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Netstal extends reach

Netstal has continued to establish itself as an independent operation within the KraussMaffei Group focusing on the medical technology, beverage and packaging industries. To date, Netstal subsidiaries have been established or re-established in the US, Belgium, France and Italy, alongside existing companies in Germany, Spain and Singapore.

Further branches are also now being established in Brazil, Mexico, Thailand and China. The incorporation process is expected to be completed this year.

"This is an important milestone for us, from which our customers will benefit greatly. With a total of 12 branches of our own and experts for sales and service stationed in them, we will be very close to our customers in the geographically most important markets," said CEO Renzo Davatz.

› **www.netstal.com**

China tops global machine exports

Global production of plastics and rubber machinery 2016-2021 by value and country share

	World Production*	Shares of particular countries (%)					
Year	(m €)	EU27+UK	China	Germany	Italy	USA	Japan
2016	34,948	40.8	32.3	21.3	7.7	7.0	4.7
2017	36,312	42.0	30.6	21.3	8.1	7.1	4.7
2018	36,795	42.3	31.1	21.5	7.8	7.1	3.9
2019	35,971	43.9	31.1	21.7	7.8	6.6	4.6
2020	34,193	40.9	34.4	20.4	7.0	7.0	4.1
2021	38,597	40.0	35.0	19.6	7.1	6.7	4.1

Source: VDMA / Federal Statistical Office

**Estimate*

China exported more plastics and rubber machinery than any other country in the world for the first time last year, according to preliminary figures released by Euromap, the umbrella organisation of major European plastics machinery manufacturers.

During 2021, global production of plastics and rubber machinery is estimated to have grown by 13% to a record €38.6bn. Exports totalled €23.7bn, near matching the industry's previous record result of 2017. China's share of plastics machinery exports increased its by 28.2% to €5.7bn, leaving long-time export leader Germany in second place with €5.2bn (up by 9.4%).

"In the medium term, companies in Europe will have to prepare themselves for a significantly higher price level, as raw materials and energy in particular, have become much more expensive," said Euromap President Luciano Anceschi.

Germany's VDMA plastics machinery association said member order books remain reasonably well filled but, due to supply chain issues resulting from Covid lockdowns, and now the war in Ukraine, it is becoming increasingly difficult to convert orders into turnover.

"In the first four months of the current year, new orders fell 17% short of those of the same period last year," said Thorsten Kühmann, Managing Director of the association. "Availability of supplier parts is the predominant issue."

› **www.euromap.org**

› **www.vdma.org**

Spectrum Plastics adds cleanroom space

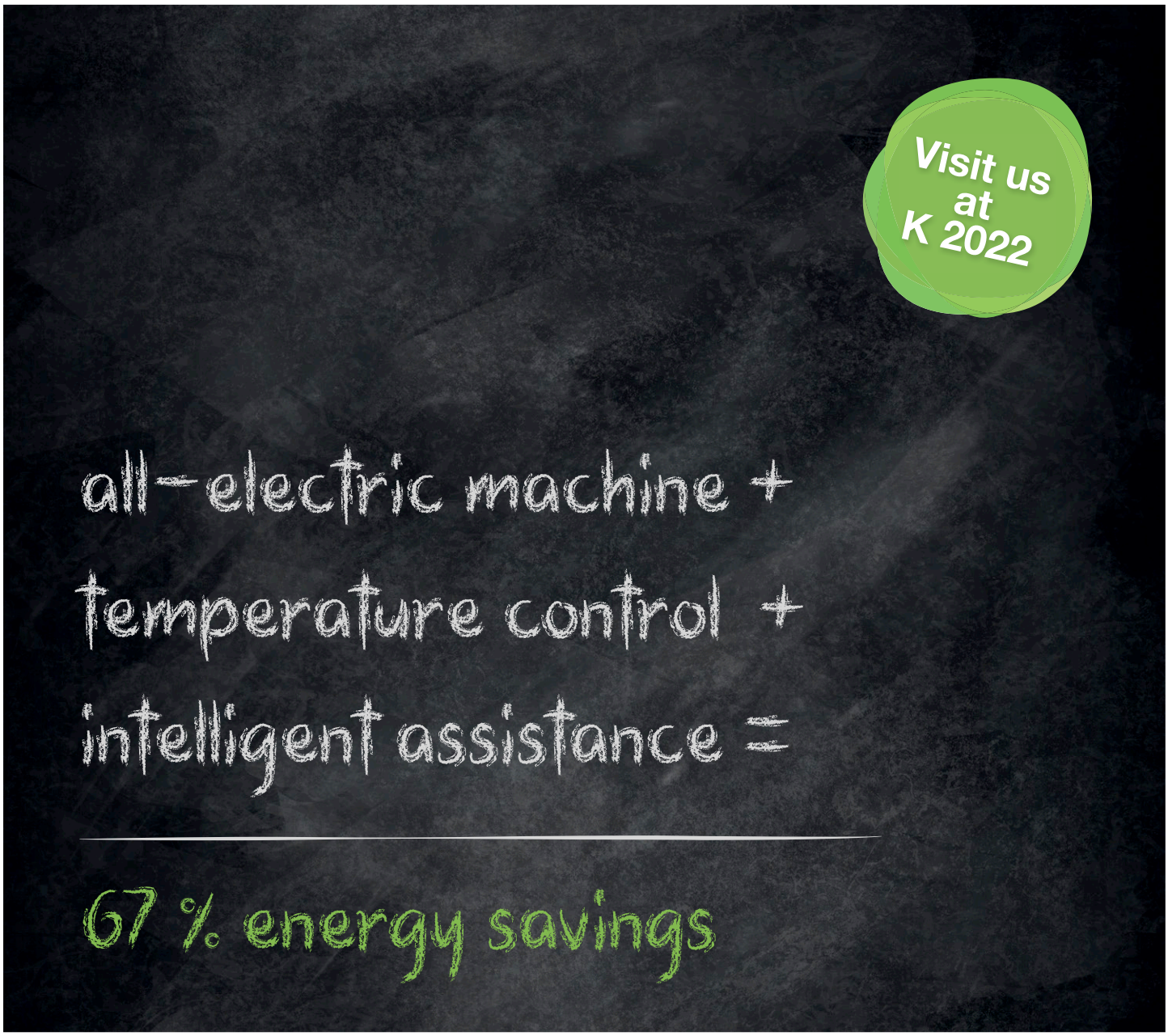
Spectrum Plastics Group has completed a major renovation and cleanroom expansion at its facility in Minneapolis, US. The company, which supplies medical and other high-tech markets, said that this will enable it to "remain a preferred supplier of precise, tight-tolerance injection moulding and assembly".

The Class 8 cleanroom manufacturing space was expanded to 10,000 sq feet in order to meet growing demand. The expansion includes additional moulding machine capacity, using all-electric machines of 110 US tons capacity or less. This, the company noted, addresses growing demand for small, complex, high-precision parts in the medical and defence industries.

"The increasing quality expectations in the manufacture and assembly of complex products and components make controlled environments a requirement," the company stated. It said that there is a continued need for particulate-free products made from specialised materials for the medical device, life sciences and aerospace industries.

The office and employee amenity space has also been upgraded to enable quality and engineering teams to work closely with customers.

› **www.spectrumplastics.com**



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Record year for Sumitomo (SHI) Demag due to all-electrics

Sumitomo (SHI) Demag's sales reached an all-time high of €808m in the 2021 financial year, up by 17.4% on 2020, announced CEO Gerd Liebig. Sales within Germany and for the Schwaig-based German subsidiary Sumitomo (SHI) Demag Plastics Machinery GmbH, which comprises production sites in Germany and China, were over €300m and order intake was €322.9m, both also records.

"This strong sales growth can be wholly attributed to our all-electric machines, where market share continues to rise," said CEO Gerd Liebig, who gave the figures out at the company's K2022 press preview in Düsseldorf in June.

Sumitomo (SHI) Demag claims to be the official global market leader in all-electric injection moulding machines and it has focused all production on these at its plant at Wiehe. All-electrics accounted for 33% of sales in 2021 and are expected to reach 40% this year.

IMAGE: SUMITOMO (SHI) DEMAG

Above: Gerd Liebig: all-electric machines are supporting sales growth

Profitability for the firm in 2021 was said to be in the double-digit range, slightly below the previous 2018 record. "This stable profit is all the more remarkable given the extreme economic adversities caused by material price increases," said Liebig.

Further milestones included a 20% reduction in quality costs and a significant increase in customer satisfaction, reaching the second highest level in the last five years. The company's Net Promoter Score – a metric that measures customers' willingness to recommend a product or service – also rose significantly on pre-pandemic levels.

Despite a "challenging" Q1 and the issues of energy and material prices, high inflation and massively disrupted supply chains, Liebig added that he expects 2022 results to be "just as good". For the market as a whole, he expected the packaging, electronic and medical markets to remain stable in 2022, while expectations in the automotive market "are more modest due to longer delivery times" and consumer markets are also uncertain due to the erosion of spending power.

› **www.sumitomo-shi-demag.eu**

Wirthwein sets up facility in Xi'an, China

Germany's Wirthwein is to build a new facility in Xi'an, China, its fourth in the country. The company has been producing at two sites in Kunshan, near Shanghai, since 2007 and opened another at Shenyang, northern China, in 2018.

The new subsidiary, Xi'an Wirthwein Plastic Technology, has rented a newly built hall in an industrial park that is mainly home to the aviation industry. The hall has a total area of 8,213 m^2 of which 3,850 will be used for production and logistics.

The new facility will make axial and radial fan wheels, housings and for the first time at the same Wirthwein site, stators, all of which go into electrical applications. These will be supplied to long-term customer EPM Pabst, which it has hitherto supplied from sites in Germany, Poland and Kunshan. EPM Pabst has also recently established itself at Xi'an, so "it was just a matter of course that Wirthwein will also settle close by", Wirthwein said.

Sales from the site are expected to be in the mid-single-digit million euros range; other opportunities are envisaged in the automotive and railroad markets. In September, six machines will be moved from Kunshan to the hall in Xi'an, while two new machines will be delivered, set up and put into operation.

› **www.wirthwein.de**

IMAGE: WIRTHWEIN

Visualisation of Wirthwein's new facility in Xi'an, China

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Lego to open carbon-neutral factory in US

The Lego Group plans to build its first US factory in Chesterfield County, Virginia, in a $1bn investment. This will be designed to operate as a carbon-neutral facility, with all of its day-to-day energy needs matched by renewable energy generated by an onsite solar park.

The plant will also be designed to minimise energy consumption and use of non-renewable resources. The company's stated aim is to secure Gold LEED certification once the 160,000 m² building is completed.

The facility, creating 1,760 jobs, will house moulding, processing and packing operations, together with a high-bay warehouse.

Ground-breaking will take place later this year and production is expected to start in the second half of 2025, when the solar park will also be completed. A temporary packaging site will open in an existing building nearby in early 2024 and will create up to 500 jobs.

IMAGE: LEGO

Above: Computer image of Lego facility set to be bult in Virginia

"Our factories are located close to our biggest markets, which shortens the distance our products have to travel. This allows us to rapidly respond to changing consumer demand and helps manage our carbon footprint," said COO Carsten Rasmussen. "We are fortunate to find a location where we can begin construction quickly and create temporary capacity in under two years."

This will be Lego's seventh factory globally and its second in the Americas. The US market has hitherto been served by its site in Monterrey, Mexico, which will be expanded and upgraded to meet growing demand. Factories in Europe and China are also being expanded. In December 2021, the group announced plans to build a factory in Vietnam to support further growth in Asia.

Lego currently employs approximately 2,600 people in the US where it has been operating since the 1960s. Its US head office is in Enfield, Connecticut, and operates 100 branded stores across the country.

› **www.lego.com**

LS Mtron opens US locations

South Korea's LS Mtron Injection Moulding Machines has recently opened two new facilities in the US: a large-tonnage mould testing and tech centre in Brownsville, Texas, which is co-located with a major customer, MVP Plastics; and a parts and service centre in San Diego, California, to support the moulding operations of customers along the US-Mexico border, such as Samsung Electronics.

