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Injection WORLD

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IPL Plastics buys Loomans

IPL Plastics of Montreal, Canada, has expanded into continental Europe with the acquisition of Loomans Group in Belgium, a firm it said it had been tracking since 2015. The deal, which was announced in the context of IPL's end-of-year-results, cost \$85.5m, and was financed by existing cash resources and credit facilities.

Loomans is a single-site tooling and plastics manufacturing business, with in-mould labelling expertise. IPL said that the deal was consistent with its acquisition strategy, diversifies its geographic footprint and adds new capacity and capabilities to serve a broader customer base such as the cosmetics, personal care and beverage sectors. Loomans will be integrated into the Consumer Packaging Solutions business in Europe.

In fiscal 2018, IPL said its revenue increased by 22.7% to \$657.8m, while adjusted EBITDA was \$78.0m. It had a small net income of \$1.8m, despite sustaining a loss in Q4. The positive impact of continued organic growth was offset by a change in product mix and by input cost pressures, particularly from high resin prices, IPL said.

➤ www.iplpgroup.com

Italy struggles with exports but boosts machine production

Italian plastics machinery manufacturers saw exports dip last year – though production, domestic demand and imports all rose.

Overall, production of machinery was up by 0.6% to €4.7bn. Trade association Amaplast pointed out that this came after “the all-time record set the previous year”.

“On the whole, we are happy with the results from 2018,” said Alessandro Grassi, president of Amaplast.

Amaplast members saw revenues rise by around 3.6% in 2018, he added.

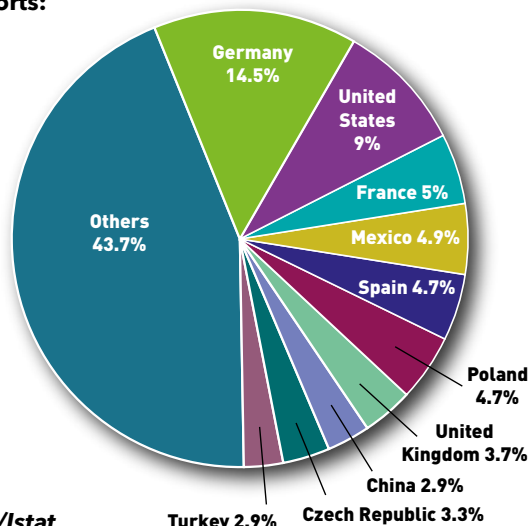
Exports fell to €3.26bn in 2018, a fall of 1.5%. Much of this was due to stagnation in European markets – which are historically strong for Italian machinery. Exports to Germany – its main export market – fell by more than 2%.

Further afield, there was a fall of 13% in exports to China – though sales to the USA rose by more than 6% to

Top export markets for Italian plastics machinery, 2018

Total exports:

€3.3bn



Source:

Amaplast/Istat

reach nearly €294m, and those to Mexico by nearly 12% to €159m.

Domestic demand for machinery rose nearly 5%, which Amaplast said was due to “support measures implemented in the previous Stability Law”. Many Italian manufacturers saw increases in their order books in the second half of 2018, it added. In addition,

sales of imported machinery rose by 3% to €1bn.

Amaplast's latest year-end member survey shows less optimism – or a reluctance to take risks – regarding orders and revenues, it said: in the latest half-year, fewer members expect an increase (or decrease) – while the proportion of those foreseeing stability has increased.

➤ www.amaplast.org

Logoplaste appoints new CEO



Portuguese rigid plastic packaging firm Logoplaste has named Gerardo Chiaia as its new group CEO. Chiaia joined the management team in October 2018 as CEO for Europe and Asia, after previously working with a company partner. He has 24 years of experience in the plastic industry,

having worked at Husky in various positions from technical service, to operations and sales. He replaces Roberto Villaquiran, who has left after two years “for family reasons, and to pursue other activities”.

Logoplaste operates units at 61 factories.

➤ www.logoplaste.com

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Expo to shine spotlight on women in plastics



Panellists in the Women in Plastics debate include (left to right): Lauren Hickey, Jennifer Proffitt, Meli Laurance, Candace Sanders and Molly Bridger

Issues surrounding the professional development of women in the US plastics industry will be addressed in a panel discussion at next month's Plastics Extrusion World Expo, which takes place in Cleveland, Ohio, and runs alongside the Compounding World Expo (previewed on page 14 of this edition).

'Women in Plastics: Empowering Industry Change' brings together several high-achieving women from across the world of plastics to share their perspectives on breaking through in this traditionally male-dominated industry. The 45-minute panel will look at the different paths these leaders have taken into the plastics industry, how the workplace

is changing to become more inclusive, and future challenges and opportunities for the next generation of women entering plastics or other manufacturing professions.

The panellists include:

- Lauren Hickey, Director of Marketing and Product Management at masterbatch manufacturer Americhem;
- Jennifer Proffitt, Plant Manager at profile and sidings producer Associated Materials;
- Meli Laurance, Regional Commercial Industry Manager for Plastics at global pigment specialist BASF Colors and Effects;
- Candace Sanders, Assistant Plant Manager at PVC product supplier Genova Products;

- Molly Bridger, Group Director of Marketing at thermoplastic materials manufacturer Simona America.

Organised by AMI, the Plastics Extrusion World Expo and Compounding World Expo take place at the Huntington Convention Center in Cleveland, Ohio, USA on May 8-9, 2019, alongside the Plastics Recycling World Expo. By registering in advance, visitors gain free admission to all three exhibitions, featuring more than 250 suppliers, plus the five conference theatres hosting technical presentations, educational seminars and business debates. To book a free ticket, which is valid for both days of the event, visit: ami.ltd/Register-AMI-Expos

Timloc buys Yizumi machines in UK

Timloc Building Products, one of the UK's largest manufacturers of injection moulded building products, has purchased four Yizumi injection moulding machines from STV Machinery. These range from 120 to 1,000 tonnes clamping force and have been installed at the company's new 8,360 m² site, Timloc House, on the Ozone Business Park in Howden, Yorkshire.

The company added that this investment, coupled with purchases of other manufacturing equipment, has enabled it "to keep pace with increasing demand for its products and expand into new areas". Under the project leadership of STV, the machines were delivered by RJC Projects Engineering and Yizumi sent an engineer direct from China to assist with the installation and commissioning of the two larger machines.

➤ www.stvmachinery.co.uk

Saudi Aramco buys 70% stake in SABIC

Saudi Aramco has acquired a 70% majority stake in SABIC from the Public Investment Fund of Saudi Arabia. The private transaction was concluded for a total of about \$69bn and is subject to certain closing conditions, including regulatory approvals.

The remaining 30% of SABIC will stay

in public ownership. Saudi Aramco said it had no intention of acquiring this.

In a joint statement, the two companies said that the deal will be key to both "in the development of the petrochemicals industry in Saudi Arabia and reinforces aligned objectives to create a preferred global chemicals company".

Sabic CEO Yousef Al-Benyan said: "SABIC will benefit from the additional scale, technology, investment potential and growth opportunities Saudi Aramco will bring as a global leader in integrated energy and chemicals production."

➤ www.sabic.com

➤ www.saudiaramco.com

Single Use Plastics Directive sets out product bans

The European Parliament adopted the EU's Single Use Plastics Directive on 27 March. The Directive means that certain products will be banned in the EU by 2021: single-use plastic cutlery and plates, plastic straws, cotton bud sticks made of plastic and plastic balloon sticks. Also banned from 2021 are oxo-degradable plastics and food containers and EPS cups.

The Directive also introduces a design requirement to connect caps to bottles, to reduce the number of caps being littered. In October 2018, Coca Cola, Danone, Nestlé and Pepsi wrote to EU environment ministers to oppose the move, saying investment is better targeted at reaching recycling targets. (See more on this issue in the Caps



The Directive requires that caps remain attached to drinks bottles

and Closures feature, page 17.)

PlasticsEurope said it welcomed the Directive in terms of acknowledging that the fight against litter is a shared responsibility between authorities, producers and consumers. It said: "Setting guidelines on definitions and categories should follow promptly to

avoid the risk that different interpretations will prevail among Member States."

IK, the German plastics packaging association, said there is a danger that the emotionally charged debate around plastics in the environment could lead to hasty decisions. Climate protection should not be about banning plastic products, many of which help to reduce CO₂ emissions, save fuel, energy and water. It said an anti-littering directive would have a greater impact on waste management and effective environmental and climate protection.

➤ www.europarl.europa.eu

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Haitian machine sales rise by 6% in 2018

Haitian International Holdings, the Chinese maker of injection moulding machinery, has announced its results for the calendar year 2018. Its revenues were 6.5% up to a record high of RMB 10.85bn. Gross profit was 4.7% down at RMB 3.245bn and operating profits fell by 5.7% to RMB 2.24bn, as margins were hit by the rise in raw material prices from the end of 2017.

"Our strategic focus on small-tonnage full-electric machines and large-tonnage two-platen machines continued to deliver



Haitian boosted sales of its Zhafir electric machines in 2018

outstanding results," the company said. Sales of Zhafir electrical series machines were 49.8% up on 2017 at RMB 1.51bn, while Jupiter two-platen machines were 13.4% up at RMB 1.50bn.

Domestic sales rose by

4.6% to RMB 7.31bn and export sales were up 9.4% to RMB 3.23bn. Despite the impact of the US-China trade conflict, which led to a fall in sales in the US market, Haitian saw increased sales in Germany and Turkey.

➤ www.haitian.com

Elix appoints new CEO

Sinochem subsidiary Elix Polymers, a specialised producer of ABS, has appointed David Castañeda as CEO and board member with effect from 8 April. Castañeda has more than 15 years' experience in the polymers and chemicals industries, holding senior manager roles in operations, technology, and business development and innovation.

He replaces Wolfgang Doering.

➤ www.elix-polymers.com

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Arburg plays host to 6,000

Arburg has announced that the 21st edition of its Technology Days event, held at its Lossburg headquarters in Germany from 13 to 16 March, attracted more than 6,000 visitors from 54 countries. Of these, 44% came from outside Germany, the largest groups being 140 from North America and 110 from China. Since the first event in 1999, the company added, more than 93,000 people have attended these events, which are the largest set of in-house presentations in the plastics industry.

The overarching theme for 2019 was the 'Road to Digitalisation' that Arburg



Demonstration of the ArburgXworld customer portal during the event in March

first highlighted at Fakuma 2018, with information on its digital components for plastics processing. "In this way, we have reached another milestone and made a complex topic more

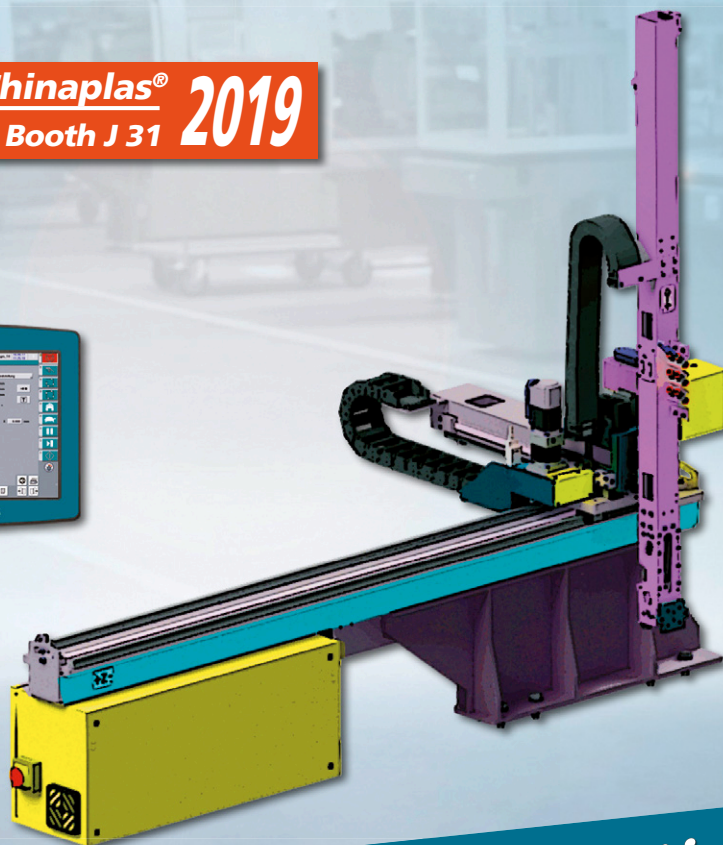
tangible," said Managing Partner Michael Hehl, at Arburg. "For example, our customers were able to experience in practice which tools using augmented and virtual reality we can provide

to make training and service significantly easier in the future."

