

# Injection WORLD



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**NEW POLYAMIDE MATERIALS PROLIFERATE**

**HOT RUNNERS: LATEST TECHNICAL DEVELOPMENTS**



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# Injection WORLD

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COVER IMAGE: LEONHARD KURZ

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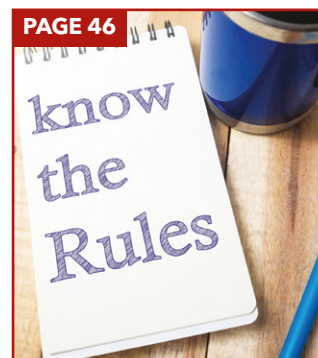
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# Automotive suppliers warn about Brexit stockpiling

Associations representing Europe's automotive manufacturers and suppliers have issued a joint warning about the potentially far-reaching impacts of a "no-deal Brexit" scenario on their sector. It could, they said, "threaten their very business model".

"Our members are already making contingency plans and are looking for warehouse spaces to stockpile parts," stated Erik Jonnaert, Secretary-General of the European Automobile Manufacturers' Association (ACEA), which represents the 15 major Europe-based car, van, truck and bus manufacturers. "However, the space required to stockpile for more than a short time would be absolutely huge – and expensive."



**Car parts will be held up at border crossings if the UK does not reach an EU exit agreement by the end of March 2019**

Jonnaert further warned that some ACEA members were planning a temporary post-Brexit production shutdown. However, he said, "no amount of contingency planning can realistically cover all the gaps left by the UK's withdrawal from the EU on WTO terms". These

would mean a 10% tariff on cars, when industry margins are already lower than that.

"Automotive components often cross borders several times before the final product reaches the customer, and that includes Channel crossings. Any change in the level of

integration of the value chain will have an adverse effect on the competitiveness of individual companies and the sector as a whole," said Sigrid de Vries, Secretary-General of the European Association of Automotive Suppliers (CLEPA).

The just-in-time manufacturing model, including just-in-sequence delivery and production means that millions of parts are delivered to plants every day, ACEA and CLEPA added. It is estimated that 1,100 EU trucks cross the Channel to deliver to car and engine plants to the UK, which means that even short hold-ups at customs will cause huge disruption.

➤ [www.acea.be](http://www.acea.be)

➤ <https://clepa.eu/>

## New hybrid liquid filter module

Mann+Hummel has developed a plastic-aluminium hybrid design for use in highly stressed automotive applications, notably pressure-loaded liquid filter modules for oil and fuel. This, the company said, gives plastic "the necessary robustness for these challenging applications", while creating a system that "exceeds the performance of the individual materials".

Plastics have been used in passenger car filter modules since 2003, but modules made of aluminium are still used in commercial vehicles because of the significantly higher loads they are subjected to. Mann+Hummel said that it achieved this landmark by developing a technology that combines the mechanical strength of metal with the flexible design capability of

plastic. An aluminium skeleton, needed for stability at highly stressed points, is contained in a plastic functional sheath, in which all the liquid-carrying elements are arranged, including the filter element and liquid guide. The connecting elements for the fuel inlet and outlet can be moulded directly from plastic.

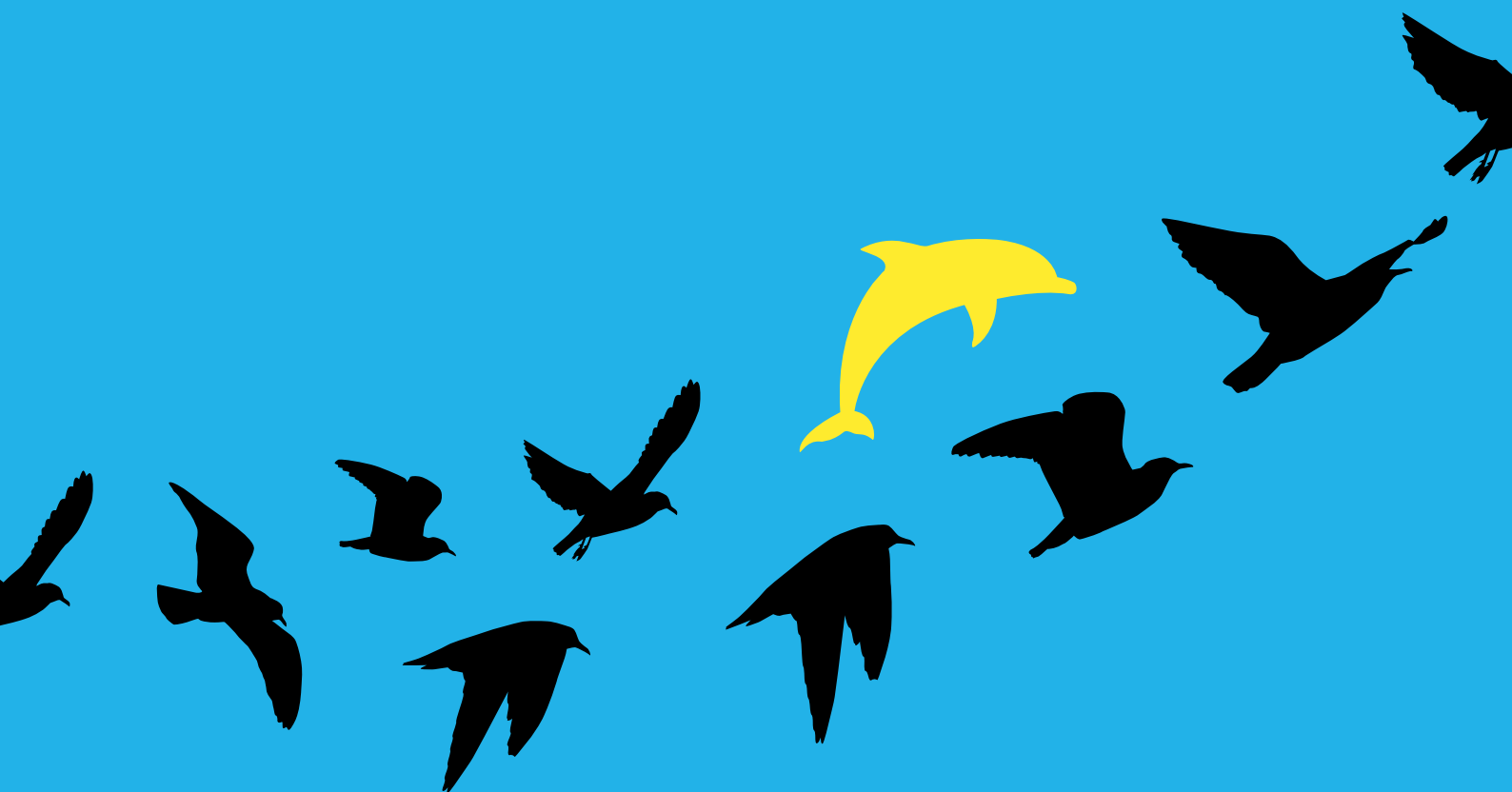
■ Mann + Hummel has appointed Werner Lieberherr as its new CEO. He previously headed B/E Aerospace until its takeover by Rockwell Collins in April 2017.

➤ [www.mann-hummel.com](http://www.mann-hummel.com)



**Mann+Hummel's plastic-aluminium hybrid liquid filter module for commercial vehicles**

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## Sun to sell Elix Polymers

Sun European Partners is to sell Elix Polymers, the Spain-based manufacturer of ABS resins and derivatives, to Sinochem International (Overseas) for an enterprise value of €195m. The deal is subject to customary regulatory approvals.

Since being acquired by an affiliate of Sun European in 2012, Sun says Elix has been transformed from "a production-focussed unit of a large chemicals conglomerate into a European stand-alone market leader with a best-in-class product and service offering". Sales have increased and EBITDA has quadrupled as a result of operational initiatives like lean manufacturing and commercial excellence, Sun said.

➤ [www.elix-polymers.com](http://www.elix-polymers.com)  
➤ [www.suncappart.com](http://www.suncappart.com)



Magneti Marelli's products include automotive lighting modules

## Calsonic Kansei and Magneti Marelli to merge

Fiat Chrysler (FCA) has agreed to sell Magneti Marelli, its automotive components business, to CK Holdings, the holding company of the Japanese automotive component supplier Calsonic Kansei in a deal with a transaction value of €6.2bn. This should close in the first half of 2019, subject to regulatory approvals.

The combined firm will be the world's seventh largest independent supplier of automotive

components, based on total revenues. It will have some 200 facilities and R&D centres across Europe, Japan, the Americas and the Asia-Pacific, as well as "enhanced scale, financial strength and the highly complementary nature of its combined product lines and geographic footprint", it claimed. Beda Bolzenius, CEO of Calsonic Kansei, will lead the combined group, based in Japan.

FCA has also agreed to a multi-year supply agreement

that will help sustain Magneti Marelli's operations. CEO Mike Manley said that FCA had examined a range of options and saw this combination as an ideal opportunity to accelerate Magneti Marelli's future growth. "The combined business will continue to be among FCA's most important business partners and we would like to see that relationship grow even further in the future," he added.

➤ [www.magnetimarelli.com](http://www.magnetimarelli.com)  
➤ [www.ckeuropa.com](http://www.ckeuropa.com)

## United Caps to build new plant in France



As part of its Close to You strategy, which emphasises manufacturing in close proximity to customers, Luxembourg-based caps and closures manufacturer United Caps is to build a plant at the Valframbert Business Park in Alençon, northern France. This will be its ninth worldwide, with two expansions also planned in Malaysia and the UK.

The company said it is working with two local government agencies in the Alençon region to buy 25,000 m<sup>2</sup> of land, on which to build the €12m factory with a first construction phase of 4,000 m<sup>2</sup>.

"We are especially interested in building a factory in Alençon because of its proximity to customers, who will have access to our full portfolio of solutions, and will also benefit from the proximity to our R&D centre in Messia if customisation or bespoke development is required," commented CEO Benoit Henckes.

➤ [www.unitedcaps.com](http://www.unitedcaps.com)

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# European Parliament seeks ban on single-use plastics

The European Parliament has voted to adopt draft plans to ban the use of single-use plastic items, such as plates, cutlery, straws, balloon sticks and cotton buds, across the EU from 2021. The move is driven by concern over marine litter, which MEPs said is comprised of 80% plastic.

The draft plans also include a ban on products made from oxo-degradable plastics and EPS fast food containers. Member states will have to reduce consumption of other items for which no alternatives currently exist by least 25% by 2025 (including single-use burger boxes, sandwich boxes, and containers for fruit, vegetables, desserts and ice creams). They will also be asked to draft national plans to encourage the use of products for multiple use, re-use and recycling.

Other plastics, such as



PHOTO: SHUTTERSTOCK

beverage bottles, will have to be collected separately and recycled at a rate of 90% by 2025. Waste from plastic cigarette filters will have to be reduced by 50% by 2025 and 80% by 2030, while member states must also ensure that at least 50% of lost or abandoned plastic fishing gear is collected each year, with a recycling target of at least 15% by 2025. Cigarette filters and fishing gear are two of the most common elements of marine pollution.

"We have adopted the most ambitious legislation against single-use plastics. It is essential in order to protect the marine environment and reduce the costs of environmental damage attributed to plastic pollution in Europe, estimated at €22bn by 2030," said rapporteur Frédérique Ries, MEP.

Plastic packaging association European said it supports "measures that address the problem of plastic pollution effectively,

that are harmonised and implementable by member states and industry". However, it repeated its concerns that certain elements of the resolution "have not been adequately examined and might not achieve [their] objectives".

In particular, European Managing Director Virginia Janssens, expressed concern over the proposed removal of internal market safeguards for measures that cover packaging items. "This will weaken policy coherence with other EU rules on waste and packaging. The Packaging & Packaging Waste Directive, with its harmonised essential requirements, should remain the sole appropriate legislation governing design and marking requirements applicable to all packaging," she said.

➤ [www.europarl.europa.eu](http://www.europarl.europa.eu)  
➤ [www.europen-packaging.eu](http://www.europen-packaging.eu)

## Plastivaloire to buy TransNav in US



France's Plastivaloire Group has signed a memorandum of understanding to acquire TransNav, which has plastics production facilities in Michigan and Kentucky, in the US, and Puebla, Mexico. This is expected to be completed by the end of 2018, subject to the approval of the US authorities.

TransNav should end the year with sales of \$105m. About 80% of its business is in the automotive industry. It makes components, notably suspension systems, spoilers, and fuel system and interior trim assemblies, for major OEMs,

like General Motors, Chrysler, Ford and Tesla, and specialised equipment manufacturers, like Plastic Omnium, Ti Automotive Group and Magna.

Plastivaloire described this as "a seamless fit for [its] international expansion strategy to move its operations closer to major production hubs, with a focus on the automotive industry", as well as taking it into the US for the first time. The group already has a Mexican facility in the major automotive production hub of San Luis Potosi.

➤ [www.groupe-plastivaloire.com](http://www.groupe-plastivaloire.com)

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## Westfall makes new purchase

Westfall Technik, which makes plastic products for the medical, packaging and consumer goods industries from eight sites across the world, has acquired the North American business of Amaray from private equity firm Atlas Holdings, which will continue to hold Amaray Europe. This follows on from seven other acquisitions in the previous 12 months.

Westfall said that the acquisition "adds a new dimension to their end-to-end supply chain capabilities". Amaray is based at Elizabethtown, Kentucky, and has injection moulding facilities there and at Pittsfield, Massachusetts, with a combined 26,500 m<sup>2</sup> of space, 165 employees and 66 machines. Westfall plans to upgrade both sites and drive volumes from its regional customer bases to them. Elizabethtown is its first location in the Midwest.

➤ [www.westfall-technik.com](http://www.westfall-technik.com)

# Engel consolidates global sales regions

Injection moulding machinery giant Engel has consolidated its 30 subsidiaries and more than 60 representations into seven regions "for higher impact and shorter decision-making processes". These are: Western Europe; Eastern Europe; America; Middle East, Turkey, Africa & India; East Asia, Australia & Oceania; and Southeast Asia. Each now has a regional sales president, with full responsibility for sales within their respective region.

The regional sales presidents will be the contact persons for the subsidiaries and representations and decide any sales-related matters locally and independently. They are also being tasked with advancing the



**Engel's CSO Christoph Steger (third from left) and the group's seven regional sales presidents**

global business unit strategy and bolstering local expertise. In addition, regional resources are being combined, "with the continuous exchange of experience accelerating the decentralisation of expert know-how", the company said.

Dr Christoph Steger, CSO of the Engel Group, commented that this represents

the next step in a strategy that had seen its European sales structure transferred to other regions, as well as establishing in-house automation centres and business units, and expanding local technological capacity. All of the regional sales presidents will report into him.

➤ [www.engelglobal.com](http://www.engelglobal.com)

## Amco Polymers enters Mexico

Orlando-based Amco Polymers, a distributor of commodity, engineering and speciality polymers, is to expand its business into Mexico by setting up Amco Polymers de México in Mexico City, with an additional sales office in Guadalajara. This will bring it additional bulk and warehouse storage with full packaging and delivery capabilities.

"The plastics industry in Mexico is witnessing a positive growth trajectory. A distinctive organisation like Amco Polymers is positioned to expand in a growing country and we are ready to provide solutions for local customers", said Gerardo Lopez-Kuri, country manager for Mexico.

➤ [www.amcopolymers.com](http://www.amcopolymers.com)

# Hexpol completes Mesgo acquisition

Hexpol has completed the acquisition of 80% of the shares of Mesgo Group from CEO Francesco Caldara and its other co-owners in a €168m deal.

Mesgo is an Italian compounder of high-performance fluorocarbon and silicone elastomers standard rubber compounds and thermoplastics for applications in the consumer products,

transportation, automotive and general industry sectors. It has sales of about €100m per year and some 180 employees at six sites in Italy, Poland and Turkey.

This, Hexpol said, is a strategic move into an area where Mesgo has cutting-edge expertise, brings it new customers and broadens its European

presence. Caldara, who will retain a minority stake, commented: "With its sizeable installed base of customers, Hexpol is uniquely positioned across the growing compounding industry and will allow us to reach new markets and qualified customers." The two firms also have similar EBITDA margins.

➤ [www.hexpol.com](http://www.hexpol.com)

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# Clean room moulding expansion at Röchling

The Röchling Group has expanded and upgraded its Medical division's plant in Brensbach, Germany, at a cost of €7.2m.

Production is now carried out in cleanrooms meeting GMP Grade C standards and under smart factory conditions, while the

cleanroom space was nearly doubled to 2,000 m<sup>2</sup>. Work originally began in September 2017.

To achieve maximum flexibility, Röchling Medical said that it designed the new building to integrate injection moulding and assembly systems into the cleanroom. This ensures that machinery can be repositioned or replaced quickly and it can respond quickly to changing requirements, especially in injection moulding.

➤ [www.roechling.com](http://www.roechling.com)



Röchling Medical's plant in Brensbach, Germany

## Borealis finds foam partner

Borealis has entered a strategic alliance with UK-based Bockatech to help accelerate the development of the latter's EcoCore foam technology, which produces injection moulded packaging, such as cups, pots, trays and tubs, with a smooth outer wall and foamed core. The non-exclusive partnership will jointly develop reusable and recyclable solutions that will be made available for global use under licence.

Andreas Leitner, Borealis Head of New Business Development, called the alliance "a real step forward for more circularity in packaging." In the development work, the Borealis grades BH381MO and Daploy WB140HMS will be used. Standard injection moulding machines can be used with EcoCore, along with commonly available blowing agents.

➤ [www.borealisgroup.com](http://www.borealisgroup.com)  
➤ [www.bockatech.com](http://www.bockatech.com)

## New IK president named

Roland Strassburger (right), CEO and chairman of the management board at Schütz, has been named president of IK, the German Association for Plastics Packaging & Films, succeeding Roland Roth. Strassburger had been treasurer at IK since 2010 and vice-president since 2014.

He said that his priorities will include strengthening the positive image of plastics packaging, focusing on its contribution to climate protection and resource conservation. "While the often-emotional debate about plastics packaging is frequently reduced to the - undeniably important - topic of marine waste, we wish to give more space to the actual function of plastics packaging," he said.

➤ [www.kunststoffverpackungen.de](http://www.kunststoffverpackungen.de)



## Celanese buys Indian compounder

Celanese has signed a definitive agreement to acquire Next Polymers, one of India's largest domestic compounders of engineering thermoplastics (ETPs), from the JP Group. The company produces some 20,000 tonnes/year of custom compounds at its facility at Silvassa, including an increasing proportion of post-industrial content. The deal, for which terms were

not disclosed, should close in Q1 2019.

"Next Polymers complements our rapidly growing India business to further establish Celanese as a leader in the Indian ETP market by broadening our ability to serve nylon and other engineered materials customers in a high-growth region," said Celanese COO Scott Sutton. He said the move will also enable the company to

support customers in a market growing at a rate of 15% per year.

Next Polymers compounds PA 6 and 6,6, PP, ABS, PC and PMMA for various industrial, automotive, electrical and electronic and consumer applications. Celanese will continue to operate the Next Polymers brand.

➤ [www.celanese.com](http://www.celanese.com)

➤ <http://nextpolymers.co.in/>

# Italian machinery imports rise while exports remain static

Italian imports of plastics and rubber processing machinery grew by 23% in H1 2018 compared to the same period last year while exports edged only fractionally up. This meant the trade balance fell by 7% and is attributed to "the lacklustre performance heralded in the early months of the year", according to the country's plastics and rubber machinery trade association Amaplast.

The plastics machinery industry was still over €1bn in the black in total, but €14m in the red for injection

moulding machinery. "The dynamism of purchases from abroad may be interpreted as renewed faith in the domestic market, mainly due to investment incentives that are likely to be renewed and naturally hoped for by businesses in the industry," Amaplast said in its analysis.

Strongest growing import sectors included injection moulding machines (+31%), blow moulding machines (+75%), flexographic printers (+111%) and moulds (+12%). This was driven mainly by strong

demand from the packaging sector, which grew by 14% last year and has continued on a strong growth path in 2018.

Amaplast said Germany remains the largest exporter of plastics machinery to Italy and widened its lead over China in H1. Europe remains the largest export market for Italy's plastics machinery firms, accounting for 61% of the total, although export sales were static year-on-year.

The NAFTA countries were in second place and saw a 7% increase in sales. Russia, which had a very

strong 2017, saw a major decline, showing that "enthusiasm has definitely waned", said Amaplast. Sales to Asia, Oceania and the rest of Latin America were down.

According to Amaplast president Alessandro Grassi, its members' July order books were stable to slightly up on both June 2018 and July 2017.

"This gives us reason to hope for a rebound in production and exports in the last quarter of the year," he said.

➤ [www.amaplast.it](http://www.amaplast.it)



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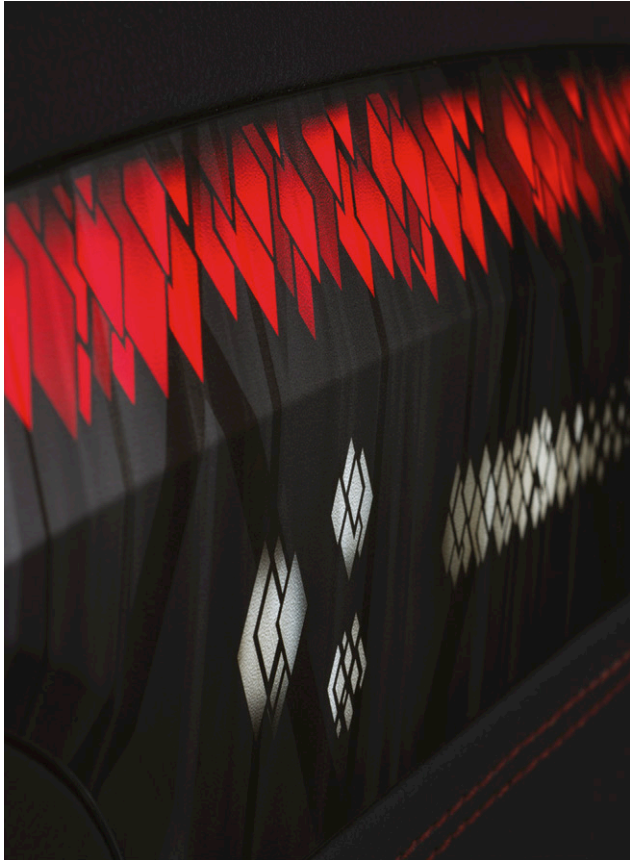
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# Hard and soft options for car surfaces

*The latest advances in injection moulding technologies and materials for Class A automotive interiors and exteriors were shown by exhibitors at Fakuma 2018.*

**By Peter Mapleston**

Material and process technologies dedicated to production of interior and exterior components in cars continue to improve. They will take weight out of vehicles, they will make them more attractive, and they will enable the creation of new designs adapted to information and illumination systems quite unlike anything that has been seen on our roads before. The Fakuma plastics exhibition in Friedrichshafen, Germany, in October was the venue for numerous new introductions and upgrades. So what is on the table for interior and exterior vehicle designers and engineers to choose from? Here is a look at some of the options.

