

Food for Thought on Printing, Gluing and Finishing

From October 24 to 26 last year the organizers (Dr. Michael Gerstenberger and Stephan Hinterwaldner, MKVS GbR) of the Munich Adhesives and Finishing Symposium assembled the who's who of the industry to three days full of food for thought on printing, gluing and finishing. Aside the exciting programme there was plenty of time for the more informal exchange of news in the conversations buzzing during the breaks or in the evenings. Once again the number of participants was up to the previous years' levels and in the breaks they kept the exhibitors (Erichsen GmbH & Co. KG, Kienzle-Prozessanalytik GmbH, Evonik Industries AG, Lion Consult, Gala Kunststoff- und Kautschukmaschinen GmbH, Rocholl GmbH, Dr. Höhle AG, Sam Sungan Ralf Pagendarm GmbH, INATEC GmbH and Hochschule München) pretty busy answering questions to their products and services. The programme covered innovations, process control and various issues regarding printing, such as standards, or printed electronics, or problems solved in finishing and gluing, with a focus on adhesives, application technology and sustainability. As is already customary from previous events, time was set aside for questions and answers to this input each day prior to lunch and again before the end of the day. The panels were chaired by experts in their fields: Michael Schmalz from Kroenert in Hamburg, Dr. Ralf Rönisch from Coroplast in Wuppertal and Dr. Hermann Onusseit, from Henkel in Düsseldorf to mention only a few.

In all continuous production processes such as printing, gluing and finishing, process control and optimization at a high standard are required 24/7. Hans Örley from Dr. Schenk in Planegg, Germany, showed how optical inspection systems can provide superior results compared to manual control.

INNOVATIONS. «The secret of all inventors is to consider nothing to be impossible»¹. True to this motto the innovations presented covered a wide range of topics, extending from cleaning to curing or sustainable packaging solutions.

Dr. Heribert Hohmann from Kienzle-Prozessanalytik in Flensburg, Germany, discussed how using laser induced fluorescence spectroscopy continuous monitoring is possible inline, online or offline, to guarantee that a substrate is sufficiently free of contaminations to permit a perfect result after gluing, finishing and printing.

Oliver Starzmann from IST METZ in Nürtingen, Germany, presented UV-LEDs as an innovative UV-solution with clear benefits compared to classical UV systems. Petra Burger from Dr.



Höhle in Gräfelfing, Germany, reported on her experiences with this technology.

How to generate an innovative substrate to replace mineral oil based plastics films by harnessing nature to generate packaging solutions was shown by Joachim Janz from Innovia Films in Bückeburg, Germany, in his presentation of Natureflex™-films.

PRINTING. Customers and printers require standards to facilitate their communication, appropriate equipment to provide the product ordered, process controls and innovations validated prior to their implementation. In his paper Prof. Dr. Martin Dreher from DFTA Technology Centre at the HdM, Stuttgart, Germany, specified the Process Standards his institution has developed to put all parties concerned on the same page in their communication on packaging printing quality. Mainly this entails generating colour profiles for each printing condition, which would then be printed in a colour strip along side of the actual job.

The more and more popular reproduction procedure using «digital» plates often leads to problems. During data transfer exposure of the print relief to ambient oxygen is responsible for insufficient crosslinking at the borders of the exposed area, which causes dot reduction and according lower print quality. Dr. Uwe Stebani from Flint Group Flexographic Products in Willstätt, Germany, showed new UV-exposure technologies for photopolymer printing plates to improve this problem in image reproduction.

Dirk Lange from AVT-Advanced Vision Technology in Hamburg, Germany, introduced a solution to simplify standardization that enhances productivity and reduces cost. It involves automatic process and quality control as well as spectral photometric inline colour measurement.