Over 50 machine exhibits and turnkey systems were demonstrated, such as the virtual maintenance of an injection unit via AR data goggles and video calls in the 'Efficiency Arena'. Arburg also presented the new ArburgXworld customer portal, which offers highly practical advantages in terms of machine fleet, service and spare parts ordering, said Hehl. It is now being used by registered German customers free of charge and will be available worldwide by the end of the year.

➤ www.arburg.com

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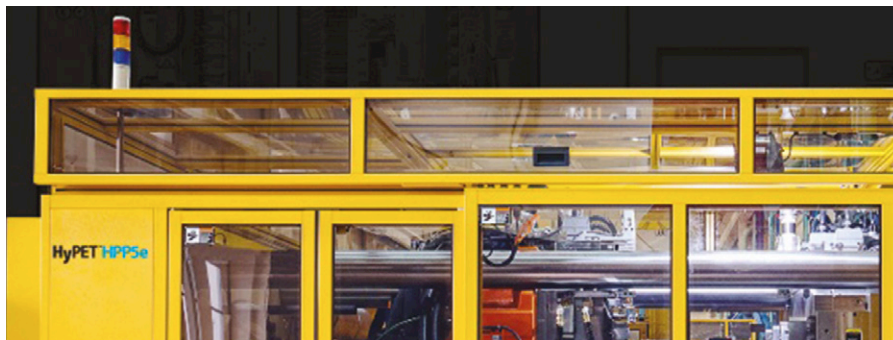
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Husky launches update to HPP5 machine platform

Husky Injection Molding Systems has launched the latest generation of its HyPET HPP5 system, the HPP5e. President of rigid packaging Rob Domodossola said that the firm has implemented "significant technology improvements that work together to deliver a smarter, more intuitive, more productive system".

The platform now incorporates an adaptive technology that uses feedback from pressure and actuator sensors to determine the optimum pressure required to mould every application. More intelligent features and real-time control enhancements have been adapted "to simplify operation and optimise the moulding process", the company said.



The updated HyPET system includes "smart" features

In addition, the HPP5e has new conveyor technology to reduce preform bounce when parts are ejected from the CoolPik unit to the exiting conveyor. There is also enhanced mould alignment software for faster system set-up and troubleshoot-

ing, robot linear bearings to maximise longevity, upgraded Altanium Inside ICC cards for more accurate temperature control and a new nozzle shut-off cylinder to promote component longevity.

> www.husky.co

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A major event for the North American plastics industry takes place in Cleveland on May 8-9. We preview the free-to-attend exhibitions and conferences

Cleveland expos attract top plastics companies

Main image:
The Cleveland skyline, including the Rock and Roll Hall of Fame, venue for a networking party

The Compounding World Expo and Recycling World Expo are taking place in North America for the first time next month, alongside the new Plastics Extrusion World Expo. The three process-focused exhibitions will take place at the Huntington Convention Center in downtown Cleveland, Ohio on May 8-9, 2019. The exhibitions are organised by *Injection World's* publisher AMI and they follow on from the success of launch events in Essen, Germany in 2018.

More than 2,000 people have already registered to attend the three exhibitions. The Plastics Extrusion World Expo, Plastics Recycling World Expo and Compounding World Expo will feature more than 250 exhibitors and five conference theatres with over 130 speakers across the two-day event. For injection moulders, the shows are well worth visiting to connect with materials suppliers (such as BASF, Cabot and ExxonMobil) and technology groups (including Cumberland, JSW and Nordson) -- and

also for the free conferences and networking on offer. Free tickets for the exhibitions and conferences are available by registering in advance at ami.ltd/Register-AMI-Expos

"Bookings are still coming in fast and we expect this to be the biggest dedicated plastics industry event in the USA this year," said Nikki Whyman, senior marketing manager at AMI.

Representatives from the following companies are among the 2,000+ people that have registered to attend: Abbott, Amcor, Ampacet, Associated Materials, Avery Dennison, Azek Building Products, Bemis, Berry Global, Bixby, Colgate-Palmolive, Dell, Envision Plastics, Ford Motor Company, Genova Products, HP, Lavergne, LyondellBasell, NAPCO, Nestle, PolyOne, Primex Plastics, Raumedic, Renolit, Reynolds, Royal Building Products, Southwire, Taghleef, Tarkett, TE Connectivity, Tekni-Plex, Teknor Apex, Trex, Veka, Whirlpool and many more influential companies.

Compounds and materials

At the Compounding World Expo conference there will be four separate panel discussions featuring industry leaders debating the future for technical compounds, masterbatch/concentrates, PVC compounds and cable compounds. These will include senior representatives from A Schulman, Alok Masterbatches, Americhem, Aurora Plastics, Champlain Cable, Chroma Color Corporation, Prysmian Group - General Cable, Mexichem Specialty Compounds, Primex Plastics, RTP, Southwire, Techmer PM, TPC Wire & Cable and Westlake Compounds.

In the opening presentation, Andrew Reynolds, a founder of AMI and Director of Advance Bidco, the owner of AMI, will set the scene with a paper analysing global trends in plastics compounding markets. Sylvia Tabero, Senior Project Consultant at AMI Consulting, will give a paper on the global compounding market and perspectives for PP compounds. And on the following day, the opening keynote will be delivered by Chris Smith, Editor of Compounding World, who will highlight five compounding innovations to watch.

The two-day programme will also include six practical training seminars covering topics such as: specifying and optimising compounding lines; designing extensional mixing in extrusion; measuring and controlling colour; formulating better compounds; and understanding polymer degradation and stabilisation.

In between the business debates and training seminars, at the Compounding World Expo conference, there will be more than 25 presentations covering the latest technology developments.

These include important technology topics such as: electrically and thermally conductive compounds, the role of silicones as high-performance additives, process-induced properties of graphene-polyethylene nanocomposites, and technical innovations in the use and development of recycled plastics and sustainable materials.

Recycling topics

The Plastics Recycling World Expo also features a high-value, free-to-attend conference programme, again including high level panel discussions. The first on Day 1 will see experts discuss the impact of global developments on local recyclers: including plastics recycling regulations, the Circular Economy trend, trade tariffs and the Chinese ban on imports of plastics waste. The second discussion brings together industry experts to explore solutions to increase plastic recycling rates. The final discussion will consider the question: the future of plastic

packaging recycling - what further hurdles still need to be overcome?

Other highlights from the conference include: a presentation by AMI Research Analyst Lizzy Carroll, on five key global trends in plastics recycling that the industry should watch out for; and a keynote speech from Dean Miller, Program Manager - Recycling Innovation, at HP in the US, who will present his company's work on closed-loop recycling of electronic equipment.

The Plastics Extrusion World Expo has two conference theatres, one focussed on film and sheet, the other on pipe and profile. An important panel discussion will focus on women empowering industry change in plastics, with Lauren Hickey from VCS-2 Consulting, Meli Laurance from BASF Colors & Effects, Jennifer Proffitt from Associated Materials, Candace Sanders from Genova Products and Molly Bridger from Simona America Group.

Don't miss out - register now

The Plastics Recycling World Expo, Plastics Extrusion World Expo and the Compounding World Expo are happening at the Huntington Convention Center, Cleveland, Ohio, on May 8-9. Admission to the expos and their associated conferences is free-of-charge - register [HERE](#).

Cleveland's iconic Rock and Roll Hall of Fame will be the venue for a major networking party for the plastics industry on the evening of May 8. The event will be open to visitors and exhibitors from the expos. Advance tickets for the networking party cost just \$20 (less than a standard ticket), and they include exclusive access to all of the Rock and Roll Hall of Fame exhibits, plus a drink and snacks - [DETAILS HERE](#).

Below:
Conference theatres proved very popular at AMI's first free-to-attend Expos, which took place in Essen, Germany last year



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PHOTO: HUSKY

Caps: new EU regulation and innovation drivers

Improvements in production coupled with a need for sustainable materials with product appeal are driving developments in caps and closures. Mark Holmes finds out more

Striking the right balance between increased production efficiency through performance and cycle times with the need to meet greater regulatory scrutiny of plastics packaging through improved sustainability, and the brand owner's desire for product differentiation, is becoming increasingly important in the caps and closures market. Injection moulding machinery manufacturers are finding ways to increase production, while meeting new material and aesthetic requirements. In addition, materials suppliers and injection moulders of caps and closures are looking for new ways to provide on-the-shelf appeal in a more sustainable manner.

According to **Husky Injection Molding Systems**, there are three primary trends driving the current plastics caps and closures market: sustainability and single use plastic regulations; lightweighting; and premiumisation in form and function. "In terms of sustainability, certain jurisdictions are proposing new regulations around the use of single use plastics," says Michael White, Business Manager, Closures. "The intent of these regulations are to minimise environmental impacts due to litter. These regulations are comprehensive, touching on everything from plastic fishing lines, to cutlery and to closures. It appears that the European Union is the first territory to pass legislation regulating the use of single use plastics. The law requires that by April 2024, all single use plastic beverage containers with a volume of up to three litres will require the closure to remain on the bottle. The intent of this law is to reduce significantly the amount of bottle

closure litter. This presents a great opportunity for brands to make an environmental statement while differentiating their products on the shelf with new and innovative closure designs that remain contiguously affixed to the bottle after opening.

"In addition, the lightweighting trend continues to have a good future. The lightweighting of caps and closures serves two purposes. Firstly, it makes an environmental statement as the product requires less resin, while it also reduces material costs for the brand owner as less resin is required per product."

Premiumisation of caps and closures through form and function is also a major consideration for brand owners. "The closure is an extension of the brand," White adds. "In order to promote shelf differentiation, brand owners can leverage both the design of the bottle and the cap or closure. The brand owner has many tools at its disposal when considering how to communicate a premium product via the cap or closure. Some of these tools include closure height. In general terms, the higher the closure, the greater the grip zone which leads to a more favourable opening and closing experi-

Main image:
The quantity, form, frequency, profile and depth of a knurl pattern all contribute to a differentiation and the premium perception

Below: The higher the closure, the greater the grip zone which leads to a more favourable opening and closing experience



PHOTO: HUSKY

Right: At Fakuma 2018, an all-electric E-cap 380 from Engel manufactured 26 mm caps including tamper-proof bands at a cycle time of under two seconds

Right: Audible and tactile feedback can be utilised. For flip top and push top closures, the audible 'click' provides a cue that the closure has been opened or closed

Below: The ultra-high speed 580-tonne EI-Exis SP from Sumitomo (SHI) Demag

ence. A taller closure also conveys a premium image as it has additional prominence on the package. A knurl pattern can also be used. The quantity, form, frequency, profile and depth of the knurls all contribute to a differentiation and the premium perception.

"The form and contour of the closure can communicate a premium message as well. In addition, audible and tactile feedback can be utilised. For flip top and push top closures, the audible 'click' when opening and closing provides a cue that the closure has been opened or closed. The tactile experience or resistance of the closure when opening or closing can also provide additional feedback as to the premium positioning of the product."

While new developments in caps and closures are focused on sustainability, safety, user experience, shelf differentiation and performance, there are some new solutions required in injection moulding for caps and closures. "The single use plastic regulations require a re-think on how we develop closures that are contiguously affixed to the bottle," says White. "These new designs must provide a satisfying consumer experience, provide similar or better product performance, and accomplish all of this without adding weight to the closure. At Husky, we are committed to developing consumer packaging solutions that minimise environmental impact, and that are of the highest functionality and convenience, with uncompromised food and consumer safety. Designs that comply with the European single use plastic regulations will be introduced later this year."



Husky adds that it is also continuously innovating and collaborating on solutions that enable packages with improved recyclability and containing more recycled content. This involves participating in research and forming partnerships on alternative materials and engineered packages to support sustainability efforts. Finally, the company says that it is introducing smaller format CSD (carbonated soft drink) closures compatible with new neck finishes that exceed the current level of performance at a lower product weight.



It is all about performance and cycle times with caps and closures, says **Engel**. In order to increase both continuously, the company is working to develop its E-cap machine further. At last year's

Fakuma, the company highlighted the E-cap with optimised movement profiles, and further developments in all-electric caps production will be presented at K 2019.

At Fakuma 2018, Engel demonstrated a further reduction in cycle times for the production of caps. An all-electric Engel E-cap 2440/380 was used to produce 26 mm caps, including tamper-proof bands made of HDPE, at a cycle time of under two seconds under realistic manufacturing conditions. Optimised movement profiles now allow for an increased output, says the company. The Engel E-cap 380 with 3,800 kN of clamping force can provide a dry cycle time of just 1.4s.

Engel says that the E-cap is the only cap machine on the market providing all-electric operation with a clamping force range as high as 4,200 kN. At the same time, it is the most energy-efficient machine in its class. Despite its substantial output, the E-cap showcased at Fakuma only needed around 0.4 kWh of electricity to process 1kg of plastic granulate. The exhibit involved a 72-cavity mould from Z-moulds of Dornbirn, Austria, as well as a dry air system from Blue Air Systems of Kundl, Austria and a camera inspection system from IMDvista of Brügg, Switzerland.

