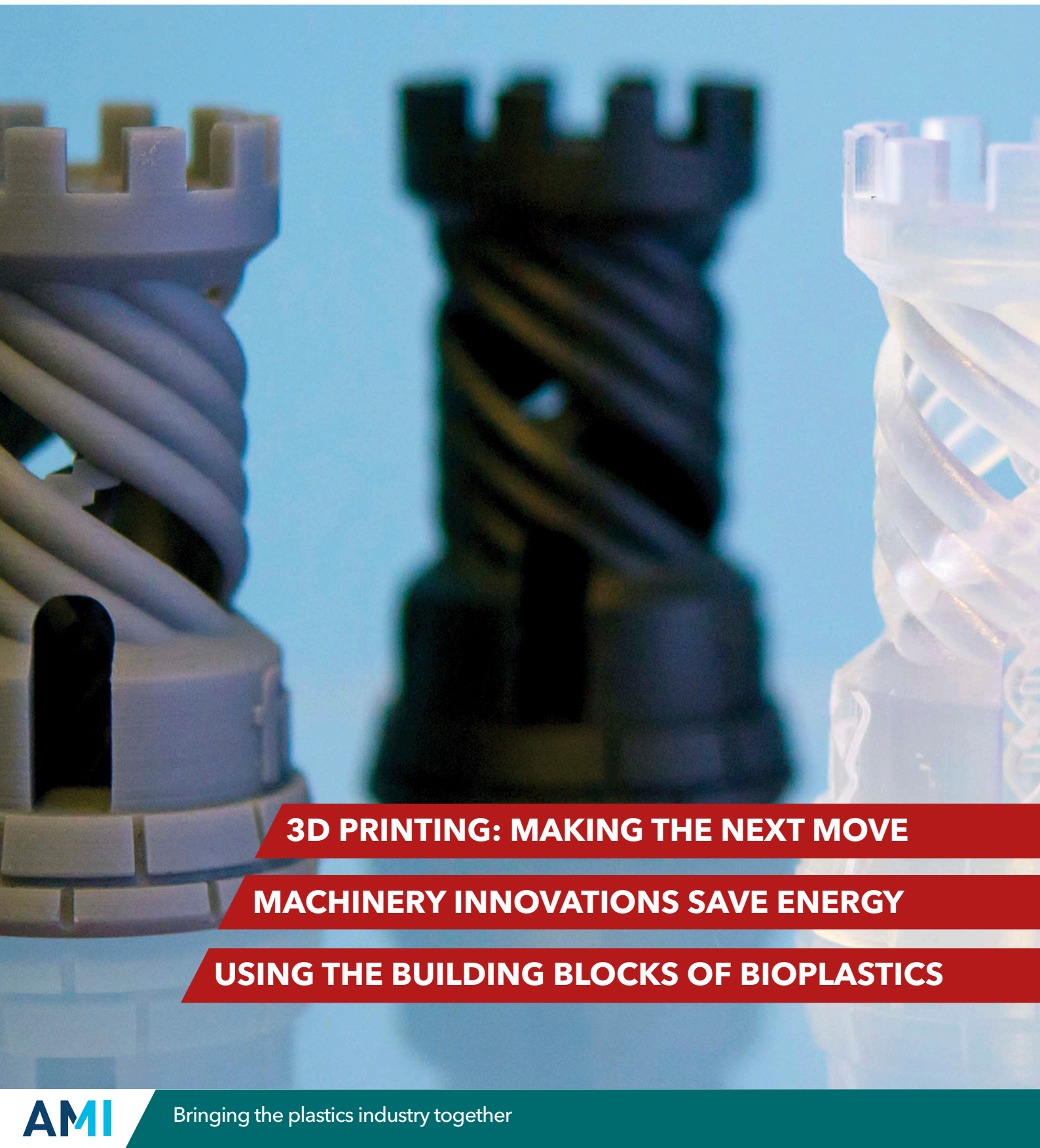


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Injection WORLD

4 News

News from across the global injection moulding industry: Lanxess, DSM and Advent shake up ETP sector; Global plastic waste may triple by 2060, says OECD; VDMA cuts German machinery outlook

13 Machinery innovations save energy

Hardware, software, and renewable energy developments power advances in energy management options for injection moulders. Mikell Knights finds out more

26 Injection Molding and Design Review

The US injection moulding industry welcomed the opportunity to share experiences at the Injection Molding and Design Expo in Detroit in May. By David Eldridge

29 3D printing: the next move

Injection moulders can now make use of 3D printing for production as well as prototyping and mouldmaking. Peter Mapleston reports on processes and new materials

41 The building blocks of bioplastics

Developers of bio-based plastics have been concentrating on properties and performance to target materials at demanding applications. Peter Mapleston reports on new products

50 Diary

PAGE 13



PAGE 26



PAGE 29



PAGE 41



COMING NEXT ISSUE

› Packaging › Colour and Masterbatch › Optical Moulding

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Recycled ABS for moulding

The Molding Solutions business unit of Barnes Group and Ineos Styrolution are to collaborate on sustainable ABS.

Ineos Styrolution has pledged to incorporate at least 325,000 tpa of recycled materials into its products. The collaboration will focus particularly on the group's Terluran ECO GP-22 MR-50 and 70 ABS grades which contain 50% and 70% respectively recycled post-consumer waste electrical and electronic equipment. Both will be black.

"With our unique technology, we are able to expand our moulding capabilities of post-consumer recycle to meet the required product quality," said Stefan Kruppa, VP of R&D for Molding Solutions. "Our aim is to enable customers to achieve the best results in the injection moulding process with recycled ABS."

> www.barnesgroupinc.com
> www.ineos-styrolution.com

Lanxess, DSM, Advent shake up ETP sector

Two leaders in engineering thermoplastics have prepared their exit from the sector with DSM selling its Engineering Materials business to a new joint venture between Lanxess and private equity group Advent. Lanxess is contributing its High Performance Materials business unit to the JV but it will be the minority partner with a stake of up to 40% and an initial payment of at least €1.1bn.

Following the transfer to the JV, the HPM business will no longer be fully consolidated at Lanxess. The group will have the possibility to divest its stake in the JV to Advent after three years.

On 31 May, when DSM announced the €3.7bn sale of its ETPs business, it also confirmed its focus on nutrition and related fields by agreeing to merge with Swiss flavours and fragrances house Firmenich.

The JV's purchase of DSM Engineering Materials will be financed via equity from Advent and external



Above: Lanxess HPM's production facility in Krefeld, Germany

debt. Combined with Lanxess HPM, the new ETP group will have annual sales of around €1.5bn, with EBITDA pre-exceptionals of around €210m and an EBITDA margin of about 20%.

Lanxess HPM is a major producer of PA 6, PBT and thermoplastic fibre composites. There are 1,900 employees at seven production sites and seven research locations, of which the most significant by far is at Antwerp in Belgium. Most of its ETP products are sold into the automotive market.

DSM Engineering Materials produces PA 6, 66, 46 and 410, plus PPS and speciality polyesters. It has about 2,100 employees at eight production sites and seven research centres. As well as Europe and the US, it has a strong presence in Asia.

The transaction is subject to approval by the authorities. Closing is expected in the first half of 2023.

Lanxess is now planning a share buyback programme of up to €300m.

> www.lanxess.com
> www.dsm.com

RadiciGroup buys ETP facility in India

RadiciGroup has continued its internationalisation by acquiring the Engineering Plastics business of Ester Industries in India for approximately €35m. This includes one site that is due to become operational in early 2023. The newly acquired business will become part of RadiciGroup's High Performance Polymers (HPP) business area, which makes engineering

polymers based on PA, polyester and other materials.

"In the Indian market, a strong presence is required to react to growth opportunities in sectors with short and responsive production chains," said Maurizio Radici, COO of RadiciGroup. "From the start, the strategy of our HPP business area has been based on working locally in the closest proximity

to customers."

Acquiring Ester's site, the company added, will add to another that is also under construction in China in boosting its footprint in Asia. It aims to achieve sales of €50m in India. At present, the compounding business accounts for one-third of the group's total sales worldwide.

> www.radicigroup.com



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OECD: global plastic waste may triple by 2060

The amount of plastic waste produced globally could triple by 2060 – with only a minority likely to be recycled.

A report from the OECD – *Global Plastics Outlook: Policy Scenarios to 2060* – says around half the waste will end up in landfill and less than a fifth will be recycled. It estimates that almost two-thirds of plastic waste in 2060 will be from short-lived items such as packaging, low-cost products and textiles.

"If we want a world that is free of plastic pollution, we will need to take much more stringent and globally co-ordinated action," said

Mathias Cormann, secretary-general of OECD.

The report projects global plastics consumption rising from 460m tonnes in 2019 to 1,231m tonnes in 2060. Growth will be fastest in developing and emerging countries in Africa and Asia, although OECD countries will still produce more plastic waste per person (238kg per year) in 2060 than non-OECD countries (77 kg).

Globally, plastic leakage into the environment will double to 44m tonnes/year, while build-up in lakes, rivers and oceans will more than triple – as plastic waste rises from 353m tonnes in 2019

to 1,014m tonnes in 2060.

The report proposes a number of policies that could help to prevent this scenario. These include: taxes on plastics, including packaging; incentives to reuse and repair plastic items; targets for recycled content in new products; improved waste management infrastructures; and increased litter collection rates.

"These concrete policies could significantly curb – and even eliminate – plastic leakage into the environment," said Cormann.

A preliminary version of the report is available [here](#).

Michigan is Axiom's latest base

Axiom Engineered Systems, the US subsidiary of a Canadian firm, has chosen Capac, Michigan, for its new injection moulding facility. The site will house its plastic injection manufacturing, warehousing, distribution and admin functions.

Until recently, Axiom had supplied US customers from Ontario and Mexico, but, it said, "an influx of recent contracts requires the company to increase production capacity". The company is planning a further three US facilities and it expects Axiom Engineered Systems to double in both sales and employment over the next three years.

Axiom president and CEO Perry Rizzo revealed that the facility has already secured more than \$50m in new business and will begin operations within an eight-month time-frame.

➤ www.axiomgroup.com

Wacker boosts silicone rubber

Wacker Chemie is making investments to the tune of over €100m to expand its silicone rubber production capacities in order to meet growing demand. The company said that all this is in line with new growth

targets it announced in March, as well as its increased focus on specialties. Wacker is the world's second largest silicone manufacturer.

Significant expansions for liquid silicone rubber (LSR)

at the main site in Burghausen, southern Germany, and in Adrian, Michigan, USA, will be available in the second half of this year. These will come into full effect in 2023.

➤ www.wacker.com

Mutares acquires Mann + Hummel business



IMAGE: MANN + HUMMEL

Munich-based Tier 1 automotive supplier Mutares has agreed to acquire the high-performance plastic parts business of Mann + Hummel. This is the sixth deal Mutares has concluded in 2022. Terms were not disclosed.

As well as Mann + Hummel's filtration and separation systems, the transaction includes air intake manifolds, high-pressure air lines and fluid reservoirs. It brings in facilities in Bad Harz-

burg and Sonneberg in Germany, and Laval, France, with a total of about 1,500 employees.

"In addition, it will benefit from synergy effects with LMS and SFC Solutions Group, which together can offer their customers a broad product portfolio of injection moulded components and elastomer parts worldwide," Mutares stated.

The two firms have further agreed on a manufacturing cooperation.

➤ www.mutares.de

➤ www.mann-hummel.com

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MakerBot joins with Ultimaker

MakerBot and Ultimaker, both specialised in desktop 3D printing, have agreed to merge. This will be backed by existing investors, NPM Capital and Stratasys, who will invest a further \$62.4m to fuel innovation and expansion into new markets. Subject to regulatory approval, the deal should close in Q2 or Q3.

Nadav Goshen and Jürgen von Hollen, currently CEOs of MakerBot and Ultimaker respectively, will be co-CEOs of the new company. The former will manage operations and R&D, while the latter will take charge of commercial functions. Both of the headquarters sites, in the US and Netherlands, will be retained.

► www.makerbot.com
 ► www.ultimaker.com

VDMA cuts German machinery outlook

The VDMA, the trade association of the German plastics and rubber machinery industry, has revealed that orders fell by 27% year-on-year in Q1 2022, while turnover grew by 3%. As a result, it is now reducing its growth forecast for 2022 from 5-10% to 0-2%.

VDMA Managing Director Thorsten Kühmann said: "We only expect a sideways movement or - in the best case - a slight increase in turnover for 2022, despite full order books."

He said that the decline in Q1 partly reflected the drop from strong demand in Q1 2021 from the packaging and medical sectors, but it also showed that VDMA members are finding it increasingly difficult to convert a high number of pre-orders into sales.

"First and foremost, there



Above: Kühmann: "We expect a sideways movement or a slight increase in turnover for 2022"

is the poor availability of materials," Kühmann said. "In addition, as a result of the Ukraine war and the strict zero-Covid policy in China, many factors, such as logistics problems and greater uncertainty in the market, are having a negative impact on business."

Since making this forecast, the VDMA has

announced that there had been "a noticeable decline in incoming orders in mechanical and plant engineering" for a second consecutive month in April 2022. Orders in Q1 fell short of the level seen in April 2021 by 7% in real terms.

Domestic orders fell by 17% and orders from abroad by 2%, with a more marked fall in non-Euro areas.

"Several factors were responsible for this," said VDMA chief economist Dr Ralph Wiechers. "Especially in domestic business, a high figure from the previous year also played a role in the significant decline. Overall, orders suffered from the slowdown in China, numerous production disruptions and the direct and indirect consequences of the Ukraine war," he said.

