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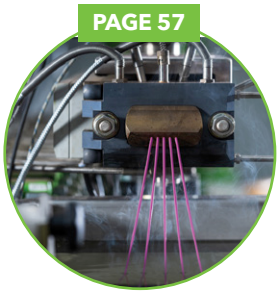

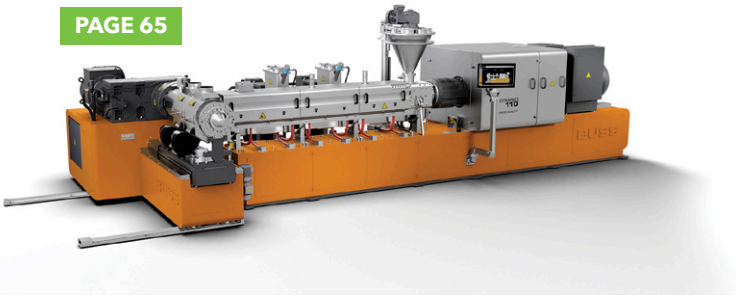

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Sirmax keeps up the pace with strong results

Technical compounder Sirmax Group will continue to invest in an expansion programme, it said as it revealed revenues had reached €215m in the first half of 2024, up from €200m in H1 2023, driven by a 10% increase in sales volumes.

"These strong results are the outcome of four years of investments totalling €180m, which include doubling capacity in the US and Poland, a 10% increase in European production capacity, and acquisitions in the recycled plastics (SER, now Sirmax New Life) and bio sectors (Microtec, now Sirmax)," the group said.

Looking ahead, Sirmax's 2025-27 industrial plan includes €30m in new investments. It said it will continue its international expansion, including the group's 14th production plant in Hosur, India which is planned for completion by 2026, and further investments at its facility in Anderson, US.

Sirmax developed materials used to make the recycled plastic components of Technogym's new generation of Excite fitness equipment

IMAGE: TECHNOGYM/SIRMAX

Sirmax celebrated its 60th anniversary with an event at its headquarters in Cittadella, Padua, Italy in September. President and CEO Massimo Pavin said to assembled guests: "The history of Sirmax is a story of unexpected opportunities and the unique qualities of the people involved. But it is also a story of keen market awareness and the courage to invest. Sirmax would not have reached its current achievements without entrepreneurial tenacity and a cohesive team capable of executing ideas and business strategies."

He said the group's strength lies in both product and geographic diversification. As an example, he said that while the appliance sector has remained flat, Sirmax has increased production volumes by gaining market share with circular products. Another advantage is having localised value chains, with short supply lines directly in the regions where it operates, he said.

Sirmax employs 850 people, and had turnover of €410m in 2023.

› **https://sirmax.com**

LYB closes loop in Germany

LyondellBasell (LYB) is investing in a new closed-loop preparation centre in Lich, Germany, which supports the company's integrated hub strategy and brings together existing assets with new advanced sorting and recycling capabilities.

The facility is expected to reach commercial scale in the fourth quarter of 2024. LYB said the investment aligns with the company's goal to produce at least 2m tpa of recycled and renewable-based polymers annually by 2030.

The recycling centre is using mechanical recycling technology to transform end-of-life automotive and appliance plastics, such as bumpers and trim, into high-quality recycled materials. These recycled materials will be incorporated into the LYB CirculenRecover product range, targeted at demanding applications.

› **www.lyondellbasell.com**

Sabo forms subsidiary in North America

Italian additives group Sabo has launched Sabo International Americas, a new subsidiary based in Orlando, Florida, US, to better serve downstream companies in North America such as masterbatch/compound manufacturers and plastic converters.

The move follows on from acquisition of the TAA (triacetonamine) and TAA derivatives business and assets from Evonik last year. TAA derivatives are used as precursors for production of HALS light stabilisers.

Germano Peverelli, CEO and Chairman of Sabo, said: "After more than 15 years of steady growth for Sabo, a new development phase has arrived and lays the basis for the new global expansion targets and the consolidation of business relationships that focus on fast and effective technical and commercial service".

The US subsidiary joins the other three locations in Europe and Asia, which the company says will strengthen its global presence.

The US subsidiary offers a complete range of HALS additives as well as high-performance antifog and antistatic additives, including USDA-certified BioPreferred grades.

Songwon, the long-standing partner of Sabo, will continue to distribute HALS to North American polymer manufacturers.

› **https://sabo.com**

Fluoropolymers sector faces tough scrutiny, industry is told

The regulatory risks and potential opportunities around PFAS-containing products were discussed at a workshop event in Brussels, Belgium, in September, organised by AMI, the publisher of *Compounding World*.

Fluoropolymers are one part of the universe of PFAS products that are facing intensified regulatory pressure in the EU and North America due to environmental and health concerns about the persistence of PFAS.

Around 40,000 tpa of fluoropolymers are sold in the EU28/EEA region, said Cedric Triquet from Chemours Group at the event, where he was representing the Fluoropolymers Product Group (FPG) Management Committee at PlasticsEurope.

He said the materials are "indispensable to sectors such as renewable energy, semiconductors, defence, healthcare, and infrastructure, all pivotal for Europe's economic growth, competitiveness, critical autonomy and sustainability".

The FPG has developed a Manufacturing Programme for fluoropolymer manufacturing sites in Europe and it is due to report on emission reductions at these sites in early 2025, he said.

The EU announced in early 2023 a proposal for a universal PFAS restriction which would come into force in 2025 or 2026. The EU's consultation process is considering proposed derogations from the restriction for certain applications where alternatives are not yet available.

Theresa Kjell, (below) Head of Chemicals Policy at ChemSec, spoke at the AMI PFAS Workshop

IMAGE: CHEMSEC

Theresa Kjell, Head of Chemicals Policy at ChemSec in Sweden, said it is "an enormous task" for any company to study the large number of chemicals in the EU restriction dossier and attempt to work out if its own PFAS-containing products will be affected. She said ChemSec had been studying PFAS for years but the EU's move "changes everything".

"Change is happening," Kjell told industry delegates at the workshop, "the question is how to tap into opportunities in the PFAS-free market."

The global fluoropolymers market was worth approximately $8.38bn in 2023, said Richard Shepherd, Senior Consultant at AMI, who stressed that market estimates vary widely. Compound annual growth rates of 5-6% would increase the market size to $13.90bn in 2033, which he said is based on AMI's interpretation of available data in an ongoing project.

Seals in energy applications are made of fluoroelastomers because of their very strong performance in chemical and thermal resistance, and viable alternatives do not currently exist, said Shepherd.

Alan Taylor, Technology Fellow at TWI in the UK, said: "There is no alternative chemistry to replace fluoropolymers for seals with chemical, thermal, plasma and radioactive resistance."

In the area of PFAS-containing coatings, he said TWI is investigating siloxane-based materials as potential alternatives. TWI is planning a joint industry project to provide support to industry partners.

■ To register your interest in AMI Consulting's work in PFAS contact Astrid Della Porta **astrid.dellaporta@amiplastics.com.**

Covestro to build TPU application centre in China

Covestro has announced it will start construction of a new TPU APAC application development centre in Guangzhou, China.

The centre is designed to integrate technical acumen with innovative solutions and tailored services in key applications including paint protection films, specialty cables, consumer electronics, footwear and further extrusion and injection moulding applications, said the company.

The new centre follows on from Covestro's commencement in 2023 of a project to build its largest TPU plant in the nearby coastal city of Zhuhai.

Construction in Guangzhou is set to begin in late 2024, with the facility expected to become operational in 2025.

› **www.covestro.com**

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Pilot plant uses CO_2 as plastics feedstock

Finnish research centre VTT and partners have opened a pilot plant to convert captured carbon dioxide into compounds such as plastics and chemicals – without relying on petroleum.

It forms part of the Forest Cump research project, investigating how bio-based CO_2 from sources like the forestry industry can be captured and converted into products such as polypropylene and polyethylene (PP and PE).

"Finland has huge potential to be one of the leading countries in using bio-based carbon dioxide," said Juha Lehtonen, who is research professor at VTT.

Finland produces around 30 million tonnes of bio-based carbon dioxide per year, said Lehtonen.

If this is captured and converted, the country could become a major producer and exporter of polymers and transport fuels made from carbon dioxide and hydrogen, he added.

IMAGE: VTT

The pilot plant, built in sea containers in the Bioruukki pilot centre in Espoo, Finland, began operations in August.

"The technology creates a significant export opportunity for renewable products," said Lehtonen.

"Due to its extensive forest industry, Finland has a huge potential to utilise bio-based carbon dioxide. Outside the Nordic countries, large sources of bio-based carbon dioxide are rare," he added.

Partners in the Forest Cump project, which runs until the end of this year, include Borealis, Neste, ABB, VTT and LUT University.

› **www.vtt.fi**

IN BRIEF...

Gabriel-Chemie is introducing a new generation of masterbatch solutions for stadium seating, combining flame retardancy, UV protection, and colour with a focus on sustainability.
www.gabriel-chemie.com

Tilo Quink has been appointed Senior VP Performance Additives at **Arkema** replacing Laurent Tellier who moves to Senior VP High Performance Polymers and Fluorogases.
www.arkema.com

Tosaf's production facilities for white and additive masterbatches have been certified to ISO 22000, which comprises strict specifications around production and processing, transport, storage and labelling of products used in the food industry.
www.tosaf.com

Henning Karbstein has taken over the management of **Kraiburg TPE** for the Americas.
www.kraiburg-tpe.com

New Avient colorant uses recycled content

IMAGE: ISTOCK

Avient has launched OnColor REC Polymer Colorants which have been formulated with pigments derived from recycled content, including end-of-life tyres.

It says the colorants can perform comparably to traditional carbon black in plastics. They are versatile, can be used in multiple resins, and are available in standard and custom colour formulations.

In addition, the colorants meet strict regulatory requirements, passing REACH and RoHS standards, as certified by TÜV Rheinland. Proposition 65 letters are also available.

OnColor REC Polymer Colorants are available in the US and Canada for sectors including automotive, wire and cable, building and construction, appliances and E&E.

› **https://avient.com**

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AMI | Events

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IMAGE: D ELDRIDGE

The audience at the Plastics Recycling World Expo in Brussels

EC makes slow progress on mass balance method

The European Commission (EC) is inching closer to making a decision on which allocation method chemical recycling companies must use for the mass balance approach in calculating recycled plastics output from their facilities.

"We have been intensively discussing this internally," said Julia Roettgerding, Policy Officer in the DG Environment Circular Economy Unit, in a keynote speech at the Plastics Recycling World Expo in Brussels in September. "We are very much aware of the urgency in giving certainty."

There have been lengthy discussions about mass balance with EU member states, which are continuing, she said. The EC's attempts to reach a decision have been further delayed as new Commissioners appointed after EU elections in June have set up their departmental teams.

When plastics waste is used with virgin feedstock in a petrochemical plant, mass balance enables a company to say a proportion of the plant's output is recycled (more details **here**). Some aspects of what the EC will permit have been decided, such as not allowing a company to transfer mass balance credits between sites.

Roettgerding said that in its discussions with member states, the EC supports the Fuel Use Excluded method for calculating the amount of recycled products, which provides a freer allocation than the Proportional and Polymers Only options. The EC's decision on the allocation method is crucial for chemical recycling companies whose investment plans are based on being able to allocate at a higher level of recycled products.

The EC is also working on connected elements such as chemical traceability to make a clear link between waste input and the product.

› **https://commission.europa.eu**

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Nanocomposites expand their application base

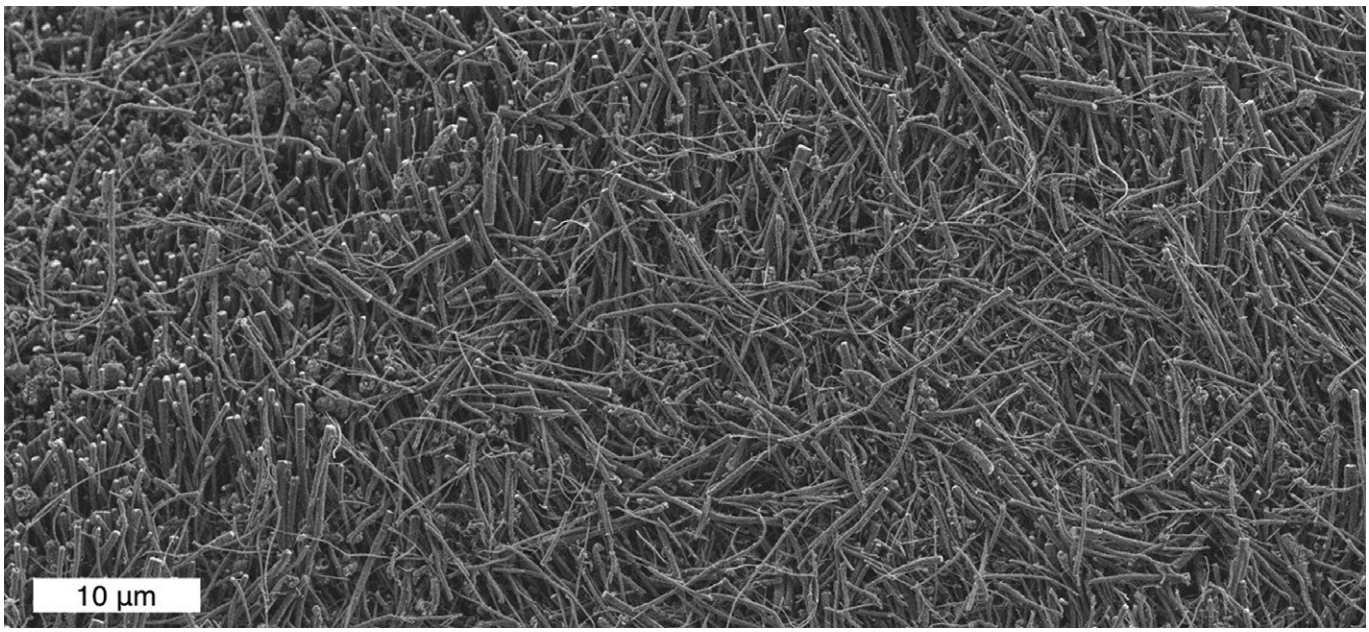


IMAGE: TRIMTABS

Graphene and carbon nanotubes are finding increasing commercial applications in thermoplastic compounds in sectors such as automotive, aerospace and consumer goods. Jennifer Markarian investigates

Nano-scale reinforcements, such as graphene and carbon nanotubes, offer high performance properties at low addition levels. Historically, these materials have been challenging to exfoliate and disperse, but new technologies help lower this technical barrier. At the same time, costs are coming down.

"I'm seeing a lot of advancements in material science and in scaling carbon nanotubes and graphene up so they're not so cost-prohibitive," said Jeremy Lizotte, Director of Innovation at Tennessee-based **Insight Polymers & Compounding**. "Companies making graphene and carbon nanotubes are trying to grow, and getting into plastics is one of their strategies."

