OCTOBER 2022

ISSN 2515-2238

Plastics Recycling WORLD

NEW LINES EXPAND RECYCLING CAPABILITIES

TECHNOLOGIES TO GET RID OF STRONG SMELLS

K2022 MACHINERY PREVIEW ● ADDITIVES

AMI

Bringing the plastics industry together

GET THE FREE APP

Plastics Recycling WORLD

Plastics Recycling World magazine is now available free-of-charge on iPads, iPhones and a huge range of Android-based tablets and smartphones.

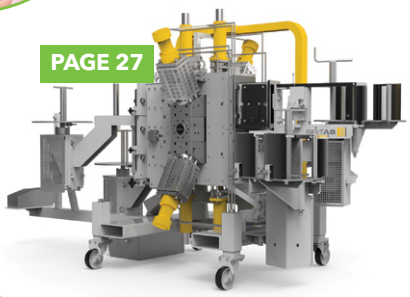
Our dedicated *Plastics Recycling World* app is easy to use and provides completely free access to the latest edition of the magazine plus more than 20 free-to-read back issues.

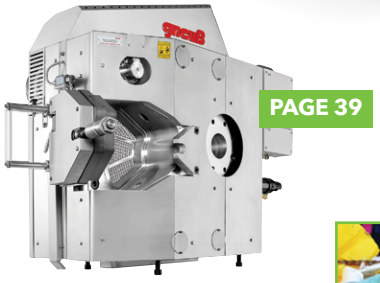
Once you have downloaded an issue, you can read it offline, there's no need for an internet or data connection. AMI's other magazine apps – *Compounding World*, *Injection World*, *Film and Sheet Extrusion* and *Pipe and Profile Extrusion* – have been downloaded more than 67,000 times by readers around the globe. Why not try it yourself? The Plastics Recycling World app is available in Apple's App Store and Google Play. Just search for 'AMI Plastics', or simply click on the relevant button below.

Download on the App Store

GET IT ON Google Play

Plastics Recycling WORLD





COMING NEXT ISSUE

› Cololurs › PET Recycling › Testing and Quality Control

CONTACT US

CLICK HERE TO MAKE SURE YOU GET YOUR COPY

AMI

Third Floor, One Brunswick Square,
Bristol, BS2 8PE, United Kingdom
Tel:+44 (0)117 924 9442
Fax:+44 (0)117 311 1534
www.amiplastics.com
www.twitter.com/plasticsworld
Registered in England No: 2140318

DOWNLOAD MEDIA DATA

EDITORIAL

Editor-in-Chief: Chris Smith
chris.smith@amiplastics.com
Editor: David Eldridge
david.eldridge@amiplastics.com
Senior Staff Writer: Chris Saunders
chris.saunders@amiplastics.com
Technology Editor: Peter Mapleston
editorial@plasticsrecyclingworld.com
Contributing Editor (UK): Mark Holmes
editorial@plasticsrecyclingworld.com
Events and Magazines Director: Andy Beevers
andy.beevers@amiplastics.com

ADVERTISING

Advertisement Manager: Claire Bishop
claire.bishop@amiplastics.com T/ +44 (0)7905 848744
Head of Business Development: Paul Beckley
paul.beckley@amiplastics.com T/ +44 (0) 117 311 1529
Advertising Sales (China/Hong Kong): Maggie Liu
maggieliu@ringiertrade.com T/ +86 13602785446
Advertising Sales (Taiwan): Ms Sydney Lai
sydneylai@ringier.com.hk T/ +886-913625628
Advertising and Expo Sales (India): Yogesh Vyas
yogesh@dexspo.com T/ +91 9920735930

Eastman joins with Interzero

Eastman has entered into a long-term agreement with Interzero for them to provide up to 20,000 tonnes/yr of hard-to-recycle PET household packaging waste to Eastman's molecular recycling facility in France.

The project is expected to be operational in 2025, and once complete will recycle approximately 160,000 tonnes/yr of hard-to-recycle polyester waste.

It is claimed that the planned facility in Normandy, which will process coloured and opaque PET waste that is not recycled mechanically, will become the world's largest material-to-material molecular recycling plant.

› **www.eastman.com**
› **www.interzero.de**

WM acquires Avangard Innovative's US business

US waste management and recycling group WM has agreed to acquire a controlling interest in Avangard Innovative's US business.

The acquired business will operate as an independent entity by the name of Natura PCR and is expected to grow recycling capacity to an estimated 400m lbs/yr of post-consumer plastics in five years.

Through Natura PCR, WM expects to deliver new recycling capabilities for its customers and provide circular solutions for films and clear plastic wrap used commercially, such as plastic stretch wrap for pallets, furniture film, grocery bags and potentially shrink wrap around food and beverage containers.

Natura PCR will focus on mechanical recycling, converting film and flexible materials to PCR that can be used to manufacture new products.

IMAGE: AVANGARD INNOVATIVE

Above: Avangard Innovative has bulit a large film recycling business in the US

Jim Fish, WM President and CEO, said: "WM's core material supply capabilities, with the head start and knowledge provided by Avangard's US business, will help Natura PCR quickly deliver circular options to WM's customers as an important component of our continued growth strategy. Today, there is so much untapped potential to reuse film which impacts many of our commercial customers. We can help our customers close the loop and bring more recycled materials to the store shelf."

› **www.wm.com**

Recycling Technologies ceases operations

Recycling Technologies, which developed a patented pyrolysis technology to recycle plastics waste, has halted all operations and called in administrators.

Nick Holloway and Will Wright from Interpath Advisory were appointed joint administrators to Recycling Technologies Group and Recycling Technologies Ltd on 26 September 2022.

Founded in 2011, Recycling Technologies is a UK-based engineering company headquartered in Swindon alongside its manufacturing facility and pilot plant, with an additional site in Perthshire, Scotland.

In recent months, the company had sought additional investment in order to complete its development phase but was unsuccessful. With insufficient funds available to fund day-to-day operations, the directors filed for the appointment of administrators and make the 73 employees redundant, with a small number retained to assist with the closing down of its sites.

› **www.interpathadvisory.com**

IMAGE: RECYCLING TECHNOLOGIES

Left: Recycling Technologies' plants are in Swindon and Perthshire, UK

Sustainable Innovation

Major player in industrial automation

11 patents related to the circular economy

3.4 % of revenues invested in R&D

301 service specialists worldwide

Piovan Group at K2022
will present innovative solutions including Condenso, SoftBoost, Vento, Vulkano, Odor Minder and CAPchiller.

PiovanGroup

DISCOVER OUR NEW PRODUCTS AT

2022

Alpla and GC open Thai recycling plant

After 18 months of construction and installation, packaging and recycling specialist Alpla and PTT Global Chemical (GC) have opened a new recycling plant in Thailand.

With a production capacity of 45,000 tonnes/yr of recycled PET and HDPE, it is set to be one of the largest recycling plants for these plastics in Asia and will greatly strengthen the region's circular economy.

Located in an economic zone in the south-eastern province of Rayong, the plant is equipped with the latest recycling technology and production lines required to manufacture high-quality plastic recyclates with food-contact approval from the US FDA. The 30,000 m² plant is situated on a plot of land measuring approximately 90,000 m² meaning there is significant space for future expansions.

Kongkrapan Intarajang, GC CEO and President, said: "The production plant is part of our long-term circular economy strategy to fully realise GC's value chain. It also has the added benefit of creating jobs within the community while simultaneously aligning with the Thai government's Bio-Circular-Green Economy Model."

Above: The new 30,000 m² rPET and rHDPE plant in Rayong

Bernd Wachter, Alpla Corporate Director Circular Economy & Recycling Asia, said: "Demand for recycled, sustainable packaging materials is rising sharply in Southeast Asia, and high-quality plastics have a key role to play. With this new plant, we are applying our many years of expertise in the treatment and processing of packaging made from post-consumer recycled resins in Thailand."

In early 2021, the Alpla Group announced that it would invest an average of €50m a year until 2025 in the ongoing expansion of its recycling with a focus on closing the gap in as many regions as possible.

In total, the annual production capacity of Alpla's recycling companies and cooperations around the world amounts to approximately 203,000 tonnes of rPET and 74,000 tonnes of rHDPE.

› **www.alpla.com**
› **www.pttgcgroup.com**

Brands' supply concerns

Twelve member companies of The Consumer Goods Forum's (CGF) Coalition of Action on Plastic Waste including Amcor, Barilla, Haleon, Henkel, Mondelēz International, PepsiCo, and Unilever, have sent a letter addressed to suppliers, regulators, and investors, demanding the procurement of chemically recycled material produced in line with their environmental safeguards.

A wider survey of coalition member companies indicates demand for over 700,000 tonnes/yr of chemically recycled material by 2030, in addition to mechanically recycled materials.

By expressing their interest in procuring these materials, companies are sending a strong signal underlining the need for scale in plastics chemical recycling infrastructure while maintaining the environmental safeguards.

› **www.theconsumergoodsforum.com**

Biotrend Energy to apply UpCycle Process

Biotrend Energy has said it will be applying Honeywell's UpCycle Process Technology at its planned recycling plant in Turkey, building on Honeywell's recent announcements that the chemical recycling technology is also set to be used in the US, Spain, and China.

The Turkish facility is expected to have the capacity to transform 30,000 tonnes/yr of mixed waste plastics into feedstock for polymer production, and when completed will become the first commercialised waste plastics recycling facility in the country using this technology.

UpCycle Process Technology involves molecular conversion, pyrolysis, and contaminants management. It expands the types of plastics that can be recycled to include those that would otherwise go unrecycled, including polystyrene, multi-layered packaging, flexible and coloured varieties.

Honeywell will provide related engineering and technical services, including start-up, commissioning, and technical support during the plant's lifetime.

› **www.biotrendenerji.com.tr**
› **www.honeywell.com**

› extruders › feeders › components › pneumatic conveying › complete systems

COPERION COMPOUNDING TECHNOLOGY. EFFICIENT. SUSTAINABLE. RESPONSIBLE.

Discover our first-class technology solutions at K 2022:
+ for compounding, extrusion, feeding, conveying and bulk material handling
+ for recycling, upcycling, processing of biodegradable products and much more
+ fulfilling highest quality standards and maximum reliability
+ efficient equipment operation with regard to processing, energy and other resources

CREATING THE FUTURE OF PLASTICS

K 2022 | Düsseldorf, Germany | Hall 14 Booth 14B19
+ Circular Economy Forum CE09

October 19-26, 2022

coperion K-TRON

Join us on the responsible path to a successful future. Visit us at Booth 14B19 and at the Forum and find out more about our comprehensive technology solutions for sustainable compounding, extrusion, feeding, conveying and bulk material handling. www.coperion.com/k2022

coperion
confidence through partnership

Chemical recycling sortation

A collaboration between Clariter, BioBTX, Bollegraaf, and N+P will see the construction of what is said to be Europe's largest and most advanced plastic waste sorting plant for the chemical recycling industry with a processing capacity of 350,000 tonnes/yr in Delfzijl, the Netherlands. The project is expected to come online by 2025.

Jasper Munier, Clariter Business Development Manager, said the project intends to improve feedstock preparation for chemical recycling and increase Dutch recycling rates. "As we are currently forced to focus on nonrecyclable plastic waste from surrounding member states, we hope the Dutch EPR organisation will soon provide access to its waste streams for chemical recycling."

› **www.clariter.com**

European Commission acts against 11 countries

The European Commission is taking legal steps against 11 member states calling on them to step up the implementation of the Single-Use Plastics Directive.

Belgium, Denmark, Estonia, Ireland, France, Croatia, Latvia, Poland, Portugal, Slovenia, and Finland are the countries that have not yet communicated to the Commission the measures necessary to ensure the full transposition of the directive.

The member states concerned now have two months to respond and take the necessary measures. Otherwise, the Commission may decide to refer the cases to the EU Court of Justice with a proposal to impose financial sanctions.

The Single-Use Plastics Directive is seen as an essential element of the Commission's Plastics Strategy and the Circular Economy Action Plan as it stimulates the production and use of sustainable alternatives that avoid marine litter. The directive also contributes to the zero-pollution ambition for the EU benefiting public health, the environment, and climate neutrality, which aims to reduce plastic litter at sea by at least 50% by 2030.

The directive entered into force on 3 July 2019, and member states had two years to transpose the legislation into national law. However, not all of them succeeded by the set deadline and in January 2022, the Commission launched infringement procedures and sent out letters of formal notice to 16 member states. Several cases have since been closed with two, the Czech Republic and Malta, still pending analysis.

Denmark and France had indicated that their transposition was complete, but the Commission found that some provisions were missing.

› **www.ec.europa.eu**

Nololex to expand US facility

Novolex is investing $10m to expand its capacity to recycle plastic bags and other polyethylene film at its facility in North Vernon, Indiana, US.

The investment in new equipment will enable the plant to produce 12,700 tons/yr of recycled material by the end of 2023.

Stan Bikulege, Novolex Chairman and CEO said the technology will reduce waste and provide much-needed recycled content that Novolex will be able to use in its products.

› **www.novolex.com**

New hope for PUR in old refrigerators

KraussMaffei, RAMPF, Remondis, and BASF have launched a new collaboration to investigate how polyurethane (PUR) insulation materials from old refrigerators can be returned to the material cycle, with each partner taking a clearly defined role in proceedings.

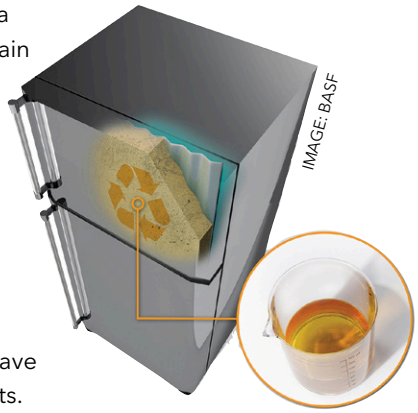
After disposal, as prescribed by the EU in Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the rigid foam ends up as regrind, which until now has mainly been supplied to companies in the energy recovery sector.

According to PlasticsEurope, this process recovers about 30% of the energy used in the production of PUR, but the carbon is not retained in the material cycle. The four partners hope to change that by using a depolymerization to obtain a recycled polyol.

This process is particularly challenging because it must be very robust in order to reliably convert post-consumer waste into a high-quality recycled polyol, but initial trials have produced positive results.

› **www.basf.com**

› **www.kraussmaffei.com**

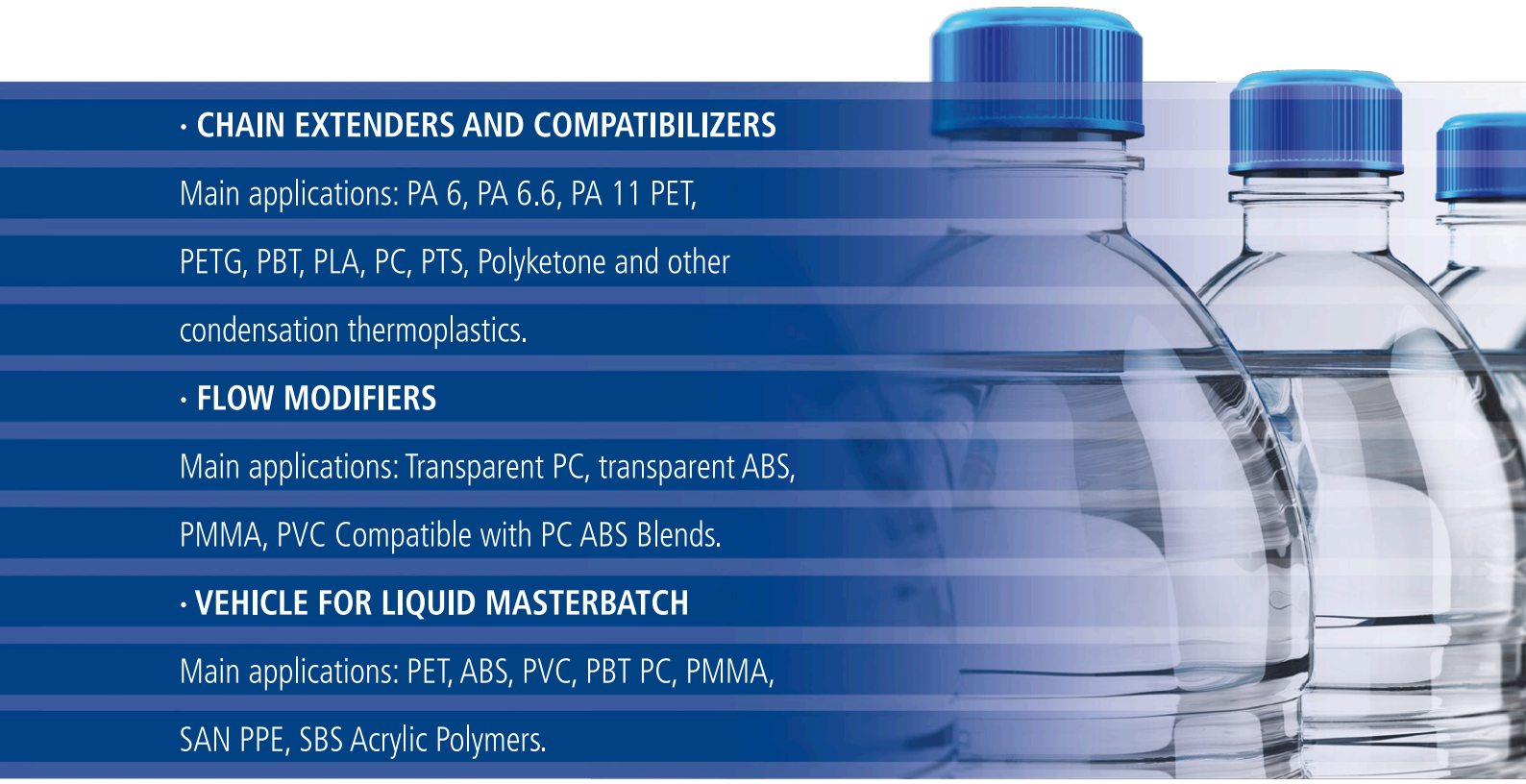


Above: The project focuses on depolymerisation technology

diransa

Additives for Plastics

We invite you to navigate through our website, get to know our products, and choose the best option for you project.



- **CHAIN EXTENDERS AND COMPATIBILIZERS**

Main applications: PA 6, PA 6.6, PA 11 PET, PETG, PBT, PLA, PC, PTS, Polyketone and other condensation thermoplastics.

- **FLOW MODIFIERS**

Main applications: Transparent PC, transparent ABS, PMMA, PVC Compatible with PC ABS Blends.