Collaboration between **Sumitomo (SHI)**

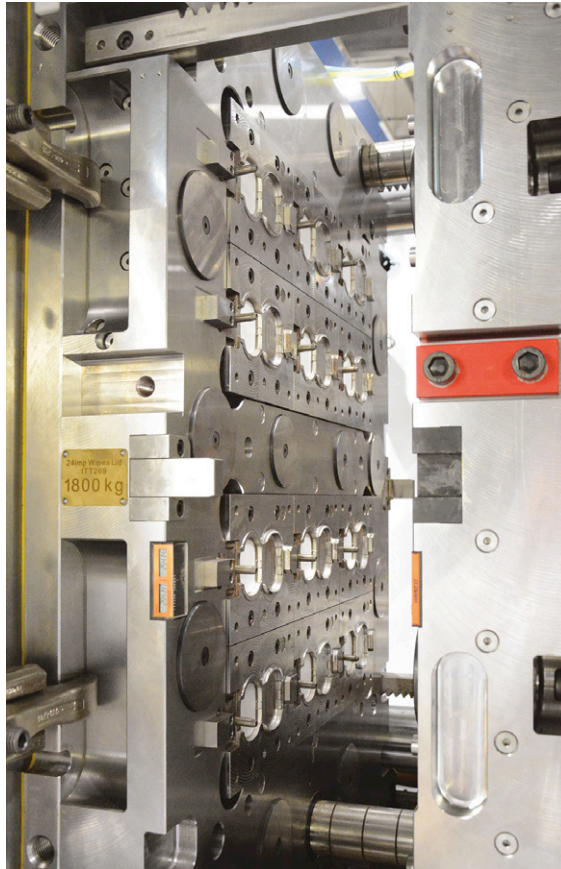


Demag, Waldorf Technik and Roth Werkzeugbau

has provided a fully automated in-mould labelling (IML) production line that is repeatedly manufacturing, stacking and wrapping more than 7,500 easy open, fully decorated rigid wipe lids per hour for UK injection moulder **Amaray**. The push button lids are designed for a major blue chip personal care client. The installation includes Sumitomo (SHI) Demag's ultra-high speed 580-tonne El-Exis SP, fitted with a multi-cavity 12+12 stack mould. An integrated high speed IML Waldorf Technik robot places each label into the mould, and then removes and closes each of the 24-hinged lids as soon as they are extracted from the mould. This has to be done swiftly while the polypropylene is still malleable. The lids are then placed on the conveyor where they are each quality checked by a camera. A robot then stacks 38 lids, passing to a binder, at which point nine stacks are fed into an automated wrapper to create a brick of 342 lids for loading onto a pallet.

Amaray undertook extensive market research with parents and carers to determine how they could structurally improve upon the rigid pop-up lid concept for wipes. Users emphasised the dexterity challenges they face when changing and cleaning a wriggling child. Other requirements included a secure lid that stopped wipes from drying out to save on waste, yet could be opened and closed with one finger. To maximise post-consumer recycling efforts, Amaray made the decision to use virgin polypropylene to allow the entire component - lid and label - to be recycled after use.

In order to deliver the design, the lid needed to be moulded as a single component and decorated and assembled in a seamless process. From an injection moulding perspective, using a 12 + 12 stack mould (although more productive) presented a tooling and processing challenge. In order to create the flip-like hinge, the tooling needed to accommodate varying depths of raw material.



Left: Amaray's packaging line comprises a 12 + 12 stack mould, producing 7,500 fully decorated rigid wipe lids per hour for a leading blue chip personal care customer

Unlike a single face tool, the polymer is injected in the centre between the two plates and has to be evenly distributed in all 24 cavities. Additionally, using a two-face 12 + 12 stack mould in conjunction with the IML system means that 24 cavities are opening at the same time, with a Waldorf Technik side-entry robot placing labels accurately within fractions of a second.

Typically, packaging moulders use a single face mould with a maximum of twelve cavities when integrating an IML system, so Amaray's installation doubled the complexity. In order to insert labels on both tool faces required a much larger robotic system, adds Sumitomo (SHI) Demag. The Waldorf side-entry robot serves two purposes. As well as



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Above:
StackTeck Systems has introduced a 1 × 4 flip-top closure mould featuring a servo actuated IMC mechanism

Right: RPC Bramlage has launched a lotion pump that combines a standard system with a customisable outer body

Right: SABIC has developed a new multi-modal grade of HDPE with good organoleptics for caps and closures

inserting the label into each cavity before the melt is injected into the mould, it has to retract and then re-enter the moulding area to remove all 24 lids, closing them before the plastic hardens.

StackTeck Systems has introduced a 1 × 4 flip-top closure mould featuring a servo actuated IMC mechanism. Compared to a conventional IMC mould with a cycle time delay of 1.5s for closing, this servo mechanism actuates in 0.35s, representing a 75% reduction in closing time. The company has also used a KoolTrack mould stack design for optimal cooling, resulting in reduced hold/cool time and an overall cycle time 3-4s faster than a conventional flip-top closure mould. The servo drive technology is suitable for unscrewing and flip top caps through a simple interface to the moulding machine. The mould can include its own stand-alone servo control cabinet and pendant which uses a standard Euromap robotic interface to the injection machine.

SABIC has developed a new multi-modal grade of HDPE with good organoleptics for caps and closures. The company says that it combines environmental stress cracking resistance (ESCR) with good flow, allowing cap manufacturers to design very lightweight closures. SABIC HDPE CCX027C polymer is claimed to exhibit strong shear thinning, which means that even though it has a relatively low melt flow index (MFI) of 0.8 g/10 min, 2.16 kg, its flow characteristics during injection moulding are similar to those of a unimodal HDPE with an MFI more than three times higher.

SABIC adds that it is addressing several trends in the market related to sustainability issues. Improvements to ESCR and physical properties like stiffness and impact strength will enable extra lightweighting. In addition, reductions in required processing temperatures will help processors save energy and cut cycle times and

better organoleptics will meet needs for caps that have no effect on the taste of packaging contents, which is particularly important for bottled water. The company is also using renewable feedstocks in its production of polyethylenes and polypropylenes. Properties of the partly bio-based plastics are identical to those made from non-renewables alone.

RPC Bramlage has launched a lotion pump that combines a standard system with a customisable outer body. The Lotus pump delivers good functionality and user-friendly operation for a wide variety of cosmetic and personal care products while enabling manufacturers to create an individual appearance for effective brand identity and maximum on-shelf appeal. The pump offers a 1.5ml dose that is achieved with minimal effort by

the consumer. Each bottle is created in consultation with the customer to meet individual product characteristics, ensuring the lightest weight of bottle, while still providing the required levels of product protection and compatibility. Pump heads can be supplied in the lock down position to maximise shipping and there is a lock up position when there is a need to travel. A choice of decoration options, along with special finishes such as soft touch, water droplet, rubber and gloss effects, ensure each bottle is fully personalised in line with particular brand objectives, creating a premium image on-shelf.

The company's Twist-Up airless dispenser has been selected by leading Belgian cosmetics company Mylène to package a new face cream and serum as part of its Detox complete facial care range. The Twist-Up dispenser combines effective protection of the products' natural ingredients, on-shelf appeal and maximum convenience for the



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Above: A new packaging solution, Talkin' Cap, uses embedded Near Field Communication tags, for application on the inside of closures from CSI

Right: Bericap's DIN 60 TAP is a safe, convenient and time-saving capping system for the industrial sector

consumer. The dispensing head is hidden to protect the contents. It is revealed by turning the upper part of the container to allow controlled dosing and hygienic application of the cream. In order to reflect the premium image of the products, the 50ml Twist-Up for Detox Face Cream and the 30ml size for Detox Nutri Serum feature a lacquered brass upper section. The white base

is silkscreen printed in two colours and hot stamped with the Mylène branding to create a strong family image with the other two products in the range.

Closure Systems International (CSI) and Talkin' Things, a product communication company, have collaborated to integrate smart packaging technology into CSI's closures. A new packaging solution, Talkin' Cap, uses embedded Near Field Communication (NFC) tags, for application on the inside of closures. CSI says that this technology introduces a powerful platform to support a brand owner's mobile marketing activities right from the package itself with just a simple tap.

The company adds that brand trustworthiness and product reliability are paramount for consumer loyalty. Talkin' Caps ensure product safety and reduce brand owners' liability by protecting against counterfeiting and 'grey market' activities throughout the distribution stream. CSI's Talkin' Caps allow for real-time consumer interconnectivity at the point of consumption, giving brand owners the ability to have dynamic interaction and gather actionable insights based on consumer location and usage history. With 90% of consumers using their smartphone to help make purchase decisions in a brick and mortar setting, Talkin' Caps are an app-less way to drive marketing content, brand and product information, gamification, loyalty programmes, awards and coupons to connected consumers.

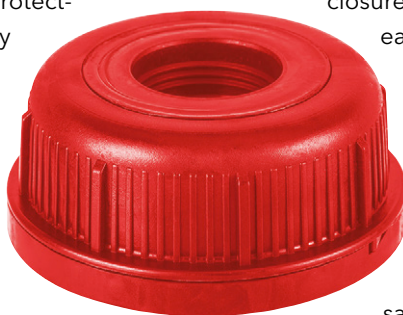
CSI has also expanded its one-piece closure portfolio. The company says that the lightweight, high performance products provide a total closure solution for brand owners and enable the lowest total cost of operations for bottlers. For example, the HF-Lok V 33mm/38mm is optimally designed to be lightweight while maintaining performance excellence for hot-filled non-carbonated beverages. It offers advanced tamper evidence for additional security, and is compatible with 9001-

5533 (33mm) and 9001-4138D (38mm) bottle finishes. In addition, the Sport Flip Top 38mm is claimed to be an ideal closure for active, on-the-go consumers of hot-filled non-carbonated beverages, such as juices, sports drinks and functional waters. Features include: one-hand opening for on-the-go convenience, dual tamper evidence for maximised security, and is compatible with the 38mm 1845 bottle finish.

New closure products from **Bericap** include the DIN 60 TAP, a safe, convenient and time-saving capping system for the industrial sector, offering a one-step tap application that avoids the need for tools and is highly consumer convenient. It is no longer necessary to remove the closure to apply the tap. The protective membrane breaks without falling into the filled product when the tap is applied. Since the closure does not come into contact with any other items like a drill, the closure and the filled product remain absolutely clean and hygienic.

The Bericap Ring Peel Liner is a new generation of induction heat seal discs, used in conjunction with IHS screw caps. Ring Peel Liner provides accurate IHS-weld seals on PE container necks. The design overcomes the problem of opening conventional seals - both the PE layer and the aluminium foil remain on the bottle neck when the closure is opened. This Ring Peel Liner is easy to tear off by lifting up a PE ring. A residual portion of the PE layer remains on the bottle neck as a gasket when the closure is applied again and works as a reliable reseal feature after first opening - while providing protection from leakage at the same time. Due to the easy tear-off,

no additional tool such as a screwdriver, key or knife is needed to remove the foil - and fingers keep clean. Both significantly improve user convenience.



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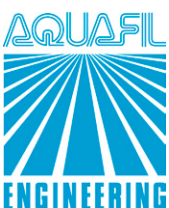
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Bauhaus and its lasting role in plastics design

On the 100th anniversary of the Bauhaus, the German institute that influenced the course of 20th century design, we look at how its legacy has been critical to plastics design. By David Eldridge

It has been 100 years since the Bauhaus art and design school opened its doors in Weimar, Germany. It only operated for the 14 years from 1919 to 1933, when it was closed after sustained opposition from the National Socialists had forced the institute to move to Dessau and then, briefly, to Berlin. But the influence of the Bauhaus has been far-reaching and continues to today in the disciplines of architecture and product design. Designers still acknowledge the debt they owe to the Bauhaus in the designs they create in furniture, homewares and other consumer products, in which the harmony of form and function is seen in characteristics such as clean lines and curves and simplicity of use. The Bauhaus teachers and students may not have used plastics in their work, but the ideas and aesthetics they espoused were vital to designers and company leaders during the rapid growth of plastics design and manufacturing that was to follow in the 1940s, 50s and 60s.

The **Staatliches Bauhaus** was founded by architect and designer Walter Gropius in the period immediately after the First World War when artists all across Europe were creating works that responded to the modern world. Expressionism and

Constructivism were two of the many movements in art that collectively have been labelled Modernism for their rejection of old styles and embrace of new trends and technology, such as mass production of cars. Gropius saw design as essentially a democratic practice, one that could serve the needs of society and was best executed by bringing together art, design, architecture and crafts in an all-encompassing education.