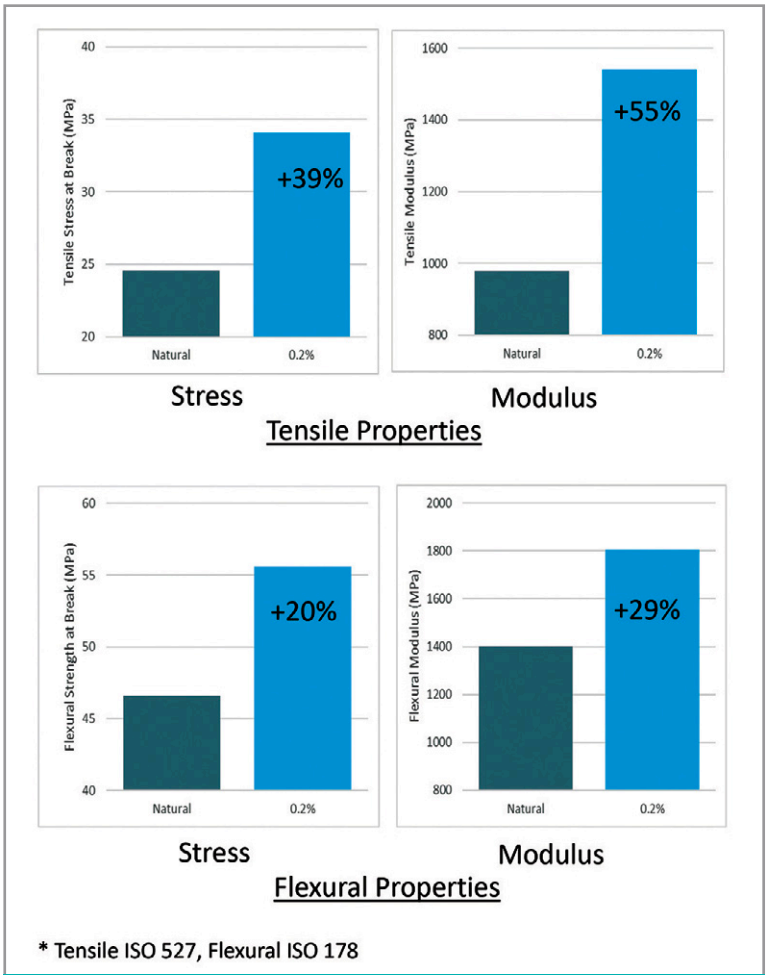
The company plans to bring new products to market based on carbon nanotubes. "These products would allow reduction of other additives like carbon fibre or carbon black, resulting in a composition with improved or comparable performance properties that process more easily or handle post-processing operations in a more robust manner," said Lizotte.

In producing nanocomposites, the form and surface properties of the nano-scale additive are critical and have to be adjusted to optimise the compound and achieve the promised, theoretical benefits, added AJ Pasquale, Co-founder and Director of Operations at Insight Polymers.

Sal Monte, President and Owner of **Kenrich Petrochemicals**, points to his company's titanates and zirconates that act at the interface to address these surface property issues. "A challenge with graphene is that it needs to be exfoliated in the finished product to deliver performance, and that once it is exfoliated, it tends to reagglomerate. Coupling agents are often used to help solve problems of agglomeration and dispersion. But another challenge is that the graphene surface is non-reactive with silanes, which means the surface must be treated before it can be functionalised with silane-based coupling agents," Monte said.

"Unlike silanes, however, the 1.5 nm titanates and

Main image: Scanning electron microscope image of carbon nanotubes produced by TrimTabs



GEM X23M – 10% graphene nanoplatelets in PP
Source: Black Swan Graphene

zirconates from Kenrich form atomic monolayers on the carbon surface via proton coordination, in situ, helping exfoliation and preventing reagglomeration. In addition, the titanate or zirconate reacts with the polymer phase, forming covalent bonds between the graphene and the polymer, which allows stress transfer over the graphene-polymer interface, to improve impact strength and flexibility." Monte said that this bond has been shown to have long-term strength in aging tests.

"So much know-how goes into using this technology properly," he said. There are different methods for appropriately coupling in situ, depending on the formulation of the compound, the polymer type, the equipment used, and other variables. Once the right level and processing conditions are identified for a given situation, the additive will perform, Monte said. "I predict that titanates and zirconates will be for graphene composites what silanes are for fibreglass composites," he concluded.

Canada-based **Black Swan Graphene** launched its GraphCore 01 family of graphene nanoplatelets products for plastics. The additives can improve mechanical properties, as well as barrier, chemical resistance, thermal properties and processing. They are available in various forms, including powders and masterbatches, directly from the company or globally through its distributors, Thomas Swan & Co, Gerdau Graphene, and Hubron International.

Graphene grows

Black Swan announced a strategic partnership in January this year with **Hubron**, which specialises in plastic masterbatch and conductive compound manufacturing. An aim of the collaboration is to facilitate commercial adoption of graphene in a range of sectors including automotive, construction, consumer goods, food packaging, and industrial.

Black Swan reports that in industrial trials it has seen improved properties in various polymers, including TPU, PA6/66, PLA, HDPE, LDPE, PET, PC and PP. With a 0.2% loading in PP, for example, the company reports a greater than 20% improvement in impact properties. In PLA, the company has seen a more than 40% improvement in barrier properties with 1% graphene.

Products added to the GraphCore product line include Graphene Enhanced Masterbatch (GEM) X23M for PP used in automotive and packaging to enhance impact resistance, GEM S24M for PP used to improve tensile in fibres, GEM D26M to improve tensile properties in PA6, and GEM B25L for TPU. In TPU applications such as fan or conveyor belts and consumer goods, the additive enhances tensile strength and elasticity, and can allow weight reduction.

Black Swan's latest addition is a 10% graphene nanoplatelet masterbatch in HDPE, which the company says improves mechanical properties, such as strength and durability, particularly for packaging and film applications. The new GEM S27M also allows improved properties in recycled PE compounds.

In July this year, Black Swan announced an agreement with UK-based masterbatch manufacturer **Broadway Colours**. Broadway will manufacture GEMs for markets including consumer goods, packaging, automotive, construction, defence, marine and logistics. A new product being developed uses a bio-based polymer as the carrier.

Black Swan's materials have been independently tested by the Graphene Engineering Innovation Center (GEIC) at the University of Manchester in the UK, which helps companies launch technologies using graphene.

Researchers at the **Warwick Manufacturing Group** (WMG) at University of Warwick's International Institute for Nanocomposites Manufacturing

IMAGE: WMG

Left: Institute for Nanocomposites Manufacturing at the Warwick Manufacturing Group at University of Warwick in the UK

in the UK have worked with graphene producer **Versarien** to launch a series of Polygrene plastic compounds and masterbatches using Versarien's Nanene graphene powders and other nanomaterials. The researchers have looked at HDPE and at pushing the boundaries of engineering thermoplastics. Versarien reports that mechanical properties could be improved without compromising any other properties. In TPU, for example, Polygrene (at less than 1%) improved abrasion resistance. They also found improved processability, with reduced cycle times (due to increased cyrstallisation temperature) and higher throughputs, for example. In specialty polymers such as PEEK, Polygrene significantly improves toughness.

Applications could include sports equipment, construction products, and aerospace or automotive components. Versarien is developing the Polygrene-E family for electrically conductive compounds with EMI shielding and static dissipative properties. These compounds have higher levels of fillers and combinations of Polygrene with other filler types. Because graphene is not abrasive, higher levels can be used without damaging equipment.

Canadian graphene producer **Nanoxplore** announced in January this year that it had increased production capacity of its plant in Quebec to meet the need for an existing customer's lightweighting initiative in thermoset sheet moulding compounds (SMC). The company is also seeing steady growth in sales of its graphene-enhanced thermoplastics, including PE, PP, TPO, and nylons, said Nima Moghimian, R&D Director at Nanoxplore.

New graphene masterbatches made with 100% recycled resins are also growing in demand. "These masterbatches are used as additives, particularly

Comparative thermo-gravimetric analysis showing purity (multi-wall carbon nanotube content) of TrimTabs compared to industrial standards

Source: TrimTabs

Sample	Description	CNT content (wt%)
Rice University HiPco SWCNT (HPR 195.3)	Industrial standard	75.64
Commercial HiPco	Industrial standard	17.91
TrimTabs	TrimTabs benchtop	91.4
TrimTabs (TTY23-08)	TrimTabs production	77.2
TrimTabs (TTY23-09)	TrimTabs production	86.0

for balancing the physical properties and processability of plastics. They are cost-competitive and help customers meet their ESG [environmental, social and governance] requirements," said Moghimian.

Lyten 3D Graphene can be engineered at the nanoscale, says California-headquartered materials producer **Lyten**. The company is growing – it expanded its California manufacturing facility in 2022 – and is setting up its European R&D headquarters in Luxembourg, with further plans being made to build manufacturing facilities in Europe and the US. The company's graphene materials go into various applications, including battery cells and sensors, as well as composite materials. In late 2022, the company launched a PE compound with 3D Graphene that can reduce weight by up to 35%. The company says the graphene additive is "infinitely tunable" to optimise strength, stiffness, and thermal and electrical properties.

The three-year Graphene Alliance for Sustainable Multifunctional Materials to Tackle Environmental Challenges **(GIANCE)** project, funded by the EU's Horizon Europe program, began in October 2023 and is a consortium of 23 partners aiming to develop and produce materials based on graphene and related substances for applications including automotive and aerospace. The project will support the ongoing EU Graphene Flagship initiative.

At the **AMIPP** Advanced Polymer Center at Rutgers, the State University of New Jersey in the US, Principal Investigator Tom Nosker continues to develop new materials using the university's patented technology for in-situ exfoliation of graphite into graphene that takes place in a modified extruder. The graphene polymer matrix composites (G-PMCs) made using this low-cost, scalable, in-situ process have much improved stiffness that makes them suitable for automotive parts, such as body panels and bumpers. In addition, the composites are still thermoplastic and can be used in conventional thermoplastic converting processes.

Recently, Nosker has developed a patent-pending process for a new composite that compounds carbon fibre into the exfoliated G-PMC. This composite, tested in multiple different plastics, has very high specific stiffness and strength that exceeds that of aircraft aluminium (per unit weight) and retains the processability of a thermoplastic material. The combination of the two reinforcing additives of significantly different minor dimensions – the graphene at approximately 0.33 nm and the carbon fibre at 20 microns – proved to be beneficial, Nosker explains. The work was performed in the Rutgers centre and the group is working with a potential scale-up partner.

Carbon nanotubes

Versions of carbon nanotubes include multi-wall (MWCNTs) and single-wall (SWCNTs) that are used to provide electrical conductivity as well as improve mechanical properties. New ways of manufacturing carbon nanotubes are being developed.

TrimTabs, a Wales, UK-based process technology company launched in 2019, is developing a new low-cost, continuous method of producing carbon nanotubes from hydrocarbons, including carbon from both pigmented and unpigmented plastic waste. The patented process uses only 15 kW of electrical energy to heat and catalytically convert waste plastic into carbon nanotubes, explains Alvin Orbaek White, CEO of TrimTabs. "When we started using plastics as a carbon source, we quickly found that certain plastics, used at 1-10% in the feedstock mix, had a beneficial effect on yields," said Orbaek White.

The company recently commissioned its first close-to-commercial-scale production unit and is in conversations with potential partners and customers. The next phase will be a commercial-scale, micro-factory that can be built within two shipping containers so that it is able to be deployed anywhere and can be located near or even within a user's facility.

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IMAGE: TRIMTABS

Right: David Ryan (left) and Alvin Orbaek White (right) from TrimTabs standing by the company's new carbon nanotubes production unit at its facility in Bridgend, Wales, UK

Each of these factories will be able to produce up to 60 tonnes of carbon nanotubes per year.

"Having a secure supply is a significant concern for CNT users," said Orbaek White. He explained that localised or "onshore" production would provide this security by avoiding shipping disruptions, with the added benefit of reducing shipping costs. "Conventional wisdom says you need to be big to be efficient, but supply-chain concerns make smaller-volume, localised production attractive," he added.

Orbaek White reported that TrimTabs' commercial-scale process makes high purity, high crystallinity CNTs, similar to the quality of CNTs grown in lab scale equipment. "Labs can make high purity CNTs, but on a large scale of several hundred tonnes, this purity is typically not seen. We've found a 'sweet spot' of scaling up to commercial quantities with efficiency, but have retained precision," he said.

Preliminary results show that TrimTabs CNTs are similar quality to those made by Rice University, which Orbaek White sees as a benchmark. TrimTabs is currently making MWCNTs. Some experiments with the company's process have also produced SWCNTs, including some with 9,6 chirality, and the company is working towards optimising a process for SWCNT production. TrimTabs has also demonstrated the ability to make carbon nitride nanotubes in a one-pot method, which is more efficient than the existing, multi-step processes used.

TrimTabs CNTs are designed for use in multiple application areas, including thermoplastics. In automotive thermoplastics, for example, CNTs can be used to make lighter, stronger parts with electrostatic dissipative properties. Other thermoplastic applications are looking for EMI shielding properties or for both electrical and thermal conductivity. The company currently supplies its CNTs as powder but has made masterbatches on a research scale.

Birla Carbon acquired Belgium-based MWCNT producer Nanocyl in October 2023. "Birla Carbon's commitment to driving growth through innovation in sustainability aligns well with the potential for MWCNTs to enable the electrification of the transportation industry," John Loudermilk, Birla's President and CEO, said in the announcement.

Israeli company **Nemo Nanomaterials** has introduced several series of NemoBlend SWCNT masterbatches. The PA6000 series offers electrical conductivity and EMI shielding in PAs, for enclosures, for example. The PE1000 series offers electrical conductivity for PE extrusion applications,

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such as cables and pipes, and for moulding applications. The PP2000 series provides electrical conductivity in PP. The PS4000 series enhances electrical conductivity in ABS or PS, such as in battery covers for electric vehicles. The company reports that it is also developing masterbatches of CNTs with other nano-carbons and halogen-free flame retardants.

The Polymer Industry Cluster, a collaboration of private and public research partners based in Akron, Ohio, recently received US federal funding to create a Sustainable Polymers Tech Hub to advance decarbonisation. One of the topics the group will investigate is sustainable sourcing CNTs from a methane source, as well as production and dispersion into a range of products, including thermoplastic composites. "Our consortium is developing a growing list of priority R&D and technology innovation projects that are suitable for collaboration," said Brian Anderson, Vice President of the Polymer Industry Cluster.

Huntsman, a member of the cluster, is building a 30-ton CNT pilot-scale manufacturing plant to make the company's Miralon CNT structural carbon material, which can be made into pulp (powder), cast sheets, or additives and dispersions for a range of applications, including thermoplastics. The process converts methane to CNT and hydrogen, which the company says is a clean fuel that can lower carbon dioxide emissions. The company is currently in the commissioning phase of the plant.

CLICK ON THE LINKS FOR MORE INFORMATION:

- **https://insightpolymers.com/**
- **www.4kenrich.com**
- **www.blackswangraphene.com**
- **https://hubron.com**
- **https://broadwaycolours.com**
- **https://warwick.ac.uk/**
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- **https://lyten.com/**
- **https://www.giance-project.eu/**
- **https://graphene-flagship.eu/**
- **https://amipp.rutgers.edu/**
- **www.trimtabs.co**
- **www.birlacarbon.com**
- **https://nemonano.com/**
- **https://greaterakronchamber.org (Polymer Industry Cluster)**
- **www.huntsman.com**

IMAGE: AMI

Compounding exhibitors flock to Cleveland event

The North American edition of Compounding World Expo is back in Cleveland, Ohio this November and the number of exhibitors continues to grow. The free event – organised by AMI, the publisher of *Compounding World* magazine – takes place at the Huntington Convention Centre in Cleveland on 13-14 November.