**Engel** continues to optimise the DecoJect process for production of injection moulded automotive interior parts with integral decorative foils, which it began developing with Benecke-Kaliko (now part of Continental) a few years ago, and which it unveiled to the public at K 2016. This in-mould graining process, which uses roll-fed TPO foils between 0.25 and 0.5 mm thick, produces high-quality soft surfaces that need no painting afterwards. The grain of the surface is imparted by the mould. The partners envisage applications in parts such as door panels, various consoles and boxes, seat backs and the like.

The process has since been expanded to include DecoJect Soft, which unsurprisingly produces a softer finish, using foils laminated with a

foam backing, bring their total thickness to between 2 and 3 mm thick. Because the foils are so thick, they are preheated on both sides just before they are formed in the female half of the injection mould. "We originally expected applications with thinner films would progress faster, but the call has been more for softer, thicker films," says Engel's Sales Manager (Technologies), Michael Fischer. Prototype evaluations with DecoJect are ongoing at several customers, with one close to industrialisation, possibly in 2019 or 2020.

This is just one technology connected with film decoration that Engel is working on. At Fakuma, it premiered a variant of its Foilmelt in-mould decoration (IMD) process, using films from **Leonhard Kurz**, in which the film is thermoformed in the injection mould, the decoration remains attached to the film, and the part surface texture comes from the film rather than the mould surface.

"We get the economics of the roll-to-roll process, without an external preforming step," says Fischer. Kurz, for its part, says the process, which it calls IMD Varioform, enables decoration on complex 3D geometries that until now have been difficult to obtain cost-effectively. The Engel production cell, which also involved in-mould trimming of the finished part, included a test mould that will be used for further trials at Engel's enlarged technology centre at its headquarters in

**Main image:**  
**Leonhard Kurz**  
showed its  
newest  
day-and-night  
decoration at  
Fakuma 2018

**Right: Test parts made using Foilmelt. The mould is always the same, only the foil decoration changes**

Schwertberg, Austria.

Engel says the spectrum of possible material combinations is very broad. "Foil functionalised using capacitive electronics, multi-layered foil systems with topcoat as well as structured, back-lightable, or open-pore systems such as wood can be processed from the roll," it says.

Kurz (whose films were evident on numerous injection moulding systems at Fakuma, not just Engel) offers a large spectrum of design and functional foils for its decoration technologies, and these are also available for IMD Varioform. "The possibilities include metallized surfaces right through to true-chrome coatings, brushed effects, wood, marble or carbon look, single-image designs plus partial and full-surface backlit designs," it says.

Various tactile properties are also possible, for example smooth surfaces, distinctive structures, and soft touch effects. It is even possible to add touch functionality to the component by integrating the capacitive touch sensors from Kurz subsidiary PolyIC.

## Two films in one mould

At Fakuma, **KraussMaffei** demonstrated a production cell combining IMD (which uses film directly fed from a roll mounted on top of the clamp unit) with IML, which uses pre-cut films. In this case, the IML film incorporated printed electronics. The group has shown the process before, but at Fakuma it had been given an upgrade, with the introduction of an automated system for removing a protective film on the printed electronics IML label before it was inserted into the mould and a



PMMA resin was back-moulded onto it.

Philp Lachner, in Product and Technology Management at KraussMaffei, says use of film insert moulding is growing as the improvements in design that it offers continue to increase. It is now even possible to do undercuts with the films, he notes, as demonstrated in Audi's Q2 SUV, which

has interior ambient lighting trim produced this way.

KraussMaffei demonstrated one of its latest all-electric injection moulding machines, a PX 320, producing a complete ten-inch touch display with integrated electronics, black decorative

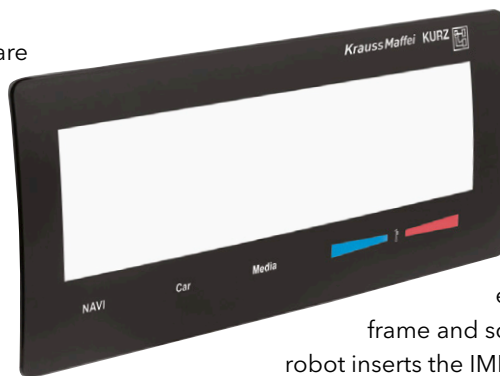
frame and scratch-proof coating. A six-axis robot inserts the IML film with printed conductor paths on the nozzle side. On the ejector side, an IMD film with single-image decor runs through the mould, transferring its design layer and UV-hardening top coat to the component. Melt is injected along the side of the part via a film gate.

The machine was fitted with a twin-cavity mould, with each cavity yielding parts with different decoration. This was made possible with a new feed system, IMD SI DUO, from Leonhard Kurz, claimed to be the first in the world to be able to position two single-image decors independently of each other with an accuracy of around 0.01 mm. The IMD SI DUO incorporates sensors that read the registration marks on the IMD foil.

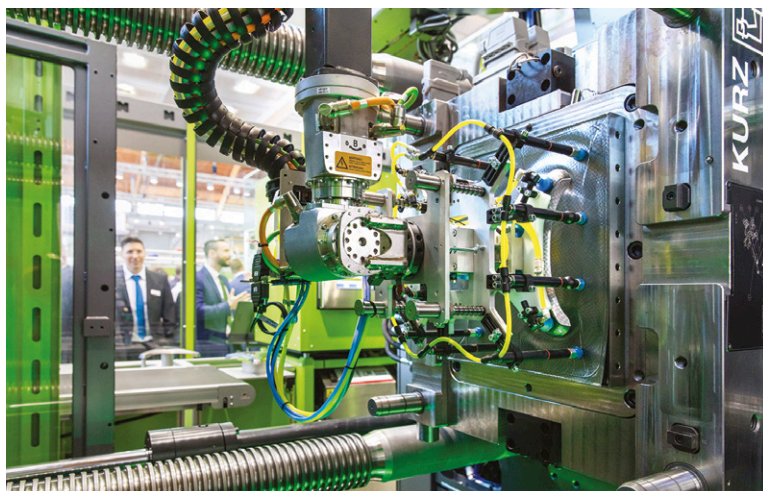
One of the decorative films produces what Kurz calls "dead-front" surface aesthetics (another expression is "secret before lit"). It contains effects that only show up when the part is lit from behind.

Over on the **Sumitomo (SHI) Demag** stand at Fakuma, Leonhard Kurz films were used to produce an avant-garde design for a conceptual interior door trim component using IMD. It featured a large area single image in a day/night design, consisting of a gradient of increasingly wide lines. The design in blue and black shows up in daylight, while the night design shows different light colours. Back-lighting can be activated and intensified with a

**Right: Display made by KraussMaffei at Fakuma uses films made by Kurz on the front and rear surfaces - one for decoration, the other for functionality**



**Below: Foilmelt in production on the Engel stand at Fakuma**



button, and the colour changed by sliding a finger over the surface.

Precise positioning of the touch sensors on the component is achieved with Kurz's recently developed FFB (Functional Foil Bonding) process. This uses highly conductive, transparent sensors, produced by Kurz subsidiary PolyIC, comprising silver-based metallic grid structures on a PET carrier. Their flexibility enables them to be integrated into curved parts.

For those preferring something a little more restrained, styrenic polymers major **Ineos Styrolution** is promoting its Terblend N, a blend of ABS and polyamide, as one solution, saying one premium Asian automotive parts manufacturer is using a new glass fibre reinforced grade, Terblend N NG-03, for a customized real wood garnish panel used in automotive interior. It says the parts manufacturer had been using locally compounded material for the application but was faced with issues including low dimensional stability and warpage from the locally sourced materials, as well as low supply reliability from the local suppliers.

Terblend N NG-03 is said to offer "easy moulding and good adhesion with real wood shell, good



**Left: Door trim with day/night design and touch-activated backlighting**

dimensional stability required to keep different module parts together, as well as good impact strength. It has also passed head impact testing for automotive interior parts, fulfilling the parts manufacturer's requirements in terms of aesthetics, functionality and safety."

Ineos Styrolution further notes that the ABS/PA blend "combines excellent impact strength and chemical resistance with high melt flow and good acoustic dampening, making it an ideal styrenic for automotive original equipment manufacturers

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# AUTOMOTIVE PLASTIC PARTS

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**At Fakuma, Covestro presented a front module concept for EVs featuring individual design functional integration. One special variant is black panel technology, which makes use of a special Makrofol polycarbonate film with a light source behind to show up bright colours when it is illuminated from behind by LEDs**

looking for a matte finish and colouring capabilities in applications, such as loudspeaker grills, column covers, seat covers and venting devices."

**A. Schulman** (now a LyondellBasell company) says its Schulblend M/MK product series, rival blends of PA and ABS, are characterised by easy flow, high-impact strength and very good optical appearance. The PA provides high rigidity and improved heat resistance to the blend, while the ABS reduces moisture sensitivity and hence warpage in moulded parts.

According to the company, the flowability of Schulblend M/MK 6501 LE SF U is excellent, while good impact strength and tensile properties, as well as the Vicat softening temperature, are all

maintained. "Outstanding" thermal stability provides a broad processing window. The high flow also helps reduce VOC emissions, since processing temperatures can be reduced.

On top of that, the good flow allows it to replicate the finest details in mould surfaces. "The matte appearance of the surface is hence significantly improved in comparison to other PA/ABS grades on the market," says the supplier.

For exterior applications, Ineos Styrolution now offers an AMSAN (Alpha-Methylstyrene Acrylonitrile) copolymer, which it says is an enhanced version of the its Luran High-Heat grade HH-120 with optimised scratch-resistance properties.

Tobias Schulz, R&D Specialist, Global R&D, at the company, says: "Luran High-Heat is a transparent base material allowing for an excellent colour depth including a rich deep-black or 'piano-black'." He says early tests and initial customer feedback confirm that the new grade "is considerably better in terms of scratch-resistance than other materials used for a similar purpose. In fact, it shows best-in-class results for uncoated and unpainted applications."

**Covestro** is pushing its polycarbonate for various interior and exterior automotive lighting applications. "Alternative drive technologies such as electric mobility, new forms of connectivity and autonomous driving require totally new car concepts," it says. "This also includes a newly designed front section - an individual 'face' - of the car, with seamless, glass-like surfaces that can be

## High gloss options

**Engel** is continuing its cooperation with **Hennecke** on the Clearmelt process for producing injection moulded parts with high-hardness, high-gloss transparent or coloured polyurethane surfaces less than a millimetre thick, applied in the mould. Fischer says the process produces higher performance surfaces than can be obtained via simple injection moulding with acrylics, particularly in terms of scratch resistance, and interest from potential users is high.

But he also admits that the extra functionality of a production cell incorporating PUR processing technology comes at a price that is not insignificant, so it really

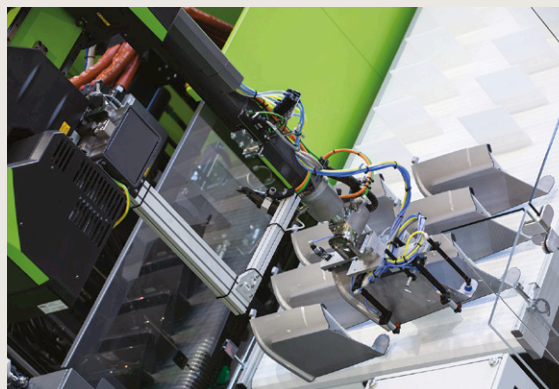
is a technology aimed at high volumes.

Who will be first to use it? It's the same old conundrum, Fischer says. Nobody wants to be the guinea pig going first, but nobody wants to lose

out on a potentially important market.

Another technology is ColorForm from **KraussMaffei**, which achieved an important milestone a couple of years ago when the technology was adopted

by Weidplas for production of A pillar covers on the Peugeot 3008 SUV. Since then, KraussMaffei has added quick colour-change capability, with the use of a dosing line for liquid colours separate from the two other lines for the two-components polyurethane system used for the surface layer. A second company is also using ColorForm for production of parts with insert moulded real wood veneers that are protected by the clear resin.



**Engel produced prototype D pillars for an SUV using Clearmelt at the Plast show in Milan earlier this year**

used for a variety of purposes."

The company, noting that it has more than ten years of experience in the field of glass-like exterior parts, says that by combining its film and glazing technologies, it has devised a study for an innovative front module that offers solutions for many requirements of the automotive industry. It presented the concept simultaneously at Fakuma and the International Suppliers Fair (IZB) for the automotive industry in Wolfsburg, Germany (home of Volkswagen).

## Grilles are going

"The front section of future automobiles will be characterized by three-dimensional, jointless and glass-like surfaces - the classic radiator grille will be obsolete," says Stefan Schulten, Segment Manager Automotive in the specialty films segment at Covestro and responsible for the Europe, Middle East and Africa region. "It is not only the desire of car manufacturers to differentiate their models from the competition by designing them as individually as possible. It is also about integrating more and more functions in ever less space."

The front section can already be designed in a variety of ways using a variety of decorated or semi-transparent films. In addition, there are, for example, lighting and signal functions such as those required for communication between an autonomous vehicle and pedestrians. One special variant is the black panel technology, in which a



Back-moulded HVAC front panel, unlit and back-lit

PHOTO: PRÖLL

special Makrofol polycarbonate film with a light source behind it is illuminated. When switched off, passers-by see only a matt, black surface.

The structure of the front module prototype consists of a film printed with a colourful motif, for example the company logo, depending on customer requirements. This composite is then over-moulded with transparent Makrolon AG polycarbonate using IMD or what Covestro terms film insert moulding technology (FIM). "The flat surface and the depth effect of the polycarbonate create a glass-like appearance," it says. "Besides that, a three-dimensional effect is generated, despite the use of a flat Makrofol film." A transparent, scratch-resistant silicone hard-coating is also applied as the outermost layer.

At specialist ink and lacquer producer **Pröll**, Marketing Communication Manager Stefan Zäh

According to KraussMaffei, there are now more than 20 ColorForm systems in the field, with processors carrying out product development, and at research institutes and mould makers. He points out that the complete system is produced by KraussMaffei - the injection moulding machine and the polyurethane processing equipment - with supervision and control of all aspects of the process via a single MC6 controller.

Lachner also points out that the polyurethane and polyurea systems developed for the process (by Panadur for the original polyurea system and by Votteler and Ruehl for PUR systems that came later) all work without the need for an external mould release. He says this is a particularly important aspect for obtaining adoption at injection mould-



Door part shows the high gloss achieved with KraussMaffei's ColorForm technology

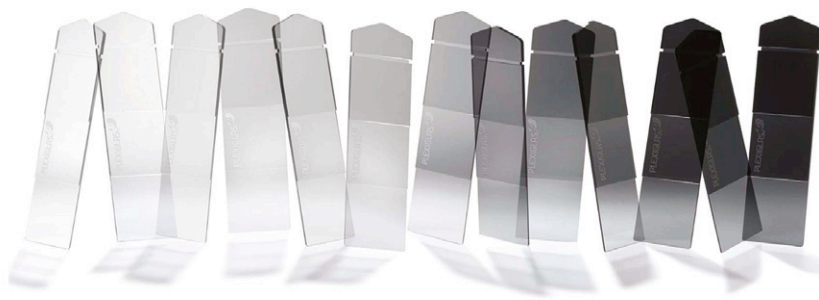
ing companies, which are generally not used to working with external mould release, unlike their counterparts in polyurethane processing.

Despite the use of a reactive polyurethane system, cycle times below the magic one-minute barrier can be obtained. Systems, both for

Clearmelt and ColorForm, can be produced with self-healing properties, which means that, for example, micro-scratches incurred when a car goes through a car wash disappear shortly afterwards.

Earlier this year, styrenic polymers major **Ineos Styrolution** said its Luran S KR 2864C, a type of acrylonitrile-styrene-acrylate (ASA), had been selected by an unnamed leading global car manufacturer for a windscreen A pillar body trim in the first commercial application of this material with ColorForm.

Ineos Styrolution says the grade has enhanced heat resistance and the best chemical resistance among ASA grades. ASA is already well-known for its high weather resistance - sometimes being described as "outdoor ABS".



**Above:**  
Evonik's  
Plexiglas range  
of neutral grey  
colour grades

describes developments for what he calls dual designs in FIM. Previously, he says, the technology involved screen printing on the second surface, followed by forming, trimming and back moulding of decorated standard or hard coated PC films.

"Nowadays, due to the development of chemically and abrasion resistant dual-cure screen printing lacquers, the films can be decorated from both sides, for example for creating matt/gloss or 3D effects or special dual designs," he says.

Dual design means that a transparent PC film is first surface decorated, for example with a haptic aluminium brush effect. Here, a semi-transparent silver layer is put on first, and then overprinted with a thick line structure of a the highly resistant Norilux DC (dual-cure) lacquer.

The second surface of the film can be decorated with, say, a photo-realistic wood or stone image, using four-colour screen printing with Pröll's new NoriCure IMS UV-curing inks.

"The first ink layer on the second surface is a semi-transparent black, to prevent a shine-through of the image," Zäh explains. "The wood image is then back printed with a white tinted adhesion promoter."

The decorated PC film can then be thermoformed, UV-cured and back moulded, to create a part such as an HVAC front panel. When panel is unlit, the brushed metal effect shows up. When it is lit from behind, the wood image is visible.

**Evonik Performance Materials** discussed its own developments in what it calls "secret until lit"

displays at the show, based on its Plexiglas polymethylmethacrylate (PMMA, or acrylic). In this case they have a high gloss uniformly black or grey appearance until LEDs behind them are switched on to reveal information.

Sven Schröbel, Head of Product Management, Automotive, Methacrylates, showed a new kit that the company has developed to help designers choose the correct material for their application.

One new grade of acrylic is 7V376. This diffuses the light from the LED more than other grades intended for displays, but unlike those grades, the original colour of the LED still shines through.

Other new developments in Plexiglas include AG100, which has improved resistance to impact and to heat, which is currently being trialled at customers for possible use in electric vehicle fronts incorporating light guides. Schröbel points out that this Plexiglas does not need a protective coating for use in such applications.

As an indication of the very good aesthetic properties of PMMA, and their high UV resistance, Schröbel points to its growing use, uncoated, in car badges, where previously decorative film technologies might have been used. He says colour retention over time in Plexiglas badges is much better than in badges with film decoration. Problems with brittleness in PMMA have been addressed, he says.

Schröbel also points to the superior heat ageing properties of PMMA compared with polycarbonate. He says that even in applications where high-power LEDs are positioned close behind the part, there is no yellowing over time. In fact, he says, yellowness actually falls. Furthermore, PMMA has much better light transmission than PC, which he demonstrates with the aid of two rods 1 m long, one in each material. If a torch is shone onto the end of the polycarbonate rod, virtually no light emerges at the other end. With the acrylic rod on the other hand, a strong beam emerges. PMMA has a light transmission of 92%, compared to 89% for PC; the differ-

**Below: EVs will  
have new front  
and rear end  
lighting  
concepts. Pics:  
Evonik**



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Polyamides specialist EMS-Grivory says that, together with Lear Corporation, it has developed sports seats for the new Opel Insignia GSi. The back support and seat shell are made of Grivory GVL HP, a semi-crystalline, partially aromatic polyamide with a special long glass fibre reinforcement. The material supplier says that during the injection moulding process, the fibres form a fibre skeleton which significantly increases the performance capability of the components. "This gives the seat shell and back support enormously higher notched impact strength and in the case of an impact, can ensure much higher energy absorption," it says. In July, the seats were awarded the Grand Innovative Award for exceptional innovation in all categories at the Society of Plastics Engineers (SPE) Central Europe Award Night



ences may not seem that great, but in long light pipes, it can be critical.

**Elix Polymers** says its polycarbonate-modified ABS (ABS/PC, rather than PC/ABS) has been approved by various OEMs for interior and exterior parts. Volkswagen for example uses it for exterior pillars on its Sportsvan, in two-component mouldings that are capped with PMMA. Audi appreciates its low emissions and odour, and considers the material as very interesting for lower instrument panel parts, centre console parts and door panel parts.

BMW has also just started using one grade, Elix ABS H801, for painted spoiler and aeroblade parts for its latest X5, X7, and X6M cars. Parts and moulds were developed in China by Jiangnan Mold Plastic Technology Corp., a major automotive component supplier with eight plants in China, and then shipped to the Minghua USA plant it recently established close to BMW's Spartanburg plant in the USA.

Elix Polymers says both the tensile modulus (2,400 MPa) and flexural modulus (2,300 MPa) of the grade are higher than many PC/ABS grades with a greater PC content. Its impact resistance, with a Charpy notched impact strength at 23°C of 30 kJ/m<sup>2</sup>, is also one of the highest for an ABS-based material. Very good thermal resistance is evidenced by a Vicat B50 of 105°C.

**Below:**  
**Award-winning composite guide rails on a sunroof module are made with Polyscope's Xiran SGH30EB**

At this year's Automotive Composites Conference & Exhibition (ACCE) sponsored by the Society of Plastics Engineers, a team comprised of Renault, Tier One Webasto, toolmaker and moulder Aark-Shapers, and polymer supplier **Polyscope Polymers** won the event's People's Choice award for the most innovative composite part: the first composite guide rails on a rollerblind sunroof module for the panoramic roof on two Renault Scenic MPVs.

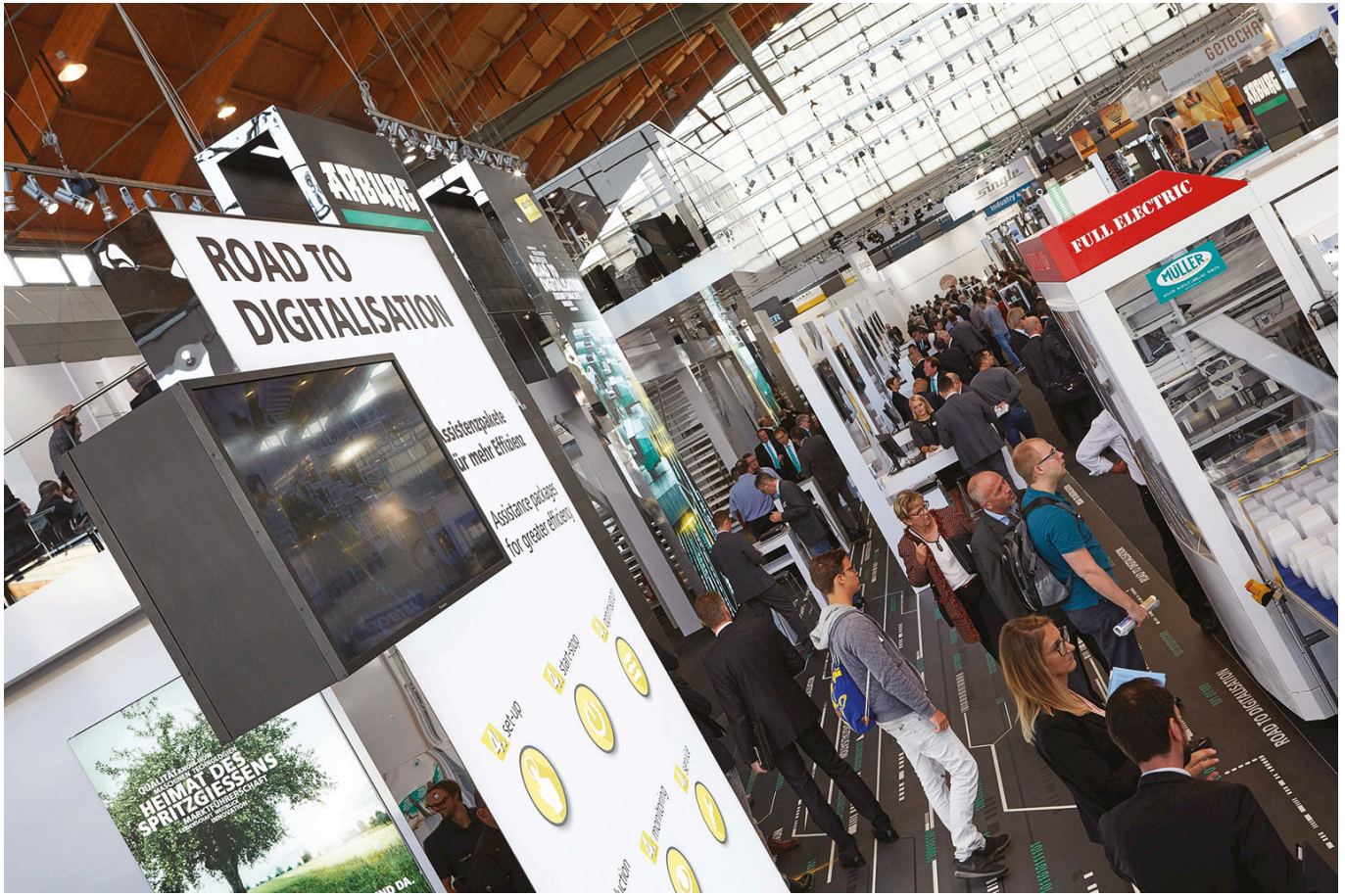
The rails are made in Polyscope's Xiran SGH30EB, a glass-reinforced copolymer of styrene maleic anhydride (SMA) and ABS, optimised to ensure high bond strength to the polyurethane adhesive used to mount the glass to the module and the module to the body-in-white (BIW) roof structure, and to ensure high dimensional stability critical for smooth operation of the rollerblind.

