

USER REPORT

Fürth/Bavaria + Kottlingbrunn/Austria – July 2019



Photo: LEONHARD KURZ Stiftung & Co. KG

Fig.1: Decorative and functional coatings, such as those developed and produced at Leonhard Kurz in Nuremberg/Fürth, enable efficient implementation of new design concepts, shown here, for example on a car door panel with variable and dimmable backlighting.

LEONHARD KURZ in Fürth has extended its product development and testing capacities with “all-in-one” injection molding systems from WITTMANN BATTENFELD.

From the roll to the third dimension

LEONHARD KURZ Stiftung & Co. KG headquartered in Fürth develops and produces decorative and functional coatings for a great variety of plastics applications which are transferred to plastic parts by means of carrier foil during injection molding. An essential objective is technology and process development as well as the further development of 3D modeling on corners and along the contours of plastic parts. For this purpose, LEONHARD KURZ operates an extensive injection molding technology center. Its equipment includes two production cells based on servo-hydraulic *SmartPower* injection molding machines from WITTMANN BATTENFELD with 1,200 and 2,100 kN clamping force.

For many of us, the car has become like a second living room, where we tend to spend more and more of our time, thanks to the increasing traffic density. But instead of being able to relax there, we are exposed to a number of stress factors. In order to counteract this, car manufacturers have increasingly invested in recent years in ergonomic improvements and assistance systems, but also in a more comfortable environment for the driver, especially through improving the surrounding surfaces. This includes coating of hard cladding parts with

soft-touch elastomers, as well as painting and printing effects or combining structural parts with surface decorations. The latter, in particular, has turned out to be the method with the greatest potential for innovation, thanks to the advancement in foil technology, which is proved by significant growth rates.

More than just high gloss, decoration and scratch protection

Ever since the 1980s, foils have been playing an increasingly important part in the surface finish of plastic parts. At first, these were mainly used as carrier foils for metal coatings to be transferred onto plastic parts by hot stamping. This led to the foil gaining an increasing significance as a transfer medium for placing design layers / decorative prints on parts during the injection molding process. Roll-to-roll transfer is used for this purpose (IMD = in-mold-decoration through transfer). A foil feeder specially developed by KURZ pulls the laminated foil web (most frequently consisting of polyester) synchronized with the cycle through the open mold, with the possibility of having continuous designs controlled by path control, and single image decorations by light conductor positioning. The IMD mold-specific clamping frame and vacuum technology then take care of high-precision holding and fitting into the mold cavity. The coating layer is subsequently “overmolded” to form an adhesive bond with the plastic. After the carrier foil has been separated from coating layer during mold opening, the inline-decorated part is demolded normally. This decoration method is also known as a “dry varnish decoration system” (including protective coating).

LEONHARD KURZ based in the Franconian city of Fürth is the market leader in transfer products for surface finishing of plastics parts. In addition to traditional hot stamping foils and IMD foils, Kurz offers a wide range of decoration products with special effects and/or functionalities, such as parts commonly known as PMD (print mold design) foil components. These are crystal-clear polycarbonate foils printed on both sides with a precisely coordinated design. In this way it is possible to create decorations with a 3D effect. Because of their relatively high rigidity and softening temperatures, however, PC foils are not suitable for direct processing on an injection molding machine, but must be cut to size and formed into insert parts outside the machine by thermoforming and subsequent downstream finishing steps instead. When inserted into the mold and then overmolded, they are transformed into instrument panels of center consoles for automobiles (Fig.1).

Varioform IMD pushes application limits and unit costs

However, neither the IMD roll passage method for processing polyester foils nor the PMD foil insert process are all-purpose solutions for decoration tasks. They differ in terms of both application limits and costs. For instance, the IMD polyester foils processed directly from the roll within one injection molding cycle can only be drawn three-dimensionally within relatively narrow limits.

As a further step towards realizing three-dimensional design transfer, KURZ intelligently combined several methods with each other into a single process and developed the “Varioform one-shot roll-to-roll IMD process“ from there.

Martin Hahn, responsible for Application, Technology & Innovation, explains this as follows: “This additional technological development in application technology opens up a wide range in the choice of foil systems in combination with the injection molding substrate materials (such as PP or ABS-TPU). This leads to new variation options also in part structures, with simultaneous utilization of a diversified design perspective as well as, from an economic point of view, to achieving an even greater 3D moldability in a “ONE SHOT roll-to-roll IMD process”.