► <http://vdma.org/kug>

Engel launches two packaging centres

Engel has officially inaugurated new technology and expertise centres dedicated to packaging at two locations, Schwertberg and St Valentin, in Austria. This is designed for customers to test the company's injection moulding systems, particularly with regard to cycle time and energy efficiency.

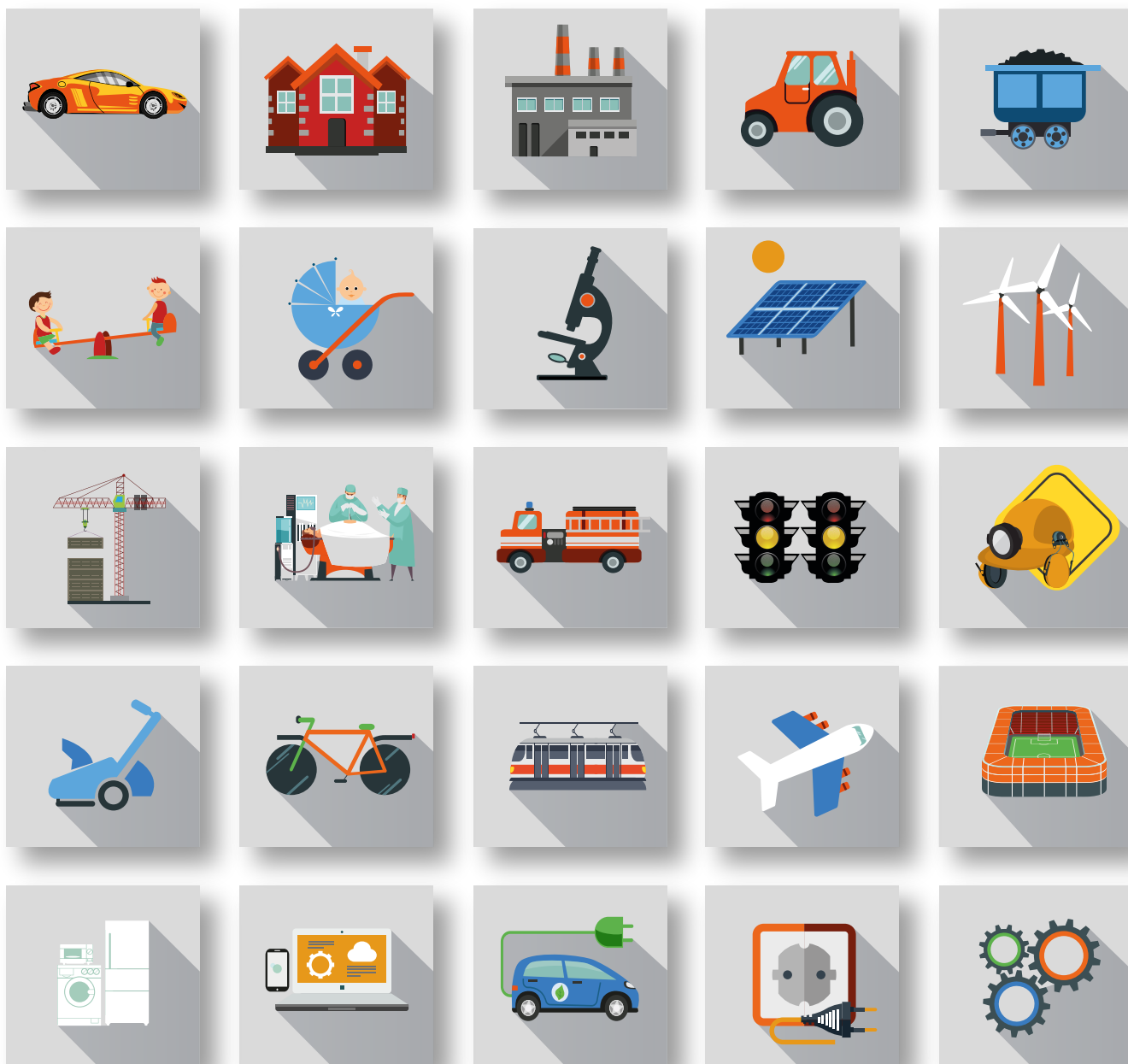
The production cells available include all-electric E-cap machines for manufacturing caps and flip-top lids, E-speed machines for thin-walled containers and pails, and Duo-speed, dual-platen machines for large containers. The all-electric E-mac injection moulding machines can also be used.

All of the machines are equipped with smart assistance systems from Engel's Inject 4.0 programme, including the iQ weight control. Also available are moulds from the various product groups on site, peripheral systems from partner companies and automation systems developed both in-house and by external partners like Campetella and Beck.

► www.engelglobal.com



Above: Visitors to Engel's inauguration event in Austria



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New presidents at European associations

Plastics Europe, the European plastics producers trade body, has appointed Marco ten Bruggencate, Commercial VP for Packaging and Speciality Plastics in the EMEA region at Dow, as its new president. Ten Bruggencate succeeds Markus Steilemann, CEO of Covestro.

During Steilemann's two-year tenure, Plastics Europe sought to promote the industry's transition towards net zero carbon emissions and circularity, including calling for a mandatory EU recycled content target for plastics packaging of 30% by 2030. It also launched the European Operation Clean Sweep certification scheme,



Marco ten Bruggencate

plus a new visual identity and website, among other initiatives.

Meanwhile, at its recent general assembly in Brussels, European Plastics Converters (EuPC), the association for plastics processors in Europe, elected Benoît Hennaut, CEO of Herige Group, as its new President



Benoît Hennaut

for the period 2022-2024.

Hennaut replaces Renato Zelcher, who had spent the last four years as EuPC President. This was the first time the EuPC assembly had taken place in person in two years, due to restrictions caused by Covid-19.

➤ <https://plasticseurope.org>
➤ www.plasticsconverters.eu

Technimark expands global HQ

Technimark has acquired a site adjacent to its global headquarters at Asheboro, North Carolina, USA.

The company plans to add a 204,000 sq ft facility there. This will have Class 7 and 8 clean rooms and will specialise in medical manufacturing, including precision injection moulding, value-added assembly, finished device assembly, contract manufacturing and logistics operations.

The expansion will bring the total space at Asheboro to 1.4m sq ft. Further expansions are under way now or planned to begin in 2023 at other Technimark sites in Mexico, UK, Ireland, Germany and China.

Kris Peavy, CCO & President of Healthcare, said: "Creating open capacity to meet our customers' future manufacturing needs is a pillar of our organic growth strategy."

➤ www.technimark.com

Engel, Koch develop interface

Engel and Werner Koch, which makes peripheral equipment, have jointly developed an OPC UA interface for the integration of mixing and dosing machines on Engel's

injection moulding machines.

As of now, Koch's units can be integrated with the CC300 control unit of the Engel injection moulding machines via OPC UA and

operated via the control panel. The dosing process is centrally controlled via the machine display, removing the need for an additional control unit.

➤ www.engelglobal.com

Faurecia targets recyclates for interiors

Tier 1 automotive supplier Faurecia and Veolia have signed a cooperation and research agreement to develop compounds for automotive interior modules, notably instrument panels, door panels and centre consoles, with the aim of achieving 30% average recycled content by 2025. Veolia will start production at its sites in France from 2023.

"The strategic partnership will leverage the companies' complementary competencies across sustainable compound formulations, stringent automotive architecture requirements, sourcing and innovative treatment of industrial and post-consumer plastic waste," the two companies said.

Veolia has been supplying recycled PP compounds to the automotive

industry in France for over five years, while Faurecia was the first automotive supplier to introduce a complete range of bio-composite cockpit materials in 2011. These have since been used in around 13m vehicles, with a CO₂ footprint 28% lower than that of their conventional counterparts.

➤ www.faurecia.com

➤ www.veolia.com

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Machinery innovations save energy for moulders



IMAGE: WITTMANN BATTENFELD

Hardware, software, and renewable energy developments power advances in energy management options for injection moulders. Mikell Knights finds out more

Injection moulding machinery OEMs continue to develop energy-saving technologies that curb energy consumption while delivering high performance, from hardware developments like new machinery models and lines that debut new or updated motor and gear designs, to software advances that make it easier to identify, monitor and manage energy consumption at a machine, from a production cell or plant wide. Moulders are also embracing renewable energy technologies at their facilities for savings.

Wittmann Battenfeld's newest machine option, the SmartPlus line of high-performance, cost-effective servo-hydraulic machines, is based on the SmartPower series but with selected technology options and a limit on equipment choices and suited to more standard, less complex moulding applications.

The model line has been available since the

fourth quarter of 2021 to an extended circle of customers, with the first series of clamping forces ranging from 60 to 180 tonnes. Features include an intelligent, energy-saving highly dynamic servo drive system and a booster unit specially developed in-house that increases the machine's response speed and enables higher clock frequency. The booster/amplifier unit is part of Wittmann Battenfeld's upgraded Drive-on-Demand 2.0 drive technology, which combines a fast-responding, speed-controlled and air-cooled servo motor with a high-quality fixed displacement pump. The drive unit is only activated for movements and pressure generation but remains off during cooling times or cycle breaks and consumes no energy.

The drive technology also lowers the thermal load, preserving oil quality and reducing overall cooling expenses, as oil cooling can normally be dispensed with. The amplifier is now available on

Main image:
Wittmann
Battenfeld
EcoPower 450
at Teko-Plastic
in Austria

both its electric and hydraulic injection machines. The drive configuration cuts energy consumption by up to 35% compared to modern regulating pump systems, the company says, with additional energy costs cut by the reduction of electric reactive power.

The injection unit for the new series is based on the company's highly repeatable standardised injection pump control system and hydraulic screw drive design. The swiveling injection unit comes in six dimensions (size 130, 210, 350, 525, 750, 1000).

The moving platen is driven by two diagonally positioned traveling cylinders that are combined with a hydraulic differential control system that enables dynamic movements by means of a further improved hydraulic system with a proportional valve, according to the company. The traveling cylinders are dimensioned for high opening forces, while extensive use of hydraulic pipes instead of hoses reduces potential maintenance expenses.

The SmartPlus line is also equipped with the company's patented Kinetic Energy Recovery System (KERS) technology originally designed for the EcoPower line of all-electric units. It converts recovered kinetic energy released during braking into electrical energy that is used to heat the injection barrel, further boosting energy efficiency. The machine comes with the company's Unilog 8 control system logic on a 21.5-in laterally swiveling multi-touch screen display and high-performance B8X hardware.

Sumitomo (SHI) Demag launched a new line of mid-sized full electric machines for packaging product applications such as cutlery, caps, and some container types, which operate on cycle times ranging from 6-15s while operating 50-60% more energy efficiently than a comparably sized hydraulic.

The new CT-6 Spec injection moulding models are a variation of the SE-EV-A HD series of all-electrics but have high-cycle performance specifications such as injection speeds up to 330 mm/s. The new models have enhanced cooling and energy management. The enhancements allow for the shorter cycle

time capability, says Tony Marchelletta, Sumitomo (SHI) Demag's US National Sales Manager.

The higher injection rate (12.2 in/s) is twice the velocity of the stand SE-EV-A model (6.3 in/s), opening the door for an all-electric machine to tackle applications typically completed on a hybrid machine, says Marchelletta, such as thin-to-medium wall containers requiring high filling speeds, or caps and closures produced in a sub-10s cycle, or parts with a long flow path like pipettes or injectable pen components for the medical industry.

The SE-EV-A HD CT-6 Spec is available in eight models with clamping force sizes ranging from 224 to 550 tonnes. Each main axis of motion operates independently and uses a Sumitomo designed and built low-inertia motor and drive. Separate servo driven belt and ball screw drive systems are responsible for plasticising, injection, and ejection, while a direct drive servo system operates the more rigidly designed toggle to mechanically open and close the clamp and build up pressure. The company's new S-Move clamp force control technology allows for optimised clamp open/close speeds up to 56.6 in/sec.

Use of the belt drive overcomes limitations of direct drive motor technology where the servo is directly coupled to the mechanical device when managing deeper draw parts that require longer ejector strokes, higher injection pressures, hold times and injection speeds, says Marchelletta. Sumitomo (SHI) Demag currently installs its direct drive servo systems on SE-EV-A models that are under 180 tonnes of clamping force.

The CT-6 Spec incorporates the SE-EV-A HD's control platform and the company's defect minimisation system called Zero-Moulding, comprised of its Simple Process Setting (SPS) system to ease machine setup, Flow Front Control (FFC) system for balanced filling and Minimum Clamping Molding (MCM) system which reduces clamp force requirements.

