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# PLASTISCOPE

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 <p><b>OPAL DINNERWARE</b></p>	 <p><b>MICROWAVE SAFE GLASS MIXING BOWLS</b></p>	 <p><b>GLASS BOTTLES &amp; JUGS</b></p>	 <p><b>VACUSTEEL FLASKS</b></p>	 <p><b>VACUSTEEL SPORTS BOTTLES</b></p>			
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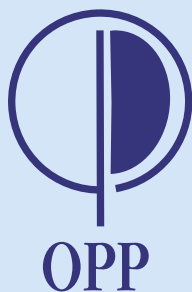
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# FROM THE PRESIDENT'S DESK

Mr. Dilip Parekh



Dear Members,

Greetings from Organization of Plastics Processors of India!

This issue of Digital Plastiscope will be in your hands before PLASTINDIA 2023, which commences on 1st February 2023.

PLASTINDIA will provide good opportunity to you to meet the Plastics Fraternity at Pragati Maidan, New Delhi.

The stall number of Organization of Plastics Processors of India is 5H-FF/E7A. In case, you require any assistance at PLASTINDIA 2023 you may meet Secretary General Mr. Deepak Lawale at OPPI stall.

On the day of Inauguration of PLASTINDIA 2023, the Union Budget 2023-2024 will be announced. It is felt that the Union Budget 2023-2024 will be- "Path-Breaking Budget". It appears that the Custom Duty on Plastic Products is likely to be increased. This will certainly reduce the import of unnecessary and poor quality plastic products.

IPF Bangladesh is scheduled from 22nd to 25th February 2023 at International Convention City, Bashundhara, Dhaka. Almost 25 Indian Companies are participating in IPF Bangladesh 2023 through OPPI. As this exhibition is being held after a gap of 3 years, the exhibitors are expected to receive lot of response.

It is observed that there is a dip in the export of Plastic Products. The decline in exports is not limited only to plastic products. It is a general trend across the sectors. In view of this PLEXCONNECT 2023 scheduled from 15th to 17th June 2023 is important. Large number of foreign buyers of plastic goods is being targeted to visit PLEXCONNECT 2023. I appeal to you to participate in PLEXCONNECT 2023 to boost your exports.

With Best Wishes,

**Dilip Parekh**  
President

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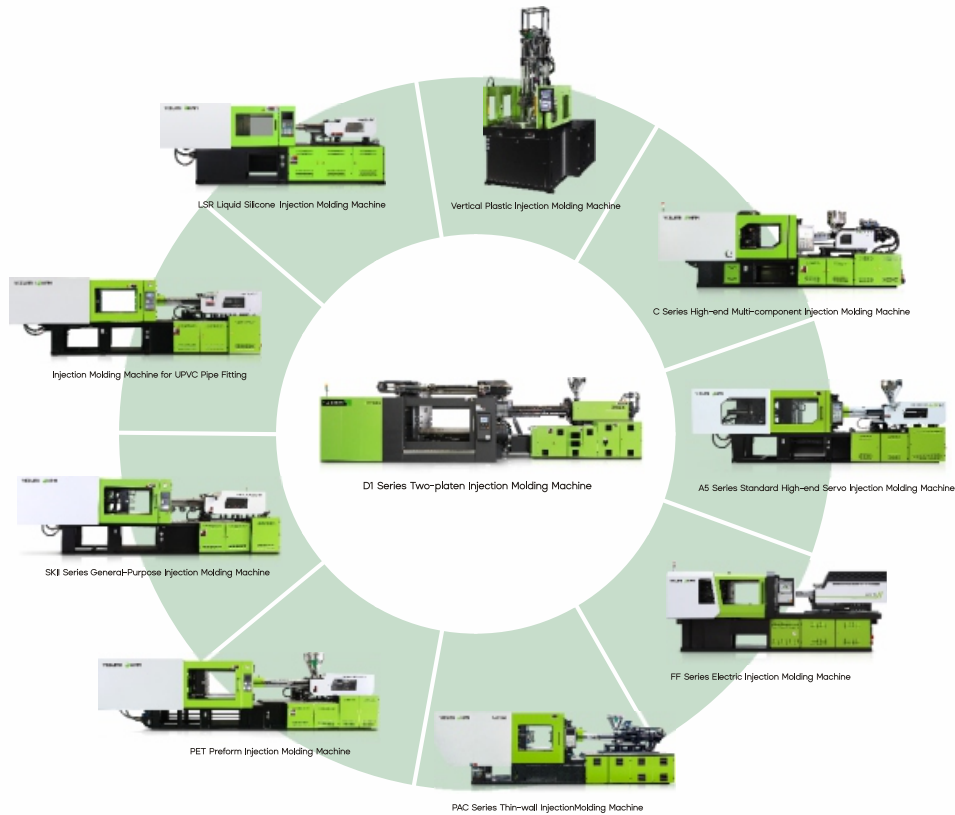
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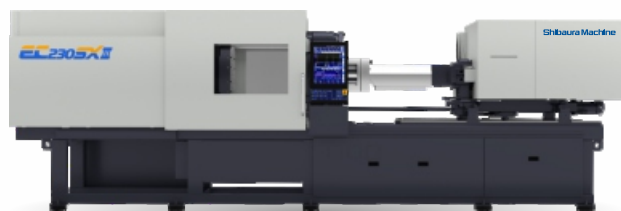
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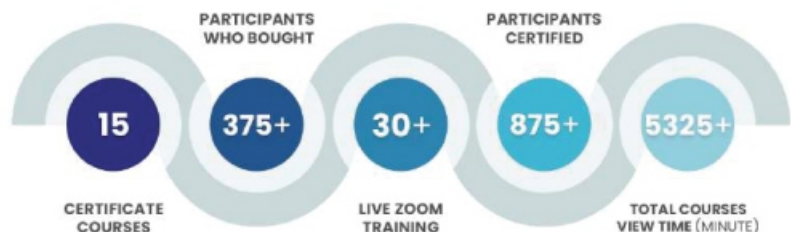
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## NEWS FROM INDIA

### 7<sup>th</sup> Petrochemical Conclave: Union Petroleum Minister Shri Hardeep Singh Puri Calls for More Investments

Mr. Hardeep S. Puri, Union Minister of Petroleum & Natural Gas and Housing & Urban Affairs addressed the Plenary Session at the 7th Petrochemical Conclave at New Delhi.

Speaking at the Plenary session, Union Petroleum Minister, Shri Hardeep Singh Puri, said, "Petrochemical market size is currently in India about US \$ 190 Billion, whereas the per capita consumption of petrochemical segments is significantly lower, compared to that in developed economies. And this gap offers substantial space for demand growth and investment opportunities."

"Petrochemicals sector supports PM's initiative of Make In India and Make for the World and can transform India into a global manufacturing hub. One of the most important factor driving the growth of petrochemical industry is the increasing demand for petrochemical products from a growing population and a rapidly expanding economy. India

would contribute 10% to the incremental growth of global petrochemical demand. The govt has instituted several policies to boost this sector and improve the ease of doing business including 100% foreign direct investment through the automatic route", he added.

### Nayara Energy to Commence Polypropylene Production in Oct-Dec 2023 Quarter

Nayara Energy, a Mumbai-based Indo - Russian downstream oil company, is planning to commence commercial production on a polypropylene plant in the September - December quarter of 2023. The company laid a foundation stone in November 2021 to set up a petrochemical plant to produce polypropylene at an annual capacity of 450,000 tonnes.

The company's oil refinery encompasses refining, marketing, and production and has a network of over 6,000 retail fuel outlets in India. It operates India's second-largest oil refinery in Vadinar, Gujarat. A company statement said that the progress on this plant was satisfactory with commercial production

scheduled to start by the end of the current quarter. According to the statement, a majority of work got completed on the propylene recovery unit.

Nayara presently operates a 20-million tonne per annum of an oil refinery at Vadinar. The company has adopted a phase-wise asset development strategy to foray into the petrochemical sector. In phase-I of this project, Nayara is setting up a 450,000 tonnes per annum of polypropylene plant at its Vadinar refinery in Gujarat – a propylene recovery unit along with upgrades to the existing Fluidized Catalytic Cracking (FCC) Unit and a polypropylene (PP) unit. Phase-I project development has achieved over 85 percent progress and expects production of its first petrochemical product i.e. polypropylene by the September-December quarter of 2023

"With the completion of the FCC revamps, we have made significant progress on our petrochemical entry. The planned phase-wise execution of the project is a testimony of Nayara's capabilities to successfully deliver on mega projects. This capability will serve us well for our larger phase II project, which will be an integrated petrochemical complex," said Alois Virag, CEO, of Nayara Energy Ltd.

India has approximately 250 million metric tonnes per annum of refining capacity making the country thereby the second largest in Asia. Over 60 percent of crude docks are in the Gulf of Kutch, Gujarat, which makes Vadinar one of the most strategic locations in India. Nayara's Vadinar refinery started commercial production in May 2008 and is today India's second - largest, single - site refinery. It is one of the safest, most reliable, and most efficient refineries in India and is striving to become one of the top five refining complexes in the world.

With a daily refining capacity of 405,000 barrels, Nayara Energy is capable of processing some of the toughest crude oils and yet producing high - quality Euro IV and Euro VI grade products. The company can now produce high - quality Bharat Stage (BS-VI) compliant fuels that meet international standards. This brings Nayara closer to the global emission standards.

### India May Split Planned Mega Refinery into Several Refineries

India is considering building several refineries instead of a single mega plant planned with Saudi Aramco and Abu Dhabi National Oil Company (ADNOC), due to challenges in acquiring land, three sources familiar with the matter said.

Hurdles in land purchases are one of the key reasons for sluggish infrastructure development in Asia's third-largest economy.

Aramco and ADNOC joined a consortium of Indian state - run firms in 2018 to set up a 1.2 million barrels - per - day coastal refinery and petrochemical plant in western Maharashtra, seeking a reliable outlet for their oil. Delays in acquiring a 15,000 - acre land parcel have almost stalled the project, initially planned for 2025, and boosted costs by 36% to \$60 billion, as per estimates made in 2019.

### Ganesha Ecosphere Recycles 41 - Billion Bottles in Last Decade

Ganesha Ecosphere, a Kanpur based plastic recycling company has recycled more than 41-billion plastic bottles that would have occupied 50,00,000 cubic yards of landfill and saved 11,00,000 tonnes of CO2 over a period of a decade.

In 2022, the company has been in the news ever since it inaugurated the first phase of twin projects in the Kakatiya Mega Textile Park.

The PET bottle recycling company invested close to Rs. 350 crore (to be ramped up to Rs. 550 crore in 2023) in the manufacture of recycled polyester fiber and yarn. Once operational, the two plants will employ more than 1000 people and consume approx 60,000 tonnes of waste PET bottles per annum thereby contributing to India's vision of sustainable development.

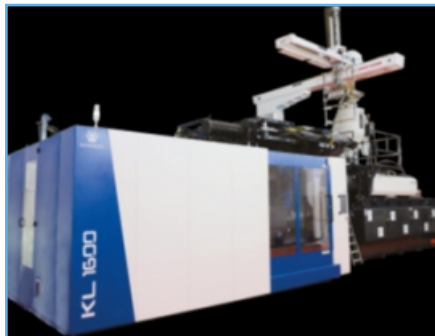
Ganesha Ecosphere established in 1987 is one of the leading rPET Fibre manufacturers in India. They manufacture rPET Fibre and rPET Yarn from pre and post consumer PET bottles at its manufacturing units at Kanpur (Uttar Pradesh), Rudrapur (Uttarakhand) and Bilaspur (Uttar Pradesh). The company has a cumulative capacity of 1,18,800 tons per annum (1.08,600 TPA of RPSF and 7200 TPA of RPSY and 3000 TPA of Dyed and Texturised / Twisted Filament Yarn) of rPET Fibre and yarn.

Ganesha Ecosphere recycles the discarded PET bottles into user friendly polyester staple fibre and polyester spun yarn having versatile applications. To source raw material (Pet plastic waste) they have developed a Pan India network of scrap dealers and contractors who in turn work through rag pickers for supplying the PET plastic waste to the Company. Contractors also supply directly from various cities. Network enables collection of about 350 tons of PET plastic waste daily.

The waste PET bottles are collected, compressed, packed into bales and shipped to the processing factory. Then, the plastic bottles are sorted to remove non PET stuff. Then they are cleaned, chipped to small flakes and converted into Rate Based Size Per flow (RPSF) through high speed extruders in a non-chemical process. High end drawing and crimping machines are used for the process.

