

# Pipe and Profile **EXTRUSION**



**LATEST INNOVATIONS IN MULTI-LAYER PIPE**

**DEVELOPMENTS IN WOOD-PLASTIC COMPOSITES**

**PEX UPDATE ● EUROPEAN POLYMER DISTRIBUTION**

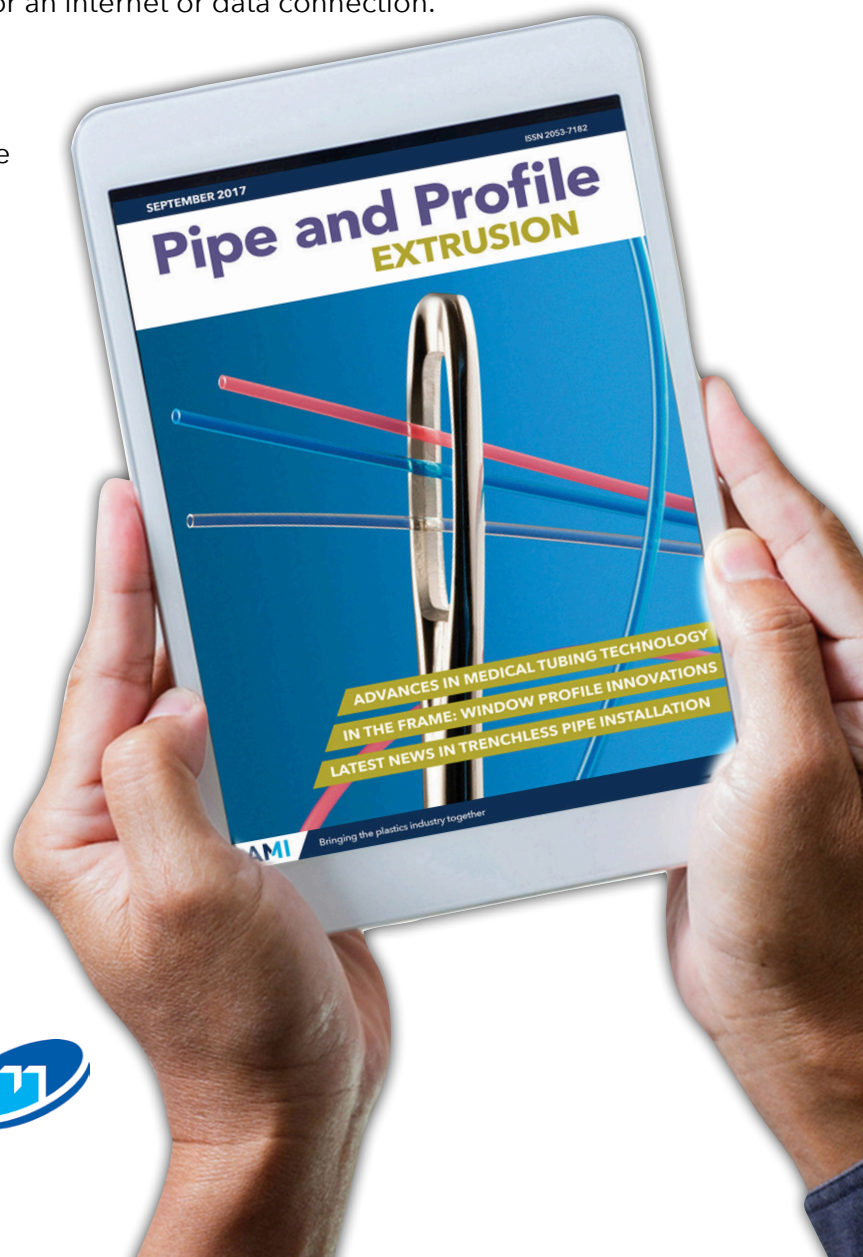
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# Pipe and Profile EXTRUSION

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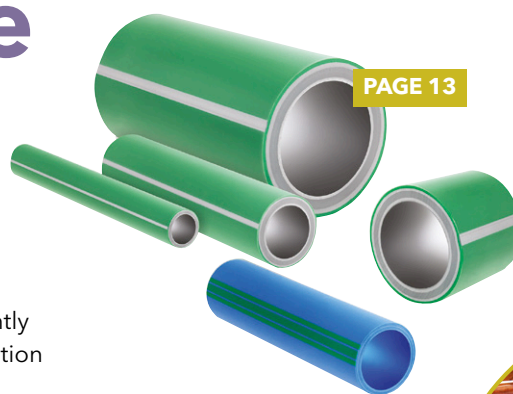
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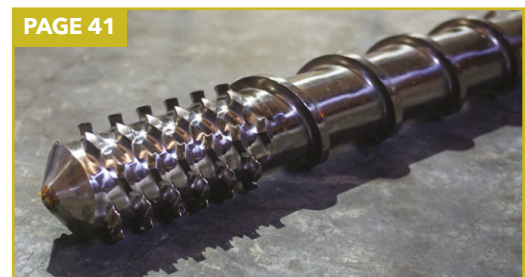
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# New rules allow more plastic for gas transport

The Pipeline and Hazardous Materials Safety Administration (PHMSA) – part of the US Department of Transportation – has amended its Federal Pipeline Safety Regulations for plastic piping systems used in the transportation of natural or other gas.

The update – known as a Final Rule – is intended to improve safety and allow for greater use of plastic pipe in this area.

"Advances in plastic pipe design and manufacturing

have resulted in products that are much safer today than they were 20 years ago," said PHMSA administrator Skip Elliott. "These regulatory updates will significantly contribute to advancing public safety."

The updates take into account the changing technologies and issues affecting plastic pipe. They address concerns with installation and operational safety issues associated with plastic pipe, as observed by

federal and state inspectors during routine field activities, he said.

Additionally, several industry petitions received by PHMSA requested that the agency consider regulatory updates for plastic pipe that align with new innovations in manufacturing and design, as well as current best practices in plastic pipe installation.

The Final Rule will only apply to new, repaired and replaced pipelines. Updates include: an increased design factor for polyethylene pipe; and updated standards governing the pipelines made of polyamide 11 and 12.

As a result, the cost of materials to make new pipe is estimated to be reduced by 10 percent, resulting in an annual material cost savings of approximately \$32 million for transmission, gathering, and distribution operators, said PHMSA.

➤ <http://phmsa.dot.gov>



US authorities have changed the rules regarding the use of plastics in gas pipelines

PHOTO: SHUTTERSTOCK

## 'Mistrial' in JM Eagle case

Jurors in the long-running JM Eagle 'whistleblower' case – in which the pipe maker was found guilty of supplying sub-standard products – have been unable to agree that plaintiffs suffered any damage. As a consequence, the court has declared a mistrial.

Earlier, the presiding judge had ruled that plaintiffs could not seek damages for the cost of removing and replacing the installed pipes – but only the difference between what they paid and what the pipes were worth. On this basis, the plaintiffs argued that the pipes

were worthless – and asked for \$2.1m (the amount they had originally paid).

It was the jury's inability to agree on an amount of compensation that led to the deadlock, and the mistrial.

As well as the five 'exemplar plaintiffs' who took part in the trial, more than 50 others – most of them local water authorities – were also involved.

Despite the current deadlock, the case is not over. A status conference is scheduled for 29 November.

➤ <http://www.jmeagle.com>

## NEWS IN BRIEF...

**Nupi Americas**, a subsidiary of Italy-based Nupi Industrie Italiane, is investing US\$6.2m to expand its manufacturing and distribution facility in Hampton County, South Carolina. Here, it makes its Niron product line – a complete polypropylene pipe and fitting system for distributing hot and cold water in plumbing and air conditioning systems. Nupi will build a new, 50,000 sq ft warehousing facility to mirror its existing facility and allow for better integration of its manufacturing operations. Within two years, Nupi Americas will be able to manufacture 95% of the pipes it sells in the US, avoiding long import lead times from Europe, said Marco Genoni, CEO.

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

**Wincore Window**, a US-based manufacturer of vinyl windows and fibre-glass entry door systems, is to create 150 new jobs – and invest US\$6.5 million – in a new manufacturing facility in Swainsboro, Georgia. Its products include new and retrofit vinyl windows and sliding patio doors, as well as impact-resistant vinyl windows specifically designed for coastal areas. It currently employs 340 people nationwide, and is scheduled to begin operations at the new 75,000 sq ft facility in Swainsboro in April 2019.

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

# Italian machinery imports on the rise in first half of 2018

Italian imports of plastics and rubber processing machinery grew by 23% in the first half of 2018 compared to the same period last year while exports edged only fractionally up.

This meant the trade balance fell by 7% and is attributed to "the lacklustre performance heralded in the early months of the year", according to the country's plastics and rubber machinery trade association Amaplast.

The plastics machinery industry was still over €1bn in the black in total, but €14m in the red for injection moulding machinery. "The dynamism of purchases from abroad may be interpreted as renewed faith in the domestic market, mainly due to investment

incentives that are likely to be renewed and naturally hoped for by businesses in the industry," Amaplast said in its analysis.

Strongest growing import sectors included injection moulding machines (+31%), blow moulding machines (+75%), flexographic printers (+111%) and

moulds (+12%). This was driven mainly by strong demand from the packaging sector, which grew by 14% last year and has continued on a strong growth path in 2018.

Amaplast said Germany remains the largest exporter of plastics machinery to Italy and widened its lead over

China in the first half of 2018.

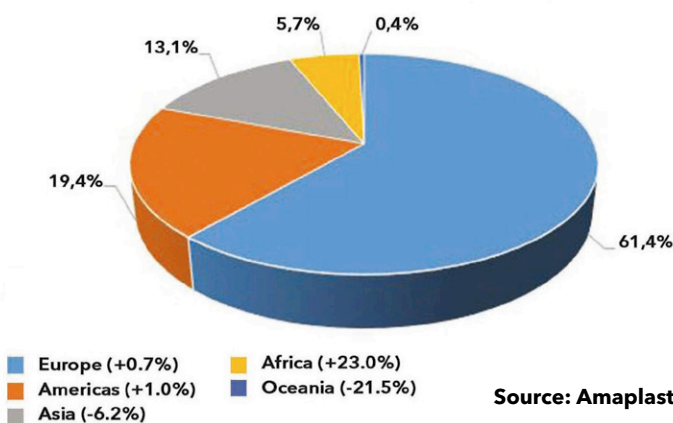
Europe remains the largest export market for Italy's plastics machinery firms, accounting for 61% of the total, although export sales were static year-on-year. The NAFTA countries were in second place and saw a 7% increase in sales. Russia, which had a very strong 2017, saw a major decline.

Sales to Asia, Oceania and the rest of Latin America were down.

According to Amaplast president Alessandro Grassi, its members' July order books were stable to slightly up on both June 2018 and July 2017. "This gives us reason to hope for a rebound in production and exports in the last quarter of the year," he said.

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

**Italian plastics machinery exports by destination  
(% share and Δ% H1 2018/H1 2017)**



## Euromap working group drafts standards for networking of extrusion machinery

Euromap has published draft standards governing the networking of extrusion machinery.

The Euromap 84 working group deals with the standardization of OPC UA based interfaces for extrusion. Experts from 10 European extruders and extrusion line manufacturers are working with control systems manufacturers and MES suppliers on standardised information models to allow extrusion lines to be networked to central computers/MES.

They also allow networking within the extrusion line itself. As with all

Euromap recommendations, they are manufacturer-neutral.

First, basic specifications will be made, then the extrusion line will be modelled as a whole. This helps to control overall production (such as throughput, product quality and energy consumption). For managing production jobs, a new concept was needed because the existing model - for injection moulding - could not be transferred to extrusion.

Next, the various components of an extrusion line will be examined separately to record all important process

parameters.

The drafts of seven parts - which includes haul-offs, melt pumps and filters, in addition to extruders and extrusion lines - have now been published.

They will be validated in test implementations before being published as final versions.

Additional parts for further components of an extrusion line are in preparation, says Euromap.

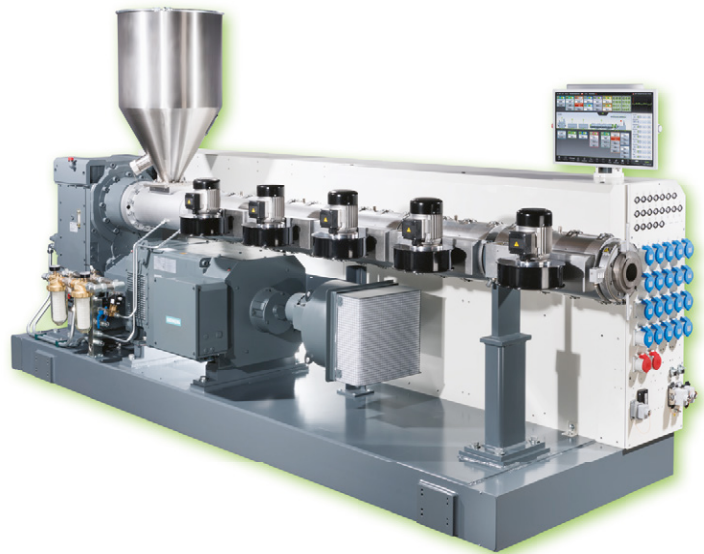
The drafts are available on Euromap's website.

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# Free registration opens for plastics extrusion exhibition and conferences

Free online registration has now opened for the first Plastics Extrusion World Expo 2019, which will be held at the Huntington Convention Center in downtown Cleveland, Ohio on 8-9 May 2019.

Organised by AMI, the tradeshow will take place alongside the Plastics Recycling World Expo and the Compounding World Expo.

By registering in advance, visitors will receive free admission to all three exhibitions, featuring more than 200 leading suppliers, plus free entry to five conference theatres hosting technical presentations, educational seminars and business debates. Attendees and exhibitors will also have the option to buy tickets (just \$20 each) for a networking party at Cleveland's iconic Rock and Roll Hall of Fame on the evening of May 8.