According to Peter Gardner, Business Director at the US subsidiary, LS Mtron shipped 284 machines to North America in 2021 and is seeing increased demand, especially for large-tonnage models. "We have over 40 machines in stock now in the USA, including models up to 1,400 US tons," he said

The company has also moved its headquarters from Peachtree Corners to Duluth, also in Georgia.

› **www.lsinjection.com**

Engel unveils customer technical centre

Engel has opened a new customer technical centre at its large machine plant in St. Valentin, Austria. Built at a cost of €14m, this has a total floor space of 3,400 m², more than double the size of its predecessor.

The technical centre showcases a long list of injection moulding technologies for a wide variety of industries. All of the machines are equipped with digital systems from Engel's Inject 4.0 programme.

The Applications Technology Centre features machines with clamping forces of 7,000-17,000 kN, plus a 15,000 kN large combi M-type machine with an indexing table and a 9,000 kN Duo machine.

The Centre for Lightweight Composite Technologies, features a V-Duo 1700 with a vertical clamping unit, an insert 130 vertical machine and a Duo 1700 horizontal machine with two Easix articulated robots for composite processes, all equipped with IR ovens. Engel's new Packaging Centre is split across the St. Valentin site and Schwertberg site in Austria. Find out more in the Packaging feature in this issue.

› **www.engelglobal.com**

Dates and venue set for 2023 US injection moulding expo

The second Injection Molding and Design Expo will take place in Novi, Michigan, USA, on September 20-21, 2023. Organised by AMI and Crain Communications, the free-to-attend exhibition and conference is backed by their respective magazines *Injection World* and *Plastics News*.

The first event took place in Detroit, Michigan on May 25-26, 2022, attracting 135 exhibitors and more than 2,000 visitors. "The reaction to our first expo was very positive, with exhibitors and visitors appreciating its clear focus on injection molding, plus its Michigan location," said Andy Beevers, Events Director at AMI. "We're looking forward to building on this successful debut with an even larger event in 2023."

Next year's expo will take place at the Suburban Collection Showplace in

Novi, Metro Detroit. The 460,000 square foot facility is the largest privately-owned expo centre in Michigan. It is conveniently located directly off the I-96 expressway and boasts ample on-site parking.

Companies that have already rebooked their booths for the 2023 expo include Absolute Haitian, Accede, Advanced Blending Solutions, Ampacet, Beaumont Technologies, Cavalier Tool, Chroma Colors, DME, EAS, Frigel, General Polymers, Incoe, Kistler, KraussMaffei, Milacron, Moldex 3D, Progressive Components, RJG, Yizumi-HPM, Yushin, and many more.

More than 50% of visitors to this year's debut expo came from injection moulders, OEMs and mould makers. They included representatives from Amcor, Aptar, Berry Global, Forvia/ Faurecia, Ford, General Motors, Huhtamaki, IAC, Medbio, Newell Brands, Nissan, PepsiCo, Plastic Omnium, Rivian, Spectrum Plastics, Stellantis, Teel, Tesla and Westfall Technik.

To find out more about this year's exhibition and the companies that attended, view the post-show report here.

› **www.injectionmoldingexpo.com**

IN BRIEF...

The US-based **Barnes Group** has named Thomas Hook as its president and CEO. Barnes owns a number of hot runner, injection mould and mould components businesses. Hook replaces Patrick Dempsey, who will now serve as executive vice-chairman.

www.barnesgroupinc.com

Rico expands at Austrian site

Rico has held a ground-breaking ceremony to mark the start of construction work to expand its site at Thalheim bei Wels in Upper Austria. The company, which makes moulds and injection moulded silicone parts mainly for the plumbing supplies, household appliances, healthcare, life sciences and automotive sectors, said that its "strong current order situation has made the extension necessary".

The new building, on a 2.5-hectare plot next to its existing facility, is expected to be occupied in 2023. In the first phase, it will house three production facilities, a high-bay warehouse, handling areas and additional office space across an area of more than 10,000 m^2.

"We always think big. When we finished the most recent addition in 2018, we thought it would give us enough space until 2025, but the site is already bursting at the seams," said Managing Director Markus Nuspl.

› **www.rico.at**

Davies Moulding buys EA Plastics in USA

Davies Moulding, a subsidiary of Illinois,US-based Heico Companies, has completed the acquisition of high-precision injection moulder Euro-American (EA) Plastics. No financial details were disclosed.

EA's single facility at Flora, Mississippi, has 15 injection moulding presses and a full in-house tool repair shop. It supplies injection moulds and moulded components to the automotive, consumer goods and electrical product sectors worldwide.

Davies said that this will complement its own capabilities. The firm's site at Carol Stream, Illinois, has 45 thermoset compression moulding machines, five thermoset and 24 thermoplastic injection moulding machines, plus finishing machines.

› **https://daviesmolding.com**

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PHOTO: ARBURG

Main image: Visitors and demonstrations at the Customer Centre in Lossburg during Arburg Technology Days 2022

Arburg welcomes moulders back to German headquarters

The German group has resumed its popular in-person Technology Days showcase event. A major theme this year was the interaction between sustainability and digitalisation

The 3,700 visitors to the Arburg Technology Days in Lossburg, Germany, in June showed injection moulders are still attracted to Arburg's usually-annual event which has had a Covid-enforced break since 2019. The Technology Days that year had about 6,000 visitors, but despite the drop in numbers this year, Arburg executives were upbeat in their presentations to journalists regarding the business and its injection moulding technology capabilities.

Michael Hehl, Managing Partner of Arburg, said that with the completion of the Lossburg HQ's new assembly hall 23 and a new Training Centre in 2020, there would be a break at the large facility after 14 years of uninterrupted construction. In August-September, renovation work will start at the two German Arburg Technology Centres, located in Radevormwald and Rednitzhembach.

Arburg achieved a 27% increase in group turnover to €735m in 2021, said Jürgen Boll, Managing Director Finance, Controlling and IT. Arburg's order book is "in good shape" but incoming orders "quietened" in the second quarter, he said. "This is a result of the additional insecurity that we have been facing since February [when Russia invaded Ukraine]. When it comes to modernising the machine fleet, for example, a customer might consider postponing such a development for now. But production is continuing, and this is shown by the figures in the spare parts sector, as well as by our experience during visits on-site."

Gerhard Böhm, Managing Director Sales and Service, said the long-term effects of the war in Ukraine are difficult to predict. Another ongoing development, China's domestic Covid restrictions, is affecting Arburg less as it does not produce machines there, he said. In the market for high-end injection moulding machines used for lower volume applications, Arburg expects China to continue providing good demand, he said during the Q&A session with journalists.

Supply chain issues mean Arburg's suppliers are planning to increase their prices again this year, said Böhm, following on from "double-digit price increases in the past two years". Arburg has a cycle of reviewing its machine prices every two months and making adjustments if necessary. He assured customers that the company is able to deliver against orders as it had planned ahead and built up stocks of

electronic components and materials that are currently in short supply. Arburg has also launched its Ready To Go app which allows customers to order standard machines from its warehouse stock, thereby cutting delivery times.

Guido Frohnhaus, Managing Director Technology and Engineering, who started at Arburg after the 2019 Technology Days, set this year's event in the context of the ArburgGreenWorld and ArburgXWorld (AXW) arenas. Sustainability is the focus of the former and digitalisation the focus of the latter, but there is interplay between the two, he said. The Gestica control system contains smart functions that can optimise processing in different ways, from smoothing viscosity fluctuations when moulding recyclates (AXW Control Reference Pilot and AXW Control ScrewPilot) to reducing cycle times (AXW Control CycleAssist) and energy usage (AXW Control EnergyAssist).

PHOTO: ARBURG

Above: Arburg highlighted benefits of 5G connectivity available in its Customer Centre

Traceability

Traceability is becoming an important issue as recyclate is used more and more in injection moulding. Frohnhaus highlighted the Holy Grail, Curve Code and R-Cycle initiatives, which are industry projects to provide material identification and traceability when recycling plastics or when using recycled plastics in new products.

An innovative traceability technology from German start-up Detagto was demonstrated on a hydraulic Arburg Allrounder 470 S with 1,100 kN clamping force which was moulding black housings made of glass-fibre-reinforced PA66. Frohnhaus said the technology captures a "fingerprint" for moulded parts, which is a result of tiny differences on the surface. In the Detagto technology, a defined surface of the component is photographed and the image data is converted into a string of characters that is uploaded to a database. As every surface looks slightly different, each component can be clearly identified later by reference to the database.

Among the displays in the Customer Centre at Arburg Technology Days were demonstrations of moulding with post-industrial and post-consumer recycled plastics, which provided examples of the interaction between sustainability and digitalisation that Frohnhaus had discussed. In the ArburgGreenWorld showroom, the company presented its new recyclate package, which combines software and hardware features. A hybrid Allrounder 370 H was shown moulding PIR based on PA originating from technical textiles (airbags). "Here you can see that the two worlds can supplement each other," said Bertram Stern, Sustainability Manager, during a tour.

The intertwining of sustainability and digitalisation was also shown on an electric Allrounder 370 A producing a reusable drinking cup from chemically recycled PP, which highlighted the R-Cycle initiative started by Reifenhäuser. In this demonstration, each product received a digital product passport with all data relevant to recycling, such as raw materials and colouring agents. The pivotal element of R-Cycle is a database that contains the information about the materials used, enabling traceability and recyclability.

Campus network

Related to digitalisation is networking and Arburg has enhanced its telecoms provision in a deal with Deutsche Telekom to provide a 5G campus network at the Lossburg site. It says this combines the strengths of Telekom's public 5G network with the exclusivity of a virtual private network. So, Arburg benefits from highspeed and stable coverage via the public 5G network, while on the other hand, mission-critical data traffic, for example from injection moulding machines, is separated by a virtual private network and can also be prioritised.

The 5G campus network enables Arburg to test innovative applications for its own production needs, such as autonomous transport systems, industrial robots or automated production processes. In the Customer Centre, Arburg says customers from various sectors, such as the automotive and packaging industries or medical technology, can test digital manufacturing concepts. For this purpose, Deutsche Telekom has equipped the Customer Centre with eight special in-house antennas that supply the 2,100 m² area with 5G.

There were a number of other demonstrations at the event, including LSR and medical moulding, machine-mould communication, automation and turnkey installations, and Arburg's Freeformer additive manufacturing technology.

› **www.arburg.com**

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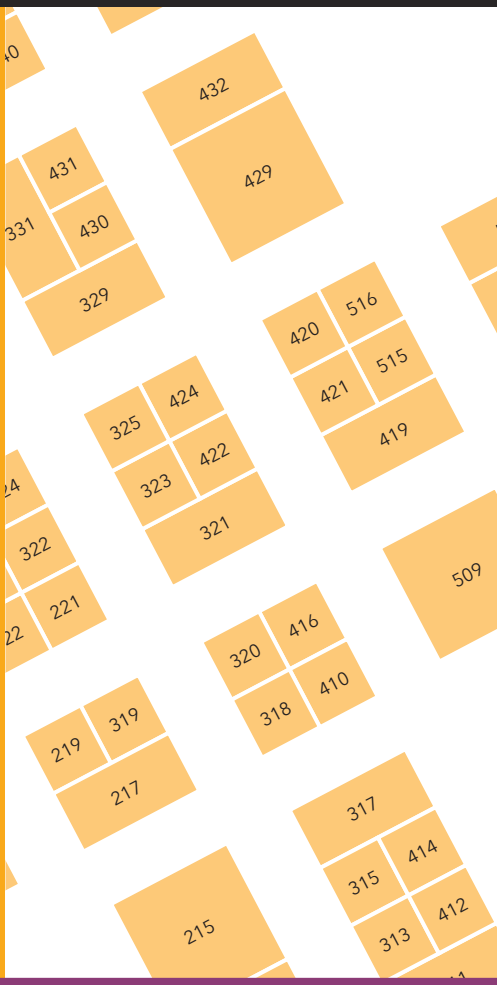

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Injection moulding technology suppliers are helping packaging manufacturers with challenging applications. Mikell Knights reports on some recent developments

IMAGE: WITTMANN BATTENFELD

Meeting the needs of packaging moulders

Several suppliers of injection moulding machinery, process technology or tooling have developed new approaches that advance industrial and consumer rigid packaging applications. The latest investments go as big as new technology centres dedicated to packaging applications, to more modest but significant developments including new machine models built expressly for moulding pails, buckets and cans, and new patent applied tooling solutions that allow for part consolidation. Material savings by thinning product walls and the use of recycled materials are packaging themes that continue their advance in 2022.