### Windsor Rolls Out Industry's Highest Tonnage KL - 1600 Two Platen Injection Moulding Machine Made in India Absolutely.

KL - 1600 is the latest from Windsor's stable. On 5th January, 2023, Windsor launched the highest tonnage two platen Injection Moulding Machine in India which will now open up new vistas in manufacturing thermoplastic products. It is developed keeping in view to manufacture bigger plastic components required in Automotive, White goods, Construction and Packaging industry, with a generous specification and a footprint akin to that of a clamp unit.



#### Key highlights:

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- 100 % Made in India
- Generous specification with multiple benefits
- Footprint reduction for the same daylight by 15-20%
- Improved reliability

- Manufacturing ease
- Assured high price - to - performance ratio.

The large distance between tie - bar and platen dimension of KL - 1600 enables universal utilities of different moulds and more versatility and high degree of flexibility. The optimized parts with documented element analysis help our customers achieve high strength to weight ratio, apart from ensuring lesser downtime in day - to - day operation. Currently on the floor is execution of KL - 2300 machine, being readied by April this year, will further enhance the range for the two platen machines from 350 to 2300 ton.

### OPPI Promotes Plexconnect 2023: The First Ever Export - Focused Event for Plastics

The first ever export - focused event for plastics. The marquee event to be held 15th to 17th June 2023 at Bombay Exhibition Centre, Nesco, Mumbai will connect the Global Plastics Industry and focus on inviting international plastic buyer looking to meet their sourcing requirements in India.

PLEXCONNECT 2023 is a unique business networking platform which will connect global buyers with Indian Suppliers. The Show especially Focuses on inviting selected international buyers of plastics who will be invited to meet Indian exhibitors for their sourcing requirement.

The Plastics Export Promotion Council of India (PLEXCONCIL) with the active support & financial assistance from Ministry of Commerce & Industry, Govt of India has been driving and accelerating the exports growth of the Indian Plastics industry, promoting brand "Made in India" worldwide and connecting Indian exporters with vast number of Buyers at leading plastics exhibitions world over. Now, for the first time, PLEXCONCIL presents a unique platform designed to bring the global plastics fraternity and allied industries under one roof in India and showcase the prowess of the Indian Plastics Processing Industry

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# PLASTIC PRODUCTS AND NEW TECHNOLOGIES

## In Sustainable Packaging, The Word is 'Monomaterial'

In both flexible and rigid packaging, the trend is to replace multimaterial laminates, co-extrusions and “composites” with single - material structures, usually based on PE or PP. Non-packaging applications are following suit.



Exemplifying the trend to recyclable monomaterial packaging in place of hard-to-recycle multimaterial structures are these two winners of the 2023 WorldStar Global Packaging Awards in the food category: Mondi's high - barrier MAP thermoformed tray with PP top and bottom webs; and Mondi's all - PP retortable pouch.

There is a growing trend in the packaging world, and even outside of it. That trend is borne of developments in materials and processing technology that all monomaterial structures—usually

all - PP or all - PE — to replace laminations, coextrusions and “composites” utilizing paper, aluminum, barrier resins or highly dissimilar polymers (like PET with polyolefins). The goal, of course, is increased recyclability. Unlike materials would no longer need to be separated mechanically or otherwise. Greater volumes of plastics overall would thereby be available for recovery and reuse.

Mondi, a UK - based global producer of plastics and paper packaging, celebrated its 2023 WorldStar Global Packaging Awards — eight of them. In the food category, a winner was Mondi's Mono Formable PP, a recyclable, high-barrier modified-atmosphere packaging (MAP) created from monomaterial PP. It has a printed PP top web and thermoformable, semirigid PP bottom web; together they weigh about 30% less than the industry standard of multimaterial, nonrecyclable PET trays.

Another winner in the food category was Mondi's RetortPouch Recyclable, an all-PP pouch that can withstand high-temperature retort processing and can replace complex multilayer unrecyclable structures using aluminum or metalized barrier layers.

In September, Jindal Films, an India - based global producer of packaging films, publicized its products exhibited at the FachPack 2022 show in Luxembourg. These included Metallyte metalized OPP barrier films as recyclable alternatives to nonrecyclable PET barrier laminates such as PET/aluminum/PE or paper / aluminum / PE; Bicolor OPP films as alternatives to nonrecyclable PVDC - coated films; and new high - barrier Ethy-Lyte BOPE films (with or without metalization) as recyclable alternatives to conventional laminates of nylon or PET with PE films.

In July, another global producer of films and packaging materials, Germany - based Südpack, previewed its FachPack 2022 exhibits. These included PureLine monomaterial "Doypacks" (reclosable standup pouches) of PP as alternatives to aluminum-containing composites. Südpack also showed Multifol PurePP bottom web and Mutipeel PurePP top web for all-PP thermoformed trays.

PE squeeze tubes from Hoffmann Neopac, a Swiss-based global producer of plastic packaging tubes was said to be the first-ever fully recyclable, all-PE tube

with a PE shoulder and HDPE flip-top cap in place of the usual PP hinged cap.

BOPE films are emerging as a major new contender for recyclable packaging. Nova's development work on bioriented HDPE (HD-BOPE) to may replace multimaterial packaging based on BOPP or BOPET.

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### Amcor's Latest Light weighting Technology Launches a Quantum Leap for The Future of Packaging

Taking a quantum leap forward in reducing weight in packaging, Amcor Rigid Packaging (ARP) (NYSE:AMCOR) has developed a revolutionary two - step, light weighting technology that eliminates more than 50% of the material and weight in the finish of the bottle. A leader in developing technology that produces more sustainable packaging options, ARP's new Quantum™ technology for polyethylene terephthalate (PET) bottles delivers sustainability benefits, lowers cost, and improves packaging appearance.



By removing more than 50% of the material and weight from the finish, the new Quantum™ technology reduces manufacturing costs and GHG emissions, resulting in energy savings and lower carbon emissions compared to bottles with a traditional finish. Quantum™ technology

also allows for up to 100% recycled material use and provides a superior consumer experience with a more sustainable, fully recyclable package.

“Our customers and consumers alike are looking for ways to support the circular economy and eliminate waste, and our engineers have developed a new technology that meets their needs and advances more sustainable packaging,” said Terry Patcheak, vice president of R&D, Sustainability and Project Management at ARP. “We're helping our customers support source reduction, reduce material use and reduce weight, which means a lighter and more sustainable package.”

Initially developed for the spirits industry, the Quantum™ optimized finish technology can be used for packaging in multiple segments including healthcare, home and personal care, food and dairy.

PET, which has rapidly become the world's preferred packaging material, is lightweight, shatterproof, reclosable, resalable, reusable, and infinitely recyclable. In addition, PET bottles often have the lowest carbon footprint, and their production results in up to 70% fewer greenhouse - gas emissions than other packaging materials, according to Amcor's lifecycle analysis.

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### The Heinz Tomato Ketchup Introduces First 100% Recyclable Cap Delivering The Perfect, Eco - Friendly Squeeze

Heinz offers innovative and further sustainable caps for its squeeze sauce bottles, created to be 100% recyclable.

Heinz created 45 different designs on the mission to create the new cap, which was printed in-house using a state-of-the-art 3D printer. After completing the prototypes, Heinz followed a rigorous testing procedure to ensure the cap met the most critical quality standards.

To date, Heinz sauce bottles have used an adjustable valve, which had been designed to deliver the perfect part of sauce per squeeze but was typically challenging to recycle. The latest innovative cap has been designed to present the exact ideal squeeze of Heinz Tomato Ketchup using a single, complex, and more recyclable material. The new cap distributes the same perfect amount of sauce every time without changing the squeezability.

Heinz is committed to decreasing packaging waste wherever probable while offering great value, and this move is part of Heinz's pledge to make 100% of its packaging recyclable, reusable or compostable by 2025.

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### Amcor's AmSky™ Blister Packaging System Wins U.S. Sustainability Accolade

AmSky™, Amcor's breakthrough recycle - ready healthcare blister system innovation, has won the U.S. Plastics Pact Sustainable Packaging Innovation Award in the Recyclability category.

AmSky™ offers a more sustainable option and an optimized carbon footprint for the most in-demand healthcare packaging type — blister packaging, which is widely used to package and protect

oral solid medications and nutraceuticals. Unlike traditional blister packaging, containing polyvinyl chloride (PVC), the AmSky™ blister system is created using polyethylene (PE), which can be recycled through rigid and flexible packaging streams.

“In the manufacturing process, AmSky™ offers a 55% reduction in carbon footprint compared to other options on the market,” explained Amcor's Business Development Director of Healthcare North America, Ed Haedt. “When recycled, this footprint is further reduced to 75%, as verified using ASSET™, Amcor's proprietary life cycle assessment tool certified by the Carbon Trust.”

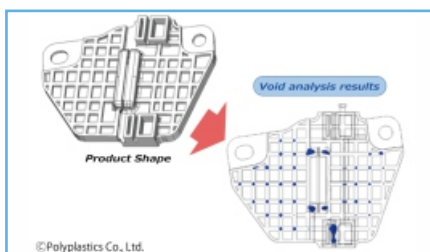
The packaging industry has been quick to recognize the significance of this more sustainable innovation, with AmSky™ winning two accolades already in 2022 — the Recyclable Packaging Award at Packaging Europe's 2022 Sustainability Awards and the 2022 AmeriStar Award in the Sustainable Packaging category.

The AmPrima™ range of recycle-ready solutions for food, beverage, home and personal care, and industrial products was also named as a finalist for the U.S. Plastics Pact Sustainable Packaging Innovation Award in the Recyclability category.

Both the AmSky™ and AmPrima™ innovative packaging solutions deliver against essential sustainability criteria, such as recycle-ready packaging, reduced carbon footprint and increased use of recycled content in the manufacturing of products. They are both under the EcoGuard™ brand.

### Polyplastics Develops New Void Prediction Technology for Injection Molded POM Products

Polyplastics Co. Ltd., a leading global supplier of engineering thermoplastics, has developed unique CAE analysis technology that predicts the occurrence of vacuum voids in injection molded products made of DURACON® POM. This new CAE tool can predict the risk of voids forming before creating the mold, and thus helps to reduce trial samples, shorten the development cycle, and reduce energy usage.



Polyplastics' void prediction technology takes into consideration changes in variables including temperature and pressure during the resin solidification process when using DURACON® POM. This technology verifies the shape, molding conditions, and effects of changes in the gate position in advance, and visualizes the size of voids as well as the positions in which they will form.

One type of molding defect is hollow pockets, called voids, which form near the center of thick injection molded products. Parameters such as volume shrinkage that is produced as output from flow analyses had conventionally been used for void prediction, but the accuracy of this method has been problematic since the actual phenomenon can't be recreated.

The new void prediction technology is an entirely new method that links flow analysis with structural analysis to predict the formation of voids according to strain arising inside molded products, taking into consideration mold shrinkage, elastic modulus, and distribution of pressure in the resin solidification process. Since it can predict voids with high accuracy before the mold is built, this technology promises to reduce the development cycle, cut down on product development costs, and reduce energy consumption for simulations.

Polyplastics is offering the new technology as part of its overall technical support for current POM customers.

### Radar - Based Wall - Thickness Sensor

Measurement units include an array of these sensors positioned around the circumference of the pipe, which can be placed in multiple locations on an extrusion line.

During October's K 2022 show in Düsseldorf, Inoex introduced the WARP-CP measuring system with eight radar - based wall - thickness sensors for recording the various structures of a corrugated pipe. The outer and inner diameter as well as the wall thicknesses of the bell, the crest, the liner and the valley can be resolved. No contact coupling medium is required to transmit and receive the radar waves, which makes the device very robust, reliable and independent of process fluctuations. The system is available for large corrugated pipes with diameter from 300 mm.



The sensors around the corrugated pipe scan it continuously. Since the corrugated tube has different structures, it is necessary to assign the measurement data to the corresponding position on or in the pipe. The WARP - CP algorithms do this automatically and prepare the data for the user in such a way that he is provided with different graphics and corresponding measurement data for each structure.



For applications with the most stringent quality inspection requirements, Inoex's WARP 100 units use more sensors to enable 100% measurement around the circumference of the pipe as well as the extrusion direction and can also detect eccentricity and ovality.

The specially developed optics allow the alignment of the radar wave to be focused on the center of the pipe. The sensors are arranged in such a way that the measuring spots overlap, thus ensuring close-meshed coverage in the extrusion direction. The maximum line speed for 100% coverage is up to 11.8 m/min. Measured variables such as wall thickness, diam, ovality, eccentricity and process conditions (e.g. sagging) are precisely recorded, documented and used for automatic process control.

