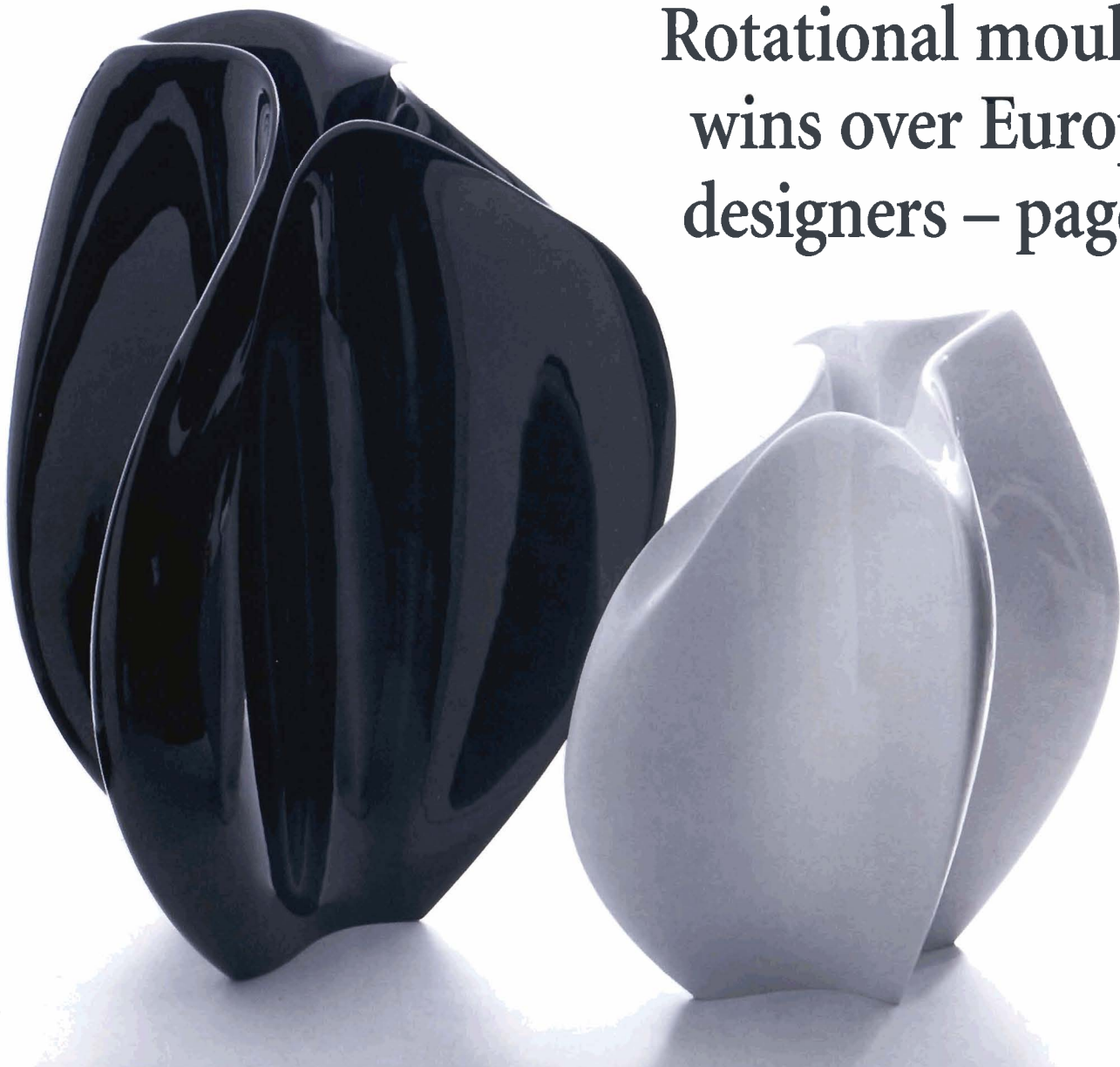


Formed to function

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Focused on the surface

David Vink reviews some of the latest developments in in-mould decorated injection moulding

The ability to produce a finished part direct from the mould has long been a key attraction of plastics – in mould decorating techniques take that attraction one step further, allowing a whole range of sophisticated surfaces to be applied with little extra process complication.