Engel in May opened two dedicated packaging centres at its existing manufacturing operations in Schwertberg and St. Valentin, Austria that will feature fit-for-purpose packaging production cells to help customers boost the performance of their production cells.

A wide variety of packaging applications will be demonstrated in customised production cells featuring different Engel injection presses. These include its Duo speed dual platen machines demonstrating large container production; E-speed machines for thin-wall containers and pail production; and an all electric E-cap unit to mould caps and flip-top lids. In addition, the technology centre can include Engel's all electric E-mac injection machine to demonstrate mid-performance packaging applications, which frequently processes recycled materials.

All of the injection machines in the packaging centres are equipped with smart assistance systems from the Engel Inject 4.0 programme, such as its iQ weight control which detects fluctuations in the shot volume and material viscosity then automatically compensates for them in the same cycle, or iQ flow control, which controls the temperature differences in the individual cooling circuits to maintain the set value.

Engel customers can bring their own materials and moulds for a hands-on performance test, including cycle time or energy efficiency analyses. Engel offers moulds from various product groups that it has on site, and offers a wide range of peripheral systems from various partner companies, as well as automation solutions developed both in-house and by partners such as Campetella and Beck Automation.

The versatility of its injection moulding machinery units helped resolve different rigid packaging challenges at the opening event in May. An E-speed

Main image: Wittmann Battenfeld's Airmould process was used in the production of a beer crate for German brewer Störtebeker Braumanufaktur

servo-hydraulic toggle unit with accumulator technology was used in the production of an ultra thin-walled 1 litre pail, with a flow path to wall thickness ratio of 500:1, where part weight and material consumption impact the overall profitability of a production plant. The product wall thickness was reduced to 0.4 mm, shaving material consumption 20% to 21.56 g. A label made from polyolefin material similar to the pail is applied using an automated in-mould labeling process.

The hybrid machine layout consists of high precision servo-electric drives combined with hydraulic, accumulator assisted injection to deliver high acceleration/deceleration and injection speeds up to 1,200 mm/s, along with a very short injection stroke. A kinetic energy accumulator storage system helps reduce energy peaks. Energy efficient performance from the injection unit and all-electric 5-point toggle clamping unit achieved a low specific energy requirement of 0.763 kWh/kg. The pail was produced using a mould from **Brink Moulds & Automation**.

An Engel press was used during the opening days of the packaging centre to demonstrate opportunities for recycled polypropylene material. Margarine tub lids made from 30% food-grade recycled PP were moulded in what Engel calls a world premiere. Prof Edward Kosior, founder and CEO of **Nextek**, a London-based consultancy with expertise in the design, optimisation, processing and recycling of plastics, spoke about food packaging production opportunities opened up by rPP.

At the upcoming K 2022 show, Engel will demonstrate the processing of recycled PET in a thin wall injection moulding demonstration that will produce 125 ml round containers with a wall thickness of 0.32 inches in a single step. Engel said that until now it has only been possible to process

Above: Milacron offers a modified Q-series 610 model for the production of pails. It has a faster clamp, higher torque extruder, quicker ejector, extended L: D screw and updated water and air connections

Above: Fit-for-purpose packaging production cells are part of two new packaging centres launched by Engel at its manufacturing sites in Schwertberg and St. Valentin, Austria at an event in May

PET in thick walled parts such as bottle preforms in injection moulding.

Engel will introduce a more powerful injection unit for its E-speed line developed in-house and designed to process rPET materials. The high performance injection unit achieves injection speeds up to 1,400 mm/s at a maximum injection pressure up to 2,600 bar when processing small shot weights with an extreme wall-thickness to flow path ratio.

The modified rPET to be processed at Engel's K 2022 show stand comes from drink bottles recycled by packaging and recycling specialists Alpla Group, with tooling and IML system from Brink Moulds & Automation and printed labels from IPB Printing.

Last year **Milacron** introduced a variation to its Q-series line of servo-hydraulic toggle presses that is designed specifically for injection moulding of 1 to 6 gallon pails. The pail-specific Q610 model incorporates numerous updates, such as faster clamping and a clamp design that allows for moulding of the larger rigid packaging products at lower minimum tonnage than prior toggle designs. The Q160 model incorporates a higher torque extruder designed to handle low-melt HDPE, and a mixing screw with an extended L: D ratio.

Larger circuits for water (up to 2 inch circuits) and air (up to 0.75 inch circuits) are designed for high flow and high volume to deliver improved cooling, while Milacron's eDrive system assists with quicker part ejection. A high base design allows the part drop area to be accessible from three sides. The upgrades allow the value-priced machine to achieve production cycle times of around 16.5 s, says Andy Stirn, Vice President of Sales for injection

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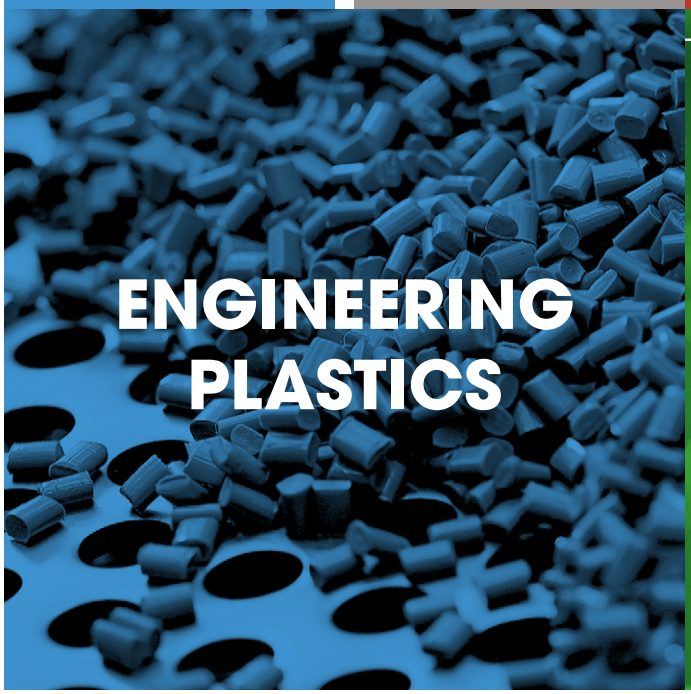

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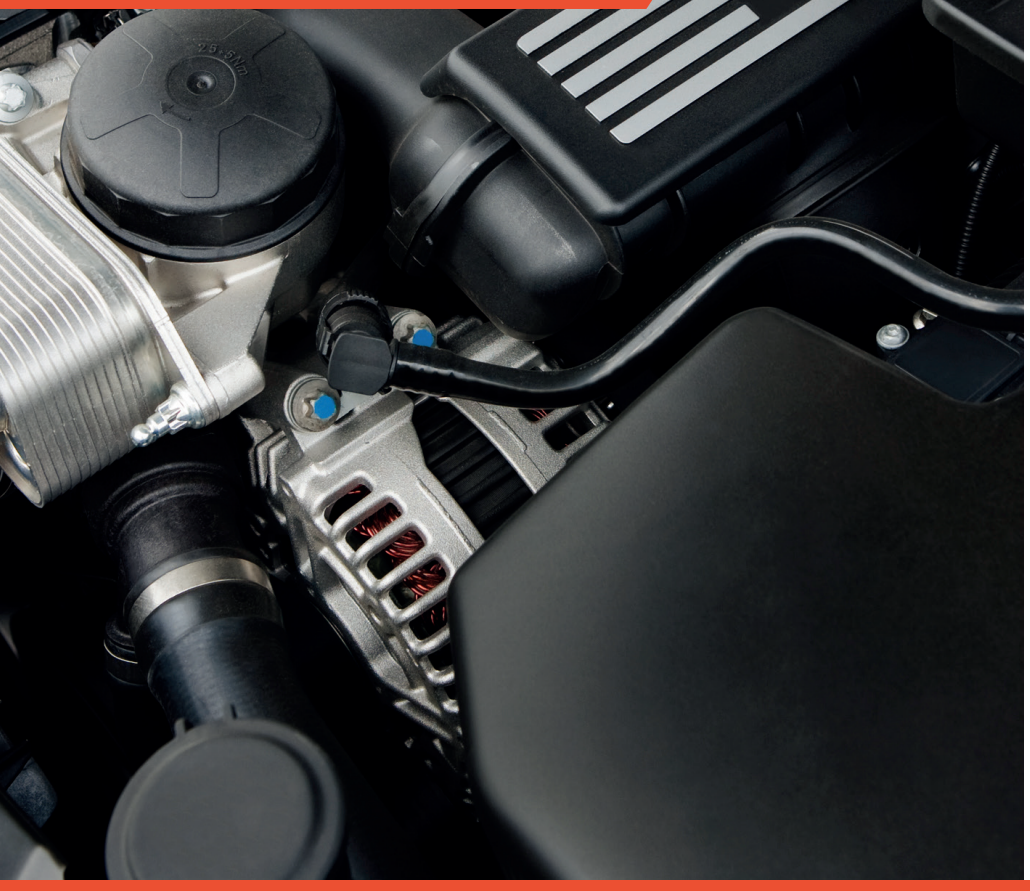

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moulding at Milacron North America.

The Q-series is a further development of Milacron's Quantum toggle series introduced at NPE 2018. It is based on the company's Magna toggle (MT) line from the US and the F-series from Ferromatik Milacron, a German subsidiary. Ten models with clamp tonnages ranging from 56 to 617 US tons are offered, says Stirn.

Additional features of the Q-series include new kinematics for the 5 point double toggle that reduces dry cycle times by about 30% compared to the MT line. The toggle mechanism incorporates a 10-pin design on the traversing platen, which travels on precision linear guides that allow for faster clamp open and close while ensuring smooth and low-friction platen movements.

Optimised clamp linearity ensures accurate and repeatable clamp force generation that is evenly distributed even at lower tonnages. Clamp tonnage can be set as low as 30% of the machine's maximum setting, where previously the tonnage generation could only be set to 50% of the machine's maximum tonnage. The platen sizes, tiebar spacing and mould weight capacity have been upgraded from previous designs to be more robust, says Stirn.

IMAGE: NEXTLOOPP

Left: Nextek says the NEXTLOOPP project has carried out successful production trials using 30% food-grade recycled PP, with Mannok Pack moulding a 500g dairy spread tub with an IML label

The combination of a servo drive motor and bi-directional fixed pump hydraulic system provides power only when needed, resulting in energy savings by using less power. The injection unit is similar to that of the MT line but with the routing of hoses redesigned along the base of the machine which allows the footprint of the machine to be reduced. Side-by-side twin injection cylinders shrink the machine's footprint while providing uniform load distribution across the screw centerline.

Other features include operational control

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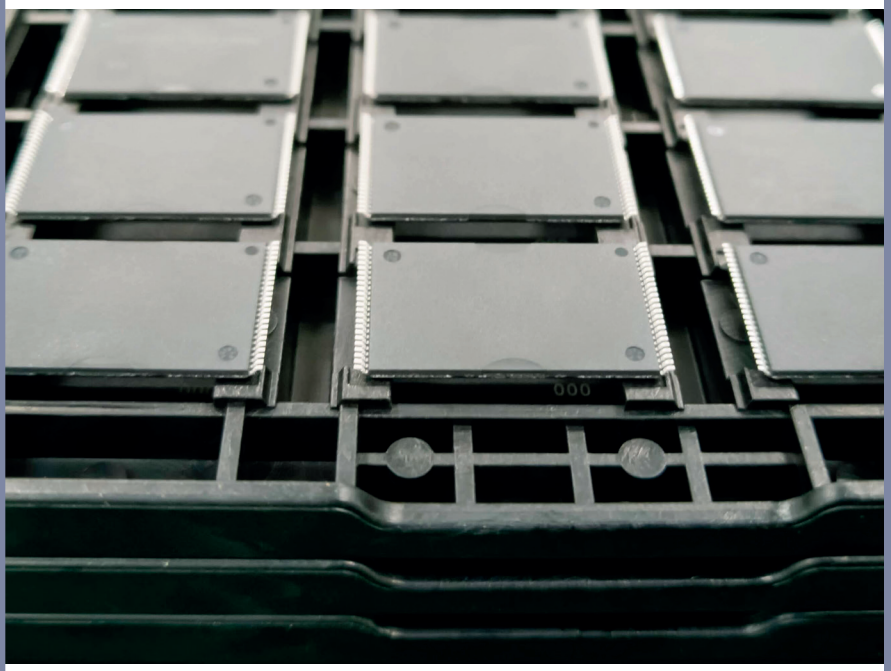

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through Milacron's Endura Touch or Mosaic G6 control system, with the graphical functions displayed on a 15-inch colour touchscreen terminal. Mould safety monitoring, intelligent clamp Die Height setup and automatic purge setup are some of the standard functions easily accessed through the controller.