Other features include the installation of an extended L:D mixing screw assembly for fast cycle moulding as standard on the CT-6 Spec, and the ejection unit is designed off to the side of the machine rather than in-line with the clamp to shorten the footprint of the machine. A new energy monitor built into the CT-6 Spec allows the machine user to analyse energy consumption of any motor or drive during any phase of the production process to optimise cycle time or push a button and let the controller optimise the process, says Marchelletta. Also, ample tiebar spacing and the

Below: The new CT-6 Spec injection presses from Sumitomo (SHI) Demag offer 50-60% energy savings versus a comparable hydraulic



IMAGE: SUMITOMO (SHI) DEMAG

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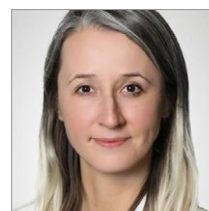
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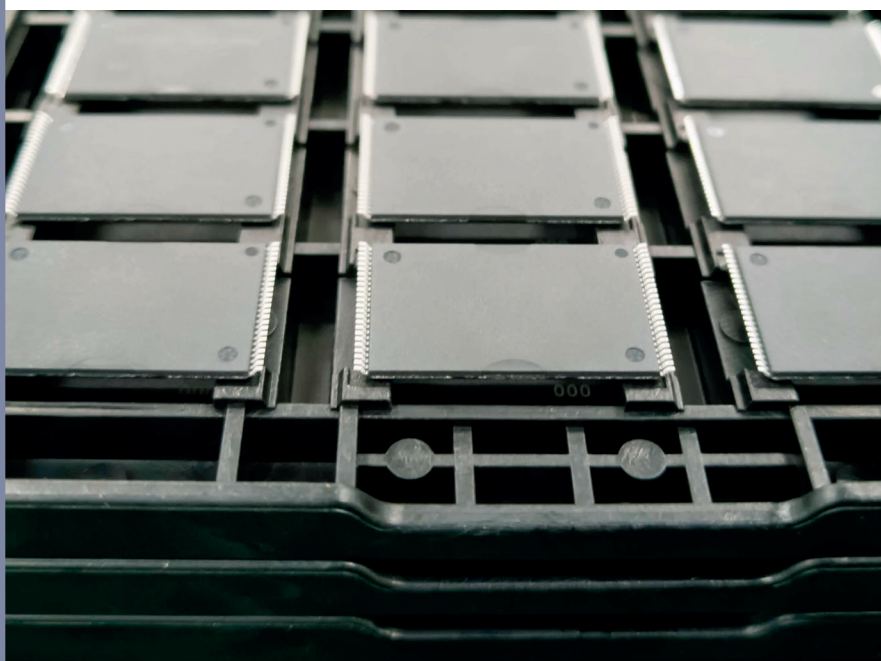
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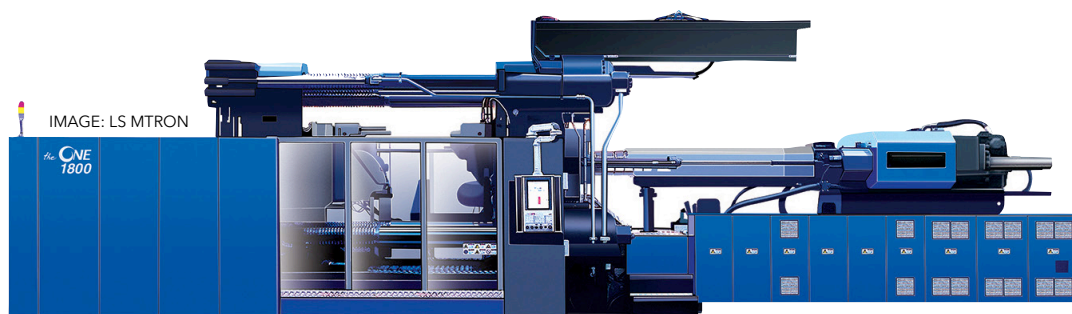


IMAGE: LS MTRON

The ONE*-E series of fully electric injection moulding machines from LS Mtron use low inertia servo motor for 20 ms acceleration/deceleration speeds

platen design allow for larger moulds to be run on smaller sized units.

LS Mtron, a South Korean injection moulding machine supplier, this year launched its high-performance all-electric ONE*-E series line of toggle injection presses made for high cycling, precise moulding applications such as medical devices or rigid packaging.

Offered in ten models with clamping tonnages from 33 to 440 tons the ONE*-E line complements the WIZ-E series of fully electric machines as well as its ONE*-E series of hybrid machines, according to Peter Gardner, Business Director at the company's Duluth, GA subsidiary, LS Injection Molding Machine North America. The parent company purchased the plastics machinery division of Daiichi Jitsugyo America (DJA), Wood Dale, IL, in 2018, which distributed injection machines from LS Mtron and from Japanese machine maker Niigata.

Features of the new line include a one-piece, high rigidity casting structure for the injection unit, low-inertia servo motors that deliver injection speeds up to 300 mm/s, with acceleration/deceleration speeds of 20 ms for improved reproducibility. The improved fast charging plasticising screw manages increased screw RPMs. The injection unit moves on a low friction LM guide rather than a bush guide system for repeatable acceleration and precise control.

Servo encoder resolution for the injection step was increased in the ONE*-E models compared to the WIZ-E full electric model by improving the drive

control frequency response nearly fourfold for controlled, high-speed servo injection. The unit can handle increased injection pressures between 270-350 kg/cm².

At the same time, a KEBA controller received an upgrade from a single core processor to a dual core CPU for faster scan times. The company also added an energy monitoring system to the injection unit to determine the power usage during movement of the main axis. Energy usage per shot, shot volume, production and sum production can be determined from the power meter. Energy monitoring can check for moulding condition changes in real time based on energy consumption, giving insight to process adjustments and a way to minimise energy consumption. The updated design of high-speed toggle reduces dry-cycle times 35-40% compared to standard models. Clamp open/close speed was updated to register a 45-50% improvement compared to a standard unit. The centre press fixed platen is designed to deliver a more uniform mould surface pressure which extends the life of the mould. A minimum clamp force software program uses a sensor to detect clamping force on the tie bars, and measures the load received from the mould during moulding, automatically calculating the minimum power requirements to reduce the load on the mould and driving unit, says Gardner.

The company says future energy-focused developments include implementation of regenerative power devices outfitted with a regenerative



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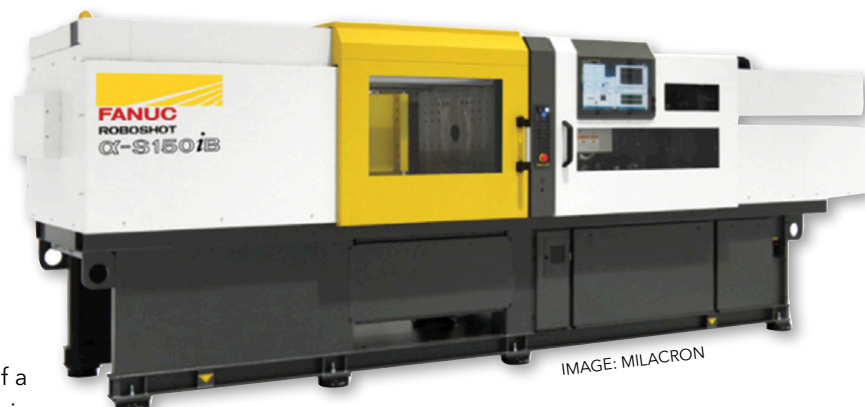
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Right: Milacron says the newest Fanuc Roboshot Alpha S-iB all-electric machines incorporate new servo drive technology that is 10-15% more energy efficient than competing models

converter to capture and return braking energy for the moving platen or injection unit and send it to the power supply grid. The approach replaces use of a regenerative resistor component, which is designed to capture the braking energy as thermal energy and hold it within the electrical cabinet of the press. The increased cabinet temperature required use of a cooling fan or air conditioner, which is eliminated with the updated approach.

LS Mtron is also developing artificial intelligence technologies that look at improving initial process settings and part weight control during production to reduce the time and raw materials consumed, while using the weight data to minimise the occurrence of part defects. Its Smart Weight Control will automatically adjust process parameters in real time to calibrate for product weight fluctuations. Its M-GA AI moulding assistant learns the process environment to improve productivity.

Milacron rolled out the new Fanuc Roboshot Alpha-SiB series of all-electric machines in 2021 featuring an updated controller and standard features that were options on the previous Fanuc Roboshot Alpha-SiA models. The fully electric series continues a partnership with **Fanuc** of Japan and features that company's high performance servo motors and amplifiers. The Fanuc Roboshot line incorporates four servo motors, with each governing a main axis of motion. The servo motor drive technology offers low energy consumption which is 10-15% better versus a comparable all electric machine and 70% less energy-consuming compared to a hydraulic unit of similar clamping tonnage. The new line features an advanced servo drive system that meets EN201 and ANSI standards



and allows for the Jam Bar to be removed.

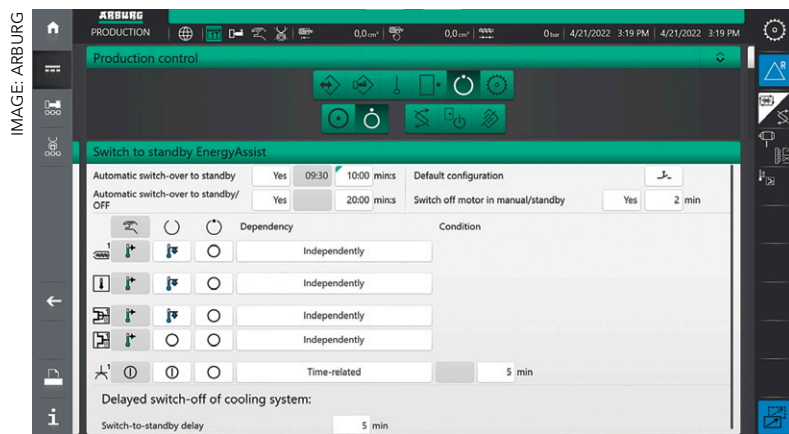
The new Alpha-SiB line comes in five clamp tonnages (55, 110, 140, 165 and 240 tonnes) with smaller injection capacity models available in multiple sizes for high precision moulding applications. The new series includes a higher performing control panel, the Panel iH Pro, which delivers 2.6 times higher resolution compared to the Alpha S-iA controller. The controller has a 21.5-in full HD (1,920 x 1,080 pixel) screen which runs the Windows 10 IoT based operating system. The controller has improved graphics and a new screen layout, including Multi-screen and Multi-Sub Data viewing areas. Other features include quicker set-ups and data viewing, and a help function with an improved response via swipe and pinch functions.

The new line also comes with Roboshot Linki2, its updated product and quality management software that allows the user to view its entire moulding network from any machine. "Using Modbus and SPI communications, we've developed capabilities that will reduce human error in operation and allowing for the creation of custom shut-down sequences using the Roboshot customised I/O feature using ADD/OR logic," says Kent Royer, Milacron's Technical Product Manager for Roboshot. I/O is expanded for improved automation/sequencing.

The new generation machines include increased standard injection pressures, increased standard injection velocity/rates, longer standard tie bars on select models, 3-stage air ejection and expanded screw diameters. Other features are increased mould stack height, precision clamp force control for consistent venting and reduced mould wear.

Arburg announced several new software features to its Gestic control system that increase ease of use and efficiency. The four smart ArburgX-world (aXw) Control assistant functions incorporated into the Gestic control allow the control system to know some aspect of the environment the machine is operating in.

Its new aXw Control EnergyAssist function is



Above: Arburg has added software features to its Gestic control system that help the moulder operate more efficiency, like its aXw Control EnergyAssist function to optimise energy usage

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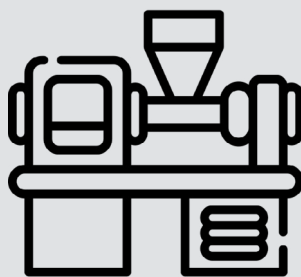
NEW

Injection Moulders in Italy

We interviewed over 1,000 injection moulding sites in Italy to provide you with verified contact and production data



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designed to optimise cycle time and energy requirements. The function knows when production is scheduled to start and when it will end, and from this point allows energy-efficient operation to be pre-programmed. In an example, Arburg says the EnergyAssist function makes it easy for the controller to heat up or deactivate the cylinder module and mould in a uniform, controlled and energy-optimised manner. Thermal decomposition of the material or damage to the hot runner can be prevented through use of the energy-saving switch-on and can reduce the machine's overall carbon emissions.

Arburg also developed aXw Control FillAssist which can help define injection parameters for the machine and process being run by creating a filling study based on the import of STL data. Its aXw Control MeltAssist function identifies the installed injection unit from a chip and uses the data to calculate parameters such as the utilisation level for plasticising and dwell times. The aXw Control CycleAssist function graphically compares the current times of each step in the process cycle against a programmed cycle sequence and the defined reference values in it. Unproductive time segments can be displayed and adjusted. This allows for high productivity to be programmable in advance, says Arburg.

Arburg also developed "pilots" that bring adaptive process control and regulation into the control unit. The aXw Control ScrewPilot regulates the position of the screw to ensure a stable filling process, while its aXw Control PressurePilot makes mould filling more consistent and improves balancing to prevent burr formation and underfill-



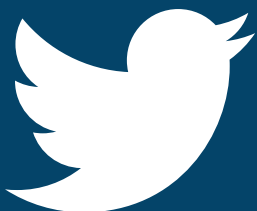
IMAGE: WITTMANN BATTENFELD

ing. Arburg's aXw Control ReferencePilot controls the holding pressure curve in real time using a pressure sensor in the mould, which can improve part quality, while its aXw Control FlowPilot combines a cooling water manifold close to the mould with temperature and flow control. This allows for the detection of variables that can interfere with cooling flow, such as clogged filters, colling channel deposits and kinked lines.

Cincinnati Process Technologies (CPT), the exclusive US agent for injection moulding machinery from Taiwan-based Asian Plastics Machinery, says that company's Closed Loop Intelligent Servo system, offered as standard on its product lines provides energy savings of up to 80% versus systems with fixed displacement pump and savings between 20-40% when compared to systems incorporating a variable volume pump, says Michael Green, General Manager. The AP energy system combines a high response gear pump with

Above:
Wittmann
Battenfeld's
TEMI+ MES
technology
now has an
energy
consumption
tracking
module and a
hydraulic unit
performance
indicator
module

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Above: Jabil's injection moulding facility in Mebane, North Carolina incorporates a wind farm and solar panels. Jabil operates 3,000 injection presses globally, with 20 facilities sourcing 100% of electricity from renewable resources

a high precision servo motor integrated with a proprietary servo-drive that ensures high precision with low power consumption. The pump drive and motor are supplied by Daikin Industries of Japan.