¹ Justus von Liebig

Simulating production conditions in a lab is often a problem, where inert conditions at production speed need to be generated to obtain a viable result, as in simulating UV-light curing e.g. in printing processes. Dr. Georg Bolte from Bolte Consulting in Halle/Westfalia, Germany, presented his solution. It is based on a cylinder with a slit opening rotating around an UV lamp. The cylinder's rotating speed simulates the transportation speed of the substrates for >200 m/min. A repeated turn of the cylinder is used by the comparison of several numbers of UV-lamps. The separated, inert chamber makes the precise adjusted oxygen content between 100–2000 ppm O₂ during the UV-cross-linking process possible.

GLUING. Various motivations are behind new developments in the adhesive industry and the adhesive application technology: saving cost, improving an adhesive's properties, generating new products, and last but not least, protecting the environment.

Since the prices for raw materials for adhesives are raised time and again the industry is on a quest to set off this disadvantage by coming up with technology permitting to apply less adhesive without forfeiting adhesive bonding or any of the other properties a customer requires. Be it the die design, as shown for hot melts by Michael Brune from Inatec, Langenfeld, Germany, and in general by Harald Döll from TSE-Troller in Murgenthal, Switzerland. Be it the application method, curtain coating or bead-coating mode, as explored for dispersion adhesives in the paper by Dr. Wolfgang Neumann from Kroenert in Hamburg, Germany, assisted by Jérôme Malaise from Hochschule Munich, Germany.

Technical innovations such as OPV or OLEDs, where application weights of 15–50 Nm are required, are an altogether different motivation to reduce application weight. As the lively panel discussion on «printed electronics» showed, here well-trodden paths will not lead to the desired result and thinking out of the box is the order of the day. The adhesive to be applied too bears challenges as Dr. Klaus Noller from the IVV Fraunhofer-Institute for Process Engineering and Packaging in Freising, Germany, showed in his presentation of novel barrier adhesives applied in multi-layered high-barrier laminates such as OPV.

One of the most important and at the same time most flexible ways of supplying adhesives for further process chains is in the form of pellets, or granules. Michael Eloo and Helmut Schöttner from Gala Kunststoff- und Kautschukmaschinen in Xanten-Birten, Germany, and Duane Booth from Gala Industries in Eagle Rock, VA, USA, walked the audience through the established and new solutions for the production of such pellets or granules.

Although solvent free UV-curable acrylics were introduced into the adhesives market with the goal to replace solvent based acrylic PSA systems already some 20 years ago, so far, due to their limitations such as restricted compatibility with tackifiers, a limited ability to bond to low energy surfaces and curing problems at high coat weights resulting in poor shear performance, this goal has not really been reached as they have only captured a small albeit steadily growing part of the market. Dr. Christoph Timm from Novamelt in Wehr, Germany, introduced his company's new developments opening new application opportunities for UV-curable acrylic HMPA.



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Laminates with most solventless and many solvent-based adhesives usually require storage times of several days between lamination and delivery to the food packer in order to build up bonding strength for subsequent cut and sealing processes, and to reduce low migratable ingredients with a toxicological risk potential for the food being packed. Dr. Karl-Heinz Schumacher from BASF in Ludwigshafen, Germany, revealed how novel water-borne polyurethane and acrylic based adhesives make it possible to convert laminates immediately and enable food packaging within a very short time period. In addition a maximum of toxicological safety is guaranteed and they can be processed easily on slightly modified existing coaters for solvent-based adhesives.

Water-soluble acrylic pressure-sensitive adhesives (PSA) are synthesized and formulated in organic solvents, which is how come they are not commercially available, although their application covers a wide range of interesting products, such as water-soluble or water-dispersible splicing tapes, water-soluble or water-dispersible labels, protective films, OP-tapes or bio-medical electrodes. New aqueous water-soluble organic solvent free PSA based on acrylics shown by Prof. Dr. Zbigniew Czech from the West Pomeranian University of Technology in Szczecin, Poland, can provide the same performance level as their solvent-based counterparts coupled with the advantage of not requiring a special permit for their use.

