coating pore structure on coated sheet properties and rotogravure printability. These studies examined pigments spanning a wide range of particle size, while binder content was held constant. The results showed that, as expected, the larger the particle size, the larger the coating pore size. Pore volume remained relatively constant for the standard kaolin samples while it decreased for talc. Rotogravure printability as measured by the Heliotest

Missing Dot Method improved with increasing particle size while Parker Print Surf (PPS) did not show any trend with particle size. Chemically structured kaolin increased pore size, pore volume, PPS smoothness, brightness, opacity, and most importantly rotogravure printability, while it tended to decrease sheet gloss compared to an unstructured counterpart. Analysis of all of the available data indicated that, of the variables evaluated in this study, large pore size and smooth surface were the two most important parameters for improving rotogravure printability. Deficiency of one parameter may be compensated for by the other as long as minimum threshold smoothness is achieved. The Compressibility Factor measured from PPS values at two different pressures, and often used as an indicator of compressibility, did not correlate well with printability. Now that the significant factors affecting rotogravure printability have been identified, coating formulations can be designed to increase pore size and smoothness by appropriately selecting coating materials for improved rotogravure printability. From the pigment selection standpoint, a coarser delaminated clay or talc would increase pore size and smoothness. Chemically structured kaolin would also provide larger pore size and a smoother surface.

4/25/2006
Session: 5

10:00:a.m. - 12:00:p.m.

New in the Pressroom: "Color Management" - The Coating Formulator's Opportunity

Invited speakers will provide the printer's perspective, the terminology used, how color is measured, the affects of press design and ink on color, and how a coating can help or hurt a pressroom's ability to meet color goals.

Moderator

Jan C. Walter, Western Michigan University

Panelists:

Appearance Standards

Bill Garno, Rochester Institute of Technology (RIT)

Measuring Color in the Pressroom

Mark Fisher, X-Rite

Brightness and Whiteness, Paper's Color

Randy Branston, Ciba

Substrate's Impact on the Color Gamut

Veronika Lovell, Western Michigan University

Printer's Perspective

Jim Kohler, International Paper

4/25/2006
Session: 6

12:30:p.m. - 2:00:p.m.

CIG Lunch-N-Learn – Coating Materials (Pigments, Binders and Additives)

Moderator

Prakash B. Malla, Thiele Kaolin Company

The Applications of Insolubilizers in Aqueous Coatings for Paper and Paperboard

Gordon Bugg, EKA Chemicals Inc., Speaker

Coating Cost Reduction Strategies

Mark Cranch, Dow Chemical Corporation, Speaker

4/25/2006
Session: 7

12:30:p.m. - 2:00:p.m.
CIG Lunch-N-Learn -- Emerging Technology

Moderator

Amy C. Dimmick, Specialty Minerals Inc.

Trends in Coated Printing and Imaging Paper and Paperboard

Chuck Klass, Klass Associates, Speaker

Digital Today

Dan M. Clark, Rochester Inst. of Technology, Speaker

4/25/2006
Session: 8

12:30:p.m. - 2:00:p.m.
CIG Lunch-N-Learn – Calendering: Care and Operation of Polymer Rolls

Moderator

Mark A. Sorenson, Kuesters Paper Machinery Corp.

Mike Stoltz, Metso Paper, Speaker

Paul McCarten, Voith Paper, Speaker

Bob Carney, Stowe Woodward, Speaker

4/25/2006
Session: 9

12:30:p.m. - 2:00:p.m.
CIG Lunch-N-Learn -- Printing

Moderator

Margaret K. Joyce, Western Michigan University

Influence of Coating Composition on Tack Development

Peter Bauernschmid, Prufbau GmbH, Speaker

4/25/2006
Session: 10

2:00:p.m. - 4:00:p.m.
Pigment Design: Cause and Effect

Various invited suppliers discussing advances, chemistry, understanding products.