Cincinnati Process Technologies also offers its Energy Management Device as part of its retrofit services for hydraulic machines. The EMD maximises energy savings by controlling all the machine's energy usage during startup, shutdown, and idle periods. EMD has four main capabilities, including Idle Shutdown Sequence, which shuts down barrel heats, and motors; Bank Temperature sequence, which gets the machine's barrel temperature to an adjustable setpoint; Auto Temperature Shutdown Sequence, which sets the shutdown time and zone temperatures; and Auto Temperature Startup Sequence which handles start up time and zone temperatures and has a selectable soft start feature that limits barrel kilowatts from 1-100% during startup.

CPT also offers its own retrofit control and drive package which incorporates a B&R Controller, variable speed drive, 3-phase AC induction motor and pump technology. CPT also offers Pump MD, a device that monitors the health of a hydraulic axial piston pump. It also offers a Nozzle Leak Protection device. The devices and services help to reduce machinery operating costs through energy savings and improvements to overall equipment operating efficiency.

Software advances

Wittmann Battenfeld also advanced the functionality of its TEMI+ MES technology with the addition of an energy consumption tracking module and a

hydraulic unit performance indicator module. Its new Imago software visualises and displays in a scalable manner the energy consumption of a machine or all devices in a production cell or the production equipment in an entire plant. By connecting all production relevant machines, the total energy consumption of the production site can be measured, providing a permanent overview of power peaks and energy consumption.

The Imago energy monitoring and management module is offered in three versions, with the newest, ImagoXT, giving the possibility of detailed analysis of every single energy consumption point in the factory. It contains numerous functions and tools that are helpful for displaying current energy usage, graphically depicting historical trends, and defining key performance indicators (KPIs) and consumption targets. Real-time energy flows between different departments or consumption clusters can be visualised and analysed, which helps businesses to identify energy-guzzling equipment within the company. The software can also directly calculate carbon consumption and achieved energy savings. All the calculated values can be archived for long-term analyses.

The ImagoSX module is designed for companies that produce systems for measurement and monitoring of industrial machinery not natively equipped with customisable user interfaces. The module can connect with other monitoring and measurement systems and allows for remote cloud-based data collection without additional software, with data accessible by web browser. ImagoLX is designed for simple monitoring of electrical parameters, ideal for investigating specific energy usage or to bring visibility to a company's general consumption of energy.

Wittmann Battenfeld's Health Factor module is a robust and easy-to-understand performance indicator that determines the health status of the main hydraulic units, from which the condition of the pumps can be deduced. It takes a multitude of internal process parameters of the respective drivetrain into account in real time and draws on historical trend values. The module can zero in on a specific questionable hydraulic unit or pump, enabling repair and maintenance work to be planned more effectively and minimise disruption of production operation.

Renewable energy

Jabil is a US-based worldwide manufacturing and supply chain services company with more than 100 strategic sites in 30 countries, more than 260,000 employees and more than 3,000 injection

presses spanning clamp tonnages from 100 to 1,200 metric tonnes.

Twenty of Jabil's sites worldwide source 100% of electricity from renewable resources as part of the company's 2020 Climate Action Plan to reduce its operational greenhouse gas emissions. The goal is to be in line with the scientific community's recommendations for limiting global warming to 1.5° C.

The company aims to reduce GHG emissions 25% at its operations by fiscal year 2025, attaining a 50% emissions reduction by fiscal year 2030. Jabil uses its 2019 fiscal year emission levels as the benchmark. So far, the company has avoided the generation of 1.2m metric tons of emissions in the 2021 fiscal year through use of renewable energy.

Jabil's Mebane, North Carolina site was formerly a production facility for Nypro, a private precision plastics moulder of healthcare, packaging, and consumer electronics products. Jabil acquired Nypro in 2013. In Jabil's 2021 fiscal year, the Mebane facility reduced its carbon footprint from 14,000 tpa to 11,000 tpa - the equivalent of a car driving 8m miles, or powering 600 American homes. Introducing hybrid injection moulding machines to the facility accounted for 64% of the reduced emissions, with a 19% drop in GHG emissions coming from updated cooling towers and chillers. Operational efficiencies make up the remaining reduction in emissions.

Jabil's continuing focus on minimising energy use includes the introduction of real-time energy monitoring with its BMS/BAS solutions, but also the use of analytics on operational information captured by their Factory of the Future solutions. Improving the injection technology with all electric or hybrid injection moulding machines and replacing old hydraulic technology when it is technically possible is another step.

Comparing machines

Sustainability and energy efficiency are guiding principles for **Teko-Plastic**, in Preding, Austria, a producer of PP and PE injection moulded household goods. The family-owned business, now in its third generation, uses recycled materials in production for circularity, and has added 6,000 m² in solar cells atop its 18,000 m² facility that produce 850,000 kWh of total output annually. Of that amount the company expects to use 550,000 kWh, sending 300,000 kWh to the public grid.

The company operates 12 Wittmann Battenfeld injection machines at the plant ranging from 101 to 815 tons. This February it added an EcoPower 450 with an 85 mm screw to evaluate as precisely as possible the performance and energy-saving



Above: Teko-Plastic in Austria compared energy use of a new Wittmann Battenfeld EcoPower 450 with its fleet of older Battenfeld machines

benefits of new injection moulding technology.

The company compared a Battenfeld TM 4500 model with a 100 mm screw purchased in 2001 with the EcoPower model in the production of one of its staple products, a 10-litre volume bucket. Over an eight-hour measurement period, the Battenfeld 4500 consumed 68 kWh energy producing buckets on a 16s cycle time, while the EcoPower unit consumed 24 kWh of energy to produce a bucket every 13s.

"Our measurements have shown that by comparison with the Battenfeld TM, a [production] output of 115% has been possible with an energy output of only 35%," and water consumption was lower with the EcoPower, says owner Theo Koblischek.

The difference in energy requirements in favour of the EcoPower would be even greater if both machines were equipped with screws of the same diameter, he says. The company is considering replacing all machines with up to 458 tons of clamping force with all-electric EcoPower units to realise potential energy savings of more than 60%. Energy savings of about 40% can be achieved if the larger machines are also replaced.

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INJECTION MOLDING & DESIGN EXPO

The first Injection Molding and Design Expo in May saw injection moulders and their suppliers discussing post-pandemic challenges.
By David Eldridge



US moulding industry shares its experience in Detroit

**Main image:
Talking
business at the
Mantle booth**

The inaugural Injection Molding and Design Expo in the US last month received a warm welcome from the plastics industry. The event, which took place in Detroit, Michigan on 25-26 May, comprised a free-to-attend exhibition plus conference sessions and was organised by AMI (publisher of *Injection World*) and Crain Global Polymer Group (publisher of *Plastics News*).

**Below:
Injection
moulding
machinery and
equipment at
the show**

The organisers said after the event that more than 2,000 visitors came to the Injection Molding and Design Expo, where there were 130+ exhibitors focused on injection moulding machinery, materials, mould technology and supporting services.



Exhibitors shared their enthusiasm on the first day of the event. Joe Gracia, National Sales Manager at MAC Automation Concepts, said: "We have been so busy, and it's only been open for an hour and a half. We've had a lot of good feedback and a lot of good customers and a lot of interest so we're happy to be here."

Troy Nix, Executive Director at the Manufacturers Association for Plastic Processors, said: "I think this show is an awesome opportunity for people to come together and learn about technology adoption and methodologies; this is a great place to be."

As well as the busy exhibition booths at the Injection Molding and Design Expo, there was good attendance at the three conference theatres, where visitors heard from 70+ experts delivering industry insights during the conference keynote speeches and panels as well as practical advice from training sessions and company presentations.

Themes discussed during the event included sustainability, production efficiency and the effects of the Covid pandemic on business and markets in the North American injection moulding sector. A recurring topic was the difficulties moulders are having with staff shortages and how this has made companies think more deeply about automation, staff training and retention.



Left: Visitors came to Injection Molding and Design to do deals

Medical needs

Mark Gomulka, CEO of Westfall Technik, gave an opening keynote address about the group, which grew rapidly through multiple acquisitions and which now has 18 injection moulding facilities in North America and other regions. Westfall Technik is not just an injection moulder but has a full-service offering including design, said Gomulka, who became CEO in September 2021. He spoke of the group's scope as similar to contract manufacturers Nypro (now owned by Jabil) and Flex, where he previously worked with Brian Jones, the founder of Westfall. The group's approach is centred on reducing the time-to-market for customers' products, he said.

Westfall had a hectic acquisition period in 2018 and 2019 and was moving to a consolidation phase when the Covid pandemic struck. "What Covid did for us was that it brought the company together," said Gomulka. It did not stand still in 2020 but took the opportunity to implement a cross-company platform. This involved consolidation of some medical moulding sites, the addition of 60,000 sq ft clean room space across facilities, investment in 45 new injection moulding machines and creation of the company-wide Westfall BOS IT system.

Westfall has also invested in automation across its production sites. Gomulka spoke about its development of a proprietary press-side automation system which has capabilities for inspection, sorting, degating and flash trimming among other features. He said 30 such systems are currently deployed across the company's operations in low-volume, high-mix environments which can run lights-out with no operators, where previously 120 people were needed in total.

In a panel discussion on medical and healthcare at the Injection Molding and Design Expo, participants noted the Covid pandemic's effects on the

supply chain. With the boost in demand for medical products, clients have cut their expectations for speed-to-market to six months or less, said Christian Herrild, Director of Growth Strategies at Teel Plastics. Customers also want a lot of design support early in a project, said John Budreau, Director of New Business at PTI Engineered Plastics. Adding to the demands on medical manufacturers, clients are asking for extra steps from US moulders because a lot of business is being reshored from China, said Megan Tzanoukakis, Supply Chain VP, at Sussex IM.

Sustainability continues to be the headline topic for packaging moulders, although there was a hiccup in the past couple of years. The pandemic caused a slowdown in the sustainable packaging projects of brand owners, although they have now started to collaborate again with manufacturers, said Millie Nuno, Director of Business Development at Hoffer Plastics. She was a participant in a panel discussion on trends in packaging design, which ranged over tamper-evident closures, labels and other topics.

"Brands are moving from lightweighting to rightweighting," said Thierry Fabozzi, President & CEO at Plastic Technologies Inc, who noted thin-gauge packaging tends to be littered more. Design-for-recycling was discussed by the panelists, including John Manderfield, Innovation and Design Fellow at Altium Packaging, who said brand clients don't always want to follow the recyclability guidelines published by the Association of Plastics Recyclers.

Staff shortages

One panel discussion was devoted to the problem of staff shortages, which has affected almost every company in the North American injection moulding value chain, exacerbated by changing labour market dynamics during the pandemic's peak. Craig Carrel, President and Partner at Team 1

Below: Training and development session during the exhibition



Right: Mark Gomulka (left), CEO of Westfall Technik, talking to David Eldridge, Editor of Injection World

Plastics, said the biggest challenge for his company is recruitment for entry-level vacancies; some newcomers only stay for a few days before leaving, he said. Jeff Ignatowski, Director of Sales and Marketing at Champion Plastics, said there are concerns for the future in skilled jobs such as toolmaking as it is not attracting young people.

There is an increasing trend towards automation at injection moulders, the panellists agreed. Carrel indicated that investment in automation is becoming a necessity, as the skills shortage is not a short-term problem. "I think [the skills shortage] will stay at this level or maybe get worse as Baby Boomers retire," he said.

Exhibiting companies also discussed increased automation as the way ahead. Sam Rajkovich, VP Sales and Marketing at Conair, said there was a customer need behind the company's development of a common control platform, which gives users the same control experience across all its auxiliary equipment lines. "The idea was about how to lessen the pain of labour shortages for customers," he said.

During development, Conair had a central goal of reducing training time for operators of its equipment. A Thermolator temperature-control unit, Model dX mobile dryer and SmartFLX conveying system will all feature the common control, which presents menu structure and navigation, set-point entry, alarm notification, icons, colours, communication protocols and back-end hardware that are essentially the same as on other Conair equipment.

Automation is a growth area for StackTeck Systems, said executives at the Canadian mould systems company's booth. In 2020, it set up an automation business for in-mould labelling applications, offering own brand IML robots for all moulds built within its FastTrack program. The executives reported the business is "going great". They estimated only 50% of the North American injection moulded packaging market is served by IML, indicating good growth potential.

Another mould-related exhibitor, Mantle, showed its 3Dprint technology for production of sintered metal mould components. Combining both additive extrusion and subtractive machining techniques prior to final sintering, the TrueShape technology automatically converts digital part files and achieves a high quality final surface finish and level of detail similar to spark erosion, almost eliminating post-processing. According to Dana McCallum, Mantle VP of Sales, Tessy Plastics has already achieved more than 1m shots running its tooling with PP. She says Mantle expects to deliver its first beta machines shortly; one to US mould-



maker Westminster Tool and a second to a medical device OEM. These will offer a build envelope of 200mm by 200mm by 150mm.

Gene Altonen, CTO at Imflux, provided an update about the company, whose injection moulding control technology uses melt pressure sensing at the machine nozzle together with custom software to provide closed loop pressure-based control of the flow front as it moves through the mould. Imflux technology was developed by (and the company is part of) P&G, which remains its major customer accounting for more than 80% of its supplied systems to date. However, Altonen says the company has "hundreds of systems out there at dozens of customers". It now uses a simple purchase model (rather than the licensing model it launched with a decade ago) and he says the company is talking to more than 20 machinery OEMs about integration into their control systems.