"The event will provide visitors with a great opportu-



nity to meet and compare suppliers from around the world, as well as giving them the chance to learn from business leaders and technical experts in the conference theatres," said Rita Andrews, head of exhibitions at AMI. "Our debut compounding and recycling exhibitions in Essen, Germany attracted 4,024 visitors, and we are confident that our first Cleveland shows will build on this success and be the biggest plastics industry gathering in the USA in 2019."

The three expos, which

will occupy the two largest halls at the state-of-the-art Huntington Convention Center, will feature a wide array of leading manufacturers of extrusion, compounding and recycling equipment, plus suppliers of a huge variety of polymers, additives and related services.

The exhibitor line-up already includes companies such as Davis-Standard, Clariant, Reifenhäuser, Milliken, Cloeren, Heritage Plastics, Maguire, Nordson, Addex, Bausano, Chemours, Starlinger, Dr Collin, Maag, Gneuss, Advanced Blending

Systems, KraussMaffei Berstorff, Bandera, Wacker, Colines, Lanier Color, Macchi, Alpha Marathon, Coperion, Polyfill, NFM, Labtech Engineering and over 120 additional leading suppliers.

The limited number of remaining booths are being filled on a daily basis. To find out more about exhibiting at the expos, visit <https://www.ami.international/exhibitions>.

The Plastics Extrusion World Expo will include separate conference theatres hosted by AMI's Pipe and Profile Extrusion and Film and Sheet Extrusion magazines, ensuring that all aspects and applications of extrusion are addressed. They will feature more than 50 expert speakers covering the latest technology developments, market trends, and business issues.

To book your free ticket, which is valid for both days of the event, visit: **[ami.ltd/Register-PEWE](https://www.ami.ltd/register-PEWE)**

## Polypipe posts 10-month growth above 4%

UK-based Polypipe says it has seen a 4% increase in sales for the 10-month period to October – and more than 10% growth for the latest four-month period.

In a trading update, the company – which makes plastic piping and ventilation systems – said it made sales of nearly £366m (US\$469m) in the first 10 months of this year, which was 4.1% higher than the corresponding period in 2017.

In the last four months, sales

increased by 10.2% – which the company says was driven by continued strong demand from new housebuild, and an element of catch-up after the disruption caused by bad weather at the start of this year. Strong organic growth in residential systems, and an improvement in the commercial and infrastructure segment, also contributed to the growth.

The figures have been adjusted to account for the disposal of Polypipe's France business – and the acquisitions

of Permavoid and Manthorpe Building Products – earlier this year.

Second half margins are expected to be higher than last year, due to improved profitability in the Middle East, said Polypipe.

"We continue to deliver strong organic growth ahead of the overall UK construction market and are well placed to achieve the board's expectations for the full year," said Martin Payne, CEO.

➤ **[www.polypipe.com](https://www.polypipe.com)**



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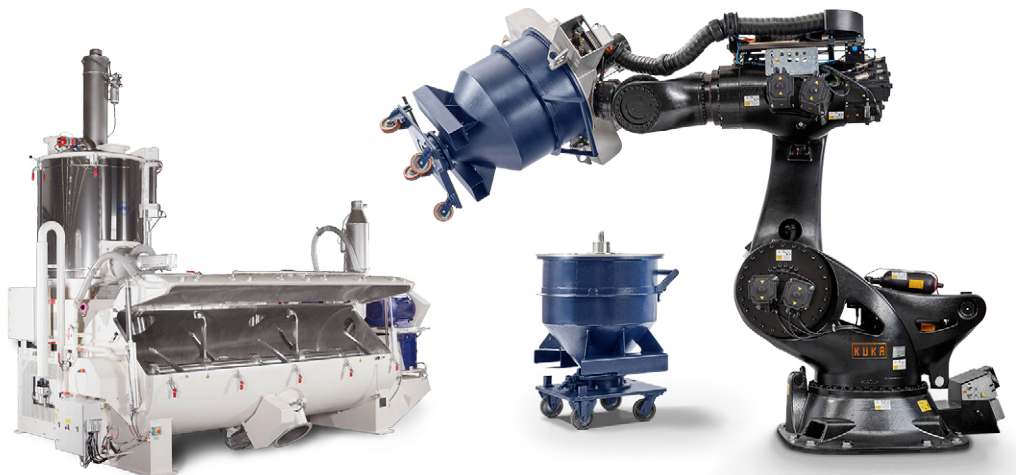
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# USA keeps strong plastics trade links with its nearest neighbours



**Pineda: "Plastics industry global trade volume increased 9.5% in 2017, by our estimates"**

The USA's closest neighbours – Canada and Mexico – remained its largest trading partners in plastics last year, despite the uncertainty of the renegotiation of the North American Free Trade Agreement (NAFTA) in 2017.

In its annual Global Trends report, the Plastics Industry Association released figures for the whole of 2017 – which it says "paints a complex and ultimately positive portrait of the US plastics industry".

"The report shows that the US plastics industry continues to innovate its way into new applications and

new markets," said William Carteau, the organisation's president and CEO.

The report showed that US plastics companies exported \$15.7 billion to Mexico and \$12.5 billion to Canada in 2017. The US also maintained the largest trade surplus – \$10.6bn – with Mexico, as it did in 2016.

Overall, while the US plastics industry trade surplus decreased by nearly 40% in 2017 – from \$4.8bn in 2016 to \$2.9bn in 2017 – demand was up across the board: apparent consumption of plastics industry

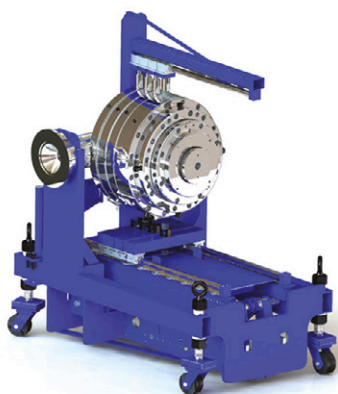
goods increased by 6% in 2017, which outpaced growth in US plastics industry shipments overall. The decline in the industry's trade surplus was driven by a 9.3% increase in imports.

Perc Pineda, chief economist at the organisation, said: "A shrinking trade surplus in this instance shows how in-demand the products and services of plastics are in the US. Our estimates show that in 2017 the plastics industry global trade volume increased 9.5% from 2016."

➤ [www.plasticsindustry.org](http://www.plasticsindustry.org)

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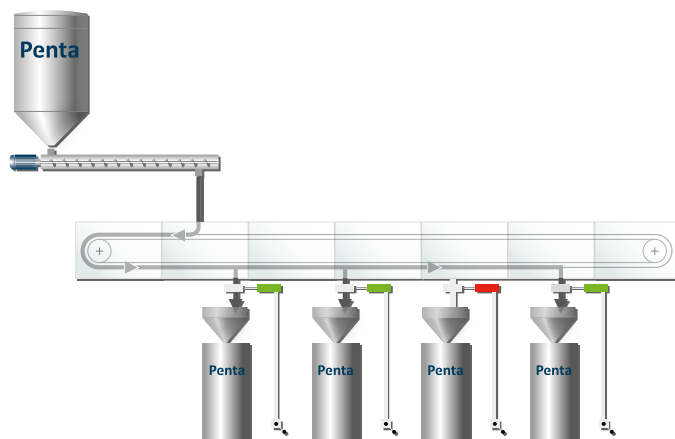


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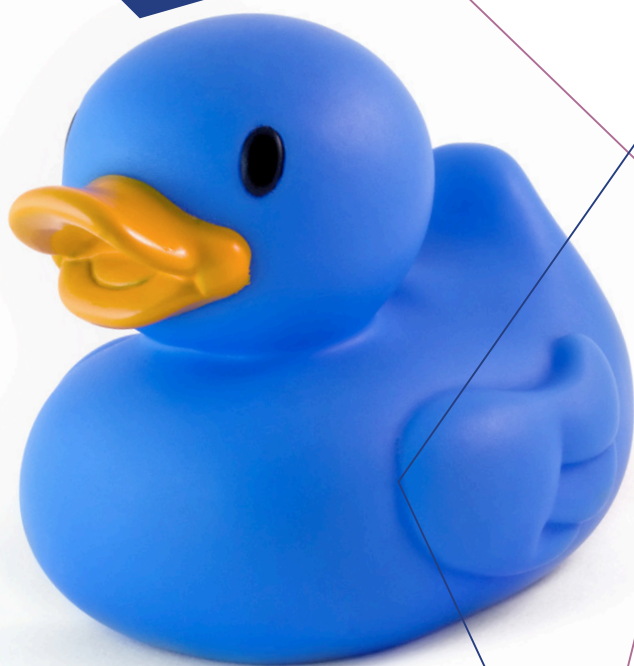


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# Tooling up for multiple layers

*The latest multi-layer pipe dies can make products more efficiently and flexibly – while future designs may even allow the incorporation of ‘layer multiplication’ principles.*  
**Lou Reade reports**

One critical element of making multi-layer pipe is tooling – and a number of research teams (both academic and commercial) are leading the charge to develop tools that could be used to make enhanced pipe designs.

Researchers at **Case Western Reserve University** in the USA recently developed a new type of extrusion die to create pipe and tubing with multiple layers.

Tyler Schneider, a postgraduate researcher in the department of macromolecular science and engineering, told delegates at this year’s Antec conference: “It is capable of producing layer structures of tens to thousands of layers, achieving layer thicknesses from millimetres to tens of nanometres.”

Layer multiplication co-extrusion can produce melt structures of high layer numbers with low layer thicknesses. This can boost properties such as barrier and impact strength. To date, the process has largely been limited to the production of multi-layer films.

“If the output could be that of an annular shape, the technology could be used to improve barriers properties in tubing and piping, or produce film-foam tubing and piping, for

insulation applications,” said Schneider.

The researchers have now produced and validated a die to produce annular structures.

Multi-layer pipes are typically made using crosshead dies to apply layers to an already formed – and partially solidified – annular structure in a downstream process.

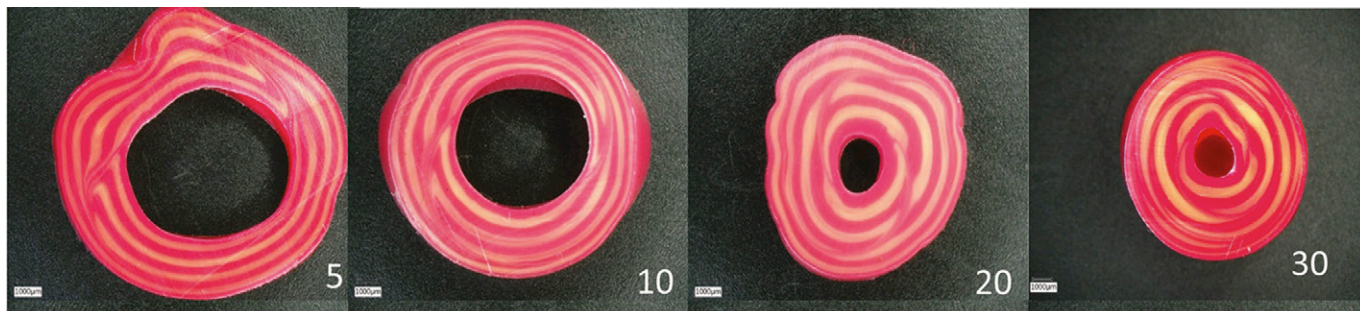
“Imagine the drastic process length increase that would be needed to produce a tube with 1,000 plus layers,” said Schneider.

The researchers used a multilayer co-extrusion line – comprising two Killion single screw extruders, a 9-layer feed block, high aspect ratio multiplying dies and a custom-designed tubing die. Extruded samples were sheared off the die face with a brass bar and allowed to cool in a water bath prior to cutting for imaging. In runs incorporating angular rotation, a custom-designed annular die land was used, along with an electric motor for rotation control.

The die design was validated by extruding a layered Dow 5004I LDPE system (in two different colours) into 9-, 33-, and 129-layer structures. The die was attached to a high aspect ratio multiplier – functioning as an adapter – and the 9-layer feed block. The two different materials enter the feed block flow paths and split into sub-flow paths of

**Main image:**  
**Muna Noor’s Omanplast pipe has multiple layers to protect it from damage in stony soil**





**Above: Case Western has developed a die that could apply 'layer multiplication' to pipes**

either four or five layers. These layers then intermesh and contract to the correct size, before being combined into a single multi-layered melt structure.

Increasing the number of layers was achieved by incorporating more multipliers between the feed block and tubing die. In the case of 33 layers, three multipliers were used. In the case of 129 layers, five multipliers were used.

The extruded product - which was not round due to a lack of post-processing equipment - was viewed using optical microscopy. Results confirmed that layer multiplication co-extrusion could be applied to pipe co-extrusion.

There were two main issues of the layered tubing: one was the presence of weld lines where the layered flows meet to form the annular shape; the other was the slightly irregular nature of the layering near the weld lines. These were solved to some extent by building a new angular land that could rotate.

"Future work will study the weld line strength within different material systems extruded with this technology," said Schneider.

### Radial design

**Tecnomatic** of Italy recently delivered a multi-purpose extrusion line to make five-layer polybutene and PEX pipe to a leading European producer.

A key component of the line was an optimised

version of its Athena die-head. Based on a radial distributor design, the product has been modified to enhance the flexibility and accuracy of its distribution - which is especially important to shape the EVOH and adhesive into a very thin and uniform layers, says the company.

The radial distributors do not have any dead zones, which allows for easy cleaning and fast assembly and disassembly. Radial spirals allow low pressure losses and high flexibility in terms of layers structure (thick or thin layers) and number of layers, while their short flow path leads to reduced residence time and rapid material and colour changes, says Tecnomatic.

The line produces pipe in sizes from 8 to 32mm. It has an output of up to 50 m/min for the five-layer PEX or PE-RT pipe (for diameters of 16mm), and up to 40 m/min for most polybutene pipe diameters.