Milacron's PowerPack, MPS and Roboshot models are also used to produce pails but they are more flexible and expensive as they are designed to deliver shorter cycle production times, says Stirn.

Milacron introduced its Klear Can multi-layer barrier packaging technology in 2015 as a transparent packaging alternative to an all-metal or glass container in food packaging applications, including those requiring a hot-fill, aseptic, pasteurization, sterilizing or autoclaving step.

At NPE 2015, Milacron produced a 14 oz (410 ml) PP/EVOH/PE see-through can using a multi-layer, multi-material co-injection technology developed by Milacron in-house. A Ferromatik 280 press with an add-on second injection unit and four-cavity co-injection mould designed by StackTeck produced the cans at rates equivalent to 12m cans per year.

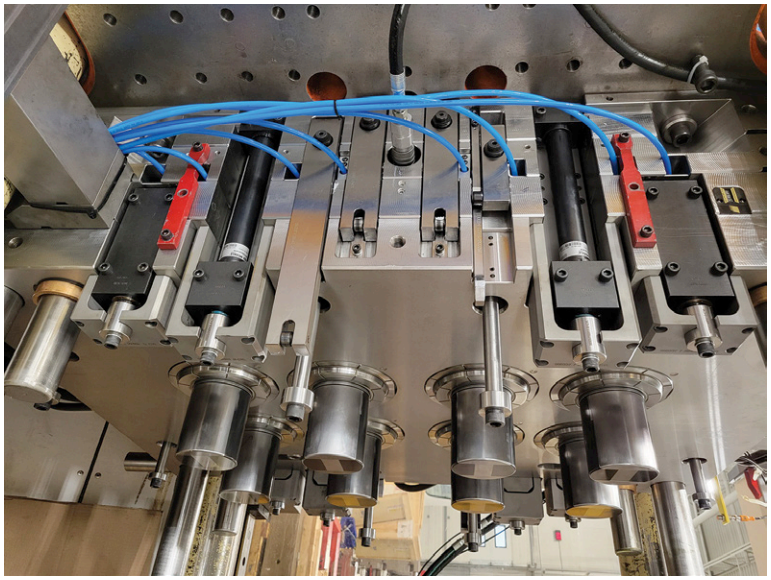
IMAGE: STACKTECK

Left: Updated collapsible core technology from StackTeck is used by KW Container of Troy, Alabama, US to produce an all plastic paint can made from recycled materials

The patented Klear Can design produced BPA-free containers that were sealed using a standard double seam metal can end. The system is designed for integration into existing production streams. S&W Fine Foods International, a Del Monte Pacific company based in San Francisco, California, packaged pineapple chunks and slices in Klear Can containers for sale in Seoul, South Korea and Shanghai, China.

Bunlim Ly, Director, Strategic Marketing and Innovation at Milacron, says: "Klear Can remains a

IMAGE: STACKTECK



Above: StackTeck's revised and improved 5-piece collapsing core tooling allows for part moulding with double the size of an undercut. A patent application has been filed

great alternative to metal and glass packaging. We do not have any active programs currently that we can mention, but understand the great benefits it provides, given the continued drive toward sustainability." Milacron has optimised its machinery product lines to meet customer needs. It no longer offers the Ferromatik toggle press in its fleet but can apply Klear Can technology to other machine models in its lineup, says Ly.

StackTeck Systems, a producer of high productivity tooling solutions for the injection moulding industry, delivered a new series of plastic can moulds for paint can producer KW Container of Troy, Alabama, US, that allows for the production of the first ever one-piece paint can. StackTeck's 5-piece collapsing core tooling technology underwent revision and improvement to allow for the production of the one-piece paint cans, which are made from recycled PP in one machine. StackTeck has filed a patent application for the improved tooling approach.

"We are using the StackTeck technology to produce paint cans in sizes of 0.5 litre, 1 litre and 1 quart round cans," says David Bacon, General Manager at KW Container. The two-piece can was already a sustainable solution but moving to a one-piece approach eliminated numerous production steps. StackTeck built an 8-cavity mould for KW Container. KW Container sources the high quality recycled materials from its sister company KW Plastics, which claims to be the world's largest plastics recycler of post consumer HDPE and PP. KW Plastics processes more than one than 1bn lbs of post consumer materials to produce a wide range of rPP and rPE resins.

Moulding the paint can in one-step produces a better part with reduced costs and savings in floor space, energy, time and overhead. "Instead of using two different machines to make two different pieces which are then taken downstream and bonded together in an assembly step, this method simplifies the process," says Jordan Robertson, VP of Business Development and Marketing for StackTeck.

StackTeck changed the relationship and the physical size of five core segments that make up its collapsing core technology. "The new design is similar in functionality to our existing collapsing core moulds but it is somewhat more sophisticated. It enables us to do what the technology previously could achieve but we can now double the size of the undercut from what we could do before," says Robertson.

The collapsing core technology core segments were previously all moved by cams, and featured four core splits in every mould, Robertson says. The improved design approach actuates the core segments differently. "We still actuate two of the four core splits as we did before with a cam, but now a separate hydraulic function has been incorporated for the movement of the other two core segments."

StackTeck says the tooling works in several millimetres of undercut in order to make a traditional geometry on the top of the can. The finished product follows KW Container's TruSnap, TwistCap and Pour Spout designs, which may require a deeper undercut. The single piece can required all of the sealing arrangement of the two-piece design while integrating with the lid.

The core segments are made from a particular steel grade with a proprietary coating. StackTeck has maintained the incorporation of specially designed cooling channels within the tooling so as to match or better the cycle time of a solid core mould. "StackTeck impressed us with the advanced cooling in the mould, which allows us to maintain a fast cycle time," says Bacon. StackTeck will explore new application possibilities for the updated tooling technology, such as new markets.

StackTeck also recently reported that its Thin Recess Injection Moulding (TRIM) technology used in thin-wall packaging applications is one of six approaches to significant light-weighting and material savings. It identifies its collapsing core technology, TRIM process, microcellular moulding, injection compression, ultra fast injection and multiple gating designs as the primary light-weighting technology options in use. Robertson says that in some cases one light-weighting technology can be

combined with another to trim part weight up to 50% or more.

StackTeck is now able to show how material savings from the use of TRIM can reduce the carbon footprint of a moulding operation, for environmental savings. In a Life Cycle Analysis study with a German packaging moulder, the company discovered that light-weighting of the rigid part by 21% with TRIM reduced the carbon footprint of the plant by 19.5%. For the packaging company it is as if they reduced their energy needs by 922,000 lbs of coal. "It is nearly a one-to-one relationship that has never been revealed before in a study. Take out 21% of the weight, reduce your carbon footprint by 19 percent," Robertson says.

Wittmann Battenfeld has upgraded its Airmould patented internal gas pressure injection moulding process for more user friendliness, better quality monitoring and compactness within a moulding cell. The process injects a gas (typically nitrogen) or liquid (such as water) under pressure into a mould cavity that is partly or completely filled with melt. The pressurised gas or fluid forms a bubble at the center of the melt that counteracts material shrinkage in the mold, prevents sink marks and warpage in the part, and lightweights the final product by removing material from the centre of the part.

The pressure control module has previously been available in two different versions: a mono module design that is controllable though a handheld device, and a standard module that is controllable through an external control cabinet. Both modules have been replaced by one uniform system, according to Richard Schnabel, Project Engineering Manager. The top priorities in creating the new module were compactness and optimised design. The new module is about 15% smaller than its predecessor, while the monitoring function has been improved considerably.

Wittmann Battenfeld's Airmould process was used in the production of a beer crate for German brewer Störtebeker Braumanufaktur. The carrying comfort of the beverage crate is improved by a targeted wall thickness increase in the gripping areas, which also prevents sink marks in those areas.

IMAGE: WITTMANN BATTENFELD

Above: Wittmann Battenfeld's EcoPower Xpress injection units are designed for short cycle high volume thin wall packaging applications

Wittmann Battenfeld offers its EcoPower Xpress line of servo-electric toggle machines for rigid food packaging, where thin walled parts can be produced in high volume on fast cycle times. The machine line comes in five sizes with 160 to 500 tons of clamping force. Water-cooled servo motors combined with rack-and-pinion gears drive the toggle lever clamping unit and the injection unit. A hydraulic system with servo drive is used for the secondary movements, including ejector, nozzle stroke/contact and core pull. The model line incorporates the company's patented Kinetic Energy Recovery System (KERS) which converts energy released in deceleration movements into electric energy.

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IMAGE: ARBURG

Forward momentum in optical moulding

*Precision optical components with zero defects are now demanded in many sectors, including automotive, E&E and medical. **Mark Holmes** reports on new developments*

Driven by technical developments in the automotive sector, optical components are fast becoming a major application area for the injection moulding industry. Car manufacturers are looking for new solutions for interior and exterior lighting, while applications in smartphones and the medical sector continue to benefit from optical moulding developments requiring high precision and quality with zero defects.

Sumitomo (SHI) Demag is observing a rapidly evolving optical moulding market in technically demanding applications, including new generation lighting made of liquid silicone rubber (LSR). Rustam Aliyev, Director Business Development Automotive & Electronics, says: "Adaptive matrix lights are only one component where silicone rubber can be applied." LSR is also set for growth in high performance applications such as connectors, seals and damping parts.

The company says that the latest report by Market Research Future 2022 indicates that the adaptive headlight segment is expected to grow at the fastest rate between now and 2027 and is anticipated to be valued at $4,389m by 2026 at a CAGR of 20.42%. Asia is the number one market, followed by USA and Europe, due to the sheer volume of vehicles on the road. Currently the LSR matrix light is mainly used in high end and luxury cars, in part due to the higher material costs compared to thermoplastics. However, it is anticipated that this will be extended to mid-range vehicles in the near future. Speed of adoption will continue to be driven by investments in electric vehicle production by the major car OEMs, as well as local government safety initiatives and the introduction of tighter emission laws. ›

Main image: LED linear collimator lenses produced by Arburg in a 1×3 configuration for three LEDs used in industrial lights

IMAGE: SUMITOMO (SHI) DEMAG

Right: An elastomer injection moulding system from Sumitomo (SHI) Demag

One example of how this could play out is in the USA, says Aliyev. In February 2022, Congress amended Section 108 of its Federal Motor Vehicle Safety Standard, updating legislation to allow adaptive driving beam (ADB) systems on cars sold within the USA. Now approved by the National Highway Traffic Safety Administration (NHTSA), this should significantly influence the future landscape. Especially considering the pent-up demand for new vehicle sales in the USA – expected to reach 15.47m in 2022, according to data published by IHS Markit.

Injection moulding polymer optics requires a high degree of precision in terms of mechanical engineering, tooling and process engineering, combined with a high level of reproducibility and cleanliness of the production environment. Efficient mass production using LSR will eventually lower the cost and make the technology more accessible to mainstream vehicle manufacturers.

"LSR is replacing specific applications of traditional polymers in more technically demanding industrial optical applications, such as optical light guides, prisms or lenses, as the material does not yellow when exposed to heat and better supports complex assembly processes," says. Aliyev. "The reason why LSR is a good material for automotive optics is it enables manufacturers to achieve component geometries and technical features not previously possible, such as the moulding of complex optical surfaces onto a light guide for a matrix headlight. Far lighter than glass, and most other plastics too, LSR is especially valuable in automotive applications due to vehicle vibrations. Its UV stability also makes it good for outdoor applications. LSR is regarded by the automotive industry as a unique material, in that it remains flexible and elastic down to -50°C, yet also retains its properties up to 200°C. As a result, LSR is used extensively in electronic components and cables, for example, where insulation is required."