Polykemi updated on progress with construction of its first US compounding operation at Gastonia in North Carolina. Post-pandemic freight problems have pushed back the original Q2 2022 start-up but construction of the 4,600 m² facility is now underway and some production may commence by the end of the year.

Two lines are to be installed in the first phase – based on 75mm and 92mm twin screw compounders – providing a capacity of around 6,500 tonnes, according to Adam Hokkanen, Technical KAM North America. He says the plant will initially take over manufacturing of existing European OEM approvals that it currently supplies to the US automotive market from Sweden or from its North American toll compounding partner.

See and hear highlights of the Injection Molding and Design Expo 2022 in two LinkedIn videos [here](#) and [here](#)

3D printing: the next move



IMAGE: SHUTTERSTOCK

Injection moulders can now make use of 3D printing for production as well as prototyping and mouldmaking. Peter Mapleston reports on processes and new materials

Additive manufacturing (AM) or 3D printing, call it what you will, what matters to injection moulding companies is that it provides them with another weapon in their development and manufacturing armoury. AM can now be considered a mature industrial process that deserves its place in injection moulding operations.

Options increase and improve, both in terms of the materials available and the equipment they can be processed on. Often, developers from both sides are working together to create fit-for-purpose solutions. So whether you want to create prototypes quickly, produce short runs that may or may not preface high-series production, or make development and even production moulds, there are plenty of things happening in the AM world that are worth looking at.

For injection moulding companies, additive manufacturing has the potential to be used in several parts of the development and manufacturing operation. First and foremost, it can be used for production of prototypes, functional and non-functional. AM can also be used to produce limited

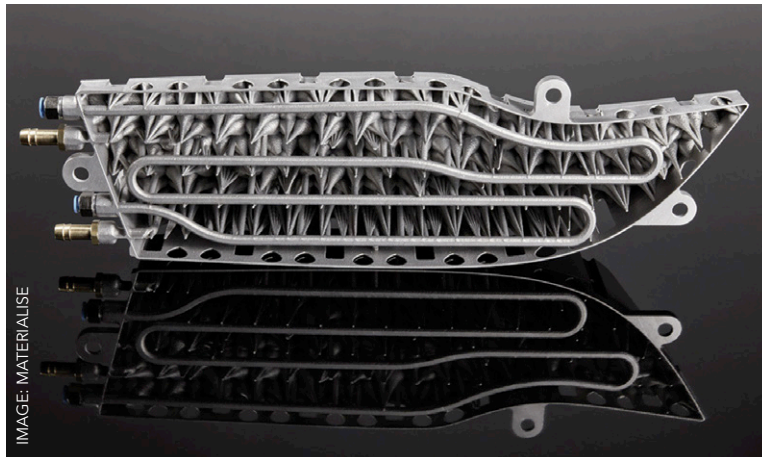
commercial runs of a part, either before the company moves onto high series production with traditional injection moulding, or simply because the demand for the part is limited, and AM is the most cost-effective option.

Then there is the use of AM in injection moulding moulds, but here the discussion is generally about AM with metals. Because AM can be so much faster and versatile than machining, it is great for production of such things as conformal cooling channels for example. Metal AM can also be used to produce cavity and core inserts that fit into the cavity and core plates that make up the bulk of the mould.

But AM can also be used to produce injection moulds in plastics. There's nothing new about using plastics to make core and cavity inserts for traditional injection moulds, but it's not really the application that plastics are made for, since the temperatures and pressures involved in the process normally mean that the inserts will last only for a few cycles. But what if the inserts were specifically designed to last for one cycle only? Enter Addifab.

Addifab has recently begun a collaboration with

**Main image:
Part or
prototype? 3D
printing
materials and
processes can
make both, as
well as injection
moulds**



Above:
3D printing
enables
production
tools with
elaborate
conformal
cooling
channels and
reduced
weight

US based Nexa3D to utilise Addifab's Freeform Injection Molding (FIM) platform on the Nexa NXE 400 industrial 3D Printer - the NXE 400, which can run at high speeds and also produce large objects. Nexa3D is a leading US manufacturer of high-performance 3D printers for industrial applications. Together, say the companies, they will bring Addifab's novel 3D printed injection mould tooling platform to injection moulders globally (See also *Injection World* June 2021).

"The collaboration enables the 3D printed mould tools that are produced with FIM faster than ever, and in new unimaginable sizes, or great volumes," says Addifab. "It is, for example, now possible to produce 100+ parts in 2 x 1 cm or one part in 50 x 30cm. Thus, injection moulding companies can now produce everything from tiny parts to large parts at significantly faster speeds than before."

The FIM platform works with the NXE 400 in the same way as it does with the original Addifab industrial 3D printer, called the Toolmaker. Both use liquid resin-based printing technologies (the Toolmaker uses Digital Light Processing (DLP) UV-curing technology, while the NXE 400 uses what Nexa3D calls Lubricant Sublayer Photo-Curing (LSP), which apparently is very similar). There are three stages: print, inject, and dissolve. The (normally single-piece) mould containing a cavity in the shape of the desired injection moulded part is 3D printed in a soluble resin; the mould is mounted on a standard injection moulding machine; the part is moulded; the mould containing the part is removed from the machine and placed for between 12 and 48 hours in a bath containing an alkaline solution that dissolves the mould and frees the part.

For larger, less complicated parts, the mould can be produced in two halves, reducing demoulding time. But in any case, because any mould can be dissolved, the technology enables injection moulding of complex components that would

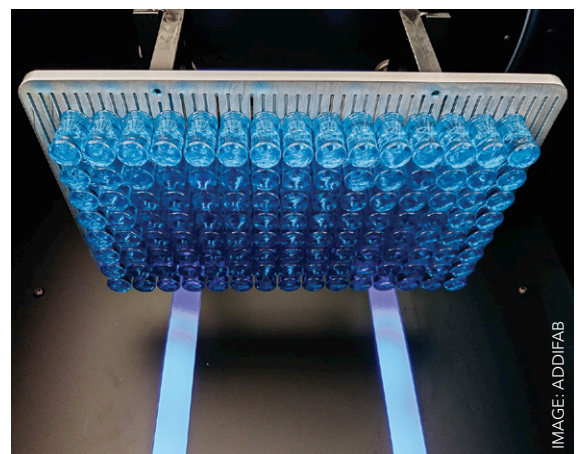
otherwise be difficult, if not impossible, to mould with conventional metal tooling, even tooling with moving or lost cores.

The original Addifab 3D printer was developed specifically for injection mould tool making. It provides high precision, tight tolerances, and great design freedom. Maximum resolution is 10µm and tolerances on the injection moulded component are 10-50µm.

Freeform Injection Molding tools can be used on any injection moulding machine. They resist injection pressures of up to 2,500 bar and melt temperatures of up to 450° C. They are compatible to varying degrees with all conventional thermoplastic injection moulding materials (some polymers, like polycarbonate, may be attacked by the solvent used to dissolve the mould), in shot sizes from 0.1 g to 100 g.

Addifab says Freeform Injection Molding combines the quality, scalability, and versatility of injection moulding with the short lead times and low start-up costs from 3D printing, "resulting in an ideal tool for high-mix, low-volume production where complexity is high, and the need for flexibility is even higher." It has already been proven in numerous demanding applications, including Covid-19 personal protection equipment, various consumer goods, and spare parts.

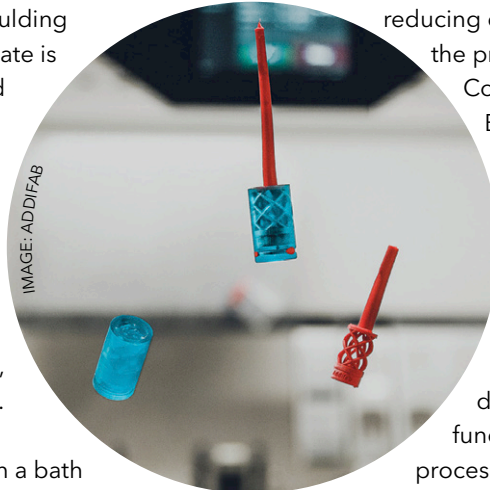
The collaboration enables Nexa3D to supply the NXE 400 system - including the industrial 3D printer as well as wash and cure units - to users of Freeform Injection Molding, while Addifab will be supplying its proprietary tooling resins and post-processing equipment.



3D printed moulds for injection moulding produced in a few hours on a Nexa3D NXE 400 industrial 3D printer using an Addifab resin. The moulds here are each 54 x 84.5mm. They are used to mould a double-helix demonstrator part, showing how 3D printing enables geometrical freedom. The process can be used to make moulds as large as 154 x 241mm

Setting up the injection moulding machine is simple. A runner plate is placed on the fixed platen and heated to 50°C. A mother tool with ejector plate is mounted on the movable platen. An aluminium frame with a pocket that fits any Addifab mould is fitted onto the ejector plate, and the printed mould is fitted into the pocket, the part can then be moulded. Once moulded, the mould containing the part is placed in a bath containing an alkaline solution to dissolve the mould.

Materials distributor and logistics provider **3D at Nexeo Plastics** is another company offering new options for mould makers. A recent project involved less unconventional moulds than those envisaged by Addifab – produced using AM, but designed to last more than a single cycle. “3D at Nexeo Plastics recognised an opportunity to use one of its suppliers’ filaments to revolutionise the process of injection moulding, with the goal of



reducing overall costs and speeding up the prototype phase,” says Thomas Collet, Director Marketing, Business Unit Customised Polymer Materials, at compound developer and producer **Lehmann&Voss** (LehVoss).

Collet says that, together with outside partners, LehVoss optimised a mould design to ensure the correct functionality in the injection process while considering the specific requirements for it to be 3D printed. Its 3D experts adapted an old metal mould to be used as a holder for the printed part, and also modified the extraction system to fulfil the part specification.

Luvocom 3F Filament PET CF 9780 was used to print 3D moulds by FFF (fused filament fabrication) technology. “The unique properties of the Luvocom 3F Filament PET CF 9780 enabled us to create a complex cavity and still provide excellent stability for the tool to withstand the pressures of injection moulding,” says Collet.

From left to right: the printed mould, the mould containing the injected part, and the part after the mould has been dissolved, made using Addifab’s Freeform Injection Molding process

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Right: Luvocom 3F Filament PET CF 9780 enabled printing of a complex cavity in the mould for a hook part

The team worked on proving the feasibility of injecting several plastic parts made of an acetal resin (POM) with a very low cycle time. The part tested was a hook designed during the Covid-19 pandemic for opening doors and pushing buttons without human contact. Multiple injections were performed with a 65s cycle time with the POM material injected at 240° C. The 3D printed mould withstood the temperatures and pressures involved in the injection process and after several injections, the mould was performing as well as it had been at the start of the test. All testing occurred at the facilities of Cepex (Fluidra group) in La Garriga, Spain. The exercise enabled the prototyping phase to be expedited, as the mould could be printed overnight.

"This disruptive approach could also be a viable solution for repairs by enabling a 3D mould to be used as a temporary substitute for a traditional metal mould," says Collet.

Sustainable materials

LehVoss is also improving sustainability of 3D printing with the launch of Luvocom 3F Eco PET family. It is 90% based on recycled PET, which Collet says is currently the highest recycling rate on the market for a PET 3D printing material. Luvocom 3F Eco PET is designed for the FFF and FGF (fused granulate fabrication) processes.

The first available product is Luvocom 3F Eco PET 50291 BK, an unreinforced, black type that gives parts with very good surface finish. The temperature resistance is up to 125 °C.



IMAGE: LEHMANN&VOSS

Techmer PM, a custom materials designer and compounder, has meanwhile developed a new series of recycled PETG grades available in unfilled (HiFill PETG 2106 ECO 3DP), glass fibre reinforced (HiFill PETG 2105 ECO 3DP), and recycled carbon fibre reinforced (Electrafil PETG 2107 ECO 3DP) versions. These grades offer up to 100% recycled content by weight, and print similarly to comparable prime materials. These grades are suitable for room temperature jigs and fixtures, prototyping, and general purpose printing. PETG offers substantial benefits over ABS grades commonly used. These advantages include better processing, less odour and smoke generation, superior dimensional stability compared to ABS. PETG is also easily colourable, so aesthetics for artistic projects/ installations are more easily achieved.

Using AM in synergy with injection moulding

It's a balancing act to choose the right technology. If flexible batch sizes, warehousing, and design iterations are relevant, 3D printing can offer solutions to increase cost-efficiency and lower risks. Looking more closely at injection moulding and 3D printing, there are in fact synergies when combining them in the right way.

The tool making process for injection moulding is not only an economical factor, but also has an impact on how fast production can be ramped up. Bridging the gap between finalised product design and production start is one of the advantages 3D printing has to offer.

Manufacturers [can benefit] by applying injection moulding and 3D



Mathieu Cornelis, Innovation Manager at Materialise, discusses the pros and cons of AM and injection moulding

printing in parallel. Once the product design is ready, the mould production is initiated and simultaneously a first series of parts is produced with 3D printing. This enables companies to serve the market on a very short notice, making money with it, while the mould is still in development.

In addition to accelerating the

go-to-market, this approach is also applied to avoid risks. By delaying the mould production after delivering a first 0 series, small adjustments to the part design are still feasible. That way, additional costs to change an existing tool can be avoided.

There are key elements to consider when using 3D printing in synergy with injection moulding. The part design needs to support production with both technologies. Depending on the used 3D printing technology, this can be achieved with minor adaptations. Another relevant element is the material. Each 3D printing technology offers a different set of materials, and their properties are influenced by the used process.



