Conference Report:

Advances in Coil Coating Technology

43rd ECCA Autumn Congress

The 43rd congress of the ECCA took place on the 23rd and 24th of November 2009 in Brussels. The 185 delegates discussed trends and new developments on the congress theme of "Advances in Coil Coating Technology". The presentations covered a wide range of subjects including environmental indicators, pre-treatment, alternative application methods, measurement techniques, product performance and various applications.

Keynote speaker Peter vanden Houte, chief economist at ING Belgium, talked about the sustainability of the economical recovery. In his opinion the recovery still looks vulnerable in the Western world, for the strong euro could hurt the economy. Financing industrial projects will stay a problem in the coming years and the production level of 2008 will be reached earliest in 2012.

Study of Different Roofs

To gain the 2008 production standard efforts have to be made in Coil Coating in respect of products, production process and marketing. For instance in the field of residential roofing comparison with competitive materials is essential. First steps in that direction were made by Chris Kendrick from Oxford Brookes University. He reported about a dynamic thermal simulation study of different roofs. The modelling has shown that metal roofing construction makes little difference to the thermal performance of housing across much of Europe when replacing tiled roofs of the same U-value. They even have a small advantage in hotter climates, especially if a solar reflective coating is used. Using solar reflective coatings the effect upon urban heat islands is beneficial, reducing both peak and average summertime surface temperatures during the day.

Pretreatment Technology

Another topic of the conference was new products for pre-treatment and coatings which improve the performance of coil coated metal. The most important quality parameter is corrosion protection. Marcus Schinzel from Chemetall in Germany talked about a new generation of corrosion protection primers, which are used in the Automotive Industry to provide additional corrosion protection in heavily exposed areas of the vehicle, such as box sections, doors and fenders. The primers are based on pigmented organic coatings and provide excellent weldability, formability and adhesive bonding.

The history of coil coating pretreatment technology was explained by Peter Mitchell. Pretreatment technology started with the very early lines of the 1930s dedicated to the painting of narrow aluminium strip. It was very similar to the technology used in post painting processes due to the very low speeds of early lines. As line speeds increased, specific coil pretreatment technologies also suitable for steel based substrates had to be developed that were able to deposit the required coatings in the very short time available. Environmental considerations relating to the reduction of waste led to the development of no-rinse technologies. Recent developments have involved the combination of primer and pretreatment technologies that give added benefits to the coil coater.

Top Coats

In respect of corrosion protection the top coat is the other important parameter besides pretreatment. On the conference Paul Davies from BASF Coatings talked about PVC plastisols which still remain the coating of choice where a deep barrier coating with high general weatherability is required. The modern PVC plastisol uses phthalate free plasticisers, and avoids the use of heavy metals in its stabiliser package and pigment system. Advancements in technology yield superb resistance to UV colour fade, and a maintenance of gloss over the lifetime of the product. Stabilisers are in the process of being reformatted to remove pTBBA, which will be phased out by the end of 2011. Besides corrosion protection environmental aspects are one of the driving forces for the development of electron beam curable coatings. For some years the rapid, low energy, pollution-free coating has been developed, but together with the critical issues of cost and performance the lack of any real weathering data is always discussed. Now Chris Lowe, Becker Industrial Coatings, presented the results of several EB cured coatings after 15 years exposure to natural weathering. It is seen that electron beam (EB) curable coatings can be made for the coil coating process and adequate formability and durability are achievable.

ECCA Award 2009

This year ECCA rewarded Peter Mitchell with the ECCA Award for his outstanding contribution to the coil coating industry. For many years he was an active member of the PTAGE / Environment & Sustainability Committee and chairman of the TC12 committee. With great enthusiasm and engagement he pushed the modelling of a coil coating line software which was released end of 2005. Peter did a lot of work championing and driving forward the distance learning project for the UK group. He was the main contact with the outside expert in the field of distance learning and put a lot of time and effort in ensuring the project was finished. This project was the basis of the on-line ECCA Academy.
Applying Technologies and Measurement Techniques

On the second day of the conference the main topic was applying technologies and measurement techniques. In the first session a comparison between coil coating and paper coating was discussed. Oliver Reimers from BASF SE showed parallels and differences between paper and metal coating. Paper is coated to enhance the printability, to impart better optical properties or improve the coverage of the base sheet. Paper can be coated on roll coaters which can be up to 10 meters in width, with a speed of up to 1800 m/min. The speed of the machine is limited by certain factors, such as specific weight of the sheet, drying capacities, rheological handling of the applied coating colours or the coating device itself.