Polyscope says the move from aluminium extrusions to thermoplastic composite lowered part weight and operating noise, simplified sunroof construction and installation on the vehicle assembly line, reduced costs, and increased headspace in the passenger compartment. Clever tooling by AARK-Shapers enabled eight module components to be moulded in a family tool.



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# Machinery groups shift focus of Industry 4.0

*Fakuma 2018 was less about the concepts of Industry 4.0 and more about practical steps that injection moulders can take in using a digital approach to production. David Eldridge reports*

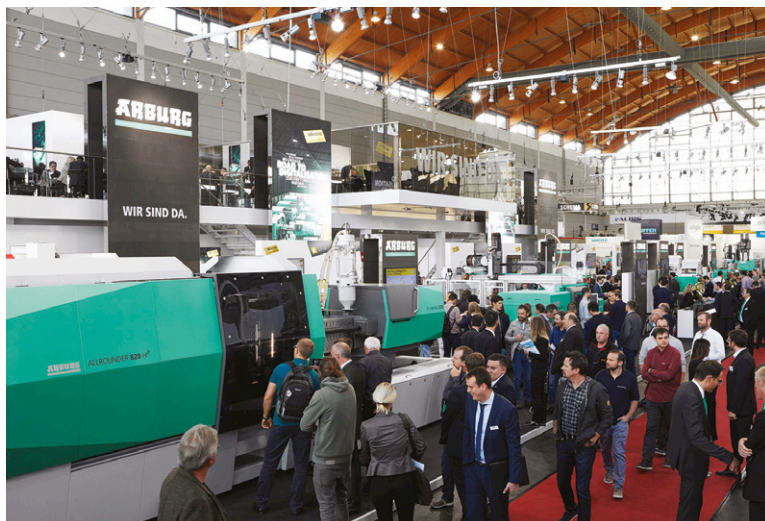
Industry 4.0 has been a dominant subject presented by injection moulding machinery companies at Fakuma in the past few years. It was noticeable at this year's event in October that Industry 4.0 was less prominent in the promotions of exhibitors, both on their stands and in media briefings. Nonetheless, major companies have not eased back on development of this important, forward-looking approach to plastics manufacturing, but have instead given it a focus that aims to meet the more immediate needs of injection moulders.

"The term 'digitalisation' has replaced the term 'Industry 4.0' to an extent," said Heinz Gaub, Managing Director of Technology & Engineering,

at **Arburg**. The group's theme at Fakuma 2018 was "The Road to Digitalisation". During the group's press conference, Michael Hehl, Managing Partner, said that with Arburg's products and services, its injection moulding customers can "have the peace of mind of knowing that they are safely on the way to digital transformation at all times, regardless of whether they are just embarking on that path, or have already got quite a long way down the road".

Arburg expects its sales in the second half of 2018 to be good, following a first half in which it was well ahead of 2017, said Jürgen Boll, Managing Director of Finance, at the press conference. The value of incoming orders in H1 2018 was more

**Arburg's theme on its Fakuma stand was "Road to Digitalisation"**



**Above: An Allrounder 820H machine attracted attention at Fakuma**

than 10% higher than in H1 2017. Electric machine orders increased by 18%, he noted.

Gerhard Böhm, Managing Director of Sales, discussed market uncertainties arising from the "punitive tariffs" that have started to feature in global trade. "A few projects and/or decisions about production locations, none of which are time-critical in nature, are encountering slight delays. Until now however, any ramifications [from tariffs] have been very slight, not indicating any substantial changes on the business we conduct in our most important markets."

Heniz Gaub's presentation outlined key features of Arburg's digitalisation offer to customers. Six new assistance packages are available that cover the areas of starting, setting up, optimising, producing, monitoring and service, and that provide the operator with active support during these various phases. These are available for the Selogica and Gestica control systems.

Operating simulation is another area Arburg is expanding, and at Fakuma it showed an integrated filling simulation as an assistance system for the future. Gaub said this demonstrates the convenience of the Gestica control system in supporting the machine operator in parameter setting by making the process displays easy to understand and follow.

**Engel** called its digital approach The Next Step at Fakuma, echoing the idea of guiding injection moulders along a route towards Industry 4.0. Stefan Engleder, CEO of Engel, said what is important to the customer is "What can I get now?" At the company's press conference, he said: "Simplicity is taking centre stage."

This philosophy can be seen in improvements to the CC300 control unit. Many of the improvements to CC300 are the result of specific customer requests, such as an overview of all components and tasks presented on the home screen. This

means the machine operator can now switch between tasks (such as mould set-up) and components (such as the injection unit) even faster.

Another response to customer needs comes in the form of tutorials that Engel has made available on the CC300 controls. The aim of the quick tutorials, says Engel, is "to support the system operator with unlocking the full potential of the injection moulding machines and systems solutions, without them needing to spend a great deal of time in training sessions or doing online research. The tutorials ensure that all employees in the factory are always brought up to the same level of knowledge."

Christoph Steger, CSO at Engel, presented a positive business outlook for the group, even with uncertainties emerging in some markets. The group is expecting a 6% rise in turnover to €1.6bn for the 2018/2019 fiscal year which ends in March 2019. This is lower than the 11% growth rate in the previous year, partly due to slower growth in North America. "The trade disputes between the major economic powers are creating uncertainty. They are making it difficult to give forecasts," said Steger, especially given that they could impinge upon European exports.

Countries in Europe continue to provide strong demand for Engel, particularly the German-speaking nations. Germany itself remains the biggest market for Engel, which has increased its sales in the country by 50% over the past five years. This is due to the global expansion of many companies based in Germany and additionally because of the high level of technological development among Germany's injection moulders.

The future of the **KraussMaffei** plastics machinery business lies in engineering quality combined

**Right: Engel has updated its CC300 control unit, making it more responsive to user needs**



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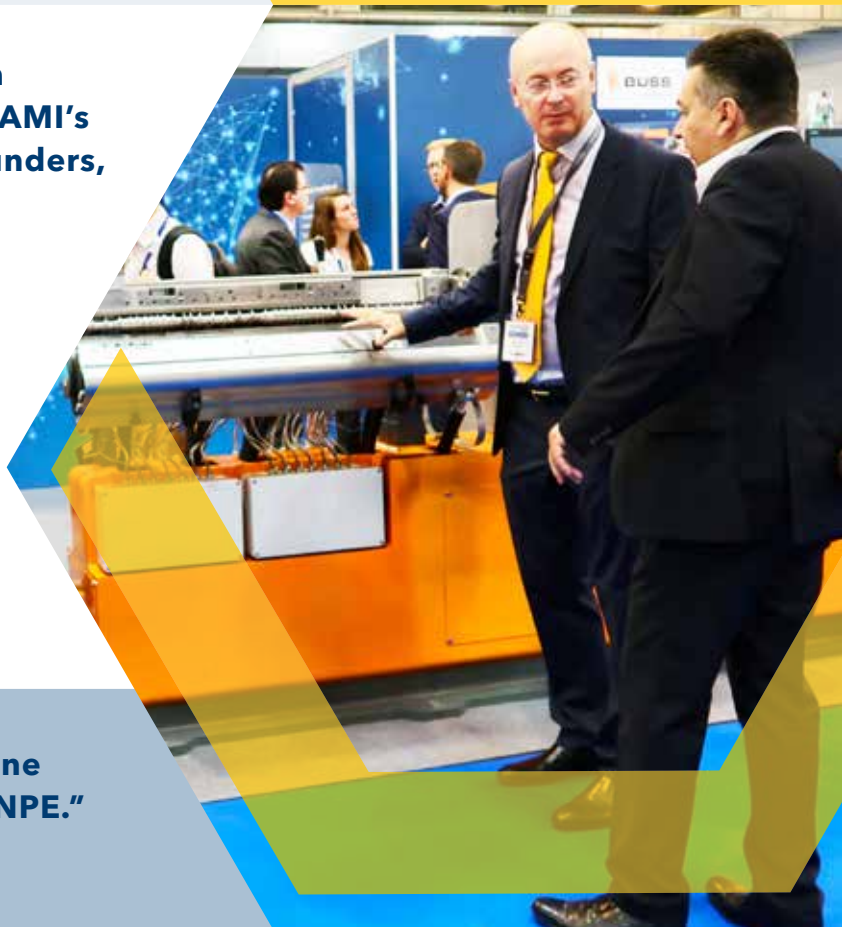
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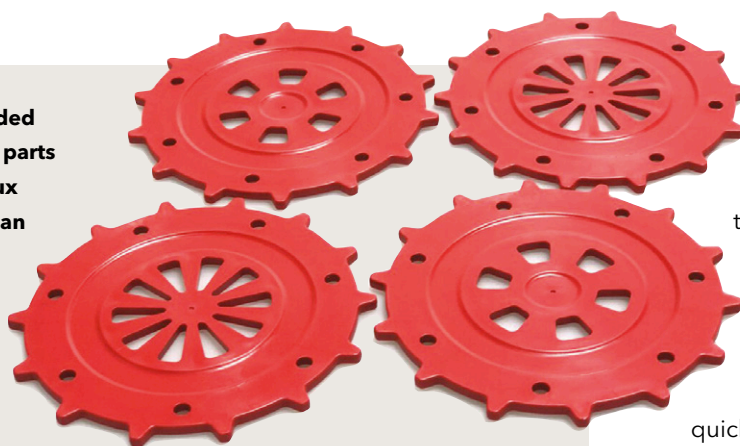
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**Milacron moulded demonstration parts using the ImFlux technology on an Elektron EVO 155 machine**



## Milacron shows ImFlux low-pressure moulding innovation

**Milacron** showed a novel low-pressure injection moulding technology from ImFlux of the US on its Fakuma stand. **ImFlux**, a wholly owned subsidiary of Procter & Gamble (P&G), claims various benefits including improved part quality, shorter cycle times, less moulded-in stress and suitability for thin-wall moulding.

ImFlux describes the pressure profile as “the green curve” because there is not the same peak in pressure during the fill stage as in conventional moulding, and, instead, a more constant pressure is maintained to fill and pack the mould. Ethan Stiefel, Plastics Processing Engineer at ImFlux, said the company’s proprietary software constantly monitors the melt pressure via sensors in a custom nozzle adaptor and instantaneously adjusts injection pressure.

Stiefel and his colleagues demonstrated the ImFlux technology on an Elektron EVO 155 machine in a cell including a Mold-Masters hot-runner system with servo-electric valve actuators and a TempMaster SeVG + controller. Parts were produced in a four-cavity mould in a cycle time of approximately 15 s, and at a constant pressure of 530 bar, compared with peak pressure of 1,250 bar if the parts had been conventionally moulded.

Less pressure variation when using ImFlux leads to more uniform shrinkage, reduces warpage and increases cavity to cavity consistency, the company claims. There are other benefits from using lower pressure, such as the potential to increase mould cavitation and improve mould and part design.

Stiefel also demonstrated a material switch from PP to HDPE to showcase the system’s automatic viscosity adjustment feature. He said P&G is using the ImFlux technology in applications moulded with materials containing recyclate, where the technology adjusts for the viscosity variations that are typical of recycled polymers.

After using ImFlux in its internal processes, P&G has this year made the technology available to moulders outside its supply chain once they have a licence from ImFlux. Milacron has a non-exclusive agreement to distribute the ImFlux technology. Since Fakuma, Milacron has been offering an ImFlux option, on new machines or retrofitted, as part of its M-Powered suite of tools.

with digital-based service and customer-focused business support tools, according to CEO Dr Frank Stieler. “We are not so naïve not to see that this market is changing,” he said. “In the future, we will not only sell high quality machines but also create value around the machines.”

Part of this “added value” will be in its ability to deliver machines to customers quickly and to offer pricing options that meet their specific needs. The machine leasing model that the company launched for customers in Germany last year has, for example, been extended to include Austria, Italy and France. KM Group’s Injection Moulding Segment President Dr Hans Ulrich Golz said the “Rent-It” model allows customers to respond flexibly to changing demands from customers. “Their production is always on the cutting edge without burdening the balance sheet,” he said.

Golz said the company was also targeting the clear need for faster lead times with the introduction of its “Speed-to-Market” programme. This includes 30 standardised variants of its CX, GX and PX machines up to 400 tonnes, as well as a range of LRX linear robots, that are available on delivery times of 10-12 weeks. “We have enlarged our production capacities to accommodate this,” Golz said. “If the model is not in stock our production is designed to build one in a short period of time.”

In the digital arena, the company is now rolling out the e-Service platform that it previewed at the K 2016 fair. According to Nadine Despineux, who heads up the newly-formed Digital Service Solutions unit at KM, this has been trialled and field-tested by its Netstal division and is now being rolled out across the group (she said the smaller and more uniform Netstal business is an ideal launch environment for new digital technologies.) More than 200 machines are already connected to the system. Similarly, the Analytix app for monitoring machine conditions and efficiency, is also now being widely released following field trials at Netstal.

Stieler said the plastics machinery market has slowed somewhat over the past few months but that the KraussMaffei business was still seeing strong growth. Sales for the first nine months of 2018 were up by 1.6% on the same period in 2017 to €973m, while incoming orders were up by 2.5% to €1.05bn.

**Wittmann Group** expects its full-year 2018 sales to be about €430m. The company had an extremely strong first quarter, said its CEO Michael Wittmann at its press conference. But there was not the

usual uplift after the summer period, he said. Some of the negatives include the European market being a little lower than in 2018, and the market in Asia has also fallen back. But on the positive side, the North and South American markets have grown for the group in 2018. "Some of our international customers see a move away from China to other areas, to Mexico for instance," he said.

The group has a number of investment projects running at its facilities in Austria, Germany, France, Italy, Czech Republic and Mexico. In Germany, it recently merged its two businesses Wittmann Battenfeld GmbH in Meinerzhagen and Wittmann Robot Systeme GmbH in Nuremberg into one company in order to provide a more unified presence in the country.

Another recent development has been Wittmann's partner agreements in the area of Manufacturing Execution Systems (MES). The company has already brought connectivity to injection moulding machines and auxiliary equipment, said Michael Wittmann. "We want to extend this co-ordination to the next level, which is MES," he said.

Wittmann Group has acquired a large shareholding in ICE-flex, an Italian start-up with MES software called TEMI, which is being extended to include Wittmann 4.0 functionalities under the name TEMI+. The TEMI MES can be used in injection moulding operations of up to 50 machines. Wittmann has another, previously agreed deal with MPDV of Germany for MES solutions that can be used in operations of more than 50 machines.

Michael Wittmann told journalists in a question and answer session the group had not made a full company takeover in MES because "we don't believe it is our core business". The young people at ICE-flex are enthusiastic about pursuing their ideas, and the size of Wittmann's shareholding is "enough for them to keep their interest, but enough for us to have control of development work", he said. The group's partnerships with previous MES providers



ended when the first became bankrupt and the second was acquired by Engel. "Enough control [of ICE-flex] means we can avoid those two things happening again in the future."

**Kistler Group** made the decision it did want full ownership when it acquired MES provider IOS, based in Aachen, Germany, in 2017. Kistler is best known in injection moulding for its sensor technology that analyses mould cavity pressures. The acquisition of IOS takes Kistler to the next level by providing customers (initially in injection moulding, but subsequently in other processes) with a modular system that provides monitoring, controlling and reporting functions across the entire manufacturing operation.

"The topic of data management is becoming more and more important," said Robert Vaculik, Head of Kistler's Strategic Business Field Plastics, who spoke to *Injection World* at Kistler's Fakuma stand. IOS has around 100 MES installations at injection moulders worldwide, he said.

Stefan Holzapfel, Manager of the Competence Centre for MES at Kistler, said: "The plan is to continue developing the MES. Current IOS custom-

**Above: Kistler's Como Neo system has new functionality**



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# Adaptable injection unit from Windsor

Windsor Technologies has developed PxP 73, a new self-contained injection unit within the German company's PlugXPress range. Shown on Windsor's stand at Fakuma 2018, the PxP can be used as an additional injection unit for two-shot moulding and, by adding more units, for multi-component moulding. One customer is already using multiple units to produce toothbrushes in three different materials and four colours.

Peter Kochs, Managing Director of Windsor, said to *Injection World* at Fakuma: "What we specialise in is finding the right way to put units onto the machine. All units are somehow unique." By working with the customer, Windsor can adapt the PxP to the space requirements of the shopfloor, by fitting it vertically or in an L-shape configuration with the IMM. Not only that, but the PxP can be



**Peter Kochs standing next to the new PxP injection unit on Windsor's Fakuma stand**

split apart if it is necessary to fit into a tight configuration.

Major IMM suppliers also offer separate injection units for customers needing to upgrade a machine for

multi-component moulding. But Kochs said these units can be restricted, such as in the screw sizes made available. The PxP injection unit operates a three-zone screw available in various sizes from 16 mm up to 105 mm. The largest size screw is being used by one moulder making pallets with a 5 kg shot weight.

The adaptability of the PxP units make them suitable for injection moulders across many sectors, said Kochs. He sees good potential in the German market where standard moulding applications are being off-shored and companies are switching their machines to more challenging applications, such as multi-component parts.

ers will be able to migrate. We are tailoring the MES to fit customers who want to start going in the direction of Industry 4.0." This is called MES Lite and is intended to be "very easy for a company to start with".

At Fakuma, Kistler showed the latest update - Version 3.0 - of its Como Neo system. The modularity of Como Neo allows the user to tailor support to their needs by enabling them to choose from functions including machine and operation data acquisition, production planning, maintenance management and ERR-link.

New functionality comes from Stasa QC software integrated into ComoNeo for use by moulders of high-grade components in the medical technology industry and other sectors where safety is critical. On the basis of measured values and statistical analyses, the software calculates the quality of manufactured parts in advance, with evaluations inside the tolerance limits.

In its press conference, **Sumitomo (SHI) Demag** said it is expecting a 10% increase in its sales to €289m in the 2018 financial year. Gerd Liebig, CEO, said machine orders had grown strongly from 1,250 in 2017 to 1,750 this year. The group is confident of further growth and forecasts machine

orders to reach 2,500 in 2023.

Liebig nonetheless indicated market uncertainties in the near term, which should stabilise in the first quarter of 2019. A complicated market picture in 2018 has featured: a slowdown in Asia stemming from the IT sector; investments in Europe's automotive sector being affected by adjustment to new emissions testing rules; and postponement of some machine purchases by customers waiting to see how the global tariff conflict develops.

Sumitomo (SHI) Demag's resilience is based on the high-speed technology it has developed, especially its focus on all-electric injection moulding machines. Liebig said the company's share of this market has risen from 10% in 2013 to about 21% in 2018, depending on the market region. The second generation of its IntElect range has been selling strongly since its launch at K 2016. In July the company said its machine investments in the clamp force range up to 1,200kN would shift entirely to the IntElect series, as demand has moved away from hydraulic machines.

At Fakuma, Sumitomo (SHI) Demag's stand had demonstrations of its El-Exis and Systec Servo machines, as well as an IntElect S machine set up for a medical application. The stand also reflected

# Albis planning further investments

Albis CEO Philip Krahn said 2019 will see the company continue to invest in its compounding operation, with some €10m earmarked for new compounding capacity worldwide. While he said it is too early to be specific on these plans they are likely to extend to all three of its operating regions. "Last year and this year we have invested globally," Krahn said.

Key projects over the past 18 months include an increase in capacity in China to 35,000 tonnes, expanding compounding capacity at its site at Zülpich near Cologne in Germany by 9,000 tonnes to 60,000 tonnes, and the start-up of two medical lines at Hamburg with a capacity of around 5,000 tonnes. The company has also resumed manufacturing in the US with the start-up of its facility at Duncan in South Carolina in the early summer.

Krahn expects medical to be a key future growth sector for the company. "We have been a provider of technical medical materials for a long time," he said. "It is clear requests [for these applications] in Europe and the US are growing and there is a demand for custom products."

Albis already distributes a broad portfolio of medical plastics for partners such as BASF, Covestro and LyondellBasell (distribution accounts for around 80% of the company's annual sales of around €1bn, compounds 20% and tolling 10%). Krahn sees its own medical compounding business allowing it "to fill the gaps." The Hamburg plant meets ISO13485 requirements and all materials will be supplied with the two or three-year guarantees of notice standard for the medical sector.

"We are not involving ourselves with high risk products—implants— but everything else is in our targets," Krahn said.

Albis is also stepping up its activities in the recycling area. The company currently produces and supplies its own recycled compounds under the Altech Eco brand, which it claims offer near-to-virgin performance, in all three geographical regions. Its acquisition of Wipag in 2017 gave it access to closed loop recycling of automotive bumpers and a pilot scale technology for recycling carbon fibre (a 4,000 tpa production scale compounding line for carbon fibre products was installed at its facility at Neuburg in June).

Krahn said that from October, it was also starting to distribute Moplen PP and Hostalen PE products from Quality Circular Plastics (QCP), a joint venture between LyondellBasell and waste group Suez.



**Albis CEO Philip Krahn is planning €10m of compounding investments**

the theme of network integration and digital services in displaying the company's MyConnect services. These user-friendly packages include: MyBasic Support, MyDocumentation, MyParts Shop, MyLife Cycle Log and MyConnect app.

