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HIGHLIGHTED PAPERS: NIP26 / DIGITAL FABRICATION 2010

Eco-Friendly Prepared Chemical Toner with Mixed Polyester Resin

Eui-Hyun Ryu, Sung-Yul Kim, Il-Hyuk Kim, and Kyung-Yol Yon, Samsung Fine Chemicals (South Korea)

Abstract: Mixed polyester resins are fascinating materials in toner development because of the possibility to tune the toner properties by the simple mixing of different resin components. But the miscibility of two different components with quite different properties is still a challenge in both pulverized and chemical toners. For chemical toners, one alternative is to use organic media to dissolve both components, but this still generates environmental problems because of the increasing level of volatile organic compounds (VOCs) used on during production and released during usage.

We have developed an eco-friendly process to reduce the amount of VOCs in toner. Every process was performed in a water-based condition. This technology was also applied to mixed polyester resins to cover a wide range of properties of Mw, Tg, T1/2, and gloss. The resulting eco-friendly prepared toner is tunable in its basic properties according to the balance of polyester resin components and has a low level of VOCs.

To view the full papers of these abstracts for no fee go to www.imaging.org/ist/publications/reporter/index.cfm

* These papers were presented at the NIP26 / Digital Fabrication 2010 conferences, held September 19-23, 2010, in Austin, Texas.

Permanence and Color Stability in 3D Ink-jet Printing

Maja Stanic and Branka Lozo, University of Zagreb (Croatia)

Abstract: In recent years, the possibility of color three-dimensional printing has been introduced. The process described in this work is by ZCorporation, and is currently the only process enabling full color printing. The basic materials are in the shape of powder and binders, clear and/or colored. In order to obtain final mechanical and surface properties, 3D prints are almost always postprocessed with a selected infiltrant. Since color printing was made possible, the use of 3D printing was further broadened to specific application areas, e.g. AEC, archeology and cultural heritage preservation, fine arts and design, spatial planning and publicdisplay of models. As the application in these emerging areas requested potentially more durable 3D prints than in the native RP /CAD applications, the color stability, an integral part of the prints permanence properties, was raised as a topic of interest for both, the researchers and the users of 3D technology. This work will discuss emerging research issues in 3D printing for selected applications, as well as describe and present examples of our current and developing work on permanence and color stability in 3D ink-jet printing.

Evaluating Environmental Sustainability of Digital Printing

Merja Kariniemi, Minna Nors, Marjukka Kujanpää, Tiina Pajula, and Hanna Pihkola; VTT Technical Research Centre of Finland (Finland)

Abstract: Concern about climate change and the need to reduce greenhouse gas emissions has created pressures also for the digital printing industry. The previously published papers are based on assump-

INSIDE THIS ISSUE

Highlighted Abstracts: NIP26/Digital Fabrication 2010 1
NIP26/Digital Fabrication 2010 Report 3
Standards Update. 6
Report on ICIS2010 8

tions of energy consumption on the press and during the pre and post press operations. We have collected the material flow and measured the energy consumption on different electrophotography printing presses from several Finnish printing houses. This enables us to present the results in reliable way.

This paper will focus on new, unpublished, results of the life cycle assessment case made for a 4-colour photo book printed with production scale electrophotography. The life cycle is studied from cradle to the customer, starting from the forest and covering the paper manufacturing, printing and distribution to customer. The life cycle inventory (LCI) phase results are concerning the main emissions to air and water. The impact assessment phase was left out. Furthermore, the carbon footprint information was seen important to evaluate properly.

The results are presented in a form to highlight the points were different actors in the value chain can affect the overall environmental load of the final product. The aim of this paper is also to provide guidance on improved environmental performance, focusing especially on energy and material efficiency in the printing phase.

Mask-less Patterning Technology for the Printed Electronics Market

P. Blom, A. Stevens, A. van Schijndel, T. Huiskamp, L. Huijbregts, N. van Hijningen, and H. de Haan, InnoPhysics (the Netherlands)

Abstract: Non-impact printed electronics is an expanding market with a large variety of applications where printing technology will be used to produce devices or components on glass or polymer films such as organic LED's, (organic) solar cells, displays and RFID tags. We will describe a unique and new printing technology which enables maskless patterning of surfaces or coatings on thin (insulating) substrates. For volume production of many applications in printed electronics, very thin, patterned layers of (semi-) conducting and/or insulating polymers need to be created with high precision and extremely uniform thickness. Printing of such layers can result in significant cost reductions compared to other techniques. InnoPhysics is developing a micro plasma printing system, which can be installed on existing (inkjet) printing platforms. It can be used for substrate surface energy controlled inkjet printing but also for direct etching and deposition of thin layers. To be more specific and valuable many emerging applications demand hybrid manufacturing utilizing both slot-dye coated forms and inkjet for which etching and activation in one machine are mandatory. Deposition is under further research. We will describe the technology behind 'plasma printing', developed applications for surface energy contrast patterning and selective ink wetting and planned future developments, making use of the new technology for the creation of functional materials on flexible substrates.

Effects of Fluid Viscosity on Drop-on-Demand Ink-Jet Break-Off

Stephen D. Hoath, Graham D. Martin, and Ian M. Hutchings, University of Cambridge (UK)

Abstract: Simulations of the jetting of Newtonian fluids from drop-on-demand print heads show that the radial jet pinch-off region, which may lie inside the nozzle, is strongly affected by the fluid viscosity over the range of values that are commonly used. Jet profiles beyond the nozzle exit predicted in these simulations match previously published high resolution images very well and validate the code used. The simulations show that the radial velocity at the minimum radius in the pinch-off region falls exponentially soon after neck formation but then approaches a speed near that predicted theoretically for filament rupture.

The overall jet length is primarily controlled by the slow speed of radial pinch-off. Towards the final break-off time, competition between the original radial minimum and a developing second radial minimum can alter the flow conditions towards symmetry. The simulations also explain why visible jets are shaped like truncated cones. Pinch-off occurs typically within one nozzle radius of the nozzle exit, and while it may be located within the nozzle region, another radial minimum also forms outside the nozzle, close to the exit for low viscosity fluids but well beyond it for higher viscosity fluid. The radial collapse follows a power law with time, with the power-law index n varying between the value of n=2/3 expected for an inviscid fluid and n=1 law expected for a viscous fluid. The transition in behavior occurs at a viscosity of ~20 mPa s, which is within the range of ~10–40 mPa s typical of most DoD inks formulations. ▲

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Digital Printing and Digital Fabrication in Austin– A Long Way from the Gutenberg Bible

By Gerhard Bartscher and Devon J.V. Strain

In Austin, Texas—the same city that holds one of five complete copies of the Gutenberg Bible—the long standing tradition of innovation and synergy between disciplines continued at this year's 26th annual International Conference on Digital Printing Technologies (NIP26) and 6th annual Digital Fabrication conferences. General Chairs Gerhard Bartscher (NIP26) and Reinhard Baumann (Digital Fabrication 2010), along with their respective Conference Committees, hosted 516 participants from around the world this September. The conferences offered approximately 185 oral and interactive papers within four tracks; Print Gallery displays and 37 company exhibits provided additional opportunities for informative discussion.

The papers, presented within twenty-five sessions, covered advances in fundamental imaging technology, and the latest in adjacent technologies. In addition, the conference committees organized two panel discussions—Open Innovation and High Speed Digital Printing: 2015. A total of six keynote talks covered a wide range of topics of interest to the digital print industry.