The Bauhaus style was developed from the idea that integration of form and function would answer society's needs in the buildings, furniture and utensils used by people in their everyday lives. In this concept, the Bauhaus was not the first group to react against the decorative styles of the 19th century. The Bauhaus style's absence of ornamentation, simplified forms and human-centred functionality were trends also followed, for example, by the **Deutscher Werkbund**, which predated the Bauhaus by a decade.

The Deutscher Werkbund was founded by a group of German designers, including Peter Behrens, who was appointed as AEG's first head of design in 1907. It was formed with an objective of helping Germany's economic competitiveness



Walter Gropius founded Bauhaus in April 1919 and was its director until 1928. The main image shows updated chairs designed by Charles Eames, one of the linking designers between Bauhaus and plastics design

The Bauhaus building
in Dessau, Germany



Right: Braun
S50 shaver
with plastics
body, 1950.
Photo: Cooper
Hewitt
collection,
Smithsonian
Design
Museum

Below: DAR
fibreglass
armchair, 1950,
designed by
Charles and
Ray Eames



PHOTO:
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through designing products that could be made using new methods of mass manufacturing. The Bauhaus approach also elevated the importance of manufacturing in the design process, leading to debates about craftsmanship versus mass production, individuality versus standardisation. Despite the manufactured appearance of furniture and objects designed at the Bauhaus, it was generally not successful in transferring hand-made versions to mass production. An exception was the tubular metal furniture designed by Marcel Breuer, including his famous cantilever chair made by Thonet from 1930/31.

By 1933 the Bauhaus was finished, and the plastics era had barely begun -- polyethylene was discovered in the same year by researchers working at Imperial Chemical Industries in the UK. But the dispersal of Bauhaus teachers and alumni to other European countries, and particularly to the USA, guaranteed that the ideas and aesthetics of the Bauhaus spread to other schools where they taught and where younger designers were eager to

implement the concept of Good Design in the blossoming manufacturing industries.

The advent of the Second World War slowed the growth of the consumer market for manufactured products, yet it was also the reason for the rapid scale-up of factories, and it demonstrated the usefulness of plastics in everything from nylon stockings to acrylic cockpit canopies. When the post-war recovery in the US led on to the country's consumer boom in the 1950s, industrial designers were ready to harness their designs to the new moulding possibilities of plastic materials and the mass manufacturing potential of



repurposed production lines. Furniture and housewares company **Herman Miller** was a leader in Modernist design in the US. The company worked with many gifted designers, most notably Charles Eames, who had first been exposed to the Bauhaus style during a visit to Europe in 1929.

Eames was enthusiastic in his use of exposed materials, such as plywood and metals, and in 1948 he turned to plastics, designing a fibreglass armchair with his wife Ray for the Museum of Modern Art's International Competition for Low-Cost Furniture Design. The armchair and its variants were among the first unlined plastic chairs to be mass manufactured. The polyester material reinforced with fiberglass had been developed by the US Army and the chairs were produced by Zenith Plastics using the latest machines, such as hydraulic press moulds from shipbuilding.

In Europe, too, plastics made a breakthrough in the post-war designs of many leading consumer goods companies. In Germany, **Braun** had been one of the first companies to use plastics to produce components, making radio dials and knobs in plastics in 1925. The company's manufacturing lines were redirected to Germany's military production in the Second World War, but when its factories were rebuilt after the war they resumed with electrical products. In 1950, it launched new products and appliances for the kitchen and home, such as the plastic-bodied S50 electric shaver. Erwin Braun (who led Braun with his brother Artur after the death of their father Max in 1951) developed the idea that the Modernist design ethic in furniture could be applied to household products and this would increase sales by making Braun products more desirable to consumers.

The man chosen to head Braun's design-led transformation was Fritz Eichler, who started the company's design department and created interdisciplinary teams that included advisers, designers and intellectuals. Braun also commissioned external designers, including Wilhelm Wagenfeld, who had studied at the Bauhaus, and Otl Eicher and Hans Gugelot, who taught at the Hochschule für Gestaltung in Ulm, established in 1953 as a successor institute to the Bauhaus.

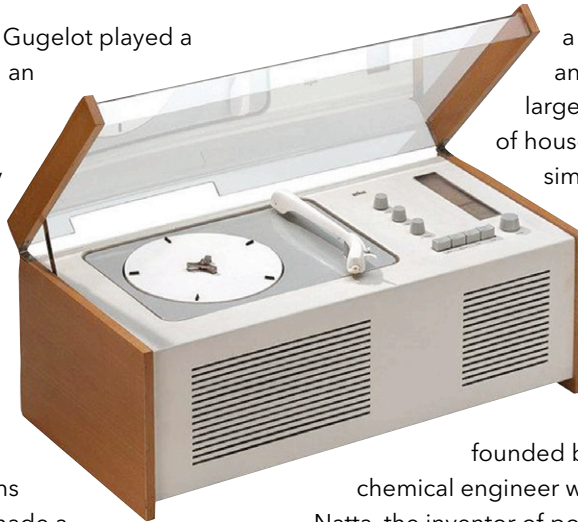
Braun says in its history: "With Eichler, Wagenfeld, Gugelot, and Aicher, Braun implemented its corporate vision of a wholly new language of design: working together, and in the space of just eight months, they developed what at the time was a radical new image for the company's entire

record player range. Hans Gugelot played a central role in this context; an exponent of functionalism and a pioneer of system design, he was particularly influential in developing Braun's new expression of form. His designs helped introduce cool and technical aesthetic forms to contemporary living rooms."

In 1955, a young architect called Dieter Rams joined Braun. He quickly made a name for himself in the company, collaborating in a more networked way with technicians. His design of the SK4 record player, with Gugelot, was the first milestone of Rams' long career with Braun. It was his idea to use acrylic for the lid of the SK4 player, which gained such wide attention that it was even given a nickname, "Snow White's Coffin." Braun says: "In a further development of the Bauhaus concept (and of the Ulm School of Design), Braun crucially influenced the concept of design at that time, and, in the process, established itself as an icon of industrial design."

Successively promoted at Braun, Rams was the flag-bearer for the company's design ethos throughout the 1960s and into the 70s. Carrying forward the functionalist design approach in Braun's product range, which expanded to include new technologies such as calculators in the 1970s, Rams became a hero for designers at the top of their profession today. Apple's Jonathan Ive is one of many designers who acknowledge the influence of Rams in their work.

Housewares made from injection moulded plastics became the ubiquitous exemplar of Modernist design in the homes of the 1950s. Tupperware had a headstart when it launched its bowls in the US in 1948, but European companies also won customers looking to modernise their homes as austerity gave way to growing spending ability. **Rosti** was a plastics injection moulding company founded in Denmark by Rolf Fahrenholtz and Stig Jørgensen which began making plastic buttons shortly after the war. Looking to leverage the design capabilities and lower production costs of injection moulding, Rosti expanded into production of mixing bowls and dinnerware. It commissioned Jacob Jensen (who later became a leading light at Bang & Olufsen) in this product area and, in 1954, Rosti launched his Margrethe melamine mixing bowl design. The design became



a plastics icon of the 1950s and Rosti went on to make large sales from whole ranges of housewares that used the same simple design language.

In Italy, another plastics company in the 1950s was discovering the appetite among consumers for well-designed plastics goods. **Kartell** was

founded by Giulio Castelli, a

chemical engineer who studied under Giulio Natta, the inventor of polypropylene. The company started producing a wide range of household utensils in injection moulded plastics, all of them showing Kartell's appreciation of the vibrant colours and sleek beauty that plastics could convey. The company commissioned a lot of leading Italian designers, including Joe Colombo, who pushed the boundaries of plastics engineering while working on designs for Kartell furniture in the 1960s. Colombo's 4860 Universale chair was the first adult chair to be completely made of plastics, and was first manufactured in ABS in 1968.

Kartell's love affair with plastic furniture has lasted a long time: its website currently has a [video](#) of the Mr. Impossible chair, designed by Philippe Starck, being injection moulded in two polycarbonate parts and then laser welded. Kartell explains its continuing use of plastics is driven not only by aesthetic possibilities but also by the innovation potential of plastic materials: "The ongoing evolution in the use of plastics and experimentation with new technologies and processes are fundamental for Kartell, which has always strived to

Left: Braun SK4 record player with acrylic lid, 1956, designed by Dieter Rams and Hans Gugelot



Left: Rosti Mepal's Margrethe mixing bowl is now injection moulded in PP. The original from the 1950s was made of melamine thermoset

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innovate its functional performance and the aesthetic qualities of its products. As a result of this ongoing research, all-new properties have been introduced to plastic, such as satin-finish, transparency, flexibility, resistance to atmospheric agents, softness and touch, and surprising and special colours. In addition to being practical and functional, Kartell plastic is also sensual and precious, and radically transforms the perception of a plastic product from a merely functional object to a veritable luxury item."

A winning attribute of plastics, lightness, was exploited by other corporations that became known for their desirable and functional designs in the 1950s and 1960s. Philips first established itself in the Netherlands as a manufacturer of lighting and other electrical products, but it was also the owner of the country's largest plastics factory. These two areas of expertise came together when the company began producing the Philips electric shaver. This was the starting point for **Philips** to design and manufacture all sorts of hand-held consumer electronic devices that benefited from housings and components made of lightweight plastics.

Robert Bosch also has a long history that started in electrical engineering and continues today with multinational businesses involved in the automotive and industrial equipment sectors. But it is the group's power tools business that is perhaps most prominent in the minds of consumers, associating the Bosch brand with green drills (blue for professional users) whose lightness, easy usability and great designs are made possible by plastics. The continuity of design in Bosch power tools is partly due to the company having worked for six decades with one industrial design group, **Teams Design**. Its founder, Hans Erich Slany, set up his design agency in 1956 near Bosch's headquarters in Stuttgart, Germany. Slany had previously gained expertise in power tools and household appliances, so he went to Bosch with his own ideas.

Teams Design explains: "Understanding the role of metal in the 1950s provides crucial historical context to Slany's story; during that time, metal was an essential building block for countless consumer products. Bosch produced the majority of their products with metal - including cooking utensils, umbrella frames, and power tools. Slany had the breakthrough idea to instead use a plastic casing for power tools - making them lighter, easier-to-use, and less likely to cause repetitive strain injuries. When Slany found that plastics could be engineered to be just as durable and heat-resistant

as metal, he approached Bosch with the game-changing idea. The new partnership led to the first generation of plastic power tools in the world."

Teams continues to design Bosch power tools that maintain the same identity through their design and easy functionality. In March, Bosch unveiled the new version of its top selling Ixo cordless power screwdriver. True to the Bosch design lineage, the new Ixo

retains its distinctive silhouette, but with a sleekness and lightness that embodies the Bauhaus ideal of harmony between form and function.

Modernism has been the subject of criticism from artists and social commentators since the 1960s. The Radical Design movement was formed in the late 1960s around a group of Italian artists, designers and architects who broke away from the dominant aesthetics of the time. And, again in Italy, arising in the early 1980s, the Memphis group was formed by Ettore Sottsass, previously a leading designer at Olivetti. Memphis designed furniture with a playful and colourful originality that was a clear break from modernism.

By the 1980s, concepts were gaining ground that are often grouped under the broad and unspecific term "Post-Modernism". Many people working in the visual and performance arts have embraced Post-Modernism. But in product design, the functionalist approach at the centre of modernism has been maintained. The notion of Good Design that was formulated in the 1950s continues to inform the work of leading designers. Individualism is also important, but the "signature" elements of a design (such as the design language of a brand) are still secondary to the functionalism evident in most successful products.