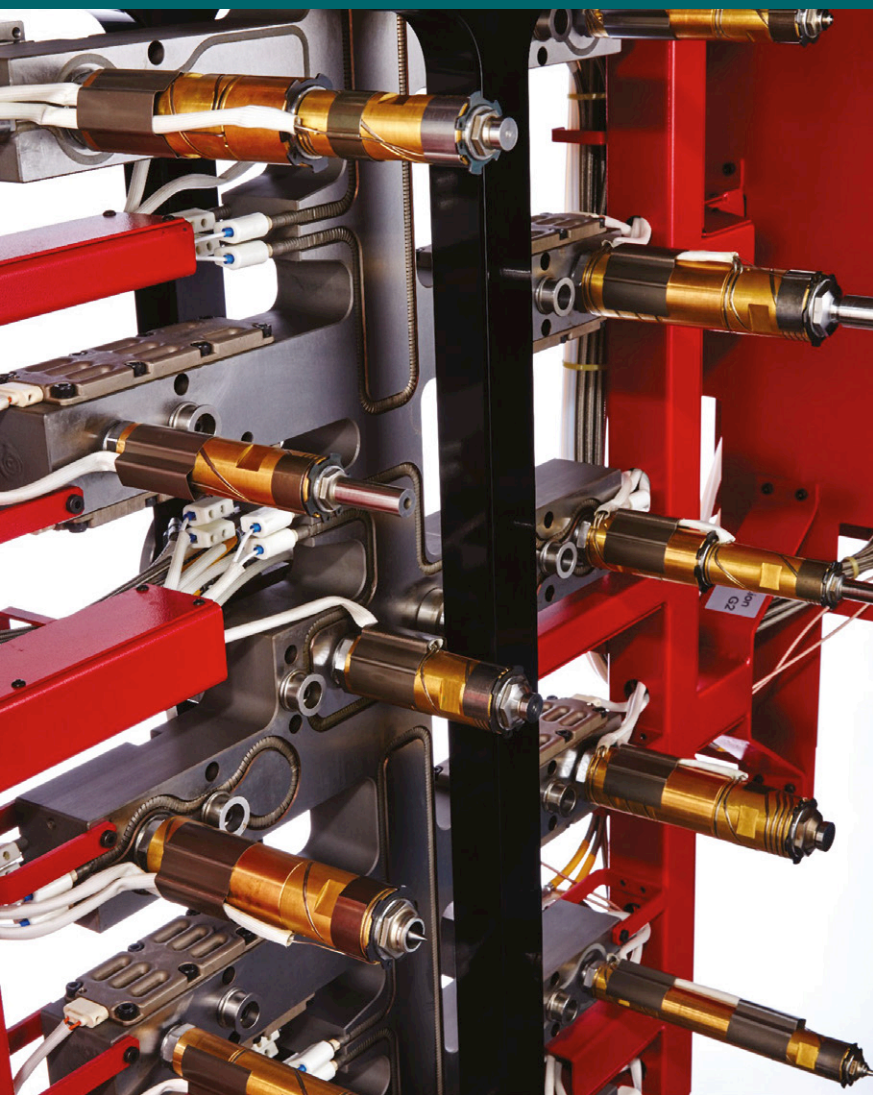
An "easy package" was also unveiled by robot maker **Sepro** at Fakuma. This package intends to make it simple for the group's injection moulding customers to choose a machine from any of Sepro's 12 IMM partners plus a robot for a new project. Jean-Michel Renaudeau, CEO of Sepro, said at the group's press conference the package idea reflects that the robot market has become more complex and Sepro is flexible in meeting the needs of the customer as shown in the company's motto at Fakuma, "Experience full control".

In addition to the Sepro robots on its stand (and those of its partner companies), the company showcased its digital advances, including the Visual control platform, which Sepro integrates with IMM controls and which will be available in Version 4.0 from K 2019. Visitors also were given a preview of OptiCycle, a control plug-in (developed in open collaboration with a key customer) that automates robot cycle optimisation, and Live Support, an app that links customers and their robots with troubleshooting assistance.

At the Sepro press conference, Jean-Michel Renaudeau also introduced a new group management board, which has been set up to help steer Sepro in its plan to grow sales to €200m by 2022 from a level of €130m in 2018. "Their mission is to bring Sepro from the position of No. 2 [of global injection moulding robot suppliers] to the position of No.1," he said. Among the six new recruits to the board from outside Sepro (plus two from inside Sepro), is Xavier Lucas, Global Service and Automation Director, who joined in August from his previous position as Managing Director at one of Sepro's strategic partners, Yaskawa France. Lucas said there is growing demand from the injection moulding market for a full automation service and Sepro sales in this area have grown to €28m this year.

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*Suppliers of moulds and hot runner systems are meeting industry needs for robust, reliable and efficient solutions for an increasingly diverse range of applications. Mark Holmes looks at some current developments*

# Latest advances in hot runner technology

Moulds and hot runners are an essential part of the injection moulding operation and system suppliers are meeting demands for ever more demanding and technical applications, while ensuring production is economically efficient and minimising scrap. Leading manufacturers have introduced a number of new products to the market to satisfy these requirements in a wide variety of industry areas.

**Milacron** has launched the **Mold-Masters** ThinPAK-Series hot runner for thin wall packaging applications. The company says that the ThinPAK-Series has the strength and durability to mould with complete reliability even in high pressure applications up to 2,800 bar. Features include new hot runner nozzles, gate seals and manifold designs. The nozzles have a robust gate seal and cut-out to withstand the high pressures required for thin wall packaging moulding operations. They also feature

precisely balanced thermal profiles for good process control and the gate seals are serviceable from the parting line. The enhanced gate features a more robust design that incorporates high-strength material and a larger contact area. Utilising an enhanced valve disk bushing design any weepage is controlled and directed to easy-to-clean areas. This design extends service intervals by up to three times, minimising interruptions to operations. The new nozzle and manifold seal provides greater reliability even on cold start-up, providing a wider processing window. The new ThinPAK-Series manifolds have also been engineered for strength, certified for withstanding injection pressures of up to 2,800 bar -- 40% higher than Mold-Masters standard manifold designs.

The company has also introduced enhancements to the Mold-Masters Fusion Series G2 of hot runner solutions for automotive and large part moulding,

**Main image:**  
**The Mold-Masters Fusion Series G2 of hot runner solutions for automotive and large part moulding**

**Right: The Dura Plus automotive lens moulding hot runner solution from Mold Masters has been engineered to produce consistent high-quality parts with good clarity**

which includes an expanded nozzle range and water-less actuator technology. The F3000 and F8000 nozzles expand the capabilities and applications of this system to include shot sizes from less than 15g to over 5,000g. The F3000 has a shot capacity of less than 15g, which is ideal for smaller under-hood components, technical automotive components and price sensitive packaging and consumer goods applications. The F8000 increases shot capacity of the system further to 5,000g by utilising runner diameters up to 28 mm. Nozzle lengths are also available that exceed 1 m. F8000 has been developed to meet the processing requirements of common large automotive components like fascias, instrument panels and door panels, and large white goods.

Additionally, Fusion-Series G2 systems will also be available with the new water-less actuator which incorporates new Passive Actuator Cooling Technology (PACT). The company says that this eliminates hose-plumbed cooling circuits to actuators and facilitates faster mould changes and provides long-term performance reliability. Maximised for uptime, the Fusion Series G2 hot runner system is delivered completely pre-assembled and pre-plumbed, saving significant set-up time. Incorporating field replaceable heater bands ensures that any maintenance is quick and easy.

In addition, the Mold-Masters Dura Plus automotive lens moulding hot runner solution has been engineered to produce consistent high-quality parts with good clarity. It is compatible with abrasive and corrosive resins, such as PC, PC-ABS and PMMA. With its introduction, enhancements over the previous Dura system include new Dura Plus nozzles with enhanced thermal profile, full stainless steel construction and a highly polished runner finish which work together to improve processability, provide greater system durability and prevent contamination defects of moulded parts. In the field,

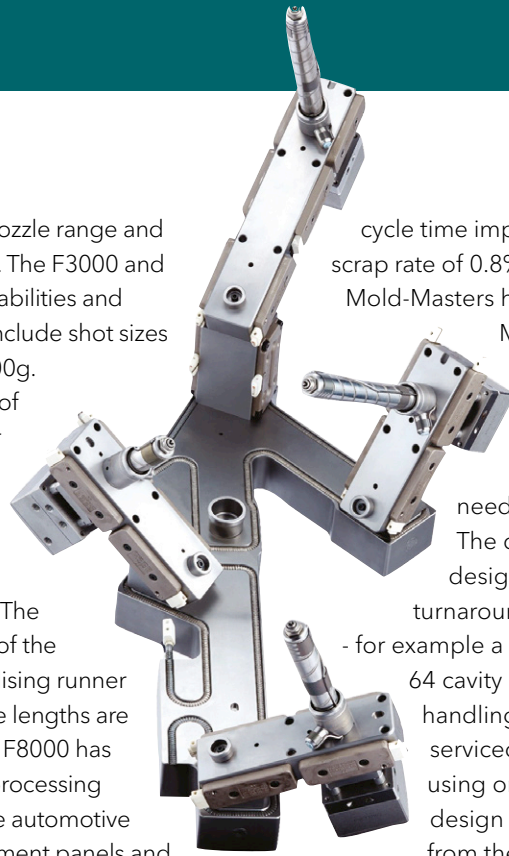
cycle time improvements of 22% and a low scrap rate of 0.8% have been observed.

Mold-Masters has also developed the Melt-Cube EVO as a hot runner for high cavitation moulds producing deep draw medical parts, such as pipette tips, syringe barrels, needle shields and horizontal tips. The company says that it is designed to minimise maintenance turnaround significantly by up to 85% - for example a saving of up to five hours on a 64 cavity system - and improved handling safety with the ability to be serviced at cold temperatures and using only one torque value. The new design has retained all the strengths from the previous version, such as

gate located tips that maintain critical tolerance resulting in good gate quality; however, with the simplified design there has been a reduction in the number of bolts securing each pair of tips from seven to one, reducing assembly and disassembly times for service and set-up. Melt-Cube EVO also offers simultaneous direct horizontal side gating of up to eight cavities per cube eliminating scrap from sub-runners and enhancing part quality. Mold-Masters Brazed Heater Technology also delivers good processing capabilities through hotter processing temperatures for a wider processing window and good thermal balance both throughout the manifold and tip to tip.

The Mold-Masters TempMaster Series hot runner controller has also been upgraded. The temperature controller features APS technology, an auto-tuning control algorithm delivering precision and reliability varying only slightly from set point. The result is enhanced moulded part quality, consistency and minimised scrap. The enhanced TempMaster M2+ controller is capable of controlling up to 500 zones and is now available with larger and more powerful touchscreen controls with a new modernised interface. Functionality like SVG, E-Drive Synchro Plate, M-Ax Auxiliary Servos and water flow temperature can be integrated, monitored and controlled from a centralised location.

At Fakuma 2018, Mold-Masters showed the SeVG+ (Sequential Electric Valve Gate) control feature in an ImFlux low-pressure moulding cell comprising a Milacron Elektron EVO machine and Master-Series hot runner system. Each valve pin is connected to an individual servo motor which allows for full, on-the-fly adjustment of pin position, stroke, speed,



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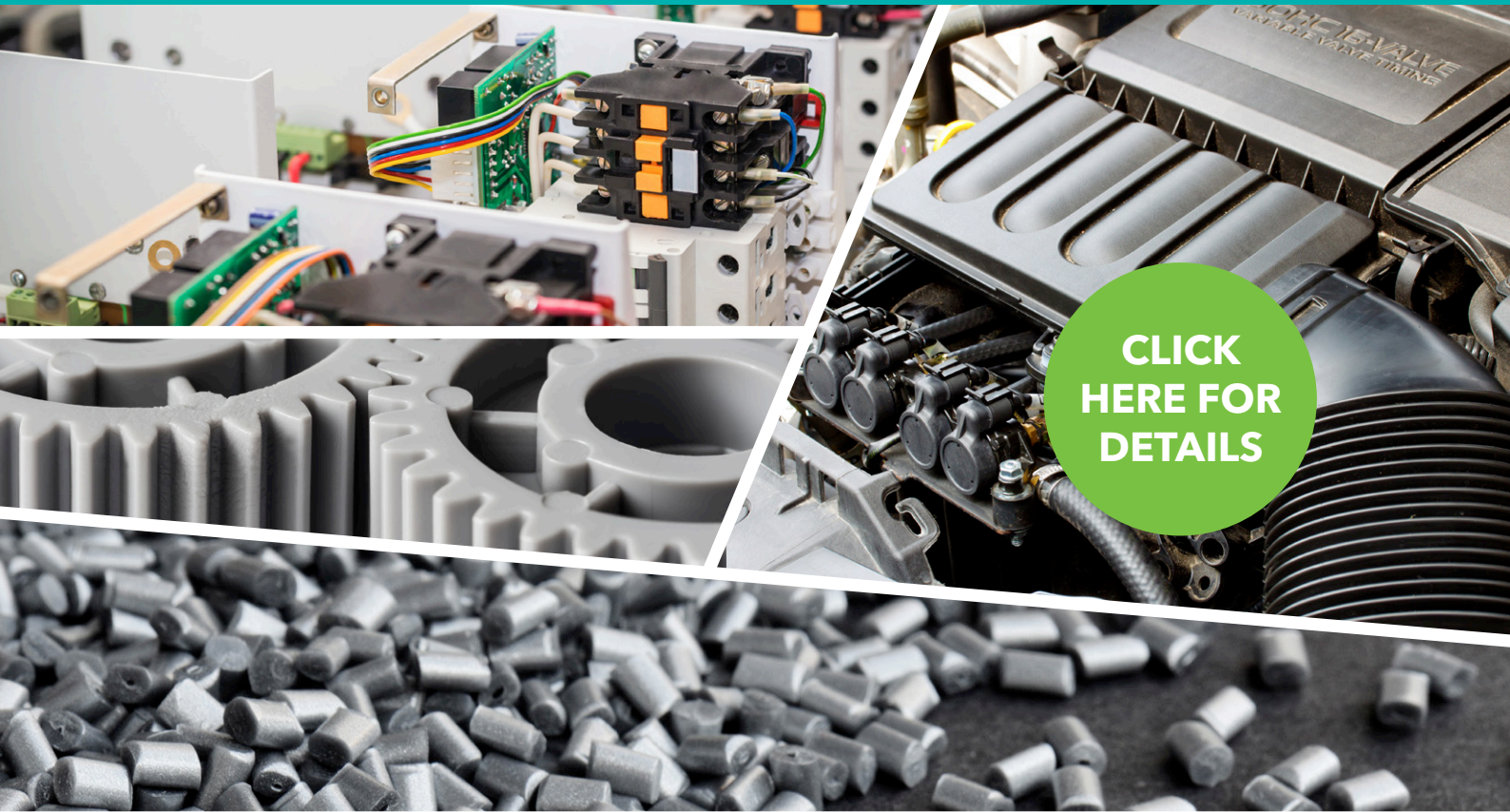
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protrusion, timing and sequence. Using these variables ten multi-step opening and closing profiles for each valve pin can be created which gives users the flexibility necessary to enhance moulded part quality and balance when using ImFlux. SeVG+ is claimed to be ideal for a wide range of applications, such as large part production and family moulds including automotive applications. Moulding large parts with traditional sequential injection methods can lead to several visual surface defects including pressure lines, hesitation marks and sink marks. These surface defects are caused by uncontrolled resin flow which results in an abrupt spike in cavity pressure during the filling stage. SeVG+ helps prevent these defects by regulating the release of melt pressure into the cavity. The precision and repeatability of the SeVG+ servos helps stabilise moulding processes.

**HRSflow** has developed its FlexFlow technology of servo-electric driven valve gates for tailored hot runner solutions for demanding technical parts for the automotive industry and other applications including thin-walled laptop housing and an ultra-light tool box. The company says that FlexFlow technology has the ability to individually control the pressures and flow velocities at each gate, making an optimal solution for large and small applications, even with thermoplastics that are difficult to process. In order to meet Industry 4.0 requirements for integration, the company has introduced the option of using a touchscreen of an injection moulding machine to control FlexFlow settings.

For lightweight construction and Class A surface applications for the automotive industry, HRSflow has developed and optimised a hot runner system for the production of an engine cover using FlexFlow One technology, in collaboration with tool specialist GK Concept and injection moulding machine manufacturer Yizumi. This servo-electric valve gate solution, which is programmed using an external Smart Interface and therefore requires no additional control unit, is claimed to combine maximum precision with a broad process window and cost efficiency. In the production of the large-sized component, an aluminium foil only 0.2 mm thick is first inserted into the mould and punched into shape during the closing process. Subsequently, the foil is thermoformed during overmoulding with a glass fibre-reinforced polyamide using a FlexFlow hot runner system and

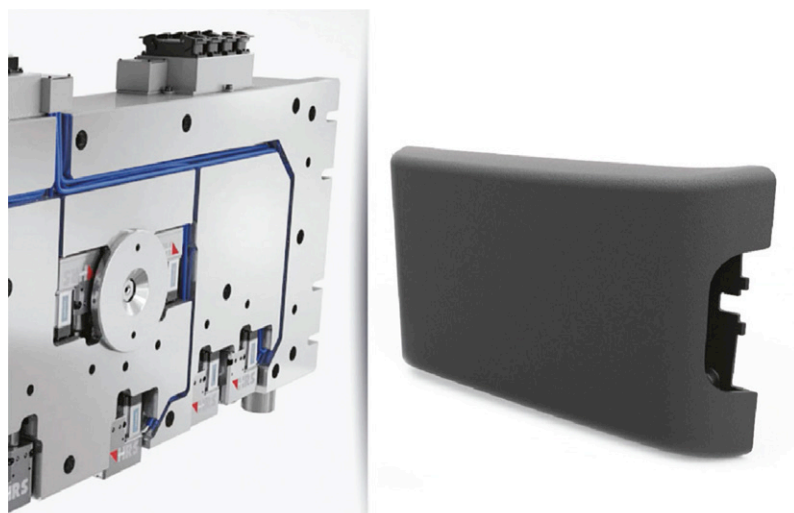
physical foaming technology. During this back injection phase, in-mould graining (IMG) takes place, in which the fine texture of the mould is transferred both to the foil and to the polymer surface. The resulting part combines light weight with high dimensional stability, low warpage and a premium surface without visible weld lines.

A FlexFlow five-nozzle hot runner system has also been used for the production of an automotive spoiler made from a polypropylene from A. Schulman, filled with 3M's hollow micro glass spheres, which enables weight savings of up to 15% compared to the unfilled version. Due to FlexFlow technology, which ensures a more homogeneous pressure distribution in the cavity, the glass microsphere survival ratio is increased with even better distribution. The result is a lightweight component with no visible weld lines that meets the highest requirements for mechanical properties and surface quality.

Another lightweight automotive application is a centre armrest that is manufactured in a multi-stage process. Development partners in this project were KraussMaffei and the US toolmaker ProperTooling. The load-bearing structure of the centre armrest was created with the aid of the FiberForm process developed by KraussMaffei in which a thin-wall, fibre-reinforced composite sheet is heated, inserted into the mould and thermoformed. The two subsequent injection moulding processes are carried out according to the principle of the swivel-platen technique simultaneously in two opposite parts of the same mould. In one step, the carrier is first encapsulated with polypropylene. This results in the near-final geometry of the part,



**Left: The Mold-Masters TempMaster Series hot runner controller has been upgraded**



**Below: An ultra-light centre armrest for automotive interiors produced using servo-electric programmable FlexFlow hot runner systems from HRSflow**



**Above: At Fakuma, HRSFlow also showed non-automotive applications, including luggage, moulded with its hot runners**

including the elements needed for subsequent assembly. This structure is then overmoulded with a thermoplastic elastomer (TPV) in the opposite section of the mould. This produces the flexible visible surface with the fine grain that is later responsible for the high optical and tactile quality of the centre armrest.

With both injection moulding steps, a FlexFlow hot runner system is used, with two or three hot runner nozzles. Their servo-electric, individually controlled valve pins ensure optimum filling of the cavities in each case, and they also contribute to the reliability and economic viability of the process. The company says that the integrated servo-electric valve gate system opens up a variety of possibilities for adjusting the process parameters. For example, it is possible to control the individual pins of a hot runner system independently of one another with regard to their stroke, velocity and force. This means that users can control the pressures and flow rates during the entire mould-filling process accurately, easily and flexibly and thus optimise the quality of injection moulded parts. Advantages over conventional pneumatically or hydraulically driven valve gate systems include producing streak-free Class A surfaces and reducing warpage. Another benefit is its maintenance and user friendliness. The clamping force can be lowered by around 20% and the part weight by up to 5%, while ensuring high reproducibility.

At Fakuma, HRSFlow showed a number of non-automotive applications on its stand, including a PP-shell suitcase, a polycarbonate laptop cover and a PP and TPE two-component baby bath, all of which were moulded using FlexFlow hot runners. Simone Callegari, Commercial Director at HRSFlow,

explained that automotive remains the core market for the company but, in order to pursue growth, it is diversifying into other markets. It sees a market opportunity in pallets and other transportation packaging, as applications have similar moulding challenges to automotive components like bumpers: they are large mouldings with both thick and thin wall areas. Callegari said HRSFlow's expertise in automotive can be transferred to other areas like electronics and consumer products, such as the suitcase shown at Fakuma which had a wall thickness of only 1.8mm.

**Hasco** has extended its product range of ready-to-install single needle valves with the H44201 and H44202 hot halves, which the company says offer high efficiency and system safety. The entire needle shut-off unit is installed directly and mould-sized, making it easy to maintain and is designed and produced for the application. The hot half is ready for immediate use: it is equipped with Vario Shot nozzles, all hot runner and connection components, the clamping, frame and nozzle retainer plate, and all standard parts. The ready-to-connect system is simply attached to the fixed mould plate. After connecting the system to the peripheral control and supply units, production can begin. Hasco adds that the concept of the hot half allows mould makers and injection moulders to reduce their design and manufacturing times significantly. The hot half is designed to the customer's specifications and within days supplies the CAD data in the required format.

Hasco has also extended its hot runner product portfolio with the H1280 series of control units. This controller has high functionality and comprehensive diagnostics, says the company. Three housing sizes with 6-36 zones are available as table-top units. With a new intuitive touch user interface, the controller is easy to operate. Operating functions allow data to be entered at different navigation levels. The Quick Start assistant guides users through all the key settings and enables untrained personnel to safely commission the controller within a short time. The functions offered by the hot runner controller include comprehensive monitoring to protect the controller, hot runner system and mould. One feature is a troubleshooting agent, which enables the cause of a malfunction

**Rght: Hasco has extended its product range of ready-to-install single needle valves with the H44201 and H44202 hot halves**



to be located rapidly and contains illustrated instructions for its rectification.

New safety couplings Z80700HT and Z80801HT have also been introduced for improved mould temperature control, where an automatic safety lock protects against unintended unlocking. Hasco says that the forced rotating guide on the locking sleeve still ensures easy decoupling. For safety reasons, a deliberate unlocking movement must be performed each time. This effectively prevents accidental or unintended unlocking. A visible green colour coding behind the locking sleeve clearly indicates correct and safe coupling. The new safety couplings are ideal for heating and cooling applications with cold or hot water or heating/cooling oil, with high-temperature sealing rings permitting maximum load. They are compatible with Hasco cooling systems, available in diameters of 9 and 13 mm, either with locking or a free throughput, and equipped with a connecting thread or hose nozzle. To achieve maximum safety, it is recommended that hydraulically pressed hoses be used.