Keynotes

Monday morning started with "Kodak's Stream Inkjet Technology and the Future of Digital Printing" presented by Douglas Bugner (Kodak). "Stream" is a continuous ink jet technology with micro mechanically fabricated and highly integrated print heads as well as a special ink. Stream claims to attack Offset as well as Electrophotography with respect to speed, quality, and costs. A monochrome impression unit running up to a speed of 1,000 feet/min has been introduced into the market for applications such as an impression unit for offset printing. First full color printers are in beta tests. Commercial availability is expected for early 2011. Stream and other technologies are expected to play an important role in the ongoing transfer from analog to digital, a development that is clearly not limited to printing.

A second keynote on Monday—"Printed Electronics: The Next High Growth Market for the Printing Industry" given by Andrew W. Hannah (Plextronics)—highlighted the fact that the world is getting more and more interactive, which he expects to be the most important trend for the future. An example is the increasing number of RFID tags, as well as their applications. Printed electronics are predicted to play an important role in this trend. IdTechEx forecasts US$1 billion in 2010, increasing to US$70 billion within less than 10 years. Related to more interaction is an increase in energy consumption. Here printed photovoltaic cells are potentially an important new source and many companies are investing heavily in these technologies.

NIP26/DIGITAL FABRICATION 2010 STATS

Attendees:	568		
Oral Papers:	168	Interactive Papers:	16
Short Courses:	22	Exhibitors:	37
Dates:	September 19-23, 2010	Location:	Austin, Texas

Gerhard Bartscher (left) and Xavier Bruch served as this year's NIP26 General and Publications Chairs, respectively.

Above: Digital Fabrication General Chair Reinhard Baumann (center) enjoys a laugh with colleagues at the Conference Reception. Left: Keynote speaker Kohei Iwamoto displays a realistic image he discussed in his talk. Right: Detlef Schulze-Hagenest and Tanja Schaffer plan which talks to attend.

Photos: Diana Gonzalez.

The Exhibit, which featured 37 companies/organizations this year, and its evening happy hour are perennial favorites of attendees.

Photos: Diana Gonzalez.

"Commercialization of Inkjet Printing Technology as an Alternative Fabrication Route for Large Area Devices" was presented by Seong Jin Kim (Samsung) on Tuesday morning. He explained advantages of ink jet and other printing methods compared to other manufacturing methods. These advantages are lower manufacturing costs at high precision, and often more flexibility with materials. Ink jet is already in use today for manufacturing of large area LCDs. Commercial gravure printing of MLCCs (Mulit Layer Capacitors) is close to introduction. Clearly more applications are to come.

In the afternoon Josef Schneider (formerly with Manroland) talked about "Visual Information—From Printing Physics to Art." He gave unconventional and deep insight into connections between information and entropy. Interestingly information density and entropy can be characterized with a formula with the exactly the same structure. He also discussed various possibilities of coding and the implications of the choice of a certain coding. There is, for example, the binary system with only zero and one typically used for computers. An extreme example on the other end is kanji with more that 20000 characters. Finally some examples of scientific characterizations of art are given. Not surprising, only rather limited aspects of what we humans consider art can be scientifically described, at least so far.

On Wednesday Kohei Iwamoto (Seiko Epson) presented "Appearance Analysis Research on Surface Quality in Reproduction of the Work of Fine Art by Ink-Jet Printing Technology." He talked about special scanning devices used to capture not only the image, but also the texture of images, especially for various types of artwork. Ink jet printing is used to reproduce the image including texture (somewhat simplified and summarized) in shadows. The result is astonishing. The author showed several samples and it was not possible to say which was the original and which was the reproduction. This technology could bring "original-like" artwork to many individuals at an affordable cost.

The technical program of the conference was concluded Thursday afternoon by Neil Hopkinson (Loughborough University) and "Printing in the Third Dimension: Industry Status." A fair summary of the talk would be from "rapid prototyping" to "rapid manufacturing." Various technologies are used for these applications, with ink jet being an important one. Typically 3D objects are printed by superimposing a big number of layers. Whereas rapid prototyping started more than 20 years ago, Rapid Manufacturing is still in the beginning. The high potential of such technologies comes especially from the possibility to manufacture a large number of single pieces at the same time, thus enabling competitive costs and typically arbitrary shape "at will."

Panel Discussions

The panel discussion, "Harnessing the Power of Open Innovation" included engaging and enlightening presentations from three corporations on their unique experiences with open innovation. W.L. Gore & Associates shared their model, which encourages employees to collaborate internally and spend time focusing on fundamental understanding of their fluoropolymer based products. Sun Chemical Corporation also utilizes collaborative innovation, but uses this to create tailor-made solutions for their customers. Xaar shared several factors that influenced their interest in open innovation, including the potential to reduce development costs. The panel discussion was followed by a "speed dating" event, allowing conference attendees to explore potential areas of collaboration.

"High Speed Digital Printing: 2015" was a unique panel discussion experience. Projecting themselves into a talk given in 2015, panelists "looked back" over the last five years (2010-2015) and noted:

- that the paperless office has become reality in the US, Western Europe, and Japan with the young working population influencing acceleration in growth of electronic and soft media business. Print pro-

SPECIAL PULL-OUT SUPPLEMENT TO THE REPORTER

JIST AND JEI: 2010 IN REVIEW

For your reference, a complete listing of all of the papers published in JIST and JEI in 2010.

JIST Vol. 54, No.1 January/February 2010

Editorial Material

010101 From the Editor, M. R. V. Sahyun

010102 Erratum: "Kubelka-Munk Model for Imperfectly Diffuse Light Distribution in Paper", L. Yang and R. D. Hersch

Feature Article

010201 ***Full Reference Printed Image Quality: Measurement Framework and Statistical Evaluation,*** Tuomas Eerola, Lasse Lensu, Heikki Kälviäinen, Joni-Kristian Kamarainen, Tuomas Leisti, Göte Nyman, Raisa Halonen, and Pirkko Oittinen

General Papers

010501 ***Measurement and Modeling of Vividness Perception and Observer Preference for Color Laser Printer Quality,*** Y. J. Kim, Y. Bang, and H.-K. Choh

010502 ***Image Reproduction for Near Infrared Spectrum and the Infraredesign Theory,*** Klaudio Pap, Ivana Žiljak, and Jana Žiljak Vujic

010503 ***Solder Jet Printhead for Deposition of Molten Metal Drops,*** Alfred Pan, Eric G. Hanson, and Michael H. Lee

010504 ***Probing Interfacial Acid-Base Interactions in Ink-Substrate Adhesion,*** Manoj K. Bhattacharyya, Hou T. Ng, Eric G. Hanson, Bruce J. Jackson, Stanley D. Morse, and Marc Aronhime

010505 ***Preparation of a Nanoscale Color Index Pigment Orange 13/Styrene-Maleic Acid Copolymer Composite Dispersion for Ink Jet Printing,*** Shaohai Fu, Mingjun Zhang, and Changhai Xu

010506 ***Preparation of Polymer-Coated TiO_2 Particles for Electronic Paper Based on Electrophoresis,*** Ming Wang, Takashi Kitamura, Nobukazu Miyagawa, and Sakiko Nakamura

010507 ***Preparation of Gold Nanoparticles Using Photographic Materials (6): Effect of Thiocyanate Ions,*** Ken'ichi Kuge, Akira Hasegawa, Xiang Chen, and Tomoko Sakai

010508 ***Reconstruction of Spectral Transmission of Colored Solutions Using a Conventional Digital Camera,*** Abolfazl Aghanouri, Seyed H. Amirshahi, and Farnaz Agahian