Moderator

Robert E. Hardy, PhD, Huber Engineered Materials

CaSO₄ Pigment Applications for Single Coated Paper Grades

Tarja Turkki, Kemira Oyj

Calcium sulphate pigments are used for coating of paper and board. Paper grades coated with calcium sulphate have become very popular for use in premium magazines and publications where the paper must reproduce photos to meet the highest quality standards. Using calcium sulphate, makes it possible to achieve properties that cannot be obtained by using any other pigment. Calcium sulphate is most suitable for bright paper grades like LWC, MWC and MFC printing papers, coated fine papers and various types of paperboard. Calcium sulphate is generated as a natural by-product of other industrial processes and consequently its production does not involve quarrying or crushing. This paper presents studies on calcium sulphate in single pigment coatings and as a co-pigment with calcium carbonate and kaolin for machine finished coated paper grades. The effect of calcium sulphate pigment and the particle shape of calcium carbonate on the coating layer structure was studied. The experimental work was done on the laboratory scale. The coating color properties, optical properties, pore structure and surface energy of the coating layer and ink setting characteristics were determined. The results show that there can be found significant benefits to use calcium sulphate as coating pigment: - The calcium sulphate coating colors have better water retention properties than carbonate or clay coatings. - The calcium sulphate gives paper coatings high brightness and whiteness and blueish shade. - The calcium sulphate gives less porous and more smooth coating surface. - The calcium sulphate based coatings have a lower ink requirement and the slower ink setting gives high ink density and delta gloss. There has been discussions about the solubility of calcium sulphate to the white water. Even though the calcium and sulphate contents in white water can be higher than usual, there has been no problems with the runnability. With coating applications, the calcium level of water circulation increase typically between 300 – 500 mg/l. Calcium sulphate does not precipitate to the circulation or there has not been any problems with the corrosion or the stability of wet-end chemistry.

Pigments Covered

Fuushern Wu, Rio Tinto Minerals (Luzenac), Speaker

GCC and PCC

Christopher R. Boothby, IMERYS, Speaker

Brazilian Clay

João Duarte, Para Pigmentos S. A., Speaker

4/25/2006
Session: 11

2:00:p.m. - 5:00:p.m.

Supplier Showcase

Moderators

Jan C. Walter, Western Michigan University

Robert L. Kearney, Western Polymer Corporation

Aqualon® AQU D-3066 Rheology Modifier for Use in Paper Coatings with 100% Calcium Carbonate Pigment

Paul Wilkens, Aqualon, Speaker

Calcium carbonate pigments provide advantages for paper coatings in terms of brightness, but these pigments exacerbate water loss from the pigmented coating into the base sheet, causing runnability issues and a need to compensate with lower-solids formulations. To address this issue, Aqualon has developed new cellulosic-based rheology modifiers that provide strong water retention performance, specifically for carbonate pigments. In addition to improved runnability, these rheology modifiers can provide better printing properties.

"OpTiSurf" - A New Optical Approach For Measuring Surface Roughness.

Kenneth Corscadden,

OPTest Equipment Inc, Speaker

This paper presents a new optical method for the measurement of paper roughness. The method provides valuable information about the spatial variation of surface non-uniformity. It can be applied to a very wide range of paper types, even specialty papers with laid lines or other imposed structure in the surface of the paper and is thus more informative than the traditional air-leak methods. The results of studies presented in this paper were performed on prototype and commercial instruments. A wide variety of paper types have been used, ranging from photo-quality inkjet paper to sack kraft. The paper reports on the dynamic range of the instrument, reproducibility of the technique, and how it compares to the traditional air-leak methods. The report demonstrates how the roughness data obtained using OpTiSurf can be used to benchmark the surface structure of a number of different papers and paper types.

Techpap "TOPO 3D", A Ground Breaking New Technology for Fast Micro Topography Measurements on Paper or Board

Joseph O'Leary, Techpap Inc., Speaker

The microtopography of paper can affect surface properties such as gloss and ink absorption, and may determine the quantity of coating color or level of calendaring required. Taking into account the specific needs of paper, CTP has designed a microtopography instrument dedicated to paper that uses the vertical scanning white-light interferometric microscopy method. This involves taking contact less optical measurements that provide a true observation of the surface, without any deformation and mechanical stress. Correlation checks have been made between existing test methods, with equations drawn from literature and the laws of physics with excellent results.