## Alpla's Canupak Reduces Carbon Emissions by Around 71 Percent

The packaging and recycling specialist Alpla has realized a carbon - optimized prototype solution as a showcase for future products with its innovative canupak beauty care packaging. The ultralight packaging system with a bottle made entirely of recycled HDPE (rHDPE) underscores the company's global sustainability strategy. Alpla is therefore offering its customers further potential to reduce emissions as well as expertise for future developments.



With its Canupak beauty care packaging, ALPLA has developed a carbon - optimised prototype solution that causes around 71 per cent fewer carbon emissions.

Around 71 per cent less carbon consumption than with comparable packaging types, complete recyclability of the bottle and cap, and a total weight of approximately just 14 grams (for a 250 ml bottle) – with its ultralight Canupak packaging system, the global packaging and recycling company ALPLA has realised carbon - optimised packaging for the field of beauty care. The bottle is made entirely of recycled HDPE (rHDPE) sourced from the company's own plants in the EU. It is also produced exclusively using renewable energies.

Canupak is a prime example of how the potential to minimise emissions can be explored with high-quality packaging systems.

## Partnerships for solutions of the future

The carbon footprint was calculated in cooperation with Climate Partner. The product carbon footprint (PCF) comprises all the emissions throughout a product's life cycle, including its disposal. The areas of package contents, retail and use phase were not taken into account as these are not relevant to the climate impacts of packaging. As no clear standards currently exist for climate-neutral products and offsetting certificates, ALPLA is focusing on reducing emissions within its own sphere of influence.

## Global sustainability strategy

At ALPLA, the development of carbon - optimized packaging solutions with a high PCR proportion, maximum recyclability and minimum material consumption goes hand in hand with investments in sustainable projects and the global expansion of renewable energy and the circular economy. All packaging is to be fully recyclable by 2025, with post - consumer recycled material (PCR) accounting for 25 per cent of the materials processed. The company is investing 50 million euros a year in recycling activities to this end. ALPLA already widely uses renewable energies and high-quality own - production recycled materials at its plants and is minimizing transport journeys with in-house plants directly at the customers' premises.

### Packaging Hot Food: New SFP Light Steam Flushing System Saves Energy Costs



Soups, ravioli or noodles: Up to now caterers and kitchens have had to allow hot food to cool down, in order for it to be vacuum packed effectively. This costs time and reduces flexibility - and in the case of active cooling this also takes energy. The alternative from MULTIVAC the packaging specialists: the new SFP Light steam flushing system.

Fun fact: It is impossible to cook an egg on Mount Everest. Because the lower the air pressure, the lower the boiling point of water. Water vaporises at 70 °C on the highest mountain in the world, which is 8,848 metres above sea level. But 83 °C is required for an egg to become hard. No problem for mountaineers. They do without or switch to a steam cooker. But the physical principle presents a challenge to caterers and central kitchens - particularly if they want to use a packaging machine to vacuum pack hot food directly after cooking, so that the shelf life can be extended. Why? Here the so-called vapour pressure curve comes into play. The greater the negative pressure, the lower the boiling point - exactly as on the mountain. If the machine creates a negative pressure of 200 mbar for example, the water content in

the product vaporises at 60 degrees centigrade. From this point onwards it is no longer possible to reduce the pressure any further.

**That is the problem: When vacuum packing hot food, some residual air remains, which can adversely affect the shelf life**

When vacuum packing hot products, some residual air with 21 percent oxygen content always remains in the header space. A residual air content that can reduce the shelf life of the food. "Many caterers and kitchens therefore let the hot food cool down before vacuum packing. Or they use active cooling. But by doing this, they lose either time or energy," says Dominik Eberhard, Product Manager for Thermoforming Packaging Machines at MULTIVAC. "In order to ease the burden on caterers and kitchens, we have launched a new steam flushing system for small to medium batch sizes onto the market, and this is called SFP Light." SFP is an abbreviation for Steam Flush Packaging.

**The solution: The SFP Light steam flushing system packs hot products without a vacuum source**

SFP Light is available with immediate effect for MULTIVAC thermoforming packaging machines. The thermoforming packaging machine first forms the pack cavities for the product from a plastic film - for packing five kilograms of goulash for example at a temperature of 60°C. The portions then travel into a hermetically enclosed sealing station. Hot steam at a temperature of 180°C now

flows through the station. Finally the upper web is sealed to the formed film, and the steam remains in the pack. The secret: Gases have a significantly greater volume than liquids. When the steam turns to water again during cooling, the pack automatically contracts. "Thanks to SFP Light, it is possible to pack hot products without any significant residual air pockets. And all this without any vacuum source, which always has a limited effect due to the vapour pressure curve," explains Dominik Eberhard. "There is also no danger of the products boiling or packs bursting, since there is no negative pressure in the product space." Another beneficial side effect of the steam flushing system: The hot gas at 180°C kills bacteria on the surface of the food, so that the shelf life is extended.

And why SFP Light? "MULTIVAC has offered a SFP system for many years now for thermoforming packaging machines with high throughputs on an industrial scale. The new version is designed for smaller batch sizes in kitchens and catering companies. It is less complex as well as being space-saving and more cost-effective."

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### New Product Launch: Tamper - Evident, Sustainable, Pet Round Deli!

Placon continues to be a leader in sustainable, thermoformed packaging innovation with their new Crystal Seal® Cravings™ product line made with recycled PET material.



With increasing online grocery and curbside food pick-up, food safety is more important than ever. Tamper-evident packaging allows the user to identify whether the package has been tampered with.

Placon has announced the launch of their NEW Crystal Seal Cravings Tamper Evident deli products to their stock food product lineup.

Craving containers offer a tamper-evident lid feature to keep the product inside safe from meddling hands on the outside. The product line is made from post-consumer recycled PET material with a #1 recycling symbol to help meet sustainability goals. PLACON's crystal - clear PCR EcoStar® material makes the food the star and offers endless merchandising options. Custom printing is available on the cups.

Cravings products are perfect for fresh - cut fruits, veggies, cold deli, and freshly prepared food items. The tamper-evident feature keeps food safe and secure for curbside pick-up, food delivery, and fresh, on-the-go convenience.

### Large - Format “Cold” 3D Printing with Polypropylene and Polyethylene

Israeli startup Largix has developed a production solution that can 3D print PP and PE

without melting them. Its first test? Custom tanks for chemical storage.



Largix's Production Solution large - format 3D printer makes it possible to print with PP and PE materials with minimal shrinkage, by softening the exterior — but not melting — the filament.

When Ronen Orr and Amir Sheelo began the collaboration that would become Largix in 2014, they knew they wanted to develop a solution for reducing manual production of industrial goods using additive manufacturing (AM) as an alternative. They had seen the challenges facing industries that have historically relied on skilled labor, and saw AM as an automated way to reduce that labor and improve quality and throughput. They also knew that pursuing additive for industrial parts would mean rejecting most of the 3D printing technologies and materials then available, and plotting a new course toward durable, high-quality components.

“We did not start by developing a technology and looking for a market,” Sheelo says. “In commercial products, it's all about quality standards and materials. That's where we started.”

The Israel-based startup is in the process of launching a new polymer 3D printing technology targeted for the production of industrial products, specifically

heavy - duty products made of polypropylene and polyethylene (PP and PE). These materials account for 50 to 60% of global polymer consumption, Sheelo says, but they have historically been difficult to 3D print. The plastics can expand up to 30% in a molten state and will retract an equal amount when cooled and solidified; this dynamic behavior makes it difficult to avoid warpage and maintain dimensions in a 3D printing process that relies on melting such as fused filament fabrication (FFF).

### 3D Printing with Square Filament

To avoid these challenges, Largix has developed a 3D printing process that mostly keeps the polymer in its solid state. Instead of melting and extruding the filament, the printer uses a laser beam to melt just the outer “skin” of each strand so that it can attach to previous and adjacent layers. Up to four filaments can feed through the printhead at once, all of them laser-softened in unison, allowing for rapid material buildup. The company produces the feedstock itself, which has a square profile to maximize the surface area for bonding. The technique creates a monolithic part with Z - axis strength above 90%, Sheelo says.

(And that monolithic part can contain multiple materials, he notes. While up to four filaments can be feed through the printhead at once, there is no need for all of them to be identical. It could be possible, for instance, to build a wall that has colored polypropylene for aesthetics only on one (external) side, then a glass fiber-reinforced filament for strength, then a recycled PP filament, and a

fourth filament with some other enhancement like a UV stabilizer additive. As long as the base material is the same, the filaments will weld and function together similar to plain PP.)

**Cold 3D Printing and Hybrid Manufacturing** This “cold” 3D printing process is offered on the company's Production Solution machine. The gantry - based printer is totally modular and offers a large build volume; the machine running at Largix's headquarters has a build volume of 4 by 3 by 3 meters (limited vertically only by the facility's ceiling height) but can be customized to the needs of the user. The automated platform can be equipped with multiple printheads as well as a robotic arm for CNC milling, making it a hybrid manufacturing system.

Because the material remains relatively cool and solid throughout printing, machining can be done in sequence, without the need to wait for the printed material to cool or contract first. With just a few hours of setup, one Production Solution can run for several days largely unattended, as long as it is kept stocked with material. The company projects that each Production Solution could consume between 120 and 150 tons of material per year.

“This is autonomous, nonstop production,” Sheelo says. The machine reduces both the need for skilled workforce and the amount of manual labor required to produce industrial parts. And the company already has an initial industrial niche in mind: custom chemical storage tanks.

### Digital Production of Chemical Storage Tanks

When mass produced, these tanks are made through rotational molding with reusable tooling. But custom chemical tanks require a far more manual process, which today is performed by many discrete companies in various regions of the world. Largix believes its manufacturing system and materials offer a digital alternative to fabricating these tanks by hand, along with the ability to create variable wall thickness and other geometries that would be difficult or impossible to produce manually.



Large, custom chemical storage tanks like this one could be made faster and through a more automated process with the Largix 3D printer.

Its first beta tester, a tank manufacturer in Israel, currently fabricates custom tanks in 50 to 60 hours through manual means. With the Production Solution set to arrive in spring of 2023, this company expects to be able to produce each custom tank in just 2 to 3 hours on this platform.

Chemical tanks won't be the only application for Largix, of course. The company is already working on applying its technology to produce custom concrete molds, another industrial product today largely built by hand. Parts for

aviation, automotive, construction, architecture and other industries will follow.

- This story is the result of outreach following our AM Radio episode on unusual 3D printing methods — listen here
- Another, much different application for polypropylene using FFF to assist a dog with a neurological condition
- More stories and video on large-format 3D printing
- Another form of large format 3D printing, this time using thermoset composites to chemically bond layers together

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### Mauser Packaging Solutions Invests to Revolutionize Sustainable Plastic Drum Manufacture

Investment in multi-layer plastic drum machine expands capacity for growing demand of Infinity Series products manufactured with recycled resin.



With the increased demand for post-consumer recycled plastic (PCR), the introduction of the Plastic Packaging Tax (PPT) in the UK, and companies making highly visible commitments to cutting back on virgin plastics, businesses are looking for a reliable, quality supply of packaging solutions manufactured from PCR.

By investing in a state-of-the-art multi-layer plastic drum machine at its plant in Littleborough, UK, global company Mauser Packaging Solutions is at the forefront of meeting the growing demand for products containing recycled resin, helping your business to be more sustainable too. The new extrusion blow molding machine can produce a much more sustainable 3-layer tight-head plastic drum (also known as an L-ring drum) using recycled resin in the middle layer of the drum.

By using the UN-certified PCR drums, you can reduce the consumption of virgin plastic and CO2 emissions.

The 220-litre drums are part of Mauser Packaging Solutions' Infinity Series which includes IBCs, medical waste containers, plastic pails, tight-head containers, and lube oil cans, offering the most comprehensive portfolio of industrial packaging made from recycled resin.

This investment does not only boost UK manufacturing and support global sustainability efforts, but it is also helping to solve the very real issue of PCR supply (which is itself recyclable). The high-quality, recycled resin, used in the drums is manufactured in-house at a Mauser Packaging Solutions facility.

The resin, called Recolene, is made from empty industrial packaging that has been collected, shredded, washed, sorted by colour and extruded on-site at one of the company's six recycling centres as part of its global packaging return programme. This unique closed-

loop process ensures a consistent, high-quality supply of recycled resin that gives plastic materials new life, reduces industrial waste, conserves raw materials, and has a smaller carbon footprint.