JIST Vol. 54, No.2 March/April 2010

Editorial Material

020101 From the Editor, M. R. V. Sahyun

Feature Article

020201 ***Role of Technical Innovation in the Physics of Electrophotography,*** L. B. Schein

General Papers

020501 ***Effects of Nanoparticle Coverage on the Adhesion Properties of Emulsion Aggregation Toner Particles,*** Huan Zhang, Weiqiang Ding, and Cetin Cetinkaya

020502 ***Stabilization Mechanism of a Black Leuco-Developer System and Its Tinctorial Strength as Viewed from the Crystal Structure,*** Hideki Shima, Kazuyuki Sato, and Jin Mizuguchi

020503 ***Further Studies Toward Assessing the Risk of Damage to Digital Prints During Flood Events,*** Daniel Burge and Jessica Scott

020504 ***Application of Vaterite-Type Calcium Carbonate Prepared by Ultrasound for Ink Jet Paper,*** Yohta Mori, Toshiharu Enomae, and Akira Isogai

020505 ***Robustly Adaptive Moving Thermal Object Segmentation Using Background Modeling Based on Run-time-Weighted Features,*** Changhan Park, Jik-Han Jung, and Kyung-Hoon Bae

020506 ***Robust Scheme for Detection of an Expanding Moving Object Using a Facet-Based Model in Infrared Imaging,*** Changhan Park, Hwal-Suk Lee, Jieun Kim, and Kyung-Hoon Bae

020507 ***Design and Evaluation of a Camouflage Pattern for the Slovenian Urban Environment,*** M. Friškovec, H. Gabrijelčič, and B. Simončič

020508 ***Can a Corona Discharge Explain the Body Image of the Turin Shroud?,*** G. Fanti

JIST Vol. 54, No.3 May/June 2010

Editorial Material

030101 From the Guest Editors, Jon Y. Hardeberg and Alessandro Rizzi

Feature Article

030201 ***Image-Individualized Gamut Mapping Algorithms,*** Zofia Baranczuk, Peter Zolliker, and Joachim Giesen

Special Section: Papers from Gjøvik Color Imaging Symposium 2009

030401 ***Multispectral Colormapping Using Penalized Least Square Regression,*** Bjørn S. Dissing, Jens M. Carstensen, and Rasmus Larsen

030402 ***Color Management Using Optimal Three-Dimensional Look-Up Tables,*** Satyam Srivastava, Edward J. Delp, Thanh H. Ha, and Jan P. Allebach

030403 ***Spatial Nonuniformity of Color Features in Projection Displays: A Quantitative Analysis,*** Jean-Baptiste Thomas, Arne Magnus Bakke, and Jeremie Gerhardt

030404 ***Automatic Redeye Correction Algorithm with Multilevel Eye Confirmation,*** Sony George, Jon Y. Hardeberg, Tomson G. George, and V. P. N. Nampoori

General Papers

030501 ***Influence of the Number of Samples of the Training Set on Accuracy of Color Measurement and Spectral Reconstruction,*** Marta de Lasarte, Montserrat Arjona, Meritxell Vilaseca, and Jaume Pujol

030502 ***Readability of Processed Digitally Printed Two-Dimensional Codes,*** U. Bogataj, T. Muck, S. Bračko, and B. Lozo

030503 ***Full Reference Image Quality Assessment Based on Saliency Map, Analysis,*** Yubing Tong, Hubert Konik, Faouzi A. Cheikh, and Alain Tremeau

030504 ***Sheet Transport Simulation for Electrostatic Transfer Process in Electrophotography,*** T. Sasaki, K. Yamamoto, T. Onishi, A. Sugiyama, T. Tomizawa, and Y. Yoda

030505 ***Transfer Process Multiphysics Simulation in Electrophotography,*** T. Sasaki, T. Onishi, A. Sugiyama, S. Nasu, Y. Yoda, and T. Tomizawa

JIST Vol. 54, No.4 July/August 2010

Feature Article

040201 ***Microscopic and Macroscopic Characteristics of the Shroud of Turin Image Superficiality,*** G. Fanti, J. A. Botella, P. Di Lazzaro, T. Heimburger, R. Schneider, and N. Svensson

Special Section: Imaging Science and the Shroud of Turin

040301 ***Life-size Reproduction of the Shroud of Turin and its Image,*** L. Garlaschelli

040302 ***Deep Ultraviolet Radiation Simulates the Turin Shroud Image,*** Paolo Di Lazzaro, Daniele Murra, Antonino Santoni, Giulio Fanti, Enrico Nichelatti, and Giuseppe Baldacchini

General Papers

040501 ***Anisotropic Three-Dimensional Wavelet-Based Method for Multi/Hyperspectral Image Compression and Its Benchmark,*** Jonathan Delcourt, Alamin Mansouri, Tadeusz Sliwa, and Yvon Voisin

040502 ***Spectral Analysis of Omnidirectional Illumination in a Natural Scene,*** Shoji Tominaga, Atsushi Matsuura, and Takahiko Horiuchi

040503 ***Web-Based Diagnosis Tool for Customers to Self-Solve Print Quality Issues,*** Hector Santos-Villalobos, Hyung J. Park, Roy Kumontoy, Kainlu Low, Maria Ortiz, Jan Allebach, Chulwoo Kim, Pilsung Choe, Sugani Leman, Kristen Oldenburger, Mark Lehto, and Xinran Lehto

040504 ***Optical Color Compensation Film for Plasma Display Panels,*** Sang H. Park, Jaehoon Choe, and Kwang H. Song

040505 ***Spectroscopic Study on Charge Generation in Bisazo-Based Layered Photoreceptor,*** S. Yokota

JIST Vol. 54, No.5 September/October 2010

Editorial Material

050101 From the Editor, M. R. V. Sahyun

Feature Article

050201 ***Review of Toner-Based Printing Technologies and Fundamentals of Toner Charging Mechanism,*** Yasushi Hoshino, Kai Li, Disna J. Karunanayake, and Takeshi Hasegawa

Special Section: Papers based on presentations at NIP25 and Digital Fabrication 2009

050301 ***Improving Tone Prediction in Calibration of Electrophotographic Printers by Linear Regression: Environmental, Consumables and Tone-Level Factors,*** C.-L. Yang, Y.-F. Kuo, Y. Yih, G. T.-C. Chiu, D. A. Abramsohn, G. R. Ashton, and J. P. Allebach

050302 ***Improving Tone Prediction in Calibration of Electrophotographic Printers by Linear Regression: Using Principal Components to Account for Co-Linearity of Sensor Measurements,*** Yan-Fu Kuo, George T.-C. Chiu, Chao-Lung Yang, Yuehwern Yih, and Jan P. Allebach

050303 ***Elastohydrodynamic Study for Deformable Blade-Organic Photoconductor Conjunction,*** Wael Salalha, Doron Avramov, Stanislav Reznik, and Eyal Zussman

050304 ***Surface Modification of an Organic Photoconductor in an Electrophotographic Charging Environment,*** K. Nauka, Seongsik Chang, and Hou T. Ng

050305 ***Next-Generation Commercial Print Infrastructure: Gutenberg-Landa TCP/IP as Cyber-Physical System,*** I.-J. Lin, J. Zeng, E. Hoarau, and G. Dispoto

050306 ***Alignment of Individually Adapted Print Patterns for Ink Jet Printed Electronics,*** Tapio Manninen, Ville Pekkanen, Kalle Rutanen, Pekka Ruusuvuori, Risto Rönkkä, and Heikki Huttunen

050307 ***Study of Ink Jet Printing Parameters to Fabricate LCD Color Filter,*** Seong-Jin Kim, Byung-Hun Kim, Sung-Wook Kim, Seung-Joo Shin, Alberto Salleo, Steve Ready, and Robert Street