The show is co-located with Plastics Recycling World Expo, Plastics Extrusion World Expo and Polymer Testing World Expo – giving ticket-holders access to four shows, more than 80 conference speakers, and over 350 exhibitors from across the entire supply chain.

The expo features the largest concentration of plastics compounding-related exhibits in the US. Exhibitors include manufacturers of compounding machinery and equipment, as well as suppliers of materials, additives, and related services.

"When we ran these expos in Cleveland last year, they attracted more than 5,100 visitors," said Jenny Amaru, expos business manager at AMI. "This provides a great opportunity to meet and compare suppliers from around the world and learn from business leaders and technical experts in the conference theatres."

At the free conference sessions – featuring more than 80 speakers in four dedicated theatres – delegates can discover the latest innovations and best practices in plastics. Within the Compounding World Expo conference, hot topics in compounding including market outlooks, technology trends and regulatory developments will be discussed in company presentations and industry debates.

On the evening of 13 November, attendees and exhibitors can attend a networking party at the Punch Bowl Social (tickets are US$60).

On the following pages, we present some of the numerous exhibitors at the event that form key elements in the compounding value chain.

For more details on the exhibition, click **HERE**.
For more details on the conference, click **HERE**.

IMAGE: AKDENIZ CHEMSON

Right: Akdeniz Chemson specialises in PVC stabilisers

3V Sigma is a provider of plastic additives including a wide range of HALS products in various forms, allowing for tailored stabilisation systems that enhance the performance of plastic products.
› **www.3vsigmausa.com**

Aangee Compounds is an India-based developer and manufacturer of high quality additives and colour masterbatches for the plastics industry.
› **https://aangee.com**

AdvanSix is a manufacturer of PA 6 resin and PA 6/66 co-polymer used in a variety of applications, including automotive components, packaging, and sporting goods.
› **www.advansix.com**

Akdeniz Chemson, a leading manufacturer of polymer additives, specialises in PVC stabilisers and offers tailor-made solutions to meet customer demands.
› **www.akdenizchemson.com**

ALAC International is a key player in chemical distribution and logistics, providing quality chemicals to industries such as plastics and automotive.
› **www.alacinternational.com**

Alandro Plastic Resources is a plastic compounding company based in the USA, producing sustainable resins that meet OEM standards.
› **www.alandro.com**

IMAGE: BAERLOCHER

Above: Baeropol T-Blend stabiliser from Baerlocher

American Cutting Edge is a leading supplier of machine knives and industrial razor blades, committed to making cutting effortless for their clients.
› **https://americancuttingedge.com**

American Industrial Products specialises in filtration solutions, providing filtration elements, gaskets, seals, spare parts, and equipment to various industries.
› **www.ameinpro.com**

Amfine Chemical is a manufacturer of polymer additives utilising the global leading technology from Adeka Corporation.
› **www.amfine.com**

Ampacet showcases AI automation for colour correction in extrusion and moulding processes with LIAD Smart technology.
› **www.ampacet.com**

ArrowPoint is a leader in offering high quality fluorescent pigments and specialty products.
› **www.arrowpnt.com**

Asaclean is the global industry leader in commercial purging compounds, offering a comprehensive product line that includes mechanical, chemical, and concentrate grades.
› **www.asaclean.com**

Asahi Kasei is a multinational company based in Japan, producing styrenic thermoplastic elastomer/SEBS called TUFTEC and S.O.E.
› **www.akelastomer.com**

Circular Polymers by **Ascend** transform post-consumer carpet into new raw materials for various industries.
› **www.circularpolymers.com**

AsiaPalm produces several single stabilisers at its base in Indonesia.
› **www.asiapalm.com**

Aurora Plastics offers advanced polymer solutions for multiple applications.
› **https://auroramaterialsolutions.com**

AZO provides innovative bulk and raw material handling, pneumatic conveying systems, mixer feeding, screeners and bulk containers.
› **www.azo.com**

Baerlocher USA is a leading manufacturer of additives for the plastics industry, delivering tailored solutions in an ethical and supportive manner.
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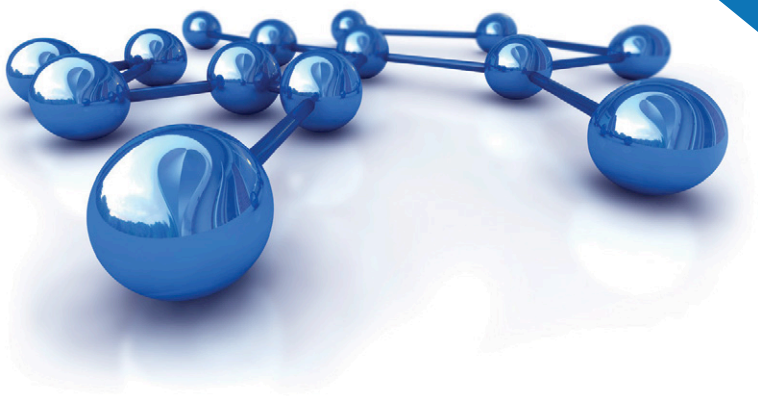

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Birch Plastics specialises in compounding and recycling, offering FDA-approved recycled polypropylene, PCR HDPE pellets, and various virgin resin options in truckload quantities, along with recycling services.
› **www.birchplastics.com**

Birla Carbon is a global leader in carbon black, providing solutions for rubber and specialty applications.
› **www.birlacarbon.com**

BoMET Polymer Solutions processes e-scrap plastics in North America, offering sorting, grinding, and pelletising services, and supplying PCR ABS and other plastic materials.
› **http://bometpolymersolutions.com**

Brabender produces rheology and extrusion equipment for material quality testing, with a focus on customer-oriented service and support.
› **www.brabender.com**

Bronkhorst USA provides fluidics handling solutions, including meters and controllers for low flow applications.
› **www.bronkhorstusa.com**

Budenheim focuses on phosphate-based products, flame retardants, and innovative solutions for plastics recycling.
› **www.budenheim.com**

BUSS is a leader in compounding and pelletising systems, with the versatile BUSS Kneader being widely used in various industries.
› **https://busscorp.com**

BYK supplies specialty additives to enhance product quality and streamline production processes.
› **www.byk.com**

CA Picard produces parts for extruders, specialising in twin screw and single screw segmented machines.
› **www.capicard.com**

Cabot supplies specialty carbons, conductive carbons, masterbatches and conductive compounds that can deliver a range of performance attributes.
› **www.cabotcorp.com**

CAI Performance Additives says its product portfolio offers odour control, process enhance-

IMAGE: CANNON INSTRUMENT

Above: MiniPV-H viscometer from Cannon Instrument

ment, anti-scratch, and more.
› **www.caiadditives.com**

Calcean Minerals & Materials processes oolitic aragonite, a sustainable and renewable calcium carbonate product for a range of applications.
› **www.calcean.com**

Cannon Instrument is a global leader in viscosity instrumentation, partnering with trusted brands for various physical testing needs.
› **https://cannoninstrument.com**

Carolina Filters offers technical cleaning services and solutions for metallic filtration challenges.
› **www.carolinapec.com/**

CFI Carbon Products supplies high-quality fillers for industries like rubber, silicone, plastics, and coatings, with a commitment to quality, sustainability, and customer satisfaction.
› **www.cficarbonproducts.com**

Chemigon provides engineered plastics and additive solutions to the manufacturing sector, focusing on technical support and distribution services in the US.
› **https://chemigon.com**

Chemyork is a global supplier of specialty chemicals and raw materials, offering products like plastic additives, TPE compounds, and engineering plastics compounds.
› **https://chemyork.com**

Chroma Color specialises in colour concentrates serving diverse markets, with custom solutions and technical expertise meeting industry standards.
› **https://chromacolors.com**

Cimbar Performance Minerals is a global supplier of mineral-based additives, with 16 production and mining sites worldwide.
› **https://cimbar.com**

Clariant operates an additives business which supplies products with functional effects in plastics, coatings, inks, adhesives, textiles, fibres, and more.
› **www.clariant.com**

ColVisTec provides inline spectroscopy solutions for continuous operations and R&D, detecting and displaying process variations in real time, allowing for immediate intervention to prevent off-spec material production.
www.colvistec.de

Conair is a leading supplier of plastics auxiliary equipment, including resin drying systems, blenders, feeders, and material-conveying systems, serving various industries.
› **www.conairgroup.com**

Coperion is a global leader in compounding and extrusion systems, catering to industries such as plastics, recycling, chemical, food, and pharmaceutical.
› **www.coperion.com**

Corporacion Sierra Madre manufactures chemical specialties tailored to customer needs, offering competitive advantages in quality, functionality, performance, cost, and service attitude.
› **https://www.linkedin.com/company/corp-sierra-madre**

Covia provides mineral-based solutions for a wide range of plastics applications, focusing on physical, chemical, and optical properties.
› **www.coviacorp.com**

CPM is a leader in equipment manufacturing, specialising in twin and multi-screw systems for various industries.
› **https://onecpm.com**

Dorstener Wire Tech specialises in polymer filtration components and extruder screens to enhance throughput and reduce costs.
› **https://dwt-inc.com/**

IMAGE: COPERION

Right: Coperion's ProRate PLUS feeder series

Double Bond Chemicals focuses on fine chemicals for the polymer and UV-coating industries, prioritising safety and environmental care.
› **www.dbc.com.tw**

Dover Chemical produces a range of chemical products and additives, including flame retardants and antioxidant blends..
› **www.doverchem.com**

Dreytek is a global distributor offering specialty polymers and polymer additives.
› **www.dreytek.com**

ECON North America specialises in underwater pelletising technologies and screen changers, providing innovative solutions for global producers of resins, compounders, and recycling companies.
› **www.econ-us.com**

Ecoplast, based in Canada, produces wood-plastic composites using over 50% wood residues, reducing greenhouse emissions compared to traditional plastics.
› **www.ecoplast.ca**

Ecopuro focuses on advanced materials technologies with innovations like Boundary Breaker for improving material flow in thermoplastics.
› **https://ecopuro.com**

Ensign Equipment offers bulk material handling equipment worldwide for a wide range of applications.
› **https://ensigneq.com**

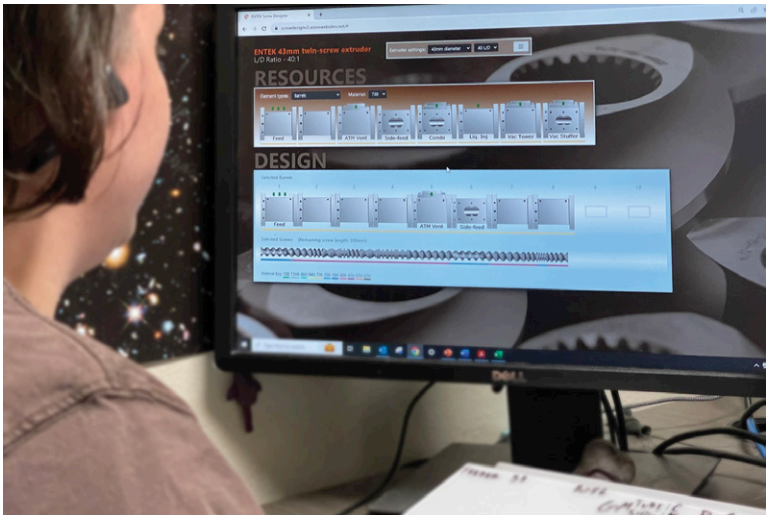

IMAGE: ENTEK

Above: Screw Layout Designer 2.0 system from ENTEK

Entec Polymers is a leading thermoplastic distributor offering a wide range of resins and compounds supported by experienced sales representatives and technical engineering.
› **www.entecpolymers.com**

ENTEK manufactures extrusion systems and components for various applications, providing turnkey solutions for custom compounding and compounding lines.
› **www.entek.com**

ENTEX specialises in planetary roller extruders for continuous mixing and processing in industries such as plastics, rubber, and chemicals.
› **www.entex.de**

Extreme Coatings offers wear-resistant solutions for machinery components, such as encapsulated

feedscrews, to extend their lifespan and maximise production efficiency.
› **https://extremecoatings.net**

Exxel Polymers says plastic scraps in the form of parts, granules or beads are recovered and analysed in order to meet its customers' moulding specifications.
› **https://exxelpolymers.com**

Farrel Pomini manufactures compounding systems, including the Farrel Continuous Mixer which is designed for distributive and dispersive mixing with low processing temperatures, enhancing efficiency.
› **www.farrel-pomini.com**

IMAGE: GÖTTFERT

Above: MI40 Melt Flow Index instrument from Göttfert

Finite Fiber's product line includes cellulose, cotton, nylon, polyester, carbon, and aramid fibres and fibre blends.
› **www.finitefiber.com**

FP-Pigments focuses on engineered specialty Opacity Pigments, offering cost-saving solutions.
› **www.fp-pigments.com**

Frigosystem specialises in industrial chillers and temperature controllers, emphasising innovation and efficiency.
› **www.frigosystem.it**

Galata Chemicals produces PVC additives for a range of industries globally.
› **www.galatachemicals.com**

Gehring Montgomery distributes high-quality chemicals for the compounding industry, including flame retardants and waxes.
› **www.gehring-montgomery.com**

General Polymers Thermoplastic Materials focuses on providing solutions for compounded and engineering resins, with partners including Asahi Kasei, Elix Polymers and Polyplastics.
› **www.gp-materials.com**

Global-Pak specialises in bulk packaging solutions with a focus on customer service.
› **www.global-pak.com**

Göttfert offers a range of rheological testing technology for various applications in the polymer industry.
› **www.goettfert.com**

Harwick Standard is a supplier of raw materials and additives for plastics, rubber, coatings, and adhesives,and has partnerships with producers based in North America, Europe and Asia.
› **www.harwick.com**

Helluva Container specialises in high-quality used and new Gaylord boxes, FIBC bulk bags, liners, films, tapes, and pallets.
› **www.helluva.com**

Herbold Meckesheim serves recyclers of post-consumer plastic waste using advanced technology that emphasises low energy consumption, ease of maintenance, and wear protection.
› **www.herbold.com**

Heritage Plastics develops calcium carbonate concentrates to improve the performance and productivity of plastic resins, offering solutions to offset rising resin costs.
› **www.heritage-plastics.com**

Holland Colours Americas is a producer of custom colourants and additives for plastics, coatings, and fabrics with a focus on sustainability.
› **www.hollandcolours.com**

Horizon Systems provides customised material handling and process solutions for the plastics industry, focusing on quality control, safety, and efficiency.
› **www.horizonsystemsinc.com**