- **VEHICLE FOR LIQUID MASTERBATCH**

Main applications: PET, ABS, PVC, PBT PC, PMMA, SAN PPE, SBS Acrylic Polymers.

good chemistry®

Diransa SRL
Pte. Roberto M. Ortiz 2485, (B1852OJK) Buenos Aires, Argentina
Phone: (+54) 11 2152 -1010 • ventas@diransa.com.ar • www.diransa.com.ar

AMI | Events

Recycling Flexible Packaging

13-14 December 2022 | Cologne, Germany

Creating circularity through increased recovery and recycling of 'hard to recycle' flexible packaging

Agenda out now! Speakers include:

Guido Aufdemkamp
Executive Director,
Flexible Packaging Europe

Mike Baxter
External Affairs Director,
Berry bpi Group

Delia Harabula
Sustainability Advocacy Lead EMEA,
Amcor

Thomas Kahl
Head of Sustainable Packaging Solutions FMCG & Industrial Channels
Mondi Group

Other speaking companies include: CEFLEX, CIRCPACK by Veolia, Erema Group, Borealis, EXPRA and many more.

BOOK YOUR PLACE TODAY

Sponsored by:

EREMA® PLASTIC RECYCLING SYSTEMS

Supported by:

CEFLEX A CIRCULAR ECONOMY FOR FLEXIBLE PACKAGING

Plastics Recycling WORLD

Dow and Mura Technology announce facility in Germany

Dow and chemical recycling technology group Mura Technology have announced plans to construct a new facility at Dow's Böhlen site in Germany, the latest in a series of planned facilities across the US and Europe.

The Böhlen site, which is expected to be operational by 2025, would deliver approximately 120,000 tonnes/yr of chemical recycling capacity at full run-rate. This and the other planned units would collectively add as much as 600,000 tonnes/yr by 2030.

Dow President Diego Donoso said: "We continue to increase Dow's capacity to use recycled content as feedstock and continue to invest in the most effective technology available to enable our circular business model for plastics. The diversification of our feedstock slate and decarbonisation of our assets will enable the achievement of Dow's goal of a sustainable, low-carbon future, and meet strong and growing customer demand for circular polymers."

The planned facility builds upon Dow's ongoing collaboration with Mura, with an initial project to construct the world's first plant using Mura's HydroPRS process in Teesside, UK, expected to be operational in 2023.

The HydroPRS process uses supercritical steam to convert most forms of plastics, including flexible and multi-layer plastics which have previously been deemed "unrecyclable", back into the original oils and chemicals from which they were made. These can then be used as feedstock to produce new plastics.

Dow, which recently announced a further strategic investment in Mura, aims to take advantage of co-location benefits which could significantly reduce costs and carbon emissions by minimising transportation of the offtake and ensuring no by-products go to waste as gas output.

Dow says the resulting material can be recycled repeatedly and so avoid landfill and incineration.

› **www.dow.com**

› **www.muratechnology.com**

PLASTICS RECYCLING WORLD EXPO

NORTH AMERICA

November 9-10, 2022 // **CLEVELAND, OHIO, USA**

Speakers include:

David Clark

Vice President Sustainability

Amcor

Brian Hankin

Chief Marketing and Innovation Officer

Altium Packaging

Amy Laird

Americas Advanced Recycling Market Development

ExxonMobil

Silke Einschuetz

Consultant Recycling & Sustainability

AMI

Rachel Bond

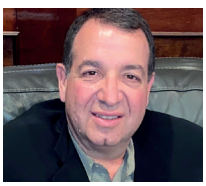
Partner

Keller and Heckman

Robert Render

Business Development Manager Sustainability

Ravago Recycling Group



David Bender

CEO

Circular Polymers

Patrick Krieger

Vice President of Sustainability

Plastics Industry Association

AMI **REGISTER FOR FREE HERE**

SHOW OPENS NEXT MONTH!

Co-located with:

COMPOUNDING WORLD EXPO | POLYMER TESTING WORLD EXPO | PLASTICS EXTRUSION WORLD EXPO

TIME IS RUNNING OUT, REGISTER FOR FREE HERE

Scott Cassel

CEO & Founder

Product Stewardship Institute

Ian Montgomery

Founder and Creative Director

Guacamole Airplane

David Eldridge

Editor Plastics Recycling World

AMI

Luciana Ballura

Market Development and Innovation Manager

Omya

Kevin Hinterberger

Sales Manager

Pureloop

Irfan Huda

Technical Business Development Plastic Additives

BASF

Clark Dinnison

Head of Product

Replenysh

Dr Sven Wolf

Managing Director

NGE (part of Next Generation Group of Companies)

and many more. See the full list of speakers here

AMI | Events

Chemical Recycling

March 20-22, 2023 | Houston, TX, USA

New for 2023: Site visit at ExxonMobil's Baytown Complex

Explore the landscape of chemical recycling, it's potential impact into the North American recycling industry

Meet the advisory board

Silke Einschütz
AMI

Craig Cookson
American Chemistry Council

Robert C Kerr
ExxonMobil Chemical Company

Dan Falla
Shell Polymers

Sreekanth Pannala
SABIC

Sathish Kumar
Prysmian Group

Sponsored by:

AVEVA ExxonMobil erema group

SECURE YOUR DISCOUNTED PLACE TODAY

IMAGE: KREYENBORG

Getting rid of strong smells

*There are many ways that additives and machinery can help reduce malodours in recycled plastics. **Peter Mapleston** finds out what suppliers have to offer*

Considerable progress is being made among suppliers of additives and recycling equipment to reduce levels of VOCs and odours in post-consumer recycled plastics. These materials often exhibit a strong smell due to the presence of contaminants or residual contents – food, detergent, inks, adhesives and others – which degrade during the recycling process. Undesirable smells can limit the amount of recycled plastic that can be used in new products, as they may affect consumer perceptions of product and brand quality.

Evonik Interface & Performance Business Line offers additives for post-consumer and post-industrial plastics waste to improve malodour or to improve mechanical properties while compatibilising polymers. It has developed masterbatches of its malodour absorber technology to use directly on a recycler's line or at a converter manufacturing location.

According to Kathrin Lehmann, Technical Director Polymer Specialities - Interface & Performance, the Evonik additives Tegomer PY 50 PE and Tegomer PY 50 PP can be easily incorporated at levels of 3-5% into recycled PE or PP without over lubrication, whereas the 100% active material Tego Sorb PY 88 can only be used in a compounding operation with a double screw. "The masterbatches can be the used directly in a film line, and malodour generated from fertilisers or urea, if the source has been agricultural films, can be realised," she says.

Proof that absorber technology reduces the level of malodour significantly can be detected with a trained panel group, Lehmann notes, but for automotive applications, VDA testing can also be carried out to support customers in quickly finding the right addition level.

It is important to consider that the polymer degradation during recycling is only one reason for

Main image: Kreyenborg has further developed its infrared technology with the introduction of the IR-Fresh for odour reduction

IMAGE: EVONIK

Right: One of Evonik's solutions for odour problems in plastics is called Tego Sorb

the malodour, she adds. Just as important can be degradation of ink resins. Evonik has developed a portfolio of additives that can be used for de-inking, demetallising and delabelling, under the brand Tego Cycle.

An odour-reducing additive from **Byk**, Byk-Max P 4200, works similarly to a stripping agent. Its molecular structure is designed so that during compounding it is active on the surface of the polymer in the melt. "This way, the VOCs are almost completely separated from the granulate," says Jörg Garlinsky, Byk's Head of Global Thermoplastics Industrial Applications. The resulting mixture of VOCs and additive carrier substance is removed during compounding by degassing.

Garlinsky says the disadvantage of many adsorbents currently used for adsorbing VOCs and odours in plastics intended for applications like car interiors, including activated carbon or zeolites (aluminosilicates), is that the VOCs are physically bound to the surface of the adsorbents. "These volatiles may be freed during warm days when the internal temperature of a car exceeds 70°C," he says. "While adsorbents may delay the release of bound substances, they cannot prevent it entirely. Additionally, adsorbents may have an adverse effect on the mechanical properties of a compound."

Stripping agents, such as water, nitrogen or carbon dioxide are added directly into the melt during extrusion, with undesirables being pulled off, preferably using a vacuum. "The downside of this method is the more complex engineering and additional investments required for the associated machinery," he says.

Byk-Max P 4200 is a granulate with a PP carrier. It can be added during extrusion like a regular masterbatch, through the main or side feeder. It works in two steps: first, the active substance is released into the melt by shear force and heat, with pressure build-up during processing preventing premature expansion of the stripping additive.

The stripping additive then evaporates in the vacuum degassing zone, causing increased foaming of the polymer melt. Garlinsky says: "The gas bubbles have a large inner surface area. This process is intensified by the surfactant additive contained in the aqueous active substance of the stripping agent. The stripping agent reduces the solubility of the volatile constituents, which are then extracted during degassing. It has been shown to function for both unfilled and talc-filled compounds."

Below: Odour-absorbing masterbatches enable post-consumer recycled material to be used in applications where smell is critical

IMAGE: AMPACET

HPF The Mineral Engineers has also developed novel additives to reduce odours. In tests, its mineral-based odour absorbers were blended into a post-consumer PP recyclate at a level of 5% by weight in a twin-screw extruder. The resulting product was subjected to olfactometric testing according to the VDA 270 standard. The results show that the addition of the newly developed high-performance fillers reduces the odour intensity of the recyclate significantly below the threshold value of 3 and is thus no longer perceived as annoying.

Masterbatch major **Ampacet** has extended its OdorClear range of innovative odour-absorbing masterbatches designed to optimise the use of post-consumer recycled material. Originally introduced as Odor Scavenger, the newly-expanded range of powerful wide-spectrum masterbatches minimises odours of post-consumer recycled materials and keeps them enclosed inside the polymer, which allows converters to boost packaging recycled content.

OdorClear masterbatches are designed for use with a broad range of recycled polymers and can

Upcycling of plastic using Nouryon's Perkadox® PM-W75

In Nouryon's new technology, an organic peroxide is used in the reactive extrusion of polypropylene to increase the molecular weight, and therefore decrease the MFI. By Dr. J.M. van der Schuur, Nouryon R&D

A paradigm shift is an important change that happens when the usual way of thinking about or doing something is replaced by a new and different way. It is undisputable that the polymer industry is living through a paradigm-shift: the traditional linear economy from crude to waste is transforming into a circular economy where waste is the resource. Such a deep transformation cannot be achieved by the plastic recyclers or the polymer producers alone but requires the contribution of all players in the plastic cycle.

Nouryon is a global leader in specialty chemicals providing essential solutions to manufacture everyday products, such as packaging, paints and coatings, building products, etc. Our Polymer Specialties business has a long history in supplying the polymer, rubber and resin industry with reactive chemicals for their production, crosslinking and curing. While our products are already known by recyclers to modify the properties of recyclate, our latest development opens up the possibility for the upcycling of plastic.

The problem

Most of the properties of recycled plastics, in particular recycled plastics from post-consumer waste, are inferior to virgin material. Compared to virgin polypropylene, recycled polypropylene has for instance a lower molecular weight and poorer mechanical properties[1]. This is due to exposure to UV and sunlight during the polypropylene article's use and lifetime; the reprocessing of this used material also has an adverse effect on its subsequent mechanical properties.

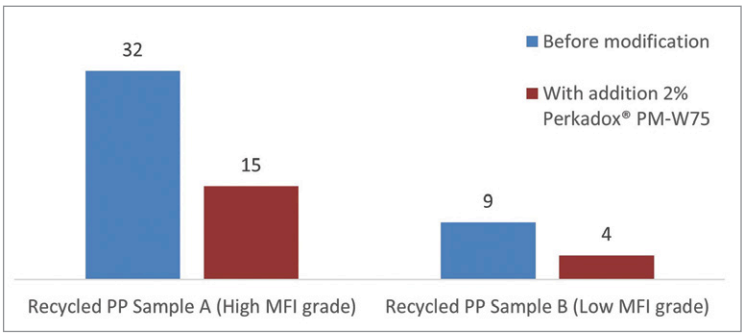


Figure 1: MFI (g/10min) of Recycled PP before and after 2% addition of Perkadox® PM-W75 product.

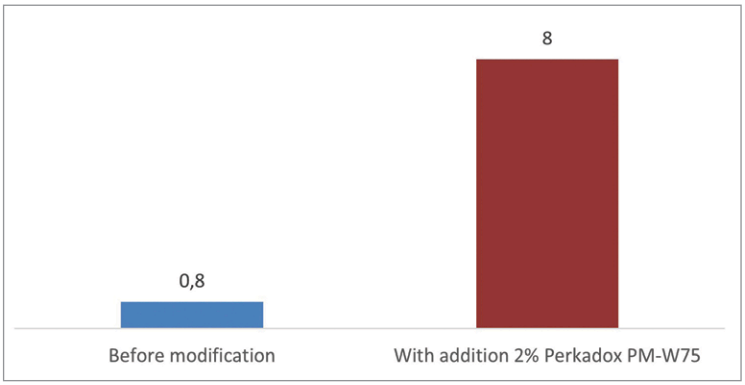


Figure 2. Melt strength (cN) of recycled polypropylene (Sample B) before and after 2% addition of Perkadox® PM-W75 product.

Nouryon's upcycling technology

The modification of recycled polypropylene to tune its molecular weight and thereby its Melt Flow Index (MFI), is commonly known in the recycling industry. For example, by using organic peroxides in reactive extrusion, the MFI of the recycled polypropylene can be increased.

It is important to note that in current processes, the MFI of recycled polypropylene in general always increases, which is equivalent to a molecular weight decrease, thus leading to inferior mechanical properties.

Nouryon has invented and patented[2] a new technology in which an organic peroxide is used in the reactive extrusion of polypropylene to increase the molecular weight, and therefore decreases the MFI. By using small amounts of the organic peroxide Perkadox® PM-W75, the MFI can be decreased (see Figure 1), restoring the MFI of the recycled polypropylene, so that it is comparable to the MFI of the virgin polypropylene. This is known as upcycling.

In addition, Melt Strength and Melt Elasticity of the modified recycled polypropylene increases strongly (see Figure 2). This will enable new processing opportunities and applications like foaming, blow moulding and even thermoforming.

[1] *Luzuriaga, S.; Kovářová, J.; Fortelný, I.; Polymer Degradation and Stability, 2006, 91, 1226-1232*

[2] *J.M. van der Schuur et al., Nouryon, WO2019/038244 A1*

Nouryon

Interested?

To learn more about this new technology and Nouryon's range of products for the plastic recycling industry, go to https://www.nouryon.com/markets/polymer-processing/polymer-recycling or contact us at elisa.conte@nouryon.com

PLASTICS RECYCLING WORLD EXPO EUROPE

BOOK YOUR STAND

14-15 June 2023
ESSEN, GERMANY

Present your products to key decision makers at this focused exhibition

"This is our first show in the European market to introduce our products and applications [and] it's a very positive sign to see so many full stands with so many different exhibitors who have managed to come from all over the world."

Christy Sapp, Greenmantra

"A one-stop shop for recycling industrial trends and technology advancements"

Christian Kohlweyer, Procter&Gamble

Brought to you by: AMI

Proudly supported by: Plastics Recycling World

Co-located with: Compounding World Expo, Polymer Testing World Expo

be specially formulated for injection and blow moulding, film and other extrusion processes. They also can be used in combination with other Ampacet R3 Sustainable Solutions products, including ThermProtect, BlueEdge and ReVive, to minimise issues such as thermal degradation, inconsistent colour or product uniformity that may occur with the use of high quantities of recycled material.

AFI Global says its Addisperse ON108 (pellet) or ON106 (powder) can reduce the smell of burnt wax arising through oxidation of a polymer like HDPE as a result of multiple heat histories. For compounds containing natural fillers, which can break down during processing, it offers ON103 (pellet) or ON104 (powder) for countering odours based on chemicals containing sulphur and amines. The company says it is currently developing odour elimination masterbatch that will be acceptable for use in food packaging applications, such as trays, boxes and film.

Some odours can be attributed to a build-up of bacteria, moulds and mildew within raw materials that have not been stored or handled properly. **Microban International** has considerable expertise in incorporating antimicrobial additives into recycled plastic products to help reduce microbial growth and eliminate odours. It also boasts deep knowledge of global regulatory requirements that help manufacturers to navigate the complexities of regulations in various geographical markets. For example, it ensures that all its antimicrobial solutions are registered with the Environmental Protection Agency (EPA) in the US or notified with the Biocidal Products Regulation (BPR) in Europe.

Equipment developments

Odour-eating options from compounding equipment manufacturers are on the increase too. Deodorising systems from **Coperion** are one example. In order to optimise the specification of such a deodorising system and to individually determine its operational parameters, the company now provides onsite tests using its mobile deodorising unit at customer production facilities for reducing plastic recyclate odour (see also *Plastics Recycling World* October 2021). "Using this solution with freshly produced product and under actual production conditions, the potential for reducing recyclate odour can be thoroughly investigated, and system parameters to achieve desired optimal product quality can be defined on location," says Ralf Bösch, Head Of Research & Development, Material Handling.

"Coperion determines the optimal parameters for the targeted odour reduction, enabling variable selection of both the devolatilisation medium (dry or humid air, pressure) and temperature. Such flexibility allows for intensive investigation into which conditions most effectively remove odours. Deodorisation temperatures of up to 150°C are possible."

Below: Coperion's mobile deodorizing system

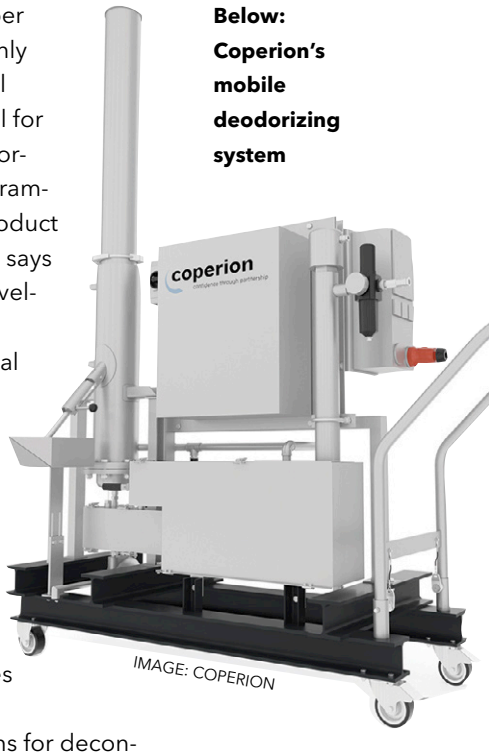


IMAGE: COPERION

Kreyenborg already has solutions for decontamination of PCR-PET, crystallisation, drying, and heating of bulk materials, using infrared technology. Now it says further development of this


IMAGE: KREYENBORG

Right: Kreyenborg's two-stage IR-Fresh system

technology has brought to the fore its newest member among its products, the IR-Fresh, for odour reduction.

In the first process step, an infrared module installed above a material bed heats the material passing along a drum. Continuous rotation of the drum ensures a homogeneous mass flow with a defined dwell time (applying the first-in/first-out principle). Mixing elements ensure that the material is continuously mixed in the drum with constant surface exchange. "Combined with controlled heating, this ensures considerable odour elimination, even within a very short residence time," says Kreyenborg.

In the second process step, the remaining odorous substances in the regrind or granules are removed by a thermal-physical cleaning process in the IR-Fresh Conditioner. This insulated hopper keeps the material to be decontaminated at a temperature range ideal for the decontamination process by means of a hot purge-gas. "Excellent results for deodorisation and decontamination can be achieved through the interaction of the main process parameters of airflow, temperature, and residence time," says the company.

