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Injection WORLD



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MANAGING MATERIALS FROM MICRO TO MACRO



2019 MACHINERY GUIDE FOR MOULDERS



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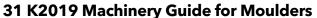
Injection WORLD

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New electro-mobility applications are making increasing demands on plastics for electrical and electronic components. Mark Holmes finds that new resins and compounds for the injection moulder are meeting this challenge





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Electrolux restructures and invests

Sweden's Electrolux Group has announced plans to outsource parts of its current manufacturing in Hungary and invest in its refrigerator plant in Nyíregyháza, as part of a series of wider efficiency measures. This will lead to restructuring charges of about SEK 1.6bn, which will be taken in its Q3 accounts.

As part of an ongoing SEK 8bn programme of spending on manufacturing, Electrolux has decided to invest some €100m in automation, digitalisation and innovation capabilities for high-end refrigerators at Nyíregyháza. It will outsource the production of vacuum cleaners and a "significant part" of freestanding refrigerators from its other Hungarian site at Jászberény, at a cost of some 800 jobs.



Above: Electrolux will outsource the production of vacuum cleaners it currently makes in Hungary

The company has also "identified opportunities to improve efficiency in both the consumer and professional organisations". This follows on from a decision taken on 31 January to spin off its Professional Products business area as a separate company, and to create four regionally focused businesses, plus a reshaped consumer group.

The resulting redundancies should lead to about 875 job cuts in non-production positions. Like the cuts in Hungary, this is all subject to consultations with unions. "The activities will more than offset increased ongoing costs related to the separation of Professional Products and result in a more streamlined setup for the consumer business," Electrolux said.

> www.electroluxgroup.com

Grenadier to be built in Wales

Ineos Automotive has announced that its "stripped back, utilitarian" 4x4 vehicle, which is the personal vision of CEO Jim Ratcliffe, will be manufactured in a dedicated facility at Bridgend, UK. This will create 200 jobs at first and up to 500 in the long term. Production is due to start in 2021.

The car will be called the Grenadier after the pub where the idea was conceived. The company will also be investing in a sub-assembly plant in Estarreja, Portugal, to produce the body and chassis in conjunction with supply chain partners.

> www.ineos.com

Automotive first for BASF Vision

BASF's semi-crystalline PA Ultramid Vision has been used in a car interior for the first time, in the window regulator module of an unnamed German OEM. As well as high resistance to UV, temperature, scratching and chemicals, this material is claimed to display very high light transmission with low light scattering compared to opaque standard PAs.

Ultramid Vision was selected, according to Dr Rainer Xalter, product developer in BASF's Performance Materials division, for good adhesion to the glass fibre-reinforced switch housing and homogeneous light transmittance, among other things. French interior specialist Valeo, which developed the part, said that another key advantage over amorphous, transparent materials is that it can be repeatedly exposed to aggressive media like sun cream, thus making it suitable for backlit switches and buttons.

> www.basf.com



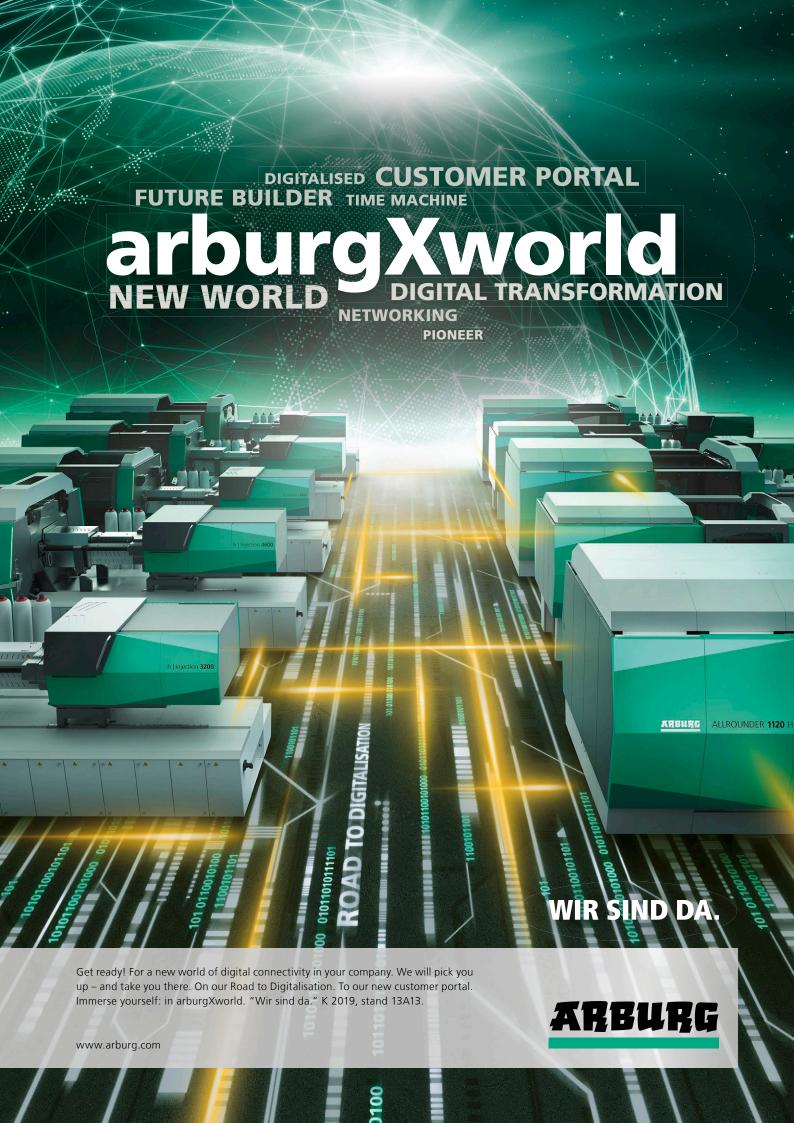
LyondellBasell boosts Knapsack PP plant

LyondellBasell has started up a fifth production line at its site at Knapsack in Germany, adding 25,000 tonnes/yr of new capacity taking the total to more than 200,000 tonnes.

The move is the latest in a series of debottlenecking and investment projects across its European operations. It makes the Knapsack site the world's largest PP compounding facility, according to the company.

The company said it expected demand for its lightweight polymer compounds to grow in automotive for both conventionally-powered vehicles, where they can contribute to reduced CO2 emissions, and in the coming generation of electric vehicles.

> www.lyondellbasell.com



Ford/Roechling share insight at LFTs 2019

Engineers from Ford and Roechling will detail the development of the company's D-LFT MegaBox multi-functional luggage compartment - which will be launched on the upcoming Puma car - at AMI's Long-Fibre Thermomplastics conference in Dusseldorf in Germany in December.

The MultiBox is the first composite multi-functional luggage compartment box to be put into a series production vehicle by Ford. Manufactured using compression insert moulding by Roeching Automotive, the part glues to the rear vehicle floor and can be purposed to hold luggage, spare wheel or Li-lon battery



Ford's D-LFT MultiBox luggage compartment system will be detailed at Long-Fibre Thermoplastics 2019

according to the specific vehicle specification.

The thinking, development and production of this novel component will be explained by Meltem Öztürk and Egemen Erbil from Ford Otosan in Turkey, Matthias Hellriegel from Ford in Germany, and Egon Moos from Roechlilng Automotive, in Germany.

Attendees at AMI's third Long-Fibre Thermoplastics conference, which takes place on 4-5 December 2019, will also hear from material and technology experts from LFT specialists including Borealis, Celanese, Fraunhofer, Lotte Chemical, SABIC, SKYI Composites and Xiamen LFT Composite.

To find out more about the programme and to book a place, download the conference brochure: bit.ly/LFTs2019.

Italian machine sales slow

Amaplast, the Italian plastics machinery association, released mid-year figures showing that the country's trade in plastics machinery continued to decline in H1, albeit at a slower rate in Q2 than Q1.

Overall, the association said imports were 17% down on H1 2018, while exports were 5% down. There was a very slight improvement in the balance of trade.

The decline is mainly the result of a slump in trade with Germany, which is Italy's largest biggest import and export partner for plastics machinery. Imports and exports fell by 26% and 33% respectively, Amaplast said.

Most other European national markets were also down for Italian exporters, as was South America. North America was slightly up but by far the strongest markets were in the Far East and Middle East, with China showing a 39% increase, Thailand 55% and Indonesia more than doubling albeit from a low base.

Looking ahead, the association predicts ongoing weakness in the plastics market. "Overall, there is concern for the tendency towards a postponement or reduction in orders by customers," the association said.

) www.amaplast.org

Engel and HB-Therm to intensify co-operation

Austrian injection moulding machinery giant Engel has announced it "will be further intensifying its co-operation" with HB-Therm, which is based at St Gallen, Switzerland, and which manufactures the Engel-branded E-Temp temperature control units.

As well as further development of E-Temp, the companies will focus on improved energy efficiency and further digitalisation and networking of the temperature control process. This came as Engel revealed that more than 1,000 E-Temps have been

Right: Engel's new XL variant of the E-Temp temperature control units which has higher pump capacity

installed in injection moulding machines to date.

Inter-system communication is another critical area of focus and the two firms have jointly promoted the Euromap 82.1 recommendation for temperature control units, which was released at the beginning of 2019. They will continue to work to establish OPC UA as the communication standard in the plastics industry.

Engel added that it has



been devoting special attention to mould temperature in its development work for years, saying this has a significant influence on the efficiency and quality of the injection moulding process. It has worked on electronic temperature control water manifold systems and flow control software.

) www.engelglobal.com



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Lanxess opens China ETP plant

Lanxess has officially inaugurated its new €20m compounding facility at Changzhou in China. The facility produces the company's Durethan and Pocan high-tech compounds, which are used mainly in the automotive, electrical and electronics sectors.

"This facility was built to address several strategically vital markets," said Hubert Fink, Member of the Lanxess Board, at the opening ceremony. "In the automotive industry, lightweight materials become ever more important in new mobility. At the same time, the electrical and electronics sector sees an increasing need for best-in-class flame



The €20m Lanxess compounding operation at Changzhou in China

retardant, easy flow and easily processable grades."

The new facility is part of the company's High Performance Materials business unit, which operates a global compounding network with sites at at Brion, Dormagen, Krefeld-Uerdingen and Hamm-Uentrop in Germany, Antwerp in Belgium, Gastonia in the US, Porto Feliz in Brazil, Jhagadia in India, and Changzhou and Wuxi in China.

> www.lanxess.com

Ypsomed expands HQ site

Medical device manufacturer Ypsomed has opened new and renovated buildings at its headquarters in Burgdorf, Switzerland. It has modernised and expanded both the tool shop and the laboratory, while creating 100 more office workstations and rooms for training courses and workshops.

The investment follows on from the expansion of insulin pen production in Solothurn in April, which involved relocating 110 workplaces from Burgdorf, and the recent opening of a new plant for injection and infusion systems at Schwerin, north-eastern Germany.

Employment at Burgdorf will rise to about 600 people by end-2020.

> www.ypsomed.com

Executives on the move in Germany machinery firms

Injection moulding machinery manufacturer Wittmann Battenfeld Germany has announced that Andreas Schramm and Michael Tolz will succeed Klaus Ehlig as joint managing directors. Schramm will work alongside Ehlig until his retirement at the end of the year, after 53 years with the company. Tolz will then take up his new position on 1 January 2020. Schramm will also be management spokesman for the firm.

Schramm studied mechanical engineering at TU Dresden and worked for many years at Sumitomo (SHI) Demag Plastics Machinery in Schwaig, ultimately rising to the role of chief technology officer. Tolz, meanwhile, has been with Wittmann Battenfeld since 2011 as CTO and plant manager of the Nuremberg facility. Their key



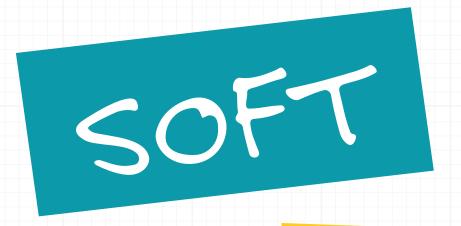
Above: Andreas Schramm (centre) and Michael Tolz (right) are succeeding Klaus Ehlig (left) as joint managing directors of Wittmann Battenfeld Germany

areas of experience are injection moulding technology and automation technology respectively.

Moving in the opposite direction from Schramm, and taking up a different job function, is Siegfried Köhler, who has joined Sumitomo (SHI) Demag from Wittmann Battenfeld to be its group chief sales officer with effect from 1 October.

Köhler is said to have expertise in both injection moulding and peripheral manufacturing equipment. He had previously worked with Italian and Austrian companies.

- > www.wittmann-group.com
- > www.sumitomo-shi-demag.eu



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Two more Tepex lines

Lanxess subsidiary Bond-Laminates has commissioned two new production lines for Tepex continuous-fibrereinforced thermoplastic composites at its site in Brilon, Germany, increasing capacity by 50%. It said the "mid single-digit millions" investment included a new 1,500 m² hall, plus three cutting machines and a fourhead waterjet cutting machine for prefabricating component cuts.

The investment was made to address strong demand for mass production of highly stressable components, the firm said. Automotive applications include lightweight structural components, such as front-end and bumper brackets, brake pedals and underbody panelling components. Tepex is also used in consumer electronics, sports equipment, body protectors and helmets.

> www.lanxess.com

Berlin Packaging buys firms in Netherlands

Berlin Packaging, which claims to be the world's largest full-service supplier of glass, plastic and metal containers and closures, has acquired two firms located at Utrecht, Netherlands: Vincap and Adolfse Packaging. The deal has closed and integration planning is already underway.

Vincap and Adolfse are active in the manufacture of plastic, cork, and metal closures and plastic packaging for the food and beverage and pharmaceutical markets in Northern Europe, particularly the Benelux countries.
Both will be integrated into
the Milan-based Bruni Glass
subsidiary, which is said to be
the largest packaging
distributor in Europe.

These two firms represent the tenth acquisition by US-based Berlin Packaging



since 2010 and the fourth in Europe since 2016. Berlin turns over \$2.6bn per year, supplying rigid packaging products and services to the food and beverage, wine and spirits, pharmaceutical and nutraceutical, personal care, household care and industrial sectors worldwide. As well as its operations in five European countries, it has others in China and South Africa.

> www.berlinpackaging.com

Left: Vincap and Adolfse
Packaging produce closures
in plastics, metal and cork

Covestro upgrades R&D network

Covestro has announced that its Innovation Centre Japan (ICJ) is now ready and equipped to carry out R&D on materials, focusing mainly on the automotive and construction markets. "The laboratory upgrade will further increase the prototype capabilities to create innovative solutions for Japanese industrial partners and customers," the

company said.

Key features in the lab include a high performance PUR R&D installation with power-assist devices to prototype larger PUR panels, a two-component injection moulding installation and the DirectCoating and DirectSkinning technologies. There is also a customer experience centre to facilitate innovation work

with customers.

The ICJ was originally part of the technical division of the Sumika Covestro Urethane joint venture, covering the Polyurethanes, Coating, Adhesive & Specialties and Polycarbonates business units. Since 2009, it has been part of Covestro's global R&D network.

> www.covestro.com

Toyoda Gosei invests in Tryeting Al firm

Toyoda Gosei of Japan has invested about ¥50m (\$460,000) in Tryeting for the rapid development of materials using artificial intelligence (AI). Tryeting is a Nagoya University start-up in AI, whose key strengths include materials informatics, which can be used to accelerate the development of new materials.

The company will combine this technology with its own expertise in materials design. Among the key areas of focus will be light detection and ranging, a sensing method that measures distance and direction by the time it takes emitted infrared laser light to reflect off an object and return.

Toyoda Gosei said that it is seeking

to achieve greater added value of products with the integration of sensors and other electronic components into the plastic and rubber parts that are its core technologies. It regards the development of materials that can accommodate electronic technology as "an urgent task".

> www.toyoda-gosei.com



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New majority investor for Stork

Injection moulding machine maker Stork
Plastics Machinery is set to get a new owner as Hydratec Industries reaches an agreement with current owner Wadinko to take a 75% interest.

Stork, which specialises in high-speed machines mainly for packaging, employs approximately150 people at its facilities in Hengelo, Netherlands and Meinerzhagen, Germany.

The investment from Hydratec alongside existing shareholder Wadinko will support the continued growth and development of Stork IMM's business, said Stork. Netherlands-based



machines are designed for thin-wall packaging

Hydratec owns businesses in various industries, such as agri/food, automotive and health technology. In plastics, it owns injection moulding companies Helvoet and Timmerije. Stork said Hydratec is also set to take a 75% interest in plastic pipe extrusion machinery company

Rollepaal Holding.

Bart Aangenendt, CEO at Hydratec, said: ""This plan dovetails very well with Hydratec Industries' growth ambitions. Both these machinery manufacturers have many years of experience and are true specialists in their niche markets. This constitutes a major expansion of Hydratec Industries' systems activities."

Oscar de Gruijter, CEO at Stork IMM, said "Hydratec is a recognised technology leader in all its activities and the industry leading solutions offered by Stork IMM fit perfectly with this strategy. The acquisition by Hydratec, and the continued support of Wadinko, heralds an exciting next

Stork IMM will continue to operate as an independent company and will retain its current brand and company logo.

> www.storkimm.com

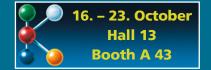
chapter in the 50-year

history of Stork IMM."