Positive locking cylinders are used in injection moulds to operate valves, cores and similar components. For high-temperature applications in compression and injection moulding tools up to 180°C, Hasco has introduced the positive locking cylinder Z2302, with mechanical final position sensing. The solid design of the new positive locking cylinder and the precise final position sensing via proximity switches permits safe locking of the piston rod and is suitable for use with core pullers and mould slides. Service temperatures of up to 180°C are possible. The positive locking cylinder has optimised gaskets and is easy to mount. The integrated positive locking means there is no need for a locking device on the mould. The cylinder is mounted either with the Hasco flange Z2310 or the Hasco groove-nut set Z2311, which helps with fine setting.

Hasco has also developed the A5850 status indicator for injection moulds. The company says that it can be easily adjusted by hand, via a knurled wheel, without any tools. In a readily visible window, a clear colour code shows the current mould status on a roll with four colours. Green means an enabled mould, yellow shows that the mould is due for maintenance, red that the mould is locked and blue signifies sampling. The status indicator can be



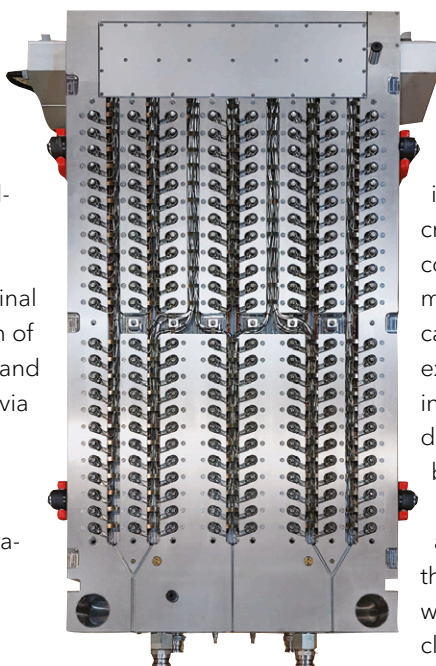
**Above: The H1280 series of control units from Hasco has high functionality and comprehensive diagnostics**

positioned as required and is fixed in place by screws or a magnet, and can also be mounted vertically on narrow plates. It can be employed at service temperatures of up to 100°C, is individual and versatile in use and also easily dismantled for cleaning, says the company.

**Sipa** has recently developed a high cavitation hot runner system – a preform mould with 192 cavities – for a leading PET container maker, based in North America. The company

says that its Xflow melt distribution system, which is now available for use on GEN 3 (third generation) XFORM 350 and 500 high-performance injection moulding machines, creates a hot runner system that consistently and reliably enables many cavities to be filled identically, at high speed and without excessive force. The new system incorporates a hot runner manifold design that provides a good balance of melt distribution and exhibits a low pressure drop. This allows a significant extension of the maintenance interval, since wear and tear is reduced, and is claimed to be easy to carry out.

**Left: Sipa has recently developed a high cavitation hot runner system: a preform mould with 192 cavities**



The company adds that Xflow technology allows the creation of high cavitation systems without having to compromise on balance, pressure losses, and the formation of acetaldehyde due to polymer degradation. Xflow can also be applied to moulds with more modest levels of cavitation. According to Sipa, the Xflow solution applies advanced concepts of polymer fluid dynamics to hot runner engineering. By taking melt rheology aspects into account, it is possible to halve the imbalance in melt flow compared with first generation systems. Third generation hot runner systems now incorporate a version of Xflow that benefits from a total overhaul of the cylinder



**Above: Sipa has introduced a new quick mould change system for its ECS SP single-stage injection-stretch-blow moulding machines. The system is capable of producing all sorts of shapes, including the production of miniature bottles as small as 10 ml in size**

units, valve guides and nozzles.

Sipa has also introduced a new quick mould change system for its ECS SP single-stage injection-stretch-blow moulding machines, which means changeover times can be reduced by around a quarter. New features also add extra safety and user-friendliness for operators, especially for some critical operations. The Sipa ECS SP system is claimed to be ideal for the production of speciality products, such as containers for pharmaceuticals, cosmetics, personal care products, and spirits, particularly (but not exclusively) in sizes between 20 and 50 ml. Two models are available: the ECS SP 50 with a 500-kN injection clamp force, and the 800-kN ECS SP 80.

The system involves a new automated procedure for loading and unloading the preform core plates; this incorporates additional sensors to ensure that the mould opening stroke is adjusted correctly, according to the preform length. Operations for assembling and disassembling the neck ring plate have also been modified. Sipa has developed a system that now makes it possible for the procedure to be carried out safely by one person instead of two. Changing the blow mould is also easier. Modifications to the press and the introduction of roller bearings in critical positions, for example, now mean that

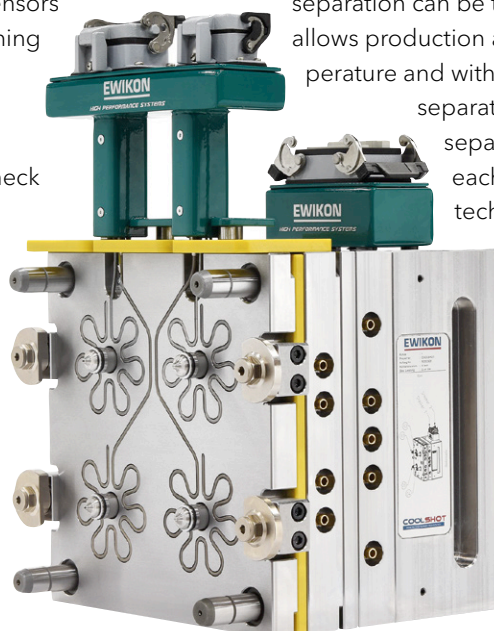
once the forklift has positioned the mould next to the clamp unit, the mould can then be pushed into position by hand. Height adjustment of the mould, once it is in the clamp, is also easier. Finally, modifications have been made to sealing plate and stretch rods, and standard screw fittings for the water cooling system have been replaced by quick-fit push/pull fittings.

**Ewikon** has introduced a cold runner solution for the processing of LSR. The company says that the high performance Coolshot cold runner system allows process reliability and efficient processing of various types of LSR. The system features an electric drive valve gate, which has already been successfully used for years in hot runner applications. When processing LSR the electric step motors used allow the positioning of the valve pins with high precision in steps of 0.01 mm, enabling fine-balancing of the cavity filling. No manual adjustment of the valve pin length is required, meaning that the time for system set-up and re-adjustments during production is considerably reduced. Furthermore, the advanced control technology allows permanent monitoring and automatic adjustment of the valve pin positions by using encoders. There is a touch screen panel for operation of the system and remote control access is possible by tablet PC (iOS, Android, Windows) with VNC viewer.

The company adds that all components of the system are designed for maximum reliability and easy maintenance. The manifold system features a fully balanced flow channel layout without dead spots for quick colour changes and can be easily dismantled and opened for cleaning. Depending on the LSR type used, the water-cooled cold runner nozzles are available with different material combinations in the gate area. Consequently the thermal separation can be tailored to the process. This allows production at the optimum mould temperature and with reduced cycle times. A heated separator plate with coil heater and separate temperature control for each cavity is also available. This technology from the hot runner

field enables a particularly even heating of the mould plate for homogeneous crosslinking of the LSR. The cavity plate can be equipped with an additional mechanism to separate it easily from the cold runner nozzles after production or in case of a temporary interruption. This stops heat transfer from

**Right: The Coolshot cold runner system from Ewikon allows process reliability and efficient processing of various types of LSR**



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# Fire Resistance in Plastics

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the hot cavity plate into the gate area of the nozzles and prevents crosslinking of the LSR in the cold runner. The Coolshot system is delivered as a complete cold half with pre-installed cold runner system, cooling and complete electric wiring and can be easily integrated into the mould.

Ewikon has also developed Smartcontrol, a compact process monitoring and diagnosis unit for hot runner moulds that monitors, analyses and logs all relevant process and system parameters over the entire life cycle of the mould. Data including running times and downtimes of the mould, nozzle and manifold temperatures of the hot runner system, as well as shot numbers, are collected and logged. When defined critical values are exceeded, a warning signal can be triggered. As an option, hot runner system pressures can be monitored as well. The Smartcontrol unit is attached to the outside of the mould or to the wiring box. All data can be exported by using WLAN, Bluetooth, Ethernet or USB. A browser-based user interface allows clear visualisation of the data and can be installed on mobile devices, as well as in company networks. In case of system errors, data can be transmitted to Ewikon for quick remote diagnosis. This allows an early initiation of specific maintenance activities and minimises downtime of the mould. All new hot halves can be equipped with Smartcontrol as an option. Retrofitting the unit to existing moulds is possible as well.

**SISE** has added three new units to its GC range for sequential valve gate control. The entry-level GC Timer can control up to 16 pneumatic or hydraulic valve gates, with the GC Access up to 18, and the GC TECH up to 32 gates. Two are equipped with new colour touchscreens and they all include new functions such as end of stroke management, multi-material management, VNC link, curve displays and in particular the new programming mode. In addition, they offer traceability of parts produced with part counting, scrap detection and real-time data recording.

For hot runner temperature control, SISE has also developed a new generation MV3, capable of regulating up to 336 zones. It will be deployed in early 2019 on six platforms (XXS, XS, S, M, L and XL) with four available power cards (2.5 A, 15A, 20A and 30A) to adapt the offer to various industries such as packaging, automobile, cosmetics, medical

and electrical engineering. It will be sold with 10 and 15 inch integrated touch panels and a Linux-based software program developed by SISE.

Pivoting and detachable side panels facilitate easy access to power and thermocouple cards. This new model will include advanced functions such as four soft start modes, zone grouping, PTI function for thermocouple anomalies, Moldscan for hot runner system real-time diagnosis, as well as real-time material leak detection. The system is multilingual (up to 12 languages) with unlimited backup of mould programs. Recording and monitoring temperatures in production, and communicating via multiple protocols is fully in line with Industry 4.0.

SISE has also updated its line of water temperature controllers with the launch of the 95 E9-45E (90°C). Units offer heating capacities ranging from 9-45 kW, four pump models – 130, 140, 200 and 320 l/min, heat plate exchangers from 60-180 kW and solid state relay as standard. Two heating rates can be used to control the rise in temperature, but also save energy during everyday use. Components are accessible and easy to replace. Other options include multi-protocol communication, tool bleeding, external probe, alarm report, Vortex flowmeter, pseudo-cascade control, external set-point, track measurements and direct cooling.

**I-mold** has developed a range of space-saving tunnel gate inserts, fast high-precision servo motor drives for turntables and indexing plates as used in multi-component injection moulding, and particularly rugged hot runner nozzles. The company also offers system solutions for the manufacture and automation of injection moulds, including hot runner nozzles for tight cavity pitches, easy-to-install 'Fast Half' systems, and low-height linear actuators

**Left: Ewikon has developed Smartcontrol, a compact process monitoring and diagnosis unit for hot runner moulds**



**SISE has added three new units to its GC range for sequential valve gate control**



**Above: I-mold has developed a range of space-saving tunnel gate inserts, fast high-precision servo motor drives for turntables and indexing plates as used in multi-component injection moulding**

for rack and plate movements, sliders and core-pulling operations.

The TG Series range of tunnel gate inserts that support compact designs due to sharply curved feed channels are now available in a greater diversity of types to provide mould makers with matching solutions for every application task. Three sizes are available for shot weights up to 35 g (type 1), 120 g (type 2) and 1,000 g (type 3), as well as between three (low, medium and high) feed channel outlet levels. With these nine different configurations it is possible to optimise the sprue-to-moulding volume ratio in applications involving large contour steps, mouldings with a peripheral rim, or interior contours located above the mould parting line. While the

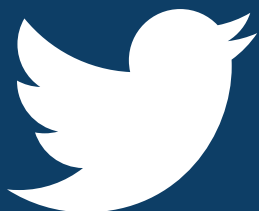
low-level (LL) models are particularly suitable for gating below the parting surface, the high-level (HL) variety provides benefits in gating from the inside or above the parting line. Mouldings with a small peripheral rim are the preferred application domain of medium-level (ML) types.

The company has also developed rotary motion solutions for multi-component injection moulding. The Servomold product range comprises servo drive units for turntables measuring up to 1.6 m in diameter, which rotate together with the entire mould mounted on them. I-mold says that it provides the power train rating and design – complete with servo motor, planetary gear unit, gear wheel or belt transmission and autonomous controller – that ensures fast rotation, for example through 180° in just 0.5 s while being optimally adapted to the large masses involved.

The company also has a new series of single nozzles made by Heatlock. The devices are claimed to have a rugged nozzle tip and good temperature control. The single-shot nozzles are suitable for shot weights up to 800 g (with low-viscosity plastics) and for processing all types of engineering thermoplastics due to a uniform temperature distribution over their full length.

**MHS** has launched cooling-free Black Box and iVG hot runners for a new generation of valve gate systems that do not require maintenance during the life of the mould. The company says that these systems eliminate all quality issues related to cooling water such as corrosion and contamination. Less plumbing also simplifies the design and assembly of the mould. The company says that the new cooling-free technology can benefit all valve

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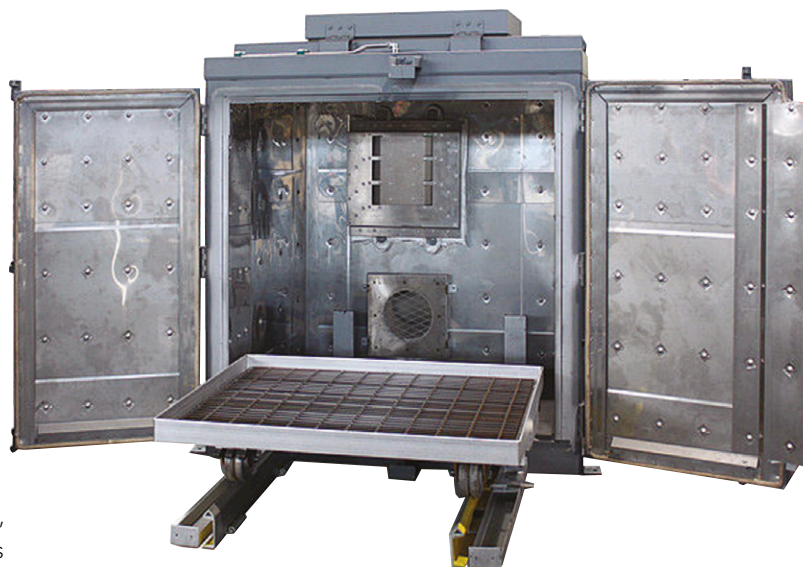
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gate applications, including high temperature plastics such as PEEK, LCP, PSU, PEI and PPS. Processing these materials requires high melt temperatures of up to 450° C in the hot runner and mould temperatures of over 200° C. Black Box and iVG hot runner systems deliver uninterrupted performance under extreme conditions without cooling or wear. The result is a significant increase in reliability and mould uptime.

The company has also developed the Rheo-Pro Black Box valve gate cylinder that operates without elastomeric seals or lubricants, delivering continuous operation at temperatures of 450 °C without cooling or maintenance. MHS says that the new technology outperforms electric, hydraulic, and conventional pneumatic valve gate hot runners in a wide range of applications. In addition, the Rheo-Pro iVG is an internally air actuated valve gate system with no external cylinder, seals, lubricant and cylinder cooling. It is claimed to be ideal for ultra-compact mould designs. The iVG performs well under the most demanding processing conditions. Unlike electric valve gates and conventional pneumatic cylinders that can fail in extremely hot operating environments, the internal valve gate performs at temperatures up to 400 °C.

**Schwing Technologies** has developed a hot runner cleaning system for gentle thermal removal of glass fibre reinforced polyamide, as well as large and heavily overmoulded components in the automotive industry. The company says that glass fibre reinforced polyamide presents a great challenge in all hot runner systems. Contamination and blockages are a significant problem and machine downtime is a top priority. The Maxiclean pyrolysis system is claimed to clean overmoulded hot runner distributors with complicated geometries and glass fibre components reliably, safely and gently, without leaving any polymer residues, carbon remnants or inorganic contaminants. Other advantages for manufacturers in the automotive industry include the ability to clean inside pores and significantly prolong service life of the equipment. Cleaning is flexible, safe, effective, and environmentally friendly.

The precisely controlled cleaning process takes place in an external gas-heated chamber with special hot air routing for optimal temperature distribution. The automatic process control monitors the development of low temperature carbonisation gases and ensures short cleaning times. Inorganic residues are removed using an appropriate post-treatment method. Maxiclean works without wastewater and has a separate after-burner, which completely burns the carbonisation gases



above 800 °C and discharges them through an exhaust chimney.

**Cold Jet** has introduced shaved dry ice MicroParticle technology to clean moulds at operating temperature and in place that does not generate any secondary waste or leave any residue behind. MicroParticle technology shaves dry ice into sugar-sized particles. This allows more media to strike the surface per second than traditional methods, which results in an increased coverage area and a faster and more even clean. The company says that particles can enter the hardest-to-reach places in complex geometry moulds, including vents, and are small and delicate enough for a thorough clean without damaging the mould surface or changing dimensions.

The i3 MicroClean utilises MicroParticle technology and is a lightweight, compact, single-hose low pressure blasting system, which Cold Jet says uses less compressed air and dry ice and is quieter than similar machines.

According to the company, MicroClean extends the running time of moulds by 200-500%, and saves moulds from cooling down and being removed, disassembled, reassembled, replaced and heated back up again.

**Above:**  
**Schwing Technologies** says its **Maxiclean pyrolysis system** can clean over-moulded hot runner distributors with complicated geometries and glass fibre components

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# Forming the right response to regulatory questions



*Regulation of plastics is intensifying around the world, making it essential for companies to keep on top of compliance. We preview AMI's Plastics Regulations, Pittsburgh 2018 conference, the first to take place in the US*

**Main image:**  
**Hear from**  
**experts who**  
**know the**  
**plastics**  
**rulebook**

AMI's Plastics Regulations conference provides expert analysis and guidance on a range of international legislative and regulatory issues that will impact on polymer producers, compounders, processors and end users doing business in the US and beyond. The two-day conference takes place in Pittsburgh, PA on December 11-12.

Legal and regulatory experts will cover new and impending regulations in areas such as TSCA, product stewardship, biomaterials, single-use plastics, plastics waste and the Circular Economy. Key stakeholders from Europe will also address issues from across the Atlantic affecting the plastics supply chain in the US.

Food contact legislation is another evolving subject that has significant implications for the suppliers of polymers, additives, compounds and masterbatch, as well as the producers of food packaging and food processing equipment. Legal experts at the conference will review existing and planned regulations in this area and provide advice on how to meet them.

Here we preview the conference, highlighting expert speakers from government agencies, compliance departments and specialist law firms.

## US regulatory scene

The opening session of Plastics Regulations, Pittsburgh 2018 takes a closer look at the current regulatory landscape and some of the challenges likely to affect those in the plastics industry. **Ed Brzytwa**, the Director for International Trade at the **American Chemistry Council (ACC)** in the US, starts proceedings with a look at how global trade conflicts are impacting on the US economy and the business of chemistry. This is followed by a talk from **Christopher Thelen**, Regulatory Specialist at **M. Holland Company** in the US, who discusses a modest new approach to regulatory compliance.

## Product stewardship

The second session features **Bernard Henn**, Supplier Development Manager at **Verisk 3E** in the US, who investigates modernising product stewardship in the plastics industry. The second talk in the session, focusing on biomaterials supplier liability issues with regards to FDA regulation and managing risk, is given by **Frederick A. Stearns**, Partner at law firm **Keller and Heckman** in the US. **Beth Trenor**, Advanced Regulatory Specialist at **Milliken & Company** in the US, then presents from

the additive supplier perspective and how Milliken is thriving through innovation in a challenging regulatory environment.

After lunch, the session is continued by **Dee Wilson**, Senior EHS Specialist at **UL Product Supply Chain Intelligence** in the US, who covers antimicrobial protections as a solution in the move towards reducing single-use plastic waste – the talk focuses on the regulatory challenges and requirements for pesticides.

## Europe and beyond

The third and final session of day one opens with a paper about the recent proposed amendments to the EU Waste Framework Directive from **Dr Anna Gergely**, Director, EHS Regulatory at **Steptoe & Johnson** in Belgium. This is followed by a look at the Circular Economy and plastics by **Roberto Crespi**, Senior Associate Lawyer at **Fieldfisher** in Belgium.

After a networking and refreshment break, **Alfred Voskian** and **Jytte Syska**, Partners at **Syska Voskian Consulting** in the US and Denmark, then discuss EU REACH and CLP (Classification, Labeling and Packaging) regulations affecting the plastics industry. The final talk of the day is given by **Michael Fischer**, Vice President, Codes and Regulatory Compliance at **Kellen** in the US, who focuses on the impacts and solutions relating to construction regulations in China, for US producers of foam plastic-core insulated metal panels.

To round off the day's proceedings, a networking drinks reception is being held in the exhibition room, where delegates and speakers debate the conference so far and attendees have the opportunity to network with industry peers.

## Food contact

Day two of the Plastics Regulations conference is opened by **Dr Mitchell Cheeseman**, Managing Director at **Steptoe & Johnson** in the US, who

looks at building a global strategy for innovative food contact products.

This is followed by a close look at the US FDA Food Contact Notification Program presented by **Dr Jessica Cooper**, Review Chemist at the Center for Food Safety and Applied Nutrition, Office of Food Additive Safety in the Division of Food Contact Notifications at the **US Food and Drug Administration (FDA)**.

After the morning refreshments, **Jim Mo**, Business Development at **CIRS Group** in the US, showcases a road map to Food Contact Materials and Articles regulations in China. And finally, **Naeem Mady**, Vice President, Regulatory Market Access, Health, Environmental & Regulatory Services (HERS) at **Intertek** in the US, presents a paper on migration protocol in support of global food contact notifications and compliance.

## Packaging applications

The final session of the conference begins with a look at emerging issues and insights related to food and beverage packaging delivered by **Dr Ruud Overbeek**, Chief, Business Development & Strategy at **Decernis** in the US. **Dr Dave Brassington**, Vice President Regulatory Affairs at **Addivant** in the UK, explores non-intentionally added substances and developing new plastic additives in the era of the parts-per-trillion detection limit. Closing the conference is **Dr Grant B. Kenion**, Scientific Fellow at **Henkel Corporation** in the US, who makes a comparison between direct contact, different food contact layers, and conditions of use analytical extractive studies versus diffusion modelling predictions.

**Speakers at the conference include (from top):**  
**Christopher Thelen** from **M. Holland**, **Bernard Henn** from **Verisk 3E**, **Frederick A. Stearns** from **Keller and Heckman**, **Grant B. Kenion** from **Henkel**, **Jim Mo** from **CIRS Group** and **Ruud Overbeek** from **Decernis**



# About Plastics Regulations Pittsburgh 2018

Plastics Regulations 2018 takes place on 11-12 December at Pittsburgh Marriott City Center, Pittsburgh, PA, in the United States. In addition to the formal conference sessions detailed above, attendees will benefit from the chance to discuss and network during informal refreshment breaks and at the drinks reception in the evening of day one.

