4th Afera Technical Seminar (Brussels April 9-11, 2008)

For the fourth time Afera, the European Association for the Self Adhesive Tape Industry, summoned some 120 participants from 16 countries (including Russia, China, United Arab Emirates, and Venezuela) to their meanwhile well established event. Following, there are presented some excerpts from all in all twenty-two contributions, which offered a brought scale overview of what may be regarded the current forefront of self-adhesive materials development.

A Whole World of End-uses

On *"Recent Developments in Halogen-free Flame Retardant Pressure Sensitive Hot Melt Adhesives (HMPSA)"* elaborated D. Toppel (Collano, Switzerland). On one hand demand for flame retardant PSA´s is strongly growing in various industries and a multitude of applications. On the other hand, hot melt technology can offer many advantages. Avoidance of halogenated materials increasingly has become a must due to toxicology requirements and environmental aspects. Properly chosen non-halogenated phosphor compounds offer the possibility of formulating HMPSA´s with sufficiently high LOI (Limited Oxygen Index above 29) and very promising adhesion / cohesion profile values, i.e. peel adhesion >30N/25mm and shear adhesion failure temperature (SAFT) >65°C. Respective prototypes are subject to further optimization efforts.

About *"Choosing the Right Foam for Sealing Tape Applications"* spoke L. Berger (Sekisui Alveo, Switzerland). Foam based sealing tapes are employed in numerous applications such as window and door sealing, partition walls, sandwich elements or car rear light fixations, the foams being polyethylene, soft PVC, soft rubber or polyurethane based exhibiting closed, open or partly open cell structure. A broad variety of properties is requested depending on the respective area of application, such as fire resistance, air permeability, water sealing, and compression behaviour at elevated temperature. Consequently, foam outline has to be carefully tailored according to the requested mode of action, and a suitability matrix was presented which allowed for the proper selection of the most well-suited material envisaging a given application.

F. Küster (3M Deutschland, Germany) presented *"Advances in Printable UV PSA´s".* As it turned out during the presentation monomer and oligomer base as well as the photoinitiator package have to be particularly optimized in order to avoid over-crosslinking by UV radiation with the result of a dry adhesive surface layer. As a result the process window can be widened with high tackiness being maintained

even at high UV dose and good bonding properties vs. LSE (low surface energy) substrates such as PP. Process alternatives comprise curing under inert atmosphere (Nitrogen or Carbon Dioxide), which requires additional investment and aggravates handling, or cationic curing systems, which are more expensive and sensitive to moisture.

Solvent borne, Waterbased, HMPSA, UV – Innovations across the Board

"Novel Acrylic PSA with Outstanding Automotive Clear Coat Adhesion" was V. Stone´s (Cytec Specialty Chemicals, U.S.A.) topic. Vehement development efforts in the field of automotive clear coats have lead to high performance types of products, which – unfortunately – cause insufficient properties of acrylic PSA´s employed e.g. to bond aftermarket trims and accessories. Newly developed solvent based acrylic PSA´s with molecular weight between 50,000 and 90,000 and solid contents from 42 to 48% now have been demonstrated to be able to overcome this obstacle. Balance of cohesive and adhesive performance has been improved on a number of different clear coat compositions, high peel adhesion could be shown different backing materials, and particularly high cohesion values even suggest the use at elevated temperature.

Innovations in Water Based Acrylic Technology", on the contrary, was the headline of S. Sundaram´s (Rohm and Haas, U.S.A.) contribution. Basically, the author distinguished among product and process innovations. The first mainly refers to improvement of adhesion / cohesion balance employing nanotechnology techniques up to a level that so far only solvent borne systems have been able to attain. Also the moisture sensitivity due to the removal of water soluble surfactants within the polymer film has been improved. Process innovations presented are primarily concerning Fast Dry Technology that allows for 25% higher drying speed without changing machine parameters. The key buzz words for improvement here are foam control, increase of shear stability and, very important, reduced skinning which avoids surface defects due to blistering.

W. Rönisch (Henkel, Germany) with his presentation on *"Expanding the Limits – New HMPSA for Tape Applications"* was addressing the third main adhesive application technology within the pressure sensitive field. To cut a long story short: "Limits have been expanded!", was the author´s key message to the audience. Limits in the sense understood here are formulation properties for crystal clear applications ("no label look"). Loop tack and peel adhesion on corrugated cardboard or steel as well as results of flap test all exhibit levels better than the respective benchmarks. Availability of respective high clarity formulations now opens areas like medical / hygiene, building / construction, automotive industry and general packaging also for HMPSA.

According to S. Hagenberg (PolymerLatex, Germany) *"New SB Pressure Sensitive Adhesives"* do offer interesting perspectives for waterborne formulations. The conventional adding of tackifying resin in order to increase adhesion leads to drawbacks like loss of cohesion and price increase of formulation. It has been found that a more linear design of the SB polymer chain (similar to acrylics), e.g. through lower reaction temperature, longer polymerisation time and increase of chain transfer catalyst allows for a better balance of properties. Results are pronounced improvement of tack whilst maintaining good cohesion properties. Among further advantages there are low foam formation, good freezing resistance, and applicability on plasticizer containing substrates.

Achieving the same or even better yields in UV curing with less electric power is the constant effort of the UV lamp producing industry. As one representative R. Müller (IST Metz, Germany) contributed with *"Increased Energy Efficiency when using UV Curing Systems".* Some key requirements are more energy saving UV lamp modules and reduction of machine down times. New UV lamp reflector design e.g. allows for reduction of lamp power from 200W/cm to 140W/cm achieving the same curing level. Also electronic power supply devices offer an increase in efficiency at low energy consumption so that a further reduction of power towards 100W/cm may become accessible in the future. Further measures are 3D simulations of UV ray distribution geometry and fast lamp change systems which help reduce down times to no more than a few seconds.

From Automotive Industry to Medical Applications

Avoiding the halogen content related to the use of classical PVC tapes is an important challenge being tackled by industry since now more than 15 years. Consequently, B. Müssig (teas, Germany) offered an interesting alternative with *"Wire harness Tapes for a non Halogen Automotive Future".* PVC backed tapes in automobile assembly are used in a variety of applications, such as bundling, shaping, insulation, dampening, etc. Polyolefin alternatives are falling short of processability, conventional flame resistance testing, and flexibility. In order to match the magic triangle of tensile strength, flame resistance and flexibility and at the same time taking account the low cost requirement the only viable alternative was found to be polyurethane film prepared with a synergistic combination of phosphorous and nitrogen based flame retardants.

S. Sigg (IVF Hartmann, Switzerland) devoted his presentation to one rather unique field of application: *"Medical Devices and Pharmaceutical Products coated with Pressure Sensitive Adhesives."* Among the respective areas of interest are wound dressings, bandages, fixation of medical devices, transdermal drug delivery, etc. Key requirements for PSA´s being employed in direct skin contact are low allergenic potential, sufficient adhesion force to the skin with easy, painless peel-off properties at the same time, and biocompatibility. Particularly in percutaneous drug delivery membrane plasters are involved, which require the adhesive layer to be permeable for the ingredient to be administered to the human body through the skin. All in all, skin related PSA applications require processes and materials very precisely to be specified and reproducibility and traceability to comply with high standards.

Concluding, one will agree with L. Jacob, chairman of Afera´s Technical Committee and organizer of the symposium and his introductory announcement of an “informative and exciting event”. Afera Technical Seminar has become a “must” within the international PSA community and we are looking forward to its continuation in 2010.