The IR-Fresh system has a modular design, so it can be used continuously in two stages both for regrind - before the extrusion process - and for granules after the extrusion process. It is possible to either integrate the IR-Fresh Conditioner as an individual step in the process chain or to operate it as an independent, stand-alone solution either continuously or discontinuously. The IR-Fresh system is also suitable as a retrofit solution for integration in existing plants. Kreyenborg says it can develop a solution that is optimally tailored to the individual customer's process.

Erema points to its ReFresher technology for reducing odour downstream of the extrusion process. The company highlights how the combination of its Intarema TVEplus RegrindPro machine with the ReFresher, is enabling PCR-HDPE to be used in proportions of up to 100% in packaging for direct contact with food and beverages, in conformance with FDA regulations.

The company has an extruder-ReFresher combination for industrial-scale customer testing in the expanded customer centre at the group's headquarters in Ansfelden, Austria. For carrying out tests at the customer's plant, Erema also offers a compact and mobile ReFresher module that can be integrated into the on-site recycling process.

Bandera says the most frequent quality factor requested by players in the recycling market relates to removal of VOCs and accompanying odours. "Thanks to the outstanding vacuum degassing performance, Bandera RevoTech solutions – both Twin and Tandem – represent the most advanced instruments to guarantee excellent purification levels of the material in molten state," it claims. "The forced extraction of intrinsic contaminants is significant and tangible."

The company says that to further improve quality levels, it recently finalised its RevoTech VOC & Odor Removal process dedicated to the pelletised material coming from its extrusion lines. Four systems have already been installed at customers. Bandera says the innovative odour extraction method, offers extremely lower residence time and relevant power saving compared to the alternatives.

"RevoTech VOC & Odor Removal is based on a special stripping system equipped with microwave emitters that stimulate the internal VOC molecules and their evacuation from the pellets," says R&D Manager Matteo Colloni. "In addition to that, a counterflow of hot air optimises both the temperature homogeneity of the blend and the odour extraction." In tests on PP pellets, the Bandera process produced superior results than a competing process, in much less time: five hours versus eight hours, says Bandera.

Starlinger's customary setup is a RecoSTAR Dynamic recycling line with a C-VAC degassing

Below: Bandera RevoTech VOC and Odour Removal system uses microwave technology to reduce odours in batches of granules that have been cooled after granulation

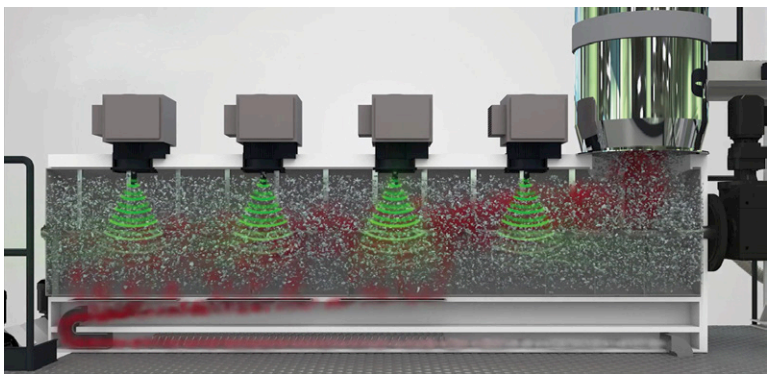


IMAGE: BANDERA

module for highest degassing efficiency, which in combination with melt filtration already eliminates most of the substances causing the smell. Whatever is left is removed by the pellet conditioning unit. The machine setup may vary individually depending on the plastic, the source, type, and intensity of the odour as well as on the requirements on the end product. Customer-specific adaptations may be necessary – this is determined during test runs with the customer's material at the Technical Centre of Starlinger Recycling Technology.

The odour reduction process consists of four main steps: material preparation, melt filtration, highly efficient degassing, and post-treatment of the pellets. This procedure eliminates even deeply embedded odours. Compared to methods which merely bind odours through the use of additives and thereby enclose them in the final pellet, the Starlinger process removes the foreign substances that cause the smell and delivers permanently smell-improved pellets. Due to their excellent, homogeneous quality the odour-improved recycled pellets are suitable for use even in highly demanding applications such as food-contact packaging.

At K2022, **Piovan** will show its new Odor Minder, which is a compact in-line electronic nose designed to verify the effectiveness of the post-consumer plastic deodorisation process. In addition, it will be possible to test visitors' finished products (sheets and bottles) or semi-finished products (granules and preforms) in PET and rPET for benzene or acetaldehyde using the Inspecta analyser.

Odours are under the olfactory microscope in the EU-sponsored project Circular FoodPack, which began in June 2021 and runs until November

IMAGE: STARLINGER

Left: Starlinger says meal trays made of PP can be turned into homogeneous odour-improved regranulate that can be reused at levels of up to 100%, even in demanding packaging applications

IMAGE: FRAUNHOFER INSTITUTE IVV

Above: Fraunhofer Institute IVV researches a wide variety of sources of bad odours in plastics

2024, coordinated by **Fraunhofer Institute IVV**. "We intend to recycle post-consumer LDPE back into food packaging using a cascade of technologies, starting with sensor based and tracer based sorting to distinguish between food and non-food packs in waste packaging," says Martin Schlummer, Senior Scientist at Fraunhofer IVV.

"Downstream, washing, de-inking and delamination technologies of University of Ghent are being used. This way we avoid food residues, dirt, printing inks and adhesives to be compounded into LDPE upon regranulation, which in any case may cause off-odours.

"We are also considering the dissolution-based CreaSolv technology from Fraunhofer IVV. Due to its high purification performance, this produces very pure recycled polymers. As solvents are brought in contact with the polymer and are evaporated from the polymer within the process, other VOCs and semi-volatile organic compounds are removed together with the solvents. This leads to significant odour reduction." The project is also investigating Kreyenborg deodorisation technology.

The objectives of Circular FoodPack include: development and validation of robust, food contact compliant fluorescent tracers, which can be printed as additive of typical printing inks; adoption of conventional NIR sorters so that these can reliably detect small and commercially viable amounts of sorting tracers on all types of multi-layer food packaging; sorting trials with Tracer-Based-Sorting of marked food packaging items; development, upscaling, and application of deodorization technologies able to remove over 95% of odorous components, benchmarked with common implemented deodorization technologies; development of high performance functional barriers, effectively preventing migration of any residual contaminants from the PCRs below the migration limits set out by legislation and EFSA.

CLICK ON THE LINKS FOR MORE INFORMATION:

- **https://corporate.evonik.com**
- **www.byk.com**
- **www.quarzwerke.com**
- **www.ampacet.com**
- **www.aromaticfusion.com**
- **www.microban.com**
- **www.coperion.com**
- **www.kreyenborg.com**
- **www.erema.com**
- **www.luigibandera.com**
- **www.starlinger.com**
- **www.piovan.com**
- **www.ivv.fraunhofer.de**

AMI | Events

Chemical Recycling

26-28 June 2023 | Frankfurt, Germany

SAVE 20%* off your delegate place today

Exploring the potential of chemical or advanced recycling to turn waste plastics into new materials

The go-to event to learn about the:

- latest technological advancements
- future of advanced recycling in Europe
- new tools and technologies to advance the circular economy
- importance of feedstock and value chain collaboration

New for 2023: APK Pilot Plant site visit

Join us in Frankfurt and take the opportunity to experience the inner workings of an advanced recycling plant in action

Event sponsored by:

erema group | MURA TECHNOLOGY | APK | SynCycle unwasting plastic Inspired by: NGE BDI | SULZER

*Discount cannot be used in conjunction with other offers. Valid until 13 January 2023.

JOIN US IN FRANKFURT

AMI

Maximise your business growth in the global polymer industry with our market intelligence and events for the recycling and sustainability sector

Trustworthy market intelligence, data and insights to drive your business forward

Our most popular market reports and database titles include:

- **Database**
  - Plastics Recyclers in Europe and Turkey
- **Market reports:**
  - Chemical Recycling Global Status
  - Mechanical Plastics Recycling Industry Europe
  - Mechanical Plastics Recycling Industry Global
  - Post-Consumer Plastics Packaging Waste Management Europe
  - Recycling of Flexible Polyolefin Films Europe
  - Recycling of Agricultural Films Europe
  - Rigid Polyolefin Recycling Europe

Visit us at 2022

Hall: 7
Stand: C11

Upcoming plastics recycling and sustainability events from AMI

Plastics Recycling World Expo
9-10 November 2022
Cleveland, OH, USA

Recycling Flexible Packaging
13-14 December 2022
Cologne, Germany

Plastics Sustainability Strategies
April 2023
Brussels, Belgium

Chemical Recycling
21-22 March 2023
Houston, TX, USA

Plastics Recycling World Expo
14-15 June 2023
Essen, Germany

Ocean Plastic
20-21 June 2023
Houston, TX, USA

Chemical Recycling
26-28 June 2023
Frankfurt, Germany

Plastics Recycling Technology
10-12 October 2023
Vienna, Austria

Book an appointment

AMI

INJECTION MOLDING & DESIGN EXPO

FROM CONCEPT TO DELIVERY

SEPTEMBER 20-21, 2023

SUBURBAN COLLECTION SHOWPLACE
NOVI, MI, USA

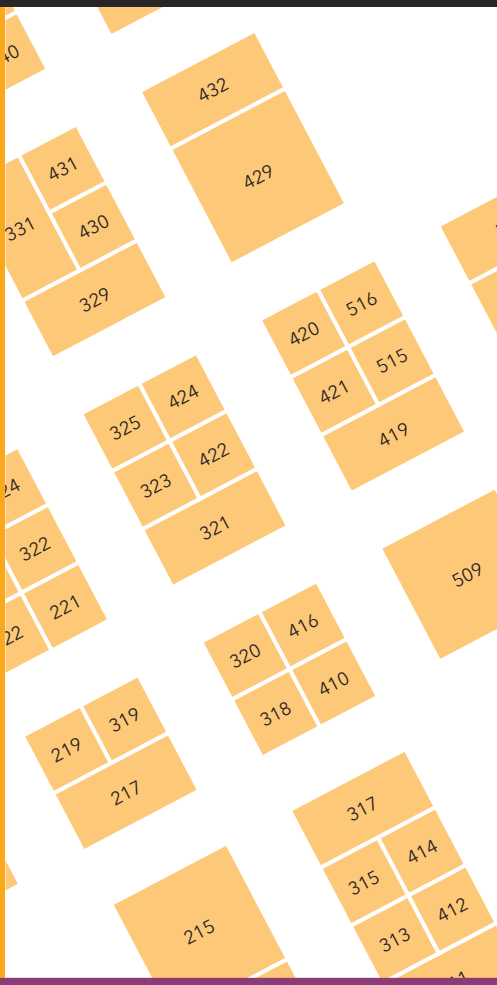
SECURE YOUR PERFECT BOOTH SPACE FOR 2023

CONTACT US

Chrissy Winegarden
Exhibitions Sales Manager

chrissy.winegarden@amiplastics.com

+1 610 478 0800



DOWNLOAD THE 2022 POST-SHOW REPORT

Brought to you by:

Plastics News

Injection WORLD

Organized by:

AMI

CRAIN COMMUNICATIONS
GLOBAL POLYMER GROUP

Recyclers' guide to K 2022

Part 2: Machinery

The world's largest and most international plastics trade fair opens its doors this month in Dusseldorf in Germany. 70 years on from its first edition, the 2022 K show will continue the tradition of hosting the latest innovations in plastics materials, machinery and services.

K is a huge event, however, and it is certainly best approached with a plan: our **K Show Guide** in the July-August edition aimed to provide some tips and weblinks to plan your trip so you could get the most from your time at the show; last month's **K2022 Materials Preview** looked at some of the planned introductions in terms of additives and other products.

This month we turn the spotlilght on machinery and equipment. Over the following pages you will find details on some of the newest products and portfolio expansions being introduced in Dusseldorf by many of the leading suppliers of equipment to the global plastics recycling industry.

Despite the Covid and geopolitical challenges of the past two years, K2022 will still be a major event for the plastics industry. The previous event in 2019 attracted 3,330 exhibitors and just over 224,000 visitors. Few expect attendance to hit anywhere near that level – most major trade shows are still to recover to pre-Covid levels – but K is certain to deliver an audience of enthusiastic and influential visitors keen to learn about new innovations and do business.

The long tail of Covid continues to play on international travel and health remains a concern for many. K2022 organiser Messe Dusseldorf has implemented a number of projects to ensure visitors are as safe as possible at the show – including €1.4m spent on fitting HEPA filters on the hall ventilation systems across the fairground.

It can do less to assuage economic worries. Recession looms as energy prices soar due to Russia's aggression against Ukraine and its spiralling efforts to punish the country's supporters. VDMA, which represents German machinery manufacturers, is forecasting growth of 0-2% across its members this year having earlier predicted growth of 5-10%. But, as long-term plastics industry professionals will know, the K show holds its own whatever the economic challenges.

The *Plastics Recycling World* and AMI Magazines team will be at the show gathering information for our post-event coverage in the November-December edition. We will also be reporting on the latest news and innovations as they happen via our @PlasticsWorld feed on Twitter. If you want to be sure you keep in touch with developments, join the more than 23,000 people already following us.

You may also be able to catch up with our editors and sales team on the AMI stand at the show – you can find us on Stand C11 in Hall 7. We will have information there about our magazines, conferences, databases, consulting services and North American and European expos. Some of our industry experts will also be available to help you with information on a variety of topics. You can learn more about this **here**.

Dates: 19-26 October 2022
Venue: Messe Dusseldorf, Dusseldorf, Germany
Hours: 10:00-18:30 daily
Advance tickets: One-day €55, three-day €155.
Note: ticket price no longer includes free local transport
Organiser: Messe Dusseldorf
Website: www.k-online.com

Use the following links to go direct to essential show information:

- **K2022 hotel booking**
- **K2022 online ticket purchase**
- **K2022 exhibitor search**
- **K2022 iOS/Android apps**

Right: Britas will show its ABMF-PET-C continuous melt filter

Bandera says plastics recycling technology is one of the features of its presence at K2022. It will focus on extrusion plants for the recycling and re-use of post-industrial and post-consumer waste, in addition to its blown film technology, flat dies, pelletisers and extruders. It says it is able to cover services from project design to engineering, plus the analysis of new contexts and answers in terms of prevention and finished product management. Bandera machinery has also been redesigned in a partnership between the company and Turin-based firm ICONA Design Group.

› **www.luigibandera.com**

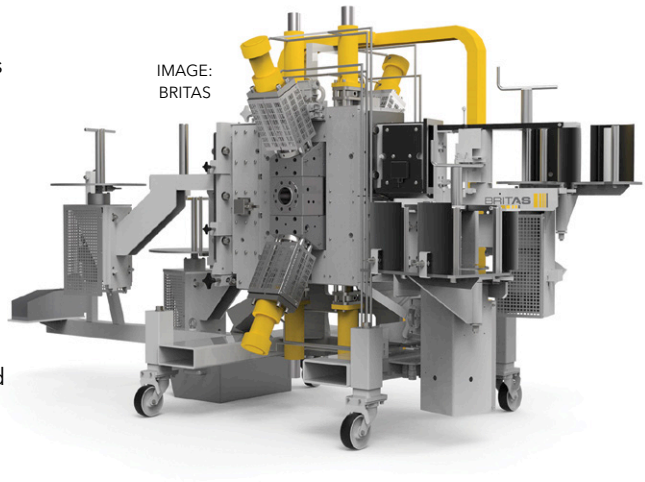


IMAGE: BRITAS

Bausano will be showing its Smart Energy System for induction heating of the extruder barrel. Claimed to significantly reduce energy consumption, the technology uses forced-cooled induction coils wrapped in insulating materials to minimise heat loss while channels allow air to be directed onto the plasticising cylinder for faster cooling. The system will be displayed on a Nextmover twin screw extruder equipped with a double output head and configured for manufacturing PVC pipe.

The company will also be showing its new E-GO R single screw technology, which has been developed to feed highly contaminated plastics back into production processes. Example applications include HDPE waste from containers for milk, motor oil, soap, and bleach, PP waste from lunch boxes, yoghurt pots, and medicine bottles, and LDPE waste from cling film, and shopping bags. The Smart Energy System can also be applied to the E-GO R machines.

› **www.bausano.com**

BB Engineering will be presenting at K2022 as an expert in extrusion, mixing and filtration, as well as an innovator for PET recycling. In addition to extruders, filters and mixers suitable for both recycling processes and the processing of recyclate, it offers a complete PET recycling plant called VacuFil. The process combines gentle large-scale filtration and targeted IV regulation for consistently outstanding rPET melt quality. VacuFil processes a wide range of input materials, both post-production and post-consumer, while the patented key component Visco+ vacuum filter quickly removes volatile impurities.

VacuFil is a modular system that can be designed for different applications, so there are no limits to the downstream processes. Simple granulation is possible, as is direct feeding into further processing. BBE offers VacuFil combined with its own VarioFil compact spinning plant to produce polyester yarn.

› **www.bbeng.de**

Britas has developed a new dedicated filtration technology for PET recycling which it will be showing at K2022. The new ABMF-PET-C operates with continuous melt process without any interruption or stoppage during change of filter screens.

Thomas Lehner, Britas CSO and Managing Director, explains: "We are absolutely convinced that our new ABMF-PET-C is the ideal filtration technology to achieve the best quality pelletised granules, but also enable our customers to operate mostly efficient in their recycling lines. The fineness level of our system down to 20 micron is unbeatable and ensures the highest level of filtration. Material costs has always [had] a significant impact on our customers, hence every kilogram matters. With our technology we support this need as our systems show melt losses below 1%."

The new ABMF-PET-C is available with a filter surface of 1,140 cm² up to 3,200 cm² and a maximum output up to 8,000 kg/h, depending on contamination and material properties.

› **www.britas.de**

Coperion and **Coperion K-Tron** will be presenting a variety of new and ongoing developments that will increase the efficiency of plastics compounding processes and help boost conscientious resource handling while at the same time achieving high product quality. It will be exhibiting an entire production line for recycling PET, encompassing bulk solids handling, feeding, extrusion, and pelletising, showcasing its expertise in numerous recycling processes.

Certain to catch the eye will be the high-performance ZSK Mc18 extruder. With a 70mm screw diameter and high specific torque of 18 Nm/cm3, it is especially suited for efficient compounding of plastics at high throughput rates and with comparatively low energy consumption. It is equipped with a ZS-B easy side feeder as well as a ZS-EG side devolatilization unit, both of which significantly reduce the time needed for recipe changes or maintenance tasks as they can easily be removed from the process section. A K3-ML-D5-V200 vibratory feeder from Coperion K-Tron will be on display at the main intake of the ZSK 70 Mc18 while the ZS-B easy will be equipped with a K-ML-SFS-BSP-100 BSP feeder.

For feeding voluminous flakes and fibres efficiently into the ZSK twin screw extruder, Coperion will show the SWB-300 Smart Weigh Belt Feeder with a S100 single screw pre-feeder, as well as the new ZS-B 70 MEGAfeed side feeder.