Similar to standard IMD processes, design changes are carried out by simply exchanging the foil roll. It is also possible to process a great variety of single image and continuous decorations as well as functional foils. This, too, enables the realization of extremely high-quality surface designs at reasonable cost. Thus IMD Varioform constitutes a further link in KURZ application technology.

For KURZ, processes and application technology are vital success factors. Accordingly, our technical application lab for injection molding has been extended by adding appropriate trial and testing equipment. Following a comprehensive cost/benefit analysis, we decided to acquire two injection molding cells from WITTMANN BATTENFELD for this purpose. The decisive argument in favor of this choice was their “all-in-one” concept, which means that all auxiliary components for the injection molding machines, such as handling robots, parts conveyor systems, material loaders, mold tempering devices and the complete clean room housing also come from the WITTMANN Group, are therefore perfectly coordinated with each other and also linked to each other and to the outside via the WITTMANN 4.0 software tools.” (Fig.3)

Optimal near-production maturity with *SmartPower* injection molding machines

To drive the further development of KURZ process technologies with maximum closeness to practice and production maturity, KURZ decided to acquire two machines from the servo-hydraulic *SmartPower* series, namely a *SmartPower* 210/750 (with 2,100 kN clamping force) and a *SmartPower* 120/350 (with 1,200 kN clamping force), each equipped with a W918 robot from WITTMANN and clocked part conveyors. KURZ has fitted the clamping unit of each machine with a roll-to-roll foil feeding unit. (Fig.4)

Project Leader Fabian Bürkel from LEONHARD KURZ and Marcus Otto, Sales Engineer for Injection Molding Technology at WITTMANN BATTENFELD / Nuremberg were jointly responsible for the detailed conception of the two systems. Fabian Bürkel comments in retrospect: “The most important point for us was the transferability of the processing parameters established in test runs to the real operation practice of potential users of our foils. Here, we wanted to be as independent as possible of variable influences from production auxiliaries. The WITTMANN BATTENFELD concept of interlinked and coordinated auxiliary devices gives us the chance to concentrate entirely on the coordination of the injection molding process with the corresponding wide range of different foil systems”. (Fig.5)

Reaching for three-dimensional heights

The main focus of the new testing capacities lies on increasing the level of three-dimensional foil stretching (through infrared pre-heating and subsequent vacuum forming inside the mold) as an integral part of the injection molding process, as well as systematic optimization of the sprue position to minimize the effect of thrust impact from the plastic melt on the carrier foil's elasticity. An important side effect of the current product development program is keeping the corners of molded parts free of wrinkles, as well as process-safe folding of the foil around the contours of the molded part. (Please note: folding in this context means bending a decorative material, e.g. a plastic foil, around the edge of a carrier part by 90° or 180°, with subsequent fastening of the bent edge of the foil to the rear side of the carrier part / Fig.6).

An award-winning application for a car door inside panel demonstrates the potential inherent in KURZ application processes (Fig.7). Here, a partly translucent decorative foil / IMD single image system is combined by means of IML technology with a printed capacitive PolyIC sensor on the inside of the molded part. Both of these are overmolded within just one injection molding cycle. The sensor enables touch operation of the light switch and the dimming function, by which the color of the LED light source can also be varied (Fig.7).

A similar project will be presented live in production at the K 2019 at the WITTMANN BATTENFELD booth No. C06 in hall 15.

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Illustrations:



Photo: LEONHARD KURZ Stiftung & Co. KG

Fig. 2: PMD insert combined with a printed capacitive PolyIC sensor on the inside of the molded part.



Photo: the author

Fig. 3: KURZ has increased its application / technology capacity by the acquisition of two “all-in-one” production cells based on *SmartPower* injection molding machines with 2,100 and 1,200 kN clamping force.



Photo: the author

Fig. 4: Both injection molding machines are equipped with roll-to-roll foil feeding units. The robots carry a foil heating panel and on the opposite side a suction gripper for finished parts removal.



Photo: the author

Fig. 5: The production cells were designed by Project Leader Fabian Bürkel, LEONHARD KURZ, and Marcus Otto, Sales Engineer for Injection Molding at WITTMANN BATTENFELD / Nuremberg.