IMAGE: SUMITOMO (SHI) DEMAG

Right: Automotive matrix lights moulded with precision using Sumitomo (SHI) Demag's new LSR package

New technical developments in automotive are driving new optical moulding applications. "Adaptive headlights are a highly sophisticated technology, comprising complex optical surfaces where light is guided through the micro-milled polished surfaces," adds Aliyev. "Connected to a camera control system, individual LEDs are switched on and off to improve road use by ensuring drivers are not blinded by a full beam or to highlight a particular road obstacle. It is an area where Sumitomo (SHI) Demag is regarded as a strong development partner, working with customers to determine the best solution. Being able to combine LSR with technical plastics to create one fully bonded component is another exciting development. It will be feasible to combine two or more individual materials into one seamless, robust component, which offers vehicle designers huge opportunities."

He continues: "In order to mix and process optical grade silicone material, moulders do need specialist equipment that can deliver the stability required. Although there are examples where traditional moulding machines have been adapted with an LSR injection unit, moulders may find that part quality or efficiency is compromised."

To achieve the extremely precise shot control needed and to handle the low-viscosity material, Sumitomo (SHI) Demag recently launched an all-electric IntElect LSR package. The cell was developed in collaboration with a number of partners that are dedicated to the LSR marketplace. The IntElect OPC-UA interface on the LSR package also includes Euromap's new 40082-3 standard for LSR dosing systems introduced on 1 June 2021. The moulding unit features a specially designed screw, a modified plasticising unit, a shut off system specifically designed for LSR and a spring-loaded non-return valve to avoid uncontrolled backflow of material. A pressure-controlled vacuum sequence

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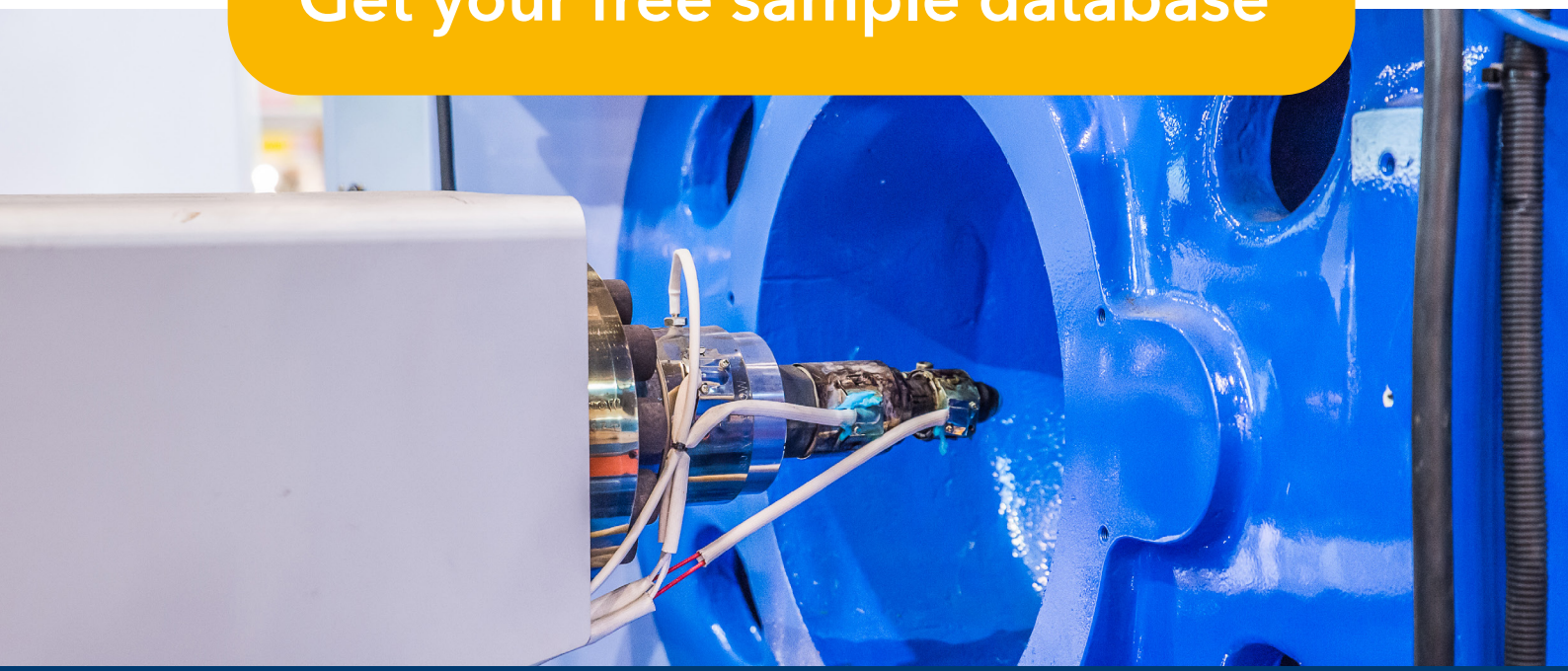

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IMAGE: FANUC EUROPE

Left: Every Fanuc Roboshot can be enhanced across a large range of applications, using dedicated software functions which give the freedom to tailor injection moulding processes exactly to individual needs

extracts air to prevent flash occurring during the filling of the mould.

Additionally, the centre press platen ensures high rigidity and uniform distribution of the clamp force to ensure more balanced pressure distribution. While the robust linear guidance system controls the mould opening and closing sequence with a built-in staged clamp force, further reduces the risk of flash. To detect any changes in force patterns and protect against damage to optical mould tools, the IntElect LSR machine features an advanced mould sensor safety system called ActiveProtect.

Fanuc is observing a growing market for optical moulding. "We are seeing a strong level of enquiries in this area, with a definite growth sector being lighting technology due to the popularity of LED designs," says Dave Raine, Roboshot Manager UK & Ireland, Fanuc UK. "Historically, we have received requests for more functional products and designs, but recently we are getting more cosmetic requests. This is driving technical developments in more complex light cluster designs and geometries. Other current areas of development include tool design, levels of automation and material availability, which all require new optical moulding solutions. For material availability, there now needs to be some consideration given to materials and the complexity of current designs."

Fanuc says that pre-injection and precise metering in combination with lens specification, screws and barrels have been standard on its machines for over ten years and are essential to optical manufacturing. Every Fanuc Roboshot machine can be enhanced across a large range of applications, using dedicated software functions which give the freedom to tailor injection moulding processes exactly to individual needs, adds Raine. This benefits better part quality, repeatability and transparency of processes. Fanuc Precise Metering 2 and Precise Metering 3 are additional functions designed to avoid uncontrolled volume flow between the end of plasticising and decompression. Precise Metering 2 provides advanced decompression control with reverse rotation of the screw after plasticising, while Precise Metering 3 checks the volume after plasticising, automatic V-P and decompression adjustment. Set to automatic mode there is no need to set various different parameters, it can be just switched on.

The optical moulding market is strongly characterised by the requirements for different optical components, reports **Wittmann Battenfeld**. Firstly, there are optical parts with lens properties. While there are also those requiring connectors for fibre optic data transmission within a complete moulded part, where several optical fibres are connected with single connectors for each wire. This is a significantly growing market, says Martin Philipp-Pichler, Project Engineer with responsibility for micro-moulding.

Data transfer is one of the main technological drivers and has a big impact on our daily life, he adds. Digital technology is developing at an unprecedented speed, which requires fast systems to handle this data. Due to high data transmission rates in several technology markets, it is necessary that this data transmission occurs in the shortest possible time and is of the highest quality.

In addition, components are getting smaller. "Simple one-purpose parts are being replaced by multi-purpose components that need to be smaller, more precise, reliable, and easy-to-handle," says Philipp-Pichler. "Therefore, engineers developing and designing high-end products need equipment to match. The need for low energy consumption, as well as limited space, also requires solutions that are smaller and more efficient than before. The less energy needed to manufacture the parts, and space and resources required, the more efficient the life cycle and carbon footprint will be. If the resources required are reduced, then the better it is for the complete production chain related to the product."

He says: "For example, micro injection moulding machines (MIMM) can result in buying less material and storing it, as well as less energy for drying the material. In addition, there is a smaller footprint for a dedicated MIMM and less waste if it is reliable

and precise. Savings can also be made by moulding microparts with more than one function or using a two-component MIMM that replaces two single machines that previously required twice the energy consumption."

Wittmann Battenfeld adds that it has been involved in prototype moulding for intelligent lens systems for medical applications, smart contact lenses, and glass fibre connectors for the automotive and telecommunications industries. Some of these are already on the market, while others are at the testing and development stage.

According to **Arburg**, LSR components are ideally suited for optical applications due to their heat resistance and transparency, for example, for applications in medical technology, industry and automotive construction. At the company's recent Technology Days 2022, the automated production of a light conductor for only one light source was demonstrated as an example, where it can be used for camera systems and car headlights with matrix LED lighting. For this purpose, an electric Allrounder 370 A with 600 kN clamping force was equipped with a 4-cavity mould and handling system from ACH Solution, as well as an LSR dosing system from Elmet integrated into the control system via OPC UA. In a cycle time of around 20 s, four 1.5g moulded parts with a hardness of 60 Shore A were produced from an LSR material from Shin Etsu. A Multilift V linear robotic system used claws in the handling unit to remove the components by their side tabs and placed moulded part samples on an LED test station before being discharged via a conveyor belt.

In a further example, LED linear collimator lenses were produced in a 1×3 configuration for three LEDs used in industrial lights. The parts were moulded by a hybrid Allrounder 470 H with a 2-fold mould from Erco in a cycle time of around 66 s. A Multilift Select robot system transferred the lenses onto a conveyor belt.

IMAGE: ISTOCK

Above: The quality of photos taken with smartphones increases with each new generation of devices. As a consequence, the requirements of plastic optical lenses are increased

IMAGE: ARBURG

Above: At its Technology Days 2022, Arburg demonstrated the automated production of a light conductor for only one light source where it can be used for camera systems and car headlights with matrix LED light – in detail and in the LED control station

Eliminating defects

Engel has developed new software for its Optimelt sequence that reduces microdefects in optical components, providing freedom from internal defects for high quality images. Injection moulding of optical components is subject to strict requirements and tomography analytical methods can identify microdefects in the order of 20 microns. The main cause of these very small defects are gases that enter the melt either from the material or the environment. With new software, Engel intends to reduce gas inclusions during the processing of transparent plastics and ensure a consistent high melt quality.

Engel has been conducting intensive research for years and recently a technical paper was written by Clemens Kastner, Product Manager Technologies and Norbert Müller, Vice-President for Global Application Technology.

Engel says that in the manufacture of optical lenses, there are principally two risks of defects. Firstly, on the surface, where streaks or other defects can occur. Secondly, the lens volume can facilitate the formation of small defects such as cavities. While in standard injection moulding the formation of cavities can be prevented by optimising the process control, the risk of other small defects often creates greater problems for the user. Particularly critical are microvoids (microdefects of below 20 microns) which cannot be made visible via conventional light microscopy investigations.

Microvoids are the result of gases, which occur in the process despite careful material conditioning and feeding. Engel says that two main causes can be identified. First, the distribution of non-dis-

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solved larger air inclusions and second the agglomeration of even smaller voids. The aim of the development work was therefore to find ways of freeing the melt from gases or preventing gas inclusion.

In conventional injection moulding, even a compression relief before and after dosing often does not offer enough flexibility to eliminate gases present in the melt, says Engel. According to Henry's Law, there is a direct relationship between the pressure acting on the plastic melt and the amount of gas that can be dissolved in it. It is therefore an obvious step to eliminate the presence of gas by suitable process and pressure management during processing, to avoid the formation of microdefects. The aim for Engel was therefore to create additional possibilities for applying pressure to the melt. Because of the large number of different materials and customer-specific production conditions, this means customising the plasticising process to a high degree.

The result of the development work is Optimelt sequence software, which makes a variety of new modules available to the process for extending the plasticising process (see box). In the first expansion stage, the software offers modules for customising the machine sequence. The core element of this is the freely configurable plasticising sequence, which can be programmed into the workflow as an additional sequence. Steps such as dosage, screw retraction for closing the active-closing non-return valve (for example, SmartShut by Engel) or compression reliefs are then programmed. Two options for applying the backpressure are available. This application of pressure can be arbitrarily adjusted in terms of level, duration and onset time.