The SP series dual bearing strand pelletizers have been given a comprehensive facelift, the new version allowing even faster recipe and colour changes in comparison to previous models.

The SWB is an extremely reliable gravimetric feeder that can process large volumes of bulk materials with a wide variety of flow properties. Using the newly developed Coperion ZS-B MEGAfeed, plastic recyclate with a bulk density under 200kg/m³, long considered intake-limited, can be fed into smaller sizes of Coperion's ZSK twin screw extruders and concurrently be recycled and compounded.

› **www.coperion.com**

Erema and its subsidiaries will present several new recycling systems and components at K2022 – which will enable large-scale plants with a production

IMAGE: HELLWEG

Above: Hellweg's Smart Control system

capacity of up to 6 t/h. These include: the new Erema 406 laser filter, with 50% larger screening area; innovations in the plasticising unit, for high throughput and low specific energy consumption; and the PredictOn app, which can anticipate and eliminate imminent malfunctions based on continuous measurement of machine data. The increased screen area of the 406 laser filter helps to ensure lower pressure and temperature at the same throughput rate. The Quattro version of the LF 406 laser filter can filter up to 9,000 kg/hr of melt.

Chemarema is a new series developed for mechanical material processing as part of the chemical recycling process. Chemarema features extrusion technology that can be adapted to the application requirements and is designed precisely for downstream chemical processes.

In the outdoor area of K2022, Erema will have live recycling demonstrations – where different waste streams will be processed – in co-operation with partners. The company's in-house recycling segment – Pure Loop and Plasmac – will also present a range of machinery at the show.

› **www.erema.com**

Gneuss will show its latest machinery innovations with a complete Omni recycling machine featuring a new 3C rotary feeder, an MRSjump 70 extruder, a fully-automatic melt filtration system RSFgenius 90, and an online viscometer VIS, for the processing of 200 kg/h of undried and uncrystallised PET thermoform reclaim.

The newly developed 3C Rotary Feeder makes it possible to use low bulk density materials without any external processing steps. A conveyor belt feeds shredded reclaim material into the hopper, where a fast-rotating disc with knives cuts, compacts and pre-conditions the material. The knives add energy into the material and start the heating and degassing process before the material is automatically fed into the MRSjump extruder, which is based on conventional single-screw technology but equipped with a multiple screw section for devolatilization. It enables very efficient decontamination of PET, whilst achieving requirements for direct food contact standards.

As demand for PET bottle flakes outpaces supply and processors are looking for alternative feedstock, the MRSjump offers an excellent solution for PET thermoform, film or fibre recycling, while the newly-developed MRS cutter compactor makes it possible to use low bulk density materials.

› **www.gneuss.com.**

Hellweg Maschinenbau will be presenting extended options around the Smart Control system for its entire granulator range. It has added a hardware module to the Smart Control system capable of storing the power consumption of the machine it is fitted to. The software has the option of controlling granulator speed in increments of one, giving the user even more flexibility in tailoring machine parameters to requirements while the SECURE+ package adds safety features. As soon as it detects imminent granulator overloads, it counteracts them so that rotor blockages can virtually be avoided.

Hellweg can now optionally equip all central granulators from the 260 series upwards with a new

central lubrication unit. Using a Bluetooth interface, the unit provides the operator with all relevant data, such as battery voltage, temperature, and delivered lubricant volume, as well as the time since the most recent pump stroke and operating time, enabling the operator to detect irregularities at an early stage.

The new R 200/20 Servo edge trimming system, a joint development with Breyer Extrusion, complements Hellweg's range of systems of this type, also known as guillotines or chippers. When trimming film webs, it pre-shreds one or two edge strips, which are then fed to a granulator for further processing. The operator is able to select the cutting frequency and specify the length of the chopped edge strips.

› **www.hellweg-maschinenbau.de**

ICMA San Giorgio's display at K2022 is focused on recycling. The company will present a One Step up-cycling line for recycling of flexible packaging into high quality material using one co-rotating twin screw extruder. It will also present an upcycling compounding system suitable for production of engineering compounds, TPEs and bio-based materials.

› **www.icmasg.com**

KraussMaffei's K2022 display focuses on integration of its compounding into upcycling and circular production processes. The company will, for example, be demonstrating injection moulded production of insulin pen caps in a medical grade PP followed by direct transfer to a ZE28 BluePower twin screw compounding extruder, where additives, glass fibre reinforcement, and liquid colorants are introduced before the finished upcycled compound is delivered to a second moulding machine for production of an automotive door module.

The ZE28 extruder will be equipped with KraussMaffei's latest control system, which gets its first public showing at K. The most noticeable change is the interface, which uses a number of wizards to provide the operator with step-by-step instructions. The aim is to ensure that even less experienced staff members are able to control complex extrusion processes. Any deviations from setpoints are indicated at an early stage by visual feedback, so that intervention is possible before it becomes even necessary.

IMAGE: KREYENBORG

Left: Kreyenborg's Universal Quick Mixers

The machine is also equipped with the company's ColorAdjust system. This uses a photometer to determine the colour of the cooled reclaimed pellets in the vibration chute, then transmits the corresponding values to the machine control system where they are used to programme and control a colour metering unit (typically four liquid colours but expandable to six depending on the specific application). The ColorAdjust system provides completely automatic control of the colour.

› **www.kraussmaffei.com**

Kreyenborg will be delivering a highly flexible tailor-made mixing system which can be used for a wide range of regrinds. The mixing system includes two proven Universal Quick Mixers which can be operated individually when mixing smaller quantities to ensure easier cleaning, or they can be connected and used together. For smaller quanti-

ties, mixing times can be reduced by around 50%, and with larger quantities the mixer volume can be doubled to generate a single batch.

Because of varying widths of the conveying paths within production facilities, the system is suitable for feeding using pressure-conveying systems. The two mixers, equipped with tangential inlets, thus act as cyclone separators during pneumatic feeding. Correspondingly, a required filter module was installed downstream of the silos to collect the conveyed dust. The homogenized material is discharged via two discharge screws into the big-bag filling stations.

› **www.kreyenborg.com**

Krones says that at its K2022 stand this year, everything revolves around plastics recycling, a topic that is equally relevant to industry, society and the environment. The company has been investing intensively in the development of its MetaPure recycling technologies and the underlying process knowledge for years. It says that at K2022 it will be explaining how easy and profitable it is to recycle packaging materials.

www.krones.com

Lindner will be presenting new all-in-one solutions for efficient plastics recycling at K2022. Along with a wide range of product innovations, a special highlight is a new system solution to directly process post-consumer rigid plastics in an injection moulding process.

The key to recycling success lies in the coordination of the upstream processes of shredding, washing and sorting, and Lindner offers solutions to effectively optimise these steps while processing rigid plastics, film and PET. Shredding waste plastic is the start of the recycling process, an area where Lindner can apply its experience to obtain standard throughputs of 40 t/h or more.

Lindner will be presenting the upgraded Jupiter BW series for the first time, a product innovation focused on optimising the handling of plastic films for the downstream NIR sorting process. In addition to a constant volume flow and homogeneous larger particles, this also includes optimising the particle size.

Lindner will also be introducing EcoDry, its new thermal dryer. Clever use of heat exchangers and sustainable insulation of the material-conveying components means it can achieve energy savings

of up to 30%, the high degree of drying ensuring that the flakes are better prepared for subsequent processes.

› **www.lindner.com**

Maag Group will be presenting its latest innovations in integrated solutions at the K fair, including a complete underwater pelletising system from recently acquired AMN. This comprises a 1,500 mm diameter die plate with central water injection (CIS) and sword-shaped knives and is being shown at the exhibition for the first time. The CIS system is designed to improve both pellet cooling and ejection and is said to be an effective solution for pelletising of high melt index or peroxided polymers. AMN die plates offer performance and longevity in a wide range of applications, especially high-capacity underwater pelletisers.

Melt filtration products include the Ettlinger ERF and ECO series screenchangers, which are designed for highly contaminated post-consumer recycling applications and can deliver throughputs of up to 10 tonnes/h, depending on the application. Also new is the ContiNeo filter, which is said to combine the advantages of a single-bolt screen changer with those of a continuous dual-piston screen changer with backflush functionality. It is suitable for extrusion processes requiring low pressure fluctuations and fully automatic operation in a small space.

The company will also show for the first time its newly developed PEARLO XXL underwater pelletiser, which offers a capacity of more than 40 tonnes/h as well as innovations such as a cutting chamber that splits on an angle to simplify start up. The fully automatic JSG strand pelletising system, which is suitable for compounding applications up to 9 tonnes/h, will also be on show.

› **www.maag.com**

Nordson will introduce BKG HiCon K-SWE-HD/RS at this year's K show, a new melt filter for blown film applications. It says producers are under pressure to use more recycled material but adding it to the mix can be an additional disruptor to an already delicate process with contaminants potentially causing optical flaws and bubble ruptures. To cope with the high process pressures in blown film applications, Nordson made some patent-pending changes to its backflush technology.

Pressure consistency is an essential aspect of op-

Right: Sorema's WT wet grinder

IMAGE: SOREMA

erating a blown film line successfully, and in this high-pressure application it is even more important to avoid pressure fluctuations through intelligent solutions.

The BKG HiCon K-SWE-HD/RS melt filter is equipped with the patented melt pressure controlled venting start that fully automates the filling of the screen cavity after a screen change for maximum pressure consistency. Additionally, the filling is done so carefully that no air entrapments endanger the process or the end product.

› **www.nordson.com**

Piovan Group will present a complete overview of its most advanced technological solutions. Among the highlights will be Winfactory 4.0, the company's production process control and management software developed to ensure automatic recipe setting and product traceability.

Other products on display include the Winenergy energy efficiency monitoring and analysis system and Winflo monitoring and control for its Aquatech industrial cooling solutions. The Condenso dehumidification line has been specially developed for the plastics recycling process. It removes VOCs (Volatile Organic Compounds) from the process air using a novel energy recovery system. The system comprises SoftBoost air channelling system for granule heating, the water-cooled CAPchiller, Vulkano portable VOC measurement instrument, and Odor Minder in-line electronic nose.

› **www.piovan.com**

Saperatec, a developer of recycling processes for composite packaging, will highlight an innovative multi-layer delamination approach at K2022. The novel approach results in recycled materials that can replace virgin raw materials in numerous applications, including film packaging.

Saperatec's composite packaging recycling capabilities bring the potential to separate and reintegrate a wide variety of substrates into the packaging stream. For starters, Saperatec will focus on composite flexible packaging materials and tube packaging with aluminum foil barriers, as well as plastics and aluminium from beverage cartons. Beyond that, the technology opens the door for future recyclability solutions in a wide range of composite packaging, as well as other materials combining plastics with metal, glass and paper.

› **www.saperatec.de**

Sorema will be demonstrating its upcycling concept. The system's wet grinders grind the film to a size that guarantees the best yield with a limited production of PE fines, so that the subsequent washing, drying and extrusion operations benefit from working with a constant, reduced material size, resulting in a significant final reduction in energy and water consumption. During the grinding process, the machine generates high friction on the surface of the material by opening and removing a huge amount of contamination due to the high mass flow of water.

This solution cleans the material that is quickly separated from water by the centrifuge. Sorema says this offers a better quality of recycled polymer than solutions based on a single dry shredder, both in terms of greater cleanliness and less wear and tear on machine components.

› **www.sorema.it**

Starlinger will showcase the RecoSTAR PET Art, the company's latest plant model in the field of PET recycling. In addition to Starlinger's established technology solutions, the new plant is characterised by particularly low energy consumption and considerably simplified maintenance processes.

Both the pre-drying unit and the extruder of the new RecoSTAR PET Art will be on display, and the company will also be showcasing machine solutions from the fields of polyester fibre/filament recycling and recycling of post-consumer polyolefins, including odour reduction technology.

Commercial Director Paul Niedl says: "What happens in the PET bottle-to-bottle recycling process to turn a used mineral water bottle back into a new mineral water bottle can be called high art. It is a composition, a synthesis of experience combined with the latest scientific knowledge and high technological standards. Our new RecoSTAR PET Art embodies 20 years of experience."

› **www.starlinger.com**

AMI | Events

Polymers in Footwear

29 November-1 December 2022 | Online

Enhanced delegate price

Attend for just €350*

Identifying opportunities in polymer materials and processing technologies for footwear applications

Hear from industry experts:

Filipe Moreira
Head of Footwear Engineering - Innovation
Rev'It!

Alberto Gonzalez Ravelo
Commerical Director
Quinorgan

Levi Kishbaugh
VP Engineering
Trexel

Dr. Elena Orgilés
Subdirector of Materials & Technology
INESCOP

REGISTER YOUR FREE PLACE OR UPGRADE TO ENHANCED TODAY

Sponsored by:

QUINORGAN feel good chemistry

Trexel

DUPONT™

ARLANXEO Performance Elastomers

NATURAL FIBER WELDING®

Media supporters:

Compounding WORLD

Injection WORLD

*Exclusive of VAT.

AMI Plastics World Expos
NORTH AMERICA

November 9-10, 2022 // **CLEVELAND, OHIO, USA**

Exhibitors already include:

ABS Advanced Blending Solutions LLC
SCHWING Technologies
omipa Extrusion Machinery
AdvanSix
Q-LAB
Reifenhäuser Extrusion Systems
PerkinElmer For the Better
Vecoplan
ThermoFisher Scientific
TPEI Technical Process & Engineering Inc. Customer Service, Compounded Daily
ECON
brabender Technologie
Windmoeller & Hoelscher
WACKER
NGR Plastic Recycling Technologies
coperion confidence through partnership
PTI
Sanitized Swiss antimicrobial expertise since 1935
AZO
NETZSCH Proven Excellence.
GEON Performance Solutions
EREMA Plastic Recycling Systems
Krauss Maffei Pioneering Plastics
DAVIS-STANDARD Where your ideas take shape.
cumberland
CDS
Milliken
BASF We create chemistry
DOVER Chemical Corporation
MACRO Advanced Extrusion Systems
struktol
COLLIN Lab & Pilot Solutions
FIMIC Italian.Melt.Filter
CLOEREN
BÄRLOCHER
Chroma Color Corporation
MAAG Group
NFM
BYK
FB Balzanelli
ENTEK
CPM Extrusion Group Local Service Global Reach
American Cutting Edge Industrial Blades & Knives A division of CB Manufacturing
GEFRAN Beyond Technology
Barentz.
BUSS excellence in compounding
ECM
KRONES
GÖTTFERT
chemigon
JSW Extrusion Technical Center
MECO Seals An Employee Owned Company
Dynisco
MAG
Leistritz Extrusion Technology
orion Engineered Carbons Focused. Innovative. Responsive.
MIXACO Maschinenbau
BRITAS Filtration Systems
CIMBAR Performance Minerals
kaneka
GENOX USA
EVONIK Leading Beyond Chemistry
MODIX Plastique Inc.
NDC Technologies
plasmec Excellence in Mixing
LAB TECH Engineering Company Ltd
ENTEC
PROMIX Solutions
psl rheotek USA
Trendelkamp
SIKORA Technology To Perfection
Budenheim
arxada
Macchi

BOOK YOUR BOOTH HERE

Co-located exhibitions:

COMPOUNDING WORLD EXPO

POLYMER TESTING WORLD EXPO

PLASTICS EXTRUSION WORLD EXPO

PLASTICS RECYCLING WORLD EXPO

REGISTER FOR FREE HERE

Experience Addex · ZEPPELIN WE CREATE SOLUTIONS · pinfa North America · STEER AMERICA · sesotec · SHAMROCK · APEX

OXFORD INSTRUMENTS · BREAK Polymer • Filtering · PSI POLYMER SYSTEMS INC. · ENTEX The Planetary Roller Extruder · ARTEC MACHINE SYSTEMS · APPLIED OPTIX

SILON · ExxonMobil · ALTECH · BERGEN International · HOSOKAWA MICRON HOSOKAWA POLYMER SYSTEMS · Re-cre8 Recycling · IMCD

ADITYA BIRLA BIRLA CARBON · BPM BAY PLASTICS MACHINERY · SonicAire · BEKAERT better together · Granulator · Una-Dyn Piovan Group · KISUMA

PrintSafe Marking and Coding Solutions · NORAC ADDITIVES · OMYA · WELSET Innovation in Compounding · Paulson Training Programs, Inc. · PRODUX Nylon Processing · KUHNE GROUP

COMBILIFT LIFTING INNOVATION · STAR PLASTICS · exxel polymers inc. · DREYTEK · ALOK · VAC-U-MAX · ecopuro GLOBAL SOLUTIONS

Royce GLOBAL · PALMAROLE AG Trading & Marketing Consultants · ORLEN Unipetrol · CABOT · schenck process · Southeast Machinery

get recycling · ZERMA · HERBOLD MECKESHEIM USA · iD Additives · TOYOTA TSUSHO AMERICA, INC. · POWDER KING · IMPERIAL INDUSTRIES INC

J-TEC MATERIAL HANDLING · POLYSTAR · LINDNER · PROGNOST Intelligence on Duty · TECHNOVEL CORPORATION · Otsuka Chemical America, Inc.

MDI MODERN DISPERSIONS, INC. · sāco AEI polymers · METTLE FILTRATION PRODUCTS, LLC · Bronkhorst USA · union OFFICINE MECCANICHE · NASCA ELASTOMERS · Helluva CONTAINER A Balcon Enterprises Inc. Company

NATIONAL BULK EQUIPMENT · pmc · RAVIZZA PACKAGING USA · TOYOTA TSUSHO AMERICA, INC. · SCIENCES COMPUTERS CONSULTANTS · Orbetron · USE EXTRUDERS · enercon

and many more. See the full list of exhibitors here.

Brought to you by: AMI

Proudly supported by: Compounding WORLD · Film and Sheet EXTRUSION · Pipe and Profile EXTRUSION · Plastics Recycling WORLD

AMI | Events

Stretch and Shrink Film

November 30 - December 1, 2022
New Orleans, LA, USA

AGENDA HAS BEEN RELEASED

Examine the opportunities accelerating the growth of the stretch and shrink film market and gain insight into the latest material, technology and market trends

Speakers include

Alison Keane
President & CEO, Flexible Packaging Association

Shawn Cook
Technical Manager - Plastic Additives, Dover Chemical

Patrick R. Lancaster, III
Chairman and Co-Founder, Lantech

Esteban Sagel
Principal, Chemical and Polymer Market Consultants

Sponsored by:

EREMA® PLASTIC RECYCLING SYSTEMS

PURE LOOP MEMBER OF EREMA GROUP

CLOEREN

COLINES® ONE STEP AHEAD

SML EXTRUSION LINES – ENGINEERED TO PERFORM

BOOK YOUR DELEGATE PLACE HERE

New lines expand recycling capabilities

Innovations in core recycling and recompounding extrusion lines, plus other key technologies, are on show at K2022. Mikell Knights discovers what's new

IMAGE: SHUTTERSTOCK

The pace of innovation in plastics recycling technologies appears to be increasing, with brand new recycling lines being launched into the market, along with enhancements to established systems. The latest recycling and compounding technology introductions incorporate designs to better handle low bulk density materials or highly contaminated plastic waste, improve devolatising, degassing or deodorising operations for high quality end products, or process a wider range of materials with greater energy efficiency and lower CO_2 emissions. Other innovations let operators compound custom formulations with add-on technologies, provide a no-frills but efficient prefabricated recycling line from stock, or usher in new component technologies from filtration to feeders that significantly improve those tasks. Several companies are constructing dedicated recycling centres to test and develop new technologies and processes that will bring previously discarded waste materials into circularity.