The line configuration includes an Atlas 60.30 as the main extruder - in a gearless version, to reduce maintenance and optimise energy consumption - while Mizar and Atlas 30 co-extruders are used for adhesive, EVOH and external layers. All extruders work in synchronisation mode and are integrated and fed by multi-component gravimetric systems. Ultrasonic wall thickness and eccentricity scanners continuously control all pipe parameters during the production.

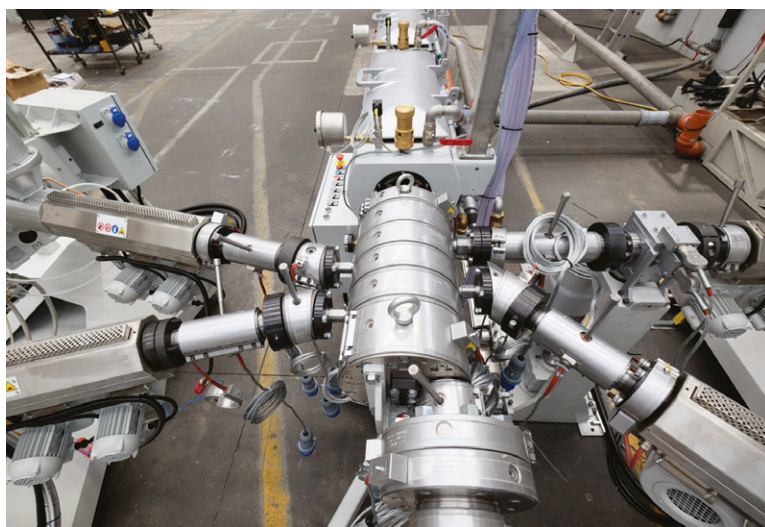
Advantages of the Athena die-head include:

- Short flow paths and low melt volume, for a short residence time;
- Rapid material colour changes;
- Optimal melt flow and layer uniformity; and,
- High flexibility in terms of layer structure (thick or thin layers and materials).

By using a co-rotating twin-screw extruder, a second downstream production process can be eliminated, saving on energy costs and handling. Two single-screw extruders are used for the thin internal and external layers, while the die-head can process up to 1200 kg/h in diameters of 200mm.

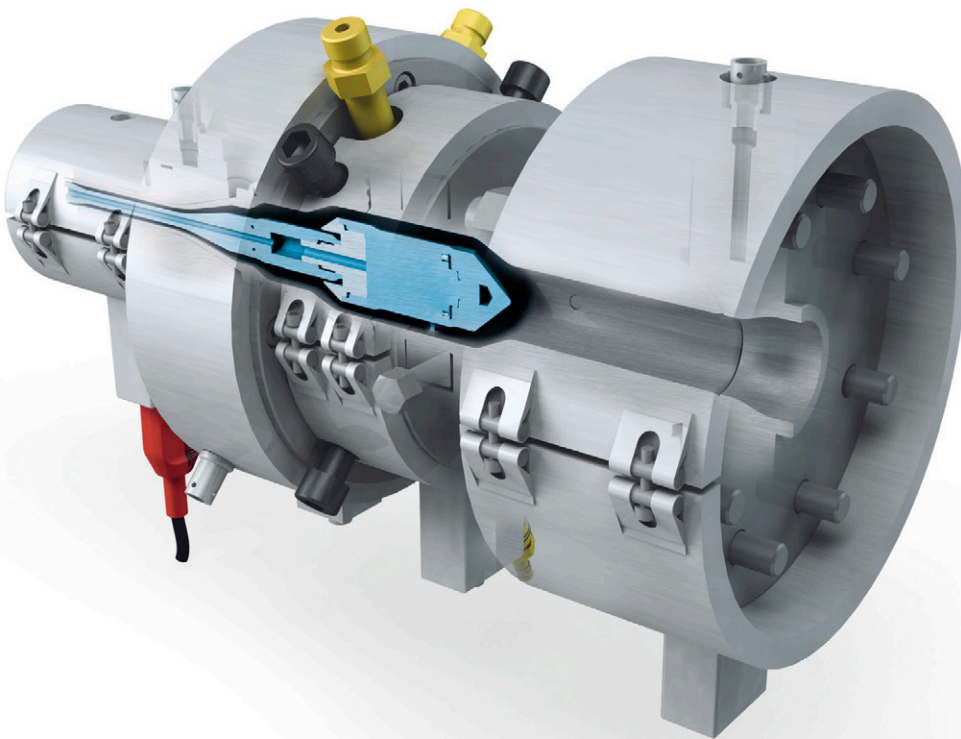
It is based on three-spiral geometry, with the inner one modified for a filled PP material, to ensure high melt flow. The die-head, despite the high output to be managed, is compact and has a contained

**Below: Tecnomatic recently supplied an extrusion line to make five-layer polybutene and PEX pipe**



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**Right:**  
**Conextru's PO 4 315 multi-layer pipe head is flexible to produce a wide range of multi-layer structures from many different materials**

pressure build-up. The low pressure also resulted in a lower increase of the melt temperature, to boost pipe quality.

### Flexibility boost

**Conextru** of Austria has designed a pipe head system that can be used for a wide range of multi-layer structures – and many different materials.

“Usually, a multilayer head is designed for a certain pipe structure and is used only for this,” said Josef Dobrowsky, managing director of Conextru.

The company's PO 4 315 multi-layer pipe head uses a series of adapter blocks to add flexibility to the design. This allows it to make a range of structures – such as A/A/A, A/B/A, A/A/B, A/D/C and C/A/B (where A is PE or PP, B is recycled PE or PP, C is PA, PVDF or PET, and D is adhesive).

An important requirement for flexibility is that the position of each extruder remains the same for all pipe structures. Only a short longitudinal movement of a few centimetres is allowed – for mounting to the head. The extruders must have this flexibility in terms of processing different polymers without changing screw. The extruders are optimised for that by focusing on a wide processing range rather than high output.

The system has an adapter block between the multi spiral channel head and the extruder, which brings the melt of each extruder to the correct distributor of the head. The adapter block works like a feedblock, bringing the melt A from extruder A to

the inner, middle or outer layer – depending on the product being made.

If the layer structure needs to be changed (to switch to making a new product, for instance) then the correct adapter block has to be mounted between the head and the extruder. The multilayer head has four different spiral distributors, which are optimised for melt distribution of low viscosity polymers such as PVDF, PA, EVOH and adhesive – as well as for high viscosity materials like PE 100 RC types or PP high modulus types.

High shear stress – and high flow speed differences at the border between two layers – must be avoided to

prevent flow anomalies, says Dobrowsky. Flow anomalies are visible as waves or shown by penetration of polymer B into Polymer A.

### Hybrid efficiency

**Guill Tool** says that a new version of its 800 series of extrusion tooling – known as 800 series Hybrid – offers a number of benefits in applications that typically use crossheads and inlines.

In some typical applications, layers of the same material are applied multiple times with a single die. This method is used to reduce

the chance of errors caused by gels breaking through a thin wall, weld lines,

inconsistent wall thickness, plus material and process variations. Other errors include difficult-to-process materials and demanding applications where there is zero fault tolerance.

The 800 series Hybrid was designed to overcome these problems. Its efficient design reduces cost and size, compared to other methods of overlapping layers, says Guill.

The main benefits include: eliminating weld lines in materials through patented overlapping technology, resulting in a more consistent finished product; reduced sensitivity to changes in viscosity; reduced sensitivity to changes in line speed; many material and multi-layer application possibilities; the ability to work in all tubing and jacketing applications with a wide range of materials; low residence time; compact design; and a low tolerance stack-up error factor.

Overall, the main benefit is an improvement in concentricity, says the company.

The new tool reduces stagnation, because overlapping layers are more inherently balanced than single layers and also because each semi-deflector is ‘tuned to flush’, says Guill.

### PP benefits

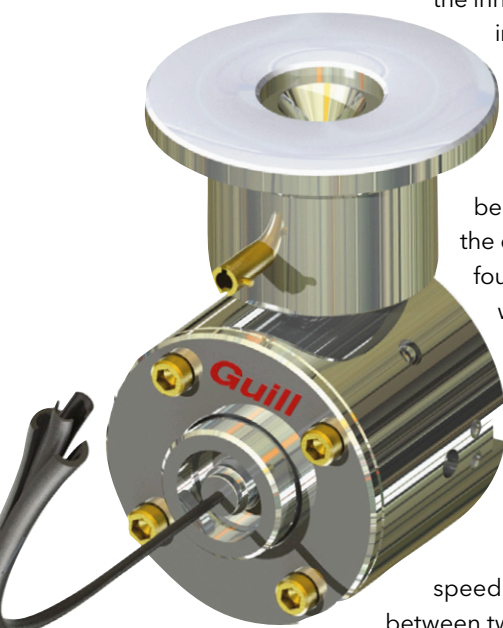
**KraussMaffei Berstorff** has helped German plastic pipes manufacturer Poloplast develop a special concept for manufacturing five-layer PP-R pipes with fibreglass reinforcement.

The system was commissioned at Poloplast's plant in Bavaria. Poloplast has received product approval and authorisation to produce the pipes for drinking water and air-conditioning systems (for the diameter range 32–250mm).

“In a challenging development process that

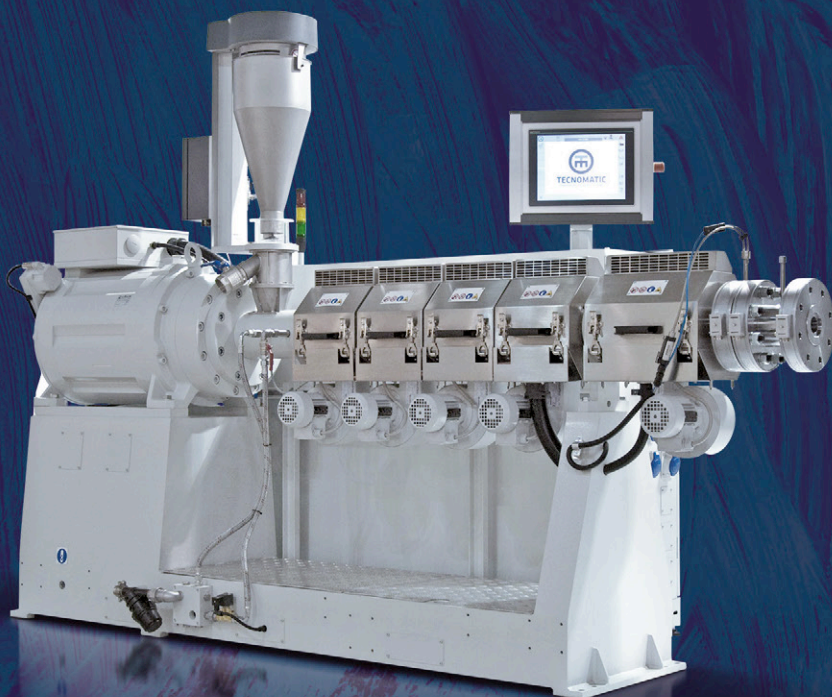


**Below: Guill Tool's 800 series Hybrid claims to have an efficient design that reduces cost and size, compared to other methods of overlapping layers**





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Energy efficiency criteria is a crucial issue across manufacturing industries. Pipe extrusion is an energy consumption intensive process and its optimisation while maintaining melt stability is necessary in order to produce good quality product at low unit cost. Tecnomatic, with the new extruder series Zephyr, has made of this the utmost priority offering increased screw length (40 L/D) and smaller torque AC water cooled motors to assure same output of bigger machines and unprecedented energy saving.

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**Right:**  
**KraussMaffei**  
**Berstorff**  
**helped**  
**Poloplast**  
**develop a**  
**special concept**  
**for five-layer**  
**PP-R pipes with**  
**fibreglass**  
**reinforcement**

involved various tests and a wide range of providers, KraussMaffei Berstorff impressed us the most," said David Zovkic, head of production at Poloplast. "The pipe head concept meets our high standards for material composition and quality."

Part of the development was to redesign the spiral distributor system design in order to meet the requirements for the thickness of the individual layers, according to Andreas Kessler, general sales manager for KraussMaffei Berstorff in Munich. The extruder/pipe head combination has been designed to save a lot of space.

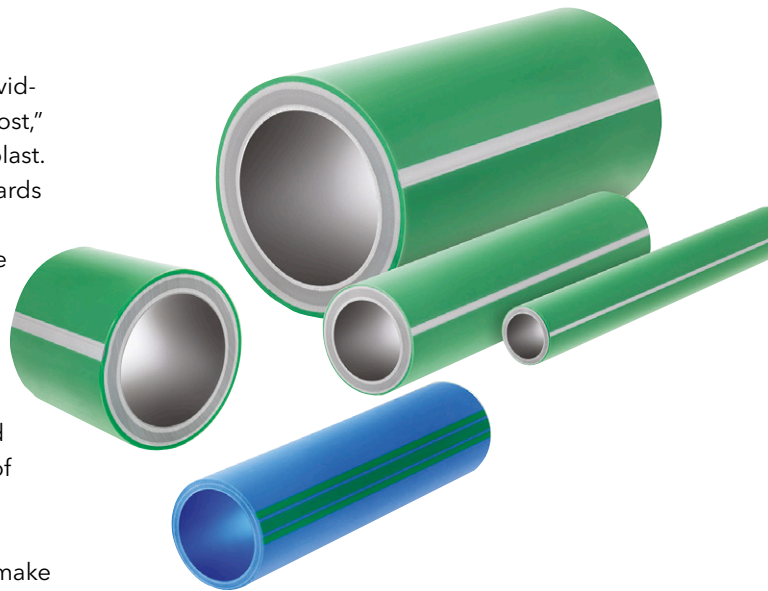
The KME 45-30 B/R main extruder, which features the KM-5L RKW 94-250 pipe head to make the PP-R intermediate layer, is surrounded by four co-extruders from the same series, plus a KME 20-25 B/R co-extruder for applying strips. This allows the machine operator to control and monitor production from a central position. The pipe head has energy-efficient internal pipe cooling (IPC), which ensures precise heat balance for thick-walled pipes.