ID Additives offers a range of chemical foaming agents, purging compounds, plastic mould cleaners, preventative maintenance cleaning systems, and other additives for the plastics industry.
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IMCD operates across the USA, providing specialty chemicals and ingredients from global producers to develop innovative solutions.
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IMI Fabi is a leading talc manufacturer serving the plastics industry among others.
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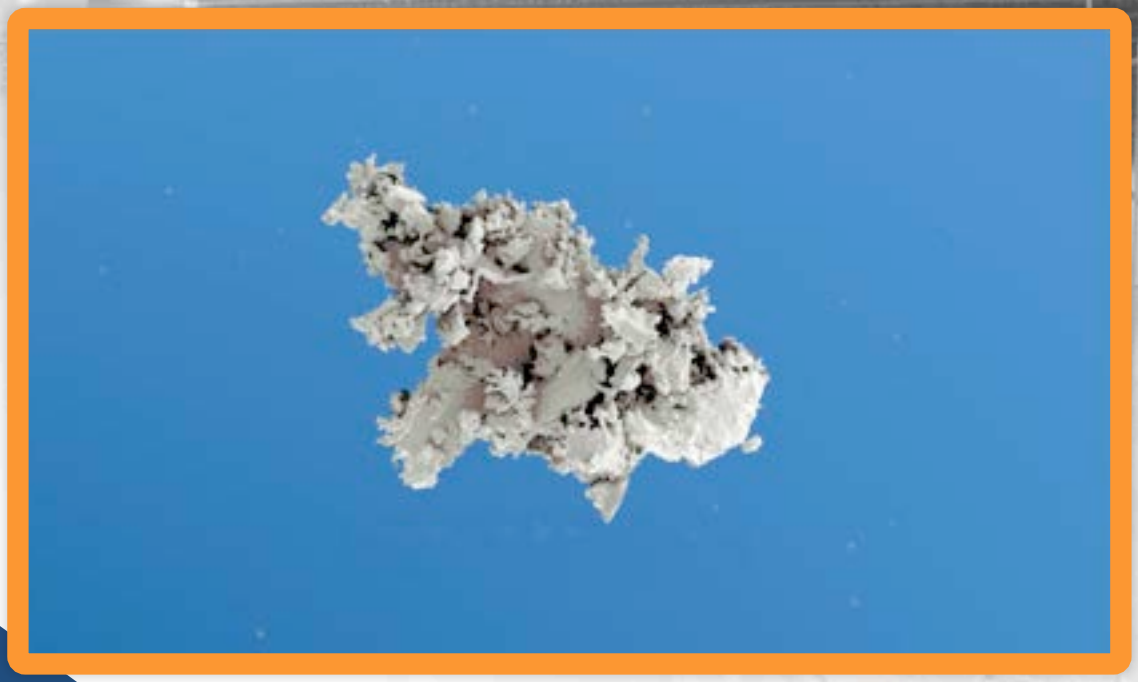

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PMMAI We Shape Plastics... Plastics Machinery Manufacturers Association of India

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IMAGE: LEISTRITZ

Left: Leistritz technology includes its Maxx line of twin screw compounding extruders

Imperial Industries fabricates industrial bulk storage tanks for various applications.
› **www.imperialind.com**

Insight Polymers & Compounding specialises in providing solutions for custom and specialty polymer compounds, offering concentrate masterbatches and fully formulated systems.
› **https://insightpolymers.com**

Intertek offers extensive experience in supporting chemical and polymer companies with polymer analysis and testing services to ensure quality and safety standards are met.
› **www.intertek.com**

J Rettenmaier USA has more than 90 production and sales locations worldwide, providing plant fibre technology solutions for various industries.
› **www.jrsusa.com**

Japan Steel Works (JSW) America manufactures a wide range of process equipment, namely, extruder/pelletising systems, twin screw compounding extruders, film sheet machines and spinning extruders.
› **www.jswamerica.com**

J-Tec Material Handling provides automated material handling systems and process engineering solutions for the food and chemical industries.
› **https://j-tec.com**

Kal-Polymers is a compounder of recycled plastic raw materials, specialising in PP, PE, PET, and PS, among others.
› **www.kalpolymers.com**

Kaneka North America provides innovative additive solutions for the plastics industry.
› **www.kaneka.com**

Keller USA specialises in air filtration technology, offering solutions for capturing and filtering airborne particles during industrial processes.
› **www.kellerusa.com**

Kisuma Americas supplies magnesium-based technology for polymer and pharmaceutical/nutraceutical additives.
› **https://kisuma.com/**

KraussMaffei is a leading manufacturer of machines and systems for plastic and rubber production, with a wide range of technologies in injection

moulding and, extrusion and compounding.
› **www.kraussmaffei.com/en/home**

Kubota Brabender Technologie manufactures feeding solutions for various industries, offering a range of feed mechanisms and agitation systems.
› **www.kubota-btca.com**

Lawer specialises in industrial weighing systems, providing technologies for the automatic weighing of powder and liquid products.
› **www.lawer.com**

Leistritz Extrusion manufactures twin screw extruders for various applications, including compounding and film and sheet systems.
› **http://extruders.leistritz.com**

Lianda distributes high-performance elastomers and specialty chemicals for the rubber industry, offering strong technical support and expertise in product applications.
› **www.liandacorp.com**

Lindor Products is a leading manufacturer of polymer soaking equipment, known for their gentle processing technique.
› **https://lindor.nl/**

MAAG Americas provides customisable systems and integrated solutions in process technology for the polymer and chemical industries.
› **https://maag.com/**

Magris Talc is a leading talc producer, supplying quality products for industrial applications globally.
› **www.magrispm.com**

Matium is a company that specialises in extruder screen filtration products.
› **www.matium.io**

Meridian Manufacturing focuses on toll grinding plastic polymers and ingredients for the polymer industry using various equipment.
› **www.meridianmfg.com**

Mettle Filtration Products supplies all types of extruder screens, hard-to-find mesh, and extra heavy wire cloth.
› **www.mettlefiltration.com**

Midwest Elastomers is a toll manufacturing company in polymers, adhesives and ingredients.
› **www.midwestelastomers.com**

IMAGE: MAAG

Right: Ettlinger ECO 350 melt filtration unit from MAAG

Milliken has an additive portfolio which enables the use of virgin and recycled polypropylene and polyethylene in new products.
› **www.milliken.com**

Mine Plastik is a masterbatch and plastic additive manufacturer based in Turkey.
› **https://minecolours.com.tr/en**

Mitsubishi Chemical America provides high-quality polymeric additives for manufacturers and compounders.
› **https://us.mitsubishi-chemical.com/**

Mitsui Chemicals America produces specialty chemicals and high-performance polymers for North and South American markets.
› **https://us.mitsuichemicals.com/**

Mixaco USA is a leading supplier of mixing systems for the PVC Industry.
› **www.mixaco.com/**

Mixron offers advanced mixing systems for polymers and various other industries.
› **www.mixron.it**

Modern Dispersions produces a wide variety of colour, specialty, and additive products for different applications.
› **www.moderndispersions.com**

Nanox Technologies provides sustainable solutions for companies using nanotechnology.
› **www.nanoxtech.com**

NanoXplore is a graphene company that manufactures industrial volume graphene using proprietary

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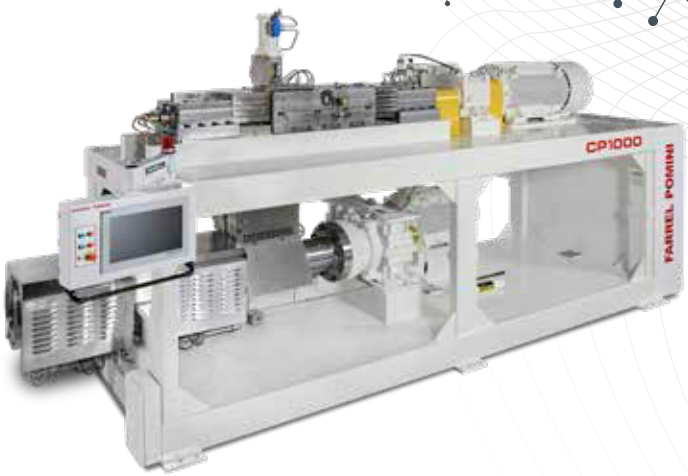

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technology to produce graphene powder.
› **https://nanoxplore.ca**

NASCA Elastomers designs high-functional materials for various industries.
› **www.nascatpe.com**

National Bulk Equipment (NBE) specialises in designing and engineering equipment for bulk material handling applications, such as conveying, mixing, and storage.
› **www.nbe-inc.com**

NeoGraf Solutions is a leader in manufacturing carbon and graphite products, such as graphite sheets and powders for various applications.
› **www.neograf.com**

Neomat Distribution is a distributor of elastomers and plastics, staffed mainly with engineers and chemists.
› **www.neomatdistribution.com**

NOF America is a producer of plastic additives to improve wear resistance and anti-scratch properties, reduce friction, prevent squeak noise, among other benefits.
› **www.nofamerica.com**

Norac Additives has been in the metallic stearate business for over 50 years, offering PVC additives like heat stabilisers and lubricants.
› **www.noracadditives.com**

O.A. Newton specialises in material handling solutions for industries worldwide, providing innovative conveying and compounding systems.
› **www.oanewton.com**

Orbetron offers extrusion and precision bulk feeding solutions.
› **https://orbetron.com**

Orion is a market leader in carbon black with over 160 years of experience.
› **https://orioncarbons.com**

Orion Performance Compounds is a thermoplastic compounding company based in SC, USA.
› **www.orioncompounding.com**

IMAGE: PLASMEC

Right: Plas Mec's mixer portfolio includes heating/ cooling models

Orrex is an independent toll compounder specialising in reactive extrusion and complex compounding.
› **https://orrex.com**

Palmarole, based in Switzerland, is a team of trading and marketing consultants with expertise in additives sourcing, product promotion, project consulting, research, and market trends.
› **www.palmarole.com**

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› **www.perryvidex.com**

PGI Plastics is a thermoplastic resins distributor in the USA, Canada and Mexico, and also trades materials worldwide.
› **https://pgiplastics.com**

PINFA North America is a not for profit trade organisation of non halogenated flame retardant additive manufacturers, synergist suppliers, compounders, formulators and related organisations.
› **www.pinfa-na.org**

PLAS MEC specialises in manufacturing equipment and accessories for mixing plastic materials, technical polymers, powder coatings resins, wood-plastic composites, and more.
› **www.plasmec.it**

Plastic Systems USA produces advanced plastic solutions for various industries such as automotive, pharmaceutical, PET, and construction.
› **www.plasticsystems.it**

Plastical is a calcium carbonate masterbatch producer located in Alabama, catering to industries like film, sheet, thermoforming, injection moulding, and more.
› **https://plasti-cal.com**

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› **www.plasticsmg.com**

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› **https://pmc-group.com**

Polybol is a plastic and laminated bag manufacturer, as well as a specialist in tubular form-fill-seal films and barrier liner products.
› **https://polybol.com**

PolyChem Alloy is a company listed on the China Stock Exchange which manufactures resins for automotive interior, exterior, and under the hood.
› **www.polychemalloy.com**

Polychem Dispersions is located in the major industrial hub of Middlefield, OH, where it has grown to become a leader in custom rubber and plastics dispersion compounding.
› **www.dispersions.com**

Polystar Containment specialises in manufacturing and installing custom spill prevention systems that meet SPCC requirements.
› **www.polystarcontainment.com**

Polyvel produces plastic additive masterbatches and custom compounds for various industries such as film, fibre and moulding.
› **www.polyvel.com**

PRET Advanced Materials is a Shanghai-based company focusing on automotive plastics, compounding materials like PA6, PP, and ABS.
› **http://wellmanam.com**

Prism Worldwide transforms tyre rubber into performance-oriented circular polymers used in TPEs, thermoplastics, vulcanisates, and asphalt.
› **https://prismww.com**

IMAGE: RELIANCE MIXERS

Left: PVC mixer manufactured by Reliance Mixers

PromaXX Extrusion provides high-quality spare parts and services for twin-screw extruders, including wear-resistant components and maintenance equipment.
› **www.promaxx.com.cn**

Re-cre8 offers general and industrial plastics recycling solutions for America's plastic waste problems.
› **https://re-cre8.com**

Reliance Mixers manufactures mixing and compounding equipment for materials like PVC, providing customised solutions for homogenous mixing processes.
› **www.reliancemixers.com**

Rianlon Americas is a supplier of antioxidants and light stabilisers for polymers, coatings, and lubricants.
› **www.rianlon.com**

Romaplas is a distributor of fillers and colour masterbatches, as well as additives for plastics.
› **www.romaplas.com**

Routsis Training offers hands-on and online training programs for the plastics industry, including custom courses in moulding, extrusion, and other processes.
› **www.traininteractive.com/ara**

Royce Global is a New Jersey-based supplier of dyes and specialty chemicals, which offers solvent dyes, colour masterbatches, and various performance additives like nucleating agents for polystyrene foam.
› **www.royceglobal.com**

IMAGE: STEER

Right: An Omega series twin screw compounding extruder from Steer America

SACO AEI Polymers offers specialty additives, including silicone masterbatches, scratch resistance additives, non-halogen flame retardants, and coupling agents for enhanced polymer properties.
› **www.sacoaei.com**

Sasol Chemicals (USA) provides polymer processing additives, plasticisers, waxes, and alcohols used in plastics and rubber manufacturing.
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Schwing Technologies is a leader in thermal cleaning technologies, specialising in removing polymers and organic contaminants from metal tools and machine parts.
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SPE Cleveland and Akron Sections are a professional association for plastics engineers in Cleveland and Akron, promoting knowledge exchange and offering scholarships and partnerships with the University of Akron.
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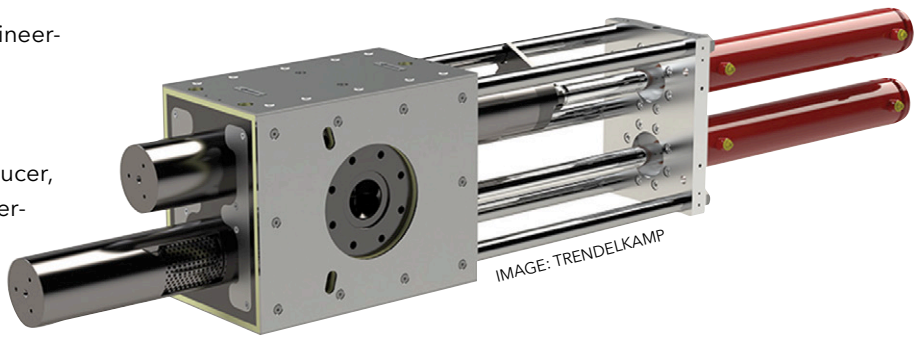

IMAGE: TRENDELKAMP

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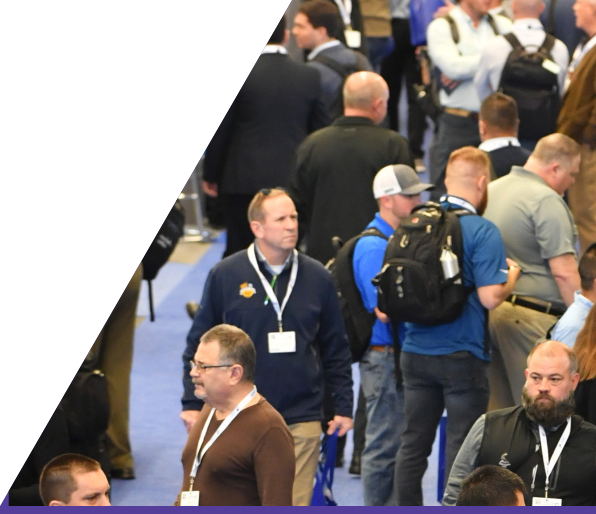

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IMAGE: GABRIEL-CHEMIE

*Stabilisers and property and process improvers are hard at work to protect plastics through use, recycling, and reuse. **Jennifer Markarian** writes about current products*

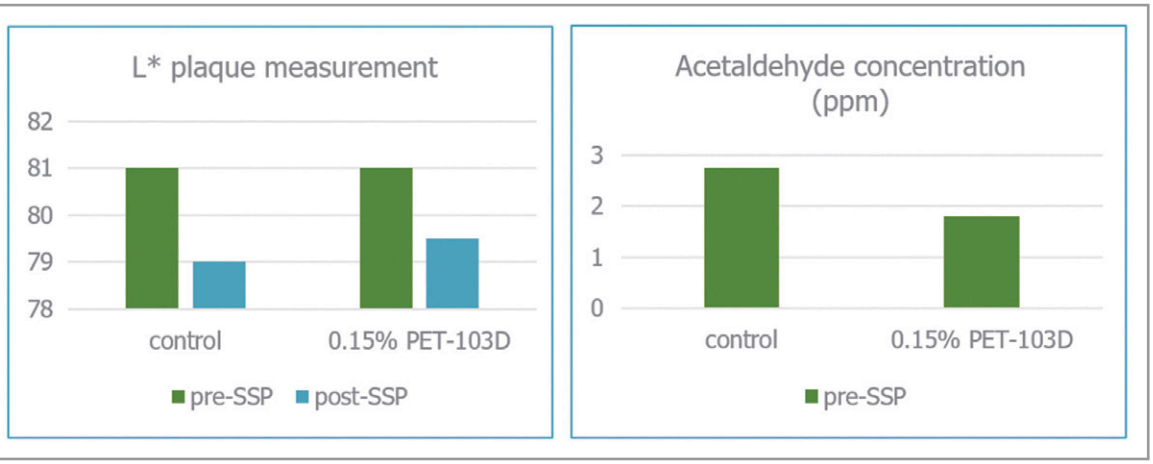
Let's go round again: additives revive plastics

The trend towards increasing recycled plastic content continues as countries move toward plastics circularity. At the same time, there is a growing expectation that recycled plastics should have good performance. Additives play a key role in enabling compounders and recycled resin suppliers to meet this expectation.

