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atmoFlex – Fraunhofer FEP enhances its facilities for coating plastic films

A leader in thin-film technology R&D, the Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP in Dresden, Germany, has significantly enhanced its capabilities. Scientists will be explaining and illustrating the new opportunities using a model of the new coating machine atmoFlex at their trade fair booth during ICE 2017 in Munich/Germany (Hall A5, booth 1157), from March 21–23.

Fraunhofer FEP has been pushing the technology development for thin-film coatings on plastic film for years. The basis for these advances has been its roll-to-roll process lines that facilitate the development of coating systems, from lab-scale to prototype samples, up through initial pilot manufacturing for industrial applications. After commissioning and testing during the past year, the new atmoFlex system has come on-line to broaden Fraunhofer FEP's capabilities by offering processing at standard atmospheric pressure. In addition to its electron beam system, the process line also provides contactless slot die coating. All of the guide rollers within the conveyance machinery are larger than in comparable plants to minimize the mechanical loading on substrate materials. In addition, a wide range of film laminating techniques is available for research and fabrication of custom film composites.

The initial results are promising. For example, combinations of layers were created that were fabricated using PVD (physical vapor deposition) and lacquering processes. The recently launched OptiPerm project, funded by the Saxony State Ministry for Economy, Employment, and Transportation (SMWA/Staatsministerium für Wirtschaft, Arbeit und Verkehr, promotional reference 3000651169), will be investigating the interrelationships of individual technologies. This project will specifically research the fabrication of improved systems of barrier coatings for functional films with PVD layers in combination with varnishes and cured by electron beams. Besides permeation barrier performance, the research is particularly focusing on optical properties.

“atmoFlex considerably broadens the spectrum of our services. It will enable fragile and extremely thin vacuum-deposited layers to be protected by coatings applied directly at normal atmospheric pressure, for example. These types of combined layers are even reliable enough for outdoor use,” explains Dr. Steffen Günther, group manager responsible for the research at Fraunhofer FEP. “We look forward to discussing this at ICE 2017 with potential users.”

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Films used for a wide range of applications can be coated with the new process line, from decorative film for furniture to permeation barriers for food packaging and organic electronics. Specialized modifications to the conveyor design permit the utilization of both smooth and textured films so that either high-gloss surfaces or decorative finishes can be produced for furnishings, for example.

High temperatures normally necessary for drying coatings can impair very thin substrate films. An alternative drying and curing process is therefore employed in atmoFlex. This new process uses electron beams for curing coatings as well as for surface treatment. The electron beams are even able to penetrate a protective film applied over top and cure the layers beneath. Processing under clean-room conditions to keep layers free of particulates is therefore not necessary.

But the new process line is capable of treating not only plastic films. It is also available for coating other flexible substrates such as metal foil, thin glass, and textiles. Substrates widths up to 1,250 mm can be processed at speeds of up to 150 m/min. The modular character of the process line also offers sufficient adaptability for integrating future technological advancements and researching new processes. The new plant has recently been fitted with a web cleaning system. Contaminants already present on substrate films can be effectively removed this way.

Fraunhofer FEP at ICE 2017

Conference:

Wednesday, March 22, 2017, 11:30 am, session 4

Dr. Steffen Günther

„From vacuum to atmosphere and back – an in-house process chain for different products.“

Exhibition: Booth of Fraunhofer FEP: Hall A5, booth no. 1157

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1,200 mm-wide slot die for contactless coating of fragile substrate can be heated up to 50°C

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View of the electron beam emission window

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The **Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP** works on innovative solutions in the fields of vacuum coating, surface treatment as well as organic semiconductors. The core competences electron beam technology, sputtering and plasma-activated deposition, high-rate PECVD as well as technologies for the organic electronics and IC/system design provide a basis for these activities. Thus, Fraunhofer FEP offers a wide range of possibilities for research, development and pilot production, especially for the processing, sterilization, structuring and refining of surfaces as well as OLED microdisplays, organic and inorganic sensors, optical filters and flexible OLED lighting. Our aim is to seize the innovation potential of the electron beam, plasma technology and organic electronics for new production processes and devices and to make it available for our customers.