PP-R pipes with fibreglass reinforcement offer low elongation and bending. This gives them much higher stiffness. The pipes are often installed so that they are exposed under suspended ceilings – especially in public buildings, says the company.

### Learning from nature

Copying natural multi-layer structures such as seashells and deep-sea sponges could help pipe extruders to develop tougher multi-layer pipe.

Researchers at the **University of Leoben** in Austria have incorporated soft polymer interlayers

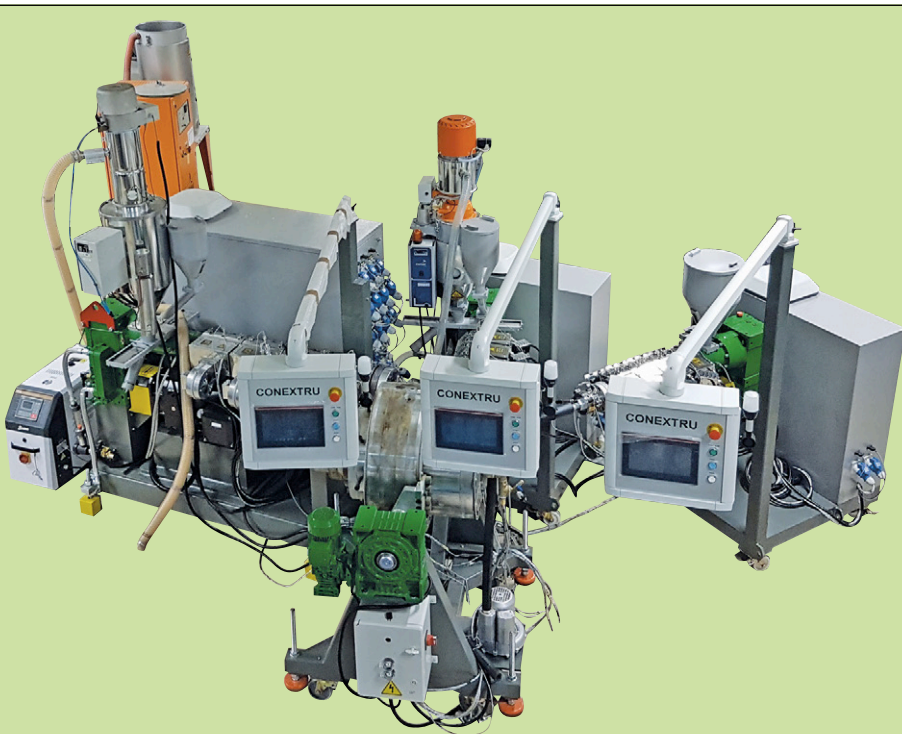


into multi-layer pipe structure, to act as 'crack arresters'. These softer layers sit between stiffer, more brittle layers and have helped to increase fracture toughness.

"The layered structure of deep-sea sponge serves as an idea giver for future multi-layered pipe wall design," said Gerald Pinter, chair of materials science and polymer testing at the university. "This marine animal has developed a skeleton that combines high stiffness with high fracture toughness by using soft protein layers inside a brittle bio-glass matrix. However, the question remains, whether these principles can be adapted for engineering materials."

A similar structure is seen in nacre – which is 90% calcium carbonate, but having interlayers of soft, tough protein to improve its overall toughness.

Rather than extrude complete pipes, the researchers made co-extruded platelets in their preliminary studies. The material structure alter-



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# Offering damage resistance in stony soils

**Muna Noor** says that its latest generation of multi-layer HDPE pipe is ideal for the poor, stony soils found in Gulf countries – which can produce high stresses in the pipe wall when sharp objects press on the buried pipe. Omanplast multi-layer pipe is produced under technology licence from Wavin Overseas.

The challenge, says the company, was to develop a pressure pipe whose service life would not be affected by outside damage such as scoring and

point loads. The latter are increasingly likely when new installation techniques (such as trenchless applications) are used. To meet the challenge, the company developed three-layer HDPE pipe with inner and outer protection layers. The middle layer is black PE100, while the outer layer is a special PE100RC material that prevents stress-crack propagation when sharp objects press on the outer layer.

Multi-layer HDPE pipe can also be lined with an abrasion-resistant inner

layer for moving materials such as mining slurry or pumping sands during dredging operations.

Omanplast pipe can be used in a range of applications, including the supply of drinking water and gas – especially for trenchless applications and installations using the native soil as backfill. It can also be used for sewer applications. The pipes are available in various pressure classes and colour configurations in lengths of 18m or coiled on reels in continuous lengths.

nated a typical mineral-reinforced polyolefin with a softer polyolefin. This soft interlayer helped to boost toughness by inhibiting crack propagation in multi-layered structures.

This opens up several possibilities for future pipe designs, he said. For example, filler content in the stiff layers could be further increased – as the loss in toughness would be offset by the soft interlayers. Also, the boost to toughness might also allow more recycled material to be used, without any loss in performance.

## Recyclate in pipe

Scientists at the **Institute of Physics of Materials (IPM)** in Brno in the Czech Republic have studied how recycled material might be used in multi-layer pipe – including pressure pipe. The work involved simulating crack propagation in several different configurations.

Recycling of polymer material for pipes has become an important issue: the European Plastic Pipes & Fittings Association (Tepfpa) has committed to use 250,000 tonnes of recycled material by the year 2020, for instance – and EU initiatives will force more virgin material to be replaced by recyclate. According to current regulations, recycling is not allowed at all for pressure piping systems.

“One way of applying recycled material possible to pressure pipe systems would be to use it in multi-layer pipes,” said Pavel Hutar, deputy research group leader at IPM, in a paper at this year’s PPXIX conference. “Co-extruded multilayer pipes – with an inner layer of recycled material – can have similar durability to conventional pipes.”

The team used linear elastic fracture mechanics to estimate the lifetime of multi-layer pipes containing both virgin and recycled PE, consider-

ing several possibilities of crack propagation. Crack growth rate was measured using a cracked round bar (CRB) test for several material grades (including recyclate). At the same time, a finite element model (FEM) of the multi-layer pipe was created to calculate stress intensity factors for elliptical cracks propagating through the pipe wall.

One test showed that, if a pressure pipe were made only of recycled material, its performance would be insufficient – and had lower calculated lifetimes than PE100 or PE100-RC pipes.

However, in a second test – on multi-layer pipe in which the crack propagates in the inner layer made of virgin PE – showed that recycled PE in a multi-layer structure did not significantly lower lifetime, which was only slightly below that of ‘all virgin’ pipe.

Slow crack propagation through recycled material is much faster than it is through virgin materials, so crack initiation in the middle (recycled) layer was also investigated – and found to have lower quality. Changing the thickness of this layer did not significantly influence the estimated lifetime.

Overall, the calculations showed “a promising potential” of using recyclate within multi-layer pressure pipes, said the researchers.

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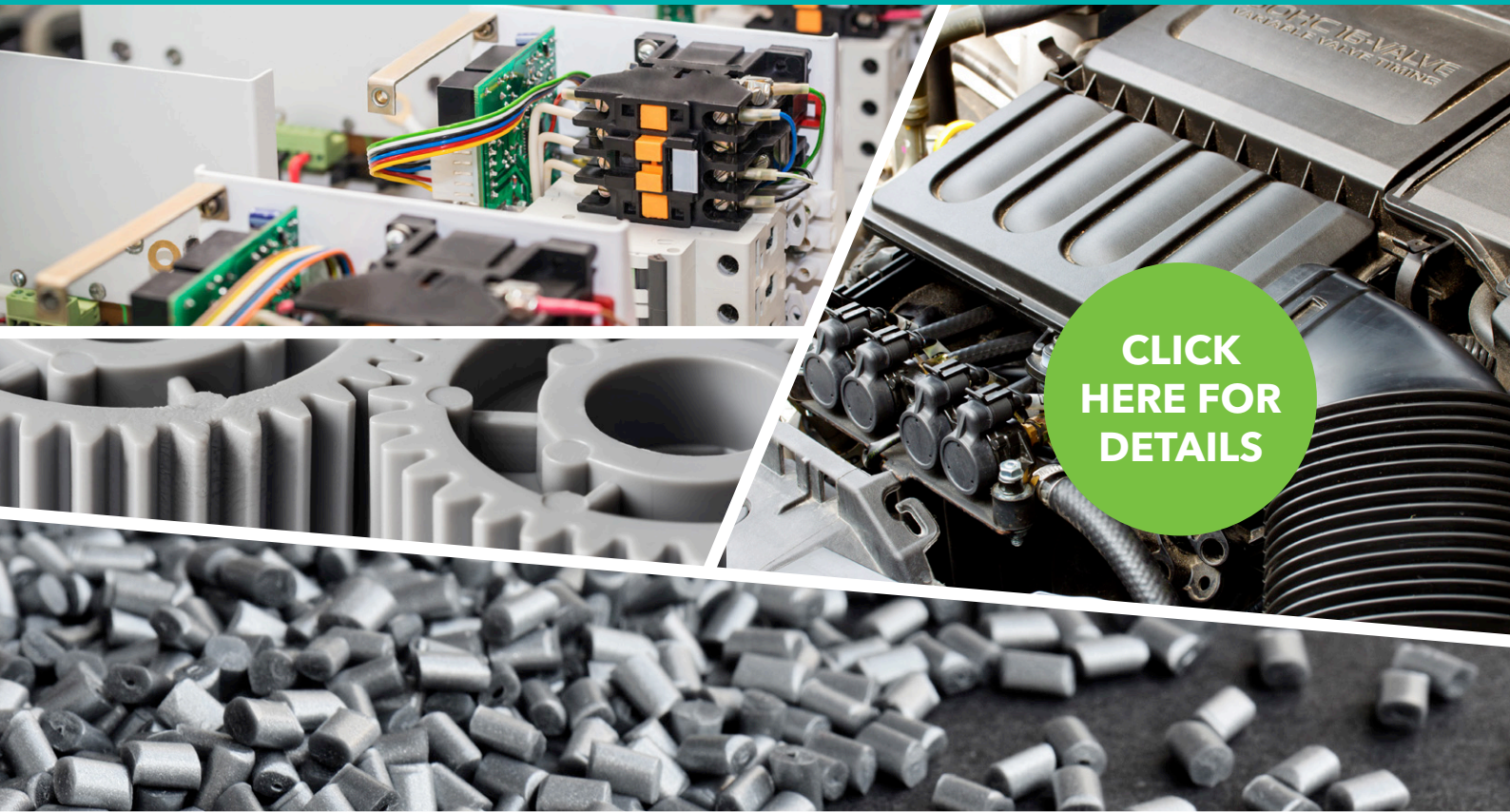
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*Recent research in wood-plastic composites (WPCs) include a study comparing the benefits of solid and hollow boards - and the latest efforts to overcome the effects of water retention. Lou Reade reports*

# Getting on board: latest developments in WPCs

Wood-plastic composites might seem like a narrowly focused field, but producers in different parts of the world use widely different materials - and produce quite different products - depending on local demand.

Peter Kotiadis, vice president of innovation at US-based WPC decking extruder **Fiberon**, told delegates at the recent Wood-Plastic Composites conference, organised by AMI, that the influences of different geographies had a marked effect on the use of WPCs.

"In North America, most homeowners prefer solid profiles as it reminds them of a solid piece of wood - and is the simplest to install and trim," he said. "Elsewhere, most of the world seems to prefer hollow decking profiles."

While South America and Europe are adherents of hollow boards, he said that Asia and Africa produced a combination of both types of product.

There were also differences in preference for base polymers: while North America favours polyethylene (LDPE), Europe's preference is polypropylene (PP). Other regions are different again, with Asia and Africa choosing a mixture of PE and PP, while South American prefers HDPE.

"The choice of polymers is influenced by the availability of virgin and recycled streams in each region," he said.

Fibre loadings can also vary widely: 55-65% in North America, 60-75% in Europe and 65-75% in Asia.

## Hollow future

Going back to product preferences, Luc Wallican - project manager technology at Belgian profiles extruder **Deceuninck** - asked delegates whether there was a future for hollow WPC decking profiles.

He said that the market for WPC decking has

**Main image:**  
**Wood is the source of many different types of fibre and filler - which can be used in plastic products**



moved from hollow towards solid planks – mainly because the latter have a more wood-like appearance, require no endcaps, and are perceived as being more robust. Within solid planks, capped versions are gaining market share the fastest, as they are easy to maintain and take up less water.

Deceuninck has performed a comparative study between solid and hollow planks – ensuring that the products have the same raw material formulation and processing set-up. The company carried out a series of tests on both types of product – including impact strength, water uptake (along both length and width), flexural properties and ‘ecology/economy’ considerations. (In a second study, it analysed the properties of commercially available hollow planks in Europe.)

The tests carried out were: an impact test (based on EN 477), in which a 30cm long sample was subjected to a force; immersion in water for 28 days, at 23°C, with weekly measurements of dimensions; a three-point bending test, where the middle of a board was compressed at 1,000N; and a creep test, in which 1,000N of force was held continually in place.

Each board – whether hollow or solid – was made from a 50/50 mixture of PVC and wood. Over the four tests the solid plank had a better impact performance, while the hollow plank showed better bending properties.

“For the same bending performance, installation cost will be lower for the hollow plank,” said Wallican.

The solid plank had much lower water uptake, with very little increase in dimensions. However, the hollow plank had a lower ecological footprint – with lower raw material consumption, transport costs and energy consumption (per m<sup>2</sup>).

“This makes it more economical for the end consumer,” he said.

Overall, he concluded that hollow profiles have

**Below: Water can have a damaging effect on wood – and on WPCs**



## Spruced up for thermoplastic composites

Norway-based **Re-Organic** says that long, thin fibres from spruce trees – called TMP fibres – can have a far greater physical effect than simple wood flour.