Mauser Packaging Solutions is committed to supporting you in moving from the linear "take-make-dispose" model to the circular "reduce-reuse-recycle" model and will continue to invest in technologies and equipment that extends the life cycle of industrial packaging and supports the circular economy.

Another positive aspect is that by using the Infinity Series you reduce your carbon footprint and save raw materials. You also do not have to compromise on quality and safety.

As more regulations, such as the PPT in the United Kingdom, are introduced around the world to encourage the use of recycled plastic, Mauser Packaging Solutions' Infinity Series of products offers companies the most comprehensive portfolio of industrial packaging made from recycled resin to help meet these regulations.

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### Halogen - Free Flame Retardant for PC Film or Sheet

CAI's new proprietary ST-SR487 additive in compounded PC achieved UL 94 V0 with 0.25mm thick film.

Massachusetts based CAI Performance Additives has announced the availability of ST-SR487, a new halogen-free flame retardant for

polycarbonate film or sheet. As the industry continues to question the safety of halogen-based flame-retardant solutions, compounders have increasingly looked for halogen-free alternatives for adding flame retardant properties to their compounded polycarbonate.



CAI Performance Additives is now delivering to the domestic market this new proprietary solution—which is based on a phenyl silsesquioxane copolymer, according to CEO Richard Marshall. As previously reported, CAI Additives is the sole distributor in North America for a broad portfolio of high-performance additives produced by China's Starbetter Chemical Materials, ST-SR487 is poised as a replacement to traditional flame retardant additives, such as those based on metal salt or bromine. The additive has been shown to allow PC film to achieve UL 94 V0 at ultra-low thickness, a very tough technical requirement. Said Marshall, "Halogen based FR solutions can contain bromine, iodine, even chlorine; all chemicals of concern nowadays. I'm proud to say we are offering a safer alternative to our customers in ST-SR487, our first FR additive that is entirely halogen-free."

ST-SR487 reportedly has more benefits than just standard FR qualities, at ~1% dosage PC compounded with ST-SR487 has achieved UL 94 V0 with a

0.25mm thick film. The additive also can provide a higher resistance to yellowing and other forms of weathering as well as increased hydrolysis protection for water-contact end products.

### Newly Developed Transparent and Flexible Radio Wave Reflection Film for 5G Communications

SEKISUI CHEMICAL CO., LTD. (President and Representative Director: Keita Kato; hereinafter, "SEKISUI") is pleased to announce that its High Performance Plastics Company (President: Ikusuke Shimizu) has recently developed a transparent and flexible radio wave reflection film for 5G communications by combining the SEKISUI's distinguished film and optical adhesive technologies with the metamaterial technology of Meta Materials Inc. (Headquartered in Canada, led by George Palikaras, CEO). SEKISUI verified the radio wave environment of the film with collaboration from DOCOMO Innovations, Inc. (Headquartered in the U.S. and headed by Takashi Hara, CEO) and confirmed that the product, having unprecedentedly high transparency and radio wave diffusion characteristics, provides a wide frequency coverage useful for 5G and 6G communications.

#### 1. Background of the development

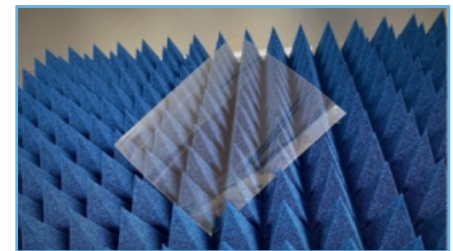
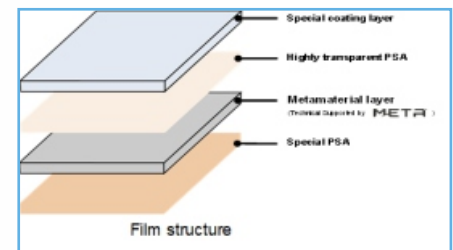
In 5G and 6G radio wave communications, higher frequency ranges than conventional LTE (4G) services are used: Sub-6 (3.6 GHz or higher) and millimeter (24 GHz or higher) wave ranges. Millimeter waves feature a high transmission capacity but have

strong directivity; when reaching a shielding object such as a building, they attenuate, deteriorating communications quality. Installing a base station or relay station may resolve the deterioration, but such a solution involves a high additional investment, and a more reasonable cost solution was demanded. While millimeter wave reflection plates, which have a metamaterial copper pattern processed on the printed circuit board, have recently been developed as a possible measure for solving such a challenge, we directed attention to a transparent and flexible radio wave reflection film that would have a metamaterial structure and would not spoil the landscape. Believing that we would be able to provide a solution by incorporating our film and optical adhesive material technologies into such a transparent, flexible plate, SEKISUI has been committed to research and development efforts. We have realized a transparent and flexible high - frequency radio wave reflection film, which can be used for not only millimeter wave ranges but also a wide range from 2 GHz to 60 GHz while featuring a total luminous transmittance of 95%, by integrating our technologies with Meta's world - leading nano - patterned transparent metamaterial technology NANOWEB (\*1) and its manufacturing technology RML (\*2).

#### 2. Outline of the developed product

This film consists of a metamaterial layer that has a high - frequency radio wave reflection structure, highly

transparent adhesive, special coating that protects the film surface, and special adhesive layer. When placed on a surface such as a wall or ceiling, the film reflects radio waves, enabling them to reach shielded areas. This technology can improve a communications environment at a lower cost and in a shorter period of time, compared with the installation of a base station or relay station. The film, which is transparent and flexible and does not require a power connection, can be installed anywhere, on a surface of whatever shape, without spoiling the appearance of where it is installed.



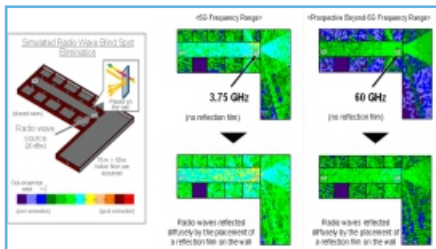
#### Advantages:

- (1) Flexible film that reflects radio waves of sub 6 GHz to millimeter wave ranges.
- (2) Transparent material that does not spoil the landscape, whether it is installed indoors or outdoors.
- (3) Easy installation without the need of power connection. Improves communications infrastructure anywhere.

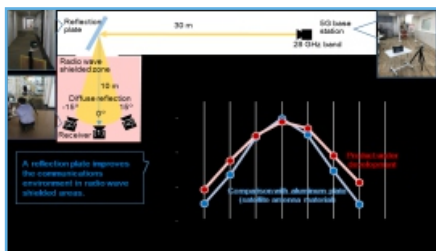


**3. Effect demonstration experiment**

Using the simulation technology of DOCOMO Innovations, Inc., SEKISUI verified the effects of the product in the planning stage and confirmed the effects indoors in the Solution Co-creation Lab of MIRAIT Corporation (Headquartered in Tokyo, headed by Toshiki Nakayama, President). The demonstration experiment confirmed that a reflection film placed 30 meters away from the base station properly controls the reflection of the radio waves, thus improving the communications infrastructure across a wide area.



**Indoor Radio Wave Environment Improvement Experiment Simulated by DOCOMO Innovations, Inc.**



**Indoor Radio Wave Environment Improvement Demonstration Experiment with Assistance provided by MIRAIT Corporation (28 GHz)**

**4. Future plans**

Using the advantages of transparency, flexibility, light weight and operation without power connection, SEKISUI plans to distribute the product for use in office buildings, factories, shopping malls, medical and care facilities, various sports facilities, farms, ranches, smart cities, underground shopping streets, rolling stock and roadway infrastructure while exploring other applications, including temporary or emergency sites providing first-aid services, construction sites, and camping areas. SEKISUI plans to start to distribute sample products in fiscal 2022, aiming to achieve a sales target of 6 billion yen by fiscal 2026.

**Amcor Opens China Largest Flexible Packaging Plant, Strengthening its Position in Asia Pacific**

Amcor, a global leader in responsible packaging solutions has announced the opening of its new state - of - the - art manufacturing plant in Huizhou, China.



With an investment of almost USD100 mln, the 590,000-sq-ft plant is the largest flexible packaging plant by production capacity in China, further strengthening Amcor's ability to meet growing customer demand throughout Asia Pacific.

The new facility is expected to employ more than 550 people, who will produce flexible packaging solutions for food and personal-care products. The plant comes equipped with the first automated packaging production line in China. This, along with high - speed printing presses, laminators, and bag - making machines, can deliver double-digit reductions in manufacturing cycle times.

Amcor is also deploying the first smart production and operation system in the Chinese flexible packaging industry, which includes smart laser scanners, light curtains, high - standard machine guarding and multiple quality - control points. All key process equipment is also CE-certified to stringent European Union health, safety and environmental requirements. Other benefits of the new state-of-the-art facility are traceability throughout the production cycle, a climate - controlled production environment and low - carbon emission production.

Amcor, a global leader in developing and producing responsible packaging solutions, has announced a five-year deal with ExxonMobil to purchase certified - circular polyethylene material in support of its target to achieve 30% recycled material across its portfolio by 2030. The volume of material will increase incrementally each year and is expected to reach 100,000 metric tpy at the end of the 5-yr period.



# PLASTIC RAW MATERIALS

## Supreme Petrochem Receives The Green Nod for Polystyrene and Expandable Polystyrene Expansions

Supreme Petrochem Ltd (SPL) has received Consent to Operate (CTO) from the Maharashtra Pollution Control Board (MPCB) for Polystyrene (PS) and Expandable Polystyrene capacity expansion projects at its plant situated at Amdoshi, in Raigad district of Maharashtra.

Following this, the company's effective manufacturing capacity of PS will stand increased from the existing 220,000 metric tonnes per annum (MTA) to 300,000 MTA and EPS capacity to 85,000 MTA now from 50,000 MTA earlier. Additionally, the company also announced the completion of the EPS production facility revamps programme / commissioning trial runs at its plant in Manali, Chennai. Consequently, the company's EPS capacity at its Manali plant jumped to 33,000 MTA now from 24,000 MTA earlier.

The company presently owns and operates state - of - the - art production facilities from two locations – Amdoshi and Manali in the states of Maharashtra

and Chennai respectively. At Amdoshi, the company's styrenics facility produces polystyrene (PS), expandable polystyrene (EPS), specialty polymers and compounds (SPC), extruded polystyrene foam boards (XPS), and styrene methyl methacrylate (SMMA). The infrastructure at the facility is geared to handle up to a million tonnes of polymers.

SPL has procured technology from Shin Ho Petrochemical of Korea (now SH Energy and Chemical Co Ltd) for general purpose and flame retardant EPS, and from NOVA, USA for food - grade EPS. SPL's New Malali Tow facility manufactures EPS using technology from Shin Ho Petrochemical of Korea for general purpose and flame retardant EPS.

SPL is a joint venture between Supreme Industries Ltd (SIL) and the Rajan Raheja Group. SIL is the largest plastics processing company in India engaged in the manufacture of pipes and fittings and moulded products (composite cylinders, furniture, crates, components for automobile and consumer durable industry), extruded products (mono, multilayer and cross - laminated films, PE foam, PP mats, etc. On the other

hand, Rajan Raheja Group has interests in automobile batteries, cement, ceramics tiles, ready mix concrete, software, petrochem, publishing, cable television, retailing, hotels, asset management, and real estate.

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## Ampacet Unveils Additive Portfolio to Impact Matte Finish in Packaging Item

Ampacet, a global masterbatch leader, has introduced MATIP 347, an additive portfolio that imparts a luxurious matte finish for premium packaging and personal care items.

Specifically designed for blown, cast film and BOPP, MATIP 347 produces an upscale look and increases shelf appeal for films used in packaged goods and graphic arts. Applications include food wrap, food packaging, pet food, pouches, labels, laminates and personal care items.

Used in the outer layer of a film structure, MATIP 347 reduces gloss and increases haze to provide a high - quality matte effect in low - thickness blown film, cast film and BOPP applications of between 6-8 microns, with gloss < 10 and haze > 75% @ 133°F.



## New Additives for Polyolefin Recyclates' stabilization from Brüggemann

At K 2022, Brüggemann presented three new additives for improved stabilization of polyolefin recyclates. These additives are said to result in recyclates with good mechanical and processing properties. All grades are supplied as dust-free additive blends in compacted granule form.