"The gap between virgin plastic and recycled plastic performance needs to be closed not only by boosting performance of recycled-virgin blends by compounding, but also by ensuring in the recycling step of the value chain that the best quality recycled resin is produced," said Jeroen Frederix, **SI Group** Market Development Manager, Circular Economy. "It is important to ensure polymers are well protected during the recycling process, where unfortunately today we see that polymers after a first lifetime [may] enter the recycling process with insufficient protection against further heat cycles." To this end, SI Group has developed its Evercycle product portfolio for plastics recyclers which include optimised stabilisation packages for specific material streams and end applications.

Frederix points to Evercycle PET-103D for PET bottle-to-bottle recycling as an example. During recycling, PET thermally degrades, which generates volatiles (such as acetaldehyde [AA]), causes loss of intrinsic viscosity (IV), and leads to yellowing. "Currently in the mechanical recycling process, the rebuilding of the food-grade rPET can be supported by adding blue colorants to offset the yellowing," said Frederix. "A downside of the blue colorants is that they also negatively affect the material's lightness (L*), so when being recycled multiple times, the PET bottle loop becomes darker and darker. Here, stabilisers offer a novel approach for PET recyclers in preventing problems from occurring by stabilising the PET polymer chain in the recycling process, not only preventing yellowing but also reducing AA creation and IV losses during recycling." ›

Main image: Gabriel-Chemie has introduced the MaxiLoop range of compatibilisers for plastics waste streams comprising different materials



Trial results for SI Group's Evercycle PET103D, which was compounded into 100% rPET at 1,500 ppm

Source: SI Group

SI Group is also developing stabilising packages tailored for recycled polypropylene (rPP) that will "close the performance gap" compared to virgin PP and allow compounders to increase recycled content while still maintaining properties, said Frederix. Meeting this dual challenge is important in PP for automotive applications, for example, where OEM specifications must be achieved while also working to add more rPP content, which is being driven by pressures such as the upcoming EU's End-of-Life Vehicle Directive.

"SI Group is currently screening new stabilising blends to improve the long-term heat aging performance for automotive PP compounds. By adding advanced stabilising packages, the performance of the rPP can be enhanced at low additive dosing rates," Frederix said.

Additive insights

Oliver Reich, head of **BASF's** Competence Center Packaging & Circular Solutions, said that BASF has gained additional insight into the interaction of additives and their impact on the quality of recycled materials since the 2021 launch of the company's IrgaCycle additives for recycled plastics. "As more applications beyond packaging – such as automotive, construction and electronics – prepare for mandatory recycled plastic content regulations, BASF is also looking to expand its offering beyond its current standard portfolio," Reich said.

The automotive industry, in particular, is driving demand for more sophisticated solutions. BASF says it is combining its additive offering with other mechanical recycling solutions from BASF, such as the TrinamiX NIR detector and the Chemetall washing solution, to provide converters and recyclers with solutions out of one source.

Clariant's PKG158, which enables greater levels of recyclate to be added in rigid packaging such as blow moulded bottles or injection moulded parts, was expanded to the North American region, the company announced at NPE 2024. The additive is designed to make polyolefins and other polymers "recycle ready" by providing long-term protection for the polymer through multiple heat histories and helping to protect against discoloration. The high efficiency of this additive chemistry allows it to provide robust stabilisation at low additional levels. It also has low migration levels and low plate-out attributes. A similar product for stabilising film products, PKG 196, was introduced at the K 2022 Show; the additive helps reduce gels and allow higher levels of recycle content in thin films and flexible packaging.

"As our customers increase their use of recycled content, we have optimised AddWorks PKG 158 for excellent processability and to enhance the resin for end-of-life plastic recycling," said Eliandro Felipe, Head of Sales Americas for Additives Polymer Solutions.

Dover Chemical's Doverphos LGP12 (liquid green phosphite) has seen success as a stabiliser in recycle streams, where it has been shown to reduce both the size and overall amount of gels in recycled-polyethylene film applications. Shawn Cook, Technical Manager for Plastic Additives at Dover Chemical, reports that the additive allows higher concentrations of recyclate to be used without a loss in finished product quality. In addition to acting as an antioxidant, the additive also acts as a PFAS-free and silicone-free polymer processing aid (PPA), showing both the ability to clear melt fracture in blown film and to reduce die-lip buildup in cast film, Cook said.

LGP12 is a high molecular weight polymeric phosphite, and its high phosphorus content allows it to be used at lower loading levels, both of which contribute to low migration. The additive recently received an endorsement from EFSA in the EU for food contact applications. The additive received US FDA clearance for food contact in LLDPE in 2019 and for HDPE in 2023. The company reports that it

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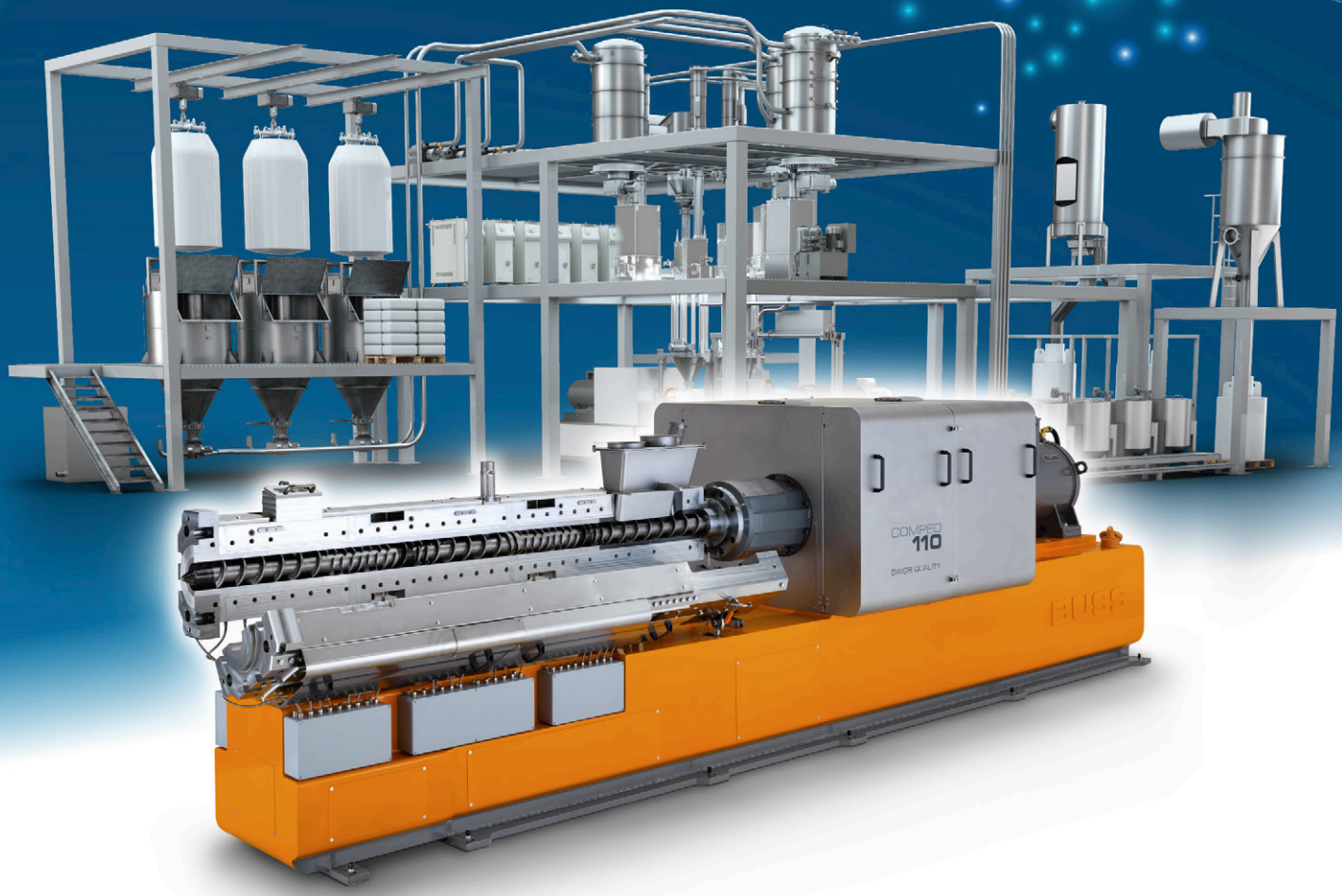

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has recently submitted requests for food-contact approval from other major global regulatory bodies.

Nexam Chemical said that its Reactive Recycling additive masterbatches for rPP can tune flow characteristics and enhance processability and quality. The technology elevates the utility of rPP so it doesn't need to be "downcycled," the company claims.

Nexamite R201 builds molecular weight (ie, decreases melt flow ratio [MFR]) of PP. Nexamite R203 is an enhanced version that also builds molecular weight of rPP. Nexamite R202, on the other hand, is a visbreaking additive that increases MFR and reduces molecular weight, if needed to match the process.

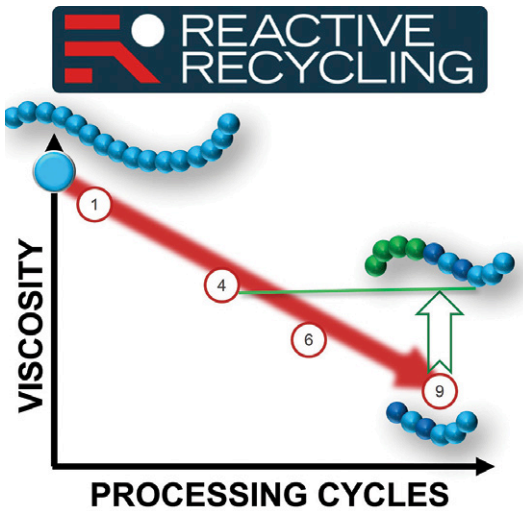
Tuning flow

A study published in March by researchers from the Department of Applied Science and Technology at Politecnico di Torino, Italy, investigated the impact of thermomechanical degradation on PP microstructure during multiple extrusion cycles. PP degrades structurally through chain scission that reduces molecular weight, but a reactive extrusion process with Nexam's additive was able to rebuild the chains. The experiments showed that Nexamite additive is able to prevent breakdown when added to PP and to restore the molecular weight when added to a simulated post-consumer rPP (as shown in the graph). The researchers also found that the additive acted differently depending on the residence time in the extruder; a longer residence time introduced some branches onto the polymer backbone, which improves melt strength and is beneficial for processability. They concluded that the additive would allow "tunable" processability.

For PET, a key measure is intrinsic viscosity. Nexam Chemical said its IV-enhancing additives for rPET are seeing expanded use in multiple regions where rPET use is growing. For example, in the US, IV enhancers are being used in PET foamed sheets, that are used for replacing polystyrene in food packaging. In Pakistan's growing packaging market, locally produced rPET sheets and other types of rPET applications are using the IV enhancers, the company reported in a July press release. Nexam said it is seeing growth also in Australia, Mexico, and South America.

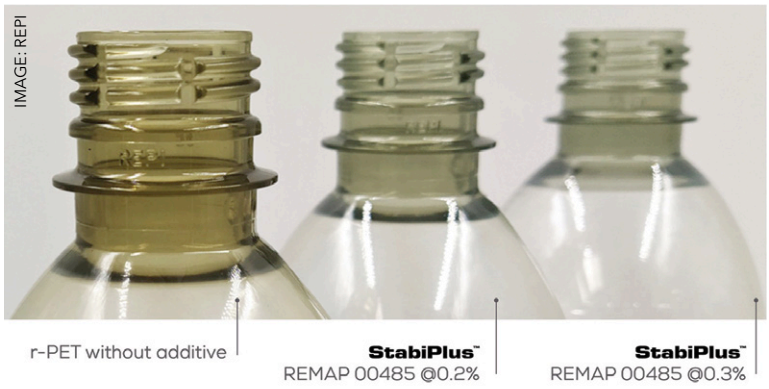
Techmer PM's HiTerra rPET Revive is an additive concentrate that counteracts the degradation experienced during reprocessing of PET. The additive works by rebuilding the polymer chains to increase viscosity and reduce yellowness.

"RPET Revive can allow for a higher regrind/recycle rate and improve productivity," said Steve Smith, Techmer PM's Market Manager for Rigid Packaging, in a release. "We



Polypropylene degrades during reprocessing, and the average molecular weight (MW) typically decreases with each processing cycle. As illustrated in this graph, Nexam's additive was introduced during the ninth processing cycle to simulate addition to post-consumer recyclate. The additive was able to rebuild the MW of PP.

Source: Nexam



Above: StabiPlus from Repi protects rPET from yellowing during mechanical recycling

selected the active ingredient to be compatible with PET resins used in fibre and moulding applications. Converters can use it in the production of thermoformed sheets, and the product is showing good potential for use in bottles, as well." The additive is suitable for food-contact applications.