Photo: the author

Fig. 6: Examples from the current testing program at LEONHARD KURZ to extend the thermoforming dimensions and potentials for forming corners and radii with various foils

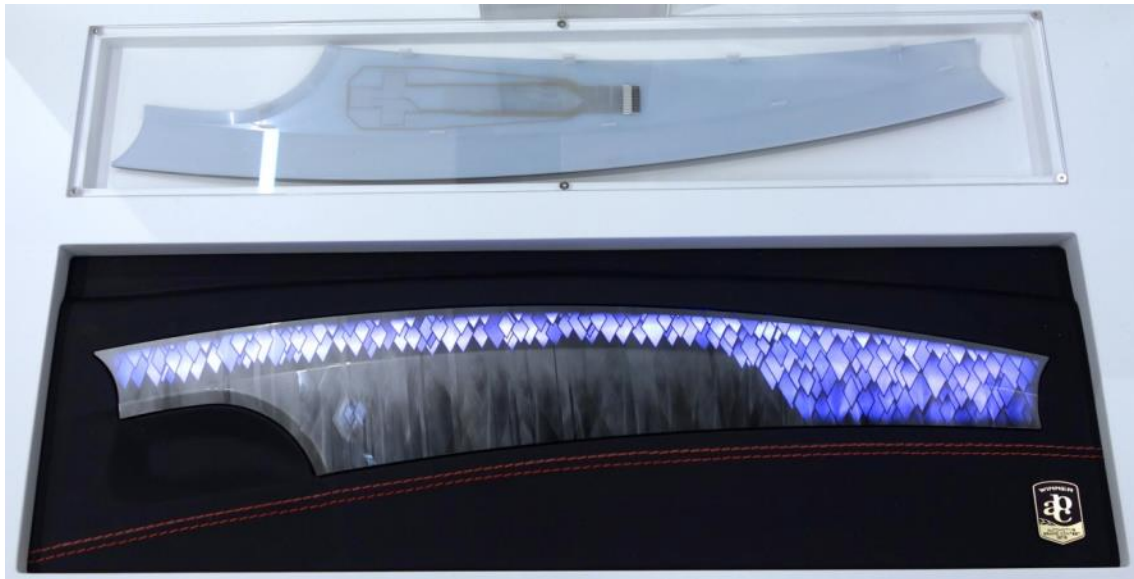


Photo: the author

Fig. 7: Application of IMD technology on the visible side of a car door panel. In addition, a prefabricated foil component from PolyIC, a member company of the KURZ Group, is placed on the rear side of the molded part, equipped with a printed-on sensor structure to integrate the interactive light switch and dimming function.

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about LEONHARD KURZ – Fürth

Photo: LEONHARD KURZ Stiftung & Co. KG

The company, founded in 1899 by Leonhard Kurz for the production of gold leaf, is known today as the KURZ Group, a global leader in hot stamping and coating technology. KURZ develops and produces decorative and functional coatings applied to carrier foils for a great variety of application areas, such as metalized, pigmented and holographic stamping foils for packaging or print products, surface finishes for electronic appliances or automotive parts, protective and decorative paints for furniture or household appliances, authenticity marks for brand products or magnetic strips for flight tickets or savings bank passbooks, or holographic strips for bank notes.

With more than 5,000 employees in 14 production plants in Europe, Asia and the USA, 24 international subsidiaries and a global network of agencies and sales offices, the KURZ Group manufactures and distributes an extensive product portfolio for surface finish, decoration, labeling and forgery protection, rounded off by a wide range of stamping machinery and stamping tools. Furthermore, KURZ invests continuously in new technologies and develops innovative solutions for integrating functions in surfaces.

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about WITTMANN BATTENFELD

WITTMANN BATTENFELD is a member company of the WITTMANN Group with its corporate headquarters and production plant located in Kottlingbrunn / Lower Austria. The company focuses on plastics injection molding technology and covers the entire range of machinery from micro injection molding machines with 5 tons clamping force all the way to large machines with 2,000 tons clamping force. In addition, the company's portfolio is rounded off by extensive technology packages, for example for multi-component, foam or fiber composite injection molding. In combination with the possibilities of the WITTMANN Group, a leading manufacturer of robotics and auxiliary appliances for materials handling, it is able to supply turnkey injection molding plants including Industry 4.0 data networks.

More information on www.wittmann-group.com