Whatever your role in the polymer supply chain, AMI's Plastics Regulations conference will give you vital information on how to ensure your company is compliant with current and future chemicals legislation. Don't get caught out by new legislative developments. Attend Plastics Regulations, Pittsburgh 2018 to discover the most effective ways to protect your business and ensure compliance. Book your place today!

For further information about attending the event, please contact the Coordinator, Shannon Slaff: [shannon.slaff@ami.international](mailto:shannon.slaff@ami.international) Tel: +1 610 478 0800. More information at the [conference website](#).



# Thermoplastic Concentrates

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*Development work by engineering plastics producers has led to a surge in new grades of polyamide 6 and 66, PA46, PPA and other materials for specific customer demands.*  
By Peter Mapleston



# New polyamide materials proliferate

Polyamides continue to hog the headlines in news on engineering thermoplastics. Whether it is new high-performance grades for electronics and metal replacement, or new developments in response to shortages in polyamide 66, there is an awful lot going on. Much of it was to be seen at the Fakuma show in Friedrichshafen, Germany, in mid-October.

Polyamide 66 producer **Ascend** is addressing the issue of how to take weight out of parts without compromising on mechanical properties such as stiffness. At the same time, says Senior Vice President, Technology, Vikram Gopal, it is working on ways to improve NVH (noise, vibration and harshness) properties. A new grade from its latest 400 Series of Vydyne polyamide 66 compounds, which contain glass fibre reinforcement and impact modifying additives, was unveiled at Fakuma. It shows improvements in notched and unnotched impact strength. Gopal notes that this is an application that can benefit from the water absorption of PA 66, as this reduces the glass transition temperature of the polymer, improving its damping properties.

Vydyne 433H can be used for A, B and C pillar stiffeners in the body in white, says Gopal, helping to reduce weight without sacrificing safety or comfort. These require not only stiffness and impact resistance, but also a high deflection temperature under load (DTUL, or HDT) to resist paint oven temperatures. Gopal says this stiffening concept is now becoming more mainstream. He also sees potential for the new material in engine mounts that improve NVH, especially in high-end vehicles. Such components need a material with low creep, high fatigue resistance, and good resistance to high temperatures and to automotive fluids.

For automotive electrical and electronics applications, **Solvay Performance Polyamides** (currently in the process of being acquired by BASF in a deal awaiting approval by the European Commission) has developed a family of "electro-friendly" high-purity, low-corroding materials for applications like electrified cooling systems, sensors and connectors, as well as high-power EV chargers. The range comprises six Technyl and

**Main image:**  
**BASF says its new Ultramid Advanced T1000 compound group based on polyamide 6T/6I can perform "1,000 tasks"**

**Right: DuPont Zytel HTN polyamides are used in connectors**

Technyl Star grades, two of them using bio-based, Technyl eXten technology for applications needing high temperature combined with glycol resistance. The range will be commercially available early next year.

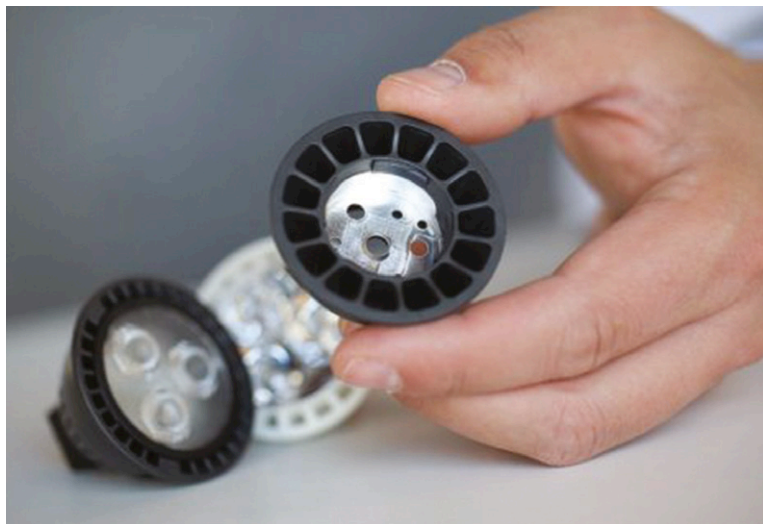
"Halogens and phosphorous in polyamide have been identified as major contributors to galvanic corrosion, a potential source of system failure and short-circuits which could lead to fire," says James Mitchell, Automotive Market Director for Solvay's Performance Polyamide global business unit.

Solvay says that for fuel cell stack components, Technyl One has emerged as a preferred material choice, offering more value to customers when compared to polyphthalamide (PPA) compounds in terms of both in-use performance and processability. This material combines a near-zero ion migration potential with high heat resistance, dimensional stability against hydrogen leakage, electrical insulation, high surface aspect and weldability.

Mitchell says this is the first PA66-based offer on the market specifically designed for fuel cell technology. It is intended for applications such as hydrogen manifolds, heater plates, humidifiers and water traps.

Also pushing automotive applications is **DowDuPont**. At Fakuma, its DuPont Transportation & Advanced Polymers business introduced high temperature polyamides for SMT connectors as well as to address the trend towards miniaturisation. Zytel HTN FR42G30NH is based on a new polymer, which is partly bio-based. It has a CTI of 600V and a V-0 rating at 0.4 mm, using a halogen-free flame-retardant package. It is designed to withstand high constant-use temperatures found under the hood of around 130°C. It is also intended as a replacement for thermoset resins in applications such as miniature circuit breakers.

**Below: E&E parts are a common application for DSM Stanyl PA 46**



In September, the company said that with the market for electric/hybrid-electric vehicles experiencing strong and sustained growth, it was launching Ahead, a new initiative "designed to bring customers solutions and material capabilities from across the new DuPont." Its aim is "to bring innovative and holistic solutions to this market, including autonomous driving, connectivity and related infrastructure."

The company says that, utilising not only engineering thermoplastics but also elastomers, fluids and specialty lubricants, electronic materials, high-performance fibres and safety materials, Ahead will provide innovative solutions for lightweighting; battery pack components and assembly; thermal management/safety; electric motors; powertrain/chassis; electrical/electronic applications for improved automation; and support infrastructure (plug-in and induction charging stations, etc.)

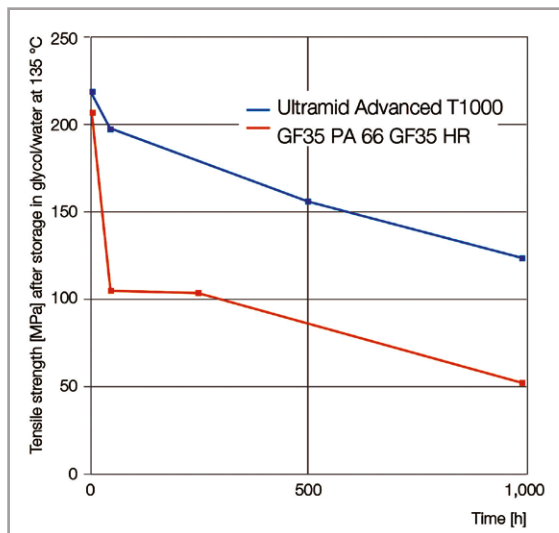
Automotive is obviously a major market for all sorts of polyamides – and that is unlikely to change any time soon, even as drive systems move from petrol and diesel to electricity. Joost d'Hooghe, Global Business Director at **DSM Engineering Plastics**, says that during the move from petrol-powered to electric vehicles, there will still be a considerable transitional phase during which many vehicles will have hybrid electric drives.

Hybrid drive systems will be an important part of the picture well into the future, until fully electric vehicles have the range that current petrol engines have, and/or can be recharged much more quickly and easily than is the case today.

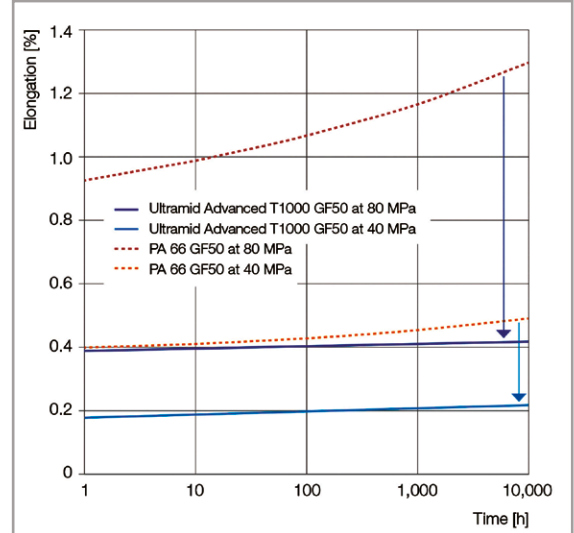
A list of new requirements from OEMs and Tiers is emerging for hybrids, as both types of drive systems have to fit into the same space. Electrics and electronics have to fit into tighter spaces than in conventionally powered vehicles, for example. So cable channels, normally made in PA 6 or 66, may be produced in products like DSM's Stanyl PA46, if they are positioned next to exhaust systems as they pass from the batteries to the electric motor. DSM has developed a 15% glass reinforced grade of Stanyl for this application.

There is also much demand for innovations connected with smaller IC engines. "So the classical solutions we have been developing will





**BASF's Ultramid Advanced T1000 with 35% glass fibre reinforcement shows higher chemical resistance compared to standard aliphatic PA66 polyamides when tested in contact to coolants at 135°C as well as retention of 50 % of initial strength for over 1,000 hours**



**Comparison of long-term performance of 50% glass reinforced Ultramid Advanced T1000 with PA66 under constant loads at room temperature in presence of humidity (23 °C, 50 % relative humidity). BASF says the advantage is even more pronounced at higher temperatures**

The new material is available in two versions: for use in automotive applications such as engine cooling systems, as well as applications with direct contact with food and drinking water.

Mann+Hummel already manufactures a cooling water valve for Hyundai made of Grivory HT1VA-35 HYS. The part requires not only high hydrolysis resistance at elevated temperatures, but also very good resistance against cooling agents and high dimensional stability. "A further reason for the choice of Grivory HT1VA-35 HYS is its optimised demoulding capabilities," says Ems-Grivory. "This means that the material enables use of complex mould geometry and undercuts improving the efficiency of the injection moulding process."

The company further notes that the material is also suitable for automotive electronics because the available "electro-friendly" stabilisation prevents problems with salt efflorescence and the corrosion it causes under warm and moist conditions.

Also promoting hydrolysis resistance, but in PBTs, is **A. Schulman** (now a LyondellBasell business). At Fakuma, it was talking about Schuladur A HR2, which it says provides "second generation" protection against hydrolysis. It was developed especially for under-the-hood components in electric cars, where parts face high peak temperatures and need to resist notable impact loads.

The supplier says the new material's performance is proven in the long term 85/85 test, where specimens are exposed to 85% relative humidity at 85°C in a climatic chamber. More than 80% of the mechanical performance is retained after 2,000

hours (84 days) of aging. This is combined with a CTI score of nearly 600 V.

A. Schulman also points to good flow properties. "Although the nominal melt volume rate is slightly higher than in comparable standard PBT compounds, internal injection moulding trials have proven that Schuladur A HR2 allows a 10% longer flow length when applying the same process parameter setting, combined with a very high melt stability," it says.

High-temperature polyamides have rivals in liquid crystal plastics, LCPs, in this area. At Fakuma, **Polyplastics** showed a new LCP with improved thermal resistance, for use in applications on EVs such as inverters. The new grade can take temperatures up to around 280°C, which is around 30°C higher than other types. This also makes it suitable for applications that need to withstand reflow soldering temperatures.

A new member of DSM's ForTii MX family of materials for diecast metal-replacement, ForTii MX53T, is suitable for applications requiring resistance to low as well as high temperatures – down to -35°C and up to 150°C. This grade is optimised for complex structural parts, the original ForTii MX53 has a Tg of 160°C and is used for higher temperature applications and where stiffness is key. Other PPAs based on PA6T have a Tg in an unconditioned state of around 125°C, falling to around 95°C after conditioning. The DSM product has a Tg of over 125°C after conditioning. "This means that it is suitable for applications where designers want resistance to very hot and

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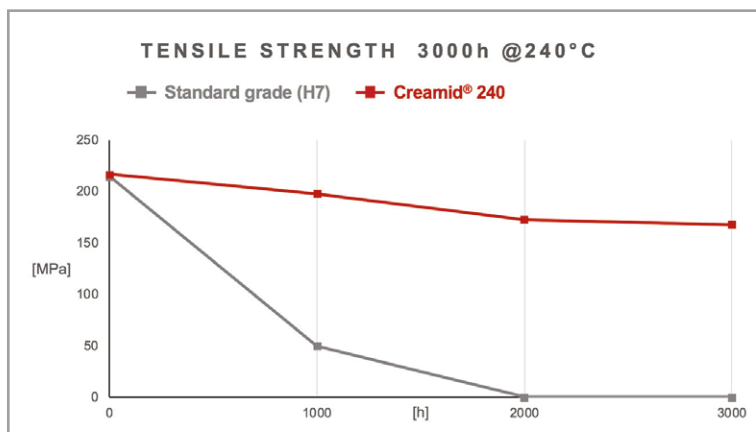
humid conditions," says d'Hooghe.

D'Hooghe also points to the potential problems of persuading specifiers who are more used to working with metals to switch to plastics. ForTii shows linear behaviour over a wide range of temperatures, so it is easier to design with, he claims.

After the market launch of a polyphthalamide 9T, Ultramid Advanced N, at K 2016, **BASF** introduced another at Fakuma: Ultramid Advanced T1000 (this takes the company's range of PPA polymers to three, since it already had Ultramid T KR, the original PA6T/6). This is actually a group of compounds based on PA 6T/6I. BASF says that within the Ultramid family, Ultramid Advanced T1000 is the product group with the highest strength and stiffness and with stable mechanical properties at temperatures of up to 120°C (dry) and up to 80°C (conditioned).

BASF says that, with its partially aromatic chemical structure, the new material offers high resistance to humidity and to aggressive media, "outperforming conventional polyamides and many other PPA materials on the market." (The company is not the first to offer a PA9T: one form of the polymer has been offered by Kuraray as Genestar for some time, mostly in Asia.)

"New materials for metal replacement are the key to developing the next generation of light-weight, high-performance components," says Abdullah Shaikh, head of BASF's global PPA team. "The demands on the materials have increased drastically in recent years, mostly because of trends such as ongoing miniaturization, higher efficiency



**Teknor Apex says Creamid grades, currently available with glass fibre content of 35, 50, or 60%, exhibit dramatically improved property retention in comparison with similarly glass-filled standard PA 66 compounds. They cost around 30% less than high-performance polyamides such as PPA and PA 46 that have comparable performance**

targets, and functional integration."

Target applications include thermostat housings and water pumps, in fuel circuits and selective catalytic reduction systems, for actuators and clutch parts in cars as well as in coffee machines, as furniture fittings, and in construction applications such as water distributors, heating systems and pumps.

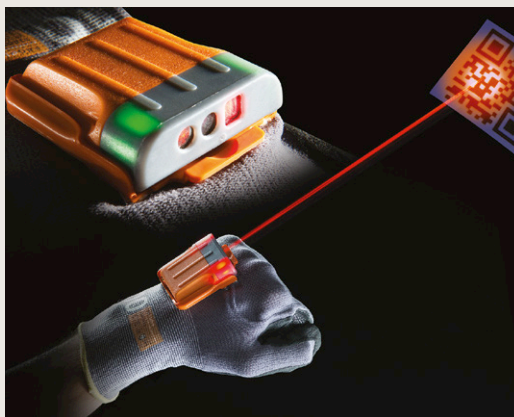
The initial portfolio consists of heat-stabilised, glass fibre-reinforced standard grades with reinforcement levels ranging from 30 to 60% for different stiffness, strength and toughness values; glass fibre-reinforced special grades with improved hydrolysis resistance with 35 or 45% glass fibre reinforcement, and a special long glass fibre-rein-

## See-through engineering materials

**BASF's** Ultramid Vision semi-transparent, semi-crystalline polyamide, first seen at Fakuma 2017, now has its first application, in a special glove for operatives in warehouses and other product handling facilities, which incorporates a scanning unit to read product codes. Ultramid Vision B3K allows light to pass through largely unhindered and impresses with its high transmission rate and low light scatter.

After injection moulding, metallic contacts are pressed into the polyamide and connected to the internal electronics. Due to the inherent toughness of Ultramid Vision, this process can be

executed without risk of stress whitening or even failure. In addition, Ultramid Vision allows a clear view of the status LEDs in the display area. As a result, workers have both hands free



and do not have to interrupt their work flow.

**Lanxess**, meanwhile, has been working on grades suitable for infrared laser transmission welding, which it says is taking on increasing importance, for example in housings around sensitive electronics, where other types of welding are less suitable. The company recently introduced a new PBT that is transparent to infrared and which is also hydrolysis resistant. This is an important accomplishment, since improvements in hydrolysis resistance normally go hand-in-hand with decreases in laser transmission.

**Below: Kärcher has used Solvay's Technyl 4earth PA 66 in a pressure washer lance**



forced, highly heat-stabilised compound for outstanding mechanical performance, especially at higher temperatures. Grades are available with different heat stabilisers.

Metal replacement may not always require PPAs though. **Teknor Apex** has developed Creamid 240, which it bills as a new series of high-heat glass-reinforced PA 66 compounds that bridge the cost-performance gap between standard heat-resistant polyamides and costly specialty polymers for automotive and other metal-replacement parts. Creamid 240 has a maximum continuous-use temperature of 240°C. Unlike most other high-temperature polyamides, it can be processed using barrel and mould temperatures in the same region as those used for regular PA66.

The compound depends on unspecified additives for its performance. Markus Krippner, Director of Sales and Marketing with Teknor Germany, points out that this is not a form of shielding technology used on other types of polyamides modified to improve their heat resistance. This means that the temperature does not have to rise to a certain point to trigger the shielding effect.

Moulding conditions are "far away" from the material's degradation temperature. The technology is valid for PA 66 reinforced with various levels of glass. Unreinforced grades show a maximum-use temperature rather lower, at around 200°C.

Teknor Apex recommends Creamid 240 compounds for automotive under-hood components such as charge air cooler end caps, air intake manifolds, quick-fit connectors, radiator end tanks, turbo air ducts and resonators, oil pump wheels, EGR valves, and thermostatic casings. Other possibilities include electronic connectors, diode carriers, and bobbins, as well as consumer products such as lamp sockets and connectors.

"While metal-replacement continues to drive demand for polyamides in the automotive market, performance-boosting technologies such as turbocharged engines and advanced transmission systems place stricter requirements for heat resistance, chemical resistance, and reduced water absorption," says Krippner. "These forces, along with the overriding industry effort to reduce vehicle weight, are driving Teknor Apex investment into new polyamide technologies."

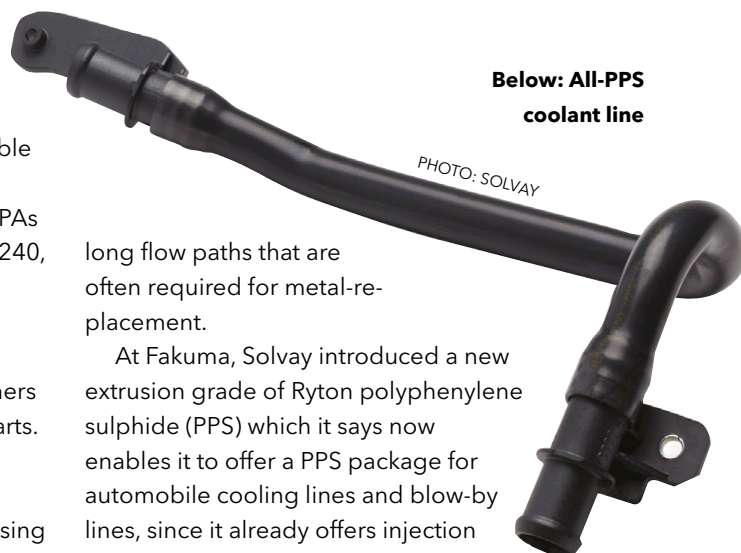
Krippner also points out that Creamid 240 compounds exhibit flow properties that readily accommodate the complex or thin-wall parts or the

long flow paths that are often required for metal-replacement.

At Fakuma, Solvay introduced a new extrusion grade of Ryton polyphenylene sulphide (PPS) which it says now enables it to offer a PPS package for automobile cooling lines and blow-by lines, since it already offers injection grades suitable for fittings on such lines. This is a family of unreinforced impact-modified grades, which unusually gives them a certain flexibility. PPS is normally offered with glass reinforcement, and as such is quite rigid and brittle.

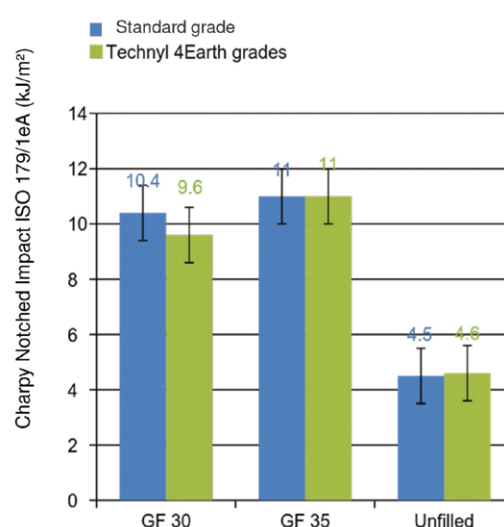
Andreas Lutz, Area Development Manager, Automotive, Europe, says the development was driven by downsizing in the engine compartment, which is leading to an increasing number of hot spots. PPS has very good resistance to high temperatures and chemical fluids. The all-PPS solution provides an alternative to combinations of long-chain polyamides with metal and elastomer components. Developed in collaboration with a European OEMs, it is now being used by several Tier Ones.

On its stand at the show, Solvay Specialty Polymers also showed an e-bike with frame and wheels all injection moulded in a 50% long glass fibre reinforced grade of its Ixef polyarylamide. Things have obviously come a long way since the



**Below: All-PPS coolant line**

PHOTO: SOLVAY



**Notched Izod impact strength of (unconditioned) Technyl 4earth and standard PA66 grades from Solvay**

short-lived Itera polypropylene pedal bike from the early 1980s (an example is now on view in the Museum of Failure in Helsingborg). The e-bike contains around 7kg of the compound, chosen for its stiffness (Ixef is the most rigid PA on the market) and a surface finish that Solvay Technical Marketing Engineer Marc Schelles says is far superior to that achievable with other glass-reinforced compounds.

## Recyclate

Solvay Performance Polyamides has secured Kärcher, the German company specialising in cleaning equipment and pressure washers, as a user for its Technyl 4earth PA 66, produced from industrial recyclate derived from offcuts during production of airbags. Kärcher, a long-standing customer of Solvay's, is using a 30% short glass reinforced grade for lances in its consumer products.

Solvay's Engineering Plastics BU Global Business Director, Gerald Durski, says the mechanical properties of the 4earth grade are the same as those of the virgin compound that Kärcher was using before. The spray lances must meet a range of demanding requirements, including high pressure resistance, hydrolytic stability, very high impact strength, printability and compatibility with cleaning agents.