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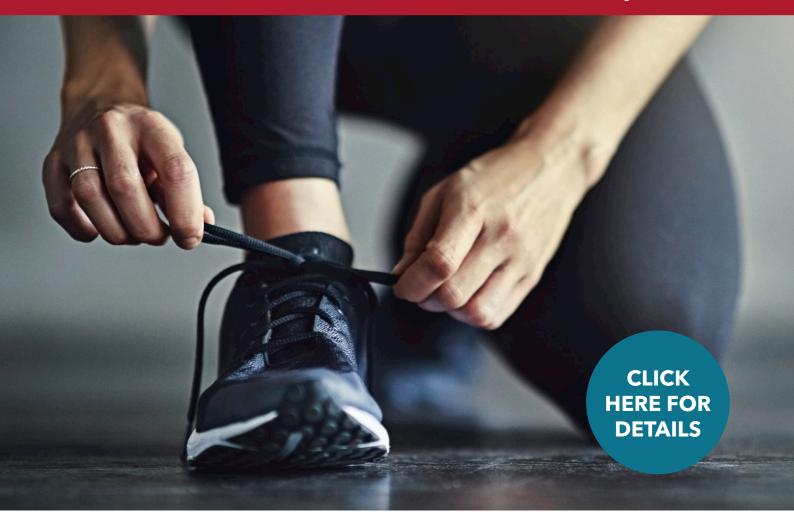
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Nanogate working on \$100m order

Germany's Nanogate has begun serial production and delivery for the largest order in its history. The Göttelborn-based company's order base for the years 2019-21 now stands at over €600m, according to CEO Ralf Zastrau.

Nanogate makes multifunctional components and surfaces and made a breakthrough into metallised plastics as replacements for stainless steel last year. It uses an in-house technology based on moulding processes and multifunctional enhancement to metallise a heat-resistant plastic with a stainless-steel appearance for applications in kitchen appliances.

In addition, Nanogate has won a further order from the same customer with a cumulative volume of \$50m from 2020 to 2027. This is based on another company technology platform called N-Glaze, which creates enhanced plastic surfaces of high optical quality in various colours, also for use in kitchen appliances.

> www.nanogate.de

Evco Plastics breaks ground at US plant

Custom plastics manufacturer Evco Plastics has broken ground on a 2,880 m² expansion to its facility at Oshkosh, Wisconsin, US. This will be dedicated to large part moulding across many industries and applications, notably what plant manager Mike Grobe called "highly cosmetic body panels in engineering-grade resins".

The expansion will include 2,500 and 3,500-tonne machines, plus associated dryers, portable chillers and other auxiliary equipment. Space will also be available for two more largetonnage machines.

The remaining space will be used to add warehouse storage for moulds and finished parts. As a result, Evco will

have 35 moulding machines of over 1,000 tonnes and the capacity to handle large moulds up to 45 tonnes.

The expanded facility will be fully operational by January, bringing the total area to 10,800 m². Employment at the site has increased by 20% as a direct result.

> www.evcoplastics.com













Exhibitor highlights from 2018



Total number of exhibitors:

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Total number of visitors:

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Number of countries represented:

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Combined budget of visitors:

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New electro-mobility applications are making increasing demands on plastics for electrical and electronic components. Mark Holmes finds that new resins and compounds for the injection moulder are meeting this challenge



E-mobility drives up performance of plastics

Current plastic electrical and electronic components require more than good antistatic or conductive properties. They need ever higher levels of heat stabilisation and flame retardancy, while maintaining good mechanical properties and water and chemical resistance, in a lightweight material. Resin manufacturers and compounders are developing new plastics for injection moulders for the electrical and electronic (E&E) sector that are meeting these increasingly stringent demands. In particular, the rapid growth of electro-mobility applications for electric vehicles is requiring enhanced properties in high voltage situations, as well as improvements in long-term colour stability for identification purposes.

The High Performance Materials (HPM) business unit of Lanxess has developed a wide range of new products relating to electric mobility. "Our objective with our materials is to help the various types of drive system involved in electric mobility to break through on the market," says Michael Zobel, head of HPM. "We are focusing on a series of different technologies, from mild hybrid and plug-in hybrid to electric-only vehicles. Our developments are also aimed at additional mobility trends such as autonomous driving and digital connectivity."

New HPM materials include orange, heat-stabilised compounds for high-voltage applications; materials that prevent electrical corrosion upon contact with live metal parts; and halogen-free flame-retardant materials for components such as battery cell holders and cover plates.

The use of the colour orange to identify live, plastic-sheathed components is becoming wellestablished in electric vehicles, but it is a challenge to develop orange compounds that exhibit high colour stability over the long term. Lanxess has developed a wide range of orange-coloured polyamide and polybutylene terephthalate (PBT) compounds for these high-voltage applications. The products will be coloured in the highly vivid RAL 2003 tone. Another colour variant is almost ready to be introduced. The compounds will be available both in a standard formulation and with thermal stabilisation, which will help to improve colour stability when the component is exposed to heat.

"We want to provide a Yellow Card listing from the US testing organisation Underwriters Laboratories for all the compounds we offer, which means that the moulders will not have to colour the product themselves nor to undergo the time-consuming UL certification process," says Julian Haspel, manager of the e-Powertrain team, which has recently been established in the Lanxess HPM business unit. "They can deploy the compounds instantly, which helps to cut costs."

The standard versions of the compounds still exhibit sufficiently high colour stability after 1,000 ageing hours at 130°C. "The thermally stabilised material settings even have the potential to withstand 1,000 hours at 150°C without the orange colour changing significantly," adds Haspel.

Among the first product types to feature the new colour are the glass-fibre-reinforced, halogen-free

Main image: **Thermoplastics** need higher levels of heat stabilisation and flame retardancy in demanding e-mobility applications

Right: Lanxess has developed a wide range of orangecoloured compounds for high voltage applications

flame-retardant PA6 compounds Durethan BKV20FN01, BKV30FN04 and BKV45FN04. A special feature is Durethan BKV45FN04, which is 45% glass fibre-reinforced yet still easy-flowing. It passes the UL94 flammability test with the top classification V-0 with a test specimen thickness of 0.4mm. "Its high stiffness and strength make the material ideal for not only structural components in the battery such as cell frames and end plates, but also large, high-voltage connectors requiring high mechanical stability," says Haspel. The compound is also characterised by high tracking resistance at high electrical voltages. This also applies to the two other polyamide variants. For example, orangecoloured Durethan BKV30FN04 has a CTI (comparative tracking index, IEC 60112) value of 600.

The company adds that Durethan BG30XH3.0 is a good choice for exceptionally low-warpage structural plastic. It has been reinforced with a mixture of glass fibres and glass microbeads. The H3.0 thermal stabilisation is copper- and halidefree, which prevents electrical corrosion in the vicinity of live metal parts.

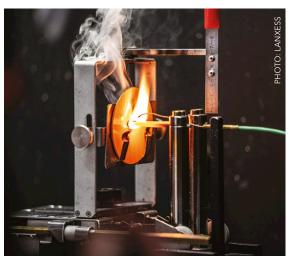
The hydrolysis-stabilised, glass fibre-reinforced PBT compound Pocan BF4232HR is also part of the new product series. In the colour orange, it also achieves V-0 classification in the UL94 flammability test with a test specimen thickness of 0.4mm. High hydrolysis resistance is demonstrated in the long-term test SAE/USCAR-2 Rev. 5 of the American Society of Automotive Engineers (SAE), which was designed especially for plug connectors.

At Lanxess HPM, the new compounds form part of a development focus on new forms of mobility. In addition to halogen-free flame-retardant polyamides, whose additive packages are specially designed for electro-mobility applications, HPM also offers, for example, highly heat-conductive PA6 versions and electromagnetically shielding compounds.

For connectors and switches in smart home



Above: Covestro offers flame-retardant and optimised plastics for electromobility - including electric surfboards



systems, Lanxess has also introduced the PA6 compound Durethan BG60XXF. The company says that it is a low warpage plastic, and its uses include switch holders in a product range from a manufacturer of electronic components. The component meets extremely high standards of planarity, dimensional tolerance and rigidity.

Covestro has developed new polycarbonate materials for electro-mobility applications, including electric surfboards. With electro-mobility applications rising significantly, the new flame retardant PC/ABS blends make batteries safe, durable and waterproof. In addition to the production of injection moulded battery casings seen in current electric car projects, leisure products such as Onean electric surfboards from the Bilbaobased Aguilaboards are also benefiting. The exchangeable batteries for this surfboard are equipped with impact-resistant, durable and flame-retardant casings made of Bayblend FR3010.

'A new sport is coming' is the slogan used by Aquilaboards, a spin-off of the Spanish company Bizintek specialising in engineering and product design. The manufacturer of electric surfboards currently offers three products in its catalogue, which are expected to develop a new environmentally-friendly sport. The Carver is a motorised surfboard with a power of 5 kW, while the Carver X for heavier people or those who want to reach a higher speed has 10 kW of power. The Manta is a model suitable for everybody that comes with a 750 W jet engine that enables longer excursions. Depending on the board, riders can travel at speeds of 10-45 km/h. All three models have a powerful jet drive and the boards come with a plug and play battery, which can be easily replaced from the body of the board after a charging time of just 2.5 hours. The Carver X, with its higher performance capacity, works with two of them.

"The plastic material impresses with its balanced

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The PC + ABS blend **Bayblend FR3010** from Covestro combines excellent mechanical parameters with good flame-retardant properties and outstanding chemical resistance



property profile, which is a perfect fit for this application," says Miguel Angel Montero Diaz, Director of Polycarbonates at Covestro Iberia. "Among other things, it combines high heat resistance with excellent mechanical parameters, good flame retardant properties and outstanding chemical resistance."

At first glance, the battery requirements for Onean jet boards hardly differ from those for e-bikes or electric off-road motorbikes. When in use, they are exposed to the wind and weather, heat up during charging and discharging and can sustain impacts. The Bayblend FR3010 protects the battery and the unreinforced injection moulded casing has improved heat resistance (Vicat/B 120 of 110°C), with good impact resistance and stress cracking behaviour.

Covestro adds that the dimensional stability of the surfboards has also proven to be excellent, since the batteries must always fit perfectly into the sockets: gaps can never open up that will allow moisture into the battery, particularly for applications in water. Bayblend FR3010 also achieves UL94 V-0 at a wall thickness of 1.5mm and Class V-1 at 1.2mm. The blend's high resistance to chemicals is another advantage, for example, in contact with sunscreen and insect repellents. The material is also suitable for recycling.

A recent Life Cycle Assessment (LCA) has found a laptop cover made of Maezio continuous fibre-

reinforced thermoplastic compounds from Covestro can significantly reduce its carbon footprint by more than 70% compared to one made from a conventional aluminiummagnesium alloy. The LCA study, conducted in line with ISO 14040/14044 standards and reviewed

by an independent panel of LCA experts chaired by Dekra Assurance Service, compared a comprehensive range of parameters to assess the environmental performance of a laptop A-cover made from the two materials which are typically used for premium laptops. In all impact categories and scenarios, the composite laptop A cover shows better environmental performance than the aluminium-magnesium alloy cover from the extraction of raw materials until the end of life. Maezio composites are based on continuous carbon or glass fibres impregnated with polycarbonate, thermoplastic polyurethane (TPU) or other thermoplastic resins.

"Thermoplastic composites are ideally suited for producing thinner, lighter and more robust parts for IT devices that meet the needs of tomorrow," says Lisa Ketelsen, head of the thermoplastic composites business at Covestro. "The fact that Maezio thermoplastics are not only mechanically competitive but also environmentally advantageous will provide the electronics industry and many other industries with a powerful solution for reducing carbon footprint and reaching their sustainability targets."

Compared to aluminium-magnesium alloys, Covestro adds that Maezio composites can also achieve weight reductions of approximately 15%, and the composite A cover exhibits a similar good bending and torsional rigidity compared to the metallic material. The composite A cover meets the V-0 classification of the UL94 standard. The technology also enables fast and efficient produc-

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Right: PolyOne has developed new polymer formulations for 5G telecommunications network development



tion of electronic parts, by combining the three conventional steps of pre-heating, thermoforming and functional integration into a single process, resulting in lower costs and shorter cycle times.

DSM has started a new production line for Arnitel in Emmen, the Netherlands. The capacity will be expanded by 20% and will enable greater supply flexibility and security. The new production line will allow DSM to meet growing demand for Arnitel high performance thermoplastic copolyesters (TPCs). The company says these materials combine elasticity, high temperature resistance and mechanical properties, as well as good processing characteristics, and have a number of E&E applications.

DSM has also expanded its electric vehicle thermal management range with a new PPS grade. Xytron G4080HR is a 40% glass-reinforced PPS engineered for heat ageing performance, hydrolysis resistance, dimensional stability, chemical resistance at elevated temperatures and intrinsic flame retardancy. "As our customers work to

enhance the performance of electric vehicles through lightweighting, it is essential for us to design lightweight materials able to withstand the increased heat and prolonged chemical exposure requirements of EV thermal management systems," says Lu Zhang, global business line director, DSM Engineering Plastics.

The company says that because Xytron G4080HR is specifically formulated for typical EV thermal management system lifecycles, it maintains its strength at continuous operating temperatures exceeding 130°C for 6,000-10,000 hours. In a recent 3,000 hour, 135°C water-glycol fluid test versus a comparable competitor grade, Xytron G4080HR delivered 114% higher tensile strength and 63% higher elongation at break. The combination of resistance to heat, moisture and chemicals provide electrical and electronic applications in connectors, structural parts, e-motors, bobbins, switches and sensors.

PolyOne has developed new polymer formulations for 5G telecommunications network development. The company says that these advanced materials will help increase speed to market and design flexibility for 5G base station antenna manufacturers. New customisable Edgetek Formulations for 5G feature specific Dk values and reduced dissipation factors (Df), enabling faster design qualification and shorter lead times. Another new formulation within this product family is compatible with SMT (surface mount technology), allowing greater design flexibility and increased speed to market for 3D circuit boards. Both materials can help 5G base station antenna manufacturers to streamline their design and process development.

5G networks are forecast to bring notable benefits to the mobile phone and tablet user, and are also expected to have a major effect on emerging systems such as smart cities, Al devices,

Figure 1. RTP's CCX masterbatches are available in a variety of resin systems, and can be formulated with four distinct additive technologies - stainless steel fibre, carbon nanotubes, carbon black and PermaStat dissipative polymer technology

Masterbatch	Technology	Process	Resin System	Typical Let Down	SR Range
CCX 110	Carbon Black	Injection Molding	Polypropylene	50 - 70%	10 ³ - 10 ⁹ Ω/sq
CCX 220 A	Stainless Steel	Injection Molding	Nylon 6	10 - 25%	10 ¹ - 10 ⁷ Ω/sq
CCX 411	Carbon Black	Extrusion	Polystyrene	60 - 100%	10 ³ - 10 ⁹ Ω/sq
CCX 2040	PermaStat™	Injection Molding	PP/PE	10 - 25%	10 ⁹ - 10 ¹¹ Ω/sq

RTP's CCX Masterbatches listed here are a representative sample

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and industrial automation. These new materials can help manufacturers to meet consumer expectations such as higher capacity, faster data transfer speeds, and coverage in high density areas.

"Telecom equipment manufacturers all over the world are readying themselves for the explosion of 5G," says Flight Xu, General Manager, Specialty Engineered Materials Asia for PolyOne. "We see 5G deployment as a tipping point in which seamless connectivity will become an expectation not only for mobile users, but for industry as well. We're confident that our innovative material solutions and product development support will enable telecom manufacturers to make that expectation a reality."

RTP Company has expanded its line of conductive compounds to include new CCX conductive masterbatches, for safe, productive and reliable solutions for environments that are prone to electrostatic discharge (ESD). The masterbatches are available in a variety of resin systems, and can be formulated with four distinct additive technologies - stainless steel fibre, carbon nanotubes, carbon black and PermaStat dissipative polymer technology. As shown in Figure 1, each additive technology provides different benefits, depending on the needs and requirements of the application.

Stainless steel fibre CCX masterbatches are created using the company's long fibre manufacturing process and allow for the highest level of conductivity, providing EMI shielding for sensitive electronics, coloured parts and components, or even FDA compliant applications. They are available in most resin systems and have similar shrinkage and mechanical performance to the unfilled base resin, making them well-suited to injection moulding and compatible with existing moulds and tooling.

Carbon nanotube CCX masterbatches can be

Left: **Polyplastics** has introduced a number of resin products for specifically penetrating the electric vehicle market



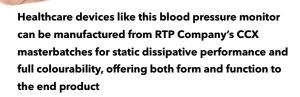


PHOTO: RTP

used in high purity applications and also have virtually no effect on shrinkage or mechanical properties compared with the unfilled base resin. Carbon nanotubes, or CNTs, are hollow structures consisting of graphene cylinders of carbon atoms capped at both ends; when incorporated into a thermoplastic, they provide highly uniform ESD protection and/or electrical conductivity at a very low loading level. Carbon black CCX masterbatches have similar isotropic shrinkage, strength, and stiffness to the unfilled base resin, but are an economical way to introduce versatile, high performance conductivity for a plastic part.

Finally, the company says that PermaStat CCX masterbatches are formulated for applications that require permanent antistatic or static dissipative performance. These masterbatches can be used in most resins with processing temperatures up to 270°C (520°F). They provide uniform dissipative performance, full colourability, and even transparency in some resins, while retaining or even enhancing the impact performance of the base resin. Additionally, they are well suited to intrinsic safety applications and can meet the surface resistance requirements of the ATEX directive. They are compatible with injection moulding or extrusion equipment and require minimal processing adjustments when incorporated into existing processes.