Two of the new stabilizers are intended for polypropylene recycling. Brüggolen TP - R2090 can be used to recycle post-industrial and post-consumer waste, whereas Brüggolen TP - R8895, through its increased acid scavenger content, is especially suitable for recycling polypropylene from battery cases. Both additives result in recyclates of quality that cannot be achieved via conventional re-stabilization.

For polyethylene recycling, Brüggemann has developed Brüggolen TP - R2162, which also contains the new repair technology and is particularly suitable for LLDPE recyclates used in film extrusion. Here, the repair mechanism results in film with increased initial mechanical strength and a significantly reduced number of defects. Laboratory tests, for example, show an increase of around

25% in tensile strength and 10% in elongation at break, even at minimal dosage levels of 0.3%.

These outstanding properties of the polyolefin recyclates are made possible by a specially developed technology. For the first time, it is possible to repair defects to the molecular chains that occur during processing and subsequent use and which impair quality. The recyclate is not only protected from further damage by re-stabilization, but, by repairing the polymer chains, the resultant mechanical strength more closely matches that of virgin polymer.

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## Teijin Frontier Develops Practical, Highly Biodegradable PLA Resin That will Help to Reduce Microplastics

Teijin Frontier, the 'Teijin Groups fibers and products converting company, has developed a practical polylactic acid (PLA) resin that biodegrades faster in oceans, rivers and soil compared to conventional PLA products. By adding a new biodegradation accelerator to the polymer, Teijin Frontier has improved its biodegradation rate without impairing strength, moldability or other practical properties.

The new PLA resin is expected to help reduce microplastics thanks to its accelerated biodegradation rate as well as reduce Co2 emissions during product lifecycles since it is made from plant-derived raw materials.

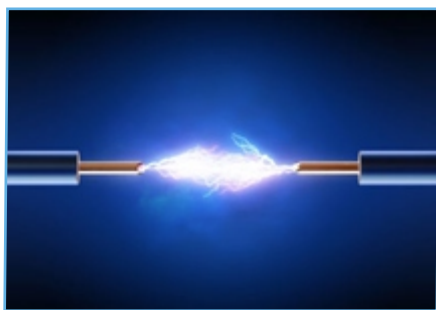
Teijin Frontier will begin producing and selling pellets, injection- and extrusion-molded products, textiles and non-woven fabrics made with its new PLA resin in fiscal 2023 (ending in March 2024), targeting sales of several hundred million JPY by fiscal 2026. PLA resins, which are generally made from plant-derived ingredients and are biodegradable, are used in a wide range of products due to their high crystallinity and practicality. Although biodegradation performance is acceptable under hot, humid compost conditions, the rate is slowed down greatly in oceans, rivers and soil, resulting in the presence of residual microplastics for long periods of time. Until now, attempts to improve biodegradability have impaired the strength and other practical properties of these products.

Under Teijin's 'Think Eco' environmental initiative, the company is striving to improve its environmental value by developing greener materials and products for applications ranging from clothing to industrial materials.

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## Ampacet Introduces ELTech™ Masterbatches for E&E Market

Ampacet, a global masterbatch leader, has launched the ELTech™ product range, specifically formulated to respond to the stringent requirements of the E&E market.



Modern society lifestyles rely on electricity and telecommunication, whether at home, at work, during transport as well as for leisure activities. The Electrical & Electronic Equipment (E&E) segment covers a broad array of applications, including power and telecommunication cables, connectors, electrical boxes, casings, ducts, conduits, plugs, sockets and switches.

“ELTech solutions, part of our diversification strategy, will further enrich Ampacet's wide portfolio of masterbatches and open opportunities for new markets,” says François Thibeau, Ampacet Strategic Business Manager E&E.

“Ampacet ELTech masterbatches are designed for coloring wire and cable jacketing and connectors, as well as other E&E applications, following the RAL color standards. The ELTech product range is based on various carrier resins such as PE, EVA, PBT and Universal Carrier (UN),” he added.

The ELTech product range also includes masterbatches combining color with functional additives.

For proper functionality and operability of E&E applications, Ampacet offers advanced additive masterbatches, including laser marking, metal deactivators, UV stabilizers, flame retardants, antimicrobial, scratch resistance,

slip and release, odor absorbers, process stabilizers and processing aids.

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### Engineering Plastic for Front Fenders From LG Chem

LG Chem has started supplying engineering plastics to Mitsubishi Motors for its powder coating parts used as the front fenders of RVR, Delica D:5 and Outlander models.

Front fender is located on the side of the vehicles, which not only acts as one of key factors in the exterior design but also protects its wheels from road debris. Thus, it not only should possess a high level of mechanical robustness but also an excellent exterior quality to keep a high integrity design with the rest of the car body.

LUCON Tx5007 developed by LG Chem is a compound material that combines modified polyphenylene ether (mPPE) and polyamide (PA66) alloy with carbon nanotubes (CNTs), and has an excellent electrical conductivity and show strong mechanical properties. In addition, this product has an outstanding heat resistance, making it suitable for the automotive on-the-line painting process at 200°C or higher. At the same time, it also provides an excellent dimensional stability thanks to its low coefficient of linear thermal expansion (CLTE).

In general, applying plastics instead of steel / aluminum contributes to automotive light weight. When a plastic fender is used, the weight of the vehicle is reduced by about 4 kg, which also improves fuel efficiency. Furthermore, plastic fenders can

provide other benefits, such as reduced fuel exhaust emissions and carbon footprints.

In addition to LUCON TX5007, LG Chem has a broad portfolio of products that can be used for large - scale automotive exterior parts that need to utilize powder coating process. These products can be customized to meet automotive suppliers' diverse parts requirements for fenders, bumper panels, hoods, tailgates, fuel doors, and side mirrors.

At the same time, LG Chem is using CNT, a filler that produces excellent conductivity even with a small amount in its engineering plastics to support diverse requirements of customers. Since this material can cover a wider range of electrical conductivity compared to other carbon fillers such as Carbon Black and Carbon Fiber, it is considered an optimal solution for powder coating. LG Chem has not only built its own CNT production line, but now expanding its 4th plant for a mass production in 2024, for the reliable supply of high - quality products for powder coating.

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### Disposable Plastic Cutlery Market Study On Key Players, Industry Share And Regional Analysis | Huhtamaki, Dart Container, Pactiv Evergreen, Solia AS, Truechoicepack (TCP), Eco-Products

The medical plastic market size reached USD 44.84 Billion in 2021 and is expected to register a CAGR of 7.5% during the

forecast period, according to latest analysis by Emergen Research. Increasing demand for at-home healthcare and outpatient procedures owing to convenience especially for rising elderly population and reduced healthcare costs in addition to growing requirement for bioplastics are a few of the factors driving the market revenue growth. According to WHO, the proportion of the global population over 60 years is expected to double from 12% to 22% between 2015 and 2050.

Plastic offers the remarkable advantage of being adaptable, with the potential to adopt various shapes and make consumer items at a low cost. Among all other industries, the medical industry has benefited the most as precise work is required, which modern plastics can readily deliver. Medical plastic is safe since it is non-permeable and shatterproof, making it easier to transfer biohazardous goods. This facilitates the safe evacuation of medical waste, hence preventing the spread of harmful illnesses.

Even with medicines, tamper-proof lids guarantee that the contents are sterile and free of bacteria. Plastic has a long life, which can be utilized for a wide range of applications, and the material used to create plastic items is less expensive, lowering production costs. Plastic, unlike metal and glass, is resistant to corrosion and breakage. Medical grade polymers are manufactured to withstand repeated sterilization. With all these benefits, hospitals can drastically cut overhead expenses, helping both the operations and the patients by providing lower-cost treatments.

Manufacturers prefer medical plastics as it is easy to build economical and convenient medical applications since the introduction of 3D printing. Prosthetics, for example, can be customized owing to injection molding as well as being lightweight and resilient, making the patient's life a bit easier. Increasing need for medical plastic in the healthcare sector is being driven by a shift in preference for using medical plastics instead of metals, ceramics, and glass for medical implants, supports, and devices because they are lighter, more versatile, cost-effective, and have higher biocompatibility. One of the most ecologically friendly solutions for medical equipment is plastic, which is recyclable. Medical-grade plastics make it simpler for healthcare professionals to fulfill their demanding medical applications and uphold environmental responsibility.

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### **New Entrant Heartland Polymers Stepping Up as Reliable Supplier**

**Heartland Polymers' new Alberta, Canada facility will produce 525 KTA propylene and 525 KTA polypropylene. It is expected to stabilize supply chains across the continent.**

In a unique geographical region of Alberta, Canada, operational readiness teams were busy over the summer optimizing production processes at North America's first integrated PDH/PP facility. Heartland Polymers represents the industry's newest supply entrant, and the company is keenly focused on delivering on

its promise to be a reliable and helpful partner for manufacturers, converters, and distributors seeking stability against volatile markets.



### **Heartland Polymers' new Alberta facility will produce propylene and polypropylene.**

“We're producing and delivering to customers, and the reaction so far has been very welcoming to say the least,” says Yonas Kebede, Director of Sales and Marketing, adding that approximately 70 percent of output has been contracted, with active interest on limited availability supply. “The build of the integrated facility was a momentous achievement in itself, completed safely during a global pandemic, but today we are really focused on demonstrating our commitment to better reliability, a better way of doing business as we step into the market as a new brand.”

Heartland Polymers is currently producing homopolymers and is ready to add random copolymers to its production line in 2023. The PDH will produce 525 KTA propylene and the PP will produce 525 KTA polypropylene.

### **A Business Model Designed by You, for You**

Kebede says Heartland's parent, Inter Pipeline, invested in early research and consultation to hear

directly from the industry on key opportunities and challenges, and these insights helped directly inform the new entrant's business model and service approach. The research showed strong interest for a new entrant outside of the Gulf Coast region, further validated by the events of 2020 and 2021 with Hurricane Laura and Winter Storm Uri, and the ensuing supply disruptions. A 30-year veteran of the industry, Kebede has seen firsthand the chaos that ensues on the heels of a major weather event – and how those disruptions negatively impact the supply chain.

“There is a reliability issue in the marketplace for current suppliers down the Gulf Coast due to hurricanes, and the ability to come to customers with product outside of the Gulf in a more stable environment is really exciting,” he says.

### The Right Place at the Right Time

Location, location, location, goes the saying in real estate, but the same holds true for manufacturing. Located northeast of Edmonton, Alberta, Canada, Heartland's production facility is designed to convert locally sourced, low-cost propane into high quality polypropylene. In fact, the region is home to one of the world's most abundant propane resources. In addition to access to a highly trained workforce and technical expertise, production facilities in this region are accustomed to seasonal fluctuations in temperature. They are built to operate through cold winters and hot summers but are not susceptible to major climate events such as hurricanes that cause downtime.

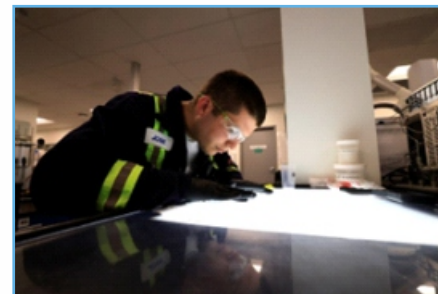


The plant proves ready access to manufacturers, converters, and distributors seeking stability against volatile markets.

When it comes to reliably moving products, the Heartland manufacturing complex is serviced by the industry's newest fleet of 1,600 railcars, all outfitted with the latest GPS technology to allow customers to track their shipments in real-time. Cars will be cleaned and loaded 24/7 on-site in compliance with Operation Clean Sweep as one part of the company's holistic approach to sustainability. The Heartland rail network provides access to ports, terminals, and centrally located storage-in-transit capacity to assist with on-demand delivery.

### Enhanced Reliability in Production

When it comes to secured access to abundant local feedstock and processing infrastructure, Heartland is leveraging an extensive extraction and processing network through its parent company Inter Pipeline. While most polypropylene producers buy their monomer from a third-party site that isn't directly attached, Heartland is fully integrated between the Propane Dehydrogenation (PDH) and Polypropylene (PP) facilities. A PGP cavern reservoir ensures that each plant can run independently from the other, improving overall reliability.



Heartland Polymers has a state-of-the-art quality control and testing lab on site to ensure all product meets customer specifications.

“Our ability to utilize salt caverns for keeping feedstocks in between these plants in reserve, a month's worth of supply, provides added security for our customers,” says Kebede. “We expect industry-standard turnaround but are confident that we have many unique differentiators that make us attractive as a new supply source.”