Electric IR vs. Gas IR

Cato Sandberg, Ircon Drying Systems AB, Speaker

Recent mill experience show Electric IR to be nearly 4x more efficient compared to Gas IR. With price of electricity at 4 cents/kWh and gas at 3.75 cents/kwh (\$11.00/MBTU) the choice is simple. An electric IR system generally has a ROI of 10 months. The price of Electricity over the past 15 years has held relatively steady while Gas pricing has been all over the map. (Graphs from the NY Stock Exchange will be shown to prove the point. New technology in Electric IR controlling the CD moisture with infrared temperature sensors that update the power supply setting to each 3" or 1.5" CD zone 10x/second is also picking up and correcting moisture variations in machine direction (MD). In the past Electric IR has been a headache for the Maintenance Department. Not anymore. Come and learn why?

New Liquid Delivery System for Paper Coating Applications

Ilkka Tamminen, C P Kelco, Speaker

CP Kelco has developed a high activity dispersion platform for their CMC product range. A key aspect of the program was to identify a delivery vehicle which would have low volatile organic compounds (VOC) as well as the characteristics of easy handling and pumping. The resulting product has VOC levels of less than 50% of competing liquid rheology modifiers available. High speed pilot coating has also shown increased paper and ink gloss compared to competing products, which has also been validated in mill trials. Whilst the feedstock for the product to be illustrated in this paper is one specific grade from the current CMC portfolio, the delivery platform can be utilized for all of our products.

Measurement and Display of Coated and Base Sheet Topography using Verity IA Optical Surface Topography Analysis System

Roy Rosenberger, Verity IA L.L.C., Speaker

The Verity-Topo system numerically ranks the surface topography of paper. The top surfaces of uncoated and coated sheet, base sheet, web, and board as well as linerboard are measured using a system composed of a computer, a specially modified graphics quality flat bed digital scanner, and the Verity-Topo analysis software. The software uses a measurement algorithm closely related to the ones used in the well established Verity IA formation and print mottle systems. The flat bed digital scanner system utilizes a line-scan camera and illumination apparatus designed to produce large images for analysis, typically 15 cm x 15 cm and larger. The entire image area is analyzed and produces a number that represents not just the small area typical of other roughness, profilers, and printability instruments, but one that is truly representative of the entire surface. The example images included were produced under typical production quality control conditions.

Optimization of Rutile Placement in Coated Freesheet for Maximum Fluorescence and Appearance Uniformity

Michael Evans, DuPont Titanium Technologies, Speaker

The "quenching" effect of rutile on optical brightening agents can be significantly reduced by proper placement of rutile in the sheet structure. In addition, fine-scale appearance uniformity is improved by rutile addition to the base paper while the larger formation-scale appearance uniformity is improved by rutile addition to the coating.

Barrier Composition

Anthony Jabar, Cerealus Holdings LLC, Speaker

HOLDOUT™ is an aqueous paper additive designed to replace fluorinated compounds in the manufacture of oil and grease resistance papers. HOLDOUT™ is based upon a thermoplastic protein extracted from corn. HOLDOUT™ imparts oil and grease resistance to a wide range of paper and paperboard products. HOLDOUT™ is formulated to be used in conventional size press or coating applications.

Specialty UV Coatings and Finishes

John Bervoets, Henkel Corporation, Speaker

This is a showcase of unique and innovative UV curable coatings and finishes. These revolutionary systems allow designers to create eye catching effects on folding cartons, magazines, posters, POP displays, greeting cards and many more. Imagine the ability to make snow on a mountainside, raindrops on a window or leather on a jacket come to life. How about a coating system that simulates aluminum foil? The possibilities are endless!

Coaters Made of Innovative Materials

Oliver Rudolph, Voith Paper GmbH & Co.KG, Speaker

The author will describe the development of the coater design using ferrous-based materials in the beginning and Voith today building applicators for film presses as well as coater blade beams made of CFRP. The driving force for entirely revising the coater model portfolio will be explained. Besides the new complete coater stations also retrofit packages are available to upgrade existing installations. Finally the advantages and benefits are shown together with some practical results.

OptiCleaner Coat - The Dependable and Safe Way to Clean Coater Backing Rolls

Pamela K. Hynnek, Metso Paper, Speaker

Metso Paper's new OptiCleaner Coat backing roll cleaning system is the dependable and safe way to keep coater backing rolls clean. This modular, automatic system is designed for use with both on- and off-machine coating heads. Both automatic and operator initiated manual cleaning are possible. Both full width and spot cleaning can be done. Successful paper and board references are proving that OptiCleaner Coat reduces both paper waste and cleaning time, and improves safety.