The benefit of the software during injection moulding of optical lenses has been investigated. Optical coherence tomography (OCT) analyses have all confirmed that adaptation of the pressure management to the particular requirements drastically reduces the number of microvoids.

In the layers from OCT measurements, microdefects can be clearly identified by means of the white dots (see top images). While the image on the left shows a lens generated by a standard injection moulding process, a customised workflow using the new software was chosen for manufacturing the lens in the image on the right.

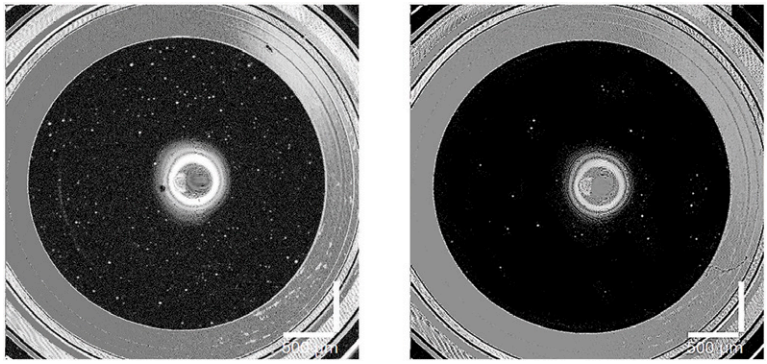


IMAGE: ENGEL

Above: With the use of Optimelt sequence, the plastic lenses have significantly fewer microdefects (right). Left: this lens was produced by standard injection moulding

Engel adds that because the reduction of defects can always lead to an improvement in optical properties, the new software opens up great potential for manufacturing optical products from transparent plastics, apart from smartphones in medical technology, for example. The company is evaluating other fields of application for the technology, including light guide structures, thick-walled lenses and head-up displays. In light guides, where the light must cover long distances within the part, significant improvements can be expected by reducing microdefects. For example, it may be possible to reduce the problematic loss of blue light along the light guide. Another application of Optimelt sequence may be in mechanically stressed parts.

The optical moulding market has been constantly evolving over a number of years, according to **Mold-Masters**. At the beginning bulbs were replaced by LED light. Following on, light guides started to be used in automotive exteriors and interiors. Now matrix LED technology is used for the front lights, while OLED is now the trend for rear lamps. In many cases, LED lighting is now part

New software Optimelt sequence – fully featured version

The software provides users with modules for extending the plasticising process. The aim is to customise the machine sequence. Functions include:

- Configurable multiple plasticising sequences.
- Interchangeable plasticising sequences.
- Overview page with the most important parameters.
- Visualisation of the plasticising sequences.

Optimelt sequence – basic version

Additional steps in the freely configurable plasticising sequence:

- Dosing up to dosing volume.
- Compression relief after dosing.
- Screw reverse rotation with SmartShut.
- Backpressure via screw position.
- Backpressure via screw rotation.
- Additional timer settings.

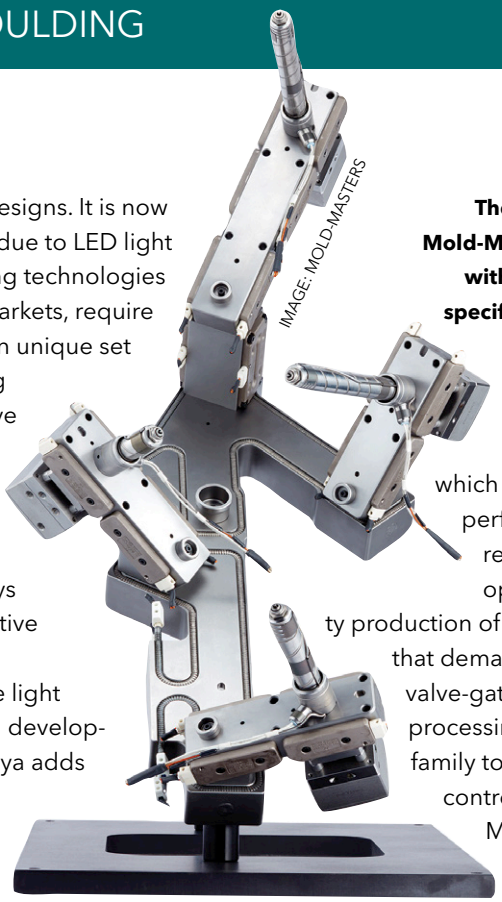


IMAGE: MOLD-MASTERS

The Dura+ hot runner system from Mold-Masters is engineered to perform with today's challenging resins and specifically developed for consistent, high-quality production of automotive lens components

of the brand signature in car designs. It is now common to recognise brands due to LED light guides. All of these new lighting technologies used in automotive or other markets, require new parts which have their own unique set of quality standards. Producing these components often involve new manufacturing processes. "It is critical for us to follow these trends to be able to offer the best processing solutions for the customer," says Enrique Moya, Global Automotive Sales Director.

The technology used for the light source is driving new technical developments in optical moulding. Moya adds that LED technology requires new advanced components that have their own unique set of moulding constraints. LED technology is also changing and requires new styles of parts that incorporate more advanced components, such as thick multi-layer lenses or thin 8-10 mm lenses injected in one shot. Other technical developments include lasers, OLED and matrix headlamps.

Mold-Masters highlights that the evolution of this market brings many challenges which includes increased quality expectations from OEMs. For example, thick lenses with high-quality optical standards must be met (perfect quality and no defects allowed). Defects in such components are much more apparent compared to other light sources such as halogen and Xenon. Defects risk damage to the light beam (misalignment and/or discolouration). In addition, some defects are not evident with a visual check following the injection process, so specific quality control testing equipment for LED lighting components is required. One potential cause for such defects is that resins dedicated for lighting applications can incorporate new additives that may react with certain materials of the mould/hot runner system, meaning that mould/hot runner material specification and design is particularly important. In addition, front and rear lenses are becoming bigger due to all the LED equipment, but they are also thinner to save weight, posing another processing challenge for the industry.

Mold-Masters says that many of its latest product developments, which include hot runner systems, controllers and auxiliary injection equipment, are highly suitable for the optical moulding market. This includes the Dura+ hot runner system, which has been engineered to perform with today's challenging resins and specifically developed for consistent, high-quality production of automotive lens components that demand exceptional clarity. For valve-gated hot runner systems processing front lenses, rear lenses or family tools that demand deeper control of the injection process, Mold-Masters offers the SeVG+ (Servo electric Valve Gate) actuation control system. The SeVG+ system uses servo motors to provide control and precision over individual valve pin opening and closing actuation profiles. The company has recently released a second-generation servo motor that is 48% more compact to reduce mould stack height significantly. It is also interchangeable with hydraulic/pneumatic cylinders, so it can be implemented only when an application demands it.

The TempMaster M3 is a hot runner temperature controller that incorporates precise temperature control along with a range of advanced features designed to optimise hot runner performance further and enhance moulded part quality and minimise scrap. In addition, TempMaster M3 incorporates Mold-Masters new TC-Connect Technology that eliminates conventional thermocouple mould cables to reduce weight, minimise clutter and save money. Finally, Mold-Masters offers the E-Multi all electric servo-driven auxiliary injection unit that quickly and economically converts any single shot injection machine to allow for precision multi-shot/multi-material moulding. E-Multi's are compatible with a wide range of materials and are suitable for applications across almost any industry.

CLICK ON THE LINKS FOR MORE INFORMATION:

- **www.sumitomo-shi-demag.eu**
- **www.fanuc.eu**
- **www.wittmann-group.com**
- **www.arburg.com**
- **www.engelglobal.com**
- **www.moldmasters.com**

IMAGE: AVIENT

Smaller carbon footprints for colours

Suppliers of colour masterbatch have developed products based on sustainable materials. Peter Mapleston checks out what's new for injection moulders

Producers of pigments and colour masterbatches continue on their journey towards more sustainable products. They are using a range of tools: incorporating recycled materials, making use of carriers derived from renewable resources, even reducing fossil-derived energy consumption in production processes by putting solar panels on their factory roofs. All these developments are progressing without compromising product quality; indeed, in some cases, performance is improving.

Compounder **Grafe** in Blankenhain, Germany, has been working on the colouring of bio-based and home-compostable materials for a while, says Lars Schulze, Head of Colour Development and Material Sciences. "We were able to successfully establish the first projects on the market and commercialise them," he says.

The company has successfully coloured coffee capsules in what it says was a very elaborate development project. "Given the strict guidelines according to which the masterbatches may only contain certain ingredients and the pigments can only be used in limited concentrations, this is quite a demanding task," says Schulze. "Nevertheless, we succeeded in over-colouring the dark base material." Maroon, light grey, brilliant blue, blue-grey, petrol brilliant, olive brilliant, violet brilliant as well as beige and berry were used from Grafe's Modalen range. The certification came into effect on 14 August 2020.

Grafe is currently working on projects involving PHBV, a type of polyhydroxyalkanoate (PHA), Schulze reports. This is a home compostable, and biocompatible polymer produced by bacteria that can provide an alternative for some non-biodegradable, synthetic polymers. He says: "Besides the difficulties of the biopolymers currently on offer, in terms of processing, inherent colour and temperature resistance, another major challenge is their colouring or over-colouring. Both the plastic base material and the additives should have as little impact on the environment as possible and be biodegradable in order to achieve the certification goals."

EN 13432, the standard governing biodegradable and compostable plastics, severely limits the pigment selection and dosage. "That is why very brilliant colours are the current challenge for our development team," Schulze says. He lists numerous applications, such as disposable articles and everyday product packaging.

In May, **Avient** introduced new colour and additive concentrates made with bio-based

Main image: A splash of colour – bio-based materials and colouring recyclate are priorities for colour companies

Above: Avient now has more bio-based polymer solutions for medical and pharmaceutical applications

polycarbonate, ABS, and other styrenic polymers. These are in addition to bio-based polyolefin products that Avient introduced in 2021. These more sustainable additions to the Mevopur portfolio were featured at Pharmapack Europe 2022 in Paris in May. The new Mevopur concentrates have bio-based content between 70 and 100%. Avient says they can be used as drop-in replacements for fossil-based materials that can be processed on standard injection-moulding machines and can be recycled in the same channels as conventional fossil-based polymers. "For users who prefer ready-to-use solutions, pre-coloured formulations using bio-based polymers are available too," it adds.

The **Gabriel-Chemie** plant in Germany has received ISCC+ certification, meaning that it can produce a range of colour, white and additive masterbatches using polymers produced from biologically derived feedstocks (such as tall oil or used cooking oil) including official ISCC+ certification documenting the sustainability of the supply chain.

The company has also introduced a new premium white masterbatch with up to 10% reduced CO_2 footprint compared to its standard product. It says it has optimised the formulation to include more raw materials that have a reduced CO_2 footprint. In addition, part of the energy used to produce the masterbatch is generated using photovoltaics.

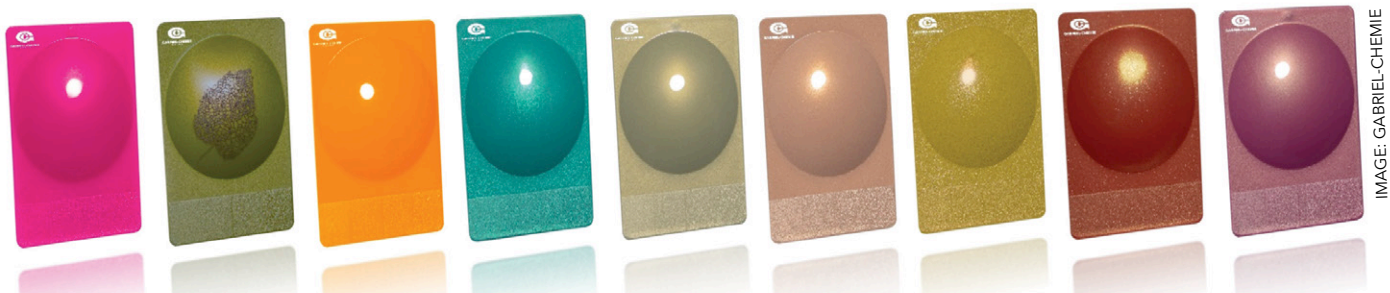
Theo van Kessel is the owner of **Innosolids**, a small masterbatch producer in Maastricht, Netherlands, which has some innovative IP behind it. The company's catchment area is mostly Northwest Europe, but one major global masterbatch producer headquartered in the USA has acquired rights to the technology for what Innosolids currently terms DLC, which stands for Dry Liquid Colour. Innosolids has patented the technology.