Austria-based **Erema Group** has been active over the past 18 months in the development of its wide-ranging product and business areas. New technology developments are on display, in demonstration or in discussion at the K2022 show in Dusseldorf, Germany this month.

Umac is an Erema Group company which offers previously owned recycling systems that is assesses and rebuilds. It is now expanding its business area with the launch of its first standardised, prefabricated recycling system produced as a stock machine.

"If customers are looking for a recycling machine for standard applications that is available immediately, we can now offer them a new product that represents excellent value for money, in addition to our range of previously owned equipment," says Markus Stölnberger, Managing Director UMAC GmbH.

The new ReadyMac line is suitable for standard post-consumer recycling applications involving PE,

Main image: The latest recycling equipment introductions include standardised "off-the-shelf" systems as well as custom upcycling plant

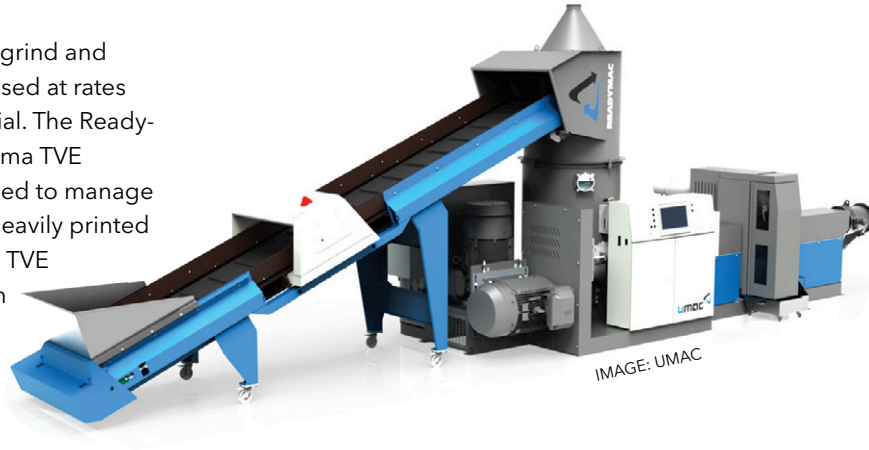


IMAGE: UMAC

Right: Umac's new ReadyMac 1109 TVE is a standardised machine based on Erema's TVE technology, which is suitable for many standard applications and can be supplied at short notice

PP, PS, PC and PA 6 materials. Film, regrind and other types of material can be processed at rates up to 450 kg/hr depending on material. The ReadyMac series is based on Erema's Intarema TVE recycling technology, which is designed to manage difficult-to-recycle materials such as heavily printed films and/or very moist materials. The TVE line offers ultrafine filtration, thorough melt homogenisation and high-performance degassing in a single-step approach.

"The TVE technology with degassing and the SW RTF filtration system with its backflushing mechanism ensure a very high pellet quality that meets the criteria of a very wide range of standard applications," says Stölnberger.

Umac says the prefabricated ReadyMac machine is offered without options or variants, although the system is otherwise complete and ready to produce. The ReadyMac 1109 TVE is the initial model.

The Powerfil business unit of Erema, responsible for development of high-performance melt filters for plastics applications, has introduced a redesigned continuous filter featuring 50% more screen surface area compared to the previous model, which ensures lower pressure and temperature at the same throughput rate.

Below: Quattro version of the new LF 406 laserfilter from Erema's Powerfil business


IMAGE: EREMA

The Erema 2/406 laserfilter is ideal for heavy contamination applications and can handle impurity levels up to 5% with filtration as fine as 70 micron while continuously cleaning the screen with a scraper, says Robert Obermayr, head of the Powerfil business unit. The Quattro version of the new LF 406 laserfilter can filter up to 9,000 kg/hr of melt. The larger screen surface area allows the throughput capacity of the recycling plant to be increased while maintaining the other parameters because a significantly higher rate of plastic melt can be filtered.

Erema is launching its Intarema TVEplus line in a new double filtration machine configuration. The DuaFil Compact configuration produces double-filtered, ultra-fine recycled pellets and is suited for particularly challenging post-consumer materials such as supermarket packaging films.

It is also launching several other technologies, including a new EcoGentle plasticising technology for its Vacunite and Vacurema PET recycling systems that significantly reduces energy consumption and features gentle treatment of the melt. The company will also introduce a solution for turning PET fibre production waste into rPET fibres for higher-value end applications.

The new solution combines a recycling technology featuring ultrafine filtration with an additional intrinsic viscosity (IV) optimiser. The resulting rPET fibre can be used 100% in the production of ultrafine fibres up to 2 dtex, the company says. The development is the result of work at the company's newly established Fibre Recycling Centre, where customers can also evaluate their own fibre materials.

Erema has also developed a machine concept it calls PCU TwinScrew, which combines its patented material PreConditioning Unit with a twin-screw extruder. A demo unit will be installed at its new R&D test centre at its headquarters in Ansfelden, Austria.

Erema is addressing chemical recycling with the development of a new machine series for mechanical material processing, a step that it says is often at the beginning of the process chain for chemical recycling to prepare input streams and ensure a reliable, continuous and energy-efficient flow of feed material. Its new Chemarema series features extrusion technology that can be adapted to the application requirements and is designed for downstream chemical processes.

Erema also began construction this year on a new 1,550 m² R&D centre at its Austrian headquarters to develop plastics recycling technologies for waste materials for which there is currently no satisfactory circular economy solution.

"While some plastics processing loops such as PET bottles have already been closed, many other plastic waste streams still require a great deal of R&D in cooperation," says Erema Managing Director Markus Huber-Lindinger.

The centre will consist of two halls and a new office building with 50 workplaces. To increase its plastics competence in these areas Erema will offer cross-developmental and cross-company test machines and a laboratory. Employees from

different departments with expertise in process engineering, mechanical engineering, automation and special technologies will be involved in developing solutions. The centre will also provide an opportunity to develop the company's digital service offerings for customers, including customer-specific information tools that feature plant and process data, predictive maintenance and online support, as well as commissioning via remote access.

An expanded machine park will be available for material tests following the completion of the new centre where recycling processes can be evaluated from end-to-end including upstream and downstream processes, such as shredding and further processing of recycled pellets. The material tests are supported by detailed analysis in the laboratory, which will be relocated to the new facility and upgraded where necessary with the most current equipment.

Erema also announced that it acquired a 19.8% stake in **Plasticpreneur**, a two-year-old start-up company based in Klagenfurt, Austria that manufactures recycling technologies that are designed to be used in regions with little recycling infrastructure and can be operated without prior knowledge. The complete system not only recycles the materials but produces end-product solutions needed locally, says CEO and co-founder Sören Lex.

Plasticpreneur's product range includes a shredder, injection moulding unit, extruder unit, as well as air filters and custom-designed and built moulds. The systems can process HDPE, PP, PS, LDPE, PLA, ABS and TPU. The company has sold 330 machines to customers in more than 70 countries on all continents. This includes sales to social enterprises and operators or refugee camps, where everyday consumer goods – from clothes pegs and school supplies to toys and fence posts – are produced and sold using plastic waste, so the added value stays local.

IMAGE: EREMA

Above: Erema showed its technology to journalists during a pre-K2022 press event at its Ansfelden HQ in Austria in June

Coperion says fibre and flake recyclate with a bulk density under 200 kg/m^3 (12.5 ft/ft^3), long considered intake-limited, not worth recycling and in some cases not even possible to recycle, can now be reliably fed in large quantities and high throughput rates with a new version of the company's ZS-B side feeder, to be introduced at K2022.

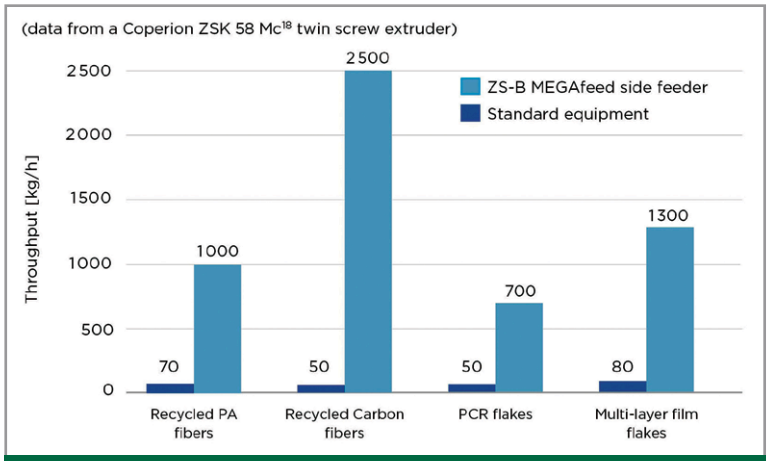
The company's new ZS-B MEGAfeed can deliver a wide range of post-industrial and post-consumer waste materials such as PA, PE, PET and PP in fibre and flake form directly into its ZSK twin screw extruder for recycling and compounding at very high feed rates.

Coperion said conventional feeding equipment handling PA fibres with a bulk density of 40-50 kg/m^3 can feed material at a rate of 70 kg/h. In contrast, when the PA fibres were fed into the ZSK extruder using the ZS-B MEGAfeed throughput rates increased to 1,000 kg/hr. A similar increase in throughput is achieved when recycling carbon fibres, with throughputs of 2,500 kg/hr reached with the ZS-B MEGAfeed compared to 50 kg/hr with conventional feeders. When recycling post-consumer recycled flakes, throughputs increased to 700 kg/hr from 50 kg/hr, and feed rates for multilayer film flakes increased to 1,300 kg/hr with the ZS-B MEGAfeed compared to 80 kg/hr with conventional equipment.

Coperion says the new feeder can supply PET flakes and fibres directly into the ZSK twin screw extruder in large quantities, with no pre-drying or crystallising, where they can be processed profitably. In addition, the new feeder technology eliminates the upstream compacting, melting and agglomeration processes associated with mechanical upcycling, with the feeder delivering material directly to the ZS-K for melting, compounding,

IMAGE: PLASTICPRENEUR

Left: Plasticpreneur manufactures recycling technologies that are designed to be used in regions with little recycling infrastructure



Throughput comparison – with and without ZS-B MEGAfeed side feeder
Source: Coperion

devolatising and filtering in a single step. This approach decreases investment costs and energy consumption while reducing the thermal stress on the material, increasing its quality.

Existing Coperion extruders can be retrofitted with the ZS-B MEGAfeed technology. "Far more plastic waste can be recycled and much more efficiently," says Coperion.

Coperion will also exhibit at the K show a new version of is ServiceBox CSB system that provides remote service support for Coperion compounding systems. The new ServiceBox CSB 4.0 unit, which will eventually replace the existing ServiceBox platform can now monitor both the operation of the compounding system and the associated equipment for materials conveying.

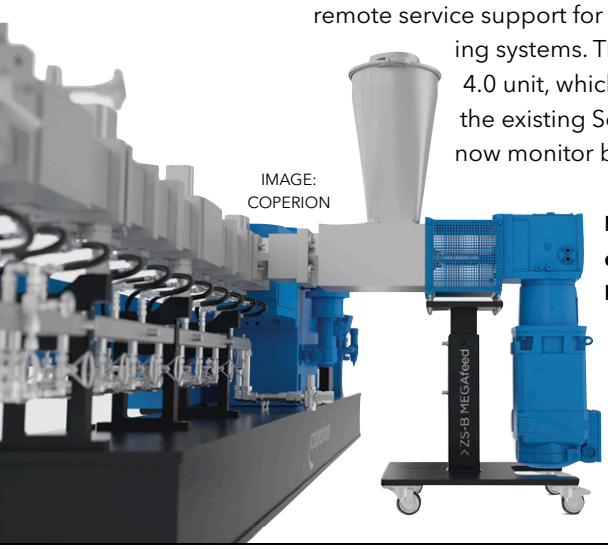


IMAGE: COPERION

Left: Coperion has developed the ZS-B MEGAfeed to deliver fibre and flake directly into its ZSK twin screw extruder for recycling and compounding at very high feed rates

In addition, the new system creates access to Coperion's C-Beyond 4.0 platform which gives access to a smart Overall Equipment Effectiveness (OEE) cockpit.

The operator can now separately activate each Coperion system independently for remote service monitoring and malfunction detection of the compounding system. Coperion actively supports the system start-up process to generate rapid online remote diagnostics or aid in increasing system efficiency with expert knowledge. Error messages can be forwarded to Coperion automatically to ensure fast remote diagnostics.

An operator can use the CSB 4.0 to capture and export relevant production data for evaluation in real time, then access a smart OEE cockpit upon request to clearly identify and display machine availability, capacity and achieved product quality. For production managers the OEE cockpit serves to monitor the compounding systems and provide an overview of their overall efficiency.

Using the Availability feature of the OEE cockpit, production disruptions due to a recipe change or maintenance task can be logged and evaluated. The OEE's Performance feature lets the operator see when a machine has fully exhausted its capacity and at what point potential capacity is available. The OEE program's Quality feature can be used to document and evaluate collected data on the targeted product quality.

Coperion has begun construction of a new 5,000 m² Recycling Innovation Centre at its production facility in Niederbiegen/Weingarten, Germany that will allow customers to develop and test all steps of the recycling process and sustainable products together with Coperion experts. Coperion will also conduct its own research activities on plastics recycling and sustainability at the facility, which will be located in the immediate

CONNECT WITH THE AGRICULTURAL FILM INDUSTRY

AMI | Events

Agricultural Film

6-8 March 2023 | Barcelona, Spain

Maximising crop yields with an effective use of silage, mulch and greenhouse films to feed the growing global population

- Discover opportunities in the global market and see the big picture
- Find ways to increase the efficiency and sustainability of your agricultural and farming business
- Hear about key technological developments in silage, mulch and greenhouse films
- Learn about film waste reduction through effective recycling and biodegradable technologies
- Explore different approaches to sustainability from material innovations to end-of-life choices

Save 15%* when you book before 13 January 2023

Secure your place today

Other ways to get involved:

Become a sponsor: Build new contacts and connect with existing customers, raise your company profile and present your latest products

Join as an exhibitor: Promote your company and its products to attendees as an exhibitor

Share your expertise: Showcase your knowledge and your company's experience to a global audience

CONTACT US

Chris Chisman
Event Sales Manager

T +44 (0) 117 311 1517
E chris.chisman@amiplastics.com

Media supporter:

Film and Sheet EXTRUSION

*Discounts cannot be used in conjunction with other offers.

KraussMaffei expands direct compounding

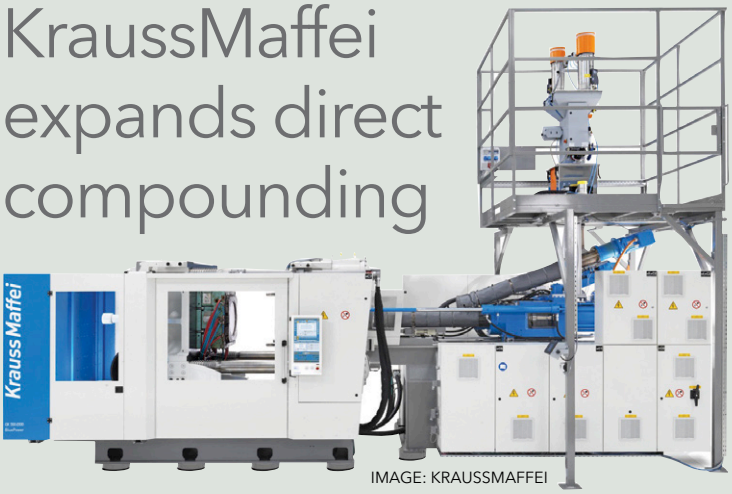


IMAGE: KRAUSSMAFFEI

Above: KraussMaffei is introducing its new Direct Compounding Injection Moulding (DCIM) machine at K2022

KraussMaffei is introducing its new Direct Compounding Injection Moulding (DCIM) machine at the K show, which presents moulders with the opportunity to compound their own formulations in-house and at the primary injection unit using recycled or virgin materials. Material savings up to 50% are possible.

The DCIM unit is a complementary technology to KraussMaffei's higher throughput Injection Moulding Compounder (IMC) system which features a twin-screw compounding extruder combined with an injection molding machine. That system requires a minimum of 2 kg for efficient operation.

Its new DCIM unit consists of a single-screw extruder with a specially designed 30:1 L/D screw to produce homogeneous melt from a wide range of materials. The DCIM is installed in a piggy-back position directly over the injection unit of a standard hydraulic injection moulding machine. DCIM manages shot weights from 50 to 2,000 g and is typically linked to a KraussMaffei CX or GX series hydraulic injection moulding machine.

The compounded melt is conveyed directly into the plasticising unit of the injection machine in a single heating step without cooling or storage, eliminating a thermal history which reduces the potential for material degradation. The one-step process also trims energy consumption and reduces CO_2 footprint.

The DCIM and injection unit operate intermittently. The DCIM extruder conveys material until the injection shot volume has been reached, at which point it stops. The DCIM restarts when the next shot begins to build.

At the K show, a DCIM unit connected to a GX 1100-4300 injection press will produce a five-piece polyolefin collapsible crate in a 35 s cycle, using three scrap materials with different viscosities – a PP staple fibre fleece from masks, a shredded HDPE material used in packaging and HDPE blow moulding scraps from toy production. A masterbatch, stabiliser additives and a micaceous iron oxide are added in the process. The five individually moulded parts will be removed from the mould by a KraussMaffei LRX 350 linear robot and transferred to an automation station from Campetella which will assemble and stack the finished 1 kg crates.

› **www.kraussmaffei.com**

vicinity of its test centre for bulk solids handling.

A recycling test laboratory at the facility will be equipped with the most current technology for high-quality and innovative recycling processes to develop processing and product solutions for the mechanical recycling of industrial and household waste and for other recycling processes. Approaches for every recycling process stage, including materials conveying, feeding, extrusion, pelletising and materials postprocessing will be investigated and evaluated.

Gneuss will unveil a complete Omni recycling machine system at the K show that is designed for closed loop recycling of contaminated polyester, polystyrene or polyethylene reclaimed as post-consumer fibres or thermoform waste. The Omni system consists of a new 3C Rotary Feeder, a new MRSjump 70 extruder as well as Gnuess' RSFgenius 90 melt filtration system and its online viscometer VIS equipment. The system can process 200 kg/hr of undried and uncrystallised polyester thermoform reclaim, the company said.

The new 3C Feeder is engineered to use low bulk density materials without any external processing steps. It consists of a conveyor belt that feeds the shredded reclaim material into the hopper where a fast-rotating disc with knives cuts, compacts, and pre-conditions the material. The knives add energy to the material which starts the process of heating and degassing before the material is transferred into the MRSjump extruder.