Joachim Karthäuser, director of technology and IPR, told delegates that their length per unit weight is 10-20 times that of wood flour

He said that combining these and other natural fibres – such as MDF – with recyclable polymers can be used as the basis for making “environmentally sound thermoplastic composites”.

a future if several factors are taken into account, including: using the correct raw material formulation; using adequate processing equipment; and thinking carefully about product design and installation (especially in the case of water uptake).

### Water problem

Though water uptake can be a problem for WPCs – by changing its mechanical properties – there are ways to reduce it, according to Christophe Burgstaller, managing director of plastics research institute **TCKT** in Austria.

WPCs tend to absorb water in proportion to the amount of wood that they contain. The surrounding matrix – and the compaction of the wood cells – limits this uptake. The method of processing can also influence the amount of water intake – injection moulded parts take up less water than extruded ones, for instance.

“You can reduce the water uptake by reducing the wood share in the WPC, adding a protective layer, using additives or modifying the wood,” said Burgstaller.

TCKT’s research focuses on how thermal treatment and chemical modification can be used to make treatments that are “effective, yet simple enough to be implemented in a product”.

Materials used included a PP homopolymer, softwood particles and a maleic anhydride compatibilizer.

In one instance, wood particles were dried overnight before treatment – to reduce the influence of moisture on the reaction. Treatment was carried out by mixing the wood with the chemicals at elevated temperatures (150°C for four hours). ➤



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## WPCs used beyond decking profiles

Andreas Haider, area manager at **Wood K Plus** in Austria, told delegates about a number of alternative uses for WPCs beyond making decking profiles. Many were not related to extrusion – and included 3D printing and foamed injection moulding – but one technology called PoExWo (or power exterior wood) was a weather-resistant coating for wood and wood-fibre composite parts. Another was the creation of bio-based silicon carbide (SiC) ceramics – in which parts are extruded or injection moulded, then carbonised and siliconized to create the new parts. This is part of the ongoing pan-European BioCarb-K project, which lasts until 2020.

Thermal treatment was found to reduce water uptake, while mechanical properties were retained up to around 230°C. Screening of chemical additives (ranging from maleic anhydride to ε-caprolactone) was found to be effective.

To check the effect of the treatments, simple rectangular hollow profiles were extruded – with formulations of 60% treated wood, 3% compatibilizer and 37% PP. While water uptake was reduced, so were mechanical properties.

“There are different strategies to reduce water uptake, but their applicability depends on requirements,” said Burgstaller.

While thermal treatment is effective, it is limited due to discoloration; chemical treatment is more effective, but also more expensive; and, treatment often comes with some kind of property degradation.

“Typically, more than a single strategy will be needed,” he said.

### Longer life

Water uptake is obviously a key factor in reducing the life of WPC products. For this reason, **CCWood** of the Netherlands says it is looking into how wood flour could be made hydrophobic – and therefore further resist the ingress of water.

Marco Pieterse, managing director of CCWood, told delegates that moisture uptake by wood flour causes decay and fungal activity – which breaks down the interface with the plastic matrix. Repeated swelling and shrinking of the wood particles causes microcracks in the plastic, he said.

An increase in moisture content of 9%, for instance, typically reduces E-modulus by nearly 40% and tensile strength by more than 20%.

“However, we can make wood flour hydrophobic – mitigating the decay mecha-

nisms by substituting OH groups,” said Pieterse.

The company has treated a range of wood flours with acetylation at high temperature (but ambient pressure) at 25kg scale. Next, it wants to increase this to a scale of hundreds of kg, with the help of partners.

“Wood flour becomes hydrophobic – like polymers – and CCWood achieves an intimate binding of wood particles with the olefin matrix,” he said.

This helps to make parts with higher mechanical properties, he added. The method compares favourably with other treatment methods, such as maleic anhydride, he said.

Pieterse also pointed to some potential cost benefits of using the material.

“In certain applications, the need for compatibilizer is reduced, since the bonding between treated wood flour and polymer is enhanced,” he said. “A 3% saving in additives is estimated – at €110/tonne of WPC – making the use of CCWood almost cost neutral.”

### Continuous improvement

Heath Van Eaton, president of US-based **Wyocomp**, said that the company’s range of continuous fibre-reinforced biocomposites – currently the subject of a US patent application – could compete more directly with traditional materials in applications including decking boards and fencing panels.

“The process embeds continuous fibres linearly into the body or wall of a product via the final forming die,” he said.

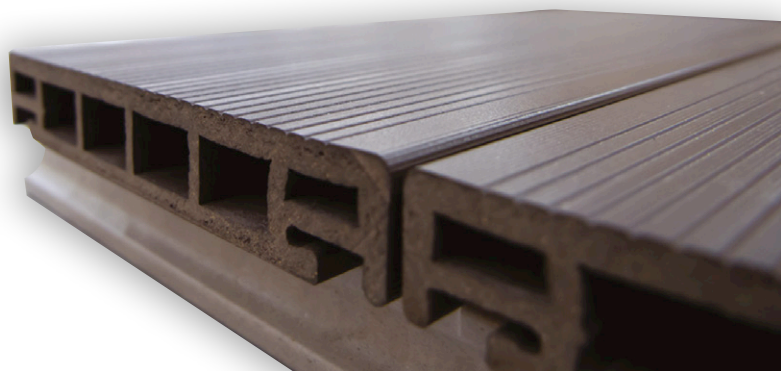
Several fibre options are available – including various ply sizes – and the fibres can be coated or non-coated.

In one example, he cited how wooden fencing is installed on posts with a spacing of 8 ft. However, WPC panels require posts spaced at only 6ft, due to WPC backer rails experiencing premature ‘creep’. Wyocomp has performed a study to test whether backer rails with continuous glass fibres could be spaced at 8ft for WPC panels.

The company modelled the physical properties of the WPC, which included estimates of the creep strain.

“As the WPC creeps over time, the glass will

**Right:**  
**Deceunink**  
**considered**  
**whether hollow**  
**WPC boards**  
**can compete**  
**with their**  
**solid-bodied**  
**counterparts**





carry more of the stress," he said.

1-ply reduced creep by around 30%, and 2-ply by more than 40%, he said – while 6-ply would completely eliminate it.

### High fibre

Nathalie Benoit, materials innovation engineer at **Fibres Recherche Developpement** (FRD) in France, told delegates how plant fibres such as hemp, flax and wood can be used in thermoplastic composites.

Strategies to improve the performance of these types of material include improving the properties of the raw materials and fibres, the processes to make them, and the underlying microstructures and interfaces, she said.

Much of the focus in this kind of research – which has been covered in a pan-European project called Maprofi – is getting factors such as the plant growth and genetics correct. For instance, the fibres in certain plants will be more or less accessible – meaning that the process to extract them is

more or less expensive and complicated. There are also processes such as retting, fractionation and functionalisation to consider.

In one project, which ran between 2016 and 2018, FRD identified the potential of various co-products for use as building materials – in applications such as decking, windows and fences. Six 'biomasses' were tested and compared to a wood reference. Their granulometries – and processing conditions – were also compared, as was the effect of the formulation.



**Left: FRD has used flax fibres and other natural products in thermoplastic composites**

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*AMI's Polymer Distribution in Europe 2018 study shows growth, M&A and new entrants to be key features of the market, writes the report's author **Elena Mozzato** of AMI Consulting*

# Consolidation drives European polymer distribution market

Polymer distribution plays an increasingly important role within the polymer industry supply chain providing opportunities for polymer producers to cut costs, improve efficiencies and deliver better service and support to the plastics processor. For converters, distributors enable them to purchase small lots of material and gain invaluable expertise and technical assistance in the journey from concept development to product delivery with its own customers. However, in an industry notorious for its slim margins and in a low growth economy, the successful distributor needs to be rigorous in understanding the cost-to-serve and the value gained from its customers in order to ensure its survival and growth.

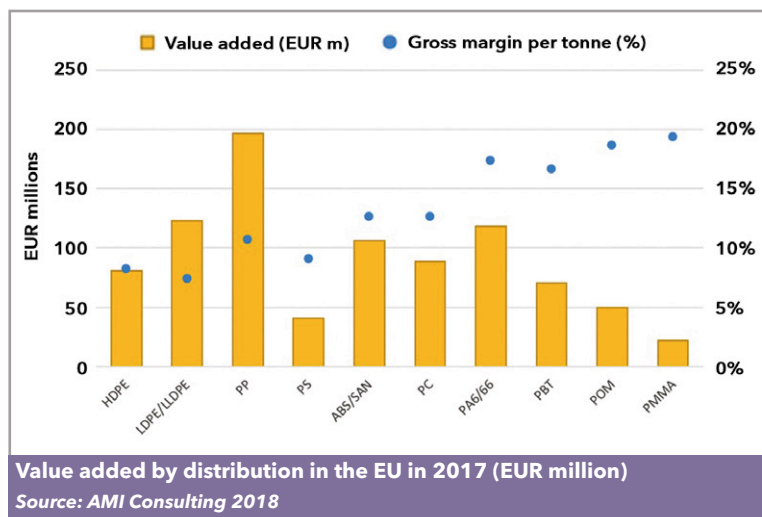
Following challenging periods of resin price volatility and times of extreme resin shortages, distributors have managed to enhance profitability and margins by offering much needed reliable supplies of material, technical support and new services to customers. Innovative strategies and

inventive customer dialogue have also been key elements in the strategy of successful companies in the industry.

The 2018 edition of AMI's Polymer Distribution in Europe report revises and updates the status and position of distributors across Europe. It builds on its earlier research to consider the newest trends influencing the industry, such as: the EU Strategy for Plastics in a Circular Economy; investments in bioplastics, recycled resins and 3D printing; a strong focus on plastics in pharma and medical sectors; digitalisation as a new competitive strategy; and Brexit's influence on the political and economic situation.

## **Continuing growth**

Approximately 13% of polymer materials sold in Europe in 2018 were supplied through the distribution channel. This proportion is predicted to increase in the future as polymer suppliers move



higher volumes through distribution to save costs and optimise sales networks. However, these benefits are likely to accrue to the larger, pan-European groups, presenting challenges to smaller distributors or groups.

In 2017, the volume of polymers distributed in Europe surpassed 4 million tonnes, proving that this is a healthy business in which specialties are becoming increasingly important, as they add a competitive edge. Polymer distribution accounted for revenues of above €8.2bn, with polyethylene, polypropylene and polyamide being the largest contributors to an added value of nearly €950m.

The pattern of distribution sales and country ranking by sales volumes, confirms Germany and Italy as the top two countries in Europe. These are now followed by the Benelux countries, which have seen distribution sales increasing substantially as local players who used to operate as traders have recently embraced the official distribution model. Spain ranks fourth, which corroborates the positive economic outlook the country has been recently enjoying.

Resinex remains the leading distributor in

Europe, while other familiar names such as Biesterfeld and Ultrapolymers Group maintain a strong position in the market. The entrance into the official distribution market by historical traders such as Vinmar International, Bamberger Polymers and NCT Holland, represents the biggest disruption that the distribution sector has experienced over the last three years. Their presence is often seen as a threat by smaller local distributors who operate in markets where customer size varies enormously and where most clients buy small quantities. However, despite the lower prices these traders-turned-distributors offer and the disruption they may cause, they may often find it difficult to sell with success due to a lack of knowledge of local networks.

Despite the difficulties intrinsic to polymer distribution – including demanding customer service and tight margins – this is still a growing market, and so is attractive to many companies. The structural changes brought by recent M&A activities portray a lively business environment offering opportunities to those who are ready to grab them. During the last couple of years, industry news has been inundated by reports of strategic corporate moves. In the most remarkable deal of this year, LyondellBasell gave the industry much to talk about with its acquisition of compounder and distributor A. Schulman. While in September Univar announced the acquisition of Nexeo Solutions in a transaction worth \$2bn.

### Diverging directions

Consolidation and rationalisation activities have certainly posed a degree of uncertainty for smaller distributors who have seen their contracts with suppliers ended in favour of larger pan-European groups. This trend has been pushing some of the smaller players in the opposite direction and, now free from the impediments of exclusivity and binding contracts, they are moving towards more

## Polymer Distribution in Europe 2018

Polymer Distribution in Europe 2018 is a new detailed market report from AMI Consulting published in September 2018. The report identifies the trends and dynamics characterising the distribution industry, while profiling the leading suppliers and polymer distributors in the region as well as their impact on industry dynamics.

Over the seven editions, this study

has evolved into the most comprehensive analysis of polymer distribution currently available on the market and represents an essential guide for industry players as they optimise business activities and plan future investments. For further information please contact Elena Mozzato, [elena.mozzato@ami.international](mailto:elena.mozzato@ami.international), tel: +44 117 924 9442.

In addition to its consultancy work,

AMI organises annual conferences including Polymer Sourcing & Distribution 2019, which will be held in Barcelona, Spain on 13-15 May 2019 and is specifically created for companies involved at every stage of the European polymer supply chain. For more information on the event please contact Maud Holbrook, [maud.holbrook@ami.international](mailto:maud.holbrook@ami.international), +44 117 314 8111.



fluid distribution agreements. Overall, the big distributors are getting bigger, and the smaller ones are surviving by focusing on niche activities and the provision of unrivalled technical knowledge and customer support.

Over the next five years, polymer distribution sales are expected to continue growing above polymer demand as distributors take advantage of promising opportunities. On the one hand, the impending new polymer production capacity coming from the US, Middle East and Asia is forecast to be partly absorbed by existing distributors. On the other hand, the trend of traders embracing the official distribution model will become increasingly important as official agreements have proved beneficial, particularly in times of material shortage.

### Engineering plastics

Engineering plastics are expected to continue driving the demand growth, with producers consistently investing in research and development activities to offer innovative products for new applications. Environmental sustainability and compliance with regulations will continue to be key elements in their R&D programmes and will



PHOTO: MANCHESTER PLASTICS

stimulate manufacturers to expand and refine their product portfolio to gain competitive advantage.