Van Kessel says DLC colour masterbatches combine important advantages of liquid colour systems (which the company used to produce) – principally the use of a universal carrier, providing very good dispersion – without the disadvantages of inducing screw slip and the need for a special dosing system. DLC masterbatches can be used in all thermoplastics that can be processed at temperatures up to 300°C. Van Kessel says that many injection moulding companies sooner or later have issues in mixing masterbatch into the melt. "DLC solves the problem," he claims.

In his patent, van Kessel says the masterbatch "acts like a dry-liquid colorant. For adding the masterbatch to the extruder or the injection moulding machine, the masterbatch will be a solid, and can be easily handled. Once the masterbatch is in the processing equipment, the masterbatch will function like a liquid colorant and give excellent uniform colouring of the polymer composition to which the masterbatch is added."

DLC masterbatches do incorporate a small amount of liquid to provide good wetting and dispersion of the pigment, van Kessel says, as do many other solid masterbatches. Some other components are also common. But one key ingredient, which acts as a binder, is not disclosed in the Innosolids patent.

The low melting point of DLC masterbatches results in a prior plasticisation of the material and



Above: Gabriel-Chemie launched the 22nd edition of its Colour Vision collection earlier in the summer. Devised by trend scouts and colourists, this is described as a source of inspiration for product and colour concepts for brand manufacturers, consumer goods and industrial designers as well as plastic processors. "Sustainability at its focus, special metallic and mother-of-pearl looks complement these colours," the company says

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Left: Building blocks produced in bio-based plastics by Dutch company BiOBUDDi are coloured using Innosolids DLC masterbatch

consequently better mixing and lower power consumption, van Kessel says. "Due to the high concentration of colour and due to the colour strength, the dosing percentage is substantially lower [than with other solid masterbatches]. Moreover, DLC has a cleansing effect on the production screws. Instead of sticking to the screws, DLC cleans the screws. The big advantage pays off in faster colour changes and less material loss and less production time loss due to burnings. The good dispersion prevents colour wisps/stripes and reduces production problems and loss of production."

In recent years, numerous colour companies have been developing alternatives to carbon black that enable black plastics packaging to be identified in post-consumer sorting systems that use near-infrared (NIR) detectors. Parts made black with carbon black in most cases are invisible to NIR, because the carbon black absorbs too much of the radiation.

One of the latest developments comes from UK-based masterbatch manufacturer **Broadway**, which has developed an NIR detectable masterbatch which meets standard food contact regulations.

Left: Broadway's NIR Detectable Piano Black Masterbatch and sample plaques moulded in PET

Compatible with PET, this product creates a high-quality gloss piano black finish. Broadway notes that traditional pigments utilised to achieve such a finish present inherent difficulties to the NIR detection systems used at waste sorting plants: traditional black pigments are strong absorbers of radiation both in the visible and infrared regions. This limits the amount of infrared radiation which can be reflected into the NIR detectors, placing considerable limitations on the system's ability to characterise and sort the polymers.

The new product range has undergone extensive and successful in-house NIR spectroscopy based tests, returning a distinct and statistically significant spectroscopic signature.

LyondellBasell too says it supports design for circularity with masterbatch solutions that enable intelligent product design including NIR-detectable masterbatches. Its black colour masterbatch Polybatch 73641 NIR has recently obtained COTREP certification, which demonstrates that plastics containing this masterbatch can be separated using conventional NIR sorting equipment.

In addition to the NIR sortable black masterbatch series, LyondellBasell has a range of standard and bespoke NIR sortable colours covering a broad colour palette. It is also offering CirculenRecover masterbatches using post-consumer recyclate carrier resins to support the increased demand for mechanically recycled polymers.

Upstream, **Lanxess** also has a development to help increase the recycling rate of black plastics packaging. Iron oxide pigment Bayferrox 303 T exhibits 20% reflectance of NIR, sufficient to enable identification of plastics using NIR detectors.

"Thanks to a special manufacturing process, we have succeeded in synthesizing a pigment with an

The colour orange is mandatory as a safety feature for high-voltage components, and is increasingly being used to mark live cables and other elements in electric and hybrid vehicles as well as in other high-voltage applications. To permanently colour plastics with the RAL 2003 shade of orange, speciality chemicals company Lanxess has developed a soluble organic dye, Macrolex Orange HT. According to Lanxess, it is highly heat-stable, light fast and weather resistant and offers outstanding colour strength and brilliance. Lanxess says that, unlike most conventional colorants, the halogen-free Macrolex Orange HT is perfect not only for use in polyamide, but also for other common plastic types such as polycarbonate and PPS, which, due to their high processing temperatures, normally pose a challenge for colorants

IMAGE: LANXESS

Predicting effects of PCR on colour

In June, **Avient** unveiled what it described as a breakthrough colour prediction service for post-consumer recycled polyolefins and PET, designed to improve the customer experience of working with PCR content for materials used in packaging.

Avient says its PCR Color Prediction Service helps brand owners understand what colours are achievable based on the amount of PCR used. It uses sophisticated technology to determine – through prior colour matching – if colours are feasible in a new application that incorporates PCR content. It also calculates how much PCR content can be added to an existing application without affecting its signature colour.

Using proprietary software, Avient experts measure resin characteristics to identify the gamut of colours that can be successfully reproduced in a specific PCR-based material. "This premium service simplifies and accelerates the selection of preferred colours for polymers with PCR content, avoiding time-consuming trial and error," says Avient.

"By speeding the evaluation process, the service also gives greater flexibility to customers that may need to switch from one PCR content source to another, which is especially important due to today's supply variability," it says.

extremely low magnetic value. If you compare Bayferrox 303 T with standard manganese ferrites, the magnetism has been reduced by more than 50%," says Stefano Bartolucci, Global Market Segment Manager for Plastics at the Inorganic Pigments business unit at Lanxess. "With our black pigment, false alarms in food production, for example, can be avoided, and a higher degree of process reliability can be achieved because there are fewer interruptions. Metal detectors cannot distinguish between pigments and pieces of metal in an edible item. This is why metal contaminants must be avoided in both the masterbatch and the packaging."

After several years away from the business of making masterbatches for PVC, **Teknor Apex** is back in the market, following the acquisition last year of **Lanier Color Company** in Gainesville, GA, USA. Lanier produces colour concentrates and specialty compounds for PVC, as well as other thermoplastics, with a focus on the building and construction market.

Suresh Swaminathan, President of Teknor Apex, says the combined strength of the two organisations "will bring more capability and capacity in product innovation leading to an enhanced customer experience."

Teknor Apex says the addition of Lanier works in several ways, expanding its portfolio back into PVC colour concentrates, adding to its specialty compounds offerings specific to the building and construction market, and giving the existing Lanier customer base access to the broader portfolio of Teknor's PVC compounds.

Lanier also brings with it something called SpectraCool Low Heat Build Technology, which makes it easier to use darker coloured products in hot, humid, and high-altitude environments. Lanier says the technology, based on infrared-reflective and/or transparent pigments, has diminished surface temperatures by as much as around 21°C, minimises or even eliminates distortion, and reduces or eliminates the need for other functional additives used specifically to reduce distortion, while retaining their vibrant colour after extensive weathering. The technology can be used with many thermoplastics and applications.

Below: TPEs and colour masterbatch

IMAGE: TEKNOR APEX

CLICK ON THE LINKS FOR MORE INFORMATION:

- **www.grafe.com**
- **www.avient.com**
- **https://gabriel-chemie.com**
- **www.innosolids.com**
- **https://broadwaycolours.com**
- **www.lyondellbasell.com**
- **www.lanxess.com**
- **www.teknorapex.com**
- **https://laniercolor.com**

AMI has published the 2022 edition of its **Thermoplastic Masterbatch Global Market** report. This is an in-depth global overview providing a current, comprehensive and authoritative analysis of the global thermoplastic masterbatch industry with forecasts through to 2026. For more information and a sample of the report, contact sales@amiplastics.com

Gearing up for K2022

IMAGE: MESSE DUSSELDORF, CONSTANZE TILLMANN

It's that time again: K2022 kicks off in a few short months. In this special section, we look ahead to the global plastics industry's key event – and provide essential links to help you get the most from your visit

In just three months, the world's largest plastics show will open its doors. K2022 runs from 19-26 October 2022 in Dusseldorf, Germany.

The show will fill all 18 halls of the venue – with more than 3,000 exhibitors from over 60 countries expected to promote their raw materials, additives, semi-finished products, machinery, ancillary equipment and services to the plastics industry.

The last K show in 2019 recorded 3,330 exhibitors from 63 countries on 177,000 m² net exhibition space. It also welcomed 224,116 trade visitors – of whom 73% came from outside Germany.

Sustainability is a growing concern within the plastics sector, so the circular economy will feature heavily at the show. As well as machinery – such as equipment for processing, recycling and waste management – there will also be multiple examples of new materials – such as bioplastics and formulations that include higher levels of recyclate.

There is also a return for the Science Campus – which allows business to exchange ideas and information with academia – as well as two special events: 'Plastics shape the future', and the VDMA's Circular Economy Forum.

A new element of the show is the Start-up Zone, which will showcase new and small companies in the plastics sector. This area, in Hall 8b, will feature companies that are less than 10 years old, have fewer than 100 employees and generate a turnover below €10m (US$9.5m).

Injection World magazine at the show

Injection World will be exhibiting at K2022 on stand C11 in Hall 7. By paying a visit, you can find out more about all of our digital plastics magazines and apps.

The stand is run by our parent company AMI, which will be showcasing its latest industry databases and market reports, and information on our many events such as Injection Molding & Design Expo 2023.

In the run up to the K2022 event, *Injection World* will be publishing detailed previews of the innovations that will be on show.

Look out for our K Preview issues in September and October. Follow the news on our @plasticsworld Twitter feed. We will review K2022 in detail in our November/December edition.

Exhibitors can send press releases to **david.eldridge@amiplastics.com**. Full details of our special coverage of K2022 are in our **media pack**.

Dates: 19-26 October 2022 **Venue:** Dusseldorf Fairground, Dusseldorf, Germany
Hours: 10:00 to 18:30 daily **Organiser:** Messe Dusseldorf **Website:** www.k-online.de

Knowledge is power

Use our selection of web links to make your visit to Dusseldorf – and K2022 – as productive and enjoyable as possible

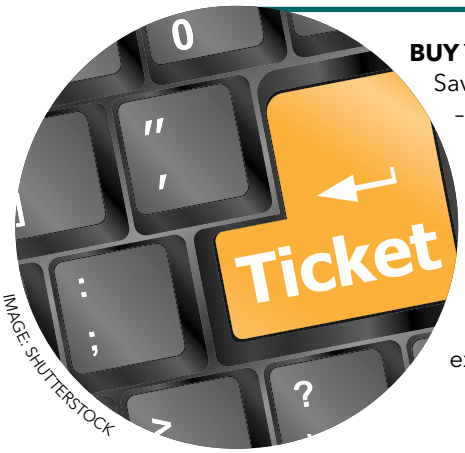

IMAGE: SHUTTERSTOCK

BUY YOUR TICKETS

Save queueing – and money – by buying entry tickets in advance. A three-day ticket costs €120, while one-day tickets cost €55 when bought in advance. Order tickets by clicking **here**. A catalogue is €25: buy a voucher online and exchange it at the show.

BOOK YOUR ACCOMMODATION

Dusseldorf accommodation fills up fast during K and the best options go early. Find out what's still available and make your reservation as soon as possible at the official **website**.

IMAGE: SHUTTERSTOCK

IMAGE: MESSE DUSSELDORF, CONSTANZE TILLMANN

GET K ON THE PHONE

Lots of useful K2022 data is now available on your smartphone or tablet – including exhibitor and product databases, exhibition plans, travel information, hotel listings, city guides and restaurant reviews – via the 'The K App'. To download the free app, visit the page **here**, which has links to both the AppStore (for iPads and iPhones) and Google Play (for Android devices).