General Papers

050501 ***Predicting the Reflectance of Paper Dyed with Ink Mixtures by Describing Light Scattering as a Function of Ink Absorbance,*** Fabrice Rousselle, Mathieu Hébert, and Roger D. Hersch

050502 ***Evaluation of Algorithms for the Determination of Color Gamut Boundaries,*** Arne M. Bakke, Ivar Farup, and Jon Y. Hardeberg
050503 ***Turin Shroud: Compatibility Between a Digitized Body Image and a Computerized Anthropomorphous Manikin,*** G. Fanti, R. Basso, and G. Bianchini

JIST Vol. 54, No.6 November/December 2010

060101 From the Editor, M. R. V. Sahyun
060102 ***In Memoriam – Annabel Muenter,*** Gary House

Feature Article

060201 ***Reproduction in Three-Dimensional Ink Jet Printing,*** Maja Stanic, Branka Lozo, and Peter J. Walters

Special Section: Including Papers from NIP25

060401 ***Productivity Analysis of Print Service Providers,*** Jun Zeng, I-Jong Lin, Eric Hoarau, and Gary Dispoto
060402 ***Optical and Color Stability of Aged Specialty Papers and Ultraviolet Cured Ink Jet Prints,*** Mirica Debeljak and Diana Gregor-Svetec
060403 ***Influence of Light on Typographic and Colorimetric Properties of Ink Jet Prints,*** Klementina Možina, Tanja Medved, Blaž Rat, and Sabina Bracko
060404 ***Authentic Versus Counterfeit Image Classification after Re-Sampling and Compression,*** Steven J. Simske, Margaret M. Sturgill, and Jason S. Aronoff
060405 ***Error-Correcting Code (ECC) and Module Size Considerations in 2D Aztec Barcode Readability,*** Steven J. Simske, Marie Vans, and Guy B. Adams
060406 ***Effect of Fusing Parameters on Print Gloss,*** Brandon M. Chaffin, Anthony P. Holden, and Anthony J. Paris

General Papers

060501 ***Behavior of Charged Particles Around a Wire in a Scorotron on Negative Corona Discharge,*** Kazuhiro Mori
060502 ***Photoinduced and Dark Discharge Mechanisms of High Gamma Photoreceptors,*** Kuniki Seino, Hideaki Hirahara, Takaaki Konuma, Ichiro Yoshida, and Shozo Kaieda
060503 ***Characterization of White Paper Sheets by BRDF Model Parameters Estimated in the Specular Reflection Plane,*** Yoshinori Akao, Norimichi Tsumura, Toshiya Nakaguchi, and Yoichi Miyake
060504 ***Evaluation of Ink Optimization Technology in Offset Color Printing,*** Abhay Sharma and Ben Starr

JEI January - March 2010, Volume 19, Issue 1

Special Section: Image Quality Assessment

011001 ***Special Section Guest Editorial: Image Quality Assessment,*** Susan Farnand and Frans Gaykema
011002 ***Inpainting quality assessment,*** Paul A. Ardis, Christopher M. Brown, and Amit Singhal
011003 ***Content-weighted video quality assessment using a three-component image model,*** Chaofeng Li and Alan Conrad Bovik
011004 ***Measurement quality metrics for rapid laser range scanning,*** David MacKinnon, François Blais, and Victor Aitken
011005 ***Framework for optimal region of interest–based quality assessment in wireless imaging,*** Ulrich Engelke and Hans-Jürgen Zepernick
011006 ***Most apparent distortion: full-reference image quality assessment and the role of strategy,*** Eric C. Larson and Damon M. Chandler
011007 ***Extended use of incremental signal-to-noise ratio as reliability criterion for multiple-slope wide-dynamic-range image capture,*** Dirk Hertel
011008 ***Psychophysical investigation of the effect of coring on perceived toner scatter,*** Hyung Jun Park, Jan P. Allebach, and Zygmunt Pizlo
011009 ***Slider-adjusted softcopy ruler for calibrated image quality assessment,*** Elaine W. Jin and Brian W. Keelan
011010 ***Measurement and compensation of printer modulation transfer function,*** Nicolas Bonnier and Albrecht J. Lindner
011011 ***Analysis and assessment of the effects of fixed pattern and quantization noise on the accuracy of color rendition in wide-dynamic-range complementary metal-oxide semiconductor imagers,*** Stephen O. Otim and Steve Collins
011012 ***Gradient approach to quantify the gradation smoothness for output media,*** Youn Jin Kim, Yousun Bang, and Heui-Keun Choh
011013 ***Comparing image quality of print-on-demand books and photobooks from web-based vendors,*** Jonathan Phillips, Peter Bajorski, Peter Burns, Erin Fredericks, and Mitchell Rosen
011014 ***Enhancement of ultrasound images by displacement, averaging, and interlacing,*** Sonia H. Contreras Ortiz, James Joseph Macione, and Martin D. Fox
011015 ***Prediction of results from subjective evaluation of real-time-capable tone-mapping operators applied to limited high-dynamic-range images,*** Bjorn Annighofer, Touraj Tajbakhsh, and Rolf-Rainer Grigat
011016 ***Attributes of image quality for color prints,*** Marius Pedersen, Nicolas Bonnier, Jon Yngve Hardeberg, and Fritz Albregtsen
011017 ***Tent-pole spatial defect pooling for prediction of***

subjective quality assessment of streaks and bands in color printing, D. René Rasmussen
011018 ***New image-quality measure based on wavelets,*** Emil Dumic, Sonja Grgic, and Mislav Grgic
011019 ***New strategy for image and video quality assessment,*** Qi Ma, Liming Zhang, and Bin Wang

Regular Articles

013001 ***Multiresolution adaptive and progressive gradient-based color-image segmentation,*** Sreenath Rao Vantaram, Eli Saber, Sohail A. Dianat, Mark Shaw, and Ranjit Bhaskar
013002 ***Efficient registration of multitemporal and multisensor aerial images based on alignment of nonparametric edge features,*** Sokratis Makrogiannis and Nikolaos G. Bourbakis
013003 ***Multithreshold progressive image sharing with compact shadows,*** Lee Shu-Teng Chen and Ja-Chen Lin
013004 ***Verification of a 3-D terrain mapping LADAR on various materials in different environments,*** Lulu Edwards, E. Ray Brown, and Sarah R. Jersey
013005 ***Novel quality-effective zooming algorithm for color filter array,*** Kuo-Liang Chung, Wei-Jen Yang, Jun-Hong Yu, Wen-Ming Yan, and Chiou-Shann Fuh
013006 ***Cascade window-based procedure for impulse noise removal in heavily corrupted images,*** Ali S. Awad, Hong Man, and Khaldoun Khashanah
013007 ***Security of ownership watermarking of digital images based on singular value decomposition,*** Khaled Loukhaoukha and Jean-Yves Chouinard
013008 ***Context-based adaptive image resolution upconversion,*** Guangming Shi, Weisheng Dong, Xiaolin Wu, and Lei Zhang
013009 ***Unusual event detection and prediction based on sectional contextual edit distance,*** Yi Zhang, Jie Yang, and Kun Liu
013010 ***Correction of dark current in consumer cameras,*** Justin C. Dunlap, Erik Bodegom, and Ralf Widenhorn
013011 ***Modified edge-directed interpolation for images,*** Wing-Shan Tam, Chi-Wah Kok, and Wan-Chi Siu
013012 ***Efficient modified RC5 based on chaos adapted to image encryption,*** Mohamed Amin and Ahmed A. Abd El-Latif
013013 ***Texture image classification using modular radial basis function neural networks,*** Chuan-Yu Chang, Hung-Jen Wang, and Shih-Yu Fu
013014 ***Detection of LSB±1 steganography based on co-occurrence matrix and bit plane clipping,*** Mojtaba Abolghasemi, Hassan Aghaeinia, Karim Faez, and Mohammad Ali Mehrabi