StabiPlus REMAP 00485 from additive supplier **Repi** is a liquid additive that is added during PET recycling to maintain the brightness (ie, L-value) of rPET, said Karsten Fritsch, Business Development Manager Thermoplastics at Repi. While anti-yellowing additives successfully mask the yellowness that comes from discoloration due to degradation by correcting the b-value, this new functional additive prevents the drop in L-value that is typically seen in rPET. Fritsch explains that the additive can be adjusted depending on the application. The suggested minimum addition rate is 0.134%. The additive does not affect intrinsic viscosity, and it has EU and FDA food contact certifications.

Compatibilisers

Compatibilisers are particularly helpful in recycled plastics streams that may contain multiple polymers or small amounts of one polymer as a contaminant of the primary material. (A range of compatibilisers and coupling agents were described in *Compounding World* May 2024 issue.) Most recently, European masterbatch provider **Gabriel-Chemie** has introduced the MaxiLoop range of compatibilisers, beginning with ten different formulations designed for various recycling applications. The additives are designed to allow increased recycled content by improving miscibility, processability and properties.

One such use is in post-industrial recycling (PIR) of edge trims from film extrusion in the production of multilayer products. Multilayer films made of PE or PP (non-polar polymers) may contain PA6, PA66, or EVOH (polar polymers) in a barrier layer. When the PIR edge trim is put back into the film extruder, the differences in polarity and in flow properties between the polymers can result in defects such as streaks and gels in the film. MaxiLoop HP7AB-4780COM compatibiliser masterbatch improves homogeneity during processing by increasing interfacial adhesion between the polymers, which leads to more stable processing conditions and higher product quality, especially in blown film production, according to Gabriel-Chemie.

MaxiLoop EMA7AB4820MOD is another additive masterbatch designed for recycled polystyrene (rPS), a material which can have high dust formation, brittleness, and low impact resistance. Adding the compatibilising additive improves impact resistance and tensile strength.

Evonik says that its range of Tego Cycle additives, introduced in May 2023, are designed to save energy during mechanical recycling and to improve the quality of recycled plastics. For washing, separation, deinking, and drying, the company's antifoams and wetting agents help make processes more efficient. During compounding of recycled materials, additives that improve processing include dispersants and processing aids. Additives including compatibilisers and Tego Sorb malodour reducers improve product quality.

Evonik points to its Circular Plastics Program as an initiative that, combined with the Tego Cycle additives, can help speed the plastic industry's transformation to a circular economy. For example,

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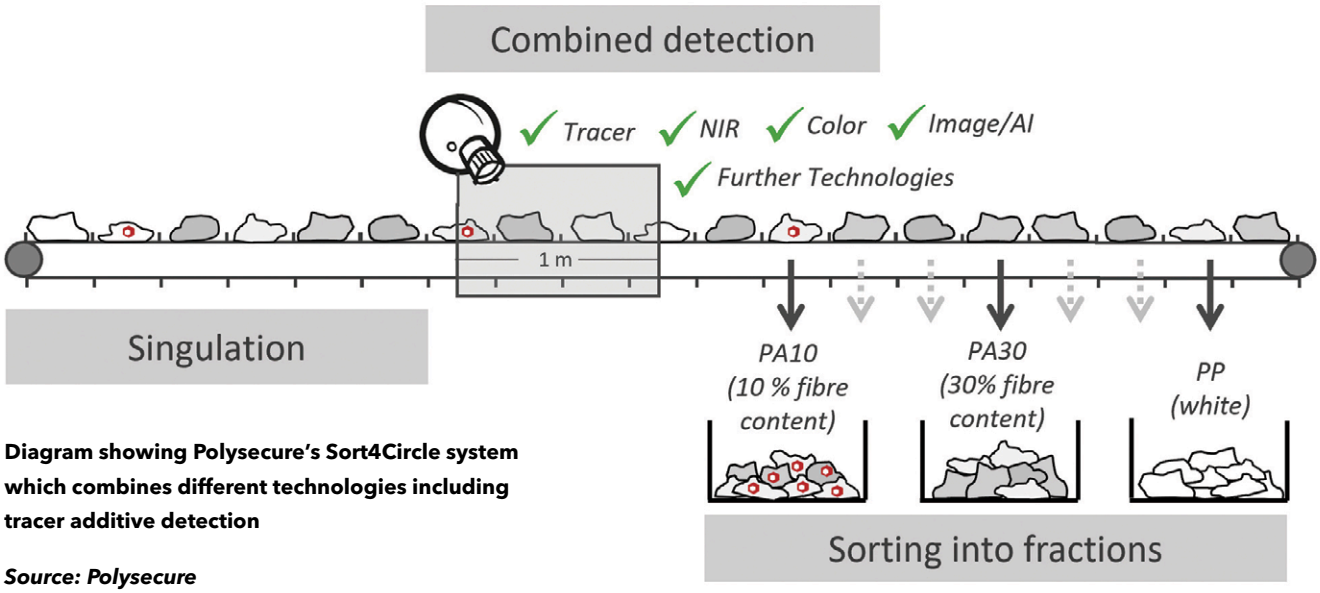

Diagram showing Polysecure's Sort4Circle system which combines different technologies including tracer additive detection

Source: Polysecure

Evonik partnered with the start-up company Wild Plastic to collect litter and make recycled trash bags. The collected material was highly contaminated LDPE, but the partners developed an efficient process to make a suitable product.

Tracking additives

Various projects over the past several years have looked at ways to "track and trace" recycled materials using additives that have been traditionally used to identify counterfeit goods. These additives can be compounded into plastics and detected throughout the supply chain. They could be used in sorting or in quantifying recycled content. Tracking additives include fluorescent markers as well as tracers that can be detected with near infrared (NIR) spectroscopy (see *Compounding World* December 2023 issue).

German technology company **Polysecure** continues to demonstrate its Tracer Based Sorting (TBS) which uses the company's fluorescent particles. Polysecure has also developed the patented Sort4Circle technology, which it says differs from the existing sorting processes that use sequential sorting mechanisms to separate a small number of material groups. Sort4Circle, in contrast, precisely identifies packages or other objects using a single-step sorting mechanism that assigns objects directly to a flexible number of fractions. A new detector module measures material characteristics, such as colour, image, and polymer type, as well as identifying markers such as fluorescent particles, to perform the sortation. The company recently announced a project with Pforzheim University called PräziSort to further develop the technology with funding from the state of Baden-Württemberg.

In another recent project, Polysecure, automotive OEM Hyundai Motor Group and the German Plastics Center (SKZ) performed a feasibility study using the Sort4Circle single-step sorting mechanism with tracer-based sorting on shredded automotive plastics. In the first part of the study, different tracers were added to PP and PA6 at a concentration of 10 ppm during injection moulding. Using Polysecure's PIDEA system, the fluorescence signal of each object was detected. The tracer ratio and code were plotted on a chart, demonstrating complete differentiation between the PP and PA6, with no false positives.

In the second part of the study, marked and unmarked shredded plastics were put through the Sort4Circle detector. The researchers report that more than 90% of the marked objects were identified and sorted, and that the PP and PA6 objects were sorted at 99.9% purity, with only one of over 1,000 objects misclassified. They say that this type of system could be used to reliably sort similar plastics, such as distinguishing between PA6 and PA66, or between plastics with different types of fillers.

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Fakuma puts its focus on plastics sustainability

IMAGE: PE SCGAKK

The 29th Fakuma fair takes place in Germany in October. Ahead of the show, we preview some of the main exhibitors connected with compounding

From 15-19 October, the 29th Fakuma show will take place at the Friedrichshafen exhibition centre in Germany. The event is known as a showcase for injection moulding technology, but there is also a strong showing in 2024 from exhibitors in the materials, extrusion and compounding sectors.

"Last year, we welcomed 1,636 exhibitors from 40 countries in 12 halls," said Annemarie Schur, Fakuma project manager for exhibition organiser PE Schall. "Foreign participants made up 38%, and similar numbers are expected this year."

The event in 2023 marked a recovery from the covid pandemic period when Fakuma was not able to take place as an in-person exhibition.

Fakuma 2024 will have a focus on sustainability. As well as energy efficient machinery, it will feature many sustainable materials, including many recycled grades.

One highlight of this year's event is a 'Round Table' session on Tuesday, 15 October. Five panellists will discuss digitalisation in plastics processing under the heading 'Digitalisation – Top or Flop?' The panellists are: Michael Braungart, founder and scientific director of Braungart EPEA; Philipp Lehner, CEO of Alpla; Guido Frohnhaus, managing director for technology at Arburg; Hans-Josef Endres from the Institute of Plastics and Circular Economy at Leibniz University Hanover; and Thomas Seul from Schmalkalden University of Applied Sciences.

On the following pages, we take a look at some of the companies that will be showing materials or equipment of interest to the compounding sector.

Main image: Visitors at last year's Fakuma exhibition in Friedrichshafen, Germany

About the show

Organiser: PE Schall **Dates:** 15-19 October 2024
Location: Messe Friedrichshafen, Neue Messe 1, 88046 Friedrichshafen, Germany
Hours: Tuesday-Friday 09:00-17:00, Saturday, 09:00-15:00
Tickets: €30 day ticket (€22 students)
www.fakuma-messe.de/en/

Asahi Kasei will showcase a range of materials at Fakuma – for applications including thermal management in electric vehicles (EVs). In batteries, it will show its modified polyphenylene ether (mPPE) Xyron with high non-halogenic flame retardance and low ion elution properties. It is suitable for thermal management applications in EV batteries.

The company will also launch grades of Xyron to boost the efficiency of 5G applications. The combination of PPE with other polymers such as PPS or PS creates compounds with low dielectric properties and a high non-halogenic flame retardance.

› **www.asahi-kasei.com**

Benvic will show at Fakuma that over the past five years it has moved from being a 'pure player' PVC compounder to a solution provider across many polymer platforms, especially in PP, TPEs and halogen free polyolefin materials. In terms of PP materials, Benvic has taken over a performing unit, sold by Celanese, covering design, test and manufacturing in the Ferrara plant. It says this unit has more than 20 years of successful operating experience and is ideally placed to offer PP-based solutions to diverse markets such as automotive, electrical appliances and others.

› **www.benvic.com**

Coperion and **Herbold Meckesheim** will show their expertise in entire systems through virtual animation – with both a compounding plant and a system for recycling plastic. The processes involved can be experienced digitally with the aid of simulation. Customers can test a wide variety of plastic recycling processes and technologies under actual production conditions – in Coperion and Herbold Meckesheim's fully equipped test centres – before they invest.

Along with recycling, at this year's Fakuma, Coperion will present versatile and efficient uses of its ZSK and STS twin screw extruders as well as its feeding and conveying technologies for classic compounding tasks. At the beginning of this year, Coperion introduced a re-worked version of the ZSK 18 MEGAlab laboratory extruder with a newly developed patent-pending feeding platform.

Coperion's ProRate Plus feeder line features new developments. With the ProRate Plus-MT twin screw extruder and the new ProFlow bulk solid activator, an efficient feeding solution for powder additives is now available.

› **www.coperion.com**

› **www.herbold.com**

Eurotec is promoting its engineering compounds at the Fakuma show for various sectors, primarily automotive and transportation, e-mobility, electrical/electronic, home appliances, safety equipments, garden and power tools, construction/agricultural equipment, and furniture. Visitors will be able to discuss about tailor-made solutions for PA, PBT, PP, PET, PC, POM, PPS, PEEK.

Eurotec has sustainable products with ECO and BIO brands which include bio-polyamides, bio and waste fillers (jute fibre, rice husk, sunflower, wood fibre) as well post-industrial and post-consumer recycled PA, PP, PET, PC and PBT based compounds.

› **www.eurotec-ep.com**

FEDDEM will be presenting the latest model of the FED 26 MTS twin-screw extruder with additional aggregates at its stand, as a production machine for small quantities or for use as a pilot plant extruder. The extruder is fitted with 32 L/D and a 10 L/D extension module, 34 kW installed drive power and maximum screw speed of 1,200 rpm. It also features a FSB side feeder, FSV vacuum side degassing unit and FSK extrusion head with FEDDEM's patented sheet die plate.

The FEDDEM Automatic AirBlade was developed to minimise the frequent problem of beard formation in twin-screw extrusion. In the case of complex compounds with a high filler content, this can lead to strand breaks which can significantly impair both productivity and the throughput rate.

› **https://feddem.com**

Finke is highlighting a special proprietary process allows for full exploitation of the entire design range of Fibaplast masterbatches for polyolefins,