Polyplastics has introduced a number of resin products for specifically penetrating the electric vehicle market as a superior alternative to metals. The company's Duranex PBT and Durafide PPS materials are designed for engine peripheral parts, such as power control units (PCUs) where they deliver high insulating properties and lower water absorption while meeting harsh operating conditions of -40°C to 150°C and up to 95% relative humidity.

The company says that Duranex PBT CG7030 provides lower water absorption and high tracking

Milliken Partners with PureCycle **Technologies to Accelerate Revolutionary Plastics Recycling Towards a Circular Economy**

At K2019 Milliken will showcase this exciting new partnership to restore used polypropylene plastic to ultra-pure recycled polypropylene advancing the closed-loop recycling of PP resin.

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PureCycle's Ultra-Pure Recycle

PureCycle's patented recycling process, developed and licensed by Procter & Gamble, separates color, odor and other contaminants from plastic waste feedstock to transform it into ultra-pure recycled polypropylene. Milliken's additives will play a critical role in reinvigorating the recycled polypropylene and the company

has formed an exclusive supply relationship with PureCycle to help solve the plastics end-of-life

challenge. Today, about 20 percent of polyeth-

ylene terephthalate (PET), which is commonly used to make plastic bottles and other consumer goods, is recycled. By contrast, less than 3 per-

cent of polypropylene plastic is currently recycled. PureCycle is the first company to solely focus on recycling and rein-

tegrating polypropylene upstream to highly sensitive consumer product applications, which are used in food and beverage and consumer goods packaging, automobile interiors, electronics, home furnishings, and many other products. And, to meet this challenge PureCycle is building the first plant in the United States that will

recycle 54.000 tonnes of polypropylene, producing over 47.000 tonnes per year starting in 2021. Milliken understands that creating a sustainable future requires meaningful collaboration

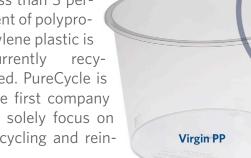
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with other industry pioneers and PureCycle's technology, combined with Milliken's leading plastic additives, provide a transformative opportunity

elevate the viability of recycled polypropylene and help solve the plastics end-of-life

challenge.





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Hans Geiger uses clean injection moulding for electronic components

German injection moulder **Hans Geiger Spritzgisstechnik** has
developed clean manufacturing
conditions to meet electronic industry
specifications. The company says that
dirt particles increase the risk of faults

in electronic components.

Geiger's products are used in circuit boards that must meet the highest quality standards. The company has responded to these requirements by developing an enclosed production line which meets all the criteria of a cleanroom efficiently and in a small space. This enables it to do clean manufacturing to individual specifications, without added costs or time for additional parts cleaning. These savings are passed on to customers.

The main cause of contamination in the injection moulding process is ambient air which can contain a variety of particles and fibres. Another possible source of contamination is the mould itself, for example in the form of metallic particles caused by



Injection moulder Hans Geiger has developed an enclosed production line for products used in the manufacture of circuit boards

friction. If these particles get on the components they can cause serious faults, such as changed friction and shorter clearances and creepage distances.

On Geiger's clean production line, two laminar flow boxes on the sealed enclosure create a constant overpressure, and a steady air current prevents particles from settling in the clean area. Since the line is closed and has its own filter units, there are no further special needs that need to be met during production, says Eva Söhnlein, Senior Manager at Geiger. The line merely needs to be comprehensively cleaned before the start of production and after a tool change. In order to prevent particles being generated during production by the line itself, for example by friction, all sliding and moving elements of the moulds are specially coated and operate lubricant-free.

The line is a complete, compact production system with injection moulding machine, removal robot and packaging station. Geiger says the line has a cleanliness level corresponding to cleanroom class 7. However, the company decided against standard categorisation, because many of the company's large customers have their own standards of technical cleanliness.

properties (CTI: 600V) for high-voltage parts such as PCUs. The material ensures high reliability for high-voltage parts that do not gain enough creepage distance. Water and salt can penetrate high-voltage parts and cause tracking issues, so materials with high CTI values are required.

Polyplastics also offers Durafide PPS 6150T73, which provides high heat shock resistance, strong dimensional stability and good heat and chemical resistance for metal insert moulded applications for electric vehicles. Previous material technologies suffered from lower heat shock resistance when mouldability (flowability) increased.

Polyplastics is also exploring new materials to replace metal in PCU housings. Thermoplastics would provide lighter weight and improved productivity. However, other key requirements include strength, dimensional stability, electromagnetic shielding and thermal conductivity. Specifically, Polyplastics is currently developing materials with electromagnetic shielding properties. The company is also targeting its material development work for other EV applications, such as motors and batteries.

Albis Plastics has introduced Alcom MS 'Anti Squeak' compounds for applications in the automotive and consumer electronics industries. The company says that the ABS, PC, or PC+ component materials provide improved 'stick-slip' behaviour, which reduces the risk of unwanted noise when coming into contact with other casing materials (it prevents the creaking and cracking noises that consumers associate with lower product quality in day-to-day use). Potential areas of application include consumer electronics casings where components are being inserted, clipped or screwed together, and where even the smallest relative motion between connected plastic parts could create noise.

"Consumers base their impressions of product quality on not only haptic and visual assessments, but on acoustic ones as well," says Eric Fautz, Product Specialist - Business Line Specialties. "Using Alcom MS 'Anti Squeak' eliminates bothersome noise, which has a lasting positive effect on end customers' usage experience."

The company says that in a test in accordance

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Above: TactoTek will add IMSE solutions to BÖ-LA's product mix

with VDA 230-206 (the Ziegler test), the newly developed materials yielded impressive results even under adverse testing conditions, with no significant effects on the new compound's mechanical and rheological properties. All materials were evaluated in terms of lacquerability and low emissions.

Albis Plastic has also expanded its TPE portfolio with flame retardant styrene-based thermoplastic elastomers (TPS) - Solplast made by Uteksol. The halogen-free TPS compounds achieve V-0 classification in the UL94 test at 2mm thickness. In addition these compounds also fulfil the glow wire test at 960°C for 2mm thickness. The limited oxygen index (LOI) is higher than 30%. The halogen-free TPS compounds are available in the hardness range from Shore A45 to Shore A85 in natural colours, as well as in black. Typical applications are flame retardant housing seals, grommets and cable bushings or assembly elements. The new Solplast series can be used for injection moulding and extrusion.

Eurostar EP has developed Starflam compounds for electric vehicle applications including components for charging systems, connectors, contactors, relays and insulators. The compounds include Starflam RF0068E, a 30% glass fibre reinforced, halogen- and red phosphorus-free flame retardant PA66, and Starflam PF0057E, a 25% glass fibre-reinforced, halogen and red phosphorus-free flame retardant PA6. Both materials offer improved safety with UL94 V-0 flame retardance with an electrical tracking index of 600V. They also provide high rigidity and impact strength, as well as long term performance and reliability with high RTI and UL F1 ratings and no blooming under wet conditions. They are a stable orange colour as a safety marker for electronic components.

OptoFidelity, a manufacturer of robot assisted test automation for smart devices, and TactoTek,

the injection moulding structural electronics (IMSE) technology developer, have collaborated to develop automated production test systems for IMSE parts. The test systems are designed to meet the specific requirements of in-mould electronics.

The OptoFidelity system tests part functionality and production process quality after each of four steps in the IMSE production process, including decoration and electronics printing, component surface mounting, thermoforming and injection moulding. "Measuring performance and functionality of printed multilayer electronics that are stretched during thermoforming requires new measurement methods," says Miikka Kärnä, Head of Operational Excellence at TactoTek. "The data from the OptoFidelity test systems supports continuous improvement in all phases of IMSE design and production."

TactoTek works directly with OEMs, brands and their suppliers to develop IMSE parts from concept to being ready for mass production by TactoTeklicensed manufacturers. OptoFidelity's test systems are available in the configuration used by TactoTek, or as custom solutions to meet each customer's specific requirements.

TactoTek has also has started a sales and marketing partnership with **BÖ-LA**. The deal brings together the know-how of the two parties to develop solutions for integrating electronic functionality within moulded plastics.

"We have been actively involved in developing and commercialising techniques for adding electronic functions to cosmetic surfaces, including integrating printed electronics in 3D-formed FIM parts," says Dirk Lange, Head of Sales at BÖ-LA. "With TactoTek's IMSE technology, we can also integrate electronic components within these moulded structures, which increases integrated functionality and streamlines production for the right designs."

CLICK ON THE LINKS FOR MORE INFORMATION:

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- > www.dsm.com
- > www.polyone.com
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The injection moulders' guide to 32019

Part 2: Machinery and equipment

The world's biggest and most international plastics show is nearly here. K2019 opens its doors in Dusseldorf in Germany on 16 October and, as in the past, will be the place to see the very latest innovations in plastics materials, machinery and processing technology. However, the event is huge and has to be approached with a plan - our pre-event coverage aims to help you get the most from your time there.

Last month's preview focused on materials of interest to injection moulders. This month we turn our attention to machinery and equipment. Over the subsequent pages we provide details on some of the newest developments in injection moulding machinery, auxiliary equipment, hot runners and more.

There is no doubt that the global economic and political environment has changed dramatically since the previous K show in 2016. Data from the German plastics machinery association VDMA – one of the key supporters of the K fair – as well as its Italian equivalent Amaplast and the US plastics industry association all show that the 10-year investment boom has come to an end. We also find ourselves having to deal with the potential fall-out of global trade wars, the uncertainty of Brexit, the challenge of a technology shift from internal combustion to electric propulsion in automotive, and intense anti-plastic campaigning against plastics packaging.

However, the K fair has taken place in challenging times in the past. Then it showed the plastics industry's ability to showcase technologies designed to meet or exceed the demands of the day. It is likely that 2019 will be no different. Expect to see potential solutions to the big issues of our time-lightweighting, emission reduction, recycling, the Circular Economy. And expect to see contacts being made and business being done.

If you are planning to attend the show but are yet to finalise your travel and accommodation you need to act really fast. There are some useful weblinks at the foot of this page and plenty more in the visitor information article in our July-August edition, pages 41-43, that may prove helpful.

The Injection World and AMI Magazines team will be at the show for the full eight days and will be gathering information for our post-event coverage in the November-December edition. We will also be reporting on the biggest news and innovations as they happen via our @PlasticsWorld feed on Twitter. If you want to be sure you keep in touch with developments join the more than 20,000 people already following us.

You may also be able to catch up with our editors and sales team on the AMI stand at the show - you can find us on Stand C11 in Hall 7. We will have information about our magazines, conferences, databases, consulting services and our new North American and European Expos available. Some of our industry experts will also be giving daily presentations covering compounding, masterbatch and recycling. You can learn more about those here https://go.ami.international/book_ami_k2019demo/

Dates: 16-23 October 2019

Venue: Messe Dusseldorf, Dusseldorf, Germany

Hours: 10:00-18:30 daily

Tickets: One-day €75, three-day €155 (€49/€108 online). All include free local transport and on-site wifi

> Organiser: Messe Dusseldorf Website: www.k-online.com

Use the following links to go direct to essential show information:

K2019 hotel booking - http://bit.ly/k2019hotel K2019 online ticket purchase - http://bit.ly/K2019tickets K2019 exhibitor search - http://bit.ly/K2019exhibitorsearch K2019 iOS/Android apps - http://bit.ly/K2019mobile



Arburg has two major focus areas in its presence at K2019: digitalisation and the Circular Economy, naming its approach to these areas "arburgXworld" and "arburgGREENworld". The group says it has "always been a pioneer in dealing with important future issues, providing answers to current questions and offering practical solutions" and its K2019 stand will show new machines, processes and digital products and services which are contributing to this.

In its digital product and service portfolio, Arburg is launching a filling assistant and plasticising assistant, as well as extended connectivity for the Allrounder machines. In addition, there are further apps and functionalities for its customer portal.

A demonstration of moulding PP cups with around 30% recycled material is being run in co-operation with Erema. In a cycle time of around 4s, a hybrid Allrounder 1020 H will produce 8 cups per cycle. In Arburg's second Circular Economy application, a PCR (post-consumer recyclate) material is used to produce a technical product - a machine door handle whose two halves are mounted in the mould. It is moulded on an electric two-component Allrounder 630 A in a Profoam foaming process, with a TPE used for overmoulding.

Injection Moulded Structured Electronics (IMSE) are featured in a demonstration using an electric Allrounder 470 A with a clamping force of 1,000 kN. In this process, films with integrated electronic functions are inserted into the mould and overmoulded with PC. As a demonstrator, the injection moulding machine produces a night light in a cycle time of around 75s.

An electric Allrounder 270 A, equipped with a size 5 micro-injection unit with 8mm screw, 8-cavity mould and LSR cartridge, will be manufacturing microswitches from non-post curing LSR. The part weight is 0.009 g and the cycle time around 20s.

In additive manufacturing, Arburg's Freeformer

technology will be used to preview how fibre-reinforced components can in future be produced using Arburg Plastic Freeforming. A total of eight Allrounders and one Freeformer will be demonstrating new technology, applications and processes on the Arburg stand. Another eleven machines can be seen on partner stands.

> www.arburg.com

Barnes Group is exhibiting at K2019 for the first time on a joint stand to showcase its Molding Solutions business unit companies: Foboha, Gammaflux, Männer, Priamus, Synventive and Thermoplay, which cover the spectrum of mould-making and hot runner technology, including temperature control and process control technology.

Foboha will present two cube mould innovations: the Plug 'n Play Compactcube for rapid implementation and easy maintenance; and its Reversecube system of counter-rotating cubes shown on an Arburg injection moulding machine, which replaces several moulding machines and automated assembly units with a single system.

In hot runner technology, Synventive will present its new generation eGate system. The electric-drive valve gate solution is now available for larger components and ensures complete pin movement control on each individual nozzle to achieve the highest performance for perfect component surfaces and dimensional consistency.

> www.barnesgroupinc.com

Beck Automation, Glaroform and BFA Solutions have a shared stand at K2019 where they will present new automation solutions in IML technology as well as innovative material-efficient injection moulding and intelligent process-data evaluation solutions.

A thin-wall moulding demonstration will mould a 200 ml container produced with a 4-cavity ICM (injection-compression moulding) configuration from Glaroform using a Netstal machine. Beck's high-performance IML automation is used with wrap-around labels. It says the system is characterised by the dynamic process, process stability and very high availability with short cycle times. The labels from Verstraete have a digital watermark to enable efficient sorting at recycling plants. MES PiSolutions from BFA provides the interface between the production and the ERP levels. The task evaluates data from the injection moulding machine, the handling process and the quality assurance system and makes this data available to different users.

The three companies will also show their technol-

ABSOLUTE IN MOLD LABELS



Korsini Packaging is the legacy of the printing business which Italian Corsini brothers have started in year 1902 under the name "Fratelli Corsini" and carries the printing family traditions for more then 117 years to this day, combining this with a contemporary business approach.

Korsini, pioneering in many kind of packaging among the years, has decided to concentrate all the experience in a newly started project 'IML' in 1998 and founded in the year 2004 the first dedicated 'In Mould Label' production plant as a Joint Venture between Korozo Group and Korsini Packaging Companies.

When our experience is combined with the latest technologies and with innovative approach, it allows us to reach the best solutions and to succeed in the IML industry. Today, with the highest quality and sustainable business approach, we are able to meet all objectives related to IML in our four factories with a total area of 42,000 m², three in Turkey and one in Italy, with offset, rotogravure and flexo printing techniques.

Our commitment for the Food Safety has been always our main priority that has driven our company to use Conventional Cobalt Free Vegetable Based Inks since 2011, Low Migration Low Odor UV since 2012 and latest in 2019 Low Migration Low Odor LED UV inks.

As well as the respect for the environment, Korsini recycle all industrial waste since 2006 for the non-food industry to utilize it as second grade material for pallet/crates manufacturing.

The perfect process, from prepress to final point that the label reaches to the customer, and wide range of products we have, make Korsini one of the leading companies offering products and services to more than 60 countries around the world, with the largest IML product variety today.



16-23 October at K Show 2019Messe Düsseldorf, Germany
Hall 8B / Stand C61



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ogy on the stands of partner companies, including KraussMaffei, BMB and Sumitomo Demag.

- > www.beck-automation.com
- > www.glaroform.ch
- > www.bfa.ch

Billion's Select² machine has a new clamping unit design with optimised mechanical specifications. It is suited to fast-cycling applications in packaging and medical, and also to overmoulding applications.

To answer the increasing need of plastics processors for insert moulding, Billion has developed its first vertical injection moulding machine, the Vertis V270. The machine features a C-Frame clamping unit design without tie bars providing easy access to the mould area. Billion says the combination of powerful electric motors, with an innovative hydraulic drive, offers precision, speed and low energy consumption.

> www.billion.fr

Boy says it is presenting more machines than ever before at a K fair: eleven exhibits at the enlarged Boy stand and an additional six machines at the stands of its partner companies. Among its new products, Boy will show its new plastification technology Servo-Plast for the first time at K2019, as well as a new alternative positioning option for its Linear-Handling LR 5 on an injection moulding machine, which reduces the footprint.

The company focus at K2019 is on the increasing automation and networking of injection moulding machines and peripherals. To demonstrate digitalisation possibilities, Boy will present a two-component hard/soft application. It says: "With the active participation of the trade visitors the interaction of injection moulding machine, handling, other peripherals and a cobot with collaborating robot technology is rounded off in an impressive barista show." Data is collected and can be traced back at any time according to Industry 4.0 needs.

In addition, Boy will demonstrate its core competencies in overmoulding technology, micro-injection moulding as well as in the processing of elastomers and silicones.