### Reliably Sustainable

Heartland employs the most modern, sustainable iterations of production technology. The focus when selecting technology was on efficiency, stability, quality, and sustainability. Heartland Polymers is proud to be partnering with W. R. Grace and Honeywell who license the UNIPOL® PP and Oleflex™ PDH (respectively) to implement leading-edge production technologies. This leading-edge technology ensures phthalate-free quality and reliability.

The on-site central utility block (CUB) cogeneration unit plays a key role in delivering increased sustainability. As a result, Heartland will produce polypropylene that is projected to have a GHG emissions

footprint 65 percent lower than the global average and 35 percent lower compared to average North American PP facilities, according to an independent third - party review commissioned by Inter Pipeline. The CUB recovers residual heat from the operation of its gas turbines (GTGs) and utilizes it to produce steam for use by the propane dehydrogenation (PDH) and polypropylene (PP) units to support process equipment energy requirements. The residual heat recovery process is used instead of traditional power and emissions - intense fossil fuels, such as coal.

The hydrogen used to fuel the integrated cogeneration unit and process heaters is a by-product of the dehydrogenation process to create the propylene. This further reduces GHG emissions and removes the need for imported grid electricity to fuel the process.

### Circulus Announces Step Forward in Food Grade PCR

Recycler Circulus announced it has received a letter of no objection from the FDA. The letter pertains to the company's LDPE recycling operation in Riverbank, CA.

The letter recognizes that Circulus has demonstrated its process can produce new plastic which is safe for food - contact applications. The company has had a goal of attaining the letter since its inception in 2019.

“We see larger demands from CPGs, brands, converters - everyone is wanting to put mechanically recycled plastics to their highest and best use.

By obtaining the FDA LNO, we've shown that we're able to hit that highest and best use.” says David Hudson, founder and chief strategy officer at Circulus.

Recycling a soft plastic like LDPE film is considered more challenging than a rigid plastic such as a PET bottle. This is both due to the physical form factor and much lower availability from material recovery facilities.



The FDA letter clears a path to food - contact applications.

Circulus anticipates the FDA letter will allow its products to be used in a much wider range of applications, completing a circle from post - consumer collection all the way back to store shelves. “Having that completely circular dynamic to our products is very important to us,” says Hudson.

Circulus plans to seek the LNO at its future facilities as well, one of which is currently under construction in Alabama.

### Highly - Loaded Masterbatch for Short - Run Color Inventories

Ampacet's RediBatch black and white colorants in a universal carrier offers processors more flexibility and faster speed to market.



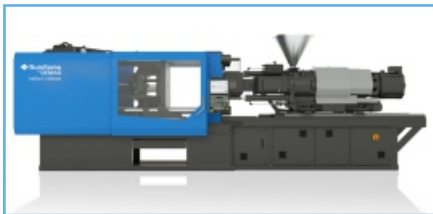
A new simplified color solution for short runs has been launched by Ampacet. RediBatch is a highly - loaded masterbatch with a universal carrier that provides processors with more flexibility and faster speed to market, and is said to be ideal for injection molding, blow molding, tubes and profile and sheet extrusion applications.

The RediBatch color palette, ranging from whites and blacks to colors, is compatible with the most popular thermoplastics, FDA approved, and eliminates the need for processors to stock dedicated polymers for each color. Available directly from Ampacet in small lot color orders from 50 lbs to 2,500 lbs, RediBatch colorants are free of heavy-metal pigments and reportedly offer the high tint strength of organic pigments with the opacity of inorganics.



## PLASTIC MACHINERY

### Full Speed Ahead: Sumitomo (SHI) Demag Expands Fast - Cycle All - Electric Platform



**Moulding specialist releases new mid - size IntElect S high - speed energy - saving range globally.**

Engineered specifically for high volume packaging, medical and automotive applications requiring the highest processing precision in the fastest cycle time, Sumitomo (SHI) Demag is accelerating its global expansion of the IntElect platform.

Filling an important gap in the mass - manufacturing market, notably thin - wall packaging, the company is releasing new sizes within its IntElect S all-electric high - performance injection moulding machine range, including medium clamping force (mid - size) machines between 220 and 450 tons. Product Manager of the IntElect series Peter Gladigau, emphasises that with this latest release moulders requiring cycle time speeds of between three to 12 seconds

now no longer need to compromise on any aspect of productivity, energy efficiency and processing speed and stability.

By expanding the IntElect S series, Sumitomo (SHI) Demag is resolute in its ambition to open up the all - electric moulding machine market and the associated benefits to even more product applications, including low part weights and narrow tolerance components. Positioned squarely between the conventional IntElect all - electric series and the new high - speed packaging injection moulding machine PAC - E, the IntElect S is geared specifically towards plastic processors mass - manufacturing narrow tolerance and thin - walled components at the fastest speeds.

"Cycle times of between three and twelve seconds and injection speeds of up to 350 mm/s are the typical range of this machine," reports Gladigau. He draws special attention to the resilient, high performance drives, shorter clamp spindles and longer service life. Culminating in faster acceleration of the injection speed to achieve on average a one second cycle time saving when compared to a standard IntElect model.

The IntElect S mid - size range caters specifically to high performance applications with the shortest cycles, high material throughput, which typically consumes more energy affirms Gladigau. "Given the rapid rise in energy prices, counteracting the impact on rising manufacturing costs through higher productivity, processing repeatability and reduced waste is increasingly imperative with regard to competitiveness. For this very reason, market interest in our IntElect S series remains very high," reports the product manager.

Indicative of the current energy challenges, for packaging applications, the IntElect S can lower energy consumption to between 0.25 to 0.32 kilowatt hours per kilogram, states Gladigau. Citing it as the epitome of mass production efficiency, compared to hybrid machines this increased production capacity combined with saving tens of thousands of euros per year on energy, can result in one of the fastest machine paybacks.

Benchmarking dry cycle times on thin wall packaging products with equivalent electric systems on the market, IntElect S remains at the forefront of innovation and energy efficiency, assures Gladigau.

Featuring optimised tool movement, nozzle position, injection and ejector movements and metering speed, the IntElect S model outperforms previous generations of IntElect machines. "Increasing the capacity of the IntElect's braking energy recovery system not only improves energy efficiency but also extends the lifespan of electrical components and capacitors. Verified by extensive machine and part lifecycle durability tests, notes Gladigau. Clamp spindles tested under the hardest conditions showed no evidence of visible wear after millions of cycles. Guaranteeing safe operation of the machine, even in the fastest - cycle applications.

### Techman Robot Announces Its All - In - One AI Cobot Series

Techman Robot has announced the introduction of its TM AI Cobot series. AI Cobot is a Collaborative Robot, which combines a powerful and precise robot arm with native AI inferencing engine and smart vision system in a complete package, ready for deployment in factories, accelerating the transition to Industry 4.0.



TM AI Cobot works on the principle of being smart, simple and safe. By combining visual processing in the robot arm,

the AI Cobot can perform fast and precise pick and place, AMR, palletizing, welding, semiconductor and product manufacturing, AOI inspections and food service preparation, among many other applications that can be accelerated by AI - Vision.

It is an intelligent robotic arm series on the market provided with a comprehensive AI software suite. It includes TM AI + Training Server, TM AI + AOI Edge, TM Image Manager, and TM 3DVisionTM, allowing companies to train and tailor their system to precisely meet their applications.

### Engel Introduces Pay Per Use Option

ENGEL says the pay - per - use model allows its customers to make payments based on machine utilization.

Austrian injection molding machine and automation supplier Engel now offers its customers a pay - per - use model in addition to traditional machine purchases. Engel says that in addition to helping processors reduce their investment risk, this model can also boost production flexibility.

Under this system, payment is based on machine utilization levels, with a unit price agreed to. This price can either be per unit molded or by machine operating time. Engel believes the pay - per - use model will help processors avoid the risk of binding up capital in a new machine or forcing them to seek approval for substantial

investments. In either case, the procurement process can be concluded more quickly.

All production cells delivered under the pay - per - use model feature the online support and remote maintenance tool e-connect.24 and are regularly maintained by Engel service technicians. In a service case, the Engel technicians can start maintenance work immediately, or it can be planned at an early stage to keep unavoidable machine downtime to a minimum. e-connect.24 acquires the machine utilization as the basis for billing.

### Nanopowder Screw Coating for High - Wear Applications

At K 2022 in Düsseldorf, Extreme Coatings debuted 9000 SF nanopowder 900 SF, which has been redesigned to combat extreme application of fine particle abrasion. The new 9000 SF nanopowder targets near micron and sub - micron composition size, which is smaller than current formulas. The material particle size has been reconstructed to further enhance wear. Testing shows 9000 SF provides a 20% increase in wear versus the standard 9000 product.

Extreme Coatings also took the wraps off its Flite Guard coating option, which protects the top of feedscrew flights with a layer of wear - resistant tungsten carbide. The coating can improve screw life from three - to ten - fold compared to standard hard facings. FliteGuard is also more

affordable, providing a 30% cost reduction for coating of cap flights. Contrary to industry belief, FliteGuard tungsten carbide coating can run in a softer nitride barrel due to a key process advancement.

The standard coating thicknesses are 0.005 in. (0.125 mm) for screws of dia 36 mm and below, and 0.010 - in. (0.25 mm) for larger feedscrews. Low heat input during the coating process ensures no post-coating stress relief or straightening is necessary.

The FliteGuard process is also an option to replace a small amount of wear on tool steel feedscrews. Most tool steel screws do not suffer from engel root - or flight - side wear, but eventually adhesive wear reduces their diameter. Tool steels can't be weld repaired due to the alloy content of the screw, but the application of up to 0.020 - in. (0.5 mm) FliteGuard coating to the tops of flights can reportedly return a worn screw to like-new condition.

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### Ultra - Compact PET Machine for 12 L in Two Cavities

New size of all - electric reheat stretch - blow machine for large PET bottles debuted from 1 Blow at K 2022. It retains the company's signature small footprint and energy - sparing features.

Compactness and energy efficiency are highlights of 1Blow's new 2XL machine at K 2022, which can mold 2 x 12 L PET bottles.



At the recent K 2022 show, 1 Blow of France introduced a model of its very compact all - electric reheat stretch - blow machines for bottles up to 12 liters (3 gal). The new 2 XL machine is the company's first two - cavity system for bottles of this size, while retaining a small footprint of only 6.5 x 8 ft. (Previous models could mold a single container of 12 L or even up to 30 L.) It handles neck finishes up to 53 mm and outputs up to 3800 bph for 0.5 L , 9 - g bottles. Optional technology kits include preferential and offset neck heating, neck orientation, heat - set / hot - fill and Sure Grip molded - in handle.

In keeping with the overall "green" theme of K 2022, 1 Blow emphasized the low energy consumption of its reheat stretch - blow machines under the new label "GreenBlow." Among the energy-saving features of this all - servo design are recovery of braking energy on the five servomotors to power the next motion; recovery of high - pressure blowing air to furnish 100% of the machine's low - pressure air requirement; and "SuperVenting" mold technology (supplied by a moldmaking partner) that allows bottles to be blown with a little as 300 psi vs.

the conventional 600 psi, reportedly saving 30 - 40% in energy. These features were highlighted at the show on a new 2X L model for two-cavity production of up to 12 L bottles.

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### Single - Inlet Air Ring

**Easy to maintain and operate, it's integrated in the blown film line through just one cooling air supply line.**

The CRX Series of single - inlet air rings from Hosokawa Alpine are said to offer exceptional bubble stability and rate. A lower pressure drop is designed for maximum output. The series is billed as easy to maintain and operate and is integrated in the system through just one cooling air supply line.



Compatible with existing Alpine cooling inserts, the CRX can be furnished with optional monomer suction between cooling ring and die head.

Alpine introduced the air ring at K 2022 in Dusseldorf.



# CIRCULAR ECONOMY/ BIO-PLASTICS/ RECYCLING

## Finding a Circular Way Out of The Plastic Waste Mess

**Weighing in on solutions to eliminate plastic waste from the environment has come to a head, especially when recycling is not helping, says Angelica Buan, Plastics & Rubber Asia in this report.**

In search of an all-in solution Think tanks and experts all over the world agree that the volume of plastic waste continues to rise despite efforts to reduce it. Plastics will continue to overwhelm the environment unless an effective solution is successfully implemented. Based on the OECD report, Global Plastics Outlook, plastic leakage to the environment is projected to reach 44 million tonnes/year in 2060, with marine waste potentially more than doubling to 1,014 million tonnes from 353 million tonnes in 2019. The OECD predicts that the amount of plastic waste produced worldwide would nearly triple, with less than a fifth being recycled and half ending up in landfills.