Omya's Multidimensional Pigment Concept

Bernd Balzereit, OMYA International AG, Speaker

Omya's Multidimensional Pigment Concept offers added value for filler and coating solutions for modern papermakers of today. The use of synergies between ground and precipitated calcium carbonate, together with the chemical modification of pigment surfaces opens up a brand-new area of pigments achieving excellent quality and printability. As a result of extensive research and development a variety of new

products have recently been launched and new innovative pigments are in the development pipeline. The benefits of the Multidimensional Pigment Concept, is demonstrated on a number of new product families which will be introduced and presented at this Supplier Showcase.

PVOH - Dispelling the Myth

Kelli Ingram-Wesley, Celanese LTD, Speaker

This presentation will review the variety of PVOH applications in coatings and the paper industry. Focus will be given to broad applications and coating methods to dispell the myth that PVOH is just another adhesive.

National Science Foundation Center for Barrier Coatings at Western Michigan University

Margaret Joyce, Western Michigan University, Speaker

WMU has received notification from the NSF that WMU, in conjunction with MSU's School of Packaging, will receive a planning grant to determine corporate interest in establishing a center for research and development in barrier coatings. NSF identified barrier coatings as being of significant, widespread commercial interest, and WMU and MSU as having the expertise and facilities to carry out the work. This talk will outline the NSF requirements and timeline for establishing the center.

Gaining a Competitive Edge with Multi-Pigment Building Blocks

Dave Bakshi, IMERYS, Speaker

Gain a competitive edge by using IMERYS' broad portfolio of shape-size engineered kaolins and carbonates. Our multi-pigment solutions will help you reduce costs, improve paper quality, and develop new grades. Benefit from the world class pigment knowledge and applications skills of IMERYS' technical experts. Profit from the synergy of complementary building blocks, like Contour Xtreme shape-engineered kaolin and steep carbonates like Opti-Cal coating PCC or Carbopaque GCC.

Paper Coating SBR Latex Replacement Technology

John van Leeuwen, EcoSynthetix Inc, Speaker

ECOSPHERE® biopolymer nano particles provide a lower cost alternative coating binder based on a renewable resource – modified corn starch. It does not require cooking and can be supplied in either dry or liquid slurry form. Particle size at 50-150 nm is smaller than SBR latex. Viscosity and rheology are similar to SBR and PVA. It can be substituted for conventional latex (SBR)and potentially PVA& Vinyl Acrylics. Cost does not depend on the increasing price of crude oil.

New Products for Improved Performance

Jim Vaughn, RohmNova, Speaker

RohmNova's new lubricant, XL 4200, is a 100% active paper coating lubricant. It is ideally suited for high temperature calendering applications by offering release without breakdown or smoking. In conventional super calender applications, XL 4200 can replicate the lubricity and anti-dusting performance of calcium stearate at one-half the dry formulation level. This translates into substantial savings in mill costs, without sacrificing performance in both offset and rotogravure coating formulations. In certain formulations, gloss improvement can be attained.

Improved Permanence and Inkjet Color Brilliance on Surfaced Sized and Off-Line Coated Papers

Dana Field, Esprit Technologies

Recent market developments are requiring inkjet bond papers to perform at levels never before expected. Color density, water-fastness, image acuity are now being demanded by many of the major OEM and aftermarket brands. Esprit had developed unique chemistries to deliver a boost to your current surface sizing and off-line coating formulations. Let us demonstrate how we can help your product meet these market requirements

60 Years of Customer Success and Innovation That Changes the Game

Femi O. Kotoye, Dow Chemical USA, Speaker

To enhance our ability to serve customers, Dow Latex has launched the Paper/Paperboard Expertise Center, a resource that offers convenience and rapid response for technical support. We will give an overview of this new service. Product technology is a hallmark of Dow Latex. We will give a review of exciting developments, including High Performance Binders to help reduce cost; new generation hollow-sphere pigments that offer higher gloss; and latexes optimized for use with engineered pigments or high starch formulations.