> www.dr-boy.de

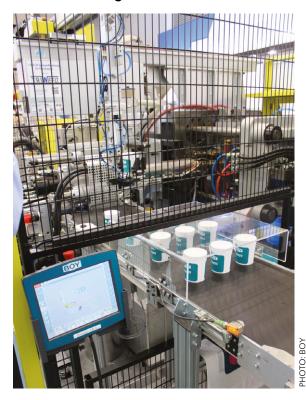
Campetella's expertise in automation and robot systems for injection moulding is being highlighted in a demonstration using its X-Series Modula for IML decoration of coffee capsules. This is a 4-cavity application with a total cycle time of 6s, a robot cycle time of 5.1s and an injection moulding machine interlock time of 0.9s.

> www.campetella.it

At K2019, **Chen Hsong** will show two machines from its Jetmaster Mk 6 range of hydraulic machines: the Jetmaster Evolution JM200-Mk6e and the Jetmaster JM328-Mk6 with a separate unit for two-component moulding. It will also highlight its Supermaster range (SM700-TP model will be shown) with high hydraulic precision and fast cycle times, down to 1.5s.

In June, the company opened a new German subsidiary as a wholly-owned subsidiary of Chen Hsong Europe, based in the Netherlands.

> www.chenhsong.com



Left: Coffee cups are an application for Boy to demonstrate automation and machine networking

CMG is launching the new G17 and G25 series granulators for applications beside the press. These feature tangential-cut rotor blades to obtain high cutting precision, homogeneity of size and shape of the regrind and to prevent dust. These features make the new G17 and G25 series the most suitable for precision moulding, says the company.

CMG is also demonstrating its new XT35-120 CMG granulator for thermoforming, and its new Evoluzione series of granulators for post-consumer recycling. All the Evoluzione granulators are equipped with advanced Industry 4.0 controls to make the machine operation 100% monitorable and manageable. These cover operating temperature, blade wear, productivity, operating efficiency, energy usage, and all functional parameters managed on the machine or remotely with OPC-UA protocol connectivity.

> www.cmg.it





Elmet is showing its technology for LSR moulding at K2019, with a particular focus on its enhanced TOP 5000 P pneumatically driven dosing system which has a smaller footprint than its predecessor. It is also preparing for the commercial introduction of a TOP dosing system with a fully electric dosing pump which is driven by a torque- and currentcontrolled servomotor. The focus is on minimizing dosing fluctuations and maximizing efficiency and simplicity of operation. Both versions are intended for the mass production of high quality parts with tight tolerances. They cover shot weights from less than 0.1 g up to several kilogrammes and viscosities ranging from 9,000 mPas to 3,000,000 mPas even when the viscosities of the two components differ greatly.

> www.elmet.com

Engel is making the Circular Economy one of its major themes at K2019, in

> of other machinery (and materials) companies. It says one of the priority

open up a broader range of applications for processed plastic waste.

The intelligent iQ weight control assistance Engel Skinmelt process.

In automotive, Engel is putting the spotlight at K on its Foilmelt and Clearmelt processes. A demonstration of Foilmelt's roll-to-roll IMD process will produce three-dimensional sample parts with different decor on a Victory 1060/300 moulding

An all-electric and tie-bar-less E-motion 310/120 TL machine will be used in a demonstration of PMMA processing for LED lighting. Engel's hot runner partners INglass and HRSflow are involved with this application, as are Volvo and Arkema.

A novel approach to producing thick-walled housings of medical devices in shorter cycle times is also being shown. A

common with a number

tasks on the way to the Circular Economy is to

system is being used at Engel's stand to process fully recycled ABS. The software from Engel's Inject 4.0 program ensures a constant melt volume during injection to ensure consistently high product quality, even with strongly fluctuating raw material quality. Engel is also showing transport boxes using recycled material in a sandwichmoulded structure. The boxes are made using the

machine with an integrated Viper 20 linear robot.

Right: The new FA-160 machine from FCS will be moulding this lunch box from Miraplast

PHOTO: ENGEL

Above: Engel

roll-to-roll IMD

will use

injection

produce

moulding to

three-dimensional sample

parts with different decor two-component process is made possible with an 8-cavity Vario Spinstack mould from Hack Formenbau used on the cleanroom version of an all-electric E-motion 310H/170W/160 combi injection moulding machine. The machine is equipped with a vertical indexing shaft with four positions: the first for injection moulding the bodies, using a transparent polypropylene from Borealis; the second for cooling; the third for applying a second layer of PP to the pre-moulded parts; and the fourth for a Viper 20 speed robot to step in and remove the parts.

Engel has a number of other demonstrations for applications in lightweight overmoulding of organosheet, packaging and other focus areas.

> www.engelglobal.com

Frigel says it will bring to the K show its complete portfolio of advanced cooling solutions for the plastics industry. On its stand will be the latest upgrade of its patented Ecodry System. This adiabatic cooling technology will be presented in its glycol-free, self-draining configuration, with an inverter driven pumping station and new digital control panel. It will also show its traditional ranges of Microgel portable chillers for injection moulding: RCM/D Series for throughputs from 10 to 900 kg/hr, and Microgel for Packaging, RCP Series, from 100 to 2,000 kg/hr, both with new digital technology and touch screen control.

For engineering resin moulders Frigel has four new Thermogel temperature control units. The TBD Series - up to 90°C - is for general moulding applications. The TDK Series - up to 120°C - and TPK Series - up to 180°C - are pressurised water TCUs for high temperature applications. The new Thermogel Heat&Cool THC Series are process synchronized alternating heating and cooling units that work with pressurised water up to 180°C. These units are designed specifically for high quality surface finishing of moulded parts.

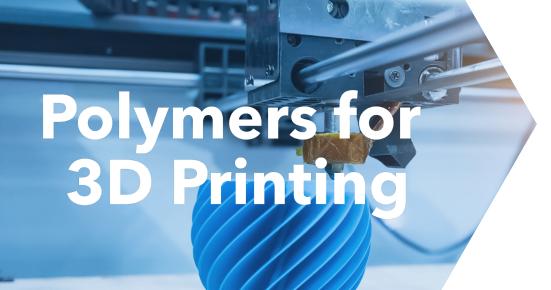
> www.frigel.com

PHOTO: WINDSOR

Fu Chun Shin (FCS) is showing a new injection moulding machine on the stand of its German partner Windsor. The

FA-160 is a servo-hydraulic toggle machine with 1,600 kN clamping force. In the K2016 demonstration, the machine works with a robot system from Wemo to mould PP snack boxes from Miraplast, Austria, 82 g in weight. The FA series from FCS is the succes-

sor to its SD series in the clamping force



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With an ever-increasing focus on the bearing that plastics have on the planet, designers, brand owners and all those involved in the plastics supply chain are under mounting pressure to develop products that have minimal impact on the environment, and designed with their end-of-life in mind to create a circular economy.

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range between 500 and 3,700 kN. Windsor says the new series has already proven itself in the packaging market, in the building industry (fittings), in the IT sector (small appliance housings), in the household goods industry and in the automotive sector. It is available with newly developed high-performance screw cylinders, a special linear guide for the injection unit and an effective servo injection system operating in a closed control loop.

- > www.fcs.com.tw/en
- > www.windsor-gmbh.de

Futaba will exhibit in-mould sensing solutions at its K2019 stand in partnership with injection moulding machine manufacturers. These include in-mould pressure, in-mould resin temperature and cavity surface temperature measurements. Machines are set-up and ready to perform measurements and display obtained waveforms.

These measurements are effective for both mould-tooling verification and mass production phases. In the verification phase, waveform comparisons between good and bad production runs contribute to identify the right waveform (which later becomes a reference waveform) that produces the best mouldings.

In the mass production phase, the measurements prevent moulders from mixing defective mouldings and secure stable production of high quality mouldings. Recorded waveforms are used for documentation of quality conformance, productivity and performance of products.

> www.futaba-eu.com

Hahn Group's companies in automation are showing their technologies on Hahn's stand at K2019. Robotics company Wemo is launching WIPS 4.0 software for user-friendly programming of robots, which is based on user experiences from customer installations. The new ergonomic and lightweight handheld controller W-Hp12, in combination with a 10.1-inch colour screen, gives operators and programmers a better overview of the status and program structure.

New robots at K2019 include Wemo's 3-5 Linear Picker, for sprue and part handling, the 8-5 sDesign high-speed linear robot for thin-wall packaging, and the 120 xLine Tandem concept which mounts two robots on the same Z-axis, resulting in a more cost-effective production.

Waldorf Technik is using a medical application, showing direct digital printing on syringes. The company developed an automation system for the process with its long-standing partner Netstal,

which is based on its Vario TIP System. Syringe barrels can be printed on, directly after extraction from the injection moulding machine.

GeKu and Hahn Robotics have formed a new subsidiary specialising in collaborative robot solutions in Diepenau, northern Germany. GeKu says the Sawyer cobot from Rethink Robotics, for example, is "very easy to install and operate" in part handling during injection moulding.

- > www.hahn.group
- > www.wemogroup.com
- > www.waldorf-technik.de
- > www.geku.de

Haitian International is using K2019 to highlight new developments in hardware and software machine models in both the servo-hydraulic range from Haitian and in the electric series from the Zhafir brand. A new concept in electric injection units from Zhafir is being launched: available in four design versions with 1, 2 and 4 spindles, the injection pressure is significantly increased. At the show, a Zhafir Venus III Series machine, VE1200III, is producing a medical part made of PP under a laminar flow box from cleanroom manufacturer Max Petek.

Another demonstration features the Zhafir Zeres F electric series with integrated hydraulic drive. The ZE2300F-830h machine, based on the latest third generation technology from Zhafir, is making an IML lid in PP.

From the Haitian brand, the group is showing a Haitian Jupiter III JU5500III-2230 producing an LED light strip made of PC. Its best-selling Mars Series is represented by a MA1700III/plus machine producing bottle openers made of recycled PP with insert technology.

> www.haitian.com/en

Hasco says it is presenting a number of innovations at K2019. Among these, its new Single Shot nozzle for hot runners has been designed as a single nozzle with maximum temperature homogeneity and generous flow channel cross-sections. Different tip geometries guarantee an optimum tear-off quality and ideal heat conduction right through to the gate. Above: Zhafir's new patented concept for large electric injection units: 4 spindles + 4 motors

PHOTO: HAITIAN INTERNATIONAL

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Tuesday 5th November 2019

08:30 Registration and welcome coffee

09:30 Opening announcements

SESSION 1 - MARKET UPDATE

09:40 **Market Overview**

Mr. Chris Smith, Editor in Chief, AMI MAGAZINES, United Kingdom

Conductive polymer solutions for e-mobility; radar absorbing, thermally conductive and EMI shielding 10:10

Dr. Frans Mercx, Chief Scientist LNP Compounds and

Copolymers, and

Dr. Norberto Silvi, Staff Scientist LNP Compounds and Copolymers,

SABIC, Netherlands

Coffee break sponsored by: 10:40

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SESSION 2 - DEVELOPMENTS IN CARBON ADDITIVES

Graphite as a filler for enhancing electrical and thermal 11:20 conductivity in polymers

Mr. Roland Mittelhammer, Senior Manager Technical Sales Expanded Graphite, SGL CARBON, Germany

11:50 High aspect ratio graphites for production of high performance, easy-processing thermally conductive plastic compounds

Mr. Jérôme Crépin-Leblond, R&D Leader Conductive Polymers, IMERYS GRAPHITE AND CARBON, France

12:20 Recycled carbon fibres, the future for sustainable conductive

> Dr. Hans Miltner, Senior Consultant and Business Development Manager, PROCOTEX, Belgium APPLY CARBON, France

12:50

SESSION 3 - PROCESSING CONDUCTIVE COMPOUNDS

Challenges in processing highly filled thermally conductive 14:20 polymer compounds

Dipl. -Ing. Marco Grundler, Group Leader Compound Technology, ZBT, Germany

14:50 Investigating the effect of part design and thickness on

conductivity
Mr. Michael Schaefer, Program Specialist Powertrain, CELANESE SERVICES GERMANY, Germany

15:20 Influence of moulding parameters on performance of thermally conductive compounds

Eng. Luca Posca, Technical Assistance and Marketing Director, LATI INDUSTRIA TERMOPLASTICI, Italy

15:50 Coffee break

16:30 Investigating the relationship between polymer blend morphology and manufacturing processes on thermal and electrical performance using carbon black and zinc oxide Dr. Frank Schoenberger, Group Manager Functional **Polymers**

FRÁUNHOFER LBF, Germany

17.00 Exploration of 3D fibre networks to improve thermal conductivity in polymer composites

Dr. Zoltan Gombos, Research Fellow Dr. Luke Savage, Senior Research Fellow UNIVERSITY OF EXETER, United Kingdom

17:30 Networking Cocktail Reception

Wednesday 6th November 2019

Welcome coffee

09:00 Opening announcements

SESSION 4 - DEVELOPMENTS IN MINERAL ADDITIVES

09:10 Application of magnesium hydroxide to enhance thermal conductivity

Mr. Katsuhiro Takahashi, R&D Department, KYOWA CHEMICAL INDUSTRY Co., Japan

09:40 Hidden inside - performance outside. Customised inorganic filler solutions for future thermally conductive

and electrically insulating polymer compounds Mr. Péter Sebö, Head of Marketing and Market Development, QUARZWERKE GmbH, Germany

10:10 Coffee break

SESSION 5 - NOVEL CONDUCTIVE COMPOUNDS

10:50 Conductive plastic performance enhancement with novel particles

Mr. Jean-Michel Poncelet, Business Development Manager, CABOT PLASTICS, Belgium

11:20 The ecological choice for carbon filled polyamide compounds

Mr. Leonardo Comperatore, R&D Manager, DOMO ENGINEERING PLASTICS, Italy

Opening up design opportunities in lightweight electromagnetic interference shielding 11:50

Dr. Zhen Liu, Head Thermoplastic Unit, CARBONX, Netherlands

12.20

SESSION 6 - ANTISTATIC AND DISSIPATIVE SOLUTIONS

13:20 Antistatic masterbatches based on TPU; reviewing performance, processing, and applications Mrs. Anja Oltmanns, Key Account Sales Manager, BASF POLYURETHANES, Germany

Novel bio-based additive for permanent anti-static polymer 13:50 modification; reviewing performance and applications
Dr. Clio Cocquet, Market Development Manager, Antistatic, Breathable and Industrial Applications, ARKEMA, France

14.20 Coffee break

SESSION 7 - MEASUREMENT AND TESTING

Characterising thermal conductivity of polymer compounds 15:00 and composites; selecting and comparing test methods Mr. Jarett Nickerson, Commercial Director, C-THERM TECHNOLOGIES Ltd., Canada

15:30 Measurement and simulation methods for the thermal behaviour of injection molded components made of thermally conductive plastic Mr. Jochen Gaiser, PhD Student UNIVERSITY OF APPLIED SCIENCES KARLSRUHE, Germany

16.00 Conference ends

AMI reserves the right to alter the programme without notice. The latest programme, including any new speakers, changes to the schedule, and any amendments to pricing and terms and conditions can be viewed on our website: www.ami.international



Above: **HRSFlow** is showing a family mould application in upper and lower bumper parts

Another highlight is the screw-on Vario Shot nozzle. This permits ready-to-mount systems, designed and produced according to individual customer specifications. Easy assembly and dismantling in the mould are key features, as is freedom from leakage and optimum temperature homogeneity.

> www.hasco.com

HRSflow, developer of the FLEXflow hot runner technology, will showcase a family mould for the production of high quality upper and lower bumper parts in one shot at K2019. Both parts are moulded using PP+14% talc and are characterised by large volume differences: 3,333 cm³ and 2,170 cm³ respectively. The use of FLEXflow produces surfaces without any flow marks and an accurate control of deflection on each component. The mould is equipped with a 21-nozzle, electricallydriven valve gate hot runner system including two angled nozzles.

A second family mould example will be the hot runner system for one-shot production of three high-quality PP parts for a car interior door module, with volumes of 560 cm³, 338 cm³ and 58 cm³ and wall thickness ranging from 2.3 mm to 3 mm. The mould is equipped with an 8-nozzle, electricallydriven valve gate hot runner system designed for sequential injection moulding, allowing for a cycle time of approximately 55 s. Both hot runners are equipped with the new FLEXflow one manifold servo driven valve gate cylinders with reduced cut-out, higher accuracy and enhanced repeatability.

> www.hrsflow.com

Husky is making the packaging market a central focus for its presence at K2019. It says a new generation of shoppers is demanding more choice and unique, personalised products, which drives plastic producers to develop more package

designs of different sizes, shapes and colours. Among the technology it has on show to meet this development in the packaging sector, the new versatile HyPET5 PET systems portfolio will make its debut. Husky is also demonstrating its flexible, lower cavitation NexPET system and mould. For the first time, Husky will also be running its high-productivity HyPET HPP5e system, which it says delivers design freedom, energy savings, system reliability, superior preform quality and user friendliness.

The heightened focus on sustainable packaging is addressed by Husky technology for using more PCR, including PET preform moulding systems capable of handling recycled content and PCR options for Multi-Layer Technology.

Husky is also showcasing its technology for moulds and hot runners. Innovative products include the new Ultra Helix 250 T2 valve gates, which are designed to improve part quality and maintain superior gate quality for millions of cycles for small parts with difficult to access gate locations. It is also showing its latest family of Altanium Mold Controllers, providing accurate temperature, integrated servo and valve gate control.

> www.husky.co

Kistler, the mould cavity sensor and process monitoring technology company, has incorporated artificial intelligence into its latest offering for injection moulders, called ComoNeoPredict. The company says: "Maximum quality can be achieved thanks to this method of calculating the properties of manufactured parts in advance."

