



Coating & Graphic Arts, Process Control papers honored at PaperCon

More than 1750 industry professionals met in Minneapolis, MN, this April for PaperCon, TAPPI's annual conference that features a multi-track technical program, seminars, networking, and exhibits. Technical program tracks included coating, papermaking, additives, process control, nonwovens, and fluid dynamics. There were also tracks on mill leadership perspectives and employee retention.

A highlight of this year's event was keynote speaker Marcus Shingles, CEO of the XPRIZE Foundation, who spoke about the benefits of disruptive change in his presentation, "Uber yourself before you get Kodaked." He noted that, in today's high-tech world of exponential, not linear, change, large companies – including traditional ones – are asking how to reach a 10X improvement instead of just 10% without needing ten times more people or resources. Shingles sees the answer in different management and planning. From quantum computing to "hyperloop" transport technology, he challenged attendees to consider a variety of disruptive changes.

Another event highlight was the annual PaperCon Awards Dinner, where Honghi Tran, professor in the Department of Chemical Engineering and Applied Chemistry at the University of Toronto, received the Gunnar Nicholson Gold Medal – the highest honor TAPPI bestows on an individual. Among other notable awards given at the dinner were four awards for best PaperCon 2017 and 2016 (assessed after the event) papers described in this column.

Coating & Graphic Arts Division Best Paper Award 2017

"The role of base substrate in barrier and convertibility properties of water based barrier coated (WBBC) paper board and paper"

*P. Miettinen, M. Abokas, T. Engstrom, J. Heinonen
(CH-Polymers Oy)*

S. Auvinen (Tampere University of Technology)

This paper studied the role of base substrate variables in dispersion coverage and barrier properties. The new genera-

tion WBBC solutions used in the study are partly based on bio materials and link together knowledge of both polymer dispersion chemistry and novelty special pigment development.

Also studied was the effect of how dispersion film coverage and surface structure affect the convertibility of dispersion coated packaging materials. Heat sealing of the dispersion coating layers against each other is usually easy, but problems can occur. Very high sealing temperatures where the dispersion coating is sealed against the uncoated surface can be lowered by closing the substrate structure before dispersion coating, as with a small layer of standard pigment coating. Pre-coating also makes the base material more dense and smooth, so in general, the dispersion coating coverage and barrier properties are assumed to improve.

The barrier properties analyzed were KIT test, grease and oil barrier, water vapor, oxygen barrier, and water resistance. The convertibility properties of dispersion coated paper materials were evaluated by creasing tests. The structure of base material was analyzed by different porosity and roughness measurements, such as optical profilometry, SEM, and other microscopy techniques.

Coating & Graphic Arts Division Best Student Paper Award 2017

"Conductive carbon-nanocellulose coatings on paper"

*V. Kumar, S. Forsberg, A. Engstrom, M. Nurmi
(Åbo Akademi University)*

C. Dahlstrom, M. Toivakka (Mid Sweden University)

This work aims at demonstrating large scale production of flexible low-cost paper-based electrodes utilizing graphene, nano-graphite, and graphite coatings. The large aspect ratio of graphene limits the suspension solids content to very low values, which makes it challenging to create thick coating layers required for high conductivity. The combined use of nanocellulose as binder and viscosity modifier, together with a custom-built slot coating device, enabled roll-to-roll coating of thick conductive coatings on paper.

The rheological and water retention properties of carbon-nanocellulose suspensions were reported. The influence of coat weight, carbon black addition, and calendering on coating structure and the resulting conductivity of the coatings was investigated. The lowest surface resistivities obtained were in the range 1-2 Ohm/sq for 15 gsm coat weight.

Best Process Control Paper 2016

["Characterization of paperboard formation using soft X-radiography and image analysis"](#)

*D.S. Keller, H. Abedsoltan (Miami University)
G. Wood (Verity IA)*

While the uniform distribution of fibers in the forming section is of paramount importance, imaging and subsequent analysis of paperboard formation has been difficult. Few systems have sufficient energy to penetrate paperboards with grammages values exceeding 120 g/m² with sufficient sensitivity to determine mass variation at the spatial dimensions useful for characterizing the inherent flocked structures.

To find a more precise imaging method with a higher spatial dynamic range, the researchers investigated the use of 6 keV soft X-radiography with both film and storage phosphor screens to obtain a continuous image of paper formation within a 70-mm² region of interest. This presentation describes the acquisition method for soft X-radiography that enables capture of images suitable for advanced statistical and spectral formation analysis. When using film and scanner, individual fibers throughout the board structure are discernable with high sensitivity and depth of field. Use of storage phosphor systems as the image detector 2 enables rapid imaging at more practical resolutions. From these images, grammages maps are subjected to statistical, spectral, and customized routines. These routines provided statistical pathways to correlate the formation images with other end use properties, such as surface topography and print quality.

Jasper Mardon Memorial Prize for Best Papermaking Technology Paper 2016

["Innovations in plant-wide monitoring, diagnostics, & optimization"](#)

R.C. Rice, D. Nash (Control Station Inc.)

From operations and engineering to maintenance and management, control loop analytics target the unique information needs of those groups that are tasked with maximizing uptime and achieving production goals. This presentation covers recent innovations in control loop performance monitoring (CLPM), specifically in context of the pulp and paper industry, to demonstrate the value of loop analytics.

The typical paper mill operates hundreds of PID control loops and maintains an even larger quantity of production assets. The typical plant historian stockpiles data, and extracting information that is actionable and relevant to performance can be a challenge.

Control loop analytics leverage the information stored in a production facility's data historian. Technologies like PlantESP actively evaluate PID control loops on a plant-wide basis, identifying issues that undermine production performance and lead to shutdown. These technologies also isolate root causes and recommend corrective actions. **TJ**

➔ **Next year's PaperCon will be held April 15-18, 2018, in Charlotte, NC. Learn more about the 2017 program, sponsors, and exhibitors at www.papercon.org.**