Injection moulding company **Schuster Kunststofftechnik** has established itself as a specialist in design, production and supply of parts produced using in-mould-labelling technology, helped in no small part by having the industrial label supplier **Back Stickers** and mouldmaker **Ruhla** all within the Schuster group. While each company acts independently in their respective business areas, they can provide focused expertise for individual projects.

Schuster managing director **Roland Beil** stresses there is an important difference between in-mould-decoration techniques that utilise the transfer of a decoration layer from a carrier foil – which then leaves a carrier film to be disposed of – and IML technologies where the decorative foil remains as a decorative element on the moulded part. He points to one of the company's latest IML applications as a good example of what can be achieved – the chrome metal effect mouldings used by Philips in its Senseo coffee machine.

Back Stickers managing director **Volker Schuster** says the group has a

Having developed IML expertise for mobile phones, IML moulding specialist Schuster and its Back Stickers foil subsidiary are now orientated towards the automotive and domestic appliance markets

long relationship with Philips, which has long exploited in-mould decorating technologies. "On average, we have Philips' designers visiting us once a year and we recently made a large presentation at Philips," he says.

IML technology is usually restricted to fairly flat parts. The Senseo application, however, involves curved mouldings but Schuster succeeded in applying an IML solution without the need to produce a pre-formed foil to follow the contour. The company says that sufficient foil forming of the

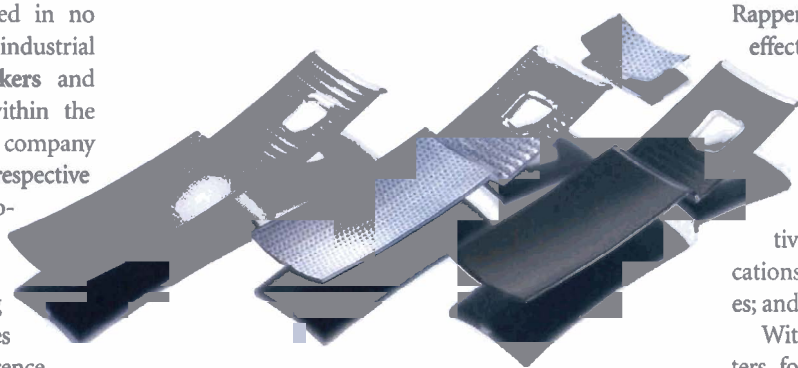
We try to do it with flat foils".

The Senseo parts give an impression of depth and this is one of a number of specific areas of competence for Schuster. It has, for example, developed a "Twinfoil" technology involving two films with injection moulding between the films and claims that it is the only company to use this approach. It is also working with Pröll on foils printed with magnetisable inks for 3D effects, and with the Institut für Werkstofftechnik und Kunststoffverarbeitung (IWK) in Rapperswil, Switzerland, on metal effect solutions using metal foils. It has also developed carbon fibre simulation effects.

Beil says there are three areas developing strongly for the future with IML: automotive engine compartment applications; domestic electrical appliances; and the cycle industry.

With automotive rear light clusters, for instance, it has been technically possible to use a foil to substitute two-colour moulding but, as the foil had to be formed, it was simply not economical. Schuster has shown that in certain examples it can make sense – integration of a chrome strip in a flat cluster, for instance.

The challenge for the future is to develop ever more sophisticated applications for IML technology, which Beil says is the only way to survive in Europe. "Sooner or later there will be competitors in China and it becomes commodity business. But our advantage here in Europe is that



Two IML mouldings made for the Philips Senseo coffee machine by Schuster, saving 66% on part cost by forming the IML foil in the mould

punched foil in this case can take place in the injection mould.

The result, Beil says, has been that part cost has come out at 66% less costly than a solution from a competitor calculated with use of a pre-formed foil – largely due to the elimination of the need for the foil forming tool and processing.

Beil, however, says the company can offer high pressure forming where it is required as its philosophy is to deliver technology to provide decorative surfaces. "If we have to do this with pre-forming it is very expensive.

we have a short connection to, for example, Philips, a company that makes it developments in Europe. This is certainly an advantage for new applications that finally end because they become commodities 15 year later," he says.