A virtual production network on the Kistler stand will visualise live data from partner companies operating its ComoNeo platform during K2019. ComoNeo offers features such as process monitoring based on cavity pressure for conventional and multicomponent injection moulding (ComoNeo-Merge). The system also enables automated switchover of the machine based on cavity pressure (ComoNeoSwitch) as well as balancing of hot runner control systems (ComoNeoMultiflow). All quality-related process data generated with ComoNeo can be transmitted to higher-level systems such as MES or ERP.

> www.kistler.com

Koch-Technik is introducing its new Ekon range of dryers at K2019. The company has combined the advantages of its CKT and EKO drying concepts in this new dryer. The concept of the heat exchanger with the piping system taken from the EKO dryers has been further improved in the Ekon series. As



the heat is recuperated, energy consumption is reduced by 20 to 30%, depending on the material drying temperature. The company's patented energy management intelligently adapts to the drying process to save energy and protect the material. Ekon is available in eight sizes ranging from 110 to 2,000 m³/h.

> www.koch-technik.com

KraussMaffei is bringing together its recompounding technology and injection moulding and digital capabilities in a circular plastics production demonstration at K2019. PP buckets moulded on a KM GX 1100 injection moulding machine will be regranulated and the material fed into a ZE28 extruder as part of the Edelweiss recompounding set-up, where a talc filler and liquid colour from Rowa Group will be added. After underwater pelletising and drying, the recompound is fed to an all-electric PX 320 injection moulding machine, and then the PP is formed into a panel for an automotive A-pillar. The component surface forms an over-moulded layer of fabric. KM's APC Plus control monitors the injection moulding process and adapts it continuously to balance fluctuations between batches.



The group announced in July it was combining its **Netstal** subsidiary under the common company brand of KraussMaffei, with the Netstal name continuing as a product brand for the Elion, Elios and PET-Line machines that the Swiss subsidiary manufactures. "With the common portfolio, the company wants to present itself even more effectively, first and foremost in the medical technology and packaging industries," says the group. Enabling faster response times under the new strategy, the K

The KM GX 1100 injection moulding machine features in a circular plastics demonstration by KraussMaffei at K2019

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Above: Milacron will show the new Q-Series machines which are available for quick delivery show presents an opportunity to make the new direction clear. While the GX 1100 in the demonstration reported above shows the group's capability with large items in the packaging sector, in an adjacent demonstration a Netstal Elios 4500 machine is producing six round dishes with IML decoration (each weighing 250 g) in less than 3.5s.

In medical technology, the group says the focal points of the fast-running Netstal Elion 800 machine are likewise output quantity and highest precision. This machine is producing 16 syringes in COC under cleanroom conditions. On the other hand, the smallest all-electric KraussMaffei PX 25 machine with a clamping force of 250 kN, demonstrates challenging medical micro-moulding, making an LSR micro membrane with a shot weight of only 0.3 g in an 8-cavity mould in 14s cycle time.

- > www.kraussmaffei.com
- > www.netstal.com

Maguire has rebranded its vacuum resin dryer range (previously called VBD) as Ultra Low Energy and is showing the technology on its stand at K2019. The company says that in a typical material drying example for a process running at 220 lb (100 kg) per hour, for 6,000 operation hours per year, an average desiccant dryer might run at 60 W per lb of material, versus the Ultra Low Energy Dryer that would run at 19 W per lb.

As well as financial savings, the technology also benefits the environment. In the example cited above, Maguire estimates that a saving of 54,120 kW per year is realised. The Ultra Low Energy Dryers are available for throughputs of 150, 300, 600, and 1,000 lb/hr (68, 136, 272, and 454 kg/hr). (Read more about Maguire in the Materials Handling feature.)

> www.maguire.com

Milacron says its new Q-Series product line, which it is showing at K2019, places the latest servo-hydraulic technology in a toggle injection moulding envelope. The Q-Series machines range in size from 500 to 5,500 kN within multiple injection frames,

providing a wide range of flexibility with each clamp tonnage. The machines are part of Milacron's Quick delivery line-up, allowing the machines to be built and delivered to a customer quickly.

Milacron says: "The Q-Series design is inspired by the durable MTs series and the proficiency that was provided by the F-Series. When combined, the globally offered Q-series will provide critical power when it is needed and use less power when it is not."

The group is also showing technology from its other machine ranges. The Elektron all-electric series uses 60% less energy and 90% less water than hydraulic injection moulding machines. This series features a new FEA-optimised clamp design with a greaseless part drop area and no hydraulic oil, making it ideal for cleanroom operations. A robust 5-point toggle system optimises operation utilising large mould opening strokes in a compact design.

The new Maxima Performance Series enhances Milacron's Maxima platform to deliver faster cycle times, wider platens, a precision greaseless clamp guided on linear bearings, and integrated auxiliary capability. In addition, Milacron says the Maxima Servo is one of its most energy-efficient machines, providing up to 70% energy savings over similar machines.

The new Cincinnati is a large tonnage, two-platen machine designed to meet the needs of the automotive, appliance and other large part moulding markets. The Cincinnati's enhanced machine specifications and performance are powered by Fanuc servo motor power packs for improved reliability, higher max mould weights, faster clamp speeds, and added tonnage sizes.

The Milacron stand will also display products from the group's Mold-Masters, DME, Tirad and Cimcool businesses. Hot runners specialist Mold-Masters will show the new TempMaster M3 controller platform which incorporates an innovative connection system and an algorithm-based control technology. DME is launching a major expansion in its mould components range, adding 15 new product ranges and enlarging the standard offering in another 11 ranges. DME guiding systems now include new ball guiding units with and without collar, guide bushes for pusher guides, self-lubricating ball guide bushes for ejector set with graphite inserts for permanent lubrication, recirculating ball bushing for ejector set with unlimited stroke length as well as threaded bolts and inserts for ejector set and many more. New additions to the self-lubricating guiding systems support your applications with high resistance to wear and very good emergency operating features.

> www.milacron.com

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Moretto is showing its X Comb dehumidifying dryers, which have been extended to serve higher production needs than before. The electric dryers are equipped with turbo-compressors, zeolite technology, and Moretto's Dew Point equaliser. X Comb dehumidifiers are intended for highly hygroscopic materials. The compact ON series is suitable for installation directly on the mouth of the processing machine. The Side series includes larger models handling up to 24 kg/h and are positioned next to the machine. Moretto's Moisture Meter can also be installed on the X Comb series. This analyses and detects the exact content of residual moisture levels down to 15 parts per million. (Read more about Moretto in the Materials Handling feature.)

> www.moretto.com

Motan-Colortronic is introducing the Metro SG HES single-phase hopper loaders for granules, which will be available in four throughput sizes from 15 kg/h to 200 kg/h. It says this new range of hopper loaders enables cost-effective and efficient automation of important areas of the production process. All units of the Metro SG HES are equipped with their own control, which recognises when material is needed and automatically starts conveying. This keeps machines running and avoids costly downtime while eliminating material wastage.

The control of the hopper loaders includes the control of the optional Metromix proportioning valve, which enables regrind and virgin material to be reliably added and mixed. When connecting the loaders to a suction box with line purging, the material feedline can easily be cleared of any material after every conveying cycle, due to an integrated line purging function.

When conveying from a beside-the-press granulator, the loader will not immediately start even if the supply signal has been received from the sensor, allowing for the granulator suction box to fill up with a specific amount of material first. This prevents the need to constantly be switching the loader on and off, so saving energy and maintenance costs. (Read more about Motan-Colortronic in the Materials Handling feature.)

> www.motan-colortronic.com

Negri Bossi is showing the Nova s600T, a new machine size in its Nova sT range that is now available from 600 to 1,300 tonnes. The range has a unique toggle system that has the benefits of a traditional toggle system but with a footprint close to that of a two-platen machine. The machines come with the latest generation servo-hydraulic



system for maximum performance and energysaving, combined with the patented Motus controller with its virtual object system for axis movement. This machine is shown at K2019 making a folding crate, which is removed by a Sytrama robot and placed on an assembly station.

The group is displaying two Nova eT all-electric machines which are aimed at the packaging, closure, medical and optical moulding sectors. The machines, ranging from 50 to 350 tonnes, feature the smart flex two clamp units specially designed for electric actuation and for reduced dry cycle times. They also feature generous tie bar spacing, fast injection speeds, and the group's Tactum multi-touch controller with scroll, zoom and swipe capability.

The Nova e130T on the stand is producing roll-on packaging in a new patented method for blown bottle production. The second Nova eT is a 220-tonne model producing glass with a side entry Sytrama robot removing and placing the parts into a bagging line.

The fourth machine on the stand is a 330-tonne servo-hydraulic machine making a broom brush using Negri Bossi's FMC foaming technology. FMC is a technique of moulding with gas (nitrogen in microcellular form) which reduces the weight of the product and eliminates aesthetic defects. The application uses a wood-plastic compound as the raw material.

> www.negribossi.com

Piovan will present products from with its brands, Piovan, Aquatech, Fdm and Penta, at K2019, showing its expertise in everything from drying to temperature control, from traceability of the raw materials to solutions for Industry 4.0, to provide complete turnkey solutions.

Piovan's new GenesysNext PET drying system will get its world premiere, which is distinguished by self-adaptive technology that is now also optimised for the treatment of recycled PET. The new dryer can automatically manage the drying process by setting all the critical parameters: from the process air flow rate to its dew point value,

Above: Negri Bossi's new Nova s600T machine



Right: Piovan's new Genesys-Next PET drying system has self-adaptive technology to maintain optimum process conditions

Below: The

Sepro stand will feature a

Demag

7 robot

capable of

out of the mould space in

under 1s

Sumitomo (SHI)

machine with

an SDR Speed

getting in and

from the residence time to the temperature, thereby maintaining optimum operating conditions. The company says "significant" improvements have also been made to the AIPC (Automatic Injection Pressure Control) technology that ensures the lowest production cost for each preform.

For the medical sector, Piovan has developed Exacta, a new microdosing unit able to feed the machines even with

only one granule at a time, whilst maintaining very high accuracy. The medical range is also complemented by machines suitable for clean rooms, such as the Pureflo filterless receiver, which requires neither compressed air nor maintenance, and the emission-free DPA dryer.

The Easytherm range of temperature control units is now complete with the launch of new pressurised temperature controls that will complement the line of atmospheric temperature controllers. There are also innovations related to the DigitempEvo water-cooled thermochillers that ensure high performance whilst keeping energy consumption levels very low. (Read more about Piovan in the Materials Handling feature.)

> www.piovan.com/en

Rapid Granulator will unveil what it calls "the biggest innovation in slow speed granulation in years" with the launch of Rapid OneCut Pro at K2019. Processors of brittle materials such as glass-fibre reinforced plastics primarily rely on slow speed granulators. The new granulator allows injection moulders to adjust the RPM range when granulating at a slow speed from the standard 25 RPM to a bandwidth of 15-35 RPM (plus/minus

SPEED 7

Genesys Next

Provan

40% rotor speed) to optimise the quality of the reground material.

The company says that using the Rapid OneCut Pro granulator leads to reductions in dust, noise and energy consumption. "For processors facing capacity limitations, operating at a higher speed level will allow them to overcome capacity constraints, boosting operational output. The torque level of the machine is maintained, regardless of the

speed at which it is running," says Rapid.

Rapid Granulator will have four OneCut Pro machines running on its stand and it is inviting customers to bring their materials along to be tested during the show.

> www.rapidgranulator.com

RJG will be presenting new process control and networking systems for injection moulders' Industry 4.0 applications at K2019. These systems include: the Hub, for remote access to data of all machines and advanced analytics to increase visibility and decrease liability; the CoPilot, for collecting machine and cavity pressure data, controlling processes and knowing when a process deviates; TZero Template Transfer, which, during a tool launch, predicts plastic flow and creates a set-up sheet before the mould is made; and Machine Independent Variables, which can validate a mould and then enable it to be moved from machine to machine with minimal revalidation.

https://rjginc.com/

Sepro will have eight robots operating on its stand, including 3-, 5- and 6-axis models as well as collaborative units (cobots), provided through a recently announced partnership with Universal Robots. Sepro products will also be operating on the stands of eleven injection machine partners. Several of the robots on Sepro's stand will be part of automation cells centred around two operating moulding machines.

One cell will feature a Sumitomo Demag machine producing a technical component that will be removed from the mould by an SDR Speed 7 robot. Made by Sepro especially for sale with Sumitomo Demag machines, this robot is a special high-speed version of Sepro's S5-25 3-axis Cartesian robot capable of getting in and out of the mould space in under 1s.

The other cell will include a Sepro-Universal

Robots cobot together with a Sepro Success 11 cartesian robot operating on a machine from Haitian International, which will be producing drinking cups. As the cups are moulded, visitors watching the demonstration will be able to enter a brief message (a name, for example) to be printed onto a label. The cobot then will apply the label and hand the personalised cup to the visitor. The label and the cup will be recyclable.

> www.sepro-group.com

Sigma Engineering is launching SigmaInteract, which allows users of its SigmaSoft simulation software to share results interactively and in 3D with colleagues, project partners and customers. The company says it encourages interdisciplinary exchange and provides a direct link between the simulation in development and production.

At its stand, showing how virtual DoE is used most efficiently, Sigma is demonstrating the project "Pot Cloth", a collaborative project with Momentive Performance Materials, EMDE MouldTec, Wittmann Battenfeld and Nexus Elastomer Systems. In this project part design and tool construction were done in parallel. Therefore, it was necessary for all

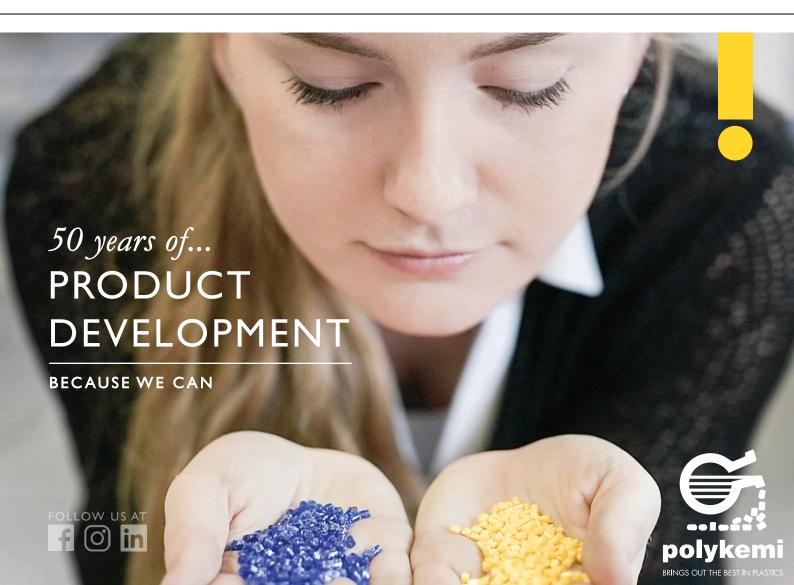


partners to work closely together. Simultaneously, Sigma conducted a virtual DoE for the validation of the part design and the evaluation of the heating concept. Stand visitors can observe the production of the "Pot Cloth" virtual and live, on a SmartPower 90/350 machine.

> www.sigmasoft.de

Sodick, known for its EDM equipment, is launching a range of plastic injection moulding machines to the European market at K2019. The company has made injection moulding machines for over 30

Above: Sodick is showing the GL30 hybrid injection moulding machine











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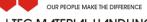












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years, but they have previously only been available in Japan, China and the US.

The GL30, which will be demonstrated at K2019, is a 30-tonne hybrid machine suited to the production of very small, high-precision parts for the medical sector. Unlike the traditional reciprocating screw and check valve, Sodick machines use the V-Line injection method to accurately prepare the shot by weight, filling the component in a precise and repeatable process. Sodick says this results in more accurate filling and pressurisation of the component. Accuracy is further enhanced by the linear motor drive system which governs the injection plunger, which travels at high speed to reduce the viscosity of the melt.

The GL30 is capable of linear injection speeds in excess of 1,300 mm/s and can achieve and maintain this speed within a 5mm shot size whilst accelerating and decelerating within 1mm of plunger movement.

> www.sodick.org

Stork IMM and Brink are combining their expertise at K2019 in two automated IML packaging demonstrations. A 7,000 kN clamp force, Stork Food-Line hybrid machine with an electric clamp is being shown with side-entry Brink IML and take-out automation. The cell will highlight high-speed performance in producing a 250 g food container in an 8-cavity mould.

In the second demonstration, a fully electric 4.400 kN Stork Food-Line machine is shown with a side-entry Brink IML and take-out automation cell. This system is producing a 1.5l cheese container in a 2-cavity mould with reduced energy consumption.

- > www.storkimm.com
- > www.brinkbv.com

Sumitomo (SHI) Demag says it will "unveil its fastest, most energy efficient, sustainable, data-driven integrated machine line-up at K2019". Spotlighting the digitalised production trend, a connected

> DEMAG SUMITOMO

Right: Sumitomo (SHI) Demag has started selling its new all-electric IntElect Multi machine for multi-component moulding

cell will feature the latest remote diagnostics, online support, document tracking and spare part ordering. Visitors to the company's stand will be able to use connected terminals to see how its myConnect software will enhance customer service and help enable future data-driven efficiency improvements.

In September, Sumitomo (SHI) Demag started selling its new all-electric IntElect Multi machine for multi-component moulding. The series is initially available in three machine sizes - 100, 130 and 180 tonnes. For moulders who want the option of transforming their existing moulding system into a multi-component machine, it is launching the eMultiPlug at K2019. This "plug-in" unit can be retrofitted to an existing machine, making multicomponent injection more cost-efficient and feasible.