The MRSjump extruder design is based on conventional single-screw extruder technology but features a Multi Rotation Section for material devolatisation, like the Gneuss MRS extruder, which is comprised of multiple satellite single screws, driven by a ring gear and pinion transmission that provides gentle yet efficient decontamination of the PET. The satellite screws rotate in the opposite direction to the main screw which disproportionately increases the surface exchange of the polymer melt. A large opening for venting that

Right: RSF Genius rotary filtration technology from Gneuss

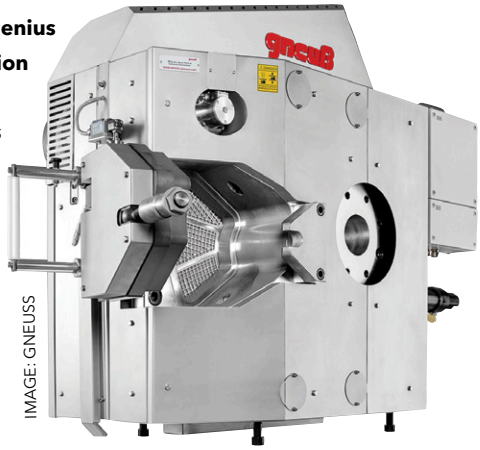
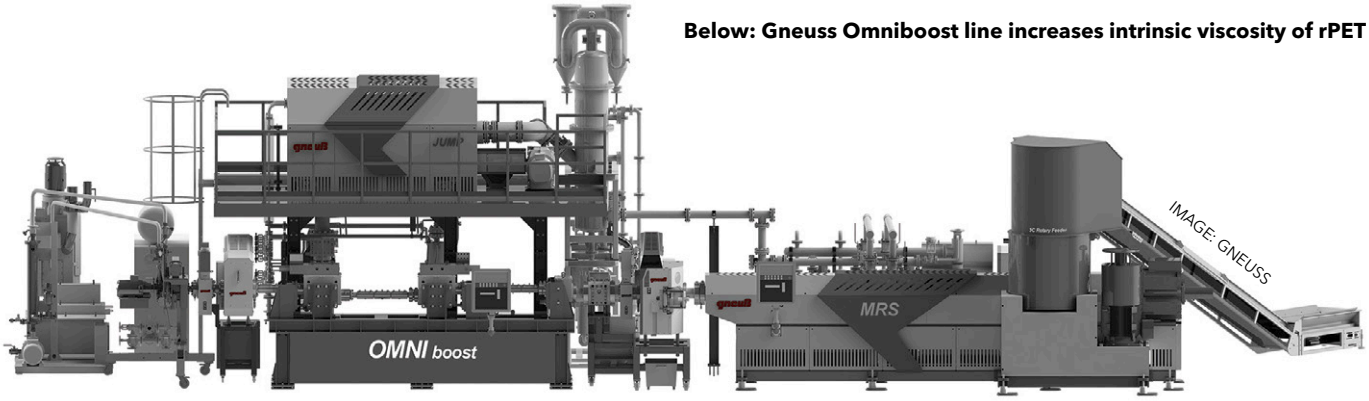


IMAGE: GNEUSS



Below: Gneuss Omniboost line increases intrinsic viscosity of rPET

extends the full length of the satellite screws, is completely under vacuum. The high rate of action by the satellite screws brings about a high surface area exchange rate of the polymer, resulting in far greater devolatisation than with other extrusion systems, the company said. The MRSjump model has a longer, modified Multi Rotation Section to ensure a longer material residence time and more material surface area exchange under vacuum. The 1 mbar of vacuum and the high surface exchange rate can be used to boost the viscosity of the rPET and hold it at a stable level even if there are variations in the input material.

The ability of the system to boost or hold the intrinsic viscosity of the rPET allow it to be used to directly recycle PET film waste or fibre reclaim in one extrusion step, which was previously impossible due to the low intrinsic viscosity or variable input viscosities of the rPET material. The RSF Genius rotary filtration technology and online viscometer VIS melt viscosity measurement device ensures the high quality of the melt.

During the K show Gneuss will operate two different Omni systems running different PET operations at its technical centre located at its headquarters. A complete PET sheet extrusion line featuring an Omnimax recycling machine, MRSjump 70 extrusion system with deep vacuum, a RSFgenius 75 fully automatic filtration system and a 500mm wide extrusion die will be in operation. An Omniboost recycling machine with Jump polyreactor technology and an extrusion and filtration system will also be in operation at the technical centre where it will increase the intrinsic viscosity value of the PET melt. The system regulates the residence time of the material under vacuum in the reactor as well as the fill level and the rotation speed of the agitating devices to achieve the desired product properties. The system can introduce the conditioned polymer directly into the production process without the need to remelt the PET.

Farrel-Pomini is introducing at K2022 a new High-Dispersion (HD) single-stage rotor with an enhanced mixing area in a 10:1 L/D format for use in its Compact Processors line of compounders with a hot feed extruder on a unitised frame. The HD rotor is specifically designed for applications requiring high dispersion, such as fibre grades, high colour carbon black and colour concentrates.

The mixing section of the HD rotor is double the length of Farrel Pomini's standard rotor. Several new technology designs are incorporated into the new component, including a new concave feed flight design which increases the conveying efficiency at the infeed of the mixer. High rotor speeds aid the intake of lower bulk density materials.

The feed screw also has a partial double feed flight design with increasing pitch that maximises the throughput rate and allows for even distribution of material over both rotor tips.

A new double length mixing section uses rotor cooling to increase the residence time of the material, resulting in higher material viscosity that increases energy input to maximise dispersive mixing, the company said. The HD rotor also incorporates a wider apex region that increases the material exchange between both rotors for better material distribution and increased homogeneity of the compound.

The HD rotor also features newly designed offset blister rings on each rotor with an adjustable dam that is used to throttle material from the mixing section, allowing for the adjustment of material residence time. A pumping section located downstream of the blister ring improves venting performance by moving material out of the mixer through the orifice.

CLICK ON THE LINKS FOR MORE INFORMATION:

- **www.erema-group.com**
- **https://plasticpreneur.com**
- **www.coperion.com**
- **www.gneuss.com**
- **www.farrel-pomini.com**
- **www.kraussmaffei.com**

Headline sponsor

AMI | Events

Polymer Sourcing and Distribution

23-25 May 2023 | Hamburg, Germany

Biesterfeld
Competence in Solutions

Disruptive forces, challenges and opportunities in global polymer sourcing and distribution

Join us next year to:

- **Dive** into the trends affecting polymer markets and their prospects
- **Deepen** your understanding of the supply chain and sourcing challenges
- **Learn** about the recycled market and impact of circular economy on supply chain dynamics
- **Get an insight** into global distribution and digital sale channels
- **Network** with senior personnel from every part of the supply chain

Save 20%* if you book before 2 December 2022

*This discount cannot be used in conjunction with other offers.

BOOK YOUR DISCOUNTED PLACE

Additives rise to the recycling challenge

Additives aim to restore the properties needed to make mechanically recycled plastics fully functional in the circular economy. Jennifer Markarian reports

IMAGE: SHUTTERSTOCK

Recycled polymer, particularly from post-consumer recycle (PCR), is notoriously challenging for both compounders and processors—high variability in viscosity, contamination, degradation and discoloration, for example, make it far more difficult to produce a quality compound capable of producing parts with consistent high quality. Nevertheless, use of and demand for PCR is increasing, and compounders are calling upon a wide range of additives to lift performance and enhance quality.

Additives are also proving useful for handling post-industrial recycle (PIR). Such materials could be sourced from in-house regrind or other converted plastics goods that are collected as waste. PIR use is already well-established in some areas of the plastics industry, but new additives can bring improvements that can open more opportunities.

Antioxidants play a vital role in polymer stabilisation, protecting from thermal degradation during processing and end use as well as preventing degradation by UV exposure. Stabilising recycled polymer, however, requires a different way of thinking. "Polymer producers have spent decades optimising the loading of additives in their plastics without recycling in mind. As a result, polymer is well-stabilised for the immediate application, but lacks enough residual stabilisation to ensure recyclability," says Tad Finnegan, Senior Technical Manager at **BASF**.

"This understabilisation leads to oxidation of the polymer, and that impacts the performance of the recycled polymer in the end-use application. To address this challenge, polymer producers are going to need to re-think how they stabilise the materials they produce to ensure future recyclability." ›

Main image: Getting the maximum value from post-consumer recycled plastic needs careful additive selection

IMAGE: SHUTTERSTOCK

Right: Film recycling is a target market for BASF's IrgaCycle additive solutions

Finnegan says that higher-performing additives may be needed to ensure successful recyclability of virgin resins, as well as to solve problems in recycled resin. "Incompatible polymers, residues, and contaminants can all find their way into the recycled resin. In addition to preventing the oxidative damage, additive packages must also address challenges with compatibilisation, neutralisation of contaminants, and mitigation of problems from residues," he explains.

BASF's IrgaCycle additive formulations, part of the company's Valeras portfolio for sustainability, are one-pack solutions designed to be added during regranulation or at the converting step. The products are formulated for specific end markets, such as rigid packaging, flexible packaging, agricultural film, outdoor furniture, and automotive. The company says that the IrgaCycle formulas allow accurate dosing and are more efficient at lower concentrations compared to traditional antioxidant systems.

"Traditional antioxidant systems are effective at addressing damage caused by the oxidation of the polymer. However, in recycled resin, there can be contaminants that accelerate the oxidative damage to the polymer, or that allow for degradation pathways that the antioxidants can't address directly," says Finnegan. "The IrgaCycle products contain additional components to address issues specific to recycling and to take the 'burden' of the antioxidants. This allows for more efficient use of the antioxidant and can allow for lower loadings of stabilisation."

For example, IrgaCycle PS 031 G has been formulated to improve the processing of film grade rLDPE. In a multi-pass single-screw extruder experiment, the melt flow rate (MFR) of the rLDPE without restabilisation dropped, indicating cross-linking degradation, while the MFR of rLDPE with IrgaCycle stayed relatively constant or increased slightly (see Figure 1). The additive also helps maintain tensile properties, according to BASF.

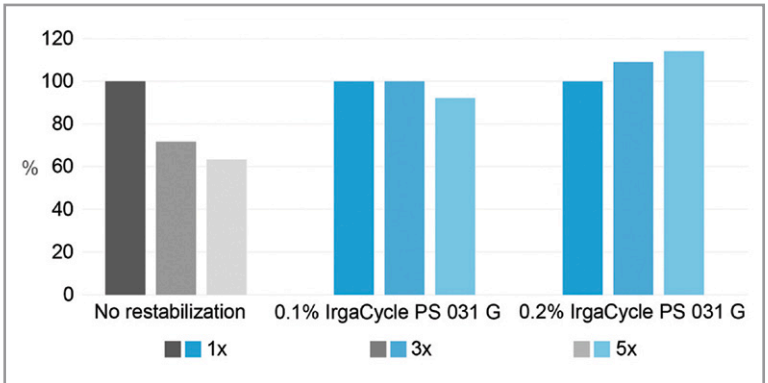


Figure 1: Melt flow rate (MFR) measured after 1, 3, and 5 extrusion cycles in a single-screw extruder at 220°C showing the effect of BASF's IrgaCycle PS 031 G stabiliser for rLDPE
Source: BASF

Sustainable gains

Additives are so important when working with PCR because poor quality can be detrimental to processability, part quality, and possibly even carbon footprint. "In many cases, with lower quality PCR, the weight of a part increases and/or the material's processability is reduced, which potentially increases energy use and resulting greenhouse gas emissions," says Robert Sherman, Technical Director at **Baerlocher**.

Sherman says that laboratory studies conducted by Baerlocher to mimic real-world conditions confirm that PCR typically needs two to three times more stabilisation than virgin material. "The quality of the incoming content from the materials recovery facility, the stream source, and the washing and sorting processes all play a huge role in determining the amount of stabiliser that's needed to produce high quality PCR. Our findings show that 2,500 to 4,000 ppm is typically needed," he says.

The company's Baeropol T-blends were launched a few years ago with several options available for PE and PP. Sherman says T-Blend 1111 TX has emerged as the "workhorse" for many applications. "Baerlocher's advanced stabilisation additives enable the use of tighter filters under more demanding processing conditions during melt filtration. As a result, fewer gels and impurities are left in the polymer and damage to the polymer architecture is minimised. In the end, the final PCR with our stabilisation additives processes much better and produces a far better final part," he says.

Polymers subjected to multiple heat histories and containing contaminants such as inks, slips,

AMI | Events

Specialty Packaging Films

6-7 December 2022 | Bangkok, Thailand

VIEW THE AGENDA AND BOOK YOUR PLACE

An Asia Pacific event on markets and technology of flexible barrier packaging for retail and industrial applications

Industry speakers include

Ying Staton
Head of Corporate Development
Plasticenergy

Horoshi Koyama
Technical Manager
Kuraray Asia Pacific

Alexander Bockisch
Head of strategy Flexible Packaging
Henkel

Baijnath Gupta
Vice President
SRF Limited

Dr. Wouter Van den Berg
Commercial Director
Yparex

SECURE YOUR DELEGATE PASS HERE

fillers, catalyst residues and other residual additives degrade both aesthetics and functionality, according to Doreen Becker, Director of Sustainability at **Ampacet**. "Choosing the correct masterbatch or concentrate is essential to prevent or correct the problems typically encountered when using recycled materials, such as viscosity changes, black specks, gels, discoloration, plate out, off-odours, moisture-retention and reduction of mechanical properties/brittleness," she says.

Becker points to Ampacet's range of solutions that include masterbatches to reduce off-odours, correct colour, and reduce moisture retention. These include its new ThermProtect antioxidant masterbatches, which are said to be designed for "PCR-rich formulations". The company says the high-performance antioxidants in the masterbatches "provide thermal stability at high temperatures and reduce gel formation in recycled PP and PE." It claims specialty radical scavengers in the masterbatch stop oxidation while acid scavengers prevent degradation caused by inks or other contaminants in PCR.

ThermProtect 1001145-N, which is manufactured in North America for non-FDA (non-food contact) PE and PP applications, contains high performance phenolic and phosphite antioxidants and alkyl radical and acid scavengers. ThermProtect 1001265-N, which meets FDA requirements, contains high performance phenolic and phosphite antioxidents and acid scavengers. The masterbatches are suited for PE and PP blow-moulded products, films, and building and construction products such as composite lumber, crates and buckets.

ThermProtect 7000121-E is manufactured in Europe for rPET applications. It contains high performance phenolic and phosphite antioxidants and is designed to reduce yellowing in recycled PET, primarily for injection stretch blow moulding, injection and extrusion thermoforming processes. In addition, Ampacet's ThermProtect 7000119-E contains high-performance phenolic and phosphite antioxidants and a blue toner for additional reduction of yellowing in recycled PET. The masterbatches enable PET bottles, containers, and trays to be recycled.

Incompatible mixes

One of the more significant issues when making PCR and PIR more usable results from the materials typically containing incompatible polymers. These

AMI | Events

Multilayer Flexible Packaging

15-17 November 2022 | Vienna, Austria

Headline sponsor

Mitsui Chemicals Group

Join your industry next month to explore advances in multilayer film design and processing for enhanced packaging performance

Industry experts include:

Dr Mark Dawes
European Market Development Manager
Dupont Teijin Films

Daniele Borin
Product Manager - Flexible Packaging EU
Taghleef Industries

Dr Dimitra Kapsimali
Packaging Specialist
A. Hatzopoulos S.A.

Vivianne Munnix
Engineer Market Development & Technical Marketing
SABIC

Andrea Cabanes Gil
CEO
Fych Technologies

AGENDA IS OUT NOW! BOOK YOUR PLACE TODAY

IMAGE: AMPACET

Above: ThermProtect from Ampacet is said to improve aesthetics, processability, and functionality in PCR polymer

incompatible mixes degrade physical properties – even a small amount of HDPE in PP, for example, will cause problems. Compatibiliser additives work to make different types of polymers, or polymer and filler combinations, compatible with each other in a recycled compound.

Ampacet's ReVive 311A Compatibiliser is designed to allow recycling of multi-layer films containing PE layers with polyamide and/or EVOH barrier layers (these polymer combinations s would normally be incompatible). The ReVive additive was initially designed for in-house recycling of film edge scrap. "Customers add ReVive to virgin, multimaterial films so that they can regenerate the scrap and edge trim back into the hopper that feeds the PE layer of the film," says Becker.

"Ampacet ReVive maintains good flow properties at the recommended letdown ratios, among the lowest in the market, and can generally be added to the PE bulk layers as a drop-in as validated in testing by leading industry partners," according to Jim Morrison, Ampacet Strategic Business Manager, Flexible Packaging.

Another use of ReVive is for addition to films containing multi-material PCR to help enhance physical and aesthetic properties. Ampacet says it went through a rigorous testing process in the US to obtain APR [US Association of Plastic Recyclers] critical guidance recommendation for the additive and subsequently How2Recycle Prequalification status for Store Drop-Off from the Sustainable Packaging Coalition.

The How2Recycle standardised package labeling system is used in the US and Canada to provide consistent information to consumers. Although prequalification is not the final designation for a package label, it is a tool for consumer product brands to see how they can achieve circular economy goals, says Ampacet's Becker. "We pursued these qualifications because many of our direct customers sell to brands who like to use this label on their packaging so that consumers know that these packages can be recycled and how to get them to the right facility to ensure they are recycled," she says.

Acti-Tech maleic-anhydride (MAH)-grafted compatibilisers from **Nordic Grafting Company** (NGC) can be used for in-house recycling at converters, during repelletising at a recycler, or in compounding of recyclate. **The Compounding Company**'s Yparex MAH-modified polyolefin compatibilisers are used in post-industrial and post-consumer recycling streams. **SK Functional Polymer** (SKFP) also has different grades of compatibilisers suitable for a wide range of recycled blends. Meanwhile, US start-up **Intermix**

AMI | Events

Single-Serve Capsules

March 7-8, 2023 | Tampa, FL, USA

Save 15%* off your delegate place today

BOOKING NOW OPEN!

Join us for next year's edition:

- Gain insight into the latest industry trends and product innovations
- Discover dynamic new applications from food and drinks companies looking at the capsule format
- Network with key stakeholders from the entire capsules supply chain
- Learn about the latest capsule design innovations
- Take away different approaches to sustainability through material innovations

Secure your discounted place

Other ways to get involved

Sponsor or exhibit: Build new contacts and boost your company profile

Speak: Showcase your knowledge and your company's experience to a global audience

Contact Us

Joe Huckings
Event Sales Manager

T +44 (0) 117 311 1517
E joe.huckings@amiplastics.com

Media supporter:

Injection WORLD

Film and Sheet EXTRUSION

*Discounts cannot be used in conjunction with other offers. Valid until December 16, 2022.

Performance Materials is commercialising an ethylene-propylene multi-block compatibiliser additive for recycled HDPE and isotactic PP, and Nexam Chemical's additive offering uses reactive chemistry to compatibilise recycled streams such as PP and HDPE or PE and PA.