New Common Machine Vision Technology for Paper and Other Flat Sheet Processes

Mikko Ruuska, Advanced Service Providers, Speaker

Vision technology is one of today's fastest growing applications, driven by dramatic new developments in cameras, in mathematical imaging analysis and data processing power. Viconsys has brought these

dramatic new technologies together in a unified and very advanced Machine Vision and Web Inspection System for the Paper Industry, with superior event detection capability compared to today's systems. Advanced Service Providers is the United States Sales, Installation and Service Company for Viconsys.

4/25/2006
Session: 12

4:00:p.m. - 5:30:p.m.
Hagemeyer Society Reception/Fundamentals CIG

Moderator

Anthony V. Lyons, IMERYS Pigments Inc.

Moderator

Roger W. Wygant, IMERYS Pigments for Paper

Effect of Optical Brightening Agents and UV Protective Coating on Print Stability of Fine Art Substrates for Ink Jet

Veronika Chovancova, Western Michigan University, Speaker

Dan Fleming, Western Michigan University

Non-impact printing is gaining wider acceptance in the printing world with one of the rapid growing applications being the fine art non-impact color printing technology. With the right amount of artist's imagination and combination of right substrate and ink, it is possible to create piece of art work that will last for a long time. The choice of proper substrate and coating, ink jet inks together with some form of protection for ink jet printouts is discussed here. Substrates with special ink jet coating with and without optical brightening agents (OBAs) were chosen for this work. The ink stability of prints with time was observed and lightfastness tests were performed in order to evaluate the stability of printed color patches on specific substrates. Special UV coating was applied to study its protection level. Results of accelerated lightfastness tests for the different substrates are interpreted in terms of change color gamut volumes and ?E.

A Simple Method for Calculation of Permeability Coefficient of Porous Media

Lokendra Pal, Western Michigan University, Speaker

The fluid storage capacity of porous media such as paper and paperboard is mainly determined by its porosity, whereas the absorption and spreading rate is determined by the permeability. A simple method for calculation of permeability coefficient of porous media is described. The permeability coefficient may be calculated by Darcy's equation [1] using Parker Print Surf porosity (which is primarily sensitive to air permeability) [2-5]. The permeability coefficient may be used for ranking porous media in fluid absorption and spreading rate and for estimation of pore size. Likewise, the coating thickness required for given barrier and printing performance may be estimated.

Evaluation of Cylinder Cell Depth and Optimal Printing Conditions for the Application of Conductive Inks on Flexible Media Using the Gravure Process

Scott Williams, Rochester Institute of Technology, Speaker

Tracy Taylor, Rochester Institute of Technology, Speaker

The low-cost production of electrically conductive circuit elements will require the precision inherent in the printing method. Whereas, screen printing has been used to achieve ever-smaller devices, such as cell phones, the higher volume printing processes will be needed to meet the current market demands. The gravure process is being evaluated for its high precision, long run length and ability to meter a range of ink film thicknesses onto a variety of substrates. Our investigation will focus on the best conditions for printing a silver-based conductive ink formula onto two types of substrates: nonwoven cellulosic and multilayer extruded film supports. The physical properties of the ink formulation will be studied in relation to the press and substrate requirements in order to produce a functionally printed electrically conductive image. One key parameter, for the printing of solid conductive patches, will be the dependence of cylinder cell depth as a function of contiguous conduction efficiency. This research supports the initiative at RIT to print active photovoltaic and RFID-related circuit structures.

Optimal Flexographic Printing Conditions for the Application of Conductive Inks on Flexible Media

Erica Passarell, Rochester Institute of Technology, Speaker

Scott Williams, Rochester Institute of Technology, Speaker

Conventional printing methods possess the precision necessary to produce low-cost radio frequency identification circuits and antennas. Flexography has been identified as the best method for printing these devices. There are, however, still many process variables that need to be optimized in order to effectively produce these devices on a large scale. Our investigation will focus on the best conditions for printing a silver-based conductive ink formula onto two types of substrates: nonwoven cellulosic and multilayer extruded film supports. The physical properties of the ink formulation will be studied in relation to the press and substrate requirements in order to produce a functionally printed electrically conductive image.

This research supports the initiative at RIT to print active photovoltaic and RFID-related circuit structures using the benefits inherent in the flexographic printing process.