Sumitomo (SHI) Demag is bringing two energyenhanced El-Exis SP machines to K2019, consuming up to 20% less energy than its predecessors. In automotive, the group will demonstrate a new "touchfoil" interactive decoration for a vehicle console on an IntElect 500 machine being unveiled at the show.

The group will also demonstrate its technical LSR capability by moulding light guides for a matrix light on a special version of the IntElect 130. The IntElect S 180-tonne is another new machine being unveiled. It is targeted at mass manufacturers of medical plastic components and has been designed for narrow-tolerance applications requiring fast cycle times between 3s and 10s.

> www.sumitomo-shi-demag.eu

Trexel says the first live demonstration in Europe of its MuCell P-Series for micro-cellular foam in thin-wall packaging will happen during K2019. The company has adapted its MuCell gas dosing process to meet the demands of fast cycling thin-wall packaging. MuCell P-Series enables lower part weights, increased L/T, reduced clamp tonnage and lower injection pressures, says Trexel. The P-Series will be in operation on the stand of partner company BMB, where it will be used in the moulding of 500g margarine tubs. Partners

in the in-mould labelling cell include StackTeck, Machines Pages, Verstraete and Borealis.

> Trexel will present on its stand an expanded range of the TecoCell line of advanced chemical foaming products, which it developed to complement the

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MuCell physical foaming technology.
Through the exclusive use of nano-sized (<=0.08 micron) CaCO3 particles, TecoCell produces the smallest cell size and highest quality surface appearance achievable through chemical agents, according to Trexel.

The company's MuCell
Tip Dosing Module has a
design that is gentle on
fibre-filled resins, provides
greater output and
requires less space
compared to traditional MuCell
screw designs. The smaller
footprint allows for the option
to bolt the TDM onto an
existing barrel in place of the
endcap to easily upgrade an existing injection
moulding machine with MuCell.

> www.trexel.com

Wilmington Machinery is using K2019 to explain how it meets specific application needs of customers in structural foam moulding of large products. In illustration, the company says it recently built and installed two vertical structural foam presses for a customer looking for a machine with ease of mould setup, reduced mould costs and reduced floor space.

The two vertical low-pressure structural foam presses have a 125 lb shot capacity each. They accept from one to six moulds mounted and produce from one to 20 components on each cycle. Each of these moulds is filled independently and precisely by Wilmington's Versafil injection system that sequences the mould fill and provides individual shot control to each mould. The machines also have energy saving servo hydraulics.

> www.wilmingtonmachinery.com

At K2019, **Wittmann Battenfeld** will for the first time exhibit in Hall 15 (on Stand C06), which provides the company with an additional 120m² of exhibition space. It says it will showcase intelligent machines with adaptive algorithms, which adjust themselves to the ambient conditions. This will be demonstrated with an all-electric EcoPower 55/350 machine equipped with the software packages HiQ-Flow, HiQ-Melt and HiQ-Metering. A W918 robot and all auxiliary appliances connected with the machine, as well as the TEMI+ MES system, are integrated in the machine's Unilog B8 control system via Wittmann 4.0. The electronic mould data sheet will also be used on Unilog B8. The

production cell linked together via the Wittmann 4.0 router is able to check whether the connected auxiliaries are sufficient for the selected product data set, or if additional equipment is needed.

Demonstrating the HiQ functions, an EcoPower 55/350 machine will produce PC clothes pegs.

The HiQ-Flow function will automatically compensate the effect of material viscosity fluctuations, ensuring stable parts quality and eliminating scrap. To avoid plastic waste, pieces of sprue and bad parts deliberately produced for demonstra-

tion purposes will be re-granulated in the new G-Max 9 granulator from Wittmann, and then directly returned to the machine hopper via the vacuum conveying device connected with the granulator.

PHOTO

WITTMANN

New machine launches at K2019 include the VPower Combimould vertical model for multicomponent moulding. The VPower 120/130H/210V will make a plug in PA and TPE for the automotive industry in a 2+2-cavity mould. The automation system involves a Scara robot and a WX142 linear robot, which insert the wrap pins, transfer the preforms, then remove and deposit the finished parts.

A medical version of the high-speed EcoPower Xpress 160/1100 machine will produce PET blood tubes in a 48-cavity mould. A special drying hopper is mounted above the injection unit, where the granulate is dried by a frequency-controlled Drymax 300 dryer from Wittmann. In automotive, Wittmann Battenfeld will demonstrate its Cellmould structured foam technology, using a MacroPower 1100/12800 with servo drive to produce a seat bench support for a German sports car in PP.

One of Wittmann Battenfeld's main application technology themes at K 2019 will be silicone injection moulding. Using an EcoPower 160/350 machine, it will produce an LSR valve for medical technology.

Wittmann's wide range of robots and auxiliary equipment will also be represented at K2019. An example is the new Tempro plus D100 temperature controller. Like other Wittmann auxiliaries, the unit can be fully integrated in the control system of a Wittmann Battenfeld injection moulding machine. (Read more about Wittmann in the Materials Handling feature.)

> www.wittmann-group.com

Left: The new Wittmann Battenfeld VPower 120/130H will be shown at the group's new stand in Hall 15

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A wide range of new dryers, loaders and feeders are being launched at the K2019 show this month. Peter Mapleston takes a look at new developments

iotan

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In the run-up to K2019, ancillary equipment producers have been previewing numerous innovations in materials handling, particularly in drying systems and gravimetric loaders. Buzz words like Circular Economy and Industry 4.0 will be hard to avoid at K2019. Here is a quick look at some of the new offerings visitors to the Düsseldorf show will be able to see this month.

Dryers of all types

Piovan's GenesysNext gets its world premiere at K 2019. Part of the Genesys range, this drying system features intuitive control and "self-adaptive" technology that is optimised for the treatment of virgin and recycled PET in production of preforms. "Significant" improvements have also been made to the AIPC (Automatic Injection Pressure Control) technology that Piovan says ensures the lowest production cost for

each preform, not only through energy savings, but also through optimisation of the entire preform production process, which leads to increased preform quality and reduction of rejects.

The new Luxor CA A compressed air dryer from Motan-Colortronic is designed for small to medium material throughputs. The dryer, which operates in a temperature range from 30 to 180°C, can be installed directly on top of the

> processing machine or on a mobile frame. It is available in four sizes with bin volumes of 8, 15, 30 and 60 litres respectively.

Moretto is presenting its newly extended range of X Comb dehumidifiers, which now cover higher production needs than before. These mini dryers are fully electric (they do not use compressed air), they are equipped with powerful turbocompressors, zeolite technology,

and Moretto's Dew Point equaliser.

Left: The Luxor CA A dryer from Motan-Colortronic

X Comb dehumidifiers are intended for highly hygroscopic technical materials. The compact ON series is suitable for installation directly on the mouth of the processing machine. The Side series includes larger models handling up to 24 kg/h, with the

> installation, not surprisingly, next to the machine.

As with all Moretto dryers, the Moisture Meter can also be installed on the X Comb series. This analyses and detects the exact content of residual moisture levels down to 15 parts per million.

Wittmann Aton dryers use something called segmented wheel technology, which the company says has been continuously refined since its intro-

duction around 10 years ago. "While the original overriding goal was to achieve a constant dew point behaviour even under the most difficult conditions, users very soon started to demand particularly energy-efficient solutions," the company says.

To cater to the increasing trend towards production equipment integration, an interface solution was created for Wittmann 4.0 (which enables the connection and use of injection moulding machines, robots and auxiliary equipment via Unilog B8 control units on the Wittmann Battenfeld injection machine), and the Wittmann dryers were also equipped with larger touch screens. The Aton segmented wheel dryers, which sit beside the machine, can handle a dry air volume ranging from 30 to 120 m³/h.

The latest Aton generation includes a battery dryer model, the Aton H1000, which debuts at K2019. This dryer, frequency-controlled in all versions, is the first segmented wheel dryer for

central plants. It can handle a dry air volume of 1,000 m³/h, which can dry 500 to 600 kg/h of granulate. The drying wheel, consisting of numerous segments, is loosely filled with a desiccant, and is rotated via a low-maintenance chain drive, so that a molecular sieve which is always fresh is available for the air to be dried, in order to maintain a constant, low dew point.

The unit comes with several different adjustment options, including dew point-controlled drying. LEDs in different colours inform operators at a glance about the current status of the dryer. The appliance has the obligatory touch screen user interface, where the temperatures and the dew point are displayed.

Maguire will be showing its Ultra Low Energy vacuum dryer at the show. The company says it is significantly more energy-efficient than conventional drying systems. Both use the same amount of energy to bring the material up to drying temperature from ambient temperature, but the energy used during drying is dramatically different. According to Maguire, a desiccant dryer uses ten times the energy of an Ultra dryer in this phase.

The dryers have a touchscreen that enables users to show the process graphically. Load cells on the vacuum chamber and retention hopper allow the drying rate to match the process rate. A pre-heat hopper that is smaller than most means the unit holds less material in the process, so it uses less energy.

Ultra dryers also feature fast drying times using vacuum as the main method. "Typically this is one-sixth of the drying time of a conventional desiccant dryer," says the company. So, for example with polycarbonate, which a desiccant dryer can take three to four hours to dry, an Ultra will take 30-40 minutes.

Maintenance requirements should also be lower, since there is no desiccant to replace, no process filter to clean, and no chilled water connections. Maguire provides a five-year warranty.

Chris Crittenden, a director at Maguire IMEA, says the touchscreen "fundamentally changes how an operator can use the dryer. We equip each dryer with two pairs of load cells, one pair on the vacuum chamber and one pair on the material retention (feed) hopper. This allows us to then make the software far more intuitive - so an operator can see

> exactly what the status of the dryer is, how much material is in process, what the demand on the dryer is and exactly what the 'live' consumption is. Seeing exactly what is in process down to the last gramme allows us to add more interactive software functions like Dynamic Drying - where the system sees the demand for dried materials go up or down and automatically increases or decreases the material in process. This is more energy efficient and better for technical raw materials."

> > The dryer also has im-



PHOTO: MORETTO

Above:

Moretto's X

Comb dryer





proved auto start and auto stop features. "When you want the dryer to stop drying a grade of material at 6pm, it will automatically stop at that time, but most importantly it will stop empty, so as to allow a very rapid and efficient clean-down process, and then a fast start-up of the next grade," says Crittenden.

Conveyors and loaders

There's quite a lot going on in loading systems, too. Metroflow is Motan-Colortronic's brand of gravimetric loaders using vacuum conveying for precise material throughput control. They are used in pneumatic conveying systems, for example to convey material from a silo to a drying bin or to the processing machine. Motan-Colortronic says the Metroflow loaders use extremely precise weighing technology, making them particularly suited for monitoring material consumption in real time, "which means that the units are predestined for use in an Industry 4.0 environment."

The company has extensively reworked and expanded the Metro range of individual material loaders. Metro G (G stands for granulate) types are for large material throughputs. The Metro R was designed for processing regrind, and Metro F (Flakes) loaders units are designed for processing flakes. All are now available in three sizes - with 60, 100 and 150 litre capacities. Because flakes do not flow freely and are prone to bridge-building, Metro F loaders are equipped with an extra-large outlet flap.

Metro SG material loaders are budget versions for standard applications, and are said to be quick and easy to install. The new MetroVac SG conveying station with conveying control, blower and central dust filter, which can supply up to eight material loaders and four purging valves, is compatible.

The new Metronet SG conveying control

provides the matching control, from which eight material loaders and one stand-by blower can be managed via its colour touchscreen display.

Wittmann will demonstrate the latest development of its gravimetric blenders from the Gravimax series. Latest models of the G series are designed for applications requiring material throughputs of more than 700 kg/h. The new Gravimax G76, for example, can handle 7 kg per dosing cycle and blend in up to six components.

Wittmann says that, despite the large quantity of material, real-time weighing technology makes it possible to reach a reproducible dosing accuracy of 0.05 % in the ratio of virgin material to additive. The material containers are virtually free of interfering edges that could obstruct material flow. From these material containers, each component is metered into a weighing container by pneumatic dosing sliders.

Depending on the material, the dosing sliders can either be opened for a set period to let the material flow freely, or they are opened in pulsed intervals until the desired quantity of material has been reached. After weighing, the materials flow into a spherical mixing container, where they are mixed into a homogeneous blend by a spiral-shaped device. A new software package, GraviLog, allows various material quantities and dosing deviations to be documented. Gravimax G76 is also capable of bidirectional data exchange via OPC UA.

Micro-dosing

Piovan will present a new micro-dosing unit for the first time. This unit can feed machines even with only one granule at a time, while maintaining very high accuracy to meet requests that come mainly above all from highly technical sectors such as the medical sector and precision micro-moulding. The medical range is also complemented by machines suitable for usage in clean rooms, such as the Pureflo filterless receiver, which requires neither compressed air nor maintenance, and the emission-free DPA dryer.

Conair says its new TrueFeed Micro Feeder also can count and dispense standard and micro pellets one by one. It is designed for dispensing ultra-low doses - fewer than five pellets per second. The user inputs the number of pellets per gram into the controller, together with the required dosing, calculated production rate, and operating mode (injection moulding, extrusion, or batch), and the Micro Feeder does the rest. Standard or micro

Above: Wittmann's Gravimax G76 blender

PHOTO: WITTMANN

pellets are captured on a proprietary dosing wheel, where they are optically counted using a light signal and dispensed.

The feeder has an 8-inch multi-function touchscreen with a graphical interface. One control can operate one or two feeders. Two Micro Feeders can work together, or one Micro Feeder can be paired with a larger, standard TrueFeed feeder.

TrueFeed Micro Feeders feature 3D-printed metal-powder construction and an extremely compact design - less than 200 mm in length. Standard models are equipped with a clear, top-mounted material hopper, suited for hand feeding, but may be optionally equipped with a mini loader that fits atop the hopper and connects to an air supply.

Moretto is also proposing a series of solutions dedicated to "micro" conveying for the feeding and conveying of small quantities of technical materials. These have very compact feeders, ideal for installation on stand-alone machines, on drying and dosing systems or directly on the throat of the processing machine. These conveying systems include models specifically indicated for the use in clean rooms.

For micro-dosing, Moretto offers DPM, available in single-component versions and up to 4 hoppers. Pulsed dosing is immune to vibrations and does not require a mixer thanks to the simultaneous dosing of the components, the company claims.

DPK is a compact precise weight-in-loss dosing system, suitable for the dosing of small amounts of masterbatch or additives. Dosing accuracy of up to \pm 0.03% is possible. The masterbatch or additive to be dosed is contained in a hopper built in a specific transparent resistant acrylic material, free from electrostatic charges, which makes immediately visible the content material and the level of load and avoids the stop of material on the hopper walls. The hopper is easily removable without the use of tools and, together with the intelligent

storage and recognition system of the masterbatches alongside

Left: The new TrueFeed Micro
Feeder from Conair makes it
possible to count and dispense
standard and micro-pellets
one-by-one, giving processors
the ability to manage ultra-concentrated additives or to feed
very small injection moulding
processes with precision and
cost-saving accuracy



the machine, the recipe change is even more immediate.

DGM Gravix batch gravimetric dosing units incorporate a "Vibration Immunity System" and "double eyelid system" to enable them to dose with a precision up to 0.01%, even on machines constantly vibrating. They cover dosing requirements for granule, powder and flakes materials. Applications dedicated to micro dosing, such as Rotopulse, make these machines extremely flexible, Moretto claims.

Maguire's MGF gravimetric feeders now have what the company calls a 100% colouring feature, specifically for injection moulding. The feeder, for dosing small quantities of concentrate or additive into the injection machine barrel, uses two signals, one during screw recovery and one during injection. "This ensures 100% dispersion achieved through a control algorithm to achieve consistent colouring, so all material in barrel is now coloured, eliminating gaps," says the company.

Intelligent controls

Motan-Colortronic highlights its new AlarmCollector, which it says is a simple and cost-effective way to centrally display alarms in the system. "In addition to the ease of use and setup of the digital display of alarms, the AlarmCollector boasts a sleek design and user-friendly interface," it says. The output of the alarms is possible on any Internetenabled device.

Moretto highlights One Wire 3, which automatically manages and supervises the entire conveying process of small or large quantities of material, using advanced FIFO (First In First Out) logic. One Wire 3 also controls devices designed to help optimise conveying and feeding. These include the Dolphin manifold unit, which automatically sup-

PHOTO: CONAIR

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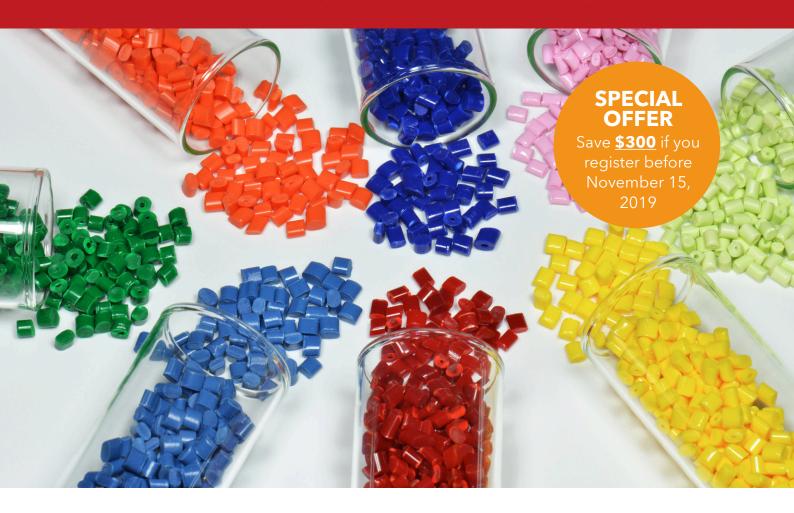
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plies and distributes all materials to all machines.