UK-based **Interface Polymers** is focused on solving compatibility issues using its patented di-block copolymer Polarfin additive technology. The company says in one project, a company is aiming to use the Polarfin technology to allow blending of mixed PE/PP recycled plastic into a polar polymer to be used in textiles. In another, it says it has demonstrated that a multilayer plastic film could be recycled back into a multilayer film without loss of properties or an increase in gels.

Reactive option

The Ken-React additive from **Kenrich Petrochemicals** acts as both a heteroatom titanate coupling agent to compatibilise fillers with polymers and as an organometallic catalyst to repolymerise and copolymerise addition polymers (such as polyolefins and PVC) and condensation polymers (such as PET and polyamide) in the melt, says Kenrich President Salvatore Monte.

Monte says that masterbatches of the neoalkoxy titanate/mixed metal catalyst in pellet form (CAPS KPR) or powder form (CAPOW) can be added during the compounding step to improve properties of any polymer blend—polyolefins, PET, PVC, PLA and others. The catalyst repolymerises in the melt to restore virgin-like properties to the recycled polymers. The additive also compatibilises inorganic and organic materials often viewed as "contaminants" in the recycle stream, including calcium carbonate, carbon black, and oils.

"The neoalkoxy titanate proton coordinates with inorganic fillers and organic particulates to couple and compatibilise dissimilar interfaces at the nano-atomic level," he says. The additive is unlike any other compatibiliser, claims Monte, because it works with all different types of materials—addition polymers, condensation polymers, and fillers—at low addition levels. It is being tested in PIR as well as investigated at the R&D level for PCR. When used optimally in a compounding extruder, it can be used to produce polymers with virgin-like properties from unsorted, mixed recyclate streams, he says.

"Plastics recycling has many problems—including

AMI | Events

Plastic Pouches

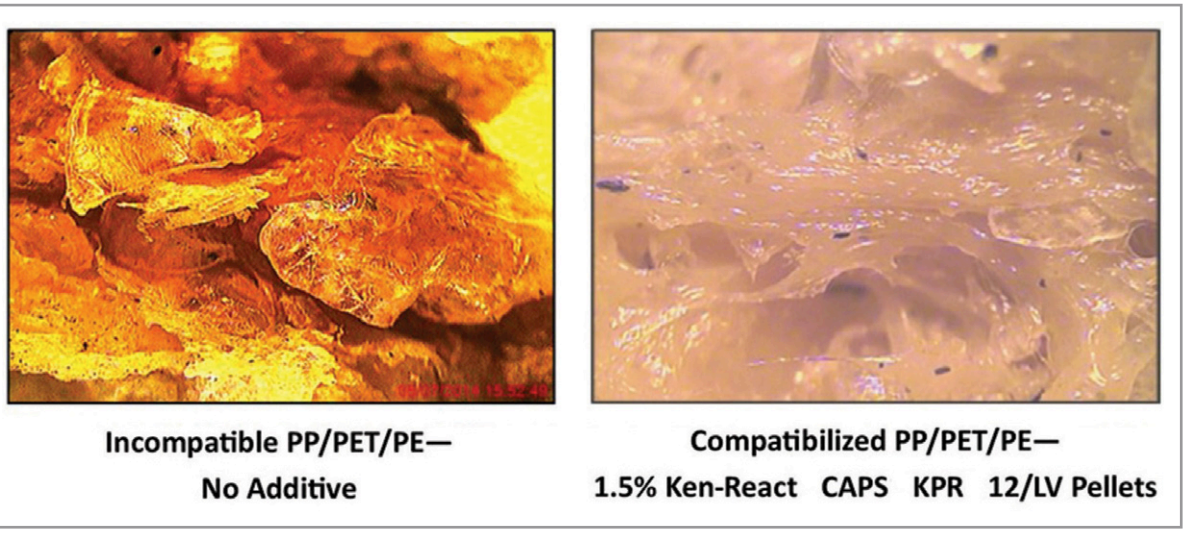
20-22 March 2023 | Barcelona, Spain

> Plastic Pouches is one of the few events in Europe, and globally, focused on the growing pouch and flexible packaging segment, and providing a place where the industry meets

Vice President, Global Applications and Innovation Development,
Proampac

SAVE 15% WHEN YOU BOOK TODAY*

*Discounts cannot be used in conjunction with other offers. Offer ends 26 January 2023.



Recycled polymer blends with and without a Ken-React additive

Source: Kenrich

infrastructure and economics, as well as incompatible materials. The solutions are not simple and require more investment in research. In the end, it will be technologies that make recycling viable, and Kenrich's additive can be part of that solution," Monte says.

Rising demand

Demand for high-quality rPET is increasing as brands commit to using more PCR in their packages. A challenge, however, is that when PET is processed and reprocessed, the thermal degradation through these multiple heat histories causes viscosity breakdown and yellowing. A new intrinsic-viscosity (IV)-building additive from **Techmer PM** counteracts this degradation, says Steve Smith, Market Manager for Rigid Packaging at the specialty compounder.

The pelletised additive concentrate is intended to be used by converters making, for example, bottles or thermoformed sheets. It is said to rebuild PET polymer chains, which increases viscosity and removes the chemical species that generate yellowness. Yellowness of the rPET is reduced to virgin-level or, in some cases, even less yellow than virgin PET, according to Smith.

Although the IV-builder does not compatibilise the PET with other polymers that could be contaminating the rPET feedstream, it does help stabilise the polymer and can improve overall quality so that small amounts of contaminant have less of an effect, Techmer says.

The additive is suitable for food-contact applications. It is already being used in thermoformed sheet and is being evaluated in bottles, where results to date are described as positive. Smith also sees interest from processors making fibre for carpet and apparel, for example, where decreased viscosity causes processing problems and limits the amount of rPET that can be added.

Smith says that the chemistry is sensitive and requires careful processing to create the optimal concentrate. He says Techmer's studies have identified what parameters need to be controlled during masterbatch production. "Although processors may have not had good experiences with chain-extenders in the past, this technology is different," he says. "We are seeing good results at both lab scale and at commercial scale."

Techmer uses in-house IV testing to help determine the appropriate let-down ratio of the concentrate for specific applications.

Bridging the gap

Performance of recycled PP (rPP) is a limiting factor in brands and converters meeting their commitments to incorporate recycled material in products. "Additives are a means by which to bridge the gap between current performance of recycled material and performance that is expected from the brands, as well as performance that is expected from virgin

Recycled PET (rPET) containing 2.5% of Techmer PM's IV Building additive concentrate (right) shows increased viscosity and reduced yellowing compared to rPET without the additive (left)

PP," says Allan Randall, Global Product Manager at **Milliken**.

"Performance enhancement is most notably needed in applications that desire high MFR (higher than 10-20 MFR) and high levels of impact necessary for durable goods," he says. Milliken's reactive extrusion platform aims to meet this need. The company's DeltaFlow viscosity modifiers are supplied as pelletised concentrates for PP recyclers seeking to increase melt flow of and reduce processing temperatures for rPP in extrusion or injection moulding. They are also said maintain or improve impact performance.

Tackling discoloration

Discoloration due to degradation is also a common problem in PCR and is a challenge that pigments can be used to overcome. **Avient** launched a PCR Color Prediction Service for brand owners that want to colour polyolefins and polyethylene terephthalate (PET) containing PCR. Its service uses a proprietary software tool that takes prior colour matching data to determine if colours are feasible in a new application that incorporates PCR content.

The company reports that the software "also calculates how much PCR content can be added to an existing application without affecting its signature colour." Avient suggests that the service can accelerate colour evaluation and selection and can also provide flexibility for switching between different PCR sources.

Another new Avient product is its Cesa Nox A4R Additive for recycling of polyolefins. According to the company, it can be added to PCR during reprocessing or incorporated in virgin resin to prepare it for future recycling.

CLICK ON THE LINKS FOR MORE INFORMATION:

- **www.basf.com**
- **www.baerlocher.com**
- **www.ampacet.com**
- **www.ngc-nordic.com/ (Nordic Grafting)**
- **www.thecompoundcompany.nl**
- **www.sk-fp.com/ (SK Functional Polymer)**
- **www.intermixperformancematerials.com**
- **www.interfacepolymers.com**
- **www.4kenrich.com**
- **www.techmerpm.com**
- **www.milliken.com**
- **www.avient.com**

ZERMA

Complete size reduction solutions

ZERMA is the leading supplier of size-reduction solutions. From our wide range of powerful Shredders, Granulators and Pulverizers, a large variety of companies rely on ZERMA for their primary and auxiliary processing equipment.

Applications from beside-the-press granulators, to multi-stage shredders, to our new combination units – **We cover the entire spectrum for your size reduction needs!**

SEE US AT 2022 *OCTOBER 19-26 DUSSELDORF GERMANY*

PLASTICS MACHINERY GROUP

HALL 13 A89-15

POWERED BY GERMAN ENGINEERING

www.zerma-america.com

The Home of Size Reduction

sales@zerma-america.com

or call **847-291-1300**

Plastics Recycling World Expo returns to US

IMAGE: HUNTIGTON CONVENTION CENTRE

The third North American Plastics Recycling World Expo takes place at the Huntington Convention Centre in Cleveland, OH, US, next month. We preview the free-to-attend event

The Plastics Recycling World Expo returns to the city of Cleveland, Ohio, US, next month for its third edition, once again providing North America's compounding industry with an opportunity to network with suppliers and customers and to learn about the latest innovations.

The free event, which is organised by *Plastics Recycling World* publisher AMI, takes place on 9-10 November at the Huntington Convention Centre and combines an exhibition with a high value conference stream. It runs alongside the Compounding World Expo, Plastics Extrusion World Expo and Polymer Testing World Expo.

"The event will provide visitors with a great opportunity to meet and compare suppliers from around the world, as well as giving them the chance to learn from business leaders and technical experts in the conference theatres," says Andy Beevers, Events Director at AMI.

In last month's edition of *Plastics Recycling World* we took a look at the Plastics Recycling World Expo conference streams and highlighted the expert speakers that will present or participate in its focused panel sessions. You can read that **HERE**.

Over the following pages we look at a selection of some of the companies that will be exhibiting at the 2022 expo, which is set to be the biggest plastics industry event in the US this year. And the Plastics Recycling World Expo is not just a hall-walking exercise – many attendees and exhibitors will take the opportunity to buy tickets for the show networking party, which takes place at Cleveland's Punch Bowl Social on the evening of 9 November. You can buy your party ticket in advance when you **REGISTER** for your free show ticket. To learn more about the show, venue and opening times, click **HERE**.

Main image: The free-to-attend Plastics Recycling World Expo returns to the Huntington Convention Centre in Cleveland, OH, US, for its third edition next month

Above: Aaron Industries is a leading recycled resin compounder

Aaron Industries
Aaron Industries is one of the largest recycled resin compounders in the Northeast. The company formulates to customer specifications and has 200 various grades of PP, PS and PE to choose from. These include two recently FDA approved grades of PP and PS.
› **https://aaroninc.com**

ADG Solutions
ADG Solutions provides engineered systems for scrap-to-pellet plastics recycling and other technologically advanced equipment for reclaiming both PCR and PIR plastics. ADG offers Davis-Standard ram and wide-mouth recycling extruders. It also manufactures the CFO filter, a continuous self-cleaning filter for heavily contaminated materials.
https://adgs.net

Advanced Cyrogenics Enterprises
ACE is a leader in precision ambient and cryogenic grinding. It offers a variety of grinding and packaging to meet customized needs and works as a toll grinder, as well as a non-toll grinder. It says it will be adding custom compounding capacities in 2023.
› **www.acecryo.com**

AEC
Application Engineering Company, known as AEC, is a market leader in material handling, process cooling, and auxiliary equipment for the plastics industry. It says its product line of chillers, pump tanks, cooling towers and temperature control units provides the broadest product offering in the industry.
› **www.aecinternet.com**

Aero Fibre Private Limited
DiamondPet Flakes, manufactured by Aero Fibre, have a consistent quality due to the use of dual automatic bottle sorters, manual sorting as well as a final check with an automatic laser sorter. Main applications are bottle-to-bottle, bottle-to-sheet and bottle-to-filament.
› **www.aerofibre.com**

Altech Recycling Technology
Altech Recycling Technology produces plastic recycling machines, shredders and filter systems. The extruders are compatible with thermoplastic materials such as PE, PP, PS, ABS and polyester. Its products include plastic recycling lines, filter systems, vertical and horizontal granulators, shredders, and additive dosing systems.
› **www.altechmakina.com**

American Cutting Edge
American Cutting Edge makes industrial knives and blades for a wide variety of plastic recycling applications worldwide. It offers in-stock options and custom blades engineered to exact requirements.
› **https://americancuttingedge.com**

American Starlinger-Sahm
American Starlinger-Sahm is owned by Starlinger and handles sales/service activities and spare parts supply for the group, and for the winder specialist Georg Sahm. In addition, the company also acts as a representative for Roblon twisters and SAB material handling products.
› **www.starlingersahm.com**

AMVT
AMVT, based in Katy, Texas, supplies sorting machines covering the full range of the sorting spectrum; from monochromatic, bi-chromatic, and full colour RGB to Infra-red and X-Ray sorting. AMVT has a demonstration lab at its headquarters with all kinds of sorting machines to serve American customers, and can evaluate product samples free of charge.
› **www.amvt.net**

Arlington Machinery
Arlington says whether a company wants to buy, sell, or repair machinery for the plastics and recycling industries, it has it covered. It says its resources ensure the customer has the right equipment to keep their business running.
› **www.arlingtonmachinery.com**

Avian Granulator
Avian Machinery is a leading manufacturer of size reduction machinery for the plastic, rubber and recycling industries. It offers a wide variety of machines: low, medium, and high speed granula-

tors, as well as shredders and pulverizers. Avian granulators and shredders are ideal for block, film, sheet, plastic and other specialized material.
› **https://avianusa.com**

B. Schoenberg & Co

B. Schoenberg & Co, headquartered in Yorktown, NY, produces quality flexible and semi-flexible PVC compounds which are produced in its central US facility. In addition to PVC compounds, it produces black colour concentrate in both PP and PE forms.
› **www.bschoenberg.info**

Baracco

Baracco is a company that specializes in the creation, development, production, promotion, sale, and distribution of spare parts and accessories for granulation of plastic materials.
› **https://baracco.us**

BASF

BASF Plastic Additives enables mechanical recycling with its IrgaCycle line of solutions that can help increase the use of recycled polyolefins in plastic articles, while also improving the quality and performance material. TrinamiX, a wholly owned subsidiary of BASF, enables on-the-spot plastic sorting with its Mobile Near-Infrared (NIR) Spectroscopy Solution.
› **www.basf.com**

Break Machinery

Break Machinery is an established trader and broker of commodity and engineering grade plastics in all forms, moving 60 million pounds in 2021. It says its experienced representatives are well-versed in all facets of plastic processing and recycling and strive to represent all materials correctly.
https://breakmachinery.com

IMAGE: AVIAN

Above: Avian single-shaft shredder

BritAS Recycling Solutions

BritAS develops and manufactures full-automatic belt melt filter for post-consumer recycling. The ABMF series offers easy operation handling and low operation costs.
› **www.britas.de**

Carolina Filters
Family-owned and operated, Carolina Filters operates two distinct and independent divisions, both providing stronger customer service and engineered solutions in the filtration industry.
› **www.carolinafilters.com**

Above: Cumberland Beside-the-Press FX1600 granulator

COLLIN Lab & Pilot Solution
COLLIN develops intelligent pilot and laboratory lines in modular system for plastic processing companies as well as for research institutes. Collin solutions are used for the development and the production of plastic products, material analysis, test series up to pilot tests which allow a scale up to production scale.
› **www.collin-solutions.com**

Cumberland
Cumberland is a global leader in size reduction equipment, and its granulators and shredders have proven to be rugged, reliable, and dependable.
› **www.cumberlandplastics.com**

DMS Recycling
DMS Recycling specializes in post-industrial plastic brokering, re-processing, and recycling. Its processing and warehouse facility is located in Mount Vernon, OH.
› **www.dmsrecycling.com**

Dorstener Wire Tech
DWT specializes in high performance polymer filtration components and extruder screens for many applications. DWT has a full range of production capabilities in Houston, TX, as well as in Europe and Asia.
› **https://dwt-inc.com**

Driven Polymers
Driven Polymers is part of the JC Plastics group, a leader in plastic recycling and trading. JC's materials can be post-industrial or post-consumer and the company is able to produce and commercialize up to 1,500 tons per month of PP and HDPE injection-grade material. JC Plastics was established in the city of Guadalajara, México, in the year 2000.
› **www.drivenpolymers.com**

Efactor3
Headquartered in North Carolina, Efactor3 offers a variety of machines for pre-shredding, screening, sifting, shredding, cleaning, granulating and extrusion. It also provides conveying and separation equipment, systems integration, and installation.
› **https://efactor3.com**

Erema
Erema says some 6,500 of its recycling systems are now in use worldwide. With subsidiaries in the USA, China and Russia, and around another 50 representatives on all five continents, the company has a reliable network to implement customised plastics recycling solutions for customers around the world.
› **www.erema.com**

Exxel Polymers
Exxel Polymers is engaged in recycling plastic scraps in the form of parts, granules or beads which are analyzed in order to meet customers' moulding specifications. Plastics expertise is a key element of its organization, says the company.
› **https://exxelpolymers.com**

Fimic
Fimic says it is the only company in the market with a range of five different models of automatic melt filters, to target highly contaminated plastic materials, especially post-industrial and post-consumer plastics. Its filtration technologies offer all possible filtrations and cover the many different existing applications to guarantee high results and a high quality of the final material.
› **www.fimic.it**

Right: Fimic RAS 700 melt filtration system

Genox USA
Genox USA creates innovative solutions for recycling challenges, whether the need is a single machine or a complete system. Its manufacturing process ensures accurate components produced to defined specifications that ensure reliable performance and long service life.
› **https://genoxusa.com**

GET Recycling
Get Recycling Technology is a manufacturer of recycling equipment specializing in LDPE film, PET, HDPE/PP, PS/ABS, WEEE, and EPS-LPDE recycling

washing lines. Each GET washing line is custom made for a specific customer according to the input material characteristics and the end requirements.
› **http://www.get-recycling.com**

Greenpath Recovery
Greenpath Recovery is a full-service recycler, processor, and manufacturer. It is vertically integrated and can handle a wide range of materials at three strategically located US facilities.
› **https://greenpathrecovery.com**

Herbold USA
Herbold USA is a leader in the design, manufacture and installation of size reduction equipment for the plastics and recycling industries. The company's products are used in both traditional and innovative applications. It offers granulators, shredders, pulverizers, compactors, wash lines, thermal dryers and fully integrated systems.
› **https://herboldusa.com**

Hosokawa Polymer Systems
Hosokawa Polymer Systems is a leading manufacturer of granulators, dedusting systems, separation systems, multiple stage recycling plants for film, cable and post-consumer materials and other general plastic recycling equipment. With Hosokawa Polymer Systems partnership with GET Recycling, Hosokawa's system capabilities have been expanded to include plastic washing lines.
› **www.polysys.com**

Innovative Recycling Solutions
Innovative Recycling Solutions is an exclusive sales agency in North America for manufacturers of plastics recycling extrusion systems, filtration systems, washing systems, drying and size reduction equipment. Brands represented include Gamma Meccanica, Bruno Folcieri, BD Plast and Plasmaq.
› **https://irecyclingsolutions.com**

Kice Industries
Kice Industries manufactures a complete line of bulk handling equipment, including Kice Multi-Aspirators for separating dust, fines, labels, angel hair and snakeskins from virgin and regrind plastics.
› **www.kice.com**

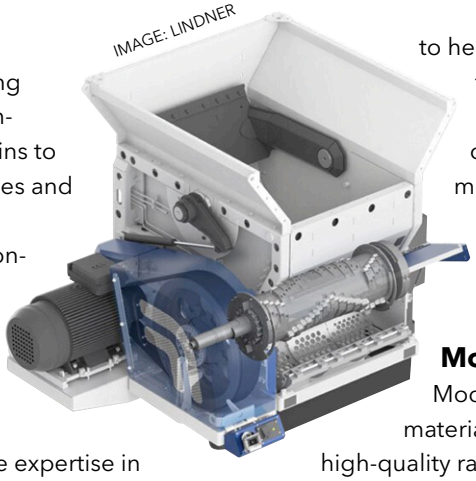


IMAGE: LINDNER

Right: Lindner Micromat shredder

Krones

Krones offers complete recycling systems for washing and decontamination of PET and polyolefins to sustainably recycle plastic bottles and other packaging. Its MetaPure technology can clean and decontaminate plastics to produce new food-grade recyclate.