Characterisation of adhesive distribution can reach limits when the bonded system contains metal, or if it is composed of several superposed layers. Dr. David Mannes, Dr. Eberhard Lehmann, F. Schmid, Jan Hovind from Paul Scherrer Institute (PSI) part of the Neutron Imaging and Activation Group, Spallation Neutron Source SINQ in Villigen, Switzerland, presented neutron imaging as a viable solution for the samples of several glued aluminium layers they had tested.

As customers increasingly base their buying decision on life cycle assessments, or the so-called «product carbon footprint» of materials used in the product no industry can refrain from making sustainability along side cost a unique selling point. Dr. Hermann Onusseit from Henkel in Düsseldorf, Germany, showed the role sustainable bonding plays in generating sustainable products. Dr. Allan McLennaghan, from Dow Europe in Horgen, Switzerland, presented several case studies he had undertaken together with his colleagues, Colin Li Pi Shan, Lisa Madenjian, Selim Yalvac, Kate Brown and Yi-Jin, to research the role of olefin based polymers and the role of product development in delivering more sustainable technologies. Wouter van der Meulen from Arizona Chemical in Almere, The Netherlands, delved into the intricacies of creating sustainable bonding and showed how tape applications can be improved using high performance terpene based resins. Since terpene is generated from renewable resources it also contributes to making these tape applications more sustainable.

FINISHING. Final products often involve a long process chain influenced by various different interest groups involved: retailers flexing their muscles, customers clamouring for sustainable, long lasting or novel products, and converters with only their part of the product chain in mind.

Kishore Sarkar from Gallus Ferd. Rüsch in St. Gallen, Switzerland, discussed the trend in the market for narrow web pres-

sure sensitive labels, which involves retailers increasingly generating their own labels. This is economically detrimental to brand owners and also puts pressure on label converters as they find themselves between a rock (market demand) and a hard place (rising raw materials cost). His solution was a very thin, down gauged label stock introduced at Labelexpo 2011, which is coated with only half the usual amount of glue and processed with the new die cut solution from Gallus.

The tasks involved in rising to the challenge of combining sustainable film with sustainable adhesives both made of renewable raw materials into a sustainable product were impressively shown by Stefan Hörnicke from Achilles Papierveredelung in Celle, Germany. A different approach to providing sustainable packaging was shown by Dr. Christophe Robert from Bostik in Ribécourt, France. Since the package is resealable, there is a saving in packaging, as no secondary packaging is necessary. The solution he showed was extrudable and showed optimal adhesive and organoleptic performance.

Painting a picture of a light weight future with products made using a combination of fibres such as carbon, glass and Kevlar® with epoxies, Jürgen Hanel from Coatema Coating Machinery in Dormagen, Germany, explained the highly precise coating and laminating technologies necessary to get there.

The opening force of a laminate or adhesive tape should remain constant for a very long period of time. Hardi Döhler from Evonik Industries in Essen, Germany, presented his findings in accelerated tests of release stability of nine different hot melt adhesives used in combination with UV curing RC silicones.

As Bettina Hirdina-Falk from Planatol in Rohrdorf, Germany, showed, a smooth transition of the unfinished product from printing to finishing to gluing is necessary for the customer to receive the brochures, glossy magazines or packaging as he has ordered them. She made a case for including the gluing process in plans for printing and finishing as poor bonding is mainly caused by an incompatibility of finish and choice in adhesive.

In our modern world print often provides the primary contact to the customer and thereby the first opportunity to reach him emotionally. Here print and finishing combine to underline the message texts are sending. According to Dr. Peter Barth from CreativeNetworkConsulting in Celle, Germany, future print finishing will include digital technologies such as inclusion of a video clip into the printed product.

For the 37th Munich Adhesives and Finishing Symposium 2012 on Pressure Sensitive Adhesives scheduled for October 22–24, 2012, a call for papers on such topics as dispersions, solvent-borne products, reactive Systems or HMPSA has been issued. Title and abstract of the technical paper can be submitted in English and/or German until April 27, 2012. Speakers will be notified whether their paper has been accepted by May 7, 2012. MKVS GbR,
D-85614 Kirchseeon,
www.mkvs.de