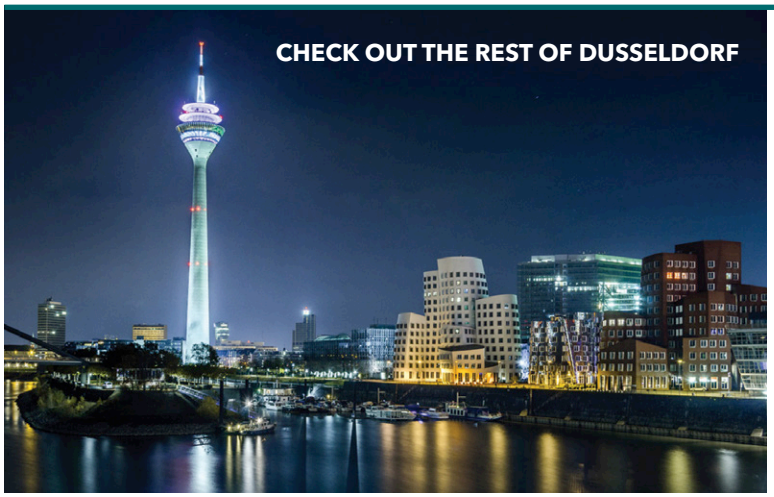

IMAGE: SHUTTERSTOCK

CHECK OUT THE REST OF DUSSELDORF

After a hard day at K2022 you will have earned some relaxation time. Make the most of your evenings in the city by checking out the restaurants, pubs, bars, culture and entertainment on offer. This official guide has useful listings, as well as guides to the sights and neighbourhoods: **http://bit.ly/DusseldorfGuide**

Also worth a look is the Wikitravel page on the city: **http://bit.ly/wikiguide**

And if the Altstadt and its 260 pubs get too crowded, try heading to the **Media Harbour**, for its modern architecture and venues, which include restaurants, bars and clubs.

IMAGE: SHUTTERSTOCK

ORGANISE YOUR TRAVEL

Dusseldorf is well connected and getting around the city is easy thanks to its excellent public transport network. There is one important change to note this year: your admission ticket to the show does not include free use of local transport, as it did in the past. Instead, visitors can travel using the **eezy app**, which is like an 'e-ticket'. Details on transport can be found **here**.

GET ROUND THE EXHIBITORS

With more than 3,000 exhibitors to choose from and a total exhibition area of more than 170,000m^2, it makes sense to plan your time at the show before you head off. The good news is that you can search for participating companies by name and by product using the online K2022 database.

To search by company, click **here**

To search by products, click **here**

You can also locate companies using the interactive floorplan which can be found **here**

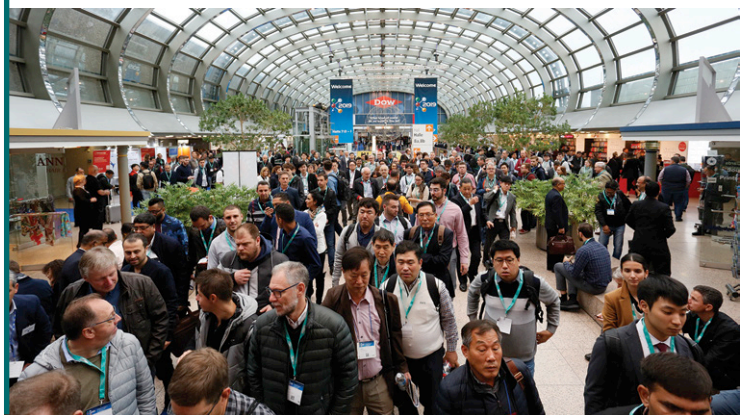

IMAGE: MESSE DUSSELDORF, CONSTANZE TILLMANN

IMAGE: DUSSELDORF TOURISMUS

SOAK UP SOME CULTURE

Dusseldorf is more than just K2022. As the capital of North Rhine-Westphalia, it is home to more than 100 galleries and museums. One celebration is for the artist Joseph Beuys, who spent much of his life in the city. While his centenary fell in 2021, there are still several ongoing events. These include: an augmented reality (AR) experience (at three separate locations); and, if you're feeling fit, a Beuys-themed cycle tour. **Find out more here**

TRY SOME RETAIL THERAPY

IMAGE: DUSSELDORF TOURISMUS: MARKUS LUIGS

If retail is your thing – and especially designer goods – then Dusseldorf will not disappoint. Königsallee – known as 'Kö' to locals – includes many of Europe's leading fashion names and is likened with London's Knightsbridge or New York's Fifth Avenue. However, neither of those locations can boast a setting to match the tree-lined, man-made 'river' that runs through this premium shopping district. Catch the flavour **here**.

IMAGE: DUSSELDORF TOURISMUS: U. OTTE

DON'T FORGET THE ALTBIER!

Regular visitors will already know that Dusseldorf's local brew is the Altbier, a malty copper-coloured ale of around 4.5% strength produced using a special top-fermented lagering method. The name translates as 'old beer' but is actually derived from the Latin word 'altus', which means 'high' and refers to way the yeast rises during brewing. Try it out in one of the city's numerous brew-pubs. Details of these and a short history of Altbier can be found **here**.

Download these new product brochures

Simply click on the brochure cover or link to download a PDF to your PC or smartphone

MASTIP HOT RUNNER SOLUTIONS

This 8-page brochure details Mastip's solutions in hot runner technology, including valve gate tip options, manifold valve gate actuators, nozzle range, its VeriShot technology, Nexus pre-assembled systems and GTV8 Integrated Sequential Control System.

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POLYKEMI: CUSTOM COMPOUNDS

This 12-page brochure provides an introduction to Polykemi and its range of custom engineered plastic compounds. It includes details of production locations, subsidiaries, R&D capabilities and quality certifications.

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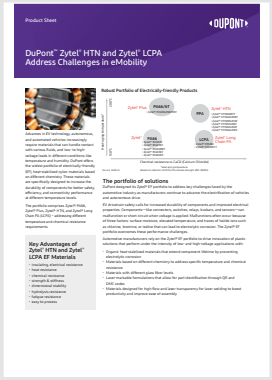
DUPONT: E-MOBILITY POLYMERS



DuPont's Zytel HTN and Zytel LCPA polyamides are electrically-friendly (EF) materials designed to increase the durability of components in e-mobility applications. Find out about the features of DuPont's EF materials in this company brochure.

❯ CLICK HERE TO DOWNLOAD

TISAN: ENGINEERING COMPOUNDS

Tisan Engineering Plastics has more than 40 years of experience developing injection moulding compounds for applications in automotive, home appliances, E&E and other sectors. Find out more about Tisan's wide range of materials in this brochure.

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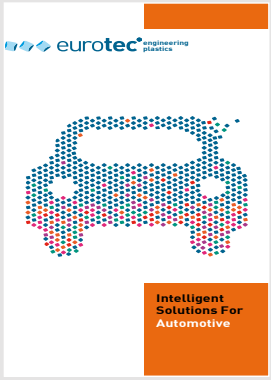
EUROTEC: AUTOMOTIVE COMPOUNDS



This brochure presents the full range of Eurotec's engineering polymer compounds for automotive applications, including interior, exterior and under the hood. Read all about Eurotec's innovative products and tailor made services.

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STRUKTOL: CREATIVE RECYCLING

Struktol Company of America offers a range of polymer additives designed to simplify the process of recycling plastics. Learn about its latest options for viscosity modification, odour control and compatibilisation.

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If you would like your brochure to be included on this page, please contact Claire Bishop claire.bishop@ami.international. Tel: +44 (0) 1732 682948

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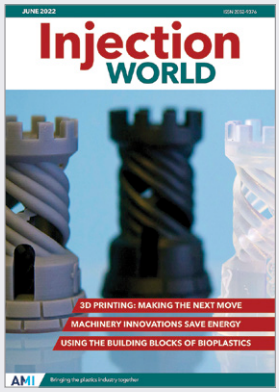

Injection World
June 2022
The June edition of Injection World looks at the latest developments in 3D printing and how they can be exploited by moulders. It also explores some options for reducing energy use and reviews innovations in bioplastics.

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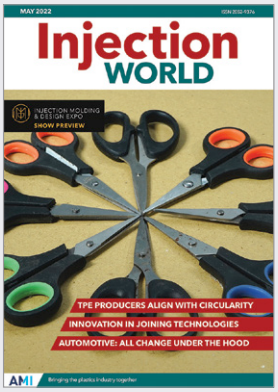

Injection World
May 2022
The May edition of Injection World magazine takes a look at how TPE producers are responding to the needs of the circular economy. It also explores some of the latest innovations in plastics joining technologies and under-the-hood automotive.

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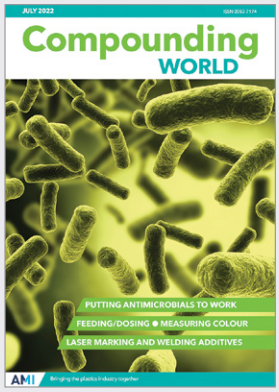

Compounding World
July 2022
The July 2022 edition of Compounding World explores developments in the fast moving antimicrobial additives sector. It also looks at some of the newest innovations in colour measurement, laser marking and welding additives, and feeder technology.

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Plastics Recycling World
May/June 2022
The May-June edition of Plastics Recycling World has these features covering: Shredding advances lead to greater precision; What's new in compatibilisers; Processors can get more from in-house recycling.

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Pipe and Profile
July/August2022
Pipe and Profile Extrusion's July-August edition has its main focus on PVC, with features on the progress made in PVC recycling and developments in PVC stabilisers. Plus a feature on the latest extruder technology and a Visitor Guide to K2022.

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Film and Sheet
June 2022
The June 2022 edition of Film and Sheet Extrusion explores some of the latest innovations in printing technology. It also looks at recent masterbatch introductions for film production, as well as reviewing developments in blown film dies and downstream equipment.

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Compounding WORLD
Film and Sheet EXTRUSION
Pipe and Profile EXTRUSION
Injection WORLD
Plastics Recycling WORLD

GLOBAL EXHIBITION GUIDE

2022	**26-30 September**	Colombiaplast, Bogota, Colombia	www.colombiaplast.org
	27-29 September	Fachpack 2022, Nuremburg, Germany	www.fachpack.de
	27 Sept-1 October	TaipeiPLAS 2022, Taipei, Taiwan	https://www.taipeiplas.com.tw/en/index.html
	4-7 October	Plastex, Brno, Czech Republic	www.bvv.cz/en/plastex/
	19-26 October	K2022, Dusseldorf, Germany	www.k-online.com
	9-10 November	Compounding World Expo USA, Cleveland, USA	www.compoundingworldexpo.com/na/
	1-3 December	Plast Print Pack West Africa, Accra, Ghana	www.ppp-westafrica.com
2023	**17-19 January**	Swiss Plastics Expo, Lucerne, Switzerland	https://swissplastics-cluster.ch/
	1-5 February	PlastIndia, New Delhi, India	www.plastindia.org
	17-20 April	Chinaplas 2023, Shenzhen, China	www.chinaplasonline.com
	30 May – 2 June	Equiplast, Barcelona, Spain	www.equiplast.com
	14-15 June	Compounding World Expo Europe, Essen, Germany	www.compoundingworldexpo.com/eu/
	5-8 September	Plast 2023, Milan, Italy	www.plastonline.org/en
	26-28 September	Interplas, Birmingham, UK	www.interplasuk.com
	17-21 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de

AMI CONFERENCES

13-14 September 2022	Performance Polyamides, Dusseldorf, Germany
13-15 September 2022	Plastics Recycling Technology, Vienna, Austria
14-15 September 2022	Conductive Plastics, Dusseldorf, Germany
20-21 September 2022	Single-Serve Capsules, Barcelona, Spain
28-30 November 2022	Fire Resistance in Plastics, Cologne, Germany
29 Nov-1 Dec 2022	Polymers in Footwear **VIRTUAL**
6-7 December 2022	Thin Wall Packaging, Cologne, Germany
7-8 December 2022	Oil & Gas Non-Metallics, London, UK

For information on all these events and other conferences on film, sheet, pipe and packaging applications, see

www.ami.international