Below: Coperion's ZSK 18 MEGAlab laboratory extruder

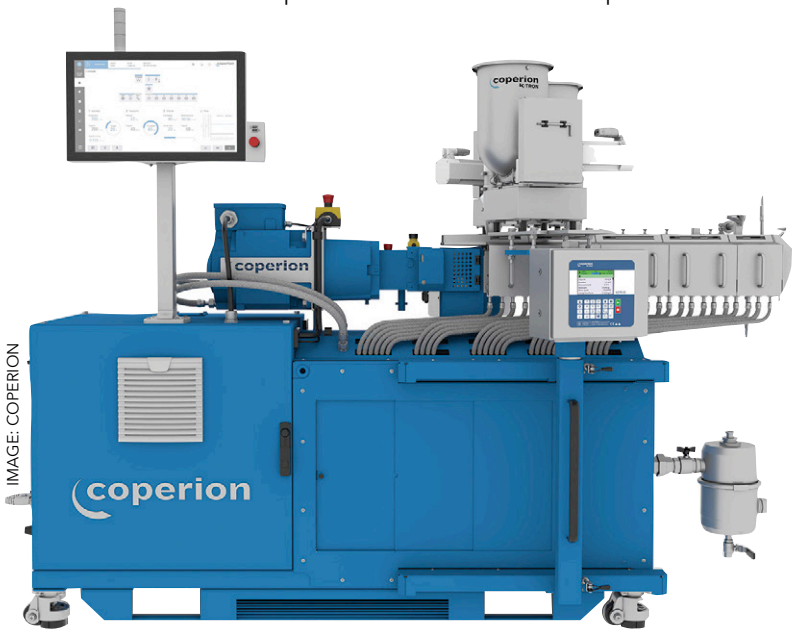

IMAGE: COPERION

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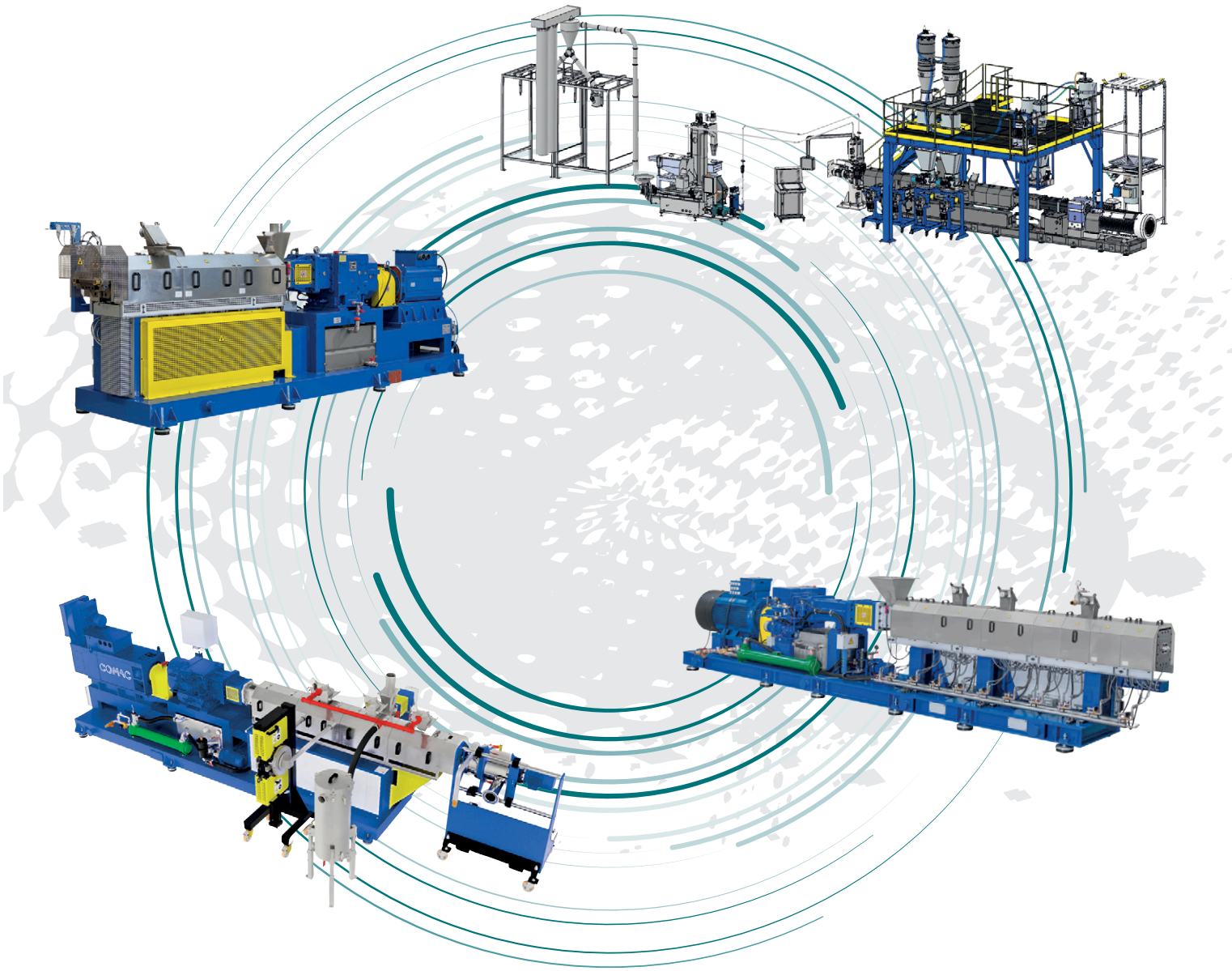

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IMAGE: FEDDEM

Left: FEDDEM FED 26 MTS with additional unit

with a high proportion of recycled material. This is made possible by encasing the core of recycled material in a thin layer of virgin material. With the Fibarec series, Finke has developed a range of completely recyclate-based masterbatches for common thermoplastics. As they can be processed in the same way as masterbatches based on virgin material, they are also ideal as a drop-in solution.

› **https://finke-colors.eu**

Hexpol TPE will present a further expansion of its Dryflex Circular TPE materials containing post-consumer and/or post-industrial recycled content. TPEs with 20 to 75% PCR content are available in hardness range 40 to 95 Shore A. Various colour options are available, including natural. Compared to equivalent virgin TPE grades, these PCR grades enable a product carbon footprint reduction of up to 35%, the company says.

Also newly developed are TPEs with recycled content for multi-component applications. TPEs with 35-60% PCR/PIR content that offer adhesion to PP, PA, PC, PC/ABS and other thermoplastics have been tested according to the VDI 2019 standard.

› **www.hexpoltpe.com**

Hoffmann Mineral will be presenting its products for the first time at Fakuma. The spotlight will be on the new product area of tailored filler solutions developed in collaboration with 3M, whose products are based on hollow glass microspheres, which are targeted at production of low-density

IMAGE: KASPARART/STOCK.ADOBE.COM

Right: Hoffmann Mineral's Sillitin products are used as IR absorbers in greenhouse films

and lightweight thermoplastics. Hoffmann will also highlight its Struktosil talc product and its Sillitin products used as IR absorbers in greenhouse films.
› **www.hoffmann-mineral.com**

Leistritz says its new LinXX control technology enables a comprehensive digital description of the entire extrusion process for extruders and extrusion systems. The system can be used flexibly, from compact extruders to entire production lines, and offers a fully integrated solution for digital control, monitoring and maintenance of extruders of any size.

Another highlight at Fakuma is Leistritz's LinXX Customer Service Portal, a user-friendly online portal that provides customers and Leistritz employees with a comprehensive overview of their extruders, auxiliary units and extrusion lines. Customers can see relevant machine information such as machine number, operating hours, current warning messages and machine documentation clearly presented.
› **www.leistritz.com**

Lifocolor will be presenting masterbatches with new sandstone looks and fine variants of its granite effect in flat film, bottle, jar and cap applications. It will showcase other gold, metallic, frost and multicolour effects as well as trend colours for 2025. A new development is NIR-detectable silver masterbatch for sorting during recycling, in which it has partnered with Eckart.

In addition, Lifocolor will present at its stand various masterbatch concepts for colouring biopolymers and recyclates. Also on show will be laser marking masterbatches.
› **www.lifocolor.de**

Below: Lifocolor is highlighting its masterbatch expertise

MAAG Group will present its Eco series of continuous high-performance melt filters, which are used to filter contaminated polymer melts. For chemical recycling, the technology is outstanding for filtering low viscosity polymers, it says.

MAAG will also display the Pearlo underwater pelletiser, which has been designed for processing a wide range of polymers and thermoplastics. Its strand pelletising system, EBG, is designed for highly filled, hydroscopic and water-sensitive compounds.
› **www.maag.com**

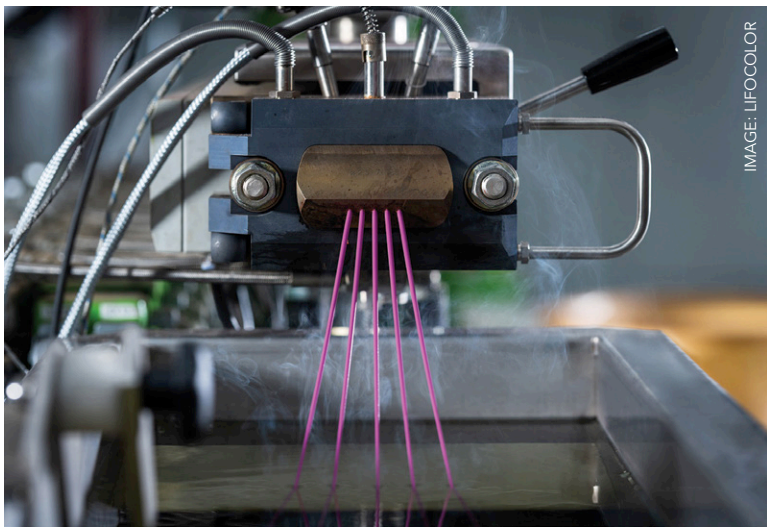

IMAGE: LIFOCOLOR

Moretto will present a range of innovations from across its ancillaries product range – in materials handling and granulation. Gravix is its doser that offers precision in micro-dosing, thanks to digital electronics, a double eyelid shutter device and self-learning.
› **www.moretto.com**

Motan says it will showcase cutting-edge solutions for efficiency and sustainability at Fakuma. The Gravicolor 310 and 610 gravimetric dosing and mixing units feature Motan's cone dosing system, allowing precise mixing of up to eight materials with recipe accuracy. Their modular design ensures optimal performance, flexibility, and reliability in injection moulding, blow moulding, and especially extrusion applications. Among other products being shown by Motan is the SColor V additive dosing and mixing unit for masterbatch and regrind dosing applications, offering quick delivery and cost-effective performance.
› **www.motan-group.com**

At Fakuma, **Movacolor** will show its new Portable Touchscreen Controller (PTC), available across all gravimetric and optometric products. The PTC will replace the MCTC, addressing the need for

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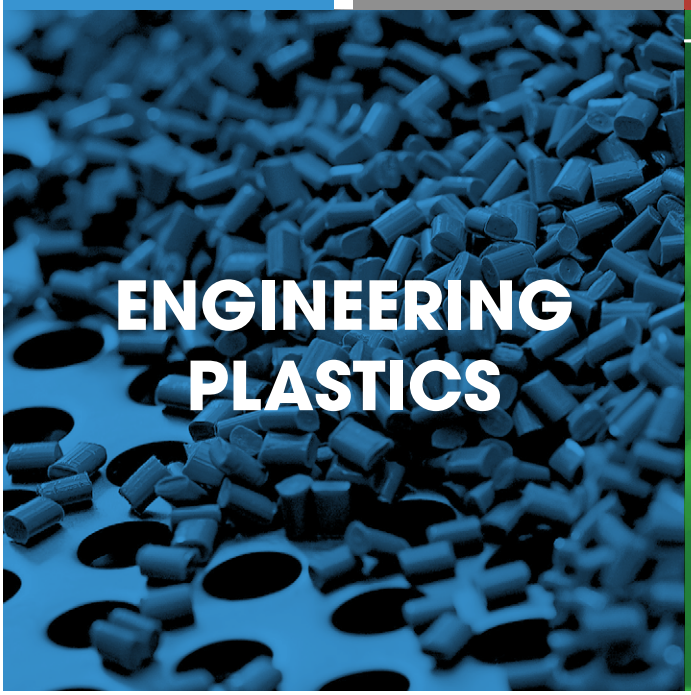


Plastics Engineer

www.tisan.com.tr

Right: Movacolor will show its new Portable Touchscreen Controller available across all its gravimetric and optometric products

increased flexibility during maintenance and production tasks without compromising reliability or usability, said the company.

Features of the PTC include: an 8-inch colour touchscreen; single CAN-bus cable offering up to 15 m of portability; storage capacity for up to 1,000 recipes with Basic Recipe Mode for faster setup times; management of up to 15 gravimetric solutions from one control screen; continuous data logging and process monitoring, ensuring efficient and flexible production management.

› **www.movacolor.com**

Nordmann, in collaboration with its partners and co-exhibitors Repol/UBE, TotalEnergies Corbion and Voelpker, will be promoting a range of new solutions relating to sustainability and recycling. The company will also be showcasing its own range of halogen-free, innovative flame retardants, Nord-Min FRMB.

› **www.nordmann.global**

Pal Plast says its new Palprop Statec will be seen for the first time at Fakuma, a PP compound which is electrically conductive due to a high carbon black content and excellent dispersion. The material is also suitable for the production of transport containers for sensitive electronic components, due to its particularly high impact toughness.

Pal Plast will also introduce a new generation of recycled PMMA compounds, available in piano black or transparent. It says they are ideal for applications requiring the highest optical standards, such as visible parts in the automotive industry or luxurious cosmetic packaging.

› **https://palplast.de**

Below: The IP carrier of the Mini Cooper E is one of the first applications of TechnoCompound's Ready To Use compounds in vehicle interiors

Sukano is making its Fakuma debut at this year's

IMAGE: TECHNOCOMPOUND

IMAGE: MOVACOLOR

event, showcasing its functional and colour masterbatches and compounds. Visiotrs to its stand can learn about the company's NIR-detectable formulations, listed under the COTREP protocol, for high-quality optical sorting of food trays. Sukano says it is also entering the world of high-performance polymers, collaborating closely with customers to develop highly specialised and customised masterbatches and compounds for polysulfones and other durable, temperature- and chemical-resistant materials in its in-house laboratory.

› **www.sukano.com**

Syensqo has extended its Echo portfolio of materials, which includes a number of mass-balanced grades. It claims to have the first mass-balance-certified PSU resins in the market, as part of its Udel and Radel offerings. Also, five new Omnix Echo grades, with recycled content of 33-98% from PCR and PIR sources, are mainly targeted at household appliances and consumer goods.

› **www.syensqo.com**

TechnoCompound is focusing its presence at Fakuma on its growing range of solutions using PCR materials for demanding technical applications. One development priority is on emission- and odour-reduced, long glass fibre compounds for the automotive industry, specifically for vehicle interiors. The company can offer a growing number of TechnoGreen grades based on PP. In addition, TechnoCompound's new Concentrate Dilution Concept makes it possible to blend TechnoFiber LGF compounds for structural components with PCR to achieve the mechanical properties required for the application while at the same time reducing the finished products' carbon footprint to the greatest possible extent.

› **www.technocompound.com**

IMAGE: CPM

Finding the right alternative

*Companies offering alternative compounding technologies are continuing to broaden the scope of their machines. **Chris Saunders** reports on new developments*

Driven by commercial and environmental concerns, as well as a growing need to work with advanced materials where other equipment may be better suited than the traditional twin-screw extruder, in recent years demand for alternative plastic compounding technology has grown. Some backers argue that such equipment is now at the forefront of innovation within the polymer industry, addressing critical challenges related not only to efficiency and material performance, but also wider issues like sustainability and regulatory compliance.

Paul Erdmenger of Bayer is credited with revolutionising plastic extrusion when he developed the original three-lobe co-rotating twin screw design in the 1950s, paving the way for modern compounding technology. Seen as being advantageous over the single screw extruders prevalent at the time due to its flexibility and efficiency, in the ensuing decades the design geometry was honed and enhanced. According to **Niche Polymer**, a 45 mm latest-generation twin screw extruder can achieve the same throughput as a 160 mm twin screw extruder from the 1970s. The twin screw is a workhorse but as with anything else it has its limitations, and technological progress means compounders are no longer bound by them. "Advancements in machine design, scientific understanding, and simulation tools have enhanced the efficiency and flexibility of the compounding process," the company says. "However, the artistry and expertise of process engineers continue to play a crucial role in achieving optimal results."

The company, based in West Virginia, US, offers custom compounding as one of its main services and specialises in tailoring compounds to meet specific requirements and performance criteria, often using unconventional hardware. For Niche Polymer, screw configuration plays a crucial part in its decision-making.

"Our custom-tailored screw configuration program provides cost-effective versatility," the company said. "Computer visualisation depicts the relationship of the screw elements to the extruder barrel, permitting engineers to place the screw elements strategically to maximise control over the process. The program allows Niche's technical staff to quickly and accurately specify a screw that meets the unique mixing requirements of specific projects at the highest possible throughput rate."

This versatile approach has been adopted as compounders revise ways of delivering what their clients require. At the NPE 2024 exhibition in Florida in May, **Farrel Pomini** displayed a new solution for both mechanical and chemical recycling applications

Main image: CPM's ring extruder technology is considered to have great potential in recycling uses, and other areas such as bio-based polymers

showcasing the versatility and flexibility of its Farrel Continuous Mixer (FCM). It says the FCM's low process temperature, short residence time, and efficient rotor shear make it an ideal system for processing temperature-sensitive or prior-heat-history applications, and it has been successfully used to process polylactic acid (PLA), polyhydroxyalkanoates (PHA), and polybutylene succinate (PBS) as well as recycled PVC and film scrap. Representing the company at NPE, Dr Peng Ye also presented promising results from trials to develop bio-based compostable compounds by mixing low-cost wood pulp and bioresins using the FCM with a hot feed extruder mounted on a unitised frame.