Daniel Carmine Manocchio, Manager of the group Material Technology at Kärcher's Central Research and Development, says the company has manufactured more than one million high-pressure spray lances in Technyl 4earth. Kärcher is now evaluating further use of Technyl 4earth throughout its portfolio.

Technyl 4earth is available in various grades with a glass content up to 50%. Solvay says its proprietary recycling technology "ensures both consistent material quality and security of supply to meet fast-growing demand for more sustainable high-performance applications in a wide range of markets, from automotive components to electrical appliances, and consumer and industrial goods."

Compounds are made at a Solvay operation in Gorzów, Poland. Obtaining material from several sources, it starts with textile that has already been silicone-coated for the airbag application. The coating is removed, leaving a high-purity fibre. Durski says that, worldwide, possibly as much as 30,000 tonnes of waste is created in production of airbags, as circular blanks are cut from rectilinear feedstock.

For the future, says Durski, Solvay hopes it will be possible to use post-consumer scrap from airbags, of which – in recent months at least – there has been excessive quantities, thanks in part to massive



**Above: The defunct Itera PP bike**

recalls. "There are many hurdles to overcome, but it is a compelling business model," he says.

Other polyamide companies are also involved in production of materials containing recyclate using industrial textile waste. They include Celanese, via the Nilit (previously Frisetta) operation it bought some months ago; and **Domo**, whose products are based on PA6. Domo has also begun offering carbon fibre reinforced Econamid, called Econamid Air (referencing its low density).

Also new from Domo is Domamid XS, a new range of glass-reinforced PA66/6T alloys aimed at metal replacement in diverse applications. A representative cites bicycle pedals, pulleys and outboard engine covers. Grades have glass contents of 50, 60 and 65%.

Finally, there is Domamid Fly, a new PA6-based product range that incorporates aluminium silicate nano particles (added during polymerisation) rather than glass. Domo's aim was to obtain an improved HDT (193°C under 0.45MPa load for one grade) and tensile properties (3.7GPa flexural modulus) without increasing the density of the material (1.12 g/cm<sup>3</sup>). The company says the very low dosage of the nano-clay confers very good dimensional stability and absence of warpage. "Innovative technology that allows perfect exfoliation of the nano-clay in the polymer matrix has led to outstanding properties," it says.

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# Suppliers highlight alternatives to PA 66

*Companies have developed reinforced polyamide 6 compounds*

A shortage of polyamide 66, caused by global production capacity issues in adiponitrile (ADN) feedstock, is unlikely to be resolved for many months (see *Injection World* October 2018). It is not a surprise, then, that some innovative compounders are coming up with alternative solutions.

One example is **Akro-Plastic**, the producer of high-performance compounds based on various thermoplastics, which has developed Akromid B+, a family of glass reinforced blends of PA6 with a long-chain polyamide, which is said to have strength properties around the same level as PA66 (depending on temperature) with the same level of glass fibre reinforcement.

"We haven't done this before because the difference in price between PA 6 and 66 didn't make it worthwhile," says Thilo Stier, Head of Innovation and Sales. "But now it makes sense to modify PA6 in this way." A portfolio with 30 to 50% glass fibre reinforced Akromid B+ compounds is already available for sampling, a grade with 60% glass is also under development.

Akro-Plastic also offers a PA66-based material that sells for under €3/kg. Its HR66 is actually a chemically coupled blend of PA66 and polypropylene, which the company developed for improved resistance to zinc chloride. It has also found out that it is hydrolysis resistant.

At Fakuma, **Lanxess** took the wraps off a new PA6-based family of glass-reinforced compounds called Durethan Performance. They have especially good fatigue resistance. Lanxess is hoping for applications under the hood and also in furniture.

Lanxess says the different grades are several times more resistant to fatigue under pulsating

loads than standard products with the same glass fibre content. The first products in the product range are the thermally stabilised Durethan BKV30PH2.0, BKV35PH2.0, and BKV40PH2.0 compounds with glass fibre contents of 30, 35, and 40%, as well as the impact resistant modified Durethan BKV130P compound, which has 30% glass.

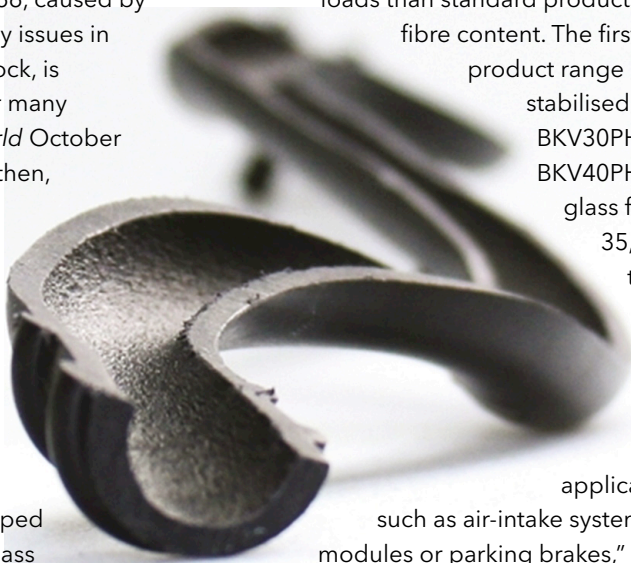
"We are targeting applications in automobiles, such as air-intake systems and oil-filter modules or parking brakes," says Thomas Linder, an expert in materials development for Durethan at Lanxess. "There is also great application potential for housing and structural components of power tools, such as drilling or grinding machines. And with regard to the furniture industry, for example, parts of furniture locking systems could be manufactured from the impact-resistant modified product type."

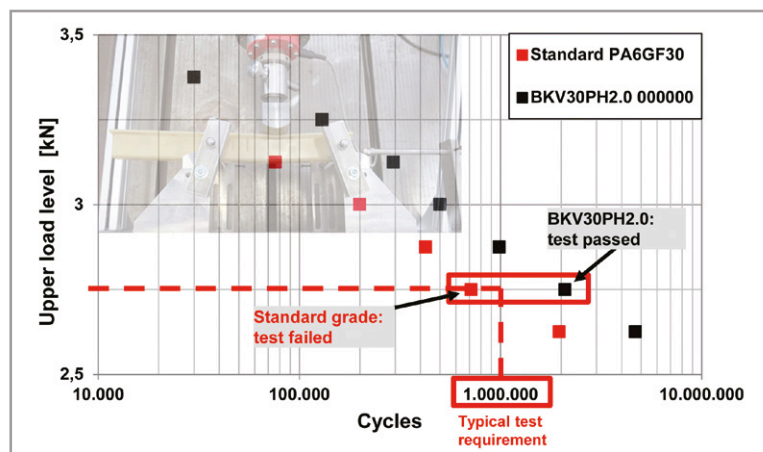
In addition to the dynamic behaviour, the static mechanical profile of the new construction materials has also been improved. For example, they offer more tensile strength at higher temperatures than standard products with the same glass fibre content.

"Its mechanical properties makes the PA6-based Durethan Performance in many cases an alternative material for PA66 compounds," says Linder, adding that any substitution can often be carried out without increasing the glass fibre content, product weight remains almost unaltered.

Lanxess has investigated the dynamic behaviour of the new compounds on a demonstrator resembling lightweight structural components. This "HiAnt" element is an injection-moulded U-shaped profile that is reinforced with ribs on the inside. Tests include three-point-bending fatigue Wöhler

**Left: Akro-Plastic has introduced Akromid B+, a family of glass reinforced blends of PA6 with a long-chain polyamide**





**Above: Tests compared Lanxess Durethan Performance compounds with standard GF-reinforced PA6**

experiments. "Durethan BKV30PH2.0 showed a service life around three times longer than a standard PA6 with 30% glass fibre reinforcement at a bending load of 2.75kN," Linder says.

Lanxess plans to further expand the family, beginning with compounds containing 50 and 60% glass, which Linder says will be particularly suitable for dynamically loaded structural components such as carriers of electrical and electronic modules in lightweight automobiles.

At Fakuma, Ralf Heinen, one of Lanxess' high

performance materials experts, said that Durethan Performance will enable it to replace PA66 in numerous applications, but it will always be difficult for PA66 to be ousted in applications that require short-term resistance to very high temperatures, simply because PA66 has a melting point that is almost 45°C higher; it also has better resistance to hot glycol found under the hood. "It may be possible to improve the glycol resistance of PA6, but it is not a simple task," says Heinen.

Lanxess offers 66 and 6 types of polyamide (Durethan A and B), although it is only "native" in PA6 polymer; it obtains PA66 through swap deals, which is quite a common feature in the polyamides world.

At DSM, Global Business Director Joost d'Hooghe reckons around 70% of parts can be made in either PA6 or 66. He says that while PA66, with its higher Tg, withstands short-term high-temperature peaks better, PA6 shows better long-term ageing. But another alternative to PA66 is DSM's EcoPaXX PA410, which d'Hooghe says can be considered like a "high-end 66" with very good hydrolysis resistance. DSM is already selling EcoPaXX for expansion tanks that were previously in PA66.

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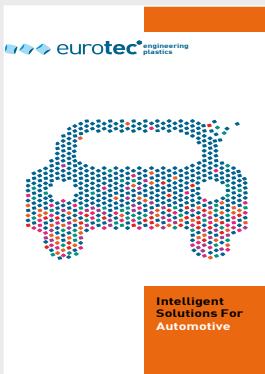
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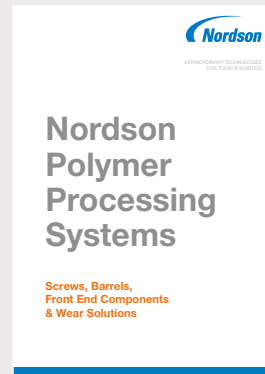
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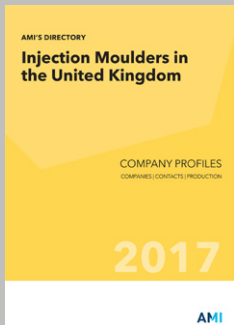
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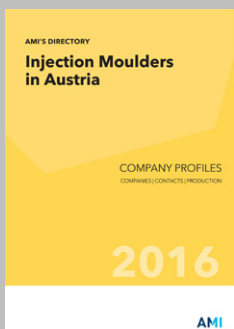
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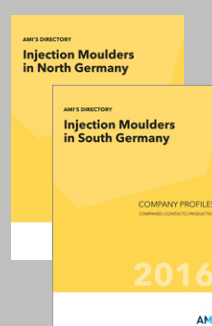
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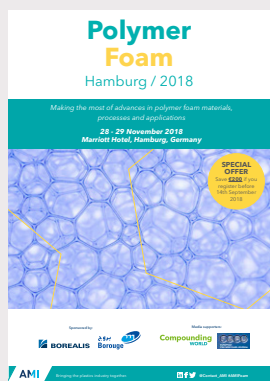
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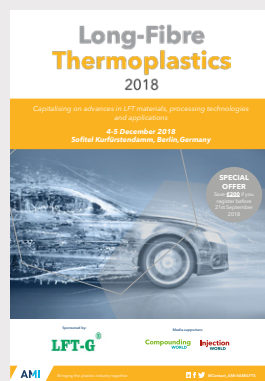
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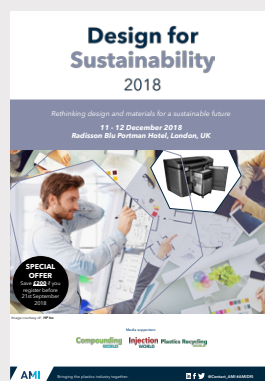
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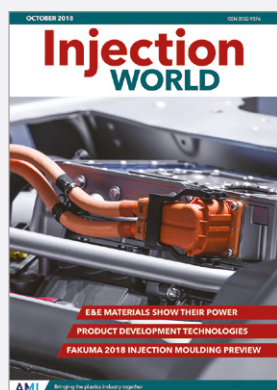
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	<b>5-7 December</b>	Plastic Japan, Chiba, Japan	<a href="http://www.plas.jp/en">www.plas.jp/en</a>
	<b>5-8 December</b>	Plast Eurasia, Istanbul, Turkey	<a href="http://www.plasteurasia.com/en">www.plasteurasia.com/en</a>
2019	<b>5-8 January</b>	ArabPlast, Dubai	<a href="http://www.arabplast.info">www.arabplast.info</a>
	<b>27-30 January</b>	Saudi Plastics & Petrochem, Jeddah	<a href="http://www.saudipp.com">www.saudipp.com</a>
	<b>29 January - 1 February</b>	Interplastica, Moscow, Russia	<a href="http://www.interplastica.de">www.interplastica.de</a>
	<b>28 February - 4 March</b>	Indiaplast, Delhi	<a href="http://www.indiaplast.org">www.indiaplast.org</a>
	<b>12-14 March</b>	JEC World, Paris, France	<a href="http://www.jecomposites.com">www.jecomposites.com</a>
	<b>12-15 March</b>	Pro-Pack Africa, Johannesburg, South Africa	<a href="http://www.propakafrika.co.za">www.propakafrika.co.za</a>
	<b>12-16 March</b>	Koplas, Goyang, Korea	<a href="http://www.koplas.com">www.koplas.com</a>
	<b>19-21 March</b>	EU Coatings Show, Nuremberg, Germany	<a href="http://www.european-coatings-show.com">www.european-coatings-show.com</a>
	<b>25-29 March</b>	Plástico Brasil, São Paulo, Brazil	<a href="http://www.plasticobrasil.com.br">www.plasticobrasil.com.br</a>
	<b>26-28 March</b>	PlastPrintPack Nigeria, Lagos	<a href="http://www.ppp-nigeria.com">www.ppp-nigeria.com</a>
	<b>28-30 March</b>	Mecspe, Parma, Italy	<a href="http://www.mecspe.com">www.mecspe.com</a>
	<b>2-5 April</b>	Plastimagen, Mexico City	<a href="http://www.plastimagen.com.mx">www.plastimagen.com.mx</a>
	<b>8-12 April</b>	Feiplastic, Sao Paulo, Brazil	<a href="http://www.feiplastic.com.br">www.feiplastic.com.br</a>
	<b>10-12 April</b>	Utech Las Americas, Mexico City	<a href="http://www.utechlasamericas.com">www.utechlasamericas.com</a>
	<b>8-9 May</b>	Compounding World Expo, Cleveland, US	<a href="http://www.compoundingworldexpo.com/na">www.compoundingworldexpo.com/na</a>
	<b>8-9 May</b>	Plastics Recycling World Expo, Cleveland, US	<a href="http://www.plasticsrecyclingworldexpo.com/na/">www.plasticsrecyclingworldexpo.com/na/</a>
	<b>8-9 May</b>	Plastics Extrusion World Expo	<a href="http://www.extrusion-expo.com/na/">www.extrusion-expo.com/na/</a>
	<b>16-23 October</b>	K 2019, Dusseldorf, Germany	<a href="http://www.k-online.com">www.k-online.com</a>


## AMI CONFERENCES

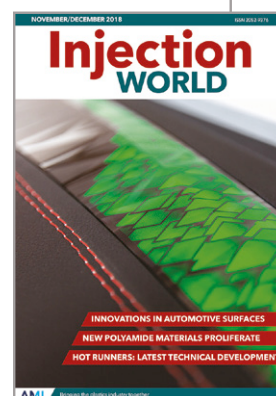
<b>28-29 November 2018</b>	Polymer Foam, Hamburg, Germany
<b>4-5 December 2018</b>	Long-Fibre Thermoplastics, Berlin, Germany
<b>11-12 December 2018</b>	Design for Sustainability, London, UK
<b>11-12 December 2018</b>	Polymers for 3D Printing, Düsseldorf, Germany
<b>11-13 December 2018</b>	Thin Wall Packaging, Cologne, Germany
<b>11-12 December 2018</b>	Plastics Regulations, Pittsburgh, US
<b>11-12 December 2018</b>	Polymers for 3D Printing, Dusseldorf, Germany
<b>29-31 January 2019</b>	Thermoplastic Concentrates, Coral Springs, US

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# Advancing Industry 4.0 in Plastics with Hydraulic Fluids

Guide prepared by Dr Robin Kent.

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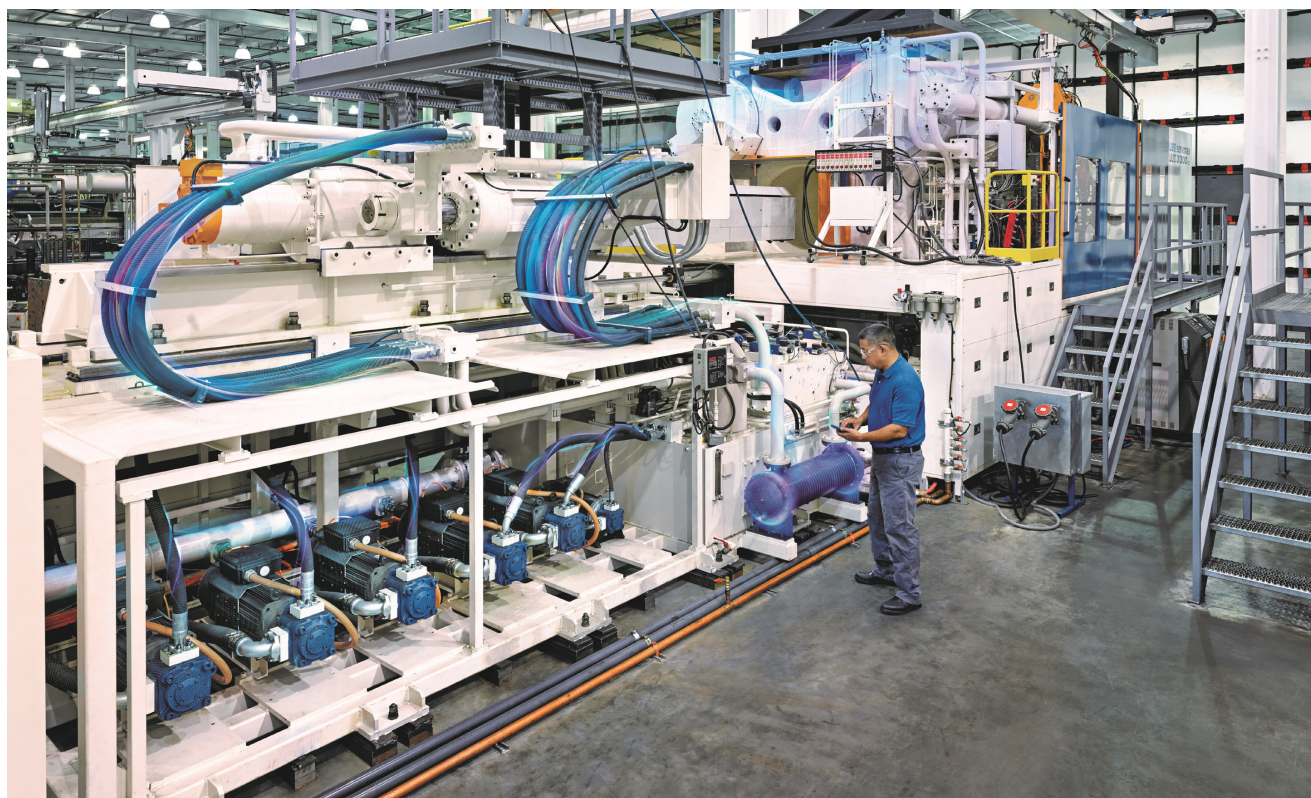
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# 1 Introduction

Opportunities for plastics processing continue to grow across a range of industries. Despite the current demonisation of plastics, there are still many advantages that plastics possess over more traditional materials. Automotive, construction, medical and many other industries are all keen to take advantage of the latest innovations in plastics processing.

However, the industry also faces challenges to profitability; plastics processing is not only highly competitive, it is also energy intensive.

Basic polymers are the largest single outlay in plastics processing and rising feedstock prices across many grades are squeezing bottom lines. With the emergence of Industry 4.0 and the smart factory, processors need to look at every opportunity to reduce their outlays and increase the overall efficiency of their operations.

High performance hydraulic fluids are one easy opportunity to improve efficiency in a range of areas.

## 1.1 Small change with a big impact

The right hydraulic fluid offers a range of benefits, from improved energy efficiency to enhanced

operational performance, which can help plastics processors reduce costs and increase productivity. This is an easy topic to overlook because the cost of hydraulic fluid is typically less than 1% of operating costs. This is made even worse if the processor has a 'fit and forget' attitude to hydraulic fluids.

This ignores the fact that the hydraulic fluid is literally the 'lifeblood' of any hydraulic injection moulding machine.

*"Lots of my business is demanding, high quality work for the automotive sector. Unfortunately, my company's overheads are squeezing my profit margin."*

Choosing a high performance fluid will not only protect the hydraulic system, it can also reduce energy use and help advance your efforts towards Industry 4.0.

A separate Energy Saving Guide for

Injection Moulders is available, which explains the steps that plastics processors can take to help reduce their energy bills and enhance plant efficiency.

## 1.2 In this guide

We will explore how to optimise your hydraulic fluid usage and make the most of the many benefits that they offer, contributing to Industry 4.0.



## 2 Changing industrial landscape

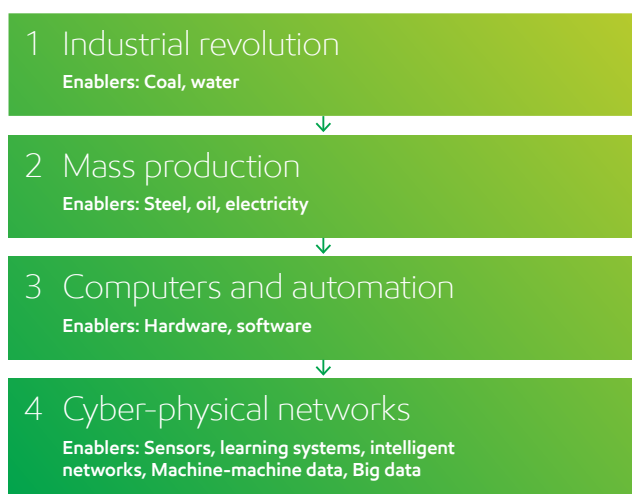
Industry 4.0 – the emergence of the ‘smart factory’ and the use of big data – is changing the manufacturing landscape. The aim of this process is to better utilise a plant’s resources by connecting the devices and analysing production data and equipment use.

### 2.1 Why care about Industry 4.0?

The smart factory, also called ‘Industrie 4.0’ from a German government project to promote the use and integration of computing in manufacturing, is claimed to be the Fourth Industrial Revolution. However, as with the others, it will be more of an evolution (see below).

Computers and machine controllers have a long

#### The Four Industrial Revolutions



history in manufacturing but the smart factory concept is bigger than this. It is about getting machines not only to talk to one another but also to communicate across the site and upwards into the organisation – all the way from the production process to business planning and logistics (and back again).