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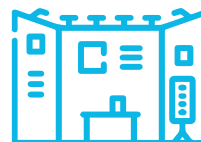
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Styrenics major **Ineos Styrolution** has also been working on sustainability issues. Last year it announced the first results of the German government-funded PolySLS project, which is focused on developing a new energy-saving styrenics based material for selective laser sintering (SLS). It said the project has been able to show that significant overall energy savings of up to 67% have been achieved when taking the entire life cycle of a new styrenics polymer compound into account compared to using PA 12 often used in SLS.

A direct energy saving of 25% was achieved from the 3D printing equipment when using the new styrenics polymer, resulting from lower process temperatures and shorter heating and cooling phases. Processing times were 7.5% shorter than with PA 12.

The coating of some 3D printed materials can be rather tricky, as a good adhesion is sometimes difficult to achieve. **BASF Forward AM** recently developed the Ultracur3D UV Adhesion Promoter. This is a single-component solvent-borne product, which the company says provides customers with more options to coat materials like PP and also improves the adhesion for rigid 3D printing materials.

BASF envisages applications where the surface quality of the printed part is too rough or uneven. The adhesion promoter smooths the surface by being recoated multiple times with intermediate drying phases. "The coated surface is also compatible with a broad range of commercially available top coats and clear coats, making developments of new or replacing existing coating systems not a requirement for end-users," it says. Ultracur3D can be applied by spray or dip coating.

Compound and masterbatch specialist **Grafe** has been developing a matting agent for 3D printing via FFF. It has tested the product extensively with PETG material. "The trial phase has been completed, initial sampling is underway, and now commercialisation begins," says Lars Schulze, Head of Color Development and Material Sciences, who is overseeing the project. Possible applications include living room elements such as lamps, covers, or switches, as well as other applications in the home.

Subjective examinations using test specimens and metrological analyses show a clear and verifiable reduction in gloss compared with a previous development, Schulze says. In tests at an angle of 60°, the measured value for black-coloured PETG was reduced from 8.8 with the help of the old matting agent to 2.6 and even to 1.3.

The matting agent can be metered at 15% and combined with any colour batch or compound, without any significant effect on the colour. The



Above: This suspension bracket design study tested multiple iterations in Precise PLA before arriving at an optimised version printed in Onyx Reinforced with continuous carbon fibre. All parts were printed on a single Markforged Desktop Series printer

matting effect is created by diffuse light scattering on the surface of the part. "Customers benefit from a velvety feel with corresponding components," says Schulze. "The undesirable visual layer build-up, which often occurs in 3D printing, is barely visible. The material almost looks like it was cast from a single mould."

The matting agent has already been tested for PLA and PC, and trials are ongoing with other materials.

PLA was one of the first polymers to be used for FFF technology. **Markforged**, creator of an integrated metal and carbon fibre additive manufacturing platform, The Digital Forge, has now added Precise PLA to its portfolio of materials. "The Digital Forge platform is now able to address all stages of product design - from validation, which relies on more affordable materials like Precise PLA, to strong, end-use applications reliant on Markforged's carbon fibre reinforced and metal-printed parts," says the company. Precise PLA comes in eight colours: yellow, red, green, blue, orange, black, white, and grey.

Zero Tolerance, an injection moulding and machine shop, used Precise PLA to bring an end-use motorcycle display adapter from concept to final product. "When using other 3D printers and PLA materials, the results were not as precise as required, even after multiple iterations," says Steve Michon, Zero Tolerance President and CEO. "Printing parts to the size and quality we need, with the required functionality and at a great price point is critical for our business. Once design validation using Precise PLA is completed, we move to production with Markforged's Onyx material for functional testing, followed by printing with continuous carbon fibre for added safety for the final part."

In addition to prototyping, Zero Tolerance also uses colour-coded inserts printed in Precise PLA in

conjunction with Markforged's high-strength continuous fibre composite materials to make glass fibre-reinforced assembly tools. The colours help the operator quickly identify the correct tool.

Precise PLA is scheduled to be available on all Markforged Industrial Series printers that are equipped with the latest A3648 extruder by the end of June.

Composite printer

In May, **Stratasys** expanded its F123 Series of 3D printers with the introduction of the F190CR and F370CR 3D printers, plus new FDM Nylon-CF10 material reinforced with carbon fibre. The new printers offer high stiffness and strength materials in a hardened machine ready for composite material printing.

The new composite 3D printers are designed for manufacturers and industrial machinists to supplement traditional fabrication technologies with high-strength composite 3D printing. Stratasys says they are ideal for jigs and fixtures.

"Stratasys is providing manufacturers with the 3D printers and materials to support the growth of additive manufacturing on the factory floor, including these new printers that give manufacturers the ability to build stronger, print stiffer and print more accurately," said Dick Anderson, Senior Vice President, Manufacturing for Stratasys. "We have the verified and published data that proves these new printers have dimensional repeatability of up to 99% regardless of part size or geometric complexity."

Stratasys has also announced new manufacturing materials across three different 3D printing technologies, including third-party materials for FDM 3D printers for the first time. "The addition of



IMAGE: STRATASYS

Above: Stratasys has introduced new manufacturing materials across three different 3D printing technologies, including third-party materials for FDM 3D printers for the first time

16 new materials dramatically expands the use cases addressable by Stratasys for a wide variety of manufacturing settings," it says. They include Stratasys Validated materials for FDM 3D printers, a variety of open, exploratory materials for the P3-based Origin One 3D printer that can be used with an Open Material License, and polypropylene powder for the SAF (selective absorption fusion) technology-powered H350 3D printer.

Materials developers contributing new materials to the program include major polymer makers Covestro, Evonik, Arkema, and BASF, as well as other companies possibly less well-known in the injection moulding world, such as Mechnano (which specialises in ESD formulations), photopolymer specialist Liqcreate, and PolySpectra (whose COR Alpha cyclic olefin resin photopolymer is described by the company as the "strongest, most durable, and heat-resistant 3D printer resin polymer on the market").

Covestro is extending its collaboration with Stratasys by adding new validated filaments to the material ecosystem for FDM technology, starting with the Addigy PA6/66-GF20 FR LS filament.

FDM is the third 3D printing technology on which both companies are collaborating, as Covestro Somos resins are already available on the Stratasys Neo printers for stereolithography and the Origin One P3 material ecosystem.

Addigy PA6/66-GF20 FR LS filament is the first Covestro filament in the Stratasys FDM Open Material platform. Covestro says the flame-resistant low-smoke flame retardant filament is one of few commercial filaments that meet norms EN 45545-2, NFPA 130 (ASTM E162, ASTM E662), SMP 800-C and FAR 25.853. Its certifications for flame, smoke

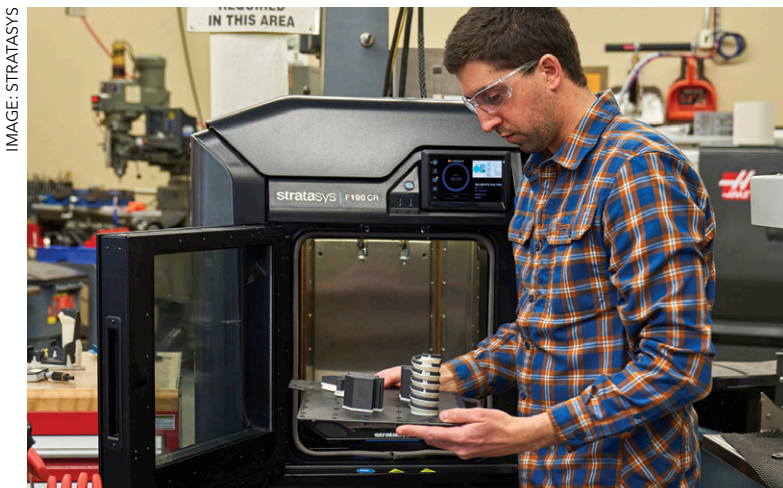
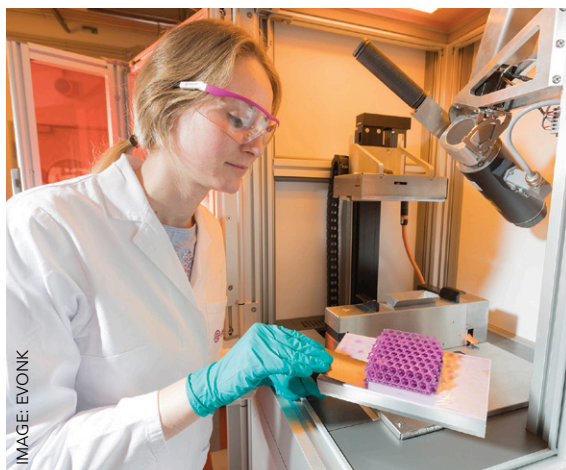


IMAGE: STRATASYS

Above: The new Stratasys composite 3D printers are designed for manufacturers and industrial machinists to supplement traditional fabrication technologies with high-strength composite 3D printing



and toxicity (FST) make it suitable for railway and other transportation applications.

Covestro says that as 3D printing moves to the factory floor, "manufacturing customers need access to functional materials that bring the right properties to their applications and meet specifications. Open ecosystems bring material and printer companies together to optimise the printing process and bring manufacturers ease of mind as they accelerate the use of additive manufacturing in their production. They also provide dual materi-

als sourcing for mitigating risk."

"Manufacturers have already been benefitting from our collaboration with Stratasys on the Neo and Origin P3 platforms," says Hugo da Silva, Vice President Additive Manufacturing at Covestro. "By adding Covestro filaments to the Stratasys FDM material ecosystem, they gain access to material innovation to address many more applications."

In March, specialty chemicals company **Evonik** and Australia's 3D printer manufacturer **Asiga** said they were strengthening their collaboration in photopolymer-based 3D printing. Their joint aim is to drive forward 3D printing large-scale industrial manufacturing by extending the capabilities of photo-curing technologies.

Last year, Evonik introduced the first ready-to-use formulations of its new photopolymers product line for industrial 3D printing applications. Infinam TI 3100 L enables production of very tough parts; Infinam ST 6100 L is said to provide a new benchmark for high strength polymers, combining tensile strength of 89 MPa, flexural strength of 145 MPa and HDT of 120 °C; Infinam RG 3101 L combines high impact resistance with high-temperature resistance while exhibiting long-lasting thermo-

Left: Evonik now has ready-to-use formulations of photopolymers for industrial 3D printing applications



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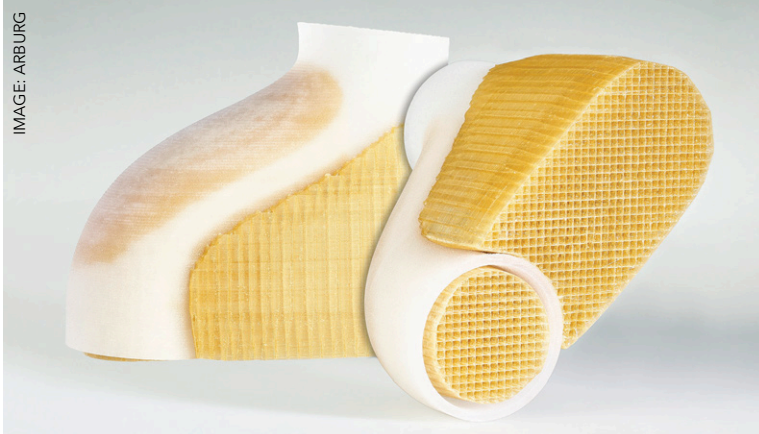
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Above: Applying support materials in a grid structure allows complex geometries to be achieved with a short build time, says Arburg. This example shows an S-shaped pipe made from white PP with Armat 12 as the support material

mechanical performance.

In April, **3D Systems** announced the SLA 750 stereolithography AM platform, designed to address large format or high volume production applications. It comprises the SLA 750 and SLA 750 Dual, the first synchronous, dual-laser stereolithography printer, as well as a new material, Accura AMX Durable Natural, and the PostCure 1050 post-processing system.

3D Systems says the solution is optimised for cost-effective SLA batch part production at up to twice the speed and triple the throughput of other available stereolithography solutions. "Additionally, the entire solution can be seamlessly integrated into the factory floor through the power of the Oqton Manufacturing OS," it says. It is intended to deliver large, production resin parts and batch part production for industries such as transportation, motorsports, consumer technology, durable goods, manufacturing services, aerospace and healthcare.

Arburg is one of the very few injection moulding machine makers so far to have branched out into AM, with its Arburg Plastic Freeforming (APF) technology. Arburg has optimised the software for its Freeformer machines so that, in future, all water-soluble Armat support materials (supplied by Arburg as part of its APF package) can be applied in a grid structure that is optimised for APF. This will shorten build times in the APF process by up to 55% - while also reducing material consumption. The water-soluble support material can then be washed out without manual finishing work.

At the Rapid + TCT 2022 trade fair in Detroit, in May, Arburg demonstrated how complex Freeformer components can be produced around 40 to 55% faster, depending on geometry and application, thanks to a process-optimised grid-type support

structure in the APF additive manufacturing process, says Martin Neff, head of the plastic freeforming department at Arburg.

The faster build speed is possible due to the optimisation of the Freeformer software. For all components with geometries requiring a support structure, the water-soluble materials Armat 11 and Armat 12 are now applied to the moving part carrier in such a way as to create a process-optimised grid structure, Arburg says. Rather than a compact build-up, a fill level of only around 20% results in lightweight structures that can also be removed more quickly than before without finishing work in the next step. In this way, the grid structures save time when building up the component and removing the support material.