The FCM features a single port for feed materials, a hinged clam shell opening chamber, a replaceable tool steel liner, multiple zones of temperature control, three-piece rotor construction, adjustable discharge opening, no thrust bearings, atmospheric venting, and rotor cooling. The level of adaptability it provides means the resulting compound features a fibre level up to 60% and demonstrates high dispersion quality and low processing temperatures. In one trial, injection-moulded disposable knives were produced with a compound made up of 40% fibre. In another, thermoformed products and extruded sheets were produced at industrial scale with a version of the compound featuring 0.5% to 10% fibre.

Dr Ye explained how the material's Heat Deflection Temperature (HDT) improved notably with the addition of cellulose fibre, and while the initial moisture content of the fibre was 3% to 4%, the compounding process decreased this level to as little as 0.1% in the final compound. "The compound is produced through a continuous economically viable process," he said. "The addition of cellulose fibre into biodegradable resin can reduce cost, enhance compostability, improve mechanical properties, increase heat resistance, and lower carbon footprint."

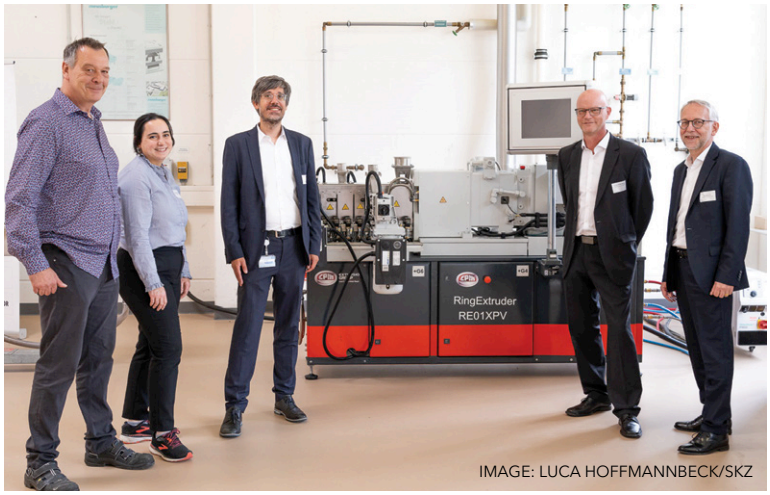
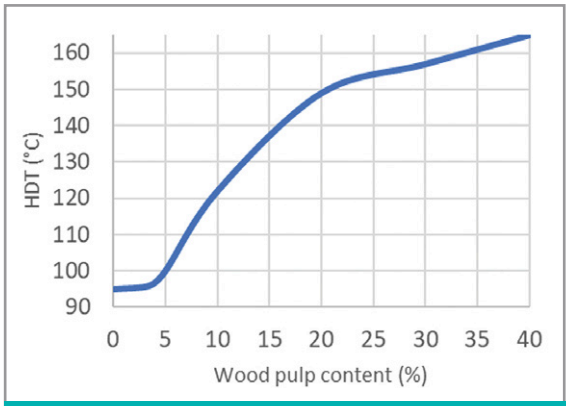


IMAGE: LUCA HOFFMANNBECK/SKZ

Left to right: SKZ Technical Centre Manager Kersten Kurda, Group Manager Compounding and Extrusion Hatice Malatyali, and Division Manager Johannes Rudloff, receive the CPM RingExtruder RE from Michael Erdmann and Joerg Mayer-Lutz of Extricom Extrusion



In tests on bio-based compounds, Farrel Pomini says the material's Heat Deflection Temperature (HDT) improved dramatically when cellulose fibre was added in the Farrel Continuous Mixer
Source: Farrel Pomini

Innovation is key

Since **CPM** launched the RingExtruder RE last year, the market has continued to evolve, prompting compounders to constantly seek out new ways in which to harness its power. "We see significant opportunities for our RingExtruder RE in various applications," said Daron Fraim, Senior Process Engineer at CPM Process Solutions. "The RingExtruder RE stands out for its exceptional mixing capabilities and low shear, allowing for an efficient process that spreads material across a large surface area. This makes it especially well-suited for handling recycled PET. With its ability to effectively remove volatile compounds and moisture, the RingExtruder RE is setting a new standard in extrusion technology."

Currently, the primary applications for the RingExtruder RE include challenging degassing processes and handling heat and shear-sensitive materials. The machine's unique 12-apex design, compared to the traditional single apex of twin extruders, allows for more intensive mixing, better temperature control, and longer residence times. This makes it ideal for reactive extrusion processes and other demanding sectors like masterbatch production.

One of the key trends driving demand for the RingExtruder RE is the growing focus on recycling, sustainability, and material reuse. As bio-based polymers, which require gentler processing due to their heat-sensitive nature, become more prevalent, the RingExtruder RE's softer compounding approach is seen by many as a perfect match for this

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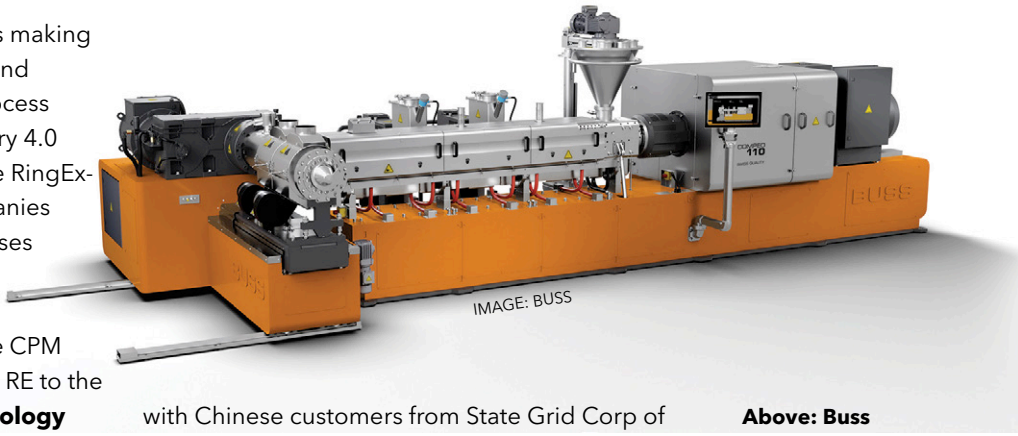
growing market. In addition, CPM says it is making significant strides in process automation and optimisation, incorporating controlled process loops and tying its innovations into Industry 4.0 initiatives. "As we continue to advance, the RingExtruder RE will remain a vital tool for companies looking to enhance their extrusion processes while prioritising sustainability and efficiency," Fraim said.

Last year, Extricom Extrusion, part of the CPM Extrusion Group, delivered a RingExtruder RE to the **SKZ Compounding and Extrusion Technology Centre** in Würzburg, Germany, to further expand the institute's technical capabilities. Hatice Malatyali, Group Manager for Extrusion and Compounding at SKZ, said: "Improving process understanding is certainly of great interest to industrial users. This work will then form the basis for application-oriented process developments. The advantages of the ring extruder have great potential, especially in the recycling and processing of biopolymers."

Ring extruders produce a good dispersion effect due to high elongation flow components, while comparatively small screw diameters can reduce shear and pressure peaks in the material with uniform energy input enabling efficient and gentle compounding. At the same time, a large surface area is available for heat exchange with the barrel and core of the extruder. Very good degassing is also an advantage, which is why this technology is often used for recycling. The 12 screws also offer the advantage of minimising spreading forces which helps reduce screw and barrel wear leading to long-term cost savings.

Buss, the Swiss developer of co-kneader technology, was an exhibitor at AMI's Compounding World Expo Europe in Brussels in September. The Buss Compeo series of machines for polymer compounding have a modular structure which can be precisely configured to meet the specific application. The series was developed for all temperature ranges up to 400°C and given the system's modular construction and novel process geometries, can be used within an extremely diverse application spectrum, extending far beyond previous Buss Co-Kneader applications. Maintenance outlay is kept low by using highly resistant surface-hardened materials in the process zone. Maintenance is an area of focus for the company as it has also been developing sensor technology for machine condition monitoring. This is at the pre-launch stage and is being developed to provide data to inform decisions on machine maintenance.

Buss put its expertise in kneading technology to the test in the successful completion of projects with Chinese customers from State Grid Corp of China, Wanhua, Wanma, and Dewei, involving the production of HV-XLPE (cross-linked polyethylene for high voltage) cable insulation materials. This application places extremely high demands on the quality, purity, and performance of the materials and the systems used, and takes place at moderate and uniform shearing speeds ensuring a temperature below 200° C can be maintained over the entire length of the process without the temperature peaks that occur in other systems. This reduces the degradation of the materials, which impairs the electrical properties of the end product.



Above: Buss Compeo machines use the company's co-kneader technology

At the SPE Screw Design Conference in Tewksbury, Massachusetts in June, a new technology was presented by Keith Luker, President and CEO of **Randcastle Extrusion Systems**, a US manufacturer of single screw extruders for laboratory, R&D, and lower output production applications. The Molecular Homogenizer is a single screw dynamic multiplicative mixer for compounding. In the presentation, Luker said Randcastle has filed patents in Europe and five other countries "for a novel mixing mechanism... [which] uses first principle arrangements of the interrupted shear, interrupted elongation, and a mixing flow called inversive mixing".

Among the applications of the new technology, Luker said: polymer producers could place a Molecular Homogenizer at the end of a polymer reactor, and before pelletising, to improve physical properties and lessen the need for drying; toll compounders could save costs and heat history; in reclaim, higher quality and improved viscosity often lead to increased output; and twin screw users could enhance mixing of actives and other small molecules by adding the Molecular Homogenizer to a twin.

CLICK ON THE LINKS FOR MORE INFORMATION:

- **www.nichepolymer.com**
- **www.farrel-pomini.com**
- **https://extricomextrusion.com**
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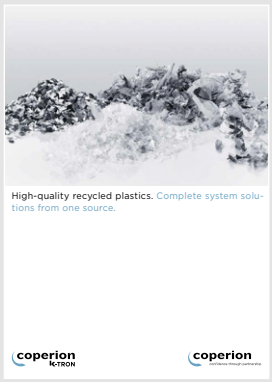

Whatever your recycling need – mechanical, solvent or chemical - Coperion provides a single source solution. Its offer ranges from shredding and agglomeration, through washing and conveying, on to melt processing and degassing, and pelletising.

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MIXACO: SPEEDY MIXER

Speedy mixers provide a flexible mixing option for small batch production. Available in sack and drum versions, the two ranges are supported with a full range of mixing tools designed to achieve fast and homogenous results.

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BUSS: COMPEO KNEADER

The Compeo is the latest generation of kneader extruder from Buss and is designed to provide the utmost flexibility in application. This 12-page brochure details key features and model specifications.

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CABOT: SPECIALTY CARBON BLACK

This brochure from Cabot details the company's range of Vulcan specialty carbon blacks for formulation of low moisture absorption electrically conductive plastics for applications such as ESD packaging.

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KLK OLEO: GREEN ADDITIVES

KLK OLEO provides a series of products for industrial application. PALMOWAX and PALMESTER provide a green lubricant solution to polymer processing. TEMEST, PALMERE and PALMERA as green ingredients for PVC additives/plasticiser.

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SUKANO: BIO-MASTERBATCHES

Switzerland's Sukano offers a full range of bioplastic masterbatches and compounds to allow processors to maximise the performance of bio-based resins such as PLA and PHA and to simplify and speed up processing.

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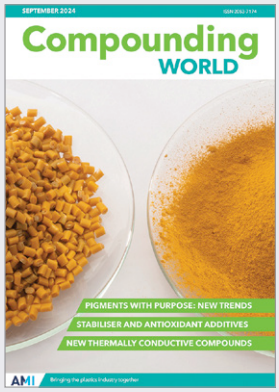

Compounding World September 2024
The September 2024 issue of Compounding World magazine has features on sustainability in colour pigments, demanding applications for antioxidants and UV stabilisers, and the latest compounds for thermal conductivity and high-temperature environments.

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Compounding World August 2024
The August 2024 issue of Compounding World magazine has a cover feature on the benefits of in-line measurement in the compounding process, plus articles on plasticisers and automotive compounds and a preview of Compounding World Expo in Brussels.

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Injection World September/October 2024
The September-October edition of Injection World includes a cover feature on advances in injection moulded packaging, plus articles covering developments in TPEs and granulator technology. There is also a preview of Fakuma 2024 in Germany.

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Plastics Recycling World September 2024
Plastics Recycling World's September 2024 edition includes a cover feature on innovative technologies for sorting mixed materials, an update on the HolyGrail 2.0 project and articles on rigid PE and PP packaging and new granulators.

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Pipe and Profile Autumn 2024
Pipe and Profile Extrusion's Autumn edition has features that explore applications for pressure pipe, recent developments in recycling and granulation, and new extruder technology. Plus a preview of the Plastics Extrusion World Expo in Cleveland in November.

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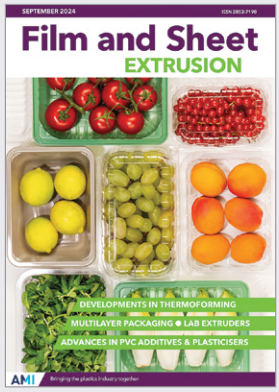

Film and Sheet September 2024
Film and Sheet Extrusion's September edition has features covering efficiency gains in the thermoforming process, mono-material film developments, PVC additives and plasticisers, plus it has an update on laboratory extruders.

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GLOBAL EXHIBITION GUIDE

2024	**8-11 October**	Plastex, Brno, Czech Republic	www.bvv.cz/en/plastex/
	15-19 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	13-14 November	Compounding World Expo US, Cleveland, OH, USA	https://na.compoundingworldexpo.com/
	4-7 December	PlastEurasia, Istanbul, Turkey	https://plasteurasia.com/en
2025	**11-14 March**	Plastimagen, Mexico City	www.plastimagen.com.mx
	18-20 March	Plastics & Rubber Vietnam, Ho Chi Minh City, Vietnam	https://plasticsvietnam.com
	24-28 March	Plástico Brasil, São Paulo, Brazil	www.plasticobrasil.com.br
	15-18 April	Chinaplas, Shenzhen, China	www.chinaplasonline.com
	6-9 May	Moulding Expo, Stuttgart, Germany	https://www.messe-stuttgart.de/moulding-expo
	7-8 May	PlastTeknik Nordic, Malmö, Sweden	www.plastteknikнordic.com
	8-10 May	RePlast Eurasia, Istanbul, Turkey	www.replasteurasia.com
	14-15 May	Compounding World Expo India, Mumbai	www.compoundingexpoindia.com
	27-30 May	GreenPlast, Milan, Italy	www.greenplast.org
	8-15 October	K2025, Dusseldorf, Germany	www.k-online.com
	4-7 December	PlastEurasia, Istanbul, Turkey	https://plasteurasia.com

AMI CONFERENCES

8-9 October 2024	Polyolefin Additives, Barcelona, Spain
21-23 October 2024	Executive Summit, Savannah, GA, USA
23-24 October 2024	Plastics Recycling Technology, Vienna, Austria
12 November 2024	Performance Polyamides, Cleveland, OH, USA
18-20 November 2024	Fire Resistance in Plastics, Cologne, Germany
20-21 November 2024	PVC Formulation Asia Bangkok, Thailand
2-4 December 2024	Stretch and Shrink Film North America, Charleston, SC, USA
3-4 December 2024	Polymer Engineering for Energy, London, UK

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

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