Book Reviews

019901 ***The Essential Guide to Video Processing,*** Al Bovik and Amit Singhal, Reviewer

JEI April - June 2010, Volume 19, Issue 2

JEI Letters

020501 ***Estimating reflectance from multispectral camera responses based on partial least-squares regression,*** Hui-Liang Shen, Hui-Jiang Wan, and Zhe-Chao Zhang
020502 ***New automatic defect classification algorithm based on a classification-after-segmentation framework,*** Sang-Hak Lee, Hyung-Il Koo, and Nam-Ik Cho

Special Section: Digital Photography

021101 ***Special Section Guest Editorial: Digital Photography,*** Peter B. Catrysse and Sabine Süsstrunk
021102 ***High-sensitivity, wide-dynamic-range avalanche photodiode pixel design for large-scale imaging arrays,*** Alvin G. Stern and Daniel C. Cole
021103 ***2PFCTM (two pixels, full color): Image sensor demosaicing and characterization,*** Daniel Tamburrino, Jon M. Speigle, Douglas J. Tweet, and Jong-Jan Lee
021104 ***Low-complexity color demosaicing algorithm based on integrated gradients,*** King-Hong Chung and Yuk-Hee Chan
021105 ***Adaptive color demosaicing and false color removal,*** Mirko Guarnera, Giuseppe Messina, and Valeria Tomaselli
021106 ***Focused plenoptic camera and rendering,*** Todor Georgiev and Andrew Lumsdaine

Regular Articles

023001 ***Global motion–compensated preprocessing algorithm for block-based frame-rate conversion,*** Young Duk Kim, Joonyoung Chang, and Moon Gi Kang
023002 ***Robust tissue classification for reproducible wound assessment in telemedicine environments,*** Hazem Wannous, Sylvie Treuillet, and Yves Lucas
023003 ***Effects of hyperellipsoidal decision surfaces on image segmentation in artificial color,*** Jian Fu, H. John Caulfield, Dongsheng Wu, and Trent Montgomery
023004 ***Partial dependence of breast tumor malignancy on ultrasound image features derived from boosted trees,*** Wei Yang, Su Zhang, Wenying Li, Yaqing Chen, Hongtao Lu, Wufan Chen, and Yazhu Chen
023005 ***Contrast image correction method,*** Raimondo Schettini, Francesca Gasparini, Silvia Corchs, Fabrizio Marini, Alessandro Capra, and Alfio Castorina
023006 ***JPEG image steganalysis using joint discrete cosine transform domain features,*** Zhihua Xia, Xingming Sun, Wei Liang, Jiaohua Qin, and Feng Li
023007 ***Discrete cosine transform–based local adaptive filtering of images corrupted by nonstationary noise,*** Vladimir V. Lukin, Dmitriy V. Fevralev, Nikolay N. Ponomarenko, Sergey K. Abramov, Oleksiy Pogrebnyak, Karen O. Egiazarian, and Jaakko T. Astola
023008 ***Performance evaluation of mail-scanning cameras,***

Umesh Rajashekar, Tony Tuan Vu, John E. Hooning, and Alan Conrad Bovik

023009 ***Graphical processing unit–based machine vision system for simultaneous measurement of shrinkage and soil release in fabrics,*** Sridharan Kamalakannan, Arunkumar Gururajan, Matthew Hill, Muneem Shahriar, Hamed Sari-Sarraf, and Eric F. Hequet

023010 ***Boosting robustness against composite attacks for quantization index-modulation algorithms,*** Chee Sun Won

023011 ***Adaptively synchronous scalable spread spectrum (A4S) data-hiding strategy for three-dimensional visualization,*** Khizar Hayat, William Puech, and Gilles Gesquière

023012 ***Microscopic autofocusing using regional monotonous variations of multiple focal value measures,*** Ku Chin Lin

023013 ***Algorithm to measure automatically the ductile/brittle fracture of Charpy test specimens,*** Anyela Camargo, Andrew J. Tickle, and Jeremy S. Smith

023014 ***Efficient adaptive arithmetic coding based on updated probability distribution for lossless image compression,*** Atef Masmoudi, William Puech, and Mohamed Salim Bouhlel

023015 ***Laser scanning system for inspecting large underwater hydroelectric structures,*** François Mirallès, Julien Beaudry, Michel Blain, Romano M. De Santis, Régis Houde, Richard Hurteau, André Robert, Serge Sarraillon, and Nathalie Soucy

023016 ***Automatic target recognition performance losses in the presence of atmospheric and camera effects,*** Xiaohan Chen and Natalia A. Schmid

023017 ***Comparative study of localization metrics for the evaluation of image interpretation systems,*** Baptiste Hemery, Helene Laurent, Bruno Emile, and Christophe Rosenberger

023018 ***Morphological skeleton decomposition interframe interpolation method,*** Nicolae Vizireanu, Simona Halunga, and Georgeta Marghescu

023019 ***Probabilistic approach for extracting regions of interest in digital images,*** Mustafa I. Jaber and Eli Saber

Book Reviews

029901 ***The Essential Guide to Image Processing,*** Al Bovik, Editor and James E. Adams, Jr., Reviewer

JEI July - September 2010, Volume 19, Issue 3

JEI Letters

030501 ***Multilevel halftoning using multiscale error diffusion,*** Yik-Hing Fung and Yuk-Hee Chan

Special Section: Quality Control by Artificial Vision

031201 ***Special Section Guest Editorial: Quality Control by Artificial Vision,*** Edmund Y. Lam, Shaun S. Gleason, and Kurt S. Niel

031202 ***Real-time passenger counting in buses using dense stereovision,*** Tarek Yahiaoui, Louahdi Khoudour, and Cyril Meurie

031203 ***Unsupervised texture image segmentation using multilayer data condensation spectral clustering,*** Hanqiang Liu, Licheng Jiao, and Feng Zhao

031204 ***Thermographic crack detection and failure classification,*** Beata Oswald-Tranta, Mario Sorger, and Paul O'Leary

031205 ***Discrete polynomial moments and the extraction of 3-D embossed digits for recognition,*** Paul O'Leary, Matthew Harker, and Bernhard Mörtl

031206 ***Real-time flatness inspection of rolled products based on optical laser triangulation and three-dimensional surface reconstruction,*** Julio Molleda, Rubén Usamentiaga, Daniel F. García, and Francisco G. Bulnes

031207 ***Novel image analysis method for in situ monitoring the particle size distribution of batch crystallization processes,*** Benoît Presles, Johan Debayle, Gilles Févotte, and Jean-Charles Pinoli

031208 ***Projection registration applied to nondestructive testing,*** Philip Bingham and Lloyd Arrowood

Regular Articles

033001 ***Image registration based on subpixel localization and Cauchy–Schwarz divergence,*** Yongxin Ge, Dan Yang, Xiaohong Zhang, and Jiwen Lu

033002 ***Tackling action-based video abstraction of animated movies for video browsing,*** Bogdan Ionescu, Laurent Ott, Patrick Lambert, Didier Coquin, Alexandra Pacureanu, and Vasile Buzuloiu