Dye Aggregate Formation Initiated by Ink Jet Printing

Aaron Bodell, Rochester Institute of Technology, Speaker

Scott Williams, Rochester Institute of Technology, Speaker

Polymethine dyes are unique molecular organic colorants with the inherent special ability to form ordered aggregates useful to the imaging, security and device manufacturing industries. Such aggregates form under very specific conditions and can be used in a variety of ways. Uniform structural and electronic properties could be achieved by controlled synthesis using a multi-step ink jet process. When reagent combinations are deposited stepwise onto paper, functional aggregates may be formed. We will report results related to the formulation of the ink jet ink and promoter compositions necessary to make structurally uniform n-mer aggregates. The preferred n-mer aggregate, known as a J-aggregate, produce a very narrow absorbance band that is bathochromically shifted when compared to the spectrum associated with its monomeric state. This n-mer form, as ink, opens the door to the development of a new form of charge separation media needed for efficient low-cost photovoltaic devices. Research results will be presented that further the goals of using ink jet methods for printing functional molecular structures.

4/26/2006

Session: 14

8:00:a.m. - 9:30:a.m.

Optimizing Multi-Layer Coatings

Moderator

Femi O. Kotoye, Dow Chemical USA

User's Perspectives

Femi O. Kotoye, Dow Chemical USA, Speaker

Coating Selection Considerations

Guillermo Bluvol, OMYA AG, Speaker

Use of Predictive Modeling to Explore Techniques to Improve Recycled Board Coating Performance

Bill Cynecki, Dow Chemical, Speaker

Dan Obermiller, Don Ervick, Chad H. Warmbier, David Hammond, Gregory W. Welsch, Dow Chemical
Coating paper or board is a complex operation involving many process variables that can change with each new run. The goal of process optimization involves analyzing enormous amounts of data in order to make the best possible decision. Traditional methods consist of manual regression by experienced individuals. That process is tedious and time consuming and may sometimes miss key relationships. The following study uses predictive modeling to analyze process data for optimization. A recycled paper mill wanted to know what size diameter rod to install on their new precoater in order to optimize performance. Pilot coater trials were conducted to study the impact of rod diameter, tube pressure, and base coat formulation solids on the recycled board coating system. These results were statistically analyzed to determine the impact of the study variables on brightness, smoothness, coat weight of the base-coat as well as brightness, DuPont appearance, smoothness, coat weight, and K&N % brightness drop of the top coat. It was determined that the base coat formulation solids had the most impact on DuPont appearance, brightness of both the base coat and top coat, and coat weight pick up. Rod diameter and base rod solids both had a high impact on K&N % brightness drop. Predictive modeling was used to optimize properties by using the desirability function to identify the highest DuPont appearance value possible at the lowest air knife coat weight.

Reducing Backtrap Mottle in Multi-Layer Coating Systems: Influence of Precoat Composition and Structure

Richard Gagnon, Dupont Soy Polymers, Speaker
Don Hiscock, Dupont Soy Polymers

Backtrap mottle in commercially printed SBS paperboard signatures was significantly reduced when precoat pore structure (diameter and volume) was modified through the inclusion of a highly associative binder. Precoat pore diameter increased while total pore volume decreased with the addition of soy protein. Measurements were made to estimate the rate at which each coated surface removed solvents from ink and to describe the relative uniformity of coating permeability. Solvent removal rates suggested that precoat structure produced a significant influence on overall ink / paper interactions.

4/26/2006
Session: 15

8:00:a.m. - 9:30:a.m.
Coating Stability and Runnability

Moderator

Donald F. Hiscock, DuPont Soy Polymers

Elimination of Misting During High Speed Metered Size Press Coating of Starch Containing Coating Colors with a New Hyper-Branched Polymer

Detlev D. Glittenberg, Cargill Industrial Starches, Speaker
A. Becker, A. Voigt, A. Kramm, Cargill Industrial Starches
Henk Van Den Abbeele, Topchim NV