Distribution markets of Central and Eastern Europe and Poland will continue experiencing the strongest growth as networks in this region are still growing and there is a greater opportunity to export to markets further east. Western Europe is forecast to grow at a slower pace as rationalisation activities have stabilised and suppliers are monitoring the outcomes of consolidation strategies.

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*PEX pipe has recently found use in applications as diverse as fire protection systems, a renovated house and at the base of a skyscraper. Lou Reade reports*

# Pushing PEX properties

PEX pipe is commonly used in buildings, where it is usually used to transport potable water – or sometimes hot water for applications like under-floor heating. However, it was recently used in a very different application, where it helped to ensure that the concrete base of a new skyscraper was produced correctly.

**Uponor** won the 2018 **Plastic Pipe Institute** project of the year – in the building and construction division – for supplying more than 20 miles of 0.75in PEX tubing to help cool the concrete base of a major new skyscraper.

The pipe was intertwined throughout the rebar in the concrete base of the Wilshire Grand Center in Los Angeles, in order to keep the slab at an even temperature to prevent cracking in the 21,200 cubic yard foundation that was poured in less than 19 hours.

To properly cure the massive, 82 million lbs of concrete for the base of the structure, the engineer specified a hydronic cooling system that used the Uponor PEX tubing to keep an even temperature in the slab to prevent it from cracking.

Mike Martin, piping department manager of Coutts Heating and Cooling – the installing contrac-

tor for the thermal cooling radiant tubing installation – said the idea of thermal cooling came from an engineer in Minnesota who was looking to redirect the heat and keep an even temperature in the slab to prevent cracking after it cured. The tubing conveyed water at 40F throughout the system to maintain an even temperature below 160F as the concrete was poured and then cured.

"The lighter weight of PEX made it easier to move around the jobsite and its extreme flexibility made it fast and easy to install around the rebar in the base of the structure," said Martin. "Also, PEX is very forgiving. The installers were walking on it and dumping concrete on it, and it never damaged the pipe."

Coutts installed the radiant tubing at 6in on centre and dropped it down 18 feet from the 8in HDPE supply header before looping it back up. Once the radiant tubing installation was complete, the concrete was poured. The thermal cooling system pumped water through the tubing for two weeks while being monitored by 24 sensors to ensure proper system temperatures. After this time, the water was removed from the system and the tubing was filled with grout and remained in the slab. ➤

**Main image:**  
Since opening its new Hutchinson plant in May, Uponor has made more than 30 million ft of PEX pipe there

**Right: Around 20 miles of Uponor's PEX pipe was used to cool the concrete base of the Wilshire Grand Center in Los Angeles, during its construction**

According to Martin, concrete thermal cooling will continue to increase as more professionals look to smarter building practices to make structures of higher performance.

### PEX expansion

Uponor North America has now begun making PEX plant at a new plant in Hutchinson, Minnesota. The 237,000 sq ft facility opened in May 2018 – six months ahead of schedule – and is a complement to its main Apple Valley plant that is around 70 miles away.

"Getting initial production launched at the Hutchinson plant on schedule is a major accomplishment," says Jon Sillerud, vice president of operations. "More than 50 employees and 14 workstream leads dedicated approximately 23,000 hours in less than one year to bring this project to fruition."

Uponor North America first announced the US\$6.35 million Hutchinson investment in July 2017 after signing an agreement to buy the existing facility – to support its growing US manufacturing operations. At that time, the company expected to begin operations in Hutchinson in "early 2019".

The opening of this plant is Uponor's 11th expansion since 1990. The previous 10 occurred on at its headquarters campus in Apple Valley, Minnesota.

In the six months since it opened, it has already produced more than 30m ft of PEX pipe, said the company.

Bill Gray, president of Uponor North America, said: "While this is our latest expansion, it is certainly not our last."

**Below: Black PEX pipe from Viega supplies water to a residential fire protection system**

### Fire protection

The US subsidiary of German plumbing specialist **Viega** recently used PEX pipe in a fire protection system – in a custom-built home in South Carolina, for the head coach of the Clemson University football team.

The large home has an area of almost 21,000 sq



ft, so required an extensive sprinkler system.

"There are close to 200 sprinkler heads in the house," said Alan Larson, manager of technical services for Reliable Automatic Sprinkler, which has worked with Viega since 2010 to make fire safety systems using Viega PureFlow PEX pipe.

Viega worked with Reliable, the contractor Century, and Elite Plumbing to install thousands of feet of PureFlow PEX. Its design team helped create the plans for the project, which includes the red and blue PEX for plumbing and black for the fire sprinkler.

Viega says that its fire sprinkler systems are versatile and easy to install: installers can mount the sprinklers before running the PEX tubing, which saves time and labour costs compared to CPVC, says the company.

Viega's PEX was also used on a renovation project that featured on a US TV show.

A home in Arlington, Massachusetts – built in 1909 – was featured on This Old House, where it underwent a number of renovations including an updated heating system. The home was originally heated with steam and later converted to high-temperature hydronic heating, but the owners wanted a new, high-efficiency heating system and chose ProRadiant.

Bilo Plumbing and Heating Company in Ipswich, Massachusetts, removed all the heating piping, the radiators and the oil tank and installed a new plumbing and heating system using Viega PureFlow PEX tubing and PureFlow Press fittings.

Viega FostaPEX tubing was also installed throughout the house, using the aluminium-coated, form-stable PEX to adapt to the manifolds and the new boiler in the mechanical room.





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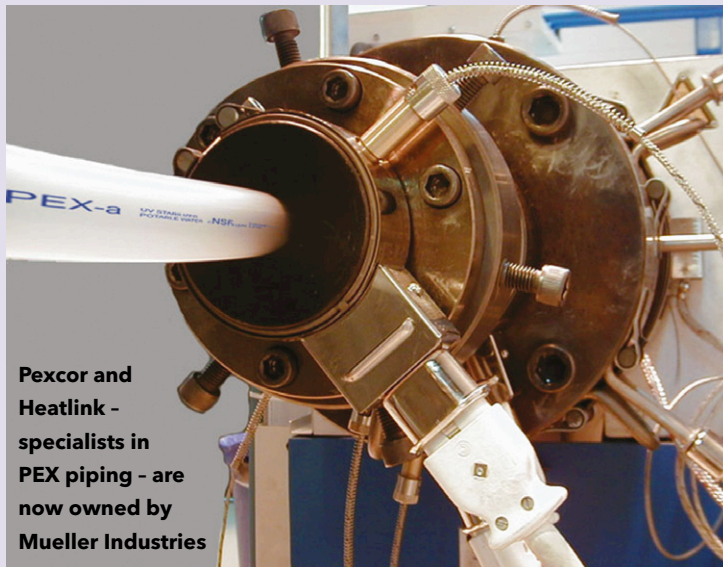
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Pexcor and Heatlink - specialists in PEX piping - are now owned by Mueller Industries

## Mueller expands into PEX production

US-based plumbing specialist **Mueller Industries** this year acquired Die-Mold Tool, a Canadian manufacturer of plastic PEX and other plumbing related fittings.

The takeover supports Mueller's plan to grow its flow control product offerings in the area of pressure plastics.

Mueller entered the PEX market last year when it acquired PexCor and HeatLink - two Canadian sister companies that focus on PEX and PEX pipe. The two firms - both based in Calgary - produce and sell a complete line of products for PEX plumbing and radiant systems.

In 2016, Pexcor and Heatlink ended a long-running patent dispute with Uponor of Sweden. The dispute, which covered both Canada and the USA, ended with a judge ruling in favour of Uponor - but the parties came to a licensing agreement as part of the settlement.

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

### Chlorinated effect

Researchers in Japan have studied the effect of residual chlorine on the performance of PEX and polybutylene (PB) pipes in polymer electrolyte fuel cells (PEFCs) - a growing market in Japan.

The pre-bent pipes are used to supply hot water to the PEFCs. Because the pipes are difficult to replace, it is important to evaluate their durability and predict their lifetime, said the researchers.

Takehiro Fujii of **Shinwa Sangyo**, told Antec delegates that a residual chlorine solution immersion test for the bent PB and PEX pipes was carried at 80, 90 and 98°C. In the test, the concentration of the residual chlorine solution is 5ppm and 10ppm for 80°C, 5ppm at 90°C and 5ppm at 98°C.

The tests revealed that the bent PB pipes developed cracks at 36,000 hours at 5ppm and 90°C; 40,000 hours at 10ppm and 80°C; and 44,000 hours at 5ppm and 80°C. On the other hand, the bent PEX pipe did not crack at all even at exposures of 47,000 hours. The double-layer PEX pipes were thought to be less affected by the chlorine and temperature, he said.

"At the beginning of this study, we thought the residual chlorine solution immersion test using bent pipes would be the easy evaluation method," he said. "But it took a long time to get the results back from this immersion test."

In future, the researchers will consider the easy accelerated evaluation method for resistance property of the plastic pipes for residual chlorine solution and the effect of scale on the pipes for lifetime of the plastic pipes, he said.

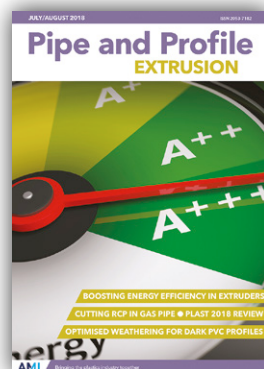
The co-researchers in the project were Kyoto Institute of Technology and Osaka Gas Company.

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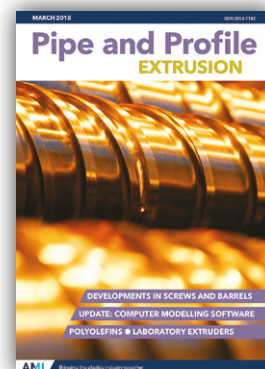
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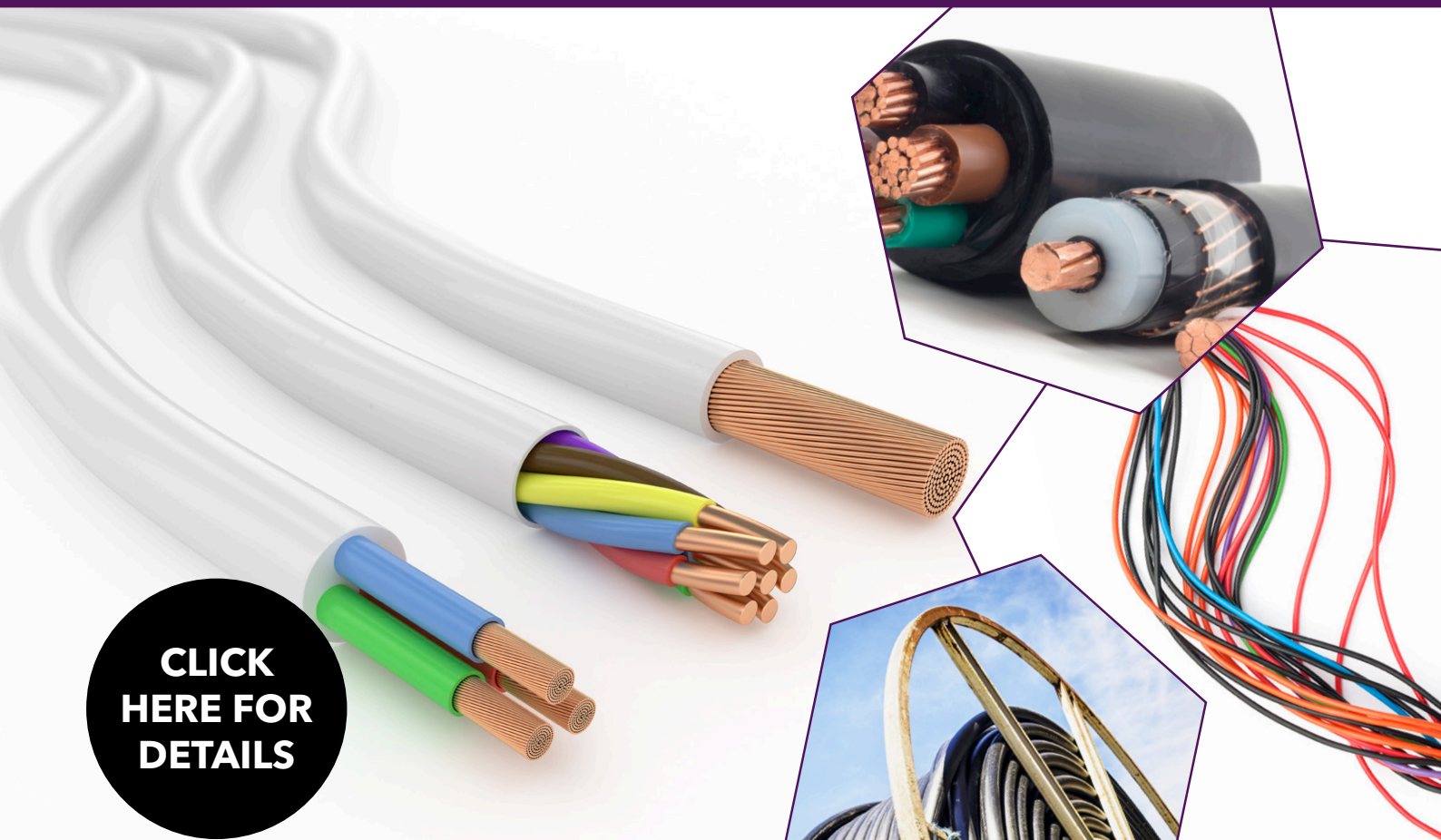
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*Extruders need screw and barrel designs to meet product quality goals while offering extended durability. Mark Holmes looks at some of the latest options*



PHOTO: SHUTTERSTOCK

# Balancing quality and durability for screws

The screw and barrel combination sits at the heart of any extrusion system, playing a critical role in product quality but also facing high levels of both mechanical and chemical wear. So, it is no surprise that extruder manufacturers – and suppliers of replacement screw and barrel components – are looking to prolong service life while aiming to shorten lead times for replacement parts.