Left: The latest Bosch Ixo powered screwdriver was launched in April with a minimal and functional design



PHOTO: BOSCH

Below: Kartell's website has a video of the Mr. Impossible chair, designed by Philippe Starck, being injection moulded on a KraussMaffei machine



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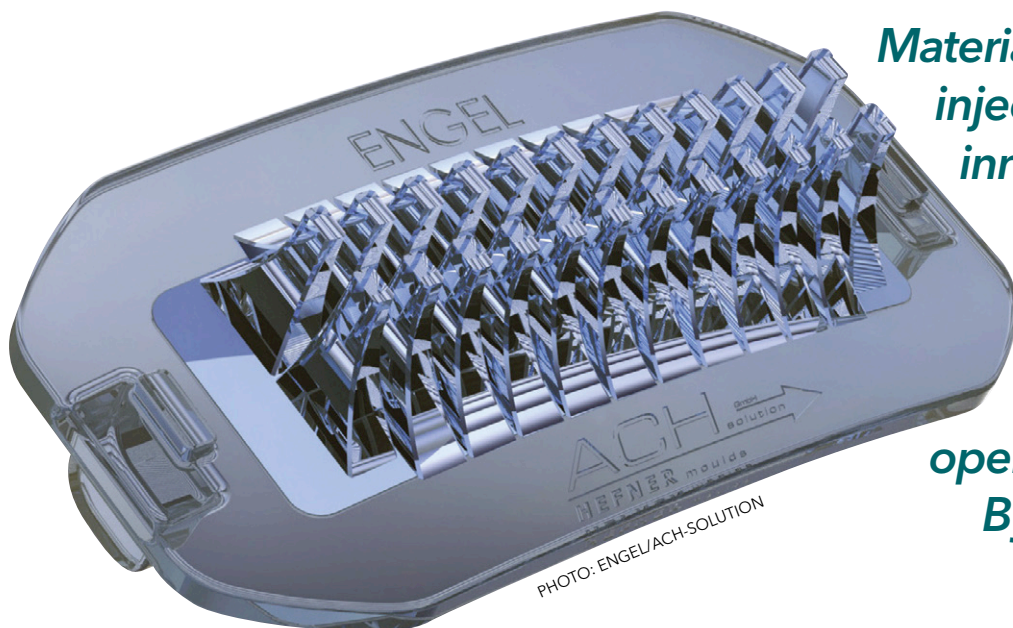
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Material suppliers for LSR injection moulding are innovating to remove extra steps from the process, and machines are being updated to open communications.
By Peter Mapleston

Finding a cure with liquid silicone rubbers

Liquid silicone rubber is on the move. This thermosetting polymer is already an interesting option for applications calling for flexibility, resistance to hot and cold, durability, transparency and purity. Now, material suppliers are introducing new systems that provide improved control over processing and properties, there are numerous options to choose from when it comes to mixing and dosing equipment to pair with injection moulding machines, and the increasing adoption of open communications protocols is helping simplify control of production systems.

Elkem Silicones has commercialized a completely new liquid silicone rubber system, called LSR Select, which works quite differently from traditional two-component systems. The company announced LSR Select several years ago, but began its market introduction in 2018. Silbione grade LSR Select is also available, for healthcare and medical applications.

Instead of A and B components, LSR Select works with a single standard base material to which are added the Cata platinum catalyst and "Control" curing additive at the processing machine. This is said to yield lower cycle times and curing temperatures. It also enables the use of one base material for diverse finished material characteristics.

"LSR Select is chemically equivalent to our

traditional two-component LSR formulations, taken apart and put back together in three components," says a representative. "The Control and Cata are unique masterbatches, which are the levers to adjust for desired cure kinetics, ease of processing and part performance."

Cycle times are generally reduced by 15-40%, and possibly by as much as 60%, depending on the part. The company cites one customer who was able to take a cycle time on a part from 50s with traditional 2K LSR at 135°C to just 25s with LSR Select at the same temperature.

Improved control over cure kinetics "helps reduce the risk of scorching and orange-peel effect from uneven temperature distribution, air entrapment, and flashing resulting in less reject rates and overall improved part appearance," the company claims.

In addition to controlling the part cure profile, LSR Select enables users to create custom durometer blends from 20 to 70 Shore A to achieve precise performance requirements, the company says.

"With LSR Select, customers can differentiate their offering – from productivity improvements in the range of 20 to 40%, to blending durometers for precise results, to low temperature cure for sensitive substrates," says Chris York, president Elkem Silicones USA. Systems can cure at tempera-

Main image:
With their complex structure, these silicone LED lenses place high demands on the injection moulding process

Right: Elkem demonstrated production of parts in its new LSR Select system at the Medical Design & Manufacturing (MD&M) West exhibition in Anaheim, CA, USA in February

tures as low as 80°C and possibly even lower, which can expand the range of applications and substrates in injection overmoulding. Some thermoplastics cannot be used with traditional LSRs, since they cannot withstand the curing temperature.

LSR Select materials are said to offer the same distinctive advantages of easy processing and release as the company's more conventional two-part LSR products.

Elkem says LSR Select "offers easy start up and shutdown, with no kit matching or off-ratio purging needed, resulting in a more efficient process with less waste."

Elkem has cooperated with dosing equipment producer **Elmet**, which now offers an optional hardware/software package for processing LSR Select on its existing Top 5000 P dosing systems. Elmet Sales Director Mark Ostermann says several companies are already using the equipment in the USA, and more in Europe are likely to start up soon.

The cooperation between Elkem and Elmet is non-exclusive, but Ostermann says that for the moment, Elmet is the only company offering a dosing system designed specifically for LSR Select. Elkem says it is working with several other dosing equipment suppliers to enable LSR Select readiness.

Another major LSR producer, **Wacker**, has been tackling the issue of post-cure. Articles made from conventional silicone rubber often do not meet legal requirements unless they have been post-cured in a heat treatment process, it says, but novel grades it introduced a couple of years ago eliminate



this laborious process step for many applications.

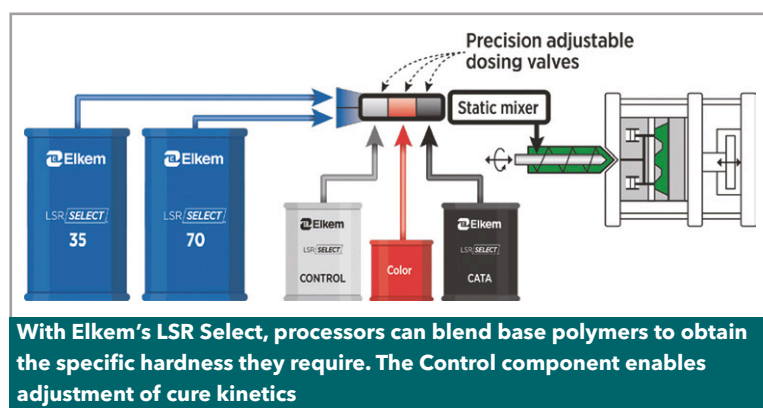
Post-cure, which needs to be performed on articles made from conventional liquid silicone rubber for use in the baby-care, food-contact and medical sectors for example, removes volatile or extractable residues from the elastomer. It involves putting parts in a well-ventilated oven at up to 200°C for several hours. The procedure is costly, time consuming and work-intensive, says Wacker.

Whereas injection moulding and packaging of the articles are fully automated steps with short cycle times, post-curing is still largely a manual process: filling and emptying of the post-curing oven is usually done by hand.

Wacker found a way to do without this process step. With Elastosil LR 5040 series grades, it says, articles show very good mechanical properties and comply with the regulatory standards relating to volatiles for sensitive applications (see also *Injection World* April 2018). The products are currently available in hardness levels between 30 and 70 Shore A, including a 45-Shore-A version suitable for numerous applications in the baby-care sector.

Wacker says the new liquid silicones' claim of being especially pure is also underlined by their optical appearance: they are translucent and have a delicate blue shimmer. Furthermore, the tendency to yellow, which occurs with some post-cured LSR articles during storage, has been reduced to a minimum.

The LRS 5040 LSR grades show good tear



Typical Properties	ASTM	LSR Select 20	LSR Select 35	LSR Select 50	LSR Select 70
Appearance	TP 038	Clear	Clear	Clear	Clear
Specific Gravity	TP 013	1.09	1.10	1.11	1.13
Durometer Hardness, Shore A	D2240	21	34	50	69
Tensile strength, N/mm ²	D412	8.9	8.1	8.5	7.8

Typical properties of Elkem's LSR Select grades incorporating 1% Control, press cured for five minutes at 177°C. The single-component base polymers are available in 20, 35, 50 and 70 Shore A hardnesses, and can be blended to achieve a custom formulation

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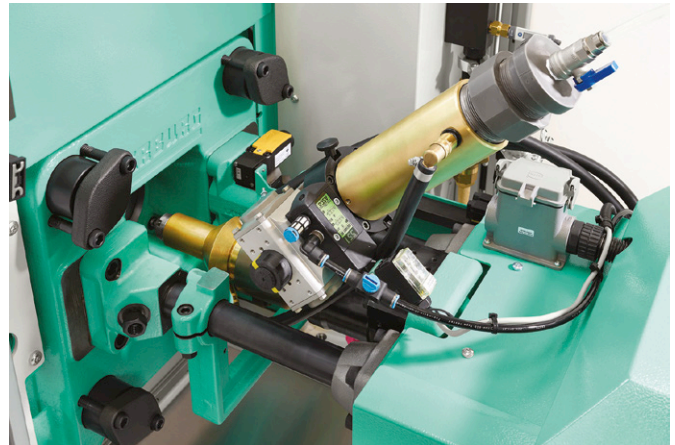
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A single slotted micro-dosing valve moulded by Arburg is made of post-curing-free LSR with a hardness of 50 Shore A weighs 0.038 g



On Arburg's new LSR micro injection unit, the LSR is premixed by means of a cartridge and injected with an 8mm screw, on a first-in-first-out basis

strength too. Parts return figures of up to 45 N/mm in the non-post cured state (as per ASTM D 624 B). Generally, conventional liquid silicone rubber only achieves such high values after post-curing, Wacker says.

For example, a cured rubber part made of Elastosil LR 3003 with a hardness of 50 Shore A has a tear strength of 24 N/mm without post cure. After four hours of post-curing at 200° C, the value increases to 30. The same silicone part made of Elastosil LR 5040 with the same hardness, on the other hand, achieves 40 N/mm even without any additional thermal treatment.

Thomas Siegel, an LSR expert in Application Technology Consulting at injection moulding machine maker **Arburg**, says the requirements for complete system solutions for processing LSRs are becoming more and more important. "Nowadays, customers want not only an injection moulding machine, but complete turnkey solutions," he says. "Arburg cooperates with several partners and is able to provide customised solutions."

Siegel also points out that LSR components, especially in medical technology, are becoming smaller and more demanding. "Therefore, the processing of micro components is an important field for further developments in the LSR sector."

He cites a new micro-production cell developed at Arburg that creates a flexible system solution for the precision manufacture of delicate LSR components. He notes that Arburg offers OPC UA communications solutions to integrate LSR dosing systems into its Selogica control system.

Arburg first presented its special LSR micro production cell at Fakuma 2018. At its heart is an electric Allrounder 270 A with a clamping force of 350 kN, equipped with a size 5 micro-injection unit and a four-cavity mould with a pneumatic needle-

type shut-off nozzle from Rico. It produced four elastic micro dosing valves weighing 0.038g each in a cycle time of around 20s.

The post-cure-free LSR is premixed using a 290mL cartridge. Its feed unit is contained in a cooled brass cylinder arranged at 45 degrees to the horizontal injection unit fitted with a special LSR screw with a self-closing 8mm diameter non-return valve. The liquid silicone is continuously fed forwards from the material inlet to the tip. "The first-in-first-out principle is fully implemented, which compensates for the disadvantage of pure piston injection," says Siegel.

Process reliability is ensured by a melt pressure sensor integrated in the feeder, which is visualised and monitored by Arburg's Selogica control system.

Also highlighting its expertise in production of very small LSR parts is **KraussMaffei**. It demonstrated its new PX 25-55 SilcoSet for LSR injection moulding at Fakuma. The 250kN unit is aimed at articles like precision components for clocks, gears and gearbox elements. At the show, it made a sealing ring with an intricate undercut and a weight of only 0.15g, in a cycle time of just 14s. To make this possible, KM developed a new plasticising process for a 12mm screw complemented with a spring-loaded check valve. Below the cantilever clamping unit there is space for the necessary vacuum pump or similar peripherals.

KraussMaffei Automation contributed the intricate precision grippers, which are required for the removal of the tiny components.

Dr. Boy demonstrated production of LSR seal rings at Fakuma, on a 10-tonne Boy XS, with the LSR being cured by ultraviolet radiation rather than heat, which it says can cause damage on some small parts.

With more elements from outside companies on

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LSR processing equipment than on regular thermoplastic processing machines, communications between different components are particularly important. Equipment companies are increasingly turning to OPC UA (Open Platform Communication Unified Architecture)

Above:
KraussMaffei's SilcoSet technology is designed for LSR injection moulding

to simplify data collection and control across diverse components in a system.

Elmet for example presented an OPC-UA interface for its Top 5000 P LSR dosing system at Fakuma 2018. It says this enables the system to communicate in real time with the injection moulding machine. At Arburg's 2019 Technology Days in March, two LSR applications illustrated OPC UA solutions that it offers for peripheral equipment.

An Arburg electric Allrounder 370 A produced flexible LSR name tags which were then personalised using a laser, while an electric Allrounder 470 A produced flexible baking tins. The LSR dosing systems - one from Reinhardt Technik, the other

from 2KM - were each integrated into the Selogica control system. This enabled relevant input parameters, exchange of material pressure, colour and additive settings as well as remaining run times all to be communicated transparently and conveniently.