Arburg says the savings potential can be demonstrated in a particularly impressive manner in the case of the 1:16-scale functional model of a complex toggle-type clamping unit from an Allrounder injection moulding machine. This was first manufactured over the eight-day duration of the K 2016 trade fair using the APF process. Then, the build time for the ABS component including support material was over 200 hours. Thanks to the grid structure, the build time can now be reduced by 54% to 92 hours. The support material, weighing 600g, can be washed out completely in just ten minutes, leaving behind the toggle model with around 30 moving joints.

In developing new support materials for the Freeformer, Arburg collaborates with universities and established material partners. The water-soluble support material Armat 11 is the standard choice for many materials such as ABS. Armat 12, which is also water-soluble, is offered by Arburg specifically for PP.

CLICK ON THE LINKS FOR MORE INFORMATION:

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- > www.techmerpm.com
- > www.ineos-styrolution.com
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Developers of bio-based plastics have been concentrating on properties and performance to target materials at demanding applications. Peter Mapleston reports on new products

IMAGE: MATTTEL

Working on the building blocks of bioplastics

Thermoplastics derived from renewable feedstocks are increasingly mainstream, with the materials often being chosen by specifiers just as much for their performance as for their green credentials. Biochemistry is also giving polymer developers the chance to create brand new materials, so not only can bioplastics slot straight into applications previously occupied by traditional plastics without having to change machine settings, but they are also expanding the application universe for plastics.

Shanghai-headquartered **Cathay Biotech** is a leader in synthetic biology now producing new materials on a commercial scale using bio-manufacturing. According to company CEO Xiucai Liu, its bio-based long chain dibasic acids (LCDA), which started commercial production in 2003, today account for over 80% of the global market.

Cathay has also developed and commercialised proprietary technology for the production of a 100% renewable 1,5-pentanediamine (DN5) from

plant materials. DN5 production is presently underway at a 100,000 tpa facility. "The availability of DN5 and LCDA enable the production of a new variety of polyamides that are renewable and can replace incumbent polyamides such as PA 6 and PA 66 in engineering polymer and textile applications," claims Liu, in a paper co-written with Xiaohui Zhou, Haishuai Li, and Bing Guan.

In addition, Cathay has developed a new class of biobased polyamide elastomers (LPAE), composed of a long chain polyamide, as a hard segment, and a polyether soft segment. At room temperature, the glass-state of the hard segments form rigid domains which act as physical-crosslink points and provide high strength to the elastomer. The soft domains endow the elastomer with excellent elasticity. In addition, this new bio-based polyamide elastomer demonstrates good solvent resistance, and good processing performance.

Cathay's LPAEs can be processed on existing

Main image:
Toy group
Mattel has
launched its
Mega Bloks
Green Town
range made
from 80%+
ISCC-certified
bio-based
plastics

injection moulding, spinning and foaming equipment, which avoids the need for further investment. Within this new class of bio-based LPAEs are a variety of products with a range of hardness, including 30D and 65D.

Injection moulding processability is similar to other thermoplastic elastomers, such as Pebax (another polyetheramide, which itself is available in partly bio-based versions) and Hytrel (a copolyester). The elastomers need to be dried, and then processed at temperatures of 200°C to 240°C. Mould surface temperatures in the range of 20-40°C are optimal.

Cathay selected Arkema's polyamide elastomer,

Pebax, as the reference material, and compared the properties of PA5X-65D. The Taber abrasion performance of PA5X-65D and Pebax 7233 are both excellent, up to 23-26mg according to the standard ASTM D4060-19. In addition, tensile stress and break elongation are similar. PA5X-65D's break elongation is more than 500%, and Pebax 7233's is less than 300%.

Liu and his colleagues say the polyamide elastomer's unique combination of strength, flexibility and excellent resilience make it a strong candidate for high-end sporting footwear. Other market opportunities for polyamide elastomers exist in automotive, transportation, and telecommunication because of its mechanical properties, easy processability, and the good surface appearance of finished parts. It can also be used for medical tubing.

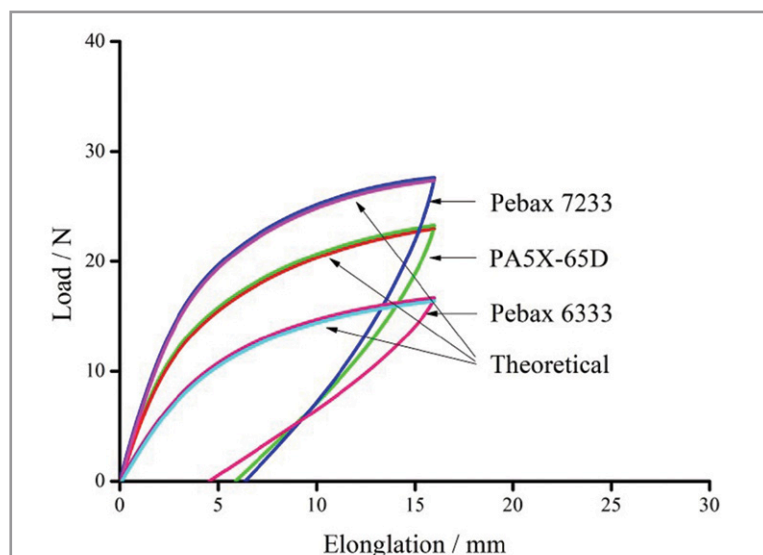
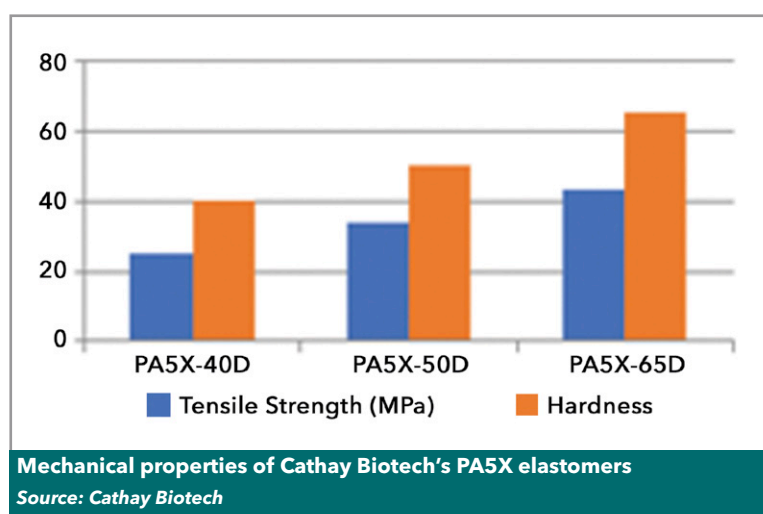
Numerous polyamides can now be made at least partly using renewables. Most of them have been long-chain polymers, often for use in extrusion applications. But last October, **Lanxess** launched Durethan Blue BKV60H2.0EF, based on PA 6. It says 92% of the raw materials used in this easy-flowing compound have been replaced with sustainable alternatives, "more than in any other prime quality glass-fibre-reinforced plastic".

This grade is the first product from Lanxess in the new "Scopeblue" series. The brand label identifies products that either consist of at least 50% circular (recycled or bio-based) raw materials, or whose carbon footprint is at least 50% lower than that of conventional products.

PA 6 is polymerised from cyclohexane, and it is this chemical that Lanxess obtains by one of three routes: it is either bio-based, recycled bio-based or produced by means of chemical recycling. Compounds are strengthened with 60% by weight of glass fibres comprising industrial glass waste instead of mineral raw materials.

The alternative raw materials that Lanxess uses in the precursors for PA 6 are chemically identical to their equivalents of fossil origin, so Durethan BlueBKV60H2.0EF exhibits the same characteristics as the virgin material and can be processed just as easily using exactly the same production tools and facilities with no conversion work needed, Lanxess says.

Guenter Margraf, Head of Global Product Management at Lanxess High Performance Materials (HPM), says the company is currently working on increasing the content of sustainable raw materials in this compound to 100%. This requires ammonia synthesised with carbon-neutral hydrogen, he says. Over the medium term, the



specialty chemicals company is also planning to replace the additives used in its plastics with sustainable equivalents.

In early June, Lanxess announced that it was working with finance company Advent to create a joint venture involving its HPM business and **DSM Engineering Materials**. The latter company is already strong in biotechnology, having several polyamides in its portfolio that are either partly bio-based or 100% bio-based. At K2019, for example, it announced that by 2030 all of its Stanyl PA46 grades would be available in a format with at least 25% bio-based raw material. EcoPaXX PA410 is already bio-based and is certified 100% carbon neutral from cradle to gate. Some grades of ForTii PA 4T are also partly bio-based.

In May, **Solvay** launched the Kalix 10000 series of materials for precision electronics components used in smart devices. "The newest high-perfor-

mance polyamide (HPPA)-based material is set to take both performance and sustainability to the next level," it says.

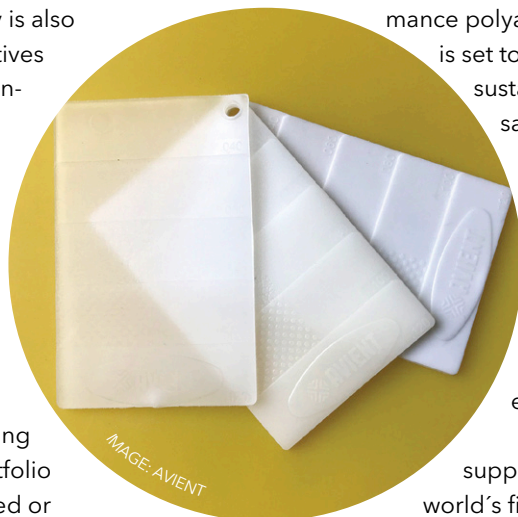
Solvay says Kalix 10000 grades are partially bio-based, made with renewable feedstock from non-food competing sources, and also produced with 100% renewable electricity.

Covestro has started supplying what it claims are the world's first climate-neutral polycarbonate from its Uerdingen site in Germany.

These Makrolon PC grades are climate-neutral from cradle to gate, thanks to the usage of renewable electricity for Covestro production processes and the introduction of raw materials coming from mass-balanced bio-waste and residues.

In April, **Trinseo** launched a more sustainable version of its established Magnum ABS for the automotive market. Trinseo uses the mass balance approach, combining fossil-based polymers with

Left: Avient has expanded its sustainable portfolio with nine new reSound Bio TPEs formulated with up to 75% renewable, plant-based content



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David Kitcher – Editor
David has been with AMI for 15 years and has been responsible for the editorial content of Injection World magazine since 2007. He has a wealth of experience in the plastics industry and has been instrumental in the development of Injection World magazine.

Chris Smith – Editor-in-Chief
Chris has been with AMI for 15 years and has been responsible for the overall editorial content of Injection World magazine since 2007. He has a wealth of experience in the plastics industry and has been instrumental in the development of Injection World magazine.

2022 features list

- January/February: Medical materials
- March: Thin wall moulding
- April: Additives and resins
- May: Automation and robotics
- June: Digital manufacturing
- July/August: Packaging
- September: Sustainability
- October: Industry events
- November: Industry events
- December: Industry events

Exhibition and show coverage

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IMAGE: ANDREU WORLD/MAIP

Above: Andreu World's Nuez Lounge Bio armchair

The first armchair in the world made of natural biopolymer

This lounge chair from Spanish furniture company Andreu World is made with lamNature biopolymer, developed by **Maip Compounding**. Andreu World, founded in 1955, has a long history in production of high quality wooden furniture. Maip has in recent years mainly dedicated itself to the study of compounds based on PHA, which it describes as "the sleeping giant, the only biopolymer in the world absolutely of natural origin capable of degrading in any environment, controlled and uncontrolled." Products in the lamNature line are based on one or more different types of PHA.

lamNature was recognised as the best material for a new line of products by Andreu World capable of overcoming the intrinsic design limits of wood, while maintaining its sustainability characteristics. The two companies, as well as the mould maker, collaborated over two years in the development of the new lounge chair, called Nuez Lounge Bio, designed by Spanish architect Patricia Urquiola. The sculptured shell of the chair is made completely in lamNature. The compound used is based on a special PHA and contains natural fillers as well as additives of vegetable and/or organic nature. In this case, the PHA is obtained from the bacterial fermentation of sugar processing scrap.

The compound meets the needs of Andreu World for a material with very high dimensional stability, as well as mechanical strength, thermal resistance, colour stability, and hardness, while also offering the possibility of highly precise surface texture reproduction, so as to make it possible to avoid painting.

The moulded component has a weight of 12.5 kg and is moulded on a 25,000 kN machine. Cycle time is just over a minute, despite the thickness of the component in some places being more than 10 mm.

Fabrics coverings, developed specifically for the chair, are made with textile waste and PET recovered from bottles.

renewable raw materials during polymerisation. The resulting Magnum Bio ABS resins contain up to 80% bio-attributed content. Second-generation waste products such as used kitchen oil and residue from the pulp industry constitute the bio-content.

Trinseo earlier launched sustainable equivalents of Magnum for non-automotive applications, as well as Styron polystyrene and Tyril SAN, with bio-content ranging from 80 to 95%. All of the materials are equivalent replacements to their virgin, fossil-based counterparts and offer both identical performance properties and processability.

To illustrate the impact of replacing fossil with renewable content, Trinseo compared the Product Carbon Footprint (PCF) of bio-attributed materials with their fossil-based counterparts. Among its findings: for Styron CO₂RE Bio GPPS, replacing fossil- with bio-attributed styrene results in an 84% reduction in the PCF; for Magnum Bio ABS, replacing fossil- with bio-attributed styrene results in a 57% reduction, and replacing fossil- with bio-attributed ACN results in a 14% reduction.