033003 ***Comparative study of background subtraction algorithms,*** Yannick Benezeth, Pierre-Marc Jodoin, Bruno Emile, Hélène Laurent, and Christophe Rosenberger

033004 ***Fusion of regularization terms for image restoration,*** Max Mignotte

033005 ***Spatial-gradient-local-inhomogeneity: an efficient image-denoising prior,*** Cheolkon Jung, Licheng Jiao, Hyungseok Kim, and Joongkyu Kim

033006 ***Robust facial landmark detection for three-dimensional face segmentation and alignment,*** Hai Shan Wu and Yan Qiu Chen

033007 ***Fast and reliable image-noise estimation using a hybrid approach,*** Shih-Ming Yang and Shen-Chuan Tai

033008 ***Adaptive mode-dependent scan for H.264/AVC intracoding,*** Yung-Chiang Wei and Jar-Ferr Yang

033009 ***Classification-based image-fusion framework for compressive imaging,*** Xiaoyan Luo, Jun Zhang, Jingyu Yang, and Qionghai Dai

033010 ***Fast mode decision for scalable video coding utilizing***

spatial and interlayer correlation, Liquan Shen, Zhi Liu, Ping An, Ran Ma, and Zhaoyang Zhang

033011 ***New algorithm for iris recognition based on video sequences,*** Salah Bourennane, Caroline Fossati, and William Ketchantang

033012 ***Two-dimensional images in frequency-time representation: direction images and resolution map,*** Artyom M. Grigoryan and Nan Du

033013 ***Implementation of an interleaved image sensor by means of the filterless transverse field detector,*** Federico Zaraga, Giacomo Langfelder, and Antonio Longoni

033014 ***Field-programmable gate array-based hardware architecture for image processing with complementary metal-oxide-semiconductor image sensor,*** Zhiwei Ge, Suying Yao, and Jiangtao Xu

033015 ***Development of depth-image-based three-dimensional mobile broadcasting system in terrestrial digital media broadcasting,*** Gwangsoon Lee, Hyun Lee, Namho Hur, Soo in Lee, and Joong Kyu Kim

033016 ***Partial differential equation–based approach for removal of chromatic aberration with local characteristics,*** Hee Kang, Suk-Ho Lee, Joonyoung Chang, and Moon Gi Kang

Book Reviews

039901 ***Object Categorization, Computer and Human Vision Perspectives,*** Sven J. Dickinson, Editor, Ales Leonardis, Editor, Bernt Schiele, Editor, Michael J. Tarr, Editor, Jie Yu, Reviewer, and Dhiraj Joshi, Reviewer

JEI October - December 2010, Volume 19, Issue 4

please note: at time of publication page numbers for these articles were not available; exact titles may change by date of publication.

JEI Letters

Efficient temporal alignment of video sequences using unbiased bidirectional dynamic time warping, Cheng Lu and Mrinal Mandal

Regular Articles

Reconstruction 2ith criterion from labelled markers: a new approach based on the morphological watershed, Damian Vargas Vazquez, Jose Crespo del Arco, Maojo Victor, Jose Gabriel Rios, Trejo Mario

Noise-robust super-resolution based on a classified dictionary, Shin-cheol Jeong, Byung Cheol Song

Quaternion-based color image filtering for impulsive noise suppression, Lianghai Jin, Hong Liu, Xiangyang Xu, and Enmin Song

Vision models for image quality assessment: one is not enough, Roland Bremond, Jean-Philippe Tarel, Eric Dumont, and Nicolas Hautiere

Efficient rotation- and scale-invariant texture analysis, Kam-Keung Fung, and Kin-Man Lam

Multiscale blob features for texture classifying and retrieving from large-scale databases, Qi Xu, Haishan Wu, and Yan Qiu Chen

Per-separation clustered-dot color halftone watermarks: separation estimation based on spatial frequency content, Basak Oztan, and Gaurav Sharma

Authentication and recovery of an image by sharing and lattice-embedding, Sian-Jheng Lin and Ja-Chen Lin

Dual focus stereo imaging, Feng Li, Ji-an Sun, Jue Wang, and Jingyi Yu

Automatic radial distortion correction in zoom lens video camera, Daehyun Kim, Hyoungchul Shin, Juhyun Oh, and Kwanghoon Sohn

Transcript synchronization using local dynamic programming, Anthony Martone and Edward J. Delp

Fuzzy variable-branch decision tree, Shiueng Bien Yang

Measurement of the optimum surround ratio (SR) inducing the highest perceived image contrast, Ye Seul Baek, Youn Jin Kim, Hong Suk Kim, and Seung Ok Park

Comparing image preference in controlled and uncontrolled viewing conditions, Silvia Zuffi, Carla Brambilla, Reiner Eschbach, and Alessandro Rizzi

Spatiotemporal wavelet MAP estimation for video denoising, Pavel A. Khazron and Ivan W. Selesnick

Application of FDTD and dynamic differential evolution for inverse scattering of a two-dimensional perfectly conducting cylinder in slab medium, Chi-Hsien Sun, Chien-Ching Chiu, Wei Chien, and Ching-Lieh Li

Real-time line scan extraction from infrared images using the wedge method in industrial environments, Ruben Usamentiaga, Julio Molleda, Daniel F. Garcia, Luis Perez, and Guillermo Vecino

Color demosaicking using deinterlacing and median-based filtering techniques, Wen-Tsung Huang, Wen-Jan Chen, and Shen-Chuan Tai

A 190 GHz active millimeter-wave imager, Greg Timms, Michael Brothers, John Bunton, John Archer, Grahame Rosolen, Yue Li, Andrew Denis Hellicar, and Juan Tello, Stuart Hay

Joint source-channel coding scheme for scalable video coding based DVB-S2 satellite broadcasting system, Kwang-deok Seo, Won Sup Chi, In Ki Lee, and Dae Ig Chang

Retrieval of intracranial haemorrhages in computed tomography brain images using binary coherent vector, Wan Mimi Diyana Wan Zaki, M Faizal Ahmad Fauzi, and Rosli Besar

Improving the performance of acousto-optic tunable filters in imaging applications, Joan Vila-Frances, Javier Calpe-Maravilla, Luis Gomez-Chova, and Julia Amoros-Lopez

Image search based on quadtree zernike decomposition, Alessandro Neri, Marco Carli, Veronica Palma, and Luca Costantini

Function-based design process for an intelligent ground vehicle vision system, Robert Lewis Nagel, Kenneth L. Perry, Robert B. Stone, and Daniel A. McAdams

Photo courtesy of Koji Hirakura.

Photo: Diana Gonzalez.

Photo: Inge Angewaare (KB).

Above left: Akira Suzuki, Gutenberg Award recipient Koji Hirakura, Masaaki Yokoyama, Service Award recipient Andronique Ioannidis, and IS&T President Rita Hofmann after the IS&T Awards presentations. Above right: Takashi Hirtsuka and Hiroyuki Kawamoto receive the Charles E. Ives/Journal Award from IS&T President Rita Hofmann. Below: NIP/Digital Fabrication attendees in front of the Gutenberg Bible at the University of Texas.

Photo: Werner Zapka.

This year's the IS&T Honors and Award Committee chose two recipients for the prestigious Gutenberg Award. Above: Steve Temple (right, formerly of Xaar) receives his award at Archiving 2010 in June from IS&T Executive VP, Robert Buckley, "for invention of shear mode-shared wall piezo inkjet."

duction and consumption are still growing in Asia, South America, and Africa where interest in hard copy remains. The move to use of electronic imaging in a soft form will take a significant amount of time because of the need to invest and build infrastructure to support those devices.