Several actions have been proposed, including the imposition of plastics taxes, the incorporation

of recycled plastic content into new plastic products, and the adaptation of Extended Producer Responsibility (EPR) schemes, in which producers and even brand owners are assigned responsibility for the treatment or disposal of post-consumer products; as well as the improvement of waste management infrastructure and the increase of waste collection rates.

The circular economy puts emphasis on recycling. In recent years, advanced recycling technologies that augment mechanical recycling, the de facto recycling method, have emerged, fuelled by policies aimed at increasing recycling rates and PCR content in products. However, the low recycling rates and poor quality of recycled plastics have called into question the viability of recycling. Consider this: the world has produced approximately 7 billion tonnes of plastic waste, with less than 10% of this being recycled. The remaining million tonnes of plastic waste are discarded into the environment or sent to locations that lack proper recycling facilities and will eventually be burned or disposed of.

In its Global Assessment of Marine Litter and Plastic Pollution report, the United Nations Environment Programme (UNEP) estimated an annual loss in the value of plastic packaging waste during sorting and processing to be between US\$80 and US\$ 120 billion.

In the meantime, while incineration and landfilling will continue to account for approximately 20% and 50% of disposing plastic waste, respectively, the OECD report expresses optimism that successful recycling will nearly double to 17% in 2060 from 9% in 2019.



**Recycling infrastructure challenges: lacking, high energy costs**

Recycling is still seen as a solution to the plastic problem by businesses and consumers. A slew of consumer goods behemoths have publicly committed to using recycled materials in more of their

products and packaging. However, there is a significant investment barrier, particularly for emerging economies that need to build an efficient recycling infrastructure from the ground up.



### Rising energy prices are increasing the recycling industry's operating costs

Consultancy McKinsey had made a bold estimate. It said that building a fully functional waste management system, including roads, landfills, waste-to-energy facilities, trucks, trash points, and recycling, along with a broad profile of supporting infrastructure, could cost between US\$560 billion to US\$680 billion over ten years. A system of this type would aim to manage approximately 850 million tonnes of waste/year, including, but not limited to, plastic waste.

Meanwhile, rising energy prices pose additional obstacles for the recycling industry. According to Plastics Recyclers Europe, high energy prices could drive recyclers out of business, with energy now accounting for up to 70% of operational costs.

It has been reported that energy prices in Europe have increased by 400%. Plastic recycling facilities operate 24/7, which means that energy utilities are one of the three major cost factors after labour and maintenance.

For plastic recyclers, energy typically accounts for 15-20% of total operating costs. Thus, the energy crisis may jeopardise the European Union's transition to a circular economy. This undermines recent EU policy and global developments that have increased investments into Europe's plastic recycling capacity. It is suggested that the European Commission and EU member states should intervene to keep recycling operations running.

### Taking conventional recycling to the next level

The race to improving recycling techniques is on. South Korea, one of the many countries that have remarkable waste management systems, is also at the helm of recycling innovations.

GE Technology, a South Korean waste management company, will license Honeywell's UpCycle Process Technology for its planned advanced recycling facility in South Korea. The plant will be able to convert mixed waste plastics into Honeywell recycled polymer feedstock (RPF), which will then be used to create new plastics.

Production is expected to begin in 2025 and the recycling plant will be able to convert 30,000 tonnes/year of mixed waste plastic.

Meanwhile, **Aduro Clean Technologies**, a Canadian developer of patented water-based technologies to chemically recycle plastics and transform heavy crude and renewable oils, says it has completed construction and mechanical assembly of its pilot-scale Hydrochemolytic continuous flow plastic (R2 Plastic) reactor.

Aduro says its hydrochemolytic technology is significantly more energy efficient than established alternatives because of the relatively low operating temperatures. The R2 Plastic unit is the company's customer engagement unit and is designed to handle various plastic feedstocks such as PE, PP and PS as single-stream materials, followed by a mixture of these feedstock streams.

In 2022, the company undertook several projects, including the construction of both the plastic upcycling and bitumen upgrading reactor units, the construction of a flash drum unit for pre-processing bitumen feedstock, and the expansion of laboratory facilities and laboratory capabilities at its facility in Canada that will centralise their resources for more efficient execution of R&D, scale up and commercialization plans.

Completion of these projects positions the company to execute in 2023 the R2 reactor research and testing optimisation program, the implementation of the customer engagement program and the delivery of reactor unit design, equipment procurement, fabrication, and commissioning of the scaled-up pre-commercial R3 Reactor unit.

Elsewhere, Japan's Teijin Limited, JGC Holdings Corporation and Itochu Corporation are to establish a joint venture company, RePEaT Co. to license technology for the chemical recycling of polyester products. Teijin will own 45% of the jv, JGC Holdings: 45% & Itochu Corporation: 10%.

What will be different is that the partners will use a chemical-recycling technology called dimethyl terephthalate (DMT), which decomposes and converts polyester (PET) and then repolymerises it. Notably, the DMT method removes dyes and impurities, making it possible to manufacture recycled PET with the same quality as petroleum-derived PET. Teijin has extensive experience in using DMT technology for the commercial production of polyester products including coloured textile waste and coloured PET waste.

**For its planned advanced recycling facility in South Korea, GE Technology will license Honeywell's UpCycle Process Technology to convert mixed waste plastics into recycled polymer feedstock**

**Recycling not a real solution, says Greenpeace** Given the above tie-ups, a recent report by **Greenpeace USA** depicts a different scenario with recycling. In its report, *Circular Claims Fall Flat Again*, the environmental organisation emphasised the inadequacy of recycling in reducing the amount of waste plastics in the environment.

It argued that most plastics could not be recycled. In the US, households generated an estimated 51 million tonnes of plastic waste in 2021, with only 2.4 million tonnes recycled. Plastic recycling was estimated to have dropped to around 5-6% in 2021, down from 8.7% in 2018.

Another interesting claim in the report is that no type of plastic packaging in the US meets the Ellen MacArthur Foundation's New Plastic Economy (EMF NPE) Initiative's definition of recyclable.



**According to Greenpeace USA, no type of plastic packaging in the US satisfies the Ellen MacArthur Foundation's New Plastic Economy Initiative's definition of recyclable**

According to the report, the EMF NPE standards require an item to have a 30% recycling rate in order to be classified as recyclable. Two of the most common recyclable plastics in the US, PET and HDPE, typically bottles and jugs, fall far short of the EMF NPE threshold, with reprocessing rates of 20.9% and 10.3%, respectively. Every other type of plastic is reprocessed at a rate of less than 5%.

It went on to say that mechanical and chemical recycling of plastic waste is ineffective because plastic waste is difficult to collect and nearly impossible to sort for recycling. It is also unsafe for the environment to process because it is frequently made of toxic materials and contaminated with them.

Thus, Greenpeace USA suggests transitioning to reuse and refill systems as the effective means of getting rid of plastic waste.

Biodegrading plastics via UV a way forward Since its discovery more than a century ago, plastics have driven innovations in numerous industries. However, today, this wonder material is viewed as a threat that must be eliminated.

But it is difficult to imagine a modern world without plastics. It is unsurprising that material science is called upon to tighten the reins. Thus, researchers are working on ways to make plastics more degradable, biodegradable, and compostable.

Researchers at the **University of Bath** in the UK, for example, have developed a novel method for breaking down plastics using only ultraviolet (UV) light. When exposed to UVM radiation, scientists found that adding sugar units to polymers increases their degradability. UV radiation has a wavelength ranging from 10-400 nm, which is shorter than visible light but longer than X-rays. It should also be noted that many biodegradable plastics can only be composted in industrial settings.

Meanwhile, polylactic acid (PLA), which is sometimes marketed as biodegradable, only dissolves in industrial composting conditions that require high temperatures and humidity and are impossible in backyard compost piles. Additionally, it is difficult to degrade in natural environments like soil or the ocean.

The above study, which was recently published in the journal *Chemical Communications*, demonstrated a method for increasing the rate at which these polymers degrade in the environment. Adding as little as 3% of sugar polymer units into PLA caused it to degrade by 40% in only six hours when exposed to UV light. By using this technique the plastic weakens and disintegrates into smaller polymer chains that are more vulnerable to hydrolysis. As a result, the biodegradability of

plastic in natural environments such as the ocean or a garden compost heap improves.

The researchers also mentioned that because the technology is compatible with current plastic manufacturing procedures, the plastics industry may quickly test and adopt it.



***One study showed that adding just 3% of sugar polymer units to PLA caused it to degrade by 40% in six hours when exposed to UV light***

### **Lowering carbon and energy footprints a help for the future?**

With all of these developments in recycling and plastics sustainability, is there real progress being made? Globally, recycling is still lagging, prompting some sectors to call for a complete halt in plastics production, which industry experts believe will harm economies.

According to a recent report released by the American Chemistry Council (ACC) Plastics Division, there is an improvement in terms of more environmentally friendly plastics production.

It says that the carbon and energy footprints of four common plastic resins, LDPE, HDPE, LLDPE, and PP have decreased, specifically in the US, over the last decade. Despite a combined increase in production of the four resins of more than 1.8 million tonnes between 2010

and 2020, a total reduction of 4.9 billion kg Co2 equivalent was achieved.

These improvements reduced Co2 emissions and the amount of energy required to produce the same amount of plastic resin. GHG reductions in plastics production, however, are attributed to factors, such as newer facilities (in the US) that use shale gas, as well as improved efficiencies that have reduced carbon emissions per pound of plastic produced.

The manufactured plastics offers advantages compared to other materials with its lightweight nature, durability, and versatility.

Overall, while drastically increasing recycling rates in a short period of time remains a difficult task, creating circular plastics may well be the silver bullet in combating the plastic waste problem.

( Source : Plastics & Rubber Asia )

### **Pyrolysis - Based Chemical Recycling of Plastic Waste (Written by, Mr. Suhas Dixit, CEO, APChemi)**

The alarming reality is that 90% of plastic waste is not recycled, and the methods used to dispose of it vary greatly by country. While some countries may burn plastic waste for energy, the majority of it is not being properly disposed of. Furthermore, the majority of plastic waste that is recycled is not suitable for use in food or pharmaceutical packaging. The global epicentre of plastic waste mismanagement is in Asia, but investment in

plastic waste management is primarily focused in Europe and North America. Plastic waste is a 280,000,000 tons per year global issue that not only harms the environment but also threatens the survival of countless species and ecosystems. Chemical recycling via pyrolysis offers a tangible solution to this problem by breaking down plastic waste into its basic chemical building blocks, which can then be used to produce new plastic products. In this article, we propose the development of several pyrolysis-based chemical recycling POCs (Proof of Concept) of plastic waste generated at locations across the globe, as a means to assess the commercial viability of this process and to identify the most effective ways to reduce plastic waste and its impact on the planet.

#### **Pyrolysis Process:**

Pyrolysis is a process that uses heat to break down plastic waste in the absence of oxygen. This process converts plastic waste into its chemical building blocks, known as monomers, which can then be used to produce new plastic products. It is important to note that the specific carbon footprint of this process can vary, depending on factors such as the specific process and materials used, as well as the source of the feedstock.

#### **Energy Input:**

Pyrolysis does require energy input, which can contribute to emissions. However, by reducing the need for virgin plastic production and reducing the emissions associated with landfilling and incineration, pyrolysis can ultimately lead to a reduction in overall emissions.

### Proof of Concept (POC):

The development of several pyrolysis - based chemical recycling POCs of plastic waste generated at locations across the globe is crucial in assessing the commercial viability of this process. These POCs will provide valuable information on the specific process and materials used, as well as the source of the feedstock, and their impact on the carbon footprint.

### Conclusion:

Chemical recycling via pyrolysis is a promising solution to the problem of plastic waste, but it is important to carefully evaluate its potential environmental impact. The development of several pyrolysis - based chemical recycling POCs of plastic waste generated at locations across the globe is crucial in assessing the commercial viability of this process and finding the best ways to reduce plastic waste and its impact on our planet.

### About APChem:

APChem is a leading developer of pyrolysis technology with a proven track record of success. With 47 projects supplied, over 1.3 million hours of plant operation, and experience in pyrolyzing over 179 million kg of plastic, our technology and expertise are unmatched in the industry. We pride ourselves on our innovation, holding 12 patents in pyrolysis and pyrolysis oil purification, which further solidifies our position as pioneers in chemical recycling and decarbonisation via Pyrolysis. APChem has state pollution control board certified facility technology demonstration facility near Mumbai. If you want to learn more APChem, please visit [www.apchemi.com](http://www.apchemi.com) or email at [contact@apchemi.com](mailto:contact@apchemi.com).