Compounders go bio

Among leading compounders active in the bio-based materials field, **Avient** has launched Nymax Bio Formulations, a line of bio-based PA materials that the company says not only help customers reach their sustainability goals but also do not suffer from undesirable water absorption, unlike other bio-derived (and fossil-based) PA materials available today. This means dimensional stability in finished parts should be superior.

Formulated in glass fibre-filled and unfilled options, Nymax Bio materials include between 16 and 47% natural filler from renewable plant sources, including corn, straw, and wheat. Avient claims that compared with traditional PA 66 glass fibre-filled materials, the new compounds offer lower warpage plus excellent surface appearance and colourability.

Nymax Bio materials are applicable for automotive, consumer, industrial, and building and construction applications and for both injection moulding and extrusion processes. They can also be customised for specific performance needs, such as laser welding and flame retardant properties. Compounds are currently manufactured in Asia and are available globally.

At the end of May, Avient announced nine new reSound Bio thermoplastic elastomers (TPEs) formulated with bio-renewable content from plants. These new grades contain 35 to 75% bio content.

The new reSound Bio 2800 and 7900 series



range in durometer from 30-70 Shore A and offer comparable performance, look, feel, and smell to traditional petroleum-based TPEs. Eight of the new grades can be over-moulded on polypropylene and the ninth grade bonds to both PP and polyethylene. Custom formulations may also be developed to meet specific application or sustainability targets.

Avient says the new TPEs “have an opaque natural colour and offer excellent colourability, just like prime TPEs. This tone allows the materials to showcase a natural aesthetic or be coloured to match design specifications with traditional TPE colorants or sustainable colour options from Avient.” Target applications include personal care products, cosmetic packaging, toys, and phone accessories.

Plant-based reSound Bio formulations are available globally and produced in America and Asia.

For medical applications, Avient has just unveiled its expanded line of bio-based Mevopur medical-grade polymer solutions. The new colour and additive concentrates and tailored ready-to-use formulations are made with bio-based PC, ABS, or styrenic polymers. These are in addition to bio-based polyolefin materials that Avient introduced in 2021.

The new Mevopur concentrates include polymers with bio-based content between 70 and 100%, as calculated to ASTM D6866 standard. Along with pre-coloured formulations for users who prefer ready-to-use solutions, they are more sustainable drop-in replacements for fossil-based materials. These bio-based materials can be processed on standard injection moulding machines and extruders and can be recycled in the same recycling channels as conventional fossil-based polymers.

Compounder **Eurotec** has also developed

“green” grades under the Tecobio banner. It says the 100% biodegradable polymer product line consists of compounds based on PLA, PBS, and PBAT, using fillers and additives that include glass fibre, mineral filler, impact modifier, wood flour, waste filler (walnut shell, nutshell and corn cob powder) and natural fibre (flax, kenaf, sisal and jute fibres).

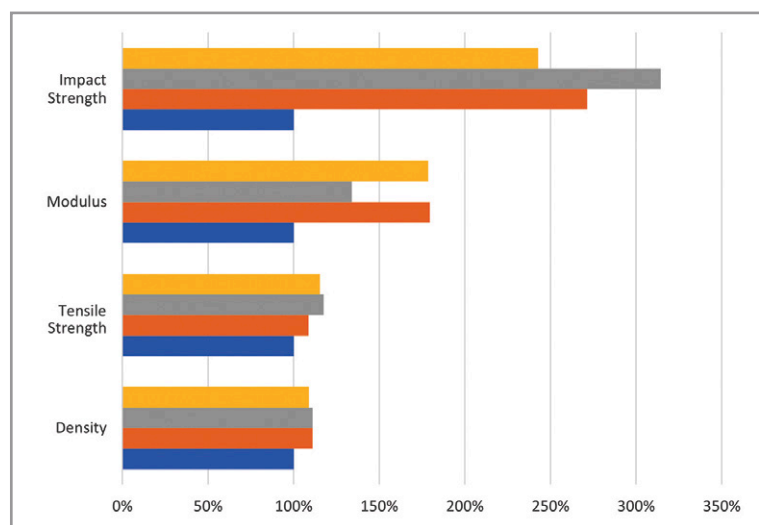
“These materials need a special compounding process due to low thermal stability and require special care and pre-treatment before compounding,” says the company. “We offer tailor-made sustainable bioplastics.”

Tecobio PL30 WR30 NL (PLA with 30% wood filler) can be used in pen bodies, toothbrushes, cutlery, cups, and is also suitable for 3D printing applications. Tecobio PL40 MF25 NL 01 (PLA and PBS blends with 25% mineral filler) is used in cutlery and cups due to its good thermal stability and flexibility.

Eurotec also provides solutions for bio-polyamides with glass fibre and recycled carbon fibres. Tecomid Bio NI40 CR30 BK111 HS is a PA 610 reinforced with 30% recycled carbon fibre, aimed at automotive applications as a replacement for PA 6 and PA 66. Tecomid NZ40 GR30 NL HS (bio-based PA with 30% glass fibre) is used as a replacement for PA 66 in automotive applications.

Green Dot Bioplastics in Emporia, Kansas, describes itself as a “full-service bioplastics company dedicated to delivering the very best of sustainable materials to our customers.” Its Terratek lines incorporate bio-based and compostable materials, tailored to individual applications. It recently partnered with major automotive Tier One Mayco International to reclaim trim and scrap fibres

Left: Terratek BD is targeted at parts with long flow paths and complex shapes, including incorporation of living hinges



Properties of PP-based compounds containing various types of natural fibre, compared with virgin PP

Source: Green Dot Bioplastics

Right: Possible applications for M-Vera PPC from Bio-Fed



IMAGE: SVETAVO/STOCK.ADOBE.COM

coming from Mayco's operations, which Green Dot converts into Terratek NFRP (Natural Fibre Reinforced Plastic).

According to Sarah Harbaugh, Sales & Marketing Director at Green Dot Bioplastics, Mayco wanted a sustainable solution for waste produced during the manufacture of automotive components. Green Dot plans to sell the Terratek NFRP compounds to third parties. Several injection moulding applications are currently under development. She envisages applications in such products as furniture and garden products.

Green Dot Bioplastics launched Terratek NFRP in 2020. Compounds contain natural fibres such as hemp, jute, sisal, American Bamboo, and flax, rather than glass or carbon fibre. The polymer matrix comes from non-renewables, most often PP.

Mike Parker, Green Dot's Director of Research & Development, says Terratek NFRP grades have similar physical properties and aesthetics to traditional compounds, but Terratek NFRP is lighter and also has better sound deadening properties.

Green Dot Bioplastics offers four different

families of compounds, all containing renewables but not always biodegradable and not always using bio-based plastics (some are based on PP, for example). Terratek NFRP is the latest line. The Terratek Bio family contains either wood or starch; the Terratek Flex family is based on a compostable elastomer; Terratek BD grades are more rigid, and biodegradable.

Parker says various projects are in progress involving Terratek BD: applications include cutlery with improved high temperature properties achieved without annealing, as well as parts with long flow paths and complex shapes, including incorporation of living hinges.

Cologne-based **Bio-Fed** develops and produces biodegradable and/or bio-based compounds under the brand name M-Vera. This grade range consists of biodegradable compounds, most of them partly or fully biobased.

The portfolio was recently expanded with ISCC PLUS and REDcert² sustainable-certified compounds made from biomass-balanced PP. These newest products are marketed under the names M-Vera PPH and M-Vera PPC. Bio-Fed says changing from conventional PP to the sustainable version is easy for processors, as the material can be used as a drop-in solution without adjusting the process parameters in production.

Bio-Fed also has a new range of masterbatches based on biomass-balanced carrier materials in cooperation with its sister company AF-Color. These are named AF-CirColor and AF-CirCarbon. The portfolio is supplemented by the matching AF-CirComplex additive masterbatches.

Bio-Fed also offers a wide range of entirely or partially bio-based materials for the injection

Italian bio-based materials start-up

A new Italian company specialising in bio-based and biodegradable plastics is **SabioMaterials**, founded in 2016. Company founder Alessandro Carfagnini says: "Our expertise includes polyhydroxyalkanoates (PHA), additives, and the production process of materials. We are expert in assessing novel ingredients, designing novel formulations and prototyping novel materials."

Alessandro Carfagnini is the son of Italo, one of the most famous figures in the compounding sector. Italo Carfagnini was founder and CEO of So.F.Ter, a major compounder of thermoplastic elastomers and engineering thermoplastics. The company now operates as Celanese Production Italy.

IMAGE: SABIO MATERIALS



Above: SabioMaterials' Alessandro Carfagnini (left) with Giorgio Colombo, President of compounding equipment company ICMA San Giorgio, in front of SabioMaterials' latest acquisition



moulding sector. Its new special compound, M·Vera GP1045, which is certified according to OK compost Home according to NF T51-800 [11-2015], is almost 100 % biobased and suitable for applications such as coffee capsules, plant pots, cutlery and others.

Food for bioplastics

Last December, leading Canadian biotechnology company **Genecis Bioindustries** and Dutch distributor and compounder **Helian Polymers** announced a collaboration for creating formulations based on PHAs (polyhydroxyalkanoates), which Genecis creates from food waste. Genecis says its rapid scaling model allows high throughput production capacity to be reached by adding its technology onto biogas plants. Target applications include biomedical products and also 3D printing filaments.

Helian Polymers has been active in bioplastics since 2007 (it also trades in colour concentrates and additives). Its PHARadox brand was launched mid-2021. The company has already developed numerous PHA-based materials under this umbrella (it obtains polymer from various sources). Helian is a sister company of ColorFabb, a European 3D printing company that pioneered the development of PHA and PLA/PHA blended filaments.

"By combining various PHA building blocks, unique and bespoke materials are being created," says Sander Strijbos, responsible for marketing at Helian Polymers. "Some of them are brand new, others are drop-in replacements for traditional petrochemical polymers. All our materials are

bio-based and biodegradable."

Initially operating only as a distributor, the company now has a Coperion ZSK 26 Mc18 compounding extruder to produce sample batches and pilot-scale production runs. It has a partnership with Chemelot Innovation and Learning Labs, which provides additional testing capacity.

Various applications have already been developed with PHARadox materials, including coffee capsules, cutlery, sunglasses and various horticultural products.

Aimplas Plastics Technology Centre in Spain, which has over 30 years of experience in bioplastics, is also involved in a project to create bioplastics from food waste. Guacapack involves making use of waste generated from processing avocado to prepare other products, such as guacamole. The waste is used to create a new biodegradable packaging system that extends the shelf life of food by 15%.

The starch from the avocado seed is extracted and purified to obtain a film that can be used to make multilayer IML labels with oxygen

barrier properties that prevent the oxidation of food. In addition, the active ingredients of waste avocado skin and flesh, which have a high antioxidant capacity, are obtained and used as a component of a bioplastic (PLA) that is injection moulded to produce the packaging system.

This project is funded by the Valencian Innovation Agency (AVI) and led by the company ITC Packaging. The Universidad de Alicante research group on Polymer and Nanomaterial Analysis (Nanobiopol-UA) is also taking part in the project.



Left: Avocado waste is the basis for a material developed by Aimplas

Left: Cutlery is a target application for Helian Polymers' PHARadox brand of PHA materials

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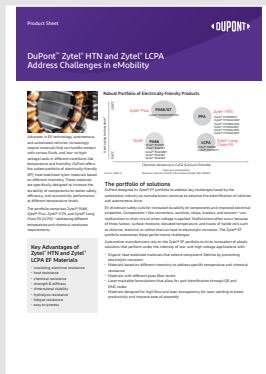
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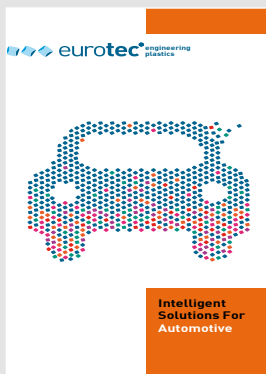
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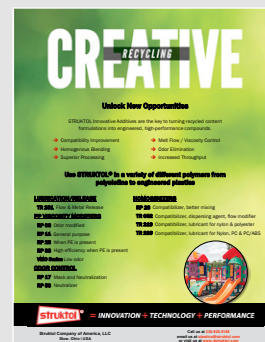
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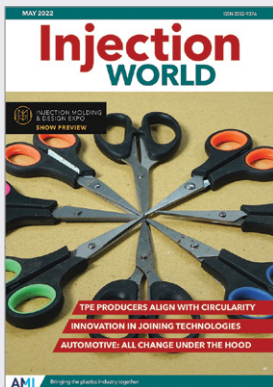
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Injection World May 2022

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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Injection World April 2022

The April issue of Injection World has an in-depth feature on tethering and recycled content in the caps and closures sector, plus other features covering moulding compounds with recycled content, and the latest injection moulding robots.

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Compounding World June 2022

Compounding World's June edition covers a wide range of products, with features on how the fillers industry is targeting sustainability, recycled carbon fibre development, the latest in PVC stabilisers, plus clarifying and nucleating agents.

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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 May/June 2022

The May-June issue of Pipe and Profile Extrusion examines corrugated pipe, how it continues to find use in cutting-edge projects, and how machinery producers look to improve speed, performance and control. Plus features on recycling/granulators and pressure pipe.

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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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	27-29 September	Fachpack 2022, Nuremberg, 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/
2023	23-26 November	Plast Eurasia, Istanbul, Turkey	https://plasteurasia.com
	1-3 December	Plast Print Pack West Africa, Accra, Ghana	www.ppp-westafrica.com
	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


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14-15 June 2022	Chemical Recycling Europe, Cologne, Germany
28-30 June 2022	Polymer Sourcing & Distribution, Hamburg, Germany
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
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