To eliminate a misting problem at 1800 m/min a customer had reduced the starch proportion in the more critical topside formulation. For reasons of printability and economy it should be tried to increase the starch level. It is known that certain additives that influence rheology are suited to reduce misting. Hyper-branched polymers are selectively constructed using polyvalent building blocks. The advantage of this procedure is that a very defined molecular structure with respect to molecular weight and hydrophilic/hydrophobic regions can be generated. Comparing with 2 others the hyper-branched polymer outperformed significantly with respect to misting reduction in a formulation containing 30% starch as a co-binder during pilot trials. Whilst a LWC formulation with 5 parts starch plus 7 parts latex could be run at 1700 m/min and 8 g/m² deposit a swap of the binder composition to 7 parts starch plus 5 parts latex lead to misting under the same conditions. The addition of 0,4 parts of a specific hyper-branched polymer to the latter formulation not only eliminated the misting but allowed to increase the speed to 1950 m/min despite the fact that due to hydrodynamics the add-on had increased to 10 g/m² and side.

Material Retention - A Novel Approach to Performance of Pigment Coating Colors- Part 1.

Laboratory Evaluation

Ken McKenzie, C P Kelco, Speaker

Anne Rutanen, Jukka Lehtovuori, Jaana Ahtikari, Teuvo Piilola, CP Kelco OY

Continually increasing machine coating speeds together with new coating color components have put more emphasis on the importance of the correct rheology and water retention of the coating colors to achieve good runnability and end product quality. In the coating process, some penetration of the aqueous phase, to the base paper or board must occur to anchor the pre-coating to the base or the topcoat to the pre-coat. The aqueous phase acts as a vehicle not only for the binder, but also for the other components. If this water or material penetration is not controlled, there will be excessive material shift from the coating color to the base, before immobilization of the coating color will stop this migration. This can result in poor machine runnability, unstable system and uneven coating layer, impacting print quality. Rheology modifiers or thickeners have tended to be evaluated on the performance of the coating color by the term, "water retention". This simple term is not sufficient to explain performance changes during coating. In this paper we are introducing a new concept of "material retention" considering the control of all of the mobile material including water in the coating color.

Parameters Affecting Coating Color Impact on the Traveling Sheet

Martin F. Kustermann, Voith Paper GmbH & Co. KG, Speaker

Franz Fischer, Voith GmbH

Norbert Alleborn and Daniel Gerlach, Universitat Erlangen-Nurnberg

Free jet coating application is today's most common blade coater type for modern high capacity machines. The study reported in this paper was initiated in order to investigate on a scientific basis the role of some important parameters governing this process. The so called "backflow" phenomenon was found to be dependent on speed as well as on the real impingement angle of the jet of liquid coating color impinging on the paper. The latter being effected not only by the machine setting, but also by operating conditions. When investigating the forces at the point of impingement, there was the idea to get an estimate to which extend these may contribute to sheet tensioning on one side and to requirements on the rheology of the coating color, respectively.

4/26/2006
Session: 16

10:00:a.m. - 12:00:p.m.

Barrier/Functional Coatings

Moderator

Steven P. Ottone, Dow Reichhold Specialty Latex

Water Resistance, Polymeric/Pigmented Coatings for Linerboard Wax Replacement

Roman E. Popil, Inst. of Paper Science & Tech., Speaker

Wax replacement alternative technology for corrugated containers is becoming increasingly prevalent but requires improved economics over wax to further promote its introduction into the industry. Incorporation of pigments with appropriate characteristics can increase barrier properties of coatings and improve the economics of wax alternative coatings. This paper demonstrates through laboratory trials the possibilities of improved water resistance by using clay base coats followed by a polymer top coat in a two stage coating process. The combination improves the polymer coating quality while increasing the compressive strength of linerboard allowing a reduction in the weights of required polymer top coat and linerboard for increased performance and cost effectiveness. Incorporation of platy clays and talc as blends with an acrylic polymer was also investigated along with calendering effects to suggest a best case scenario for simplicity and optimal economics.