Schuster is also clear that there is no way of isolating a business from global trends. The company was at one time a key supplier to the mobile phone industry but the downturn in that business in Europe hit hard. It was some time before the company returned to a growth path on the back of growing applications in the automotive industry. Now it is the domestic appliance industry that is providing strong growth for the company.

Innovation is key to delivering the special effects required by any OEM customer. Pröll's latest novelty is its Noriphan HTR 3D magnetisable effect screen printing ink. With this ink, placing the freshly printed films while the ink is still wet into a magnetic field causes visible orientation of the particles in the pattern of the magnetic field, with the effect being fixed with hot air drying.

HTR 3D is available in various colour shades, achieved by mixing with transparent colours, and the company says it can be printed onto PC and PMMA films. This 3D effect opens up new visual appearance effects in the design and production of in-mould labelled plastic parts.

Another moulding company that is highly active in IML is Kunststoff Helmbrechts (KH). Aside from its piano black and wood grained expertise, KH has more recently developed the folioplate technique where a plateable plastic foil is thermoformed, stamped out and back moulded with a non-plateable plastic. The finished clad moulding can then be selectively plated.

This system is claimed to provide more favourable economics than two-component moulding with respectively plateable and non-plateable plastics or masking, which require either more expensive two-



Seen at K 2007 - an in-mould labelled Autobar Packaging SLIM "Super Light Moulding" in the form of a 500g PP container moulded on an Evos machine on the Netstal stand. The process used Trexel's MucCell microcellular physical foam process with cycle time 5 secs in a 4*4 Plasticsud cavity mould with handling equipment from Pagès

component mould tools and the additional cost of running an injection moulding machine with two injection units or expensive masking solutions to avoid chrome being placed in areas where it is not required.

Using the Foliotec technique, which is supported by KH's own foil supplier Foliotec, it is possible to produce a high gloss chrome appearance as well as the various structured and matt surfaces required in day-and-night designs. This results in a clean and uncluttered design solution when back illuminated. Other effects designed and produced by KH include simulation of a carbon fibre appearance and an effect of depth achieved by rear and front foil printing.

Often, OEMs want to replicate the look and feel of metal. This can be achieved using metal, rather than plastic, foils up to 0.3mm thickness, according to researchers at the Institut für Werkstofftechnik und Kunststoffverarbeitung (IWK) at the University of Technology and Plastics Processing in Rapperswil, Switzerland. This co-operative project with industrial partners has been running at the institute for a little more than a year.

Prof. Frank Ehrig of IWK says use of such thin foils means they can take on mould surface structures, opening up new possibilities for designers, especially when stainless steel rather than the more conventional alumin-

um foils are used.

But Ehrig warns that metal foils are not easy to handle in the moulding process, as they have a quite different coefficient of thermal expansion - requiring use of glass fibre reinforced rather than unreinforced plastic substrates - and can more easily tear, especially in areas with tight cornered reliefs. The surfaces of metal foils are also more easily damaged than plastic surfaces, and may require both a protective lacquer and adhesion promotion treatment prior to backmoulding.

The researchers have also found that the much sought cool touch effect is dependent on the metal foil thickness and the type of metal and its heat conductivity. Aluminium performs better than steel, while thin chrome layers of 15-40 µm have been found to yield almost no cool touch effect.

Aside from the previously mentioned ability to impart surface structures from the mould surface, Ehrig says further effects can be added to the foil by printing, and IWK has been looking at suitable inks that can survive the high temperature injection moulding environment.

IWK, however, says it has seen a real interest in the ability to provide parts that look and feel like metal yet provide all the snap-fit and easy assembly features of plastics. It sees the technology being particularly advantageous for moulders which currently send parts to plating sub-contractors.

- WWW.SCHUSTER-DE.COM
- WWW.BACKSTICKERS.COM
- WWW.RUHLA-GMBH.DE
- WWW.PROELL.DE
- WWW.HELMBRECHTS.DE
- WWW.IWK.HSR.CH

Together with industrial partners the IWK institute has been developing expertise in IML with metal foils