The company's KruiseKontrol will be in the spotlight too. Moretto says this is "the only automatic and intelligent system in the world capable of defining the best transport conditions for each plastic material". It manages the speed of the material during the conveying phases, eliminating the peaks and the consequent formation of angel hair and wear of the pipes.

At K 2019, numerous companies in the materials handling arena will be highlighting their contribution to the Circular Economy, which is a theme of the show. Motan-Colortronic, for example, is involved in the presentation of a closed material and processing cycle on the KraussMaffei stand. There will be a drying system incorporating energy-saving technology and a new residual moisture sensor, material loaders, and a Gravicolor 30 gravimetric dosing and mixing unit. All components in the production cell are connected via an OPC-UA interface with a central data collection point.

Moretto will participate, in collaboration with a well-known (but, at the time of writing, unidentified) OEM, in a demonstration unit dedicated to the production of coffee cups made with biopoly-



mers: a 100% organic product, washable and reusable up to 500 times.

Left: Motan-Colortronic's AlarmCollector is browserbased with no need for additional software, so all plant-wide alarms can be viewed and processed on any device

CLICK ON THE LINKS FOR MORE INFORMATION:

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Exploring opportunities for foamed polymers

Foamed polymers offer a whole raft of potential benefits, ranging from weight, material and energy savings to improved performance and cost effectiveness. But maximising the gains means understanding and successfully implementing the very best technologies. AMI's seventh European Polymer Foam conference brings together key technical experts and decision makers from end-users, foam manufacturers, testing companies and universities, as well as leading materials and technology providers, to discuss and explore the latest innovations and end-use applications involving polymer foam.

Taking place in Hamburg, Germany, on 26-27 November, the Polymer Foam conference will explore new opportunities for polymer foams in end-use markets, will examine regulatory developments and how they may impact on the use of foamed materials and blowing agents, and will identify end-use requirements, innovative production techniques and new material combinations. Covering all foaming solutions, a key attraction of this well-established event is the opportunity it

provides attendees to find out more about their own business sector as well as learning from ideas being successfully applied in other foaming areas. This article previews the event and takes a look at the line-up of expert speakers.

Aerospace ideas

Polymer Foam will be opened by **Ingo Roth**, who is responsible for Research & Technology Cabin and Cargo Interior and Materials at **Airbus** in Germany. He will explain how foam is being used to reduce weight and increase functional integration in aerospace applications. He will be followed by **Norbert Hessenberger**, Head of Innovation & Development at **Greiner Aerospace** in Austria, who will detail some innovative foam solutions for aircraft interior and seating applications.

The focus will then turn to processing innovations. **Yuxiao Zhang**, Research Associate at the **Institute for Plastics Processing (IKV)** at **RWTH Aachen University** in Germany, will take a detailed look at available foam injection moulding processes for packaging applications. Then

Main image:
The newest
foam
production and
development
innovations
will be
discussed at
AMI's seventh
European
Polymer Foam
conference in
Hamburg in
November







Expert speakers at the seventh European Polymer Foam conference include (from left) Cellmat Technologies Manager New Products and R&D Dr Cristina Saiz-Arroyo, University of Toronto Professor Chul B Park, and **Tramaco Technical Sales Manager Dr Thomas Mergenhagen**

Dr Cristina Saiz-Arroyo, Manager New Products and R&D at Cellmat Technologies in Spain, will examine how foaming mechanisms can be controlled to successfully optimise the production of advanced polymeric foam structures. And Prof Dr Volker Altstädt, Professor at the University Bayreuth in Germany, will explore some highperformance flame-retardant foams based on thermoplastic PET and thermoset epoxy resins.

Nano innovation

A full session has been allocated to the topic of nano-fibrillated materials. Han Goossens, Chief Scientist, Technology Management & New Offerings, and Sunamita Anunciacao, Specifications Specialist, at **SABIC** in the Netherlands will kick off the discussion with a joint presentation identifying new possibilities for PET foaming using nano-fibrillated masterbatches. Then Prof Chul B Park, Professor at the **University of Toronto** in Canada, will follow on with details of an investigation into foamability of impact modified polypropylene using nano-fibrillated EPDM rubber.

The final session on the first day will give attendees the opportunity to find out about technical and regulatory developments impacting on chemical

foaming agents. Dr Thomas Mergenhagen, Technical Sales Manager/Quality Manager at **Tramaco** in Germany, will review the basics and highlight some new developments in chemical foaming agents, including some key regulatory changes within the EU. Then Dr Theresa Wassmer, Technical Sales Manager Polymers at Chemische Fabrik Budenheim in Germany, will focus on the sustainablilty theme by exploring innovations in eco-friendly, endothermic foaming agents for thermoplastics.

Progress in PU

The second day of the conference will open with a look at the polyurethane foam industry. Dr Aleksander Prociak, Prof of CUT, Deputy Manager of Department of Chemistry and Technology of Polymers at the Cracow University of Technology in Poland, will present some new research on bio-based PU foams for thermal insulating applications. His presentation will also look at the effects of selected bio-components in this application. Next up is Dr Guillaume Francois, Scientific Software Developer at **Transvalor** in France, who will explain how in situ industrial PU foaming and filling can be modelled using numerical simulation. And Dr Jan-Pleun Lens, Vice President Research and Applications at FRX Polymers in the US, will speak about graphite-free and halogen-free flame-retardant flexible PU foams for automotive applications.

The final session of the conference is focused on extrusion processing. Robert Breuer, Research Associate at the Institute for Plastics Processing (IKV) in Germany, will look at the production of polypropylene foam sheet using blowing agent mixtures based on CO₂. And Hilmar Heithorst, Product Management CoC Flat Products at Kraussmaffei Technologies in Germany, will explore some of the newest extrusion technologies for PET foams.

About Polymer Foam EU 2019

Polymer Foam EU takes place at the Maritim Hotel in Hamburg, Germany, on 26-27 November 2019. The event brings together expert speakers from foam end users, manufacturers, testing companies and universities, as well as materials and technology providers. Over its previous six editions, the conference has established itself as the place to learn about foam market opportunities, end use requirements, regulatory developments, novel production techniques, and innovative material combinations.

Aside from the formal programme, the informal lunches and refreshment breaks and the complimentary cocktail reception at the end of the first day provide plenty of opportunity for discussion and networking. To find out more, visit the Polymer Foam conference website or contact Conference Organiser Katie Edwards. Tel: +44 (0)117 314 8111; Email: katie.edwards@ami.international











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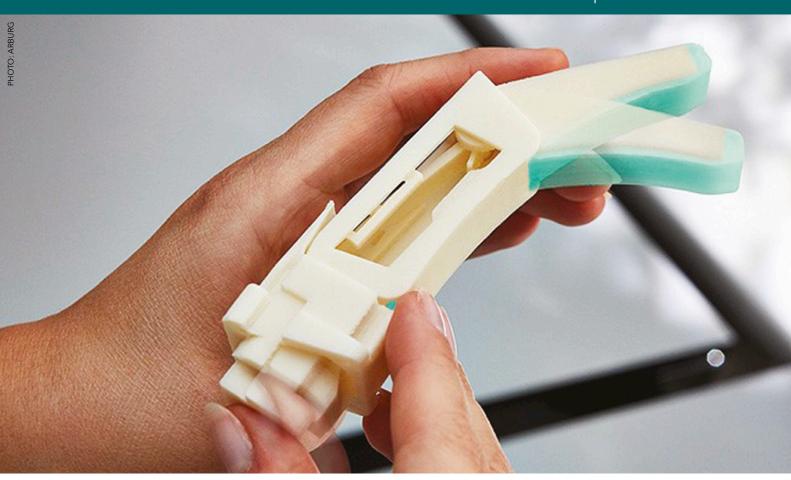
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Accelerating the product development process

3D printing continues to expand into the manufacturing environment. But prototyping and mould-making remain the main areas where moulders can gain benefits. By Mark Holmes

In the past six years the global 3D printing market has more than doubled. By 2020, analysts estimate the sector will be worth \$3.1bn. In comparison, the global plastics moulding market is forecast to reach \$690bn by 2023. While claims have been made for 3D printing/additive manufacturing to move into mass manufacturing areas, it remains the case that short bespoke production runs and, in particular, prototyping and product development will continue to be the mainstay of its market penetration.

Nevertheless, 3D printing certainly has much to offer the injection moulder. "While we cannot knock the level of innovation happening in the 3D printing space, in reality additive manufacturing is not the universal panacea it is made out to be," says Nigel Flowers, UK Managing Director of Sumitomo (SHI) Demag. "Right now, it continues

to perform strongest for prototyping rather than mass manufacturing. Looking to the future, there are exciting developments in both markets. Whether the current global trade wars and currency fluctuations will accelerate demand for onsite production remains to be seen. Yet the idea that 3D printers are about to overthrow traditional manufacturing techniques - including moulding, forging, casting, and even subtractive CNC manufacturing - is simply scaremongering. There is space for all of these technologies."

Cost is a major factor when considering which technology to opt for, especially in the production of plastic parts. "For manufacturing components in high volumes, 3D printing today is currently not fast or cost-effective enough to produce precision parts in large quantities," adds Flowers. "Where 3D

Main image: Moveable gripper fingers made of TPU, ABS and support material produced on Arburg's Freeformer 300-3X

Right: The ability to 3D print functional organs and medical scaffolds on demand is a rapidly growing field printing is beneficial is for prototyping and for generating customised parts in low volumes.
Functionality also plays a big part. Just because you can print anything you want, it does not mean that the design or materials will perform any better than the current methodology of injection moulding."

He says: "For several years now the medical sector has successfully used 3D printing to produce highly bespoke components. Among them prosthetics, implants, hip replacements, hearing aids and even dentures. For these individual parts, injection moulding would not be a financially viable option due to the cost of creating a mould tool. Similarly, aerospace manufacturers are embracing 3D printing to upgrade components and create replacement parts for maintenance, repair and overhaul (MRO) which is big business." He points to a report issued by Airbus, which forecasts MRO spend to double to over \$120bn per year in the next two decades. For those parts which may have a long lead time, a complicated supply chain or no longer be in production, 3D printing offers a viable and agile alternative to the aerospace sector, he says.

Flowers continues: "When designing a prototype using injection moulding, the process can again be quite lengthy. Whereas a 3D printer will let you create the part using the end material, injection moulders will typically use foam and adapt the design until it is approved and the tool can be designed and tested. Here, an industrial 3D printer is often used to scope out and fine-tune the part, which can then be used as a blueprint to design the mould tool. The tipping point for injection moulding will come relatively quickly once mass-production ramps up. Calculating the payback would involve comparing the unit costs and production time for 3D printing and offsetting this against the cost for tooling development, making, testing and shipping the tool, plus the new



GF Machining Solutions has inaugurated its new innovation and production centre for machine tools in Biel, Switzerland. On a total area of 44,000 m², the entire Swiss milling machine and laser production facilities have been brought together. Photo: Georg Fischer



unit costs and any assembly. Typically, a contract mass moulder producing electronic casings estimates a return on investment of 10,000 parts."

Flowers emphasises that there is room for both techniques and technologies. "3D printing is great for iterating designs and we are increasingly seeing moulders using them to test out new concepts and create tooling prototypes," he says. "Rather than pitching the two against each other, recognise that they each have distinct advantages and that the level of innovation will continue to accelerate for both."

GF Machining Solutions, a division of Georg Fischer, has inaugurated its new innovation and production centre for machine tools in Biel, Switzerland. Constructed over two years, GF invested around CHF100m in the new building, which provides space for around 450 employees.

The new centre combines three former GF Machining Solutions' sites in Nidau, Ipsach and Luterbach (all in Switzerland) in one site. On a total area of 44,000 m², GF brings the entire Swiss milling machine and laser production together. The new building, which is also the division's headquarters, provides more than 13,000 m² of space for production and assembly, as well as a research and development facility and application centre. This enables customers to experience the division's portfolio first-hand and attend training courses on-site. GF provides machine tools, automation solutions and customer services for the production of moulds, dies and high value-added metal parts. The division has manufacturing facilities in Switzerland, Sweden, China and USA, and serves customers in more than 50 countries.

The AddUp Group and IPC have joined forces to create **Addilys**, a dedicated platform for upgrading additive manufacturing in the area of tooling and plastics processing. The goal is to provide manufacturers with global solutions, from advice through to maintenance, including tooling design, demon-

strations and manufacturing. The partnership will make it possible to deploy customised and optimised thermal solutions, particularly for plastics processors and on an industrial level, through the use of conformal cooling, made possible by high-performance 3D metal printing. These technologies lead to impressive increases in productivity that benefit all operators across the manufacturing chain, from mould maker to end user, say the companies.

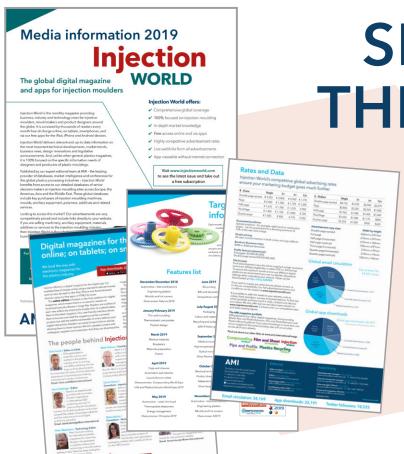
AddUp and IPC have supplied all the material and human resources required and the new company will be headquartered in the Auvergne Rhône-Alpes region of France, near the locations of AddUp and IPC. AddUp is a leader in metal additive manufacturing, while IPC (Plastics and Composites Manufacturing Technical Centre) offers knowledge of the plastics sector, as well as expertise in optimised thermal solutions and the design of printed moulds to enable plastics processors to improve cycle times and productivity.

Arburg has expanded the range of applications for the Freeformer 300-3X - its largest model to date - with many in product development. The company says that the Freeformer 300-3X with

The new Freeformer 300-3X features three discharge units and a divided build chamber door. It is designed for industrial additive manufacturing and is suitable for automated use in production lines

three discharge units opens up a host of completely new applications. It is capable of additively manufacturing complex and resilient functional components in hard/soft combinations, made from two qualified plastics plus support material. At the Rapid + TCT 2019 exhibition, Arburg produced moveable gripper fingers made of ABS, TPE and support material – in a single step and without requiring additional assembly effort.

The designation 300 stands for the available platform surface area in square centimetres. This is



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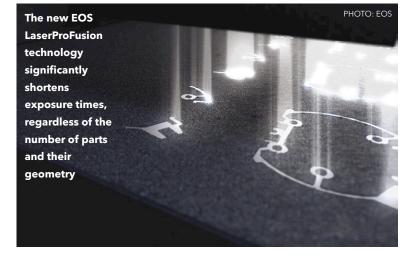
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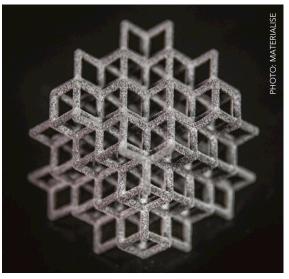
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just under 50% larger than on the Freeformer 200-3X. The build chamber of the large Freeformer offers space for larger small-volume batches and parts with dimensions of up to 234 \times 134 \times 230 mm. 3X stands for the moving axes of the part carrier in the x, y and z directions. A closed cooling system with an industrial cooling water connection is available as an option. This will enable materials to be processed at high build chamber temperatures of up to 200°C in the future. The two-piece build chamber door is another new feature and allows, for example, that the feed hoppers can be refilled during ongoing operation by opening the top half of the door. The heated build chamber now only needs to be opened for inserting the part platform and removing the finished parts. Due to the automatic opening and closing function of the build chamber door, the Freeformer 300-3X can be integrated in IT-networked production lines.

With its Freeformers in sizes 300-3X and 200-3X, Arburg covers a broad spectrum for industrial additive manufacturing. The APF process is particularly suitable for industrial additive manufacturing of functional components. This includes individual plastic parts for consumer goods, spare parts made of original materials and implants for medical technology. FDA-approved TPE-S (Medalist MD 12130H) with Shore A hardness 32 can only be processed on the Freeformer. At Rapid + TCT 2019, a Freeformer 200-3X with two discharge units processed the material to produce components with honeycomb structures that could be used for lightweight construction or as filter elements, for example.

In the Arburg Prototyping Center (APC) in Lossburg, Germany, a number of Freeformers produce benchmark parts for prospective customers. Preliminary trials are conducted to determine whether the technology is actually suitable for the desired part, material and application. Further





Above: Materialise has extended its 3D printing materials offering with the new Ultrasint TPU 01. Its durable elasticity and abrasion resistance make it an ideal material for applications like air ducts, complex tubing, grippers and seals

machines are used for the same purpose at the company's subsidiaries across the world, including in the US.

The latest development from **EOS** is the Laser-ProFusion technology for polymer additive manufacturing; with nearly one million diode lasers melting the material, building up the part layer by layer. The company says that this build process is so productive that it can serve as an injection moulding alternative for many applications. The company says that instead of the laser sintering process used to date with a single CO₂-laser moving along the entire build area, this new technology uses up to one million lasers. These can achieve a maximum total output of up to 5 kW. For each layer, only the diode lasers are activated that match the CAD data of the part - right down to the exact pixel. The new technology significantly shortens exposure times, regardless of the number of parts and their geometry.