According to US extruder manufacturer **Entek**, wear of screw elements and barrel sections remains a common problem.

"Customers are always looking to extend the life of these wear components," said Dean Elliott, technical processing manager. "We have found that wear problems are often a result of the processing and mixing work being done in only a small portion of the extruder's overall length."

Elliott says that Entek's screw layout program and visual layout comparison of the screw in relation to the barrel allows customers to identify

high wear locations to better manage wear.

"Our screw design program enables customers to quickly and accurately re-design their screw layout and spread out the processing work within the extruder," he said. "Our customers are finding that by re-configuring their machines they are able to reduce or in some cases eliminate high wear locations. As a result, they are seeing reduced overall screw and barrel wear."

Built-in features of the software include drag-and-drop functionality on all components that customers need to specify, such as barrel sections, screws and metallurgy. It also provides automatic calculation of the remaining space on the screw shafts, as well as safeguards to prevent putting certain elements where they do not belong. Complete part numbers are furnished within the program and, once the design is complete, it is easy to save within the program or export to an Excel file option.

**Main image:**  
**Extrusion screws need to be looked after in order to prolong their lifetimes**

**Right: The Cool and Clean sealing system from Extruder Experts simplifies maintenance of cooling channels**

## Shorter leadtimes

According to Jürgen Stoll, product manager for components and inside sales manager for spare parts at Extricom Extrusion (now part of **CPM Extrusion Group**), the market is really struggling with lead times for screws and barrels at present.

"Having delivery times of less than 10 weeks is rare," he says. "With customers focused on getting their spare parts for screws and barrels as soon as possible to optimise their production, we are trying to tackle the problem by offering some in-demand products to the market off the shelf."

The company says it can reduce delivery times to around eight weeks or less, such as by having components like drilled blanks available.

On the technical front, colleague Tom Urban – sales manager for spare parts at CPM Century Extrusion – says that customers continue to ask what new materials are available to make wear components last longer – as well as getting higher throughputs on existing machines.

CPM has developed a new high performance screw with a geometry that "creates better products in less time", as well as manufacturing a range of different barrel and barrel liner designs and configurations.

## Custom combinations

**Burgsmüller** – a subsidiary of KraussMaffei – has developed ScrewCon, a new software tool allowing the development of custom combinations of screw and barrel housing elements for twin-screw extruders. The software is extruder-independent.

According to Burgsmüller, the ScrewCon software helps the company's engineers to design tailored screw and barrel housing element configurations for any application with a true-to-scale visualisation. In addition to the specific rating of conveying, kneading, mixing or retaining elements, the company says it can provide advice on the optimum material selection for screw elements and housings to increase service life and output rates.

**Below: Entek says its screw design software means better optimisation to the specific application**

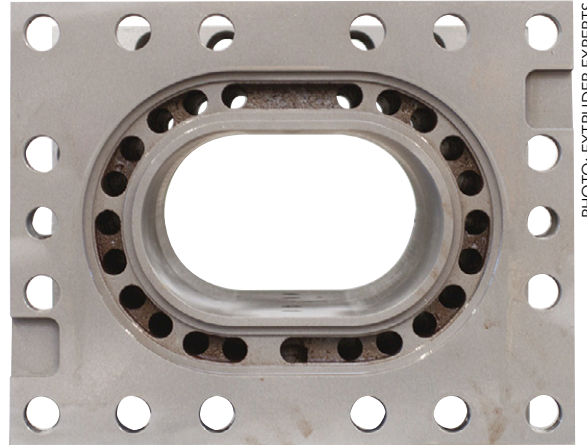


PHOTO: EXTRUDER EXPERTS

ScrewCon currently includes a library of some 3,000 screw and barrel housing elements, which allows bespoke configurations to be designed for specific machine types and applications. Where elements are not available, the company says it can easily add them using the machine owner's data.

## Easier maintenance

Extruder components specialist **Extruder Experts** has introduced a new cooling system seal – Cool and Clean – for its barrel sections. The company says the Cool and Clean design allows full access to the cooling channels and easy maintenance and cleaning of cooling systems. In cases of calcination of the cooling system, for example, it is no longer necessary to call in external specialists.

Production is maintained through fast and uncomplicated cleaning, and machine down-time can be reduced, the company claims. In addition, it says operating costs are reduced by prolonging the life cycle of the barrels while aggressive cleaning chemicals can be avoided.

Meanwhile, **CA Picard** has completed the relocation of its Extruder Technology business division's barrel production from Monschau-Imgenbroich to Remscheid in Germany. The company says capacity at Monschau-Imgenbroich was no longer sufficient and could not be expanded due to space constraints. The company has also relocated its barrel refurbishment activities to the new site and two new milling machines – DMU100 units from DMG – have been acquired to supplement the existing machines that have been upgraded and transferred from Monschau.

## CLICK ON THE LINKS FOR MORE INFORMATION:

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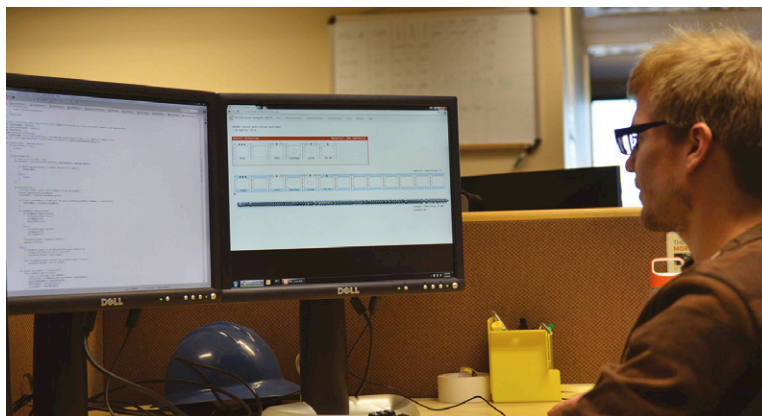


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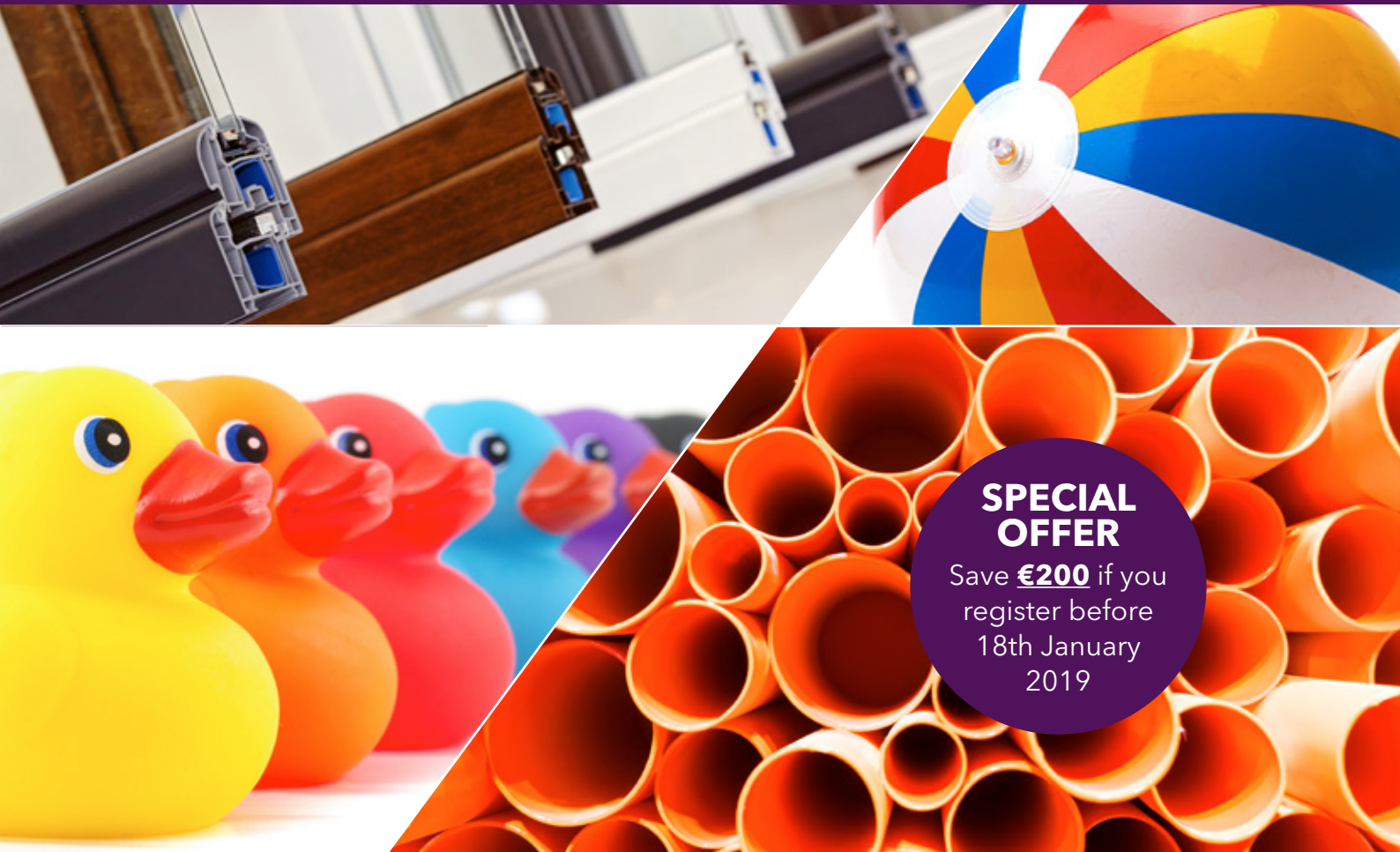


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## ENGINEERING PLASTICS

# PPS extrusion grades for automotive cooling lines

Solvay has developed its first batch of Ryton polyphenylene sulphide (PPS) extrusion grades for use in demanding automotive cooling line assembly applications.

The three new grades – XE3500BL, XE4500BL and XE5500BL – have stiffnesses between 1500 MPa (218ksi) and 2500 MPa (363ksi) to meet the needs of flexible tubes with different wall thicknesses and diameters or for post-extrusion thermoforming. Flexible coolant lines made using these materials have high melt strength, chemical resistance and

thermal stability with enhanced tensile elongation and impact strength, says the company.

"Under-the-hood temperatures are pushing existing cooling line design and material solutions to their limits, narrowing the safety margin," said Andreas Lutz, European area development manager for Solvay's speciality polymers business.

Because coolant lines are often the last components to be designed into the engine bay, materials must offer the design freedom to enable complex routing, and provide enhanced

thermal and chemical resistance to ensure operational safety without adding weight, such as the need for additional heat shields.

Solvay says the three new materials in the range can help OEMs replace cumbersome and expensive powertrain fluid handling lines with lighter, integrated solutions – which also include components that are injection moulded from other Ryton grades.

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



## ADDITIVES

## Anti-microbial additives cut biofilms to stop blockages

UK-based Bio Products Group has developed a refrigeration drainage system that resists the formation of internal biofilms – thanks to antimicrobial technology from Parx Plastics.

Supermarket refrigeration display cabinets often suffer from a build of bacteria known as *Pseudomonas*, which can grow into biofilms and slime on the internal surface of the pipes. Over time, this can cause blockage in the pipe resulting in water leaks, maintenance issues and potential outbreak of pathogens. The problem can be solved by flushing chemicals down the drain – but this is no longer a preferred solution.



By integrating its technology into the Bio Pipe and Bio Pad products, Parx helped to reduce the number of call-outs due to pipe blockage.

Ordinarily, the bacteria colony count would increase over the length of the system, creating blockages. The pipe using Parx technology showed a significant decrease in bacteria counts,

while the internal wall of the Bio Pipe drains appeared clean and smooth – with no slime deposits.

"Over the last 24 months we showed that our technology has highly effective antimicrobial functionality, and also acts significantly against the formation of biofilm," said Michael van der Jagt, CEO of Parx.

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

## MEDICAL

## Peristaltic pump's TPE boost

A new series of medical-grade thermoplastic elastomers (TPEs) from Teknor Apex – for peristaltic pump tubing – gives elasticity over a broad temperature range and withstands the stresses of pump action over time, says the company.

The Medalist compounds include clear, translucent, and opaque grades for the biotech and pharmaceutical industries, medical infusion systems, and dialysis machines. Compared with other TPEs, Teknor says its Medalist grades exhibit lower levels of spallation during pumping.

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

## PROFILE EXTRUSION

## Dual strand line doubles production

Intralox, a US-based manufacturer of plastic conveyor belts, recently replaced an older profile line with a new Davis-Standard dual-strand version – enabling it to double its output without needing extra space.

The line processes dual-strand solid rod made of PP, PE, PA, acetal and Peek materials. Davis-Standard customised the line for Intralox applications, completing delivery and installation within eight months of purchase. Intralox now plans to replace

its other profile lines with Davis-Standard dual-strand lines in the near future.

"This new line is a game-changer in terms of production outputs, rod quality and innovation," said Gregory Washington, extrusion supervisor at Intralox. "While dual-strand profile technology is not new, it's new for us. We've had great results in terms of speed, equipment performance and ease of operation."

Davis-Standard supplied all line components from extruder and

controls through to downstream equipment, including the DS-eVue control system and dual-strand Y-tooling.

"Intralox ships product all over the world," said Sean Stephan, Davis-Standard's regional manager responsible for this project. "Being able to take their outputs from 125 feet per minute to 300 feet per minute on the same line while supporting quality goals really defined this project."

➤ [www.davis-standard.com](http://www.davis-standard.com)

## TOOLING

## Changing profile on the fly

Guill Tool has developed a new reciprocating head, which it says can alter the characteristics of a profile as it is being extruded.

