EFFICIENT HEAT TRANSFER

Plastic laminate foils are used in foodstuff packaging, for sealing roofs or as decorative items in motor vehicle interiors. Infrared emitters have proved to be very successful in plastics processing, as they can be so designed to heat the plastic predominantly at the surface.

If the production speed in plastics processing needs to be increased, then conventional heating methods quickly find their limits. Large, very heavy rollers need to be heated for a long time and they cool down very slowly after an unanticipated conveyor belt stoppage, so that problems can arise. Hot air heating allows the foil to flatten and wrinkle and the heat transfer is not optimal so that hot air ovens must be of large design if higher belt speeds are to be achieved.

In contrast, infrared radiation transfers the energy without contact and very efficiently. Carbon infrared emitters deliver medium wave radiation and consequently heat the foil predominately at the surface. They can be very precisely controlled, as reaction times are a matter of seconds. This minimises damage if there is sudden belt stoppage. Excelitas offers Noblelight infrared systems, which are precisely matched to the product and the process.

DRYING PRINT

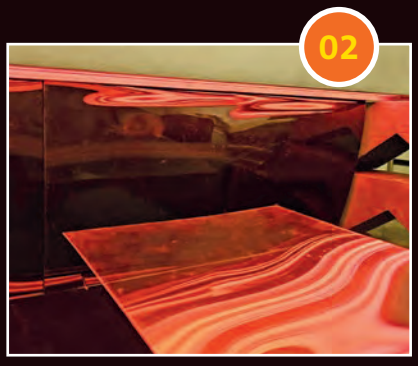
Plastic laminated foils are used in house building as well as in agriculture. “Now Contec GmbH & Co” provides products for customers, as a sub-contractor, to meet their specifications and guidelines. Its main focus is on sheet material for building protection such as sarking membranes, moisture barriers, façade covers or geotextiles. These foil sheets are printed with logos and safety instructions etc, as required by the customer. When investigating an efficient print-drying technique, it became obvious that hot air was not an option for the thin foils, as these tend to wrinkle in the air flow. In addition, to meet the required conveyor belt speed, a hot air oven needed to be very large.

Consequently, infrared drying, using mediumwave emitters, was selected for the task. These heat the sheet surfaces very efficiently. Carbon infrared emitters combine medium wave radiation with very fast reaction times, which minimises any damage when there is sudden belt stoppage. Juergen Huether, managing director at “Now Contec” is very sure: “We were not convinced with air drying, but we are now very happy with the infrared solution.”

LAMINATING SHEETS

Doors, central console or instrument panels of a car consist of support parts of synthetic- or natural fibres, which are covered with a foil sheet, often by means of vacuum laminating technology. The adhesive material is first applied to the foil or the support part. 3CON develops and manufactures tool- and plant technology for the manufacture of car interior fittings such as door cladding, instrument panels and many other parts. As a truly international, technology leader, 3CON supplies all prestigious OEMs and Tier 1 companies in the automobile sector.

Dr. Marie-Luise Bopp, *Head of Marketing, Excelitas Noblelight GmbH, Kleinostheim*



01 Printing on foil is quickly dried

02 Application-matched infrared systems heat foils in a targeted manner, without wasting energy

As a leading manufacturer of vacuum laminating plant for motor vehicle applications, 3CON is using Noblelight infrared emitters for the heating of PVC foil and thermoplastic polyolefin (TPO). In contrast to the fused silica emitters which were used previously, the Noblelight emitters offer significant advantages. They heat the foils much faster, reduce cycle times and, at the same time, save an enormous amount of energy, which represents a technological Quantum leap for this application.

To determine the optimum radiation wavelength for this application, an extensive series of tests was first carried out.

Special PVC- and TPO foils were tested for their penetrative heat characteristics. One of the aims of these tests was to establish the optimum wavelengths which gave a consistent and fast penetration of the infrared radiation into each material. Excelitas produces Noblelight infrared emitters which precisely match customer requirements. Moreover, the control system developed by 3CON allowed the wavelength of the emitters to exactly match the requirements of the relevant material. Additional process advantages were a shortening of heat-up times, reducing cycle times by around five seconds.

In addition, the medium wave infrared emitters save space and energy compared with the fused silica emitters. A standby control system to provide a permanent pre-heating of around 30% for the silica emitters is no longer necessary. This because infra-re emitters are switched on only when heat is required. Consequently, the surrounding area is no longer wastefully heated, allowing significant energy savings. Space has also been saved, as previously the heaters had to be removed from under the foil to prevent overheating. Because of their smaller mass, the fast response medium wave emitters cool down very quickly when switched off and their removal is no longer necessary. As a result, the six square metres formerly required as a parking area for the emitters has now been freed up.

IMD PROCESS BENEFITS FROM INFRARED EMITTERS

Decorative strips in cars, switches with a metal look or highly polished taps are manufactured by plastics injection moulding and then coated. This takes place regularly in IMD, In-Mold-Decoration or In-Mold-Lamination. In the IMD technology sector, Excelitas collaborates with specialists for thin film technology Leonhard Kurz. Leonhard Kurz Stiftung & Co KG develops and produces solutions for surface refinement finishing and functional coatings which are applied to carrier parts and used for a wide range of products, such as in motor vehicles, electronic products, household objects and furniture. IMD technology is used when injection moulding and plastic decoration are combined in one single operation. While the mould is filled with plastic, lacquer or paint sticks to the plastic moulding. On opening the mould, the lacquer releases from the carrier and remains on the plastic component, and this can then be removed. The complete process benefits from IR- and UV- technology. The coated transfer product can be processed significantly better and formed when preheated by infrared radiation and the lacquer is cured by UV radiation after injection moulding to make it scratch-resistant.

IMPROVEMENT OF FOIL EMBOSSING

API Foils Ltd, of Great Britain, is a worldwide group which produces an extensive range of stamping foils used on a wide variety of products from stationery to wine labels and from flexible food packaging to picture frames and more. The company also manufactures holographic foils, and these are used to create 2-D or 3-D prismatic effects for products such as credit cards and for brand logos, for decoration or security purposes. A Carbon infrared system is helping API Foils to increase production speed during hot embossing of holographic foils and also allowing them better control of the process.

The production of holographic foil relies on the hot embossing of the polyester-based film, and this is conventionally achieved using embossing rollers which are filled with hot oil. Unfortunately, this technique does not readily lend itself to sensitive control. In order to increase line running speeds and achieve greater flexibility of the embossing line to allow different materials to be run, API decided to investigate alternative heating techniques. It was quickly realised that pre-heating of the foil would provide a simple and effective method of controlling the actual embossing temperature and that infrared offered the best technology. Following successful tests, a carbon infrared system form Excelitas was incorporated in the production line.

This 83 kW carbon medium wave system is located after the film unwind and infeed stations, immediately prior to the embossing station. It features an optical pyrometer, so that the temperature of the pre-heated film passing to the embossing rollers can be precisely controlled in a closed loop system. Moreover, the fast response time of the carbon emitters ensures minimum wastage of product, as the emitters can be switched off virtually instantaneously in the event of line stoppage.

Images: *Lead image 3CON, others Excelitas*

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