Also highlighting the advantages brought by the use of OPC-UA communications in LSR moulding is **Wittmann Battenfeld**. It says it has made several enhancements to its LSR injection moulding equipment, including integration of the LSR dosing pump into the machine's control system via OPC-UA communication. Any commonly available LSR dosing and pumping system can now be connected to the machine controller via an OPC-UA interface, the company says.

The company has also revised the design of the screw, which now has a new seal at the end of the shaft in front of the screw coupling to reduce the risk of silicone leaking out towards the screw drive. The check valve now combines a larger flow cross-section with a faster and more precise closing mechanism. Wittmann Battenfeld says this has led to a significant improvement in shot weight precision.

At this year's Chinaplas in Guangzhou in May, the company plans to demonstrate an LSR applica-

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Right: An Engel viper 40 linear robot takes care of lens handling. It deposits two ready-for-installation lenses every 50 seconds

tion from the automotive sector on an all-electric *EcoPower 160/350* with 1,600 kN clamping force, equipped with LSR technology from Nexus, based in Austria. It says the design of the injection unit allows easy integration of the LSR feeding and blending elements.

The system will produce a connector seal using an LSR from Momentive, using a fully automatic 32-cavity mould equipped with an inspection system from Nexus. The mould features new cold runner technology with a needle shut-off control for moulds with large numbers of cavities, which Wittmann Battenfeld says is unique on the market. A gripper with a sensor system takes care of automatic part demoulding.

Engel says that lighting systems for automobiles, and with them the production processes, are continually being reinvented within short periods. "Large-scale production requires these innovative technologies to be implemented in a cost-effective way," it says, adding that LSR is therefore becoming increasingly important as a lens material. "In addition to very efficient processing in fully automated and rework-free injection moulding, it is the specific material properties that have shifted LSR into the product developer's focus."

At Fakuma last year Engel and two partners, mould maker **ACH-Solution** and **Dow Silicones**, presented what Engel called "an integrated solution for cost-effective production of LED lenses with a highly demanding geometry" for the first time in Europe.

Headlamp lenses are already being produced from LSR for some production models. LSR is also becoming increasingly important as a lens material for street and building lighting. Engel says that, just like established thermoplastic lens materials, acrylics (PMMA) and polycarbonate (PC), silicone offers significant weight savings compared to glass. However, LSR beats acrylic PMMA and PC in terms



of thermal and chemical resistance.

Highly transparent LSR grades have a lower yellowing index for example. They are extremely resistant to environmental influences such as UV radiation and can be used over a very wide temperature range from -40 to +200 °C. In addition, they allow particularly flexible design. "There are almost no limits with regard to geometry when processing LSR in injection moulding," says Engel.

The demonstration at Fakuma involved the use of Dowsil MS-1002, a material developed specifically for use on injection moulding machines. The curing speed has been optimised to obtain a smooth and very hard surface similar to thermoplastic. The LED lenses came out of the production cell ready for installation.

The tiebarless Engel e-victory 310/120 injection moulding machine used a two-cavity cold runner mould equipped with ACH's Servoshot electric cold runner nozzle control system, which enables individual control of each valve gate. The MaxiMix G2 LSR metering equipment was also developed and manufactured by ACH. A total shot weight of 16g was processed per cycle, in a time of around 50s. The entire process can be controlled via the CC300 operating panel of the Engel injection moulding machine.

Below: Arburg offers OPC UA solutions for peripheral equipment, even though standardisation according to Euromap 82.3 has not yet been finalised



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Single serve beverage capsules Market overview 2018

A compendium on innovation
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Gain a strong understanding of:

- Current trends in capsules development
- How many capsules will be filled by 2023 and what this means in material volume terms
- Which capsules systems will drive the demand and how this will impact the compatible offering?
- Which processing technologies are most suitable for future capsules specification and how this impacts material choice?
- The status of end-of-life options for capsules and how this impacts material choice?

FIND OUT MORE

A collage of various types of waste, including plastic bottles, crumpled paper, a blister pack of pills, and other debris, illustrating the concept of waste management. The collage is set against a dark blue background with a light blue diagonal line. The word "ers" is partially visible on the left side.

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- The logo for AMI Database, featuring the letters 'AMI' in a large, bold, blue font, with 'DATABASE' in a smaller, grey font below it. The logo is set against a white background within a computer monitor frame. To the right of the monitor is a stack of three silver, cylindrical database disks.

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Adding value to PP compounds

AMI's second Performance Polypropylene conference takes place in Cologne in Germany next month, providing an opportunity to learn more about the latest PP formulation and compounding developments

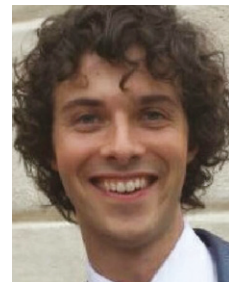
Following its successful launch last year, AMI's Performance Polypropylene conference returns to Cologne in Germany on 14-15 May for its second edition. Demand for engineered PP compounds is growing fast, especially from the automotive industry, but also in areas such as appliances, E&E and construction. And the requirements are set high - while the pressure is on to find lightweight metal replacements that is not at the price of mechanical performance, durability, processing and, of course, cost.

Performance Polypropylene 2019 will provide a timely technical forum that will bring together key players to analyse and discuss the latest formulations and applications for these high-performance PP products. It is expected to bring together a global audience - last year's launch event attracted attendees from more than 20 different countries and across the entire supply chain. The 2019 conference will provide a further opportunity to examine the latest advances in polypropylene resins and compounds for demanding technical applications across all markets. This article previews the event and takes a closer look at the international line-up of expert speakers and the topics that will be covered.

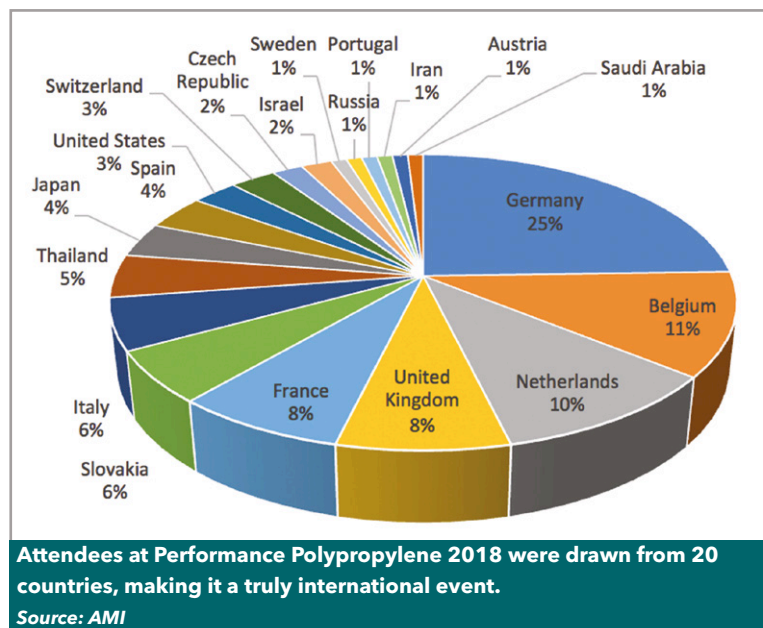
The opening session of the conference focuses

on automotive applications. **Matt Defosse**, Market Development Manager at **PolyOne** in Luxembourg, kicks off day one with an opening presentation looking at the effects of distracted drivers and rapid automotive industry change on creation of polypropylene parts for high quality car interiors. He will be followed by **Dr Nuria Garcia Batista**, Technical Researcher (Chemical Laboratory - Identification) at **AIMPLAS** in Spain, who will delve further into polypropylene inside the vehicle and discuss how to guarantee air quality in the passenger compartment. The session will be closed by **Dr Michele Grazzi**, Senior Scientist at **LyondellBasell** in Italy, who will look at the development of the

Main image:
Demand for high performance PP compounds is growing fast but there are many technical challenges to overcome



Industry experts sharing their views at Performance Polypropylene 2019 include (from left) PolyOne Market Development Manager Matt Defosse, Honda Senior Project Engineer Paul Vickers, and Electrolux Resins Commodity Manager Daniele Gallo



polypropylene building blocks that will serve technical compounders in the automotive industry.

The next session moves the focus on to modifying and enhancing the mechanical properties of polypropylene. **Dr Warren Ebenezer**, Research Manager for Polymer Applications at **SI Group**, will start the session with a presentation investigating novel antioxidant solutions for polypropylene requiring enhanced colour performance. **Dr Dimitrios G Papageorgiou**, Research Associate at the National Graphene Institute at the **University of Manchester**, then follows with an examination of hybrid, graphene-reinforced multifunctional polypropylene nanocomposites. Then **Dr Camillo Cardelli**, Chemist in the Materials Division at **IPOOL** in Italy, will present a new solution for halogen-free flame-retardant polypropylene compounds.

The flame retardant theme continues with a presentation on development of environmentally-friendly flame retardants for polyolefins by **Morteza Zare**, Senior Polymer Researcher in the Compounding Section at **Marun Petrochemical**

Company in Iran. And this session will be brought to a close with a look at the use of polypropylene and polyethylene as engineering materials by **Oscar Brocades Zaalberg**, Managing Director at **BPO BV** in the Netherlands.

Open discussion

Day One will be rounded off with an interactive panel discussion that will focus on the future of polypropylene and the latest developments and trends. Panellists include: **Dr Adam Galambos**, Director of Technology at **Washington Penn** in Slovakia; **Paul Vickers**, Senior Project Engineer at **Honda** in the UK; and **Daniele Gallo**, EU Chemicals and Resins Commodity Manager at **Electrolux** in Italy. Attendees will have the opportunity to join in the discussion by posing questions and engaging with panellists. The day will close with some informal networking over drinks and canapés.

Day Two opens with an insight into new applications. **Manfred Bachtrod**, Application Development Engineer at **Borealis** in Austria, will pose a highly topical challenge for the industry: How can we make appliances more sustainable? He will be followed by **Tim Vroman**, Technology Manager at **Beaulieu Fibres International** in Belgium, who will present details of a new generation of high tenacity polypropylene fibres for lightweight geotextiles.

Dr Robert Brüll, Group Manager, Material Analytics at **Fraunhofer LBF** in Germany opens the final session of the conference with an examination of how analytics can be used as a tool for development of high-performance polypropylene. He will be followed by **Dr Cornelia Tranninger**, Group Leader Flexible Polymers at **Borealis Polyolefin** in Austria, who will present an insight into some innovative polypropylene polymer developments based on non-phthalate Ziegler-Natta catalysts. And the conference will be brought to a close by **Marco Bernsdorf**, Business Development Manager of **Lotte Chemical**, who will detail some of the company's latest polypropylene projects.

About Performance Polypropylene 2019

AMI's second Performance Polypropylene will take place in Cologne in Germany on 14-15 May 2019. The event will provide insight into the latest developments across the PP compounds supply chain, addressing key technical challenges and identifying technological solutions to overcome them.

The conference will bring together expert speakers from across the globe with key technical and marketing personnel from the compounding industry and end user market sectors including automotive, appliances, electrical & electronic, and building and construction. Beyond the formal conference sessions, the event will provide plenty of informal networking breaks and complimentary cocktail reception.

To find out more about Performance Polypropylene 2019, visit the [conference website](#) or contact Conference Organiser Jasmine Coles. Tel: +44 (0) 117 314 8111; Email: Jasmine.Coles@ami.international



Injection moulders are increasingly turning to robots as technology improvements make them more easily reconfigurable and capable of co-working with humans. By Peter Mapleston

Automation: robots flex their muscles

The need for injection moulders around the world to automate operations has never been as great as it is today. Robots can improve reliability, repeatability and speed in production, and eventually have an important positive effect on the bottom line. And once one order has been completed, it is increasingly easy to reconfigure an automation system for the next one – thanks to the inherent versatility of the latest generations of robots, and to important improvements in communications between robots and injection moulding machines. The market is booming. Suppliers of automation solutions are reporting record sales, and the trend is likely to continue.

At **CBW Automation**, latest developments are mostly to do with flexibility. That's according to Taras Konowal, director of sales and marketing, North America, for moulds and robotics at CBW and its sister company **Müller Fabrique de Moules**. Both belong to Mold & Robotics Group,

based in Conthey, Switzerland.

"With packaging products changing so quickly, injection moulding companies don't know how long contracts will last," Konowal says. "So they need to be sure their automation can be quickly and easily adapted to new applications – for example so they can accommodate moulds with different levels of cavitation, moulds for containers rather than lids, and moulds where the robot is taking parts out of the fixed instead of the moving platen."

Konowal also points out that with the growing emphasis in the packaging world on sustainability, "people want lighter products, which can be injected faster – and this puts more pressure on automation."