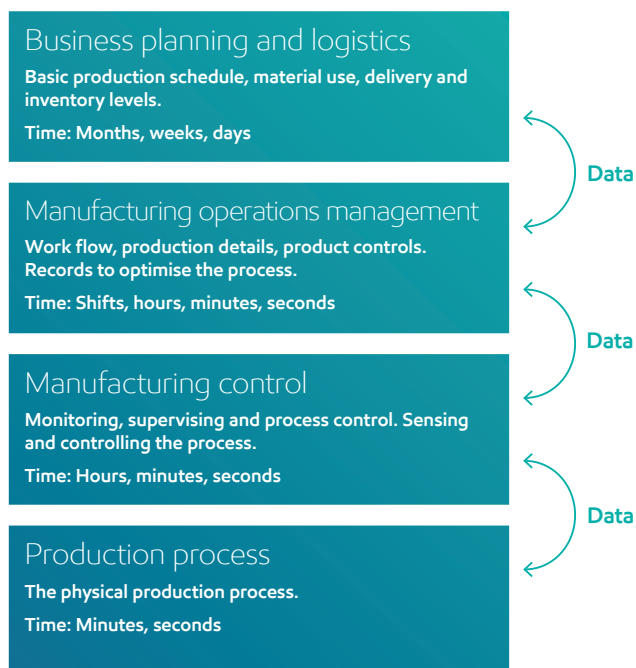
In the smart factory, these layers will all transfer data across, upwards and downwards to give greater control of the company and – hopefully – to get greater information out of what will become

Data are not the same thing as information. Data are a collection of numbers whereas information is what allows management (or machine) action to be taken

mountains of data.

In the smart factory, these layers will all transfer data across, upwards and downwards to give greater control of the company and – hopefully – to get greater information out of what will become mountains of data.

↓ **The smart factory layers** – from the process to the business and back again



The smart factory uses the same data (or parts of it) throughout these four layers of information activity in the business. It links the production process right through to the business planning and provides both data and information to all layers.

Industry 4.0 is about seamlessly collecting data from a range of sources, converting the data into actionable information and transferring it to the right place for action.

## 2.2 What role do hydraulic fluids play?

Smart factory technologies are revolutionising the way we work but machines still need to be properly protected and maintained as the physical production processes remain crucial for Industry 4.0, which requires equipment to be working at its most efficient and be available when required. A key step in ensuring this happens is the selection of hydraulic fluids. Although it is possible to save small sums of money when purchasing the 'lifeblood' of your machines, it is false economy that could easily place smart factory performance at risk.

Selecting on price rather than performance could result in reduced equipment protection and productivity; costly ramifications that outweigh the price of hydraulic fluids, which typically account for less than 1% of a plant's overall spend.

A relatively simple switch to high performance hydraulic fluids can have a big impact, helping to protect injection moulding machines and allow them to be part of Industry 4.0. Choosing advanced fluids can also help to:

- Reduce start-up times
- Cut energy consumption
- Optimise cycle times

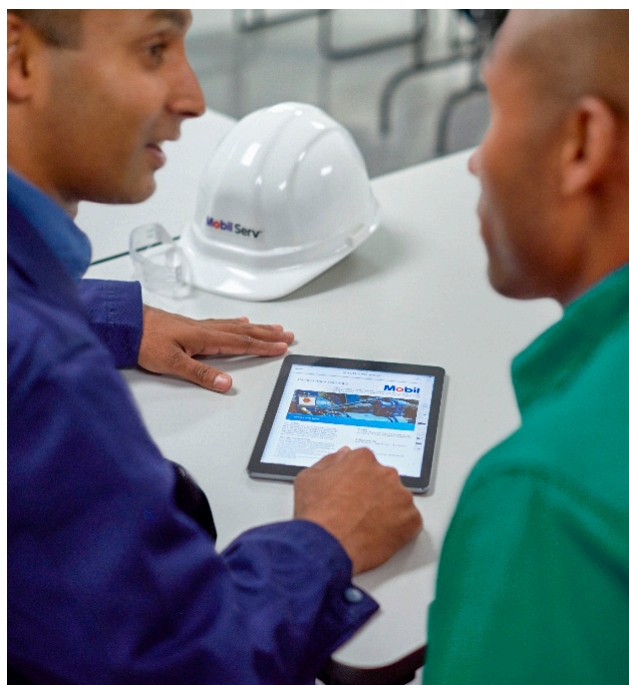
A high performance hydraulic fluid can additionally reduce system deposits, cutting machine maintenance and extending component life. Those formulated to provide thermal stability and resist oxidation can also extend fluid life, even under harsh operating conditions.

## 2.3 Sustainability

The benefits of high performance fluids are not limited to enabling the smart factory and improving operations. The importance of environmental and energy management is growing rapidly and nobody can have failed to notice the increasing frequency of criticism of the plastics processing industry. As an industry we need to prove that we are doing the best we can to reduce our environmental impact at both the input (raw materials and energy) and output phases (product and process waste disposal).

High performance hydraulic fluids that are maintained correctly will have a longer operating life, which reduces oil consumption and waste oil disposal. When the oil finally reaches the end-of-life phase and must be disposed of, then high performance oils can be formulated to have a reduced environmental impact.

The use of high performance hydraulic fluids means we can reduce energy use to help meet ISO 50001 (Energy Management Systems) and reduce environmental impact to help meet ISO 14001 (Environmental Management Systems).



## 3 Hydraulic fluid fundamentals

The lifeblood of an injection moulding machine is its hydraulic fluid. Its purpose is more complex than a simple lubricant; its main function is to transmit power from the hydraulic pump to provide the essential machinery movement. This means that hydraulic fluids need to possess very different characteristics to lubricants. The formulation of hydraulic fluids has improved significantly in recent years, especially when it comes to viscosity.

### 3.1 Viscosity

Viscosity is the resistance of a fluid to deformation by shear or tensile stress. What that really means is that it is a measure of the 'thickness' of the fluid – the higher the viscosity then the 'thicker' the fluid. For example:

- High-viscosity fluids are 'thick' fluids, e.g., honey.
- Low-viscosity fluids are 'thin' fluids, e.g., water.

The original VI scale ranged from 0 to a maximum of 100 but the introduction of new synthetic fluids and VIs means that the scale now goes as high as 400.

Viscosity can be expressed in several different ways (dynamic, kinematic and bulk) but for hydraulic fluids the most important viscosity measurement is the 'kinematic viscosity', which is the ratio of the dynamic viscosity to the density of the fluid. For most fluids, and particularly for hydraulic fluids, viscosity decreases with increasing fluid temperature, i.e., the fluid will get thinner and flow more easily as it gets hotter.

In order to maintain the peak performance of a hydraulic injection moulding machine it is essential that the hydraulic fluid is at the optimum viscosity. If the temperature of the hydraulic fluid is not consistent then the viscosity will change and the machine will not be stable. This is why a consistent and controlled fluid temperature is important in injection moulding.

However, the viscosity of a hydraulic fluid will also change over time as the fluid molecules break down in service. Some oils are more prone to this than others so always check performance characteristics.

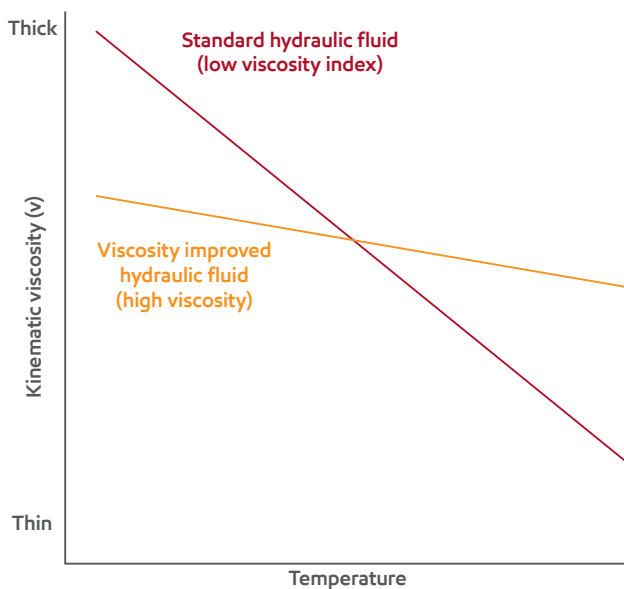


### 3.2 Viscosity index (VI)

The potential for a fluid's viscosity to vary as a result of a change in temperature is expressed using the viscosity index (VI). This measure was devised by the Society of Automotive Engineers (SAE) for lubricating oils but also applies to hydraulic fluids:

- A low VI means a high change in viscosity with temperature.
- A high VI means a low change in viscosity with temperature.

This is important for hydraulic oils because a high VI fluid will maintain its viscosity better when temperatures rise (see diagram). An injection moulding machine using a high VI oil will be able to maintain a more consistent operation if hydraulic fluid temperatures rise. It will also be able to start production faster because the oil reaches the required viscosity faster and is easier to pump at low temperatures. Just as importantly, the oil will retain its ability to lubricate moving parts at high temperatures, helping reduce wear-related maintenance.



#### **The change in viscosity of a hydraulic fluid with temperature.**

The viscosity of hydraulic fluids decreases as temperature increases. Viscosity improvers reduce the amount of change with temperature. This means decreased losses at low temperatures and better wear protection at high temperatures.

### 3.3 Viscosity index improvers

The VI of a hydraulic fluid can be improved by the use of VI improvers. These are typically high-molecular-weight polymers that are added to a base hydraulic fluid that expand or contract with temperature. These polymers minimise the effect of temperature on the viscosity:

- At high temperatures, the polymer additive expands and increases the viscosity of the fluid.
- At low temperatures, the polymer additive contracts and the viscosity of the fluid is determined by the viscosity of the base oil.

VI improvers increase the VI of the hydraulic fluid to give a consistent and optimised viscosity across a wide temperature range. This is vital for hydraulic injection moulding machines because any decrease in hydraulic fluid viscosity will result in a reduction in pump efficiency and increased energy consumption.



## 4 Hydraulic fluid benefits

It is easy to forget about the importance of hydraulic fluids as they operate out of sight. However, their role in injection moulding machines is vital – that's why plastics processors should take time to understand the benefits of switching to a high performance formulation. Making an informed choice of hydraulic fluid can improve efficiency, save money and boost cycle times – further advancing your operation to Industry 4.0.

### 4.1 Cold start

Identifying efficiencies in your plant can reveal some surprising areas for improvement. Even established practices, such as start-up times for injection moulding machines, present opportunities for change.

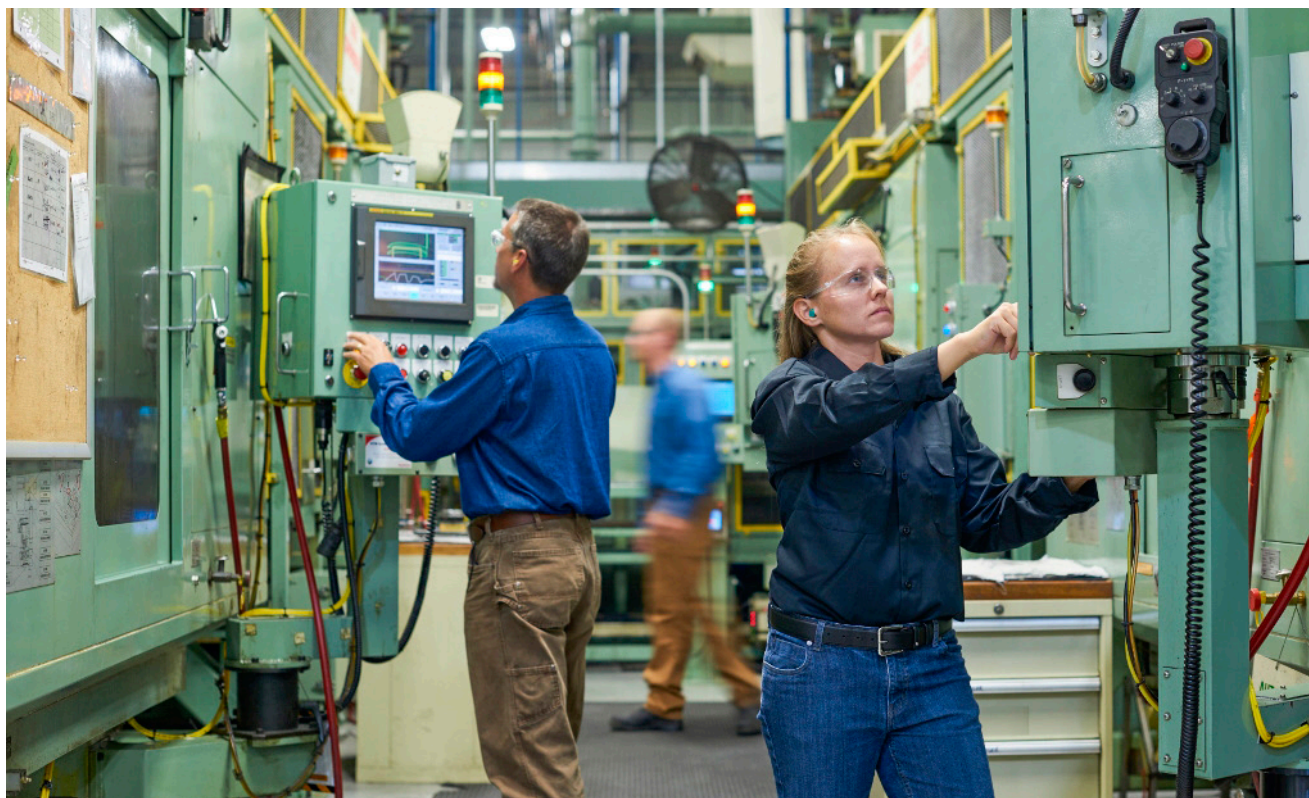
A manufacturer of plastic components for the automotive industry switched its injection moulding machines to Mobil DTE 10 Excel™ 46 hydraulic fluid. The high performance fluid's enhanced viscosity index (VI) cut the need to pre-warm it at equipment start-up, while its formulation reduced friction. These features resulted in average energy savings of 3.7%.

To start an injection moulding machine, the hydraulic fluid must be heated to  $\approx 50^{\circ}\text{C}$  to ensure it has the correct viscosity to properly flow and protect components. This is why sites spend hours and a great deal of energy getting the fluid up to the right temperature.

Many processors heat the hydraulic fluid by pumping it around the machine (rather than using external heaters or a heat source within the fluid tank). This process takes around two hours and costs  $\approx \text{€}10\text{--}15$  per machine in electricity. Hydraulic injection moulding machines use  $\approx 75\%$  of their operating energy when idling with no platen movement.

Using a high performance lubricant with a high viscosity index enables operators to start their





machine sooner, as the fluid achieves the required viscosity at a lower temperature.

Some plants run their machines 24/7 but many shut down for the weekend. This means that every week a single machine is costing at least €15 to start up. For a factory with 20 machines, that is a cost of €15,600 a year.

Using hydraulic fluids with a high viscosity index can help reduce costs and improve a plant's environmental impact by:

- Reducing start-up times, making moulding machines more productive
- Cutting the energy consumption needed to get a moulding machine into production

## 4.2 Energy savings

Changes in hydraulic fluid viscosity can directly affect the energy consumption of an injection moulding machine. This is because any decrease in viscosity will result in an equivalent reduction in hydraulic pump efficiency, which increases energy use.

The energy savings reported from using high VI hydraulic fluids are typically in the range 4-10% of the energy used by the hydraulic pump. These

savings will vary depending on machine, the application and other factors. Sites are advised to verify the savings through controlled trials.

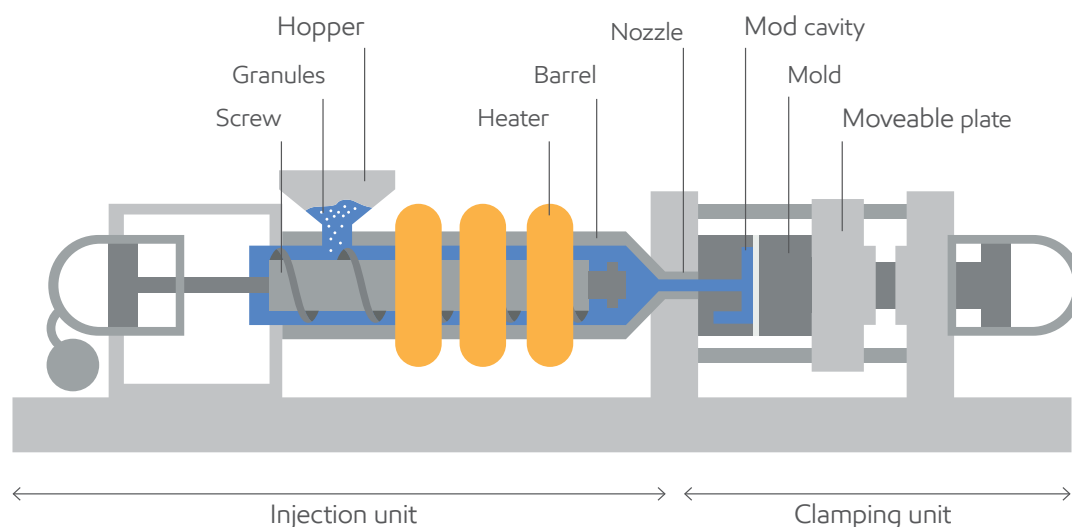
Energy savings of up to 6% through a change in hydraulic fluid are too good to ignore. Sites using hydraulic injection moulding machines are therefore strongly advised to examine their hydraulic fluid and to use fluids containing VI improvers wherever possible. The changeover can be part of a planned maintenance programme to improve energy efficiency.

However, it's not all about processing equipment. Companies should also look at their plant's 'energy fingerprint' to identify savings in other potential areas, including cooling, compressed air etc.

## 4.3 Cycle times

Optimising a plastics processing plant is all about fine details. Cycle times can already be as low as 2-3 seconds, depending on what's being made. However, enhancing plant operations can help enhance cycle times, improving productivity and a plant's bottom line.

Using a hydraulic fluid with a high, consistent viscosity will raise the volumetric efficiency of the



pump, which can improve the system response time. This has the potential to reduce cycle times for high-speed injection moulding machines where the system response time is the limiting factor.

#### 4.4 Noise

The use of a high viscosity hydraulic fluid can also reduce noise levels in an injection moulding site. The new fluids suffer from less cavitation and this is one of the main causes of high noise levels in hydraulic injection moulding machines.

#### 4.5 Energy performance

ExxonMobil's Mobil DTE 10 Excel™ Series hydraulic fluids can provide up to 6% efficiency gain in hydraulic pump performance, compared with conventional Mobil-branded hydraulic fluids when tested in standard hydraulic applications under controlled conditions.

The fluids are also specifically designed to offer high performance, anti-wear protection for modern industrial equipment, including injection moulding machines.



# 5 Switching hydraulic fluids

Once you've identified the most suitable hydraulic fluid you'll need to drain out the existing fluid in order to make the upgrade. The process is quite straightforward from an operational perspective but there are important steps to follow to help make the switch seamless.

## 5.1 Compatibility

Before switching your injection moulding machines to a high performance hydraulic fluid it is first necessary to ensure that it is compatible with the fluid it is replacing. Co-mingling incompatible fluids can result in a detrimental loss of functionality that can reduce equipment performance and ultimately result in costly and avoidable maintenance.

Testing can be organised via your lubricant supplier using a service such as ExxonMobil's Mobil Serv Lubricant Analysis (MLSA), part of the Mobil Serv suite of test options. If the results reveal a compatibility issue it will be necessary to completely drain the old hydraulic fluid from your equipment before refilling.

## 5.2 Best practice

Even if no issues are spotted it is still good practice to fully remove the old fluid so as to ensure the new one is not diluted, which could result in a reduction of overall hydraulic performance.

ExxonMobil helped Kotronis Plastics make an annual saving of more than €17,000 by switching its 40 Sumitomo Demag EI-Exis SP 250 injection moulding machines to Mobil DTE™ 10 Excel 68 hydraulic oil. The move helped cut energy consumption by 2.23%, safely extend oil drain intervals beyond 20,000 operating hours and reduce cycle times.<sup>1</sup>

Once drained it is advisable to flush the system to remove any build-up of sediment. Having refilled the tank, it should be left to settle before switching on as there is a risk that any remaining residues could be disturbed. This is especially important for older machines.

In order to minimise disruption to plant processes it is advisable to switch hydraulic fluids during scheduled maintenance periods.

Compatibility is dependent on a fluid's chemistry and particularly its additive package. To help reduce potential risks, seeking professional advice is key.



# 6 Used oil analysis

Industry 4.0 focuses on making the most of available technologies. Predictive maintenance, in particular, is already starting to transform a range of industrial processes including used fluid analysis.

If hydraulic fluid is the lifeblood of an injection moulding machine then used fluid analysis is the blood test. Properly implemented, it can help spot potentially damaging issues before they become a problem – not only in the fluid but in the machine itself.

ExxonMobil's next generation Mobil Serv<sup>SM</sup> Lubricant Analysis (MSLA) takes this process to the next level, helping plastics processors avoid unscheduled downtime while improving productivity and equipment life.

MSLA offers a range of automated features, including scan-and-go technology and a 24/7 cloud-based platform. Taken together these can enhance predictive maintenance by providing bespoke machinery insights when and where they're needed from any device. Benefits include a cloud-based mobile app, which enables users to access the information they need, when they need it, and pre-labelled sample bottle to reduce time-consuming paperwork.

The service also offers a wide range of testing options, including ones for hydraulic systems and gears, meaning that plastics processors can choose the right test package for their specific needs.

ExxonMobil continues to work closely with Original Equipment Manufacturers (OEMs) to ensure that its customers have access to the best possible lubricant solutions. Selecting high performance oils and greases, in combination with next generation used oil analysis, can help plastics processors remain competitive.

*Used oil analysis is a vital 'blood test' for your equipment, helping spot issues before they become problems.* →

## 6.1 Protecting your fluid

In addition to switching to high quality hydraulic fluid, sites should also look at maintaining the fluids that are in use. Fluid breakdown occurs as a result of high temperatures, high pressures and shear stresses. These will reduce a fluid's viscosity, decreasing its protective properties and therefore increasing the risk of avoidable maintenance. A used oil analysis service will help spot oil degradation before it becomes an issue. ExxonMobil's used oil analysis service is part of its comprehensive suite of Mobil Serv services, which includes a wide range of offerings that can help operators further optimise their plants. For example, filtration analysis, contamination control and fluid system maintenance are among the additional services best suited for injection moulders.

To deliver the best solution for your business, ExxonMobil's Field Engineering Services (FES) team of industry specialists design tailor-made lubrication solutions that combine the right products and services to suit individual operator needs.



## 7 Conclusion

Plastics processing continues to be a highly competitive industry. It is also a sector experiencing inexorable change. Next generation technologies are accelerating the rate of automation, which is enhancing productivity and improving market responsiveness. These developments, in combination with the latest digital tools, are forging Industry 4.0 – the next step in manufacturing.

High performance hydraulic fluids play an important role in this revolution, ensuring that your plastics processing equipment is operating at its optimal level, when and where you need it. By combining outstanding fluid performance with a predictive maintenance programme plastics processors can help ensure that they maximise productivity and protect their bottom line. The plastics industry is getting ever more vigorous

in its performance – choosing the best possible ‘lifeblood’ and proactively monitoring its health is therefore an essential part of every processor’s daily operations.

While hydraulic fluids typically account for less than 1% of a plant’s overall spend, choosing a high performance product, backed by the right expertise and maintenance programme, can make a big difference.



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## **Additional resources:**

- Energy Saving Guide for Injection Moulders
- [www.mobil.com](http://www.mobil.com)
- Technical Helpdesk Email - THD@exxonmobil.com

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