Drivers of Change In Barrier Packaging

John Bernardo, Albertsons, Speaker

Oil and Grease Resistant Packaging-Challenges and Solutions

Ruth Watts, Ciba Specialty Chemicals, Speaker

Water Resistant Barrier Packaing and the Next Generation Beyond Wax and Extruded Polymer Films
Martin A. Cohen, Michelman, Inc., Speaker

Application of Aqueous Barrier Systems: Traditional and Non-Traditional Approaches
John G. Kokoszka, EvCo Research LLC, Speaker

4/26/2006
Session: 17

10:00:a.m. - 12:00:p.m.
Maintaining Stiffness and Bulk

Moderator

Keith D. Hammonds, MeadWestvaco Coated Board

Effect of Sheet Moisture and Calender Pressure on PCC and GCC Coated Papers

Amy C. Dimmick, Specialty Minerals Inc., Speaker

Previous work demonstrated that narrow distribution coating PCC allowed high moisture calendering with no loss of optical properties. Broader distribution pigments exhibited a significant loss of optical properties when moisture increased and pressure was adjusted to match initial gloss. This report rationalizes these results by considering macro- and micro-smoothness. It is demonstrated that narrow distribution coating PCC produces high micro-smoothness even in the absence of calendering; calendering is only necessary to supply macro-smoothness via base paper deformation. Therefore at higher moisture, pressure can be reduced so no additional base paper deformation occurs and optical and physical properties of the final coated paper are equivalent to those achieved with lower moisture and higher pressure.

Filler Type, Level and Property Effects on Bulk and Stiffness

David Cummings, IMERYS, Speaker

Binder Contributions to Stiffness

Don Hiscock, Dupont Soy Polymers, Speaker

Mechanical Contribution

Stig Renvall, Metso Paper, Speaker

4/26/2006
Session: 18

2:00:p.m. - 4:00:p.m.
Finishing Techniques to Obtain Desired/Unique Printing Surfaces

Moderator

Mark A. Sorenson, Kuesters Paper Machinery Corp.

Improved Productivity and Superior Calenderability Provided by PCC

Seppo Siven, Specialty Minerals Inc., Speaker

Paper making operating efficiency can be improved by optimization of single unit processes. The total efficiency is depended upon the weakest loop in the chain. One of the critical factors affecting calenderability is coating pigment selection. Paper is calendered to improve surface quality. Online calendering speed is typically 2-3 times higher than offline speed. High speed calendering conditions put more challenges on coating pigment properties. Higher process temperatures and shorter residence times favor pigments which make bulkier coating structure and easily polishing surface. Pilot scale calendering studies showed 50 % increase in calendering speed in LWC and WFC grades when PCC coating pigment was used instead of a mixture of clay and GCC.

Panel Discussion: Challenges with On-line Multi-Nip Calendering in Off and On Machine Coaters

Martti V. Tuomisto, Metso Paper USA Inc., Panelist

Ulrich Rothfuss, Voith Paper GmbH & Co. KG, Panelist

Mark A. Sorenson, Kuesters Paper Machinery Corp., Panelist

4/26/2006
Session: 19

2:00:p.m. - 4:00:p.m.
Package Printing Using Flexography

Moderator

Bob Kearney, Western Polymer Corporation

Flexo Primer

Kern Cox, Clemson PrintCon, Speaker

Types of Flexo Plates, New Technology

Bob Hannum, DuPont Cyrel, Speaker

Advances in Flexo Ink Technology

Steve Brown, Flink Ink, Speaker

Bringing it all Together - Building the Coating Converters Needs

Phillip Bradley, MeadWestvaco Corporation, Speaker

4/27/2006
Session: 20

8:00:a.m. - 10:00:a.m.
Getting Unique: Future Uses and Requirements of Paper and Paperboard

Moderator

Jim Niemeic, Store Enso North America

Publishers Perspective

Jerry Faust, Time Inc., Speaker

Putting it to Paper - Guidance from the Printer

Chuck Miotke, Quebecor World Midland, Speaker

Paper's Place in Packaging

Andrew Dun, Tetra Pak, Speaker

Importance of Supply Chain Collaboration to Introduce New Materials

Doug Marcero, MeadWestvaco, Speaker

4/27/2006
Session: 21

10:30:a.m. - 12:00:p.m.
Increased Return on Investment - Using Coating Equipment in Unique Ways

Moderator

Don Hiscock, DuPont Soy Polymers

Chuck Klass, Klass Associates, Speaker

Larry Gaspar, Gaspar Associates, Speaker

Jeff Siegel, Mica Corporation, Speaker

Joseph LeBlanc, Smurfit-Stone Container Corporation, Speaker