CBW joined Mold & Robotics at the end of 2017, and Konowal says its integration into the group is going well. "The portfolio of CBW robots has been redesigned to better complement the Müller range," he says. "Work is continuing on developing

Main image:
Fanuc's robots
are used by UK
moulder
Advanced
Plastics



Above: Müller Fabrique de Moules is integrating the IML automation technology it has developed with sister company CBW Automation

a standardised platform.”

Konowal points out that Müller has historically taken a more modular approach than CBW in constructing automation systems, which has enabled it to standardise more of its components, and reduce lead times and costs. “CBW equipment was more customised for individual requirements,” he says. “In the past, CBW did lots of automation for applications such as case packing, bagging and assembly. The primary driver was to reduce labour costs, especially for customers using high-speed thin-wall injection moulding for containers and lids.

“This part of the business continues to grow, but the systems CBW now offers are modular. We aren’t customising as much anymore.”

Müller recently began transferring its technology and know-how in in-mould labelling (IML) systems to CBW. Konowal says this will help meet the growing demand among processors and end users for IML systems in North America. “There is strong growth for IML systems in North America and our customers are hungry for domestically produced systems that reduce shipping costs and deliver time-to-market benefits,” he says.

The flexibility theme is taken up by **Engel**, which at the Interplastica show in Moscow earlier this year presented a solution to process in-mould labels very economically, even in small lot sizes. It combined an E-motion 740/220 injection moulding machine equipped with a Viper 20 linear robot and an IML UniLine unit from TMA Automation. The viper robot removes the label from the IML cell, places it in the mould of the injection moulding machine, simultaneously removes the last moulded finished part and transfers it back to the UniLine for ejection.

Engel says that a standardised system concept makes the compact IML cell particularly easy to integrate. “Within a very short time, the injection moulding machine can be flexibly converted for other tasks – with or without in-mould labelling” says Olaf Kassek, Managing Director at Engel’s Russian subsidiary in Moscow. “We are thus also making IML

attractive for the general-purpose sector.”

ABB Robotics says its range of easy-to-use articulated six-axis robots are designed to increase flexibility and accessibility for plastic processors compared to the traditional 3-axis gantry robots. It cites an installation using ABB IRB 2600 robots at International Automotive Components’ factory in Skara, Sweden. IAC is the world’s third-largest automotive interior components manufacturer by market share. Its product range contains around 1,000 different items such as pillars, instrument panels, door panels, sill mouldings and luggage components.

The robots can automatically switch between grippers and programs when the injection moulding machine’s mould tool is changed. “The automation has reduced the time taken to make each change by a significant 10 minutes,” says a representative.

ABB also points to its FlexLoader FP100, which it says offers unmatched flexibility in handling components and improved reliability, due to its better tolerance. For example, when bowl-feeders rely on mechanical sorting only, the feeds need to be narrow to ensure a good flow. The FlexLoader on the other hand only needs to feed the parts to a belt and present them for a camera. Parts that cannot be recognised by the camera will be sent to a return-belt and back again for a retry, so the cell continues working.

While a bowl feeder is dedicated to only one type of part, the FlexLoader FP100 shifts between parts seamlessly, allowing operators to make different products on the same system, ABB notes. “This flexibility is especially critical in supporting manufacturers in the era of mass customisation who must make smaller lots of products in greater variety. The compact size of the FlexLoader FP100 makes it suitable for feeding or insert-applications when components such as clips, nuts, plates, etc. are loaded into the mould.”

Flexibility can also be achieved with collabora-

Right: Two ABB robots work together on clips assembly for automotive production





Left: Sepro showed its collaborative hybrid Seprobot at Fakuma 2018

tive robots – cobots – which are designed to work alongside humans. Their popularity is steadily expanding – even if one cobot pioneer, Rethink, has disappeared from the scene (its business was picked up last year by Hahn Automation). Oliver Selby, Technical Sales Engineer at **Fanuc UK**, says that over the past two decades, there has been a step-change in how cobots are implemented – as well as who is implementing them.

“Before introducing cobots onto a shop floor, it is important to check whether existing automation processes are compatible,” he says. “Anything that might present danger to a human, such as moving sharp or heavy objects, would not be suitable for collaborative automation.

“There are also additional safety factors to address during the risk-assessment stage. For example, a process that involves picking something up could cause serious injury if it failed, so a backup system would have to be installed in order to keep parts on the grippers.

“However, these should not detract from the many benefits of integrating collaborative robots into your production process. These include a reduced workload, less risk of injury due to repetitive motion or heavy-lifting, increased job satisfaction, better working conditions, and smoother processes.”

Another defining feature of working with cobots is the opportunity it presents to “upskill” employees, Selby says. Those working alongside the robots must be trained in safe operation and basic programming, which is often provided by the manufacturer. “This helps to alleviate concerns that a workforce may have over the introduction of automation, which will ultimately lead to a more productive manufacturing process.”

Claude Bernard, Product Marketing Director at major independent robot maker **Sepro**, puts cobots at the top of his list of current trends in the

market, with their capacity to provide what he calls smarter, more open automation.

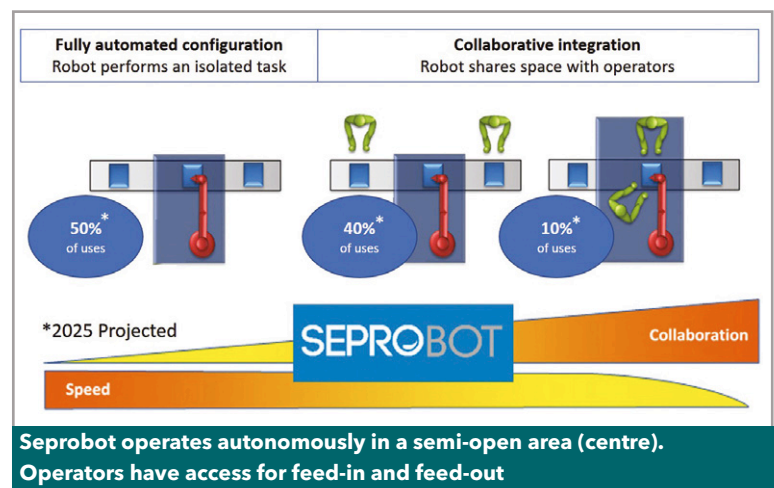
“Processors like cobots because they can be very portable and easy to set-up and operate,” he says. “However, they are limited in terms of speed, precision and payload and so the vast majority of plastics moulding applications will still need to rely on fully guarded robots. Cobots will not replace Cartesian and six-axis robots for the unloading of IMMs.”

The cobot concept is relevant, the business-model is the right one, says Bernard. “However, after a frenetic start-up phase, there needs to be a period of consolidation during which technology is more closely matched to industrial requirements. We are only at the beginning of this maturity phase.

“We believe cobots are relevant because they make it possible to design safe and open configurations for various processes such as peripheral operations or even advanced automation cells. They are portable, easy to deploy and easy to program and test. [But] cobots are limited in terms of speed and payload capacity compared to Cartesian and articulated-arm industrial robots.

“The vast majority of plastics moulding applications will need to rely on more conventional robots, but we at Sepro believe there is also room for a collaborative hybrid such as Seprobot, which we introduced at Fakuma 2018.”

A typical application would be one in which a human operator occasionally needs to move components or supplies into the robot operating zone or remove finished parts. The package combines a six-axis robot with guarding and what Bernard describes as a fully integrated human safety system. Although the robot operates in a guarded space, operators get safe access for feed-in and feed-out through openings protected by sensors, light curtains, or other safety devices. Most of the time, the robot operates at full speed, slowing down



Right: Input mask for SmartRemoval Move In on the Wittmann R9 robot control system

The screenshot displays the 'SmartRemoval' control interface for a Wittmann R9 robot. At the top, it shows 'SIMPLE-PICK-AND-PLACE.PRG' and 'MANUAL MODE'. The main area is divided into 'Move-In' and 'Move-Out' sections. Below this, the 'Axis sequence' is defined with 'First move' set to 'Y-Axis' and 'Second move' set to 'X-Axis'. The 'Takeout position' is set to Y-Axis: 1100.0 and X-Axis: 150.0. The 'Distance' parameter is ΔX: 0.0, with a note explaining it's the distance before the X-Takeout position. The 'Time' parameter is Δt: 0.0 s, with a note explaining it's the time before the takeout position is reached. At the bottom, a status bar shows '0126. SmartRemoval IN: Takeout position: Y: 1110.0 X: 150.0; ΔX: 0.0 R; Δt: 0.0 s' and includes 'Cancel' and 'OK' buttons.

or stopping only when humans enter the guarded space and returning to full speed when they depart. This enables the Seprobot to operate two to three times faster than a typical cobot.

For many years, the only communication between a robot and the moulding machine were the signals that coordinated their more-or-less independent motions. "If you wanted more integration than that, you had to buy a package from a supplier that sold both robot and IMM, with only one control," says Bernard. "Sepro has led the way towards greater interoperability by collaborating with many machine OEMs so that the robot can be directly linked to the IMM control to simply set-up and optimise cycle time. In the future, we believe open integration will be fully universal."

Back at CBW, Konowal also points out that in its main market, thin-wall packaging, leading producers of injection moulding machines now have control features that allow its robots to have dynamic entry into the mould space for safety reasons.

"Easy Package is the Sepro approach to open integration between robot and IMM, and it is still the easiest approach to integration in the plastic industry," claims Bernard. "Our customers can choose any press and any Sepro robot and we make them compatible. This includes integration of the robot controls into the IMM controls for simpler set up and operation."

Sepro already offers its customers more choice than any other supplier in the plastics industry, he claims. The company's numerous robotic solutions include those designed and built entirely by Sepro and others developed with outside partners like Stäubli, Yaskawa Motoman and Machines Pagès.

"At K 2019 we will be introducing new developments in five-axis robots, cobotics, open integration, and customer-centric solutions."

Reinhard Holzner is manager of project planning in the Automation and Periphery division at Engel, a leader in injection machines and automation. "At Engel, for a long time it has been a matter of course that within a production cell everyone 'talks' to everyone, and that all possible data are exchanged with each other," he says. "In the smart factory of the future, this networking will function across the entire machine pool, and, if necessary, even across several sites."

"To this end, OPC UA provides us with a very high-performance and above all secure communications model, and we are confident that it will establish itself as the standard in the plastics industry. In the Engel system solution, machine, robot, and peripherals all access a common database, which reduces the risk of errors and, above all, increases efficiency. For example, the early start of the robot can be very easily set via a standardised entry field in the CC300 display of the machine."

"Furthermore, our Easix articulated robots can

Star Automation puts EOATs online

No robot is complete without its End of Arm Tooling, or EOAT. The Eins division of **Star Automation** Europe recently launched a new e-commerce web site, www.eins1.eu, where users of Star robots can easily buy EOATs components and have them shipped within 24 hours. The online catalogue

features more than 1,300 products, including suction pads, grippers, cylinders, nippers, sensors, plates, fames and modules, quick-chuck changes. Star says that to get top performance levels, it has developed its Eins components with its own patented technologies and selected

top manufacturers like Vessel, SMC, and Omron "to bring to Europe renowned Japanese technology for elements such as blades, electronics, and metals". Components can be used on six-axis and Cartesian robots from all manufacturers.

➤ www.star-europe.com

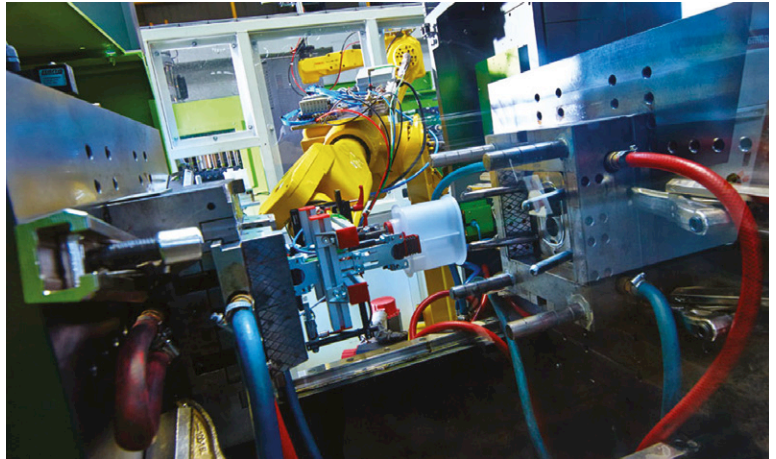
synchronise their movements with the movements within the mould, such as those of core pulls or ejectors. Engel Easix robots are currently the only ones on the market that do not require any additional, expensive hardware for this. Especially in large systems, this typically results in a significant reduction of cycle times and investment costs."

Wittmann, another company making injection machines and robots, says minimisation of unproductive downtimes is the only way to have the investment in the machine amortised in the shortest possible time. Its W8 and WX robot generations come with a function called SmartRemoval as standard; this automatically shortens the time required for parts removal from the mould area without any operator intervention.