- significant growth in the use of bio-derived materials for consumables, motivated by raw material costs as well as green initiatives.
- the development of packaging markets, addition of personalized copies, single item tagging is expected to see significant growth.

Technical Sessions

The conference's traditional technical sessions included many informative reports from a wide array of industry experts. The following are just a few highlights.

In *Toner-based Printing: Materials*, Morimura Chemicals provided an interesting presentation on the Preparation of Core-Shell Particles with dual shells. A tribocharge comparison shows that addition of a protective shell layer stabilizes charge over mixing time for all colors.

During *Toner-based Printing: Processes*, Canon presented a simulation model used to model a print quality defect due to AC current leakage from the fuser to transfer area. The banding severity level is predicted using the AC transmission rate and found that for AC transmission rates less than 30%, banding is not observed.

The *Ink Jet Printing Materials* session included many talks that focused on improvements related to colorant technology. George Cernigliaro (MircoChem) discussed the structure/property relationships of epoxy resins in photoresists using electrochemical impedance spectroscopy. These photoresists have applications in MEMS, digital fabrication, and ink jet printheads. The Material Science Institute of Barcelona gave a very interesting and exciting presentation on the printing of superconductor materials using ink jet technology.

In the *Modeling of Printing and Related Processes*, Armen Joworski (CIM-mes Projekt) presented a joint project with Xennia Holland BV on a CFD based model that identified important factors affecting ink jet printing, ink deposition, and print quality. Margaret Sturgill (Hewlett-Packard Company) presented a cost prediction model for a printing oriented security and forensics system. This study highlights interesting interactions between imaging and economics.

The *Printing Technologies: Technical Reviews and Notes* session opened with a review of Toner-Based Digital Color Presses at IPEX by Detlef Schulze-Hagenest of Kodak. Although many ink jet printers were shown at IPEX, electrophotography leads in print quality and paper latitude, with simplex or single-path duplex web presses and B3+ sheet fed presses offering internal two path duplexing. Gary Dispo- to and Nathan Moroney (Hewlett-Packard Company) presented data on the distributions of color, tactile, gloss, and fluorescence properties of available substrates that showed a truly amazing range of possibilities for graphic designers, but also significant challenges for proofing, cross-media reproduction, and in-line or near-line process control. Kasper Nossent (Xennia) described a web press for textile printing at 6 to 8 m/min that uses continuously oscillating ink jet printheads moving diagonally over a web.

The *High Speed Ink Jet* session gave a good insight into the progress and challenges for developing high speed ink jet printing. Breakthroughs in printhead design and use were reported by Xaar and Kyocera. However, complete system design is necessary, as explained for HP T300 Web press and the Xerox hot melt printing systems. Because the combination of high speed with high quality is often the market demand, precise control of all system parts and interactions is needed. Data management, registration of multiple printheads, as well as optimal performance of each printhead are all key components.

Overall, NIP26 and DF 2010 provided attendees with an excellent synopsis of the current world of digital printing and a glimpse into a very bright future. Papers from the conference proceedings are available at imaging.org at no additional charge for IS&T members.

NIP27/Digital Fabrication 2011 will be held in Minneapolis, October 2-6. ▲

STANDARDS UPDATE:

David Q. McDowell, Editor

This issue of *Standards Update* is drawn, in part, from material provided by Betsey Fanning, Director of Standards and Member Services of the Association for Information and Image Management (AIIM). AIIM is Secretariat of ISO TC 171, Document management applications, and of TC171/SC2, Application issues.

The second of these two mini-articles is very apropos in light of the recent introduction of the Adobe XMP metadata specification as an ISO Fast Track Standard in ISO TC130.

Open Standards in an Open Source World

Is anything really open? Trade publications, including Infonomics, have been dealing with the topic of Open Source a lot lately. Open Source provides many advantages such as allowing anyone to use the technology however they want. However, Open Source cannot be what it is without open standards. In fact, Open Source and Open Standards go hand-in-hand with each other.

Typically, standards can be classified into a couple of categories including standards that are developed according to an established process or de jure standards, those that are market driven or de facto which through adoption by the industry become a standard, open standards which are controlled by an organization and are typically made available for free or at a nominal cost and organizational standards which provide specific guidance to an organization. Some sources say that only open standards enable interoperability and the development of technology implementations. In actuality, all standards enable interoperability and interchangeability which help to protect an organization's technology investment.

All standards open or otherwise, document agreed upon requirements that enable technologies or parts of technology to work together.

The American National Standards Institute, ANSI (www.ansi.org), define open standard as "a standard that may be copied, used and distributed for no fee and/or whose embedded technology is irrevocably available on a royalty-free basis." Most standards work is based on openness which enables collaboration and the achievement of consensus where every member of the committee has an equal vote and all opinions may be expressed and listened to regardless of the size of the organization that the individual is representing.

According to ANSI, some of the characteristics of open standards include:

- Consensus by a group of representatives of interested parties
- Public review and comment as well as consideration of comments on all ballots for draft standards
- Incorporating the changes into the standard
- Ability to appeal a decision

Within standards work there is always the question of power especially when large technology organizations begin to participate. The perception is that the big companies like to dominate or control the development or direction the standard takes. Openness within standards development enables all organizations to have the same power or control on the standard regardless of size.

AIIM initially entered into the open standards area in 2000 by placing the work from the Document Management Alliance (DMA) and the Open Document Management API (ODMA) into open source under the name of DMWare. This transfer allowed more companies to implement the standard within their product and continue the maintenance and development of the standard.

Open standards does not mean that they are free. You may have to pay for the standard—the document—but you should not have to pay to use the standard or to incorporate it into your technology. Proprietary products support open standards whereas some open source products do not. Therefore, open standards do not equal open source but when teamed together they make a good product even better. A good open source project is based on open standards. As the open source product is adopted in the industry the open standard will gain adoption as well. When evaluating open source products and open standards, it is important to understand if an open process was used in the development of both. This means that anyone can participate and share ideas as well as develop product.

In our complex business world, it is good to know that open standards are available and can be implemented royalty free by anyone who agrees to adhere to the requirements of the standard. The next time you are evaluating technologies for your organization, look for products, open source or otherwise, that are based on standards. You will be protecting your technology investment by acquiring a product that you can expand and change as needed to meet your ever-changing needs.

Finding the Right Information at the Right Time

When we need information, typically, we need it NOW. We do not have the time to search through every folder and read every document to find the document that we need. In a paper centric world, the information the organization used to conduct its business was kept in folders and the folders were kept in file rooms, file cabinets or file drawers. The paper centric world required that we know the general location of the documents we needed. As long as we knew the right file room, file cabinet or file drawer in which the document we were seeking was located, it was relatively easy to locate the document. The general nature of a good file room or filing system allowed us to segment our docu-

ments in a hierarchial manner by placing folders within larger folders. The folders could be arranged via topics or via dates or other subject area.

Despite the fact that we now have most, if not all, of our information in electronic format and stored in our organization's repository, it may continue to be difficult to locate the exact documents that we need in order to do our work. The repositories that contain our information may not be in the same building where we are working, in fact, the repository may not even be in the same country. It is difficult if not impossible to know the exact location of the information we are looking for in an electronic environment. Therefore, it is imperative that we organize our information. Simply replicating the paper centric file folder model, while helpful, is not enough to truly make finding documents easier.

In the electronic document centric world that we are in, there are at least three elements that we need to make finding information easier. These elements are metadata, taxonomies or classification schemas and thesauri.