› **www.kronesusa.com**

KRS Recycling System

Sesotec and KRS jointly provide expertise in the field of contaminant removal and sorting technology. Sesotec systems sort plastic bottles and cups, as well as plastic regrind and flakes.

Laidig Systems

Laidig Systems is a leading provider of turnkey storage and reclaim systems. Laidig says its custom-engineered material handling systems offer proven performance and reliability.

› **www.laidig.com**

Lestoque

Lestoque is a supplier of extruder screens dedicated to extreme decontamination processes of recycled plastics. Thanks to its laser drilling technology, it obtains very small diameters and thus guarantees a very high quality of the filtered material. It uses special high-strength steels and then adds an exclusive chemical/thermal surface hardening treatment.

› **https://lestoque.com**

Lindner

Lindner Recyclingtech America is the North Carolina-based headquarters for the US and Canada for the Lindner group. Its customizable shredders cover a wide range of materials with capacities from 1,000 lbs/hr to systems producing 100,000 lbs/hr. Lindner also offers large mobile shredders.

› **www.lindner.com**

Matsui America

Matsui's North American operations are based in Hanover Park, IL. While best known for its innovative desiccant dryers, Matsui offers many auxiliary machines for material handling, size-reduction, blending, mould-temperature controllers, and total turnkey systems.

› **www.matsuiamerica.com**

MiVue

MiVue is a manufacturing insight service designed to help predict and prevent manufacturing problems before they occur. MiVue provides real time condition monitoring of critical manufacturing assets, enabling companies to see inside their equipment and operations.

› **https://mivue.com**

Modix Plastics

Modix is a recycler of PCR LDPE materials, converting them into high-quality raw material for use with flexible packaging and injection moulding. Modix says it works with the most difficult PCR to process, such as kerbside collection.

› **www.modixeco.com**

Nexam Chemical

Nexam Chemical solves recycled polymer processing/property challenges with easy-to-use reactive masterbatches and chemical additives for recycled PET, PE, PP, and PA.

› **www.nexamchemical.com**

NGR

Next Generation Recycling Machines is a supplier of custom plastic recycling solutions for the post-industrial, post-consumer and PET markets. From its One-Step shredder-feeder-extruder machine lineup to its LSP PET upcycling reactors, NGR says it provides the highest technology and quality recycling equipment in the industry. As an Austrian based company, NGR has its US facility in Atlanta offering sales, spare parts and customer service to North American customers.

› **www.ngr-world.com**

Nordson Polymer Processing Systems

Nordson Polymer Processing Systems handles virgin polymers as well as recycled materials, processing it in its pure and its compounded form. Its systems are sensitive to and respond to changes in temperature, moisture, and pressure. Thousands of its installed systems manage the melt stream, helping customers create high-quality end products for various industries.

› **www.nordsonpolymerprocessing.com**

Omya

Omya is a leading global producer of industrial minerals – mainly derived from calcium carbonate, dolomite and perlite – and a worldwide distributor of specialty chemicals. The company provides innovative product solutions that contribute to

customers' competitiveness and productivity in multiple industries including polymers.
› **www.omya.com**

Pagani USA
Pagani USA, a division of Pagani Dycomet, sells the entire product line of Pagani Recycling Equipment including: granulators, evacuation systems, aspirators, densifiers and complete wash lines for PE, PET, HDPE, PVC and PC, all made at its factory in Mexico City.
› **https://www.pagani.com.mx/en**

PlastiWin Capital Equipment
PlastiWin is a global buyer and seller of used plastic process equipment. Its recycling division offers consultation, machinery and equipment: granulators, shredders, ribbon blenders, mixers, balers, densifiers, guillotines, hammer mills, pulverizers, wash lines, extruders, and complete plastic extrusion pelletizing line.
› **https://plastiwin.com**

Polystar
Polystar is a leading plastic recycling machine manufacturer in Taiwan which specializes in post-industrial/post-consumer recycling of PE/PP packaging film and PP raffia/woven, providing simple, easy-operating recycling systems.
› **www.polystarco.com**

PolyVisions
PolyVisions is presenting DuraPET which is a graft modified high impact PET material. It is produced using up to 91% post-consumer bottle grade PET. DuraPET is a sustainable, durable, engineered resin used as a drop-in replacement for ABS, PC, or PC-ABS.
› **www.polyvisions.com**

Powder King
Powder King pulverizing systems, manufactured in Phoenix, AZ, are specially designed to increase productivity, reinforce safety, and optimize processes. Powder King provides disk sharpening services for many pulverizing systems.
› **www.powder-king.com**

Produx World
Produx procures and converts industrial scrap

IMAGE: PURE LOOP

Above: Pure Loop integrated shredder-extruder system

plastic back into useful materials that can be used to make everyday products across many industries. It buys materials mainly from the US and Mexico. Once the material is processed at its plant in Baja Mexico it is shipped to the US, Mexico, Canada, and China.

› **http://produxworld.com**

Pure Loop

Pure Loop, a subsidiary of the Erema Group, is based in Ansfelden near Linz, Austria, and specialises in the recycling of clean production waste. Its innovative shredder-extruder technology offers maximum flexibility in processing high volume and highly tear-resistant industrial and post-industrial materials into recycled pellets.

› **www.pureloop.at**

Re-cre8 Recycling

Re-cre8 Recycling is a general and industrial plastic recycling company, located in Toledo, Ohio, which handles recycling programs for businesses in the area.

› **www.facebook.com/recre8recycling**

Revolution Materials / Jadcore

Jadcore, a Revolution brand, says that it not only makes the highest quality products, it also collects, processes and recycles them to create a continuous loop of sustainability.

› **www.revolutioncompany.com**

Santmyer

Santmyer Companies is a family group comprised of three operating entities that collectively employ more than 200 Ohioans: Santmyer Energy, Santmyer Transportation and Red Rover.

› **www.santmyer.com**

Sawgrass Sustainable

Sawgrass is adept at identification and sortation of various synthetic textile fibres. Another specialty is rapid removal and transformation of material from yarn packages, beams, feeder creels and rolls.

› **https://sawgrassrecycle.com**

SI Group

SI Group is a leader in performance additives which include solutions for the plastics sector. Its global manufacturing footprint includes 24 facilities on five continents, serving customers in 90 countries with 2,800 employees worldwide.

› **https://siigroup.com**

Sterling

Sterling , based in New Berlin, WI, has grown to be a market leader across a broad range of auxiliary equipment for the plastics industry: chillers and process cooling equipment; material handling equipment including blenders; vacuum conveyors and dryers; and granulators.

› **www.sterlco.com**

Una-Dyn / Piovan

A member of the Piovan group of companies, Una-Dyn designs, manufactures and supplies an extensive line of material handling, storage and resin conveying products and systems.

› **https://unadyn.piovan.com**

Vecoplan

Vecoplan develops, produces and markets machinery and plants for shredding, conveying and processing primary and secondary raw materials gained in recycling processes.

› **www.vecoplanllc.com**

Weima America

Weima offers a comprehensive range of plastic shredders and granulators that can handle such plastics as PE, PP, PVC, PS, PU and PET among others. Its machines can process blow moulded pieces, pipes and profiles, purge or other production waste such as bottles, fibres or carpet.

› **https://weima.com**

Witte Pumps & Technology

Witte has developed a large number of standard pumps based on special designs, of which it has the most common sizes in stock. It says its pump solutions are well suited for the entire process chain of polymer production, compounding or chemical applications.

› **www.witte-pumps.com**

Zerma America

Zerma's range of granulators covers everything from slow-speed units through to high-performance granulators for heavy-duty applications.

› **https://zerma-america.com**

Optimise your industry knowledge with these recommended market reports

MARKET REPORT: Post-Consumer Plastics Packaging Waste Management Europe 2022

A comprehensive analysis of the waste plastics value chain from the point of disposal, to the point the plastic exits a material recovery facility destined for a recycler or incineration/landfill. Essential insights are given for on a country by country basis, to help you understand the collection and sorting of plastics waste, understand trends, address industry challenges and assess future availability of feedstock for recycling.

> Click here for more info

MARKET REPORT: Chemical Recycling, Global Status 2022

Identify emerging business models, potential future leaders in the industry and growth opportunities.

Our new report offers:

- site and capacity information
- a dynamic presentation of company relationships across the value chain
- a report providing background to chemical recycling technologies and concepts, plus information on the industry's operating environment and growth drivers.

> Click here for more info

MARKET REPORT: Recycling of Flexible Polyolefin Films in Europe 2021

The study aims to quantify the market for flexible polyolefin recycling, analysing the supply and demand balance, along with an evaluation of current capacity in Europe. A detailed review of the end use applications for recyclate is given, with an examination of potential future absorption. It is relevant to all those involved in the plastics industry value chain, from resin producer through to brand owners/end users of plastic products.

> Click here for more info

MARKET REPORT: Single use flexible plastic packaging in Europe - Regulatory context and market magnitude in the retail channel

This report navigates through the present European legislation and discusses the impact each will have on the consumption of single-use plastic packaging. With a specific focus on flexible plastic retail packaging, this report highlights the issues being raised by recent and upcoming regulatory instruments, the trends that are driving the market to change and solutions currently being deployed.

> Click here for more info

MARKET REPORT: The Global Plastics Recycling Industry 2020 - Capacities, Capabilities and Future Trends

This report details current trends and future recyclate volume forecasts in a rapidly changing environmental sector. This quantification includes the supply and demand balance, with an evaluation of the current plastic recycling capacities by region. This is done in the context of the economic disruption taking place in the first half of 2020 due to the Covid-19 pandemic and its economic consequences across markets.

> Click here for more info

MARKET REPORT: Rigid Polyolefin Recycling in Europe - Capacity, technology and recyclate usage

A deep-dive analysis of the European mechanical rigid polyolefin recycling industry (PP and PE). It quantifies recycling capacities, waste streams (municipal and commercial, production scrap, other), and actual recyclate volumes of pellets, compounds, regrind and flakes. It provides context on sustainability drivers and how they shape innovations in the value chain including structural and format changes.

> Click here for more info

AMI

E/ sales@ami.international T / +44 117 924 9442 W/ www.amiplastics.com/mi

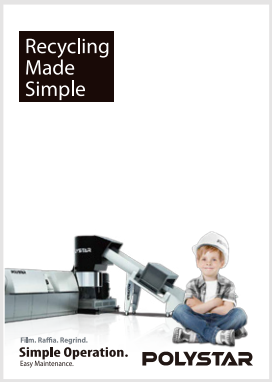
Download these new product brochures

COPERION: PLASTICS RECYCLING

This white paper by Coperion looks at the current state of plastics recycling technology, including technical challenges in production. Coperion explains why it thinks better results can be achieved in many recycling applications by using twin screw extruders.

❯ CLICK HERE TO DOWNLOAD

POLYSTAR: PLASTICS RECYCLING



Recycling Made Simple is the brochure from Polystar where you can find information about all of the company's plastics recycling systems. Its Repro Flex lines can recycle post-industrial and post-consumer PE/PP packaging and PP raffia/ woven materials.

❯ CLICK HERE TO DOWNLOAD

GLOBAL COLORS GROUP

Find out about Global Colors Group in this brochure showcasing the group companies, their vision and focus on quality, R&D, technology and sustainability. Its portfolio includes colour, white and black masterbatches.

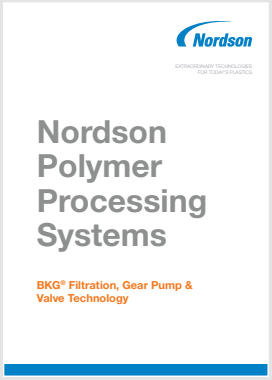
❯ CLICK HERE TO DOWNLOAD

STRUKTOL: CREATIVE RECYCLING

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

❯ CLICK HERE TO DOWNLOAD

NORDSON: FILTRATION SYSTEMS



The BKG range of filtration systems and screen changers from Nordson Polymer Processing Systems are detailed in this six-page brochure which also features products from BKG's ranges in gear pump and valve technologies.

❯ CLICK HERE TO DOWNLOAD

NOURYON: UPCYCLING PP

In this brochure about upscaling recycled PP, Nouryon presents its portfolio of organic peroxide additives. Its Trigonox products modify PP to increase the MFI, while Perkadox decreases the MFI for higher melt strength.

❯ CLICK HERE TO DOWNLOAD

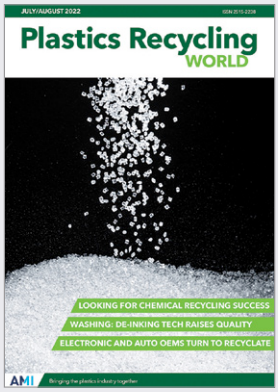
If you would like your brochure to be included on this page, please contact Claire Bishop claire.bishop@amiplastics.com. Tel: +44 (0)1732 682948

Keep informed: read our latest editions

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

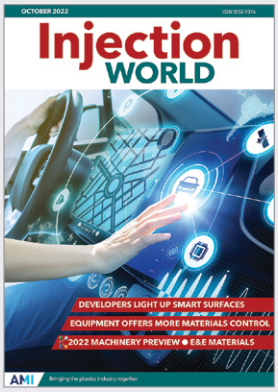
Plastics Recycling World September 2022
The September edition of Plastics Recycling World looks at innovations in sorting technology. It also explores developments in granulation and food grade PP recycling. Plus, a preview of planned material introductions at K2022.

› CLICK HERE TO VIEW



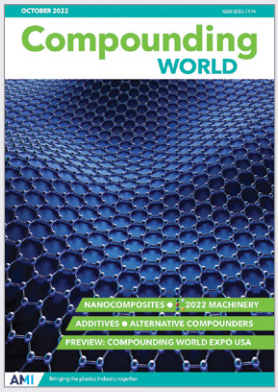
Plastics Recycling World July/August 2022
The July/August edition of Plastics Recycling World looks at ongoing moves to commercialise chemical recycling. This edition also explores the latest developments in recycling of printed packaging and OEM strategies to increase use of recycled content.

› CLICK HERE TO VIEW



Injection World October 2022
The Injection World October issue contains features covering surface technologies including integrated electronics, new equipment for materials handling and new E&E materials, plus there is a machinery preview of K2022.

› CLICK HERE TO VIEW

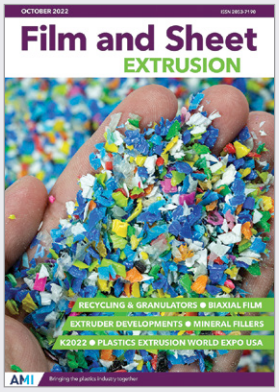


Compounding World October 2022
Compounding World delves into nano additives in the October edition. The cover story looks at new developments in graphene and CNTs. Other features cover additives for recycling and alternative compounding technology. Plus a preview of K2022 machinery exhibitors.

› CLICK HERE TO VIEW

Pipe and Profile October 2022
The October edition of Pipe and Profile magazine looks at the latest advances in pipe inspection. This issue also explores new developments in material handling equipment and PVC-O pipe technology. Plus, a preview of some of the new material introductions to see at K2022.

› CLICK HERE TO VIEW



Film and Sheet October 2022
The October issue of Film and Sheet Extrusion takes a look into the world of plastics recycling technology, with other features covering extrusion machinery and biax film. Plus there are previews of K2022 materials and AMI's Plastics Extrusion World Expo North America.

› CLICK HERE TO VIEW

Take out your own FREE subscriptions to any of the magazines. Click on the logos below to simply register on-line.

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

GLOBAL EXHIBITION GUIDE

2022	**19-26 October**	K2022, Dusseldorf, Germany	www.k-online.com
	9-10 November	Recycling World Expo USA, Cleveland, USA	https://na.plasticsrecyclingworldexpo.com
	23-26 November	PlastEurasia, Istanbul, Turkey	https://plasteurasia.com/en/
	1-3 December	Plast Print Pack West Africa, Accra, Ghana	www.ppp-westafrica.com
2023	**17-19 January**	Swiss Plastics Expo, Lucerne, Switzerland	https://swissplastics-cluster.ch/
	1-5 February	PlastIndia, New Delhi, India	www.plastindia.org
	17-20 April	Chinaplas 2023, Shenzhen, China	www.chinaplasonline.com
	30 May – 2 June	Equiplast, Barcelona, Spain	www.equiplast.com
	14-15 June	Recycling World Expo Europe, Essen, Germany	https://eu.plasticsrecyclingworldexpo.com
	5-8 September	Plast 2023, Milan, Italy	www.plastonline.org/en
	26-28 September	Interplas, Birmingham, UK	www.interplasuk.com
	20-21 September	Injection Molding & Design Expo, Novi, MI, USA	www.injectionmoldingexpo.com
	17-21 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	8-9 November	Compounding World Expo USA, Cleveland, USA	www.compoundingworldexpo.com/na/

AMI CONFERENCES

29 Nov-1 Dec 2022	Polymers in Footwear, Virtual Summit
13-14 December 2022	Recycling Flexible Packaging, Cologne, Germany
30 Nov-1 Dec 2022	Stretch & Shrink Film, New Orleans, LA, US
31 Jan-2 Feb 2023	Polyethylene Films, Orlando, FL, USA
22-23 February 2023	Stretch & Shrink Film, Bangkok, Thailand
6-8 March 2023	Agricultural Film, Barcelona, Spain

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

www.ami.international

DON'T MISS A SINGLE ISSUE

Register now for your free subscription at:

www.plasticsrecyclingworld.com

And don't forget to tell your colleagues, customers and suppliers about the magazine. You can use the share button above (the ⍐ symbol in the browser) to help spread the word.