Michael Bridges from Promatec talked about improvements for the paper roll coaters to avoid an uneven coat weight and gain ideal film thickness. “The ideal design”, he said, “would be one that would remove the necessity of additional metering rolls simplifying the design and drive requirements and one that would have some method of increasing the pressure between the Metering Roll and applicator roll in the middle.”

Emission reduction

As said before environmental aspects are an important factor for renewing equipment specially to reduce green house gas emissions. Christian Dressler from Lenzing Technik Austria introduced biofilters which can eliminate between 80 and 85% of the green house gas emissions instead of thermal oxidizers.

Curtain Coater

Kohei Ueda from Nippon Steel Corporation gave an interesting report about a roller curtain coater. The curtain coater is a noncontact type coater which delivers a smooth paint surface without ribbing. The coater has two rotating rolls, an applicator and a doctor roll. The velocity of the applicator roll and the gap between these rolls control the paint thickness. The thickness distribution of paint film is very even. The coatable ranges in paint thickness of the coater depend on the curtain stability, the air-entrainment and curtain heel.

Powder Coating Technologies

Peter Kloppers from EMB technology talked about the improvements on powder coil coating with an electromagnetic brush (EMB). The principle was introduced in 2000 by DSM. In the process powder is applied on flat substrates and the coating is similar to the Laser copier process. The powder is coated on magnetic carrier particles, and deposited on the metal surface.

Another novel powder coating technique working without spray guns was presented by Ulrich Strohbeck from Fraunhofer-Institut IPA in Stuttgart. This technology is based on the electrostatic fluidised bed principle, and high-performance infrared radiators. For the fast curing process special powder coatings have been developed, being highly reactive, and having a high degree of plasticity needed due to the deep drawing process of the precoated coil sheets. The so called „TransApp“ powder coating technique allows coating speeds up to 3 m/s and saves space, energy and maintenance costs. This is due to new highly efficient IR radiator systems which accelerate the powder curing process significantly.

As an alternative to large volume coating, Friedrich Bielefeld, Consultant, and Ard de Zeeuw, Henkel AG & Co. KGaA, talked about compact coil coating lines which are able to produce smaller lots as needed by the sheet metal fabricators. These lines can be designed as in-house sections integrated in existing fabricating processes as well as operated by Steel Service Centres. They become highly effective by using an in-line-primer-pretreatment.

To save water and energy NP Coil Dexter Industries developed a no-rinse chromefree pretreatment. Ricardo Cerno explained their efforts for “green technology”. New, less hazardous raw materials are used in the formulations and a strategy was developed how to re-use water after washing the production vessels.

Trade show at the conference
Test Method Evaluation
Running a coil coating line a lot of measurement is necessary to produce high quality products. Markus Pirklbauer from Voestalpine talked about a project of the German ECCA group where measuring techniques used in coil coating were evaluated. Test methods, established to characterize the main properties of coil coated material directly after production, are described exactly in many standards. But still lots of discussions have to be held between business partners concerning differences between test results. The ecca group tried to find answers concerning reliability of test methods, especially practical application of methods for measuring the mechanical properties, the colour, the gloss and the film thickness of coil coating materials.

Cure of Coatings
Besides measurement techniques to characterize product properties, analytical techniques to quantify, understand and monitor cure of thermosetting coatings are also important. The extent of cure has a critical impact on the coating properties. Problems have also arisen because it is sometimes mistakenly thought that optimum cure is achieved just by ensuring the system reaches the recommended peak metal temperature. James Maxted, Becker Industrial Coatings Limited, presented results from his studies of various techniques to assess cure. “Cure is not just about hitting the right PMT, the time factor and rate of reaction is also important”, he said. The curing process is both kinetic and diffusion controlled. So a suite of techniques to quantify cure of materials is preferable and to work with both off-line and laboratory prepared materials.

Colour and Gloss Measurement
Among analytical methods non contact colour and gloss measurement are additional working methods for quality control. Therefore Wolfgang PAPE from X-RITE GmbH gave some advice on how to use the instruments. Besides he presented the opportunities given with modern multi-system packages for online and offline colour and gloss measurement to gain reproducible, comparable data in different laboratories using same colour standards. Colour standards can be shared electronically by Coil Coaters, paint suppliers and end users.