The R8 and R9 robot control systems automatically calculate from the first cycle how long the mould opening movement will take. Then, in all subsequent parts removal processes, the system no longer waits for the complete opening of the moving mould half, but instead already starts to move the vertical axis of the robot beforehand. "At the moment when the mould is fully opened, the axis is already moving at an optimal speed and can be accelerated still further for the actual removal process inside the open mould area," says Wittmann. The synchronisation with the ejectors functions in a similar way.

Wittmann claims that in a program sequence with, say, a parts removal time of 1.0s, 0.2s can be saved by using a small robot from the W818 series. With larger models, a reduction of almost 30% in part removal time is possible.

The Arcelik Group, the third biggest manufac-



Above: Fanuc robot at work at Advanced Plastics

turer of major appliances in Europe, operates its most important washing machine production in Cayirova near Istanbul, Turkey. It makes 3.75 million appliances per year. Large components like two-part housings for the steel drums are made in filled polypropylene on MX injection moulding machines from **KraussMaffei**. A pick and place linear handler inserts metal bushes in the mould, which are initially insert moulded and to which a weight is subsequently screwed.

Arcelik manufactures 100 various housing types. KM says this rich variety as well as the necessary flexibility are one of several reasons for the company's interest in smart production; overall automation in the plant is 96%.

Advanced Plastics in the UK moulds a diverse range of products, from gas boiler front panels, to automotive interior, exterior and air filtration components. With customers including numerous blue-chip companies, and an impressive growth record, it says it owes a good part of its success to the adoption of the latest automated systems and robots - most of them from Fanuc; they include the M-10iA, M-20iC, M-6iB and R-2000 series. Advanced Plastics also uses Fanuc Roboshot injection moulding machines.

Advanced Plastics moulds more than 1,000 products on a single site. Each has its own robot programme, which Fanuc says are all easy to understand and maintain, with one employee operating up to six moulding machines at a time.



Above: At Arcelik Group, even the function check of the manufactured washing machine is largely automated. Only the control knobs are tested by people because machines may have difficulty assessing their haptics

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The Dryflex family of TPES from Hexpol TPE add soft touch appeal, function performance and product safety features in a range of consumer, automotive, industrial and packaging applications. Find out more in this brochure.

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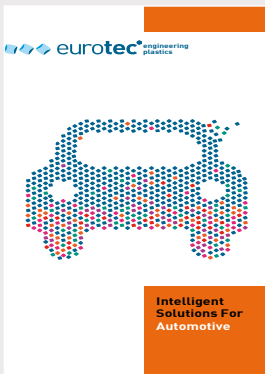
BOY: PROCAN ALPHA 4



Procan Alpha 4 is the new machine control from BOY with a fast and intuitive touchscreen operation. A more powerful CPU allows a 50% improvement in screen refresh times. Read more about Procan Alpha 4 in this brochure.

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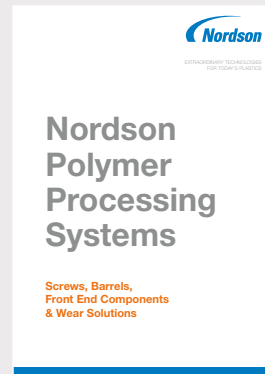
EUROTEC: AUTOMOTIVE COMPOUNDS



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

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NORDSON PROCESSING SYSTEMS



The plasticising components offered by Nordson for injection moulding include bi-metallic barrels, screws and FECs, as well as barrel coatings and wear solutions. Find out more in this brochure.

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

Optimise your industry knowledge with AMI's recommended databases

Injection Moulders in Italy



Get a key insight into the fragmented Italian market with managerial contact names, polymer consumption, market and machinery data for 1128 sites. Identify companies of interest for your business by receiving an updated overview on their production activities.

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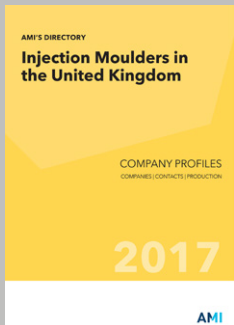
Injection Moulders in France



Get an updated picture on the injection moulding industry in France with instant access to 884 production sites. Get managerial contact names, polymer consumption, market and machinery data for each site. Access manufacturers supplying plastic products to the automotive, medical, building and packaging sectors amongst others.

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Injection Moulders in the United Kingdom



A complete and up-to-date picture of the injection moulding industry in the United Kingdom. Find out the polymers processed, the products manufactured and the number and size of machines operated by 904 injection moulding sites in the United Kingdom.

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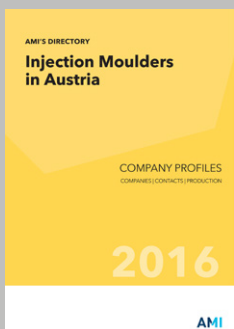
Injection Moulders in Spain and Portugal



A unique insight into the production of 1011 injection moulders in the Iberian peninsula. This directory gives you access to managerial contacts and production information on 790 manufacturing sites in Spain and 221 in Portugal serving a number of markets such as medical, automotive, electronics as well as food and non-food packaging.

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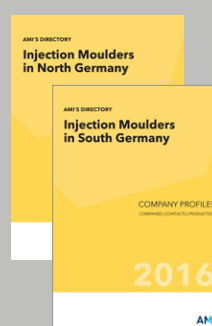
Injection Moulders in Austria



This directory identifies 189 injection moulders in Austria serving the electronic and electrical markets as well as other industry segments. The data is available in book format or as a database which enables you to search companies by polymers processed, markets served or number and make of machines operated.

[CLICK HERE](#)

Injection Moulders in Germany



Germany is the leading country for injection moulding in Europe. The company profiles of 2350 injection moulding sites in Germany reveal in-depth contact and production information. The data is available in book format in 2 volumes for the North and South of Germany, or as a single database which gives you extensive search capabilities.

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Learn more about AMI's upcoming conferences

Click on the relevant brochure cover or link to download a PDF of the full conference programme

PLASTICS RECYCLING WORLD EXPO



The Plastics Recycling World Expo, taking place in Cleveland, Ohio, on 8-9 May, includes a free-to-attend conference. The topics range from regulation and recycling rates to sorting, granulating and melt filtration.

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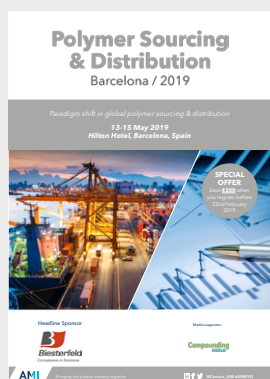
COMPOUNDING WORLD EXPO



The first US edition of Compounding World Expo takes place in Cleveland, Ohio, on 8-9 May. In the exhibition halls, visitors can attend two conference streams on compounding completely free of charge.

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POLYMER SOURCING & DISTRIBUTION



The 14th edition of AMI's Polymer Sourcing & Distribution conference will be held on 13-15 May 2019 in Barcelona, Spain. The event attracts attendees from across the plastics supply chain, from polymer producers and traders to processors and brand owners.

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PLASTIC CLOSURE INNOVATIONS



Now in its seventh year, AMI's Plastic Closure Innovations conference takes place in Barcelona in Spain on 3-5 June 2019. This leading meeting point for the European industry focuses on innovation in both food and non-food closure applications.

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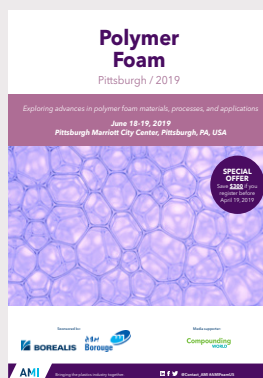
OIL & GAS POLYMER ENGINEERING US



Taking place in Houston on 4-5 June 2019, AMI's fifth US conference for oil and gas operators, contractors, equipment manufacturers and researchers will provide detailed insight into the formulation, qualification and use of O&G polymer products.

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POLYMER FOAM USA 2019



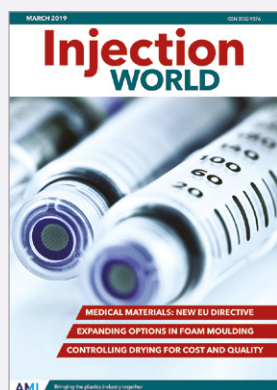
The seventh edition of AMI's Polymer Foam USA conference takes place on 18-19 June 2019 in Pittsburgh in the US. This international event examines the latest foaming technologies and applications in thermoplastics and elastomers.

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To see our full line-up of more than 50 plastics industry events over the next 12 months, please visit www.ami.international/events

Keep informed: read our latest editions

AMI publishes five process-specific FREE plastics industry magazines. Simply click on the cover below to read each magazine. Or download the issue in the relevant Apple or Android app



Injection World March 2019

The March edition of Injection World takes a close-up look at the latest medical materials and the new EU Medical Device Regulation. It also reviews developments in bioplastics, foam moulding and drying technology.

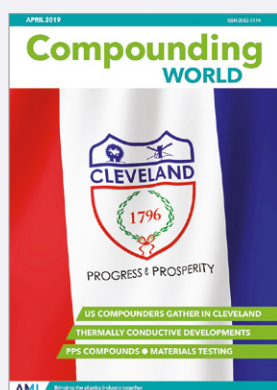
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Injection World January/February 2019

The January/February edition of Injection World magazine examines the role of designers and material producers in successful product developments. It also reviews innovations in polymer-metal hybrids and thin wall packaging.

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Compounding World April 2019

Compounding World's April issue contains an extensive preview of AMI's Compounding World Expo in Cleveland in May, covering all the exhibitors at this key event. Plus features on thermally conductive compounds, PPS materials, processing aids and materials testing equipment.

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Plastics Recycling World January/February 2019

The January/February 2019 edition of Plastics Recycling World looks at barriers to recycling flexible packaging and how they can be overcome. Plus, this edition reviews IV enhancement options for PET and the latest pelletising developments.

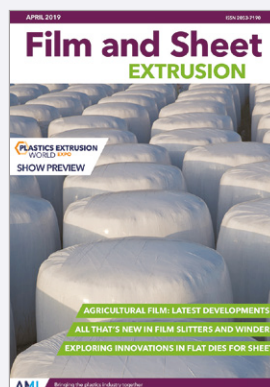
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Pipe and Profile April 2019

The April edition of Pipe and Profile Extrusion magazine looks at developments in pipe testing and regulation. It also explores the latest innovations in process control and material recycling and highlights some new PE100 resin applications.

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Film and Sheet April 2019

The April issue of Film and Sheet Extrusion looks forward to the exhibitors at AMI's Plastics Extrusion World Expo in the US next month. Features in the magazine cover agricultural film, flat dies and slitter-rewinders.

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Pipe and Profile
EXTRUSION

Injection
WORLD

Plastics Recycling
WORLD

GLOBAL EXHIBITION GUIDE

2019	8-9 May	Compounding World Expo, Cleveland, USA	www.compoundingworldexpo.com
	8-9 May	Extrusion Expo, Cleveland, USA	www.extrusion-expo.com
	8-9 May	Plastics Recycling World Expo, Cleveland, US	www.plasticsrecyclingworldexpo.com
	21-24 May	Chinaplas, Guangzhou, China	www.chinaplasonline.com
	21-24 May	Moulding Expo, Stuttgart, Germany	www.moulding-expo.com
	28-31 May	Plastpol, Kielce, Poland	www.targikielce.pl
	19-22 June	Interplas Thailand, Bangkok	www.interplasthailand.com
	18-21 September	T-Plas/Tiprex, Bangkok, Thailand	www.tplas.com
	16-23 October	K2019, Dusseldorf, Germany	www.k-online.com
	25-28 November	Plastivision Arabia, Sharjah	www.plastivision.ae
2020	27-29 November	Plastics & Rubber Vietnam	www.plasticsvietnam.com
	16-20 January	Plastivision India, Mumbai, India	www.plastivision.org
	21-23 January	Swiss Plastics, Lucerne, Switzerland	www.swissplastics-expo.ch
	7-13 May	Interpack, Dusseldorf, Germany	www.interpack.com
	13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de


AMI CONFERENCES

14-15 May 2019	Performance Polypropylene, Cologne, Germany
3-5 June 2019	Plastic Closure Innovations, Barcelona, Spain
4-5 June 2019	Oil & Gas Polymer Engineering, Houston, TX, US
4-5 June 2019	Compounding World Congress, Cologne, Germany
18-19 June 2019	Polymer Foam, Pittsburgh, PA, US
18-19 June 2019	Plastics Recycling Technology, Düsseldorf, Germany
18-19 June 2019	Performance Polyamides, Detroit, MI, US
18-19 June 2019	Thin Wall Packaging, Chicago, IL, US

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

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