Probably the most well known of the metadata standards is ISO 15836, Information and documentation—The Dublin Core metadata element set. This standard establishes a set of elements that may be used to describe a document but is not limited to documents. The Dublin core metatdata can be used to describe virtually anything. Many years ago, AIIM produced a technical report, ANSI/AIIM TR40, Suggested Index Fields for Documents in Electronic Image (EIM) Environments. This technical report establishes index fields or metadata that may be used when indexing electronic image documents or any other type of document for that matter. When documents are identified through the use of accurate metadata, the documents are more easily retrieved from the repositories.

While the Dublin Core Metadata Element Set is probably the most widely used metadata schema, there are many metadata schemas available. Additionally, an organization may determine that it is necessary to modify an existing metadata schema to meet the specific needs of their organization or industry. Often a translation between metadata descriptions and schemas is necessary. A crosswalk it used to provide that translation or bridge between the metadata schemas. There is an ISO standard that is under development, ISO/CD 11864, Guidelines for the creation of a metadata crosswalk that will define a method by which an online metadata crosswalk may be designed, built and implemented.

In addition to metadata, a taxonomy will improve the metadata by establishing parent child relationships between the topics that are included in the schema. There are several standards which are available to help in this area including:

— ISO 2788, *Documentation — Guidelines for the establishment and development of monolingual thesauri,* provides recommendations to provide a consistent practice in indexing documents. This standard focuses on monolingual thesauri.
— ISO 5964, *Guidelines for the establishment and development of multilingual thesauri,* is an extension of ISO 2788 and builds on the guidance provided in ISO 2788 to apply it to multilingual thesauri.

A thesauri improves the use of metadata and taxonomies by adding value to the terms through the relationships that they identify.

It is important to remember the better the metadata and the more structured the taxonomy and thesauri the easier it will be to find the specific information that is needed. Determining the metadata that is appropriate for your organization and structuring the taxonomy are not easy tasks to undertake and are not able to be completed quickly. As you are determining these for your organizations make sure you consult the standards and get the information owners and stakeholders involved in the process so that the metadata and taxonomy will suit their needs. Once you have identified your metadata and defined your taxonomy, make sure that you educate everyone in the organization on them and enforce their use.

Adobe XMP becomes ISO 16684-1

At the recent ISO TC 130 it was announced that the Adobe XMP Specification has been placed in ISO Fast Track ballot as ISO 16684-1, *Graphics technology — Extensible metadata platform (XMP) specification — Part 1: Data model, serialization and core properties.*

TC 130 has created WG2/TF4 to support the XMP work and TC42 has created a Joint Working Group between TC 42 and TC 130 to develop the photographic applications of XMP. Other ISO TCs are expected to initiate work to develop application specific standards for the use of XMP as defined in ISO 16684-1.

Library of Congress and PDF/A-1

The Sustainability of Digital Formats: Planning for Library of Congress Collections site has updated their guidance for PDF/A-1.

Their summary of the history of PDF/A-1 states: Developed to address the issue that large bodies of official documents and important information are maintained in PDF, but that PDF is not suitable as an archival format. The Administrative Office of the U.S. Courts was a driving force in forming a U.S. Committee to initiate an ISO standard based on PDF. The activity has been under the joint auspices of AIIM and NPES (National Printing Equipment Suppliers). Part 2 of ISO 19005 (as of September 2010, an ISO Draft International Standard) extends the capabilities of Part 1, described here. The newer version is based on PDF version 1.7 (as defined in ISO 32000-1) rather than PDF version 1.4.

More information is available at http://digitalpreservation.gov/formats/fdd/fdd000125.shtml

For questions about the activities of TC 130 , for suggestions for (or input to) future updates, or standards questions in general, please contact the editor at mcdowell@npes.org.

Beijing Hosts Successful ICIS2010

By Fan Zhigang

The 31st International Congress on Imaging Science (ICIS 2010) was held from May 13 to 15, 2010 in Beijing, China (see related story in v25 #4 July/August issue of *The Reporter*). The conference was sponsored by ICIS and Chinese Society for Imaging Science and Technology (CSIST), co-sponsored by the Beijing Institute of Graphic Communication (BIGC), China Lucky Film Corporation and the Chinese Technical Institute of Physics and Chemistry (TIPC). IS&T was one of the cooperating organizations, together with the Royal Photographic Society of Great Britain (RPS), the Imaging Society of Japan (ISJ), the Society of Photographic Science and Technology of Japan (SPSTJ), the Korean Society for Imaging Science and Technology (KSIST) and German Society for Photography (DGPh). I attended the conference and served as the program co-chair for North America.

The conference was well attended, with more than 240 papers given and 308 participants, approximately 80 of whom came from beyond China. All of these figures are much higher than for comparable conferences held in the country, and well beyond expectations, particularly given the current worldwide economic difficulties.

The content of the conference was solid. A strong set of plenary and keynote presentations composed of 11 talks were given by leaders and experts from both industry and academic institutes, covering the latest developments, and trends in various aspects of the imaging sciences and technology. The conference was organized in four parallel tracks of oral presentations, along with an interactive poster session. Attendees remarked on significant progress in the presentations by local participants, compared to a couple of years ago in similar conferences.

Plenary and Keynote Talks

The conference clearly demonstrated the further development towards digital imaging. This was not only indicated by the conference's sub-title, "Imaging Science and Technology in the Digital Era," but also reflected in its plenary and keynote talks:

- Stephen Hoover (Xerox), "The Future of Print and the Digital Printing Revolution"
- Shinpei Ikenoue (Fujifilm), "Challenge to Digital Imaging: Past, Present and Future"
- Eric Hanson (Hewlett-Packard Company), "The transformation of Commercial Printing by Digital Printing Process"
- Qian Lin(Hewlett-Packard Company), "Mobile Image Capture and Consumption"
- Phil Green (London College of Communication), "Requirements for Digital Colour Reproduction"
- Gerhard Bonnet (Spheron VR), "Full Spherical HDR Photography and its Application in Computer Graphics, the Automotive Industry, and Entertainment Markets"
- Werner Zapka (XAARJet AB), "History and Outlook of Industrial Inkjet Printing"
- Koji Hirakura (Ricoh), "Hardcopy Technologies and the Carbon Footprint"

Among the four oral presentation tracks, two were dedicated to digital and color imaging technologies, and one to digital and on-demand printing/publishing. A significant portion of papers of the fourth track ("Novel Imaging and Related Functional Materials") also dealt with digital devices. Another hot topic was sustainability. One of the plenary talks was entirely dedicated to green printing. In addition, almost all other plenary talks touched on this topic.

The conference was generally well organized, and the conference venue—the China National Convention Center—is modern, and can compete with any world-class facility. Its location has a good balance between convenience and quietness (not too close to the business centers). The banquet, with excellent food and live performance, was certainly memorable. Overall, it was a successful conference, in large part due to the tremendous efforts made by the conference organizers, particularly those local to Beijing. ▲

UPCOMING IS&T EVENTS

January 23-27, 2011; San Francisco Airport Hyatt Regency
Electronic Imaging 2011
Symposium Chairs: Sabine Süsstrunk and Majid Rabanni

May 16-19, 2011; Salt Lake City, Utah
Archiving 2011
General Co-chairs: Wayne Metcalfe and Kate Zwaard

October 2–6, 2010; Minneapolis, Minnesota
NIP27: 27th International Conference on Digital Printing Technologies/Digital Fabrication Processes 2011
General Chairs: Xavier Bruch (NIP27) and Shinri Sakai (DF2011)

To learn about all upcoming IS&T meetings, go to www.imaging.org/ist/Conferences/. For a complete list of imaging-related meetings, go to www.imaging.org/ist/conferences/events.cfm