In the design, the traditional tip and die assembly is replaced with a linear reciprocating assembly that changes the tube's profile along a given length. This process is repeated throughout a single extrusion run without interruptions.

While cost and value stream activities are reduced, quality is also improved, says Guill: only one extrusion run is needed to produce a finished product, as opposed to multiple extrusion runs with tooling changes along with a manual assembly operation to connect different tubing shapes.

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

## JOINING

## Modular system joins large PP pipe with light additions

McElroy has introduced new sizes to its Acrobat machine line, which features the QuikFit carriage to help operators fuse large-diameter polypropylene (PP) pipe in tight working spaces.

Heavy, bulky fusion machinery can make jobs difficult – or even impossible – to achieve, says the company.

The new machines, which fuse 355-630mm (14-24in) PP pipe, came in response to industry demand for lightweight, large-diameter butt fusion equipment that would make overhead pipe installations safer and more efficient.

"This will provide a solution – through a modular, single-size jaw design – that will make a huge difference in how



large-diameter PP pipe is installed," said Paul Donaldson, manager of mechanical engineering at McElroy.

The Acrobat with QuikFit carriage breaks down into multiple components. The ability to assemble the upper and lower jaws of the carriage around the pipe by hand eliminates the need for extra equipment and manpower that would be required to lift and fit an entire carriage into a

cramped space. The carriage is half the weight of alternative machines and can be arranged in 4-, 3- and 2-jaw configurations for an even smaller footprint, says the company.

All the fusion equipment, including the carriage, drill-powered facer, heater and hydraulic power unit (HPU), can be loaded on a single scissor lift platform, says the company.

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



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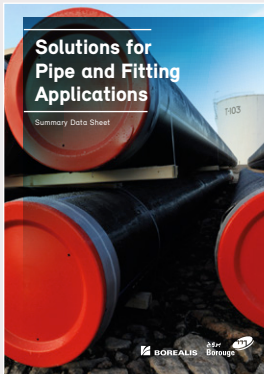
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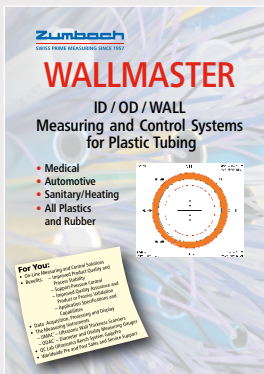
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This brochure from Sica covers the company's wide range of downstream equipment for plastic pipe production. It includes haul-off devices, saws, cutting systems and belling machines.

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This eight-page brochure details the main features of Zumbach's Wallmaster measurement and control system for improving product quality, process stability and data capture in plastic tube and pipe extrusion applications.

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## HEXPOL: DRYFLEX TPE



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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## UNICOR: PIPE CORRUGATION



This brand new 48-page brochure from Unicolor provides detailed insight into the design, production, applications and advantages of corrugated pipes. It includes specification data on the company's wide range of pipe corrugation equipment.

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## DAVIS-STANDARD: PIPE & PROFILE



Davis-Standard supplies a wide range of extruders and extrusion systems for pipe, profile and tubing applications, including medical tubing. This four page brochure details the range of equipment available and key performance benefits.

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



# Learn more about AMI's upcoming conferences

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

## COMPOUNDING WORLD FORUM 2018



The 6th Compounding World Forum takes place on 4-6 December 2018 in Coral Springs, Florida, USA. This annual meeting point for US technical compounders covers business strategies and new materials and processing technologies.

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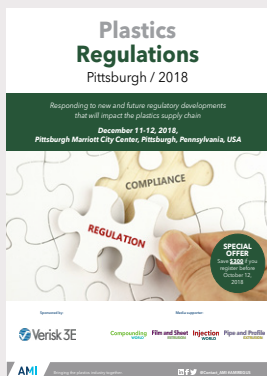
## FIRE RESISTANCE IN PLASTICS 2018



AMI's Fire Resistance in Plastics conference takes place on 10-12 December 2018 in Cologne, Germany. Now in its 13th year, the event provides a forum to debate fire safety requirements and regulatory and technical developments.

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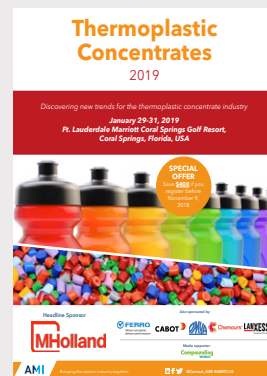
## PLASTICS REGULATIONS USA 2018



Following two successful events in Europe, AMI's first North American Plastics Regulations conference takes place in Pittsburgh, PA, USA, on 11-12 December and will examine the evolving nature of US and global chemical, plastics and food contact regulation.

[CLICK HERE TO DOWNLOAD](#)

## THERMOPLASTIC CONCENTRATES 2019



Now in its 22nd edition, Thermoplastics Concentrates 2019 is the essential meeting point for all involved in the production and use of concentrates in North America. The 2019 event takes place in Coral Springs, FL, USA on 29-31 January.

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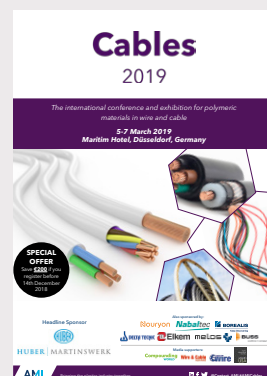
## PIPELINE COATING EUROPE 2019



AMI's 11th Pipeline Coating conference returns to Vienna in Austria on 12-14 February 2019. This high level international event examines the very latest developments in pipe coating materials and application technology.

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## CABLES 2019



Taking place in Dusseldorf in Germany on 5-7 March 2019, AMI's 19th Cables conference will explore the key commercial and technical innovations in polymer-based materials for cable industry applications.

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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](http://www.ami.international/events)

### Duro

<b>Head office:</b>	Goiania, Brazil
<b>Chairman:</b>	Leonardo Brito Ferreira
<b>Ownership:</b>	Private
<b>Profile:</b>	Duro produces an extensive range of PVC pipes and fittings for the building, sanitation, geo-duct (well-lining) and irrigation markets. In addition, it produces a range of PVC decorative lining products. All of its products are distributed across Brazil.
<b>Product lines:</b>	The company offers several types of pipe, for various applications. It has three PVC pipe products in its geoduct (Geoduto) range, for artesian wells: Filtro, Revestimento (both available in diameters of 4-6in) and Edutor - available in diameters of 1-2in, for use with submersible pumps. Its sewer pipes are available in diameters of 150 and 200mm, and include an integrated elastic joint. It also boasts a line of pipes for building and construction - including plumbing - in a variety of diameters from 20 to 110mm. There is also an extensive range of fittings. Its irrigation range of pipes - in blue PVC - is available in diameters of 32 to 150mm. Again, the range includes many fittings, including adaptors for fitting the pipe to spraying equipment, taps and tees. Finally, its PVC decorative lining products are available in sizes up to 3m x 10m, and this part of the business also offers coving products and a range of PVC profiles.
<b>Factory locations:</b>	The company has three production facilities in Brazil: its main plant (and headquarters) in Goiania, as well as two others - in Espirito Santo, and in Minas Gerais. At its main plant, the company recently took delivery of a new twin screw extruder from Battenfeld-Cincinnati - adding to the one that it already had. The main use for the new machine is to expand its water well lining production, but it is also used to make pipes for water and sewage transport.

To be considered for 'Extruder of the Month', contact the editor on [lou@pipeandprofile.com](mailto:lou@pipeandprofile.com)

## Pipe and Profile EXTRUSION FORTHCOMING FEATURES

**The next issues of Pipe and Profile Extrusion magazine will have special reports on the following topics:**

### January/February 2019

Engineering plastics and composites  
Screenchangers/melt filtration  
Titanium dioxide trends  
Continuous/batch mixers

### March 2018

Screws/barrels  
Polyolefin developments  
Computer modelling software  
Laboratory extruders

**Editorial submissions should be sent to Lou Reade: [lou@pipeandprofile.com](mailto:lou@pipeandprofile.com)**

**For information on advertising in these issues, please contact:**

**Claire Bishop: [claire.bishop@ami.international](mailto:claire.bishop@ami.international) Tel: +44 (0)1732 682948**

**Levent Tounjer: [levent.tounjer@ami.international](mailto:levent.tounjer@ami.international) Tel: +44 (0)117 314 8183**



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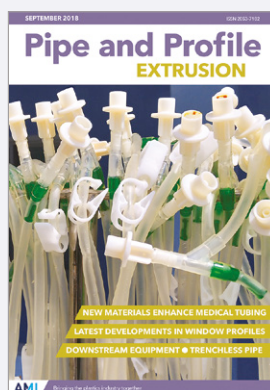
AMI publishes five process-specific FREE plastics industry magazines. Simply click on the cover below to read each magazine. Or download the issue in the relevant Apple or Android app



## Pipe and Profile October 2018

The October edition of Pipe and Profile Extrusion magazine has features taking an in-depth look at pipe inspection, oriented PVC, advances in materials handling and new methods for in situ pipe production. The edition also previews AMI's Conductive Plastics conference.

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## Pipe and Profile September 2018

The September edition of Pipe and Profile Extrusion features medical tubing, window profiles, trenchless pipe technology, PVC additives and news of AMI's first Extrusion Expo in Cleveland, US, in May 2019.

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## Compounding World November 2018

The November edition of Compounding World contains features on bio-based polyesters, mixing technologies, carbon black and additives for active packaging. Plus there is a review of Fakuma and key findings from AMI's European polymer distribution report.

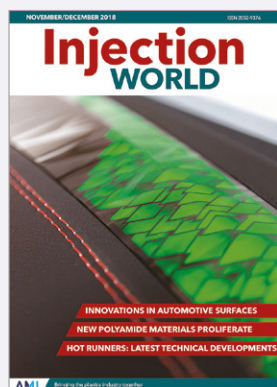
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## Plastics Recycling World September/October 2018

The September/October edition of Plastics Recycling World looks at the equipment on offer for direct recycling to sheet. Plus, exclusive analysis of Europe's recycling capacity needs and a review of the latest optical sorting technologies.

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## Injection World November/December 2018

The November/December edition of Injection World magazine reviews the latest innovations in automotive surface decoration. It also takes a look at developments in hot runner technology and polyamide compounds.

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## Film and Sheet November 2018

The November edition of Film and Sheet Extrusion has features looking at developments in the sheet sector, construction market, thin wall packaging and active packaging. Plus, AMI analysis of the European distribution market.

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EXTRUSION

**Pipe and Profile**  
EXTRUSION

**Injection**  
WORLD

**Plastics Recycling**  
WORLD

## GLOBAL EXHIBITION GUIDE

2018	<b>27-30 November</b>	DMP Mould, Plastics & Packaging, Dongguan, China	<a href="http://www.dmpshow.com">www.dmpshow.com</a>
	<b>5-7 December</b>	Plastic Japan, Chiba, Japan	<a href="http://www.plas.jp/en">www.plas.jp/en</a>
	<b>5-8 December</b>	Plast Eurasia, Istanbul, Turkey	<a href="http://www.plasteurasia.com/en">www.plasteurasia.com/en</a>
2019	<b>5-8 January</b>	ArabPlast, Dubai	<a href="http://www.arabplast.info">www.arabplast.info</a>
	<b>9-12 January</b>	Plastex, Cairo, Egypt	<a href="http://www.plastex-online.com">www.plastex-online.com</a>
	<b>27-30 January</b>	Saudi Plastics & Petrochem, Jeddah	<a href="http://www.saudipp.com">www.saudipp.com</a>
	<b>29 January - 1 February</b>	Interplastica, Moscow, Russia	<a href="http://www.interplastica.de">www.interplastica.de</a>
	<b>28 February - 4 March</b>	Indiaplast, Delhi	<a href="http://www.indiaplast.org">www.indiaplast.org</a>
	<b>12-14 March</b>	JEC World, Paris, France	<a href="http://www.jeccomposites.com">www.jeccomposites.com</a>
	<b>12-16 March</b>	Koplas, Seoul, South Korea	<a href="http://www.koplas.com">www.koplas.com</a>
	<b>19-21 March</b>	EU Coatings Show, Nuremberg, Germany	<a href="http://www.european-coatings-show.com">www.european-coatings-show.com</a>
	<b>25-29 March</b>	Plástico Brasil, São Paulo, Brazil	<a href="http://www.plasticobrasil.com.br">www.plasticobrasil.com.br</a>
	<b>8-12 April</b>	Feiplastic, Sao Paulo, Brazil	<a href="http://www.feiplastic.com.br">www.feiplastic.com.br</a>
	<b>8-9 May</b>	Extrusion Expo, Cleveland, USA	<a href="http://www.extrusion-expo.com">www.extrusion-expo.com</a>
	<b>21-24 May</b>	Chinaplas, Guangzhou, China	<a href="http://www.chinaplasonline.com">www.chinaplasonline.com</a>
	<b>21-24 May</b>	Moulding Expo, Stuttgart, Germany	<a href="http://www.moulding-expo.com">www.moulding-expo.com</a>
	<b>18-21 September</b>	T-Plas/Tiprex, Bangkok, Thailand	<a href="http://www.tplas.com">www.tplas.com</a>
	<b>16-23 October</b>	K2019, Dusseldorf, Germany	<a href="http://www.k-online.com">www.k-online.com</a>


## AMI CONFERENCES

<b>26-27 February 2019</b>	PVC Formulation, Pittsburgh, USA
<b>27-28 March 2019</b>	Polymers for Oil & Gas Engineering, Kuala Lumpur
<b>1-3 April 2019</b>	PVC Formulation, Cologne, Germany
<b>9-10 April 2019</b>	Plastic Pipes in Infrastructure, Dusseldorf, Germany
<b>4-5 June 2019</b>	Profiles, Pittsburgh, USA
<b>25-26 June 2019</b>	Medical Tubing, Berlin, Germany

For information on all these events and other conferences on film, sheet, pipe and packaging applications, see [www.ami.international](http://www.ami.international)

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