Materialise has extended its 3D printing materials offering with the new Ultrasint TPU 01. TPU is a fully-functional, flexible material, making it ideal for resistant and elastic parts. Developed by BASF for HP's new Jet Fusion 5200 Series, Ultrasint TPU combines smooth surface quality and crisp details with good mechanical properties. Its durable elasticity and abrasion resistance make it an ideal material for prototyping and manufacturing applications like air ducts, complex tubing, grippers and seals. Due to its flexibility, shape recovery and shock absorption qualities, TPU is also perfectly suitable for small series of protective housings and covers.

Ultrasint TPU is available at Materialise for design and engineering professionals and replaces TPU 92A-1, previously offered for SLS.

Mimaki Engineering has introduced the 3DFF-222, a desktop 3D printer using FFF (fused filament fabrication) technology that forms objects of sizes up to $210 \times 200 \times 195$ mm. The company says that the printer is ideal for building geometric samples, small-lot moulding and prototypes. When using the 3DFF-222, a print jig can be created that reduces manufacturing costs and stabilises print quality due to in-house production. The 3DFF-222 can also be used to form moulds for vacuum moulding. A reeled filament is inserted in the cartridge and set in the main unit. The filament supplies the nozzle automatically. A camera and LED light are mounted for remotely monitoring the process of formation. By just installing a mobile app to a smartphone or tablet computer, progress can be checked from anywhere. Modelling speed is 10-200 mm/s.

MakerBot has expanded its 3D printing materials offering with polyethylene terephthalate glycol (PETG), which is the first speciality material to be released for its Method 3D Printer, offering higher levels of performance. "PETG is the first in a new line of materials for Method," says Nadav Goshen, CEO, MakerBot. "Our customers have been asking for different materials to use for a wide range of applications that require high strength and durability. PETG is one of the most widely used polymers today. Because of its advanced properties and versatility, we view PETG as an excellent material to be used on the manufacturing line and for short-run production runs."

3D printable parts made of PETG are suitable for industrial applications, including functional prototypes, jigs and fixtures, and end-use parts. The industrial-grade material has a heat deflection temperature of up to 70°C and strong layer adhesion designed to reduce shrinkage and warping during printing. PETG is resistant to moisture and many chemicals, including some alkaline and acidic substances. It can be used with Method's water-soluble PVA for complex parts and easy support removal. The company adds that PETG has greater strength and flexibility qualities than other materials, such as PLA and ABS, and is odourless when printing. Further, the material prints with a glossy finish and has a good degree of ductility. Intended for users looking for advanced material properties, the Method speciality materials provide basic print performance and can require additional workflow steps to print successfully. PETG requires the application of an adhesion stick



Above: MakerBot has expanded its 3D printing materials offering with PETG, which is the first speciality material to be released for its Method 3D Printer, offering higher levels of performance

to the build plate prior to printing.

MakerBot also has a line of precision materials developed for Method that cover the majority of cases for prototyping, jigs and fixtures, and end-use parts. These materials have been tested by Maker-Bot for the highest reliability and measurably accurate parts. These materials currently include MakerBot Tough, MakerBot PLA, and MakerBot PVA.

MakerBot has also recently launched Method X, a manufacturing workstation engineered to challenge traditional manufacturing with real ABS material, a 100°C chamber, and Stratasys SR-30 soluble supports to deliver good dimensional accuracy and precision for complex, durable parts. Method X is capable of printing real ABS that can withstand up to 15°C higher temperatures, is up to 26% more rigid, and up to 12% stronger than modified ABS formulations used on desktop 3D printers. Real ABS parts printed on Method X are claimed to have no warping or cracking that typically occurs when printing modified ABS on desktop platforms without heated chambers.

The company adds that desktop 3D printer manufacturers attempt to get around part deformation that occurs, due to the high shrinkage rate of the material, by using a heated build plate in combination with altered ABS formulations that are easier to print but compromise thermal and mechanical properties. MakerBot Precision ABS has a higher heat deflection temperature of up to 15°C, which is modified to make the material printable without a heated chamber. With Method X, the 100°C Circulating Heated Chamber significantly reduces part deformation while increasing part durability and surface finish.



Above: Collaboration between Stratasys and Solvay is designed to expand the range of high performance polymers for systems starting with the Stratasys F900

MakerBot says that ABS for Method has good thermal and mechanical properties similar to ABS materials used for injection moulding applications, making it suitable for a wide range of applications, including end-use parts, manufacturing tools and functional prototypes. A 100°C Circulating Heated Chamber provides a stable print environment for superior z-layer bonding, resulting in high strength parts with superior surface finish.

Stratasys has selected Solvay as the first materials supplier to develop Stratasys-approved filament for the high performance F900 3D printer. The Stratasys authorised materials partner programme is designed to expand the range of high performance polymers available to manufacturers leveraging Stratasys' fused deposition modelling process using FDM technology in 3D printing applications. As an initial step, Solvay has been selected to help launch the programme and deliver new polymers for the F900 3D printer.

"With this strategic partnership, we are combining Stratasys' leadership in fused deposition modelling 3D printing with Solvay's leadership in developing high-performance, AM-ready materials for the most demanding applications in a large number of industries," says Christophe Schramm, Business Manager for Additive Manufacturing in Solvay's Specialty Polymers Global Business Unit. "This is fully in line with Solvay's ambition to push the limits of high performance additive manufacturing."

Stratasys also said Bombardier Transportation will use its F900 3D printer and Ultem 9085 PEI material as part of its operations in German-speaking countries. The manufacturer will produce final end-use rail parts, as well as manufacturing tools and prototypes for trains and trams, according to Stratasys.

Trumpf is highlighting significant improvements in cooling properties of 3D printed tools for the tool, pattern and mould making industry. The

company says that one of the many benefits of additive manufacturing is the ability to make tools with near-net-shape cooling. Tools manufactured in this way dissipate the heat generated during the production process directly at its source. This reduces cycle time and improves the quality of the fabricated parts.

Conventional methods, such as milling, soon reach their manufacturing limits when it comes to creating cooling channels, says Trumpf. "The difficulties are particularly evident with more complex shapes. We cannot get the drill into all the right places because we cannot drill around corners," says Marc Dimter, a Trumpf industry sector manager responsible for tool and mould making.

In contrast, 3D printers build up the mould layer by layer, enabling the construction of cooling channels that run almost parallel to the tool wall. The biggest benefit is the reduction in cycle time that stems from faster cooling of the tool. In many cases, quality also improves because parts are less prone to distortion. In addition, faster cooling results in more homogenous material properties in both injection moulding and die casting, ultimately making parts more resilient.

Despite these advantages, the company says that German toolmakers have been slow to adopt additive manufacturing technologies. "Many companies lack the necessary expertise and are unwilling to make the investment," says Christoph Dörr, Trumpf industry sector manager for the tool and mould making industry. He notes that US companies that supply their moulds to Europe have already built up a strong lead. That is why Trumpf is offering the TruPrint 1000 3D printer as an entry-level model. The plug and play design of the system makes it easy to install and operate, and it is particularly suitable for small injection mould inserts such as those used for plastic connectors in the electronics industry. Trumpf adds that by 3D printing a gate bushing, it was able to reduce one customer's cycle time by almost 30%.

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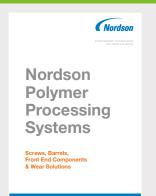
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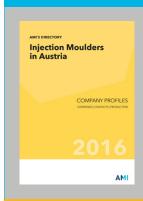
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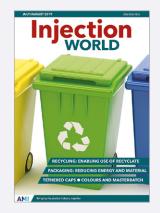
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September/October 2019 The September/October edition of Plastics Recycling World explores a new sorting technology that uses watermarks to identify polymers. Plus, a look at the latest initiatives in rigids recycling and a preview of K's innovations.

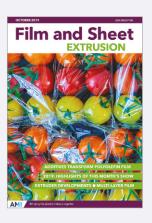




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- Be inspired: Understand how your peers are meeting lightweight demands through novel LFT applications
- Solution-focused: Join industry experts in discussing market growth opportunities for new LFT applications
- Get connected: Engage with a wide-range of key global players from across the LFT supply chain
- Build knowledge: Explore how others have optimised LFT production and incorporated sustainable initiatives

Ways to get involved:

ATTEND

Register before 25th October 2019 and pay €1040* saving €200 on the full price of €1240*. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Networking Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

SPONSOR

A variety of sponsorship opportunities are available at this conference to help promote your company's products and services to this highly targeted international audience. Contact the Conference Hotline for further information.

EXHIBIT

Make it easy to engage with the audience at this busy event with your own highly visible exhibition space. Bring your own display stand and / or banners and use the space to showcase your company's products and services and make a lasting impact. The exhibition runs throughout the conference by the main meeting room and is host to the networking functions.

Space is limited so to avoid disappointment please register for this service as soon as possible.

*VAT may apply

CONFERENCE HOTLINE

Contact: Anna Kislingbury, Conference Organiser Tel: +44 (0) 117 314 8111 Email: anna.kislingbury@ami.international SAVE <u>€200</u>
Register before
25th October
2019







Long-Fibre Thermoplastics

Düsseldorf / 2019

Wednesday 4th December 2019

08:30 Registration and welcome coffee

09:30 Opening announcements

SESSION 1 - THE FUTURE FOR LFTs - NEW APPLICATIONS AND INNOVATIVE DEVELOPMENTS

09:40 AMI Spotlight: Technology trends and market opportunities for LFTs in Europe

Mr. Chris Smith, Editor-in-Chief,

COMPOUNDING WORLD, AMI, United Kingdom

10:00 Case Study: Using D-LFT technology to produce a groundbreaking multifunctional box for the Ford Puma luggage compartment

Mr. Meltem Öztürk, Exterior Trim Design & Release Engineer, and

Mr. Egemen Erbil, Exterior Trim Supervisor,

FORD OTOSAN, Turkey

Mr. Olaf Jacobi, Safety Senior Engineer, and

Mr. Matthias Hellriegel, Body Exterior Integration Supervisor FORD MOTOR COMPANY, Germany

Mr. Simon Alexander, Technical Account Manager, ROECHLING AUTOMOTIVE, Germany

10:40 New developments in semi-structural parts using long-glassfibre polypropylene

Mr. Olaf Herd, Global OEM Manager Automotive, CELANESE SERVICES SALES GmBH, Germany

11:10 Coffee break

11:50 Weight and cost reduction - development of new lightweight and cost-effective applications for automotive safety structures using advanced long-fibre polypropylene technologies

Mr. Marco Bernsdorf, Business Development Manager, LOTTE CHEMICAL, Germany

SESSION 2 - OPTIMISING THE PRODUCTION OF LFTs

12:20 Design concepts for LFT pultrusion lines

Mr. Klaus Hojer, Business Development / Account Manager, FEDDEM GmBH & Co. KG, Germany

12:50 Modern plastics processing on highly flexible LFT pultrusion lines

Ms. Karin Luxem, Area Sales Manager Asia / Pacific, PROTEC POLYMER PROCESSING GmBH, Germany

13:20 Lunch

SESSION 3 - ASSESSING THE PERFORMANCE OF LFT MATERIALS AND COMPONENTS

14:50 Predicting the short-term performance and life-time of longfibre reinforced thermoplastics

Mr. Julien Cathelin, Application Development Engineer, SABIC B.V., The Netherlands

15:20 Numerical simulation validation for long-fibre behaviour in injection moulding

Mr. John Lin, Account Manager, MOLDEX3D, Taiwan

15:50 Studying the importance of carbon fibre length in injection moulded parts

Mr. Wolfgang Stockreiter, Senior Scientist, BOREALIS POLYOLEFINE GmBH, Austria

16:20 Coffee break

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17:00 Roundtable Discussion: A facilitated solution-focused discussion held with speakers and peers to explore challenges and opportunities. Topics to include: Automotive design trends and opportunities, materials selection and optimisation, concentrates vs compounds, optimising production and reducing costs

18:00 Networking Cocktail Reception

Thursday 5th December 2019

08:30 Welcome coffee

09:00 Opening announcements

SESSION 5 - ADVANCES IN FIBRES AND SIZING TECHNOLOGIES FOR LFT APPLICATIONS

09:10 **Degradable glass fibre as reinforcement for LFT products**Mr. Tomi Kangas, Sales and Marketing Director,

ARCTIC BIOMATERIALS OY, Finland

09:40 Make impossible things - Innovations in fibre and sizing chemistry for Long Fibre Thermoplastics

Ms. Colleen Kennedy, Global Product Manager LFTP, OWENS CORNING, United States

10:10 Coffee break

SESSION 6 - MAXIMISING THE PROPERTIES AND PERFORMANCE OF LFT COMPONENTS

10:50 Long-fibre thermoplastics - applications and challenges from a design and processing perspective

Dr. Sachin Jain, Director,

SKYi COMPOSITES PVT. LTD (India), India

11:20 Case study - pushing the limits of LFT performance with carbon fibres and advanced polymers

Mr Ji Mingyuan, CEO, XIAMEN LFT COMPOSITE PLASTIC Co., Ltd, China

11:50 Hybrid solutions: examining the zero-waste production of tailored blanks for over-moulding with LFTs, using UD tapes

Mr. Rien van den Aker, Director,

VAN WEES UD AND CROSSPLY TECHNOLOGY B.V, The Netherlands

THE NEUTERIAN

12:20 Lunch

SESSION 7 - UPDATE ON SUSTAINABLE SOLUTIONS FOR RECYCLED LFTs

13:50 Recycled, sustainable, discontinuous fibres for LFT pellets Mr. Geoff Foulds, Senior Development Engineer, COVENTIVE COMPOSITES, United Kingdom

14:20 Direct processing of recycled carbon fibre - a sustainable approach

Mr. Sascha Kilian, Research Engineer, FRAUNHOFER-INSTITUT FOR CHEMICAL TECHNOLOGY ICT, Germany

14:50 Closing remarks and coffee

AMI reserves the right to alter the programme without notice.

The latest programme, including any new speakers, changes to the schedule, and any amendments to pricing and terms and conditions can be viewed on our website: www.ami.international

REGISTRATION FORM PLEASE COMPLETE IN BLOCK CAPITALS

Register online

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Company:						
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(Must be completed by all EU Companies)						
Company activity:						
Purchase order no. (if applicable):						
Invoice address (if different from above):						
DELEGATE/EXHIBITOR DETAIL						
Title: Mr/Mrs/Dr/Other:						
First name:						
Surname:						
Position:Email:						
Special dietary requirements:						
Signature: Date						
Please confirm that you agree to your name company name and job title on the delegate		shed aloi	ngside your			
□ Yes □ No						
By registering for this event (please tick thes	e boxes);					
□ I agree to AMI's Privacy Policy (www.ami.in □ I agree to AMI's Terms & Conditions (www.						
PARTICIPATION	Price	VAT	Total			
☐ Early Booking Delegate Admission Fee¹:	€1,040.00	19%	€1,237.60			
(Until 25th October 2019)						
☐ Delegate Admission Fee¹:	€1,240.00	19%	€1,475.60			
(From 26th October 2019)						
☐ Exhibition Space:	€1,8250	20%	€2,190.00			
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☐ Exhibition Space:	€1,825.00	0%	€1,825.00			
(Non-UK Companies) ⁴						
	Total:					
¹ Subject to German VAT at 19%. ² Reverse Charge. ³ Subject to UK VAT at 20%. ⁴ Reverse Charge for companies from other EU countries, 0% for Non-EU companies.						

METHOD OF PAYMENT

You will be sent an invoice in 7-14 working days.

☐ Pay by credit card by registering online:

We accept: Visa / Mastercard

Alternatively, please provide your contact details and we will send you a link to a secure payment gateway via email.

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LONG-FIBRE THERMOPLASTICS 2019 CONFERENCE INFORMATION

4-5 December 2019 Hotel Nikko Immermannstraße 41 40210 Düsseldorf Germany

Tel: +49 211 834 0

HOTEL ACCOMMODATION

Delegates are responsible for booking their own accommodation. We have negotiated a room rate of €179 for a single room and €199 for a double (tax, breakfast and Wi-Fi included) at the Hotel Nikko in Düsseldorf until 18th October 2019.

Please make your reservation using the direct hyperlink which can be found on our website www.ami.international/events (click on 'Long-Fibre Thermoplastics 2019' followed by Travel & Accommodation)

PARTICIPATION OPPORTUNITIES

Delegate registration: includes attendance at all conference sessions, a set of conference proceedings, entrance into the Networking Cocktail Reception, lunch and coffee breaks.

Sponsor this event: maximise your company profile before, during and after the event by becoming a sponsor. For further information, please contact the Conference Organiser

Exhibition space: an excellent way to enhance your business opportunities and make it easy for delegates to find you! Includes:

- entry for one representative from your company
- one exhibition space in the networking area
- your company profile in the conference proceedings
- new and existing product display
- handing out brochures and promotional items from your stand

Spaces are allocated on a first-come-first-served basis and sell quickly.

Group discounts: when registering as a group you may be entitled to discounts. Contact the Conference Organiser for more information.

Networking Cocktail Reception

A networking cocktail reception will be held on the first evening. This offers an excellent opportunity for delegates to meet with speakers and other colleagues. All delegates are invited to attend and admission is included in the delegate fee.

CANCELLATIONS

Full refunds, less a cancellation charge of €300 will be made on cancellations received prior to 25th October 2019. Thereafter we regret that no refunds can be made. Delegates may be substituted at any time. Please note that refunds will not be given on exhibition spaces, sponsorship packages or networking dinner places.

CONFERENCE HOTLINE

ANNA KISLINGBURY, CONFERENCE ORGANISER

AMI

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Email: anna.kislingbury@ami.international

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