Photo: APChem takes home FICCI's prestigious Circular Technology Disrupter Award, leading the way in sustainable solutions for plastic waste management.

### First Biodegradable Water Bottle is Coming, for Real this Time



The Cove water bottle is a thin, sturdy cylinder, eggshell - white with a matching lid. It feels familiar. "If someone gave that to you," offered Alex Totterman, Cove's founder and chief executive, "you probably would have no idea that that wasn't a plastic bottle."

If someone does give you this bottle, it would be a remarkable achievement. Scientists and businesses have spent many years and much money trying to replace everyday packaging with natural materials that don't pollute the Earth — so far, that's given us little beyond compostable straws. But the challenge hasn't deterred Cove from its own five-year journey to producing the first "fully biodegradable" bottle of water.

In the coming months, Totterman says Cove's creation will finally hit stores at \$2.99 a pop.

Totterman has also said this before. In February 2019, he told Fast Company Cove's bottles were arriving in stores later that month. They didn't. In October 2020, Totterman told the Los Angeles Times his bottles were arriving after the new year. Still nope. Pandemic delays and supply chain bottlenecks have repeatedly derailed the startup's plans, as has the chemistry involved in its mission.

Cove's investors are still on board. The company has raised \$20 million since 2018 from luminaries like Salesforce co-founder Marc Benioff; media heir James Murdoch; and Valor Equity Partners, an early backer of Tesla Inc. Totterman also bagged investment from the DJs Diplo and Kygo, singer Ellie Goulding and a few pop stars he wouldn't name. By his telling, grocers, music festivals and corporate campuses are waiting with bated breath — and checkbooks in hand — for someone to produce a water bottle that people won't feel guilty about tossing out, and Cove is nearly ready to produce 20 million bottles a year to meet interest from "pretty much every major retailer and brand," Totterman said. (Whole Foods is the only named customer.)

Pyrowave claims breakthrough in plastics recycling Following the Advanced Recycling Conference held in Cologne, Germany, plastics manufacturing company Pyrowave announced it has reached what it claims is a breakthrough for the future of global plastic recycling, and in the fight against climate change.



Pyrowave technology has successfully passed Michelin Group's quality tests with the first 99.8% pure recycled styrene monomer produced from polystyrene waste.

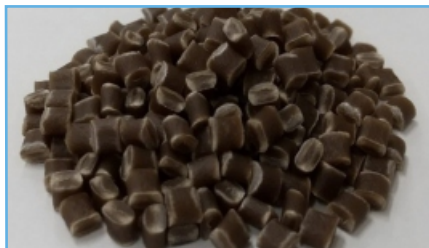
Recycled monomer can now be integrated into industrial elastomer batches. For the first time, a finished product will incorporate fully traceable and segregated recycled styrene, where all the styrene will be physically present in the product rather than a credit-based content.

A container with approximately 3 tons of recycled styrene has left Montreal for the Michelin plant in France. Following years of testing, Pyrowave claims Michelin will be able to manufacture batches of industrial styrene-butadiene rubber (SBR) products with Pyrowave recycled styrene, which would represent over 1,000 passenger car tires. Jocelyn Doucet, CEO of Pyrowave said: "The industry has forever been dreaming of a circular economy with recycled, traceable and segregated content. Pyrowave now demonstrates that it is possible through its technology. This achievement confirms once and for all that we can implement a 100% traceable and controlled supply chain in polystyrene recycling. We can now provide recycled content to meet consumer expectations: products can now be made entirely from recycled material, without dilution

or degradation. Pyrowave is defining a new standard in plastic recycling and is leading the way toward reaching environmental goals".

### Yamaha Developing Plant-Based Resin

Yamaha Marine is committing to using a plant-derived cellulose nanofiber (CNF) reinforced resin in the production of specific watercraft parts.



The CNF reinforced resin, developed through a collaborative agreement between Yamaha Motor in Japan and Nippon Paper Industries Corporation, Ltd. This represents what appears to be one of the world's first practical use of sustainable material for watercraft parts, according to the companies.

The parts developed using this material are intended for installation on certain 2024 models of personal watercraft and sport boat engines. Ben Speciale, President, Yamaha U.S. Marine Business Unit said: "We're proud to be part of a company that proactively seeks sustainability solutions for its products, Yamaha Motor has inspired the activities of Yamaha U.S. Marine Business Unit and applauded the 2019 launch of Yamaha Rightwaters, our sustainability program that seeks to reclaim, mitigate and

clean up the plastics we use, increase scientific research, improve habitat and sequester carbon dioxide."

CNF reinforced resin is a new high-strength material manufactured by kneading and dispersing CNF, a biomass material made from wood resources, into resins such as polypropylene. Yamaha Motor claims, In addition to being more than 25 percent lighter than existing resin materials, it also has excellent material recyclability, leading to a reduction in the amount of plastics used and greenhouse gas emissions, mainly carbon dioxide.

Yamaha Motor has announced its commitment to strengthen its sustainability efforts.

### Futero Plans to Produce PLA with Europe's First Vertically Integrated Biorefinery in Normandy

**Following the construction of its first PLA (poly-lactic acid) plant in China in 2021, Futero's ambition is to set up a new fully integrated biorefinery in the industrial and port area of Port-Jérôme, in the Caux Seine agglomeration (commune of Saint-Jean-de-Folleville), located on the Seine axis between Rouen and Le Havre.**

Futero, a Belgian company and leader in the production of PLA, has started negotiations with Caux-Seine Agglo and its economic development agency Caux-Seine Développement in order to build a new generation of vertically integrated biorefinery, with an annual production capacity of

## CIRCULAR ECONOMY/ BIO-PLASTICS/ RECYCLING

75,000 tonnes. The project should potentially create 250 direct jobs and 900 jobs in adjacent sectors.

PLA is a biopolymer with all the advantages that today's industry is looking for:

- It is biobased and does not draw on fossil resources
- It has excellent mechanical properties and can replace many petro-plastics
- It is molecularly recyclable to infinity without altering its quality
- The only polymer whose degradation product, lactic acid, is harmless to human health

“We describe our polymer as the first bio-renewable plastic. Derived from plant-based carbon, it can be recycled easily and ecologically to obtain a virgin polymer of the same quality as its first life cycle: this is a unique characteristic”, explains Frédéric Van Gansberghe, CEO of Futerro.

This fully integrated biorefinery aims to include a lactic acid unit transforming raw materials of agricultural origin, a PLA conversion unit and a unit dedicated to molecular recycling of PLA.

The project will be in line with the best standards in the circular economy, valuing all by-products in various sectors such as green energy, agriculture or animal and human food, thus optimizing the productivity of the infrastructure.

“We considered many sites for this first European unit. We very much appreciated the way in

which the local authorities and elected representatives helped us to study the location of our project in the port area of Port Jérôme”, so Van Gansberghe.

The selection of this site was guided by 6 key factors:

- The availability of a large industrial site with the possibility of expanding production capacity
- The possibility of using low-carbon energy
- The presence of agricultural raw materials
- The interest and experience of local public and private actors in supporting large - scale projects for the sustainable re-industrialization of the region
- Access to the waterway and the multiple logistical possibilities offered by the Radicatel terminal and the port of Le Havre
- The presence of a pool of technical skills dedicated to the chemical and polymer sectors

A project that is part of the French dynamic towards a greener economy. This project is perfectly in line with the European Green Deal policy, the development of the circular economy and the decarbonization strategy of the French government and the European Union. It will enable the Normandy basin, historically oriented towards petrochemicals, to become the first major player in green chemistry, thus accelerating the transition from fossil carbon to carbon from biomass.

## Sustainable Plastics Could Revolutionize Waste Management in Emerging Markets

Recycled packaging could eventually supplant virgin plastic production. Innovative waste - management systems work to transform pollution into added value. Recent studies offer sustainable alternatives to help break down existing waste.



As an increasing number of countries ban single-use plastics, waste remains a significant environmental issue – although a variety of initiatives promise to make emerging markets the focus of the global struggle against plastic waste. The Covid-19 pandemic saw a decline in plastic usage; however, it led to an increase in littering from personal protective equipment (PPE) and single-use plastics. Additionally, much of this waste is disposed of unsustainably, ending up either incinerated or stored in landfill, the third - largest source of methane emissions globally.

According to OECD figures, only about 9% of the global volume of plastics was recycled in 2019, and 22% was mismanaged.

An outsized portion of mismanaged plastic waste (MPW) ends up in emerging markets due to both inadequate waste-management infrastructure

and an influx of waste imports from mature economies. India and China are each estimated to account for 20% of the global volume of MPW.

### Tackling waste at the source

Plastics account for an estimated 3.4% of greenhouse gas emissions during their lifecycle, 90% of which are produced during manufacturing. Finding ways to decarbonise plastics production could significantly reduce their environmental impact.

According to a May 2022 report from the research firm BloombergNEF, an extra \$759bn in investment could make petrochemical production net zero by 2050. This, in turn, would reduce the 2% of global emissions that come from the production of high-value chemicals, a key component in the manufacturing of plastics and other goods.

Demand for recycled materials has also grown in recent years, with consultancy McKinsey reporting high-quality recycled plastics gained a premium of 60% over virgin plastics in the past decade.

Top corporate plastic producers such as Coca-Cola, Walmart and PepsiCo are part of an Ellen MacArthur Foundation initiative to achieve 100% reusable, recyclable or compostable packaging by 2025. Coca-Cola says their figure is currently at 90%, while the foundation's Global Commitment 2022 report had Coca-Cola's figure at just short of 100%.

In addition to corporate action, governments have begun to focus on international efforts to limit plastic production and pollution. At the March 2022 UN Environment Assembly meeting in Nairobi, Kenya, 175 countries pledged to negotiate a legally binding agreement limiting the proliferation of plastics and focusing on recycling, sustainable packaging and limiting virgin plastics production by as early as 2024.

On a national level, Kenya pioneered a strict plastic bag ban in 2018, followed by a total ban of single-use plastics in protected areas implemented in 2020. A significant reduction in usage was seen in the wake of the ban, with ownership of reusable bags tripling, although more work remains to be done in the management of existing waste.

### Sustainable waste management

Given the volume of MPW present in many parts of the world, expanding recycling and waste-management infrastructure in emerging markets presents a sizeable opportunity for value addition.

As OBG wrote in September 2020, the plastic waste problem that emerged from the production of PPE during the Covid-19 pandemic presents opportunities for innovations in recycling.

The "2022 Africa Waste Management Outlook" published by the UN Environment Programme estimated that \$8bn in municipal solid waste is generated in African cities annually, with \$7.6bn of its value lost due to its improper disposal, primarily in open landfill.

The circular economy generates value from items that would otherwise end up in landfill. The Manila-based start-up Humble Sustainability processes excess inventory from e-commerce and retail companies that would normally end up disposed and resells it via its storefront, or passes the inventory on to its partners in its business-to-business network.

Humble recently raised \$750,000 in an oversubscribed seed round led by Seedstars International Ventures, and the start-up plans to use the funds to hire staff and expand its partner network.

The business model of Nigeria's Soso Care aims to tackle both waste management and health care access in a country where 23% of the population has health insurance. The health-tech company accepts recyclable waste such as scrap metal, plastic or car batteries in exchange for health coverage.

Multiple emerging economies are seeking to reduce the inflow of trash from other countries, as they often lack the infrastructure to process it safely or sustainably.

Following the example of Vietnam and Malaysia, Thailand announced plans to ban imports of plastic waste by 2025.

Countries in South-east Asia had become a prominent destination for waste exports from mature economies after China, previously the recipient of roughly 50% of the world's plastic waste, banned such imports under its National Sword initiative in 2017.

Other efforts focus on the sustainable collection of mismanaged waste. In Panama,



a water wheel installed by environmental group Marea Verde helps collect trash from the Juan Díaz River, which runs through Panama City. The wheel, which aims to collect trash before it reaches the sea, is powered by a mix of hydraulic and solar energy.

### Scientists Crack Upcycling Plastics to Reduce Greenhouse Gas Emissions.

Scientists from the University of Illinois Urbana - Champaign, University of California, Santa Barbara, and Dow have developed a breakthrough process to transform the most widely produced plastic — polyethylene (PE) — into the second - most widely produced plastic, polypropylene (PP), which could reduce greenhouse gas emissions (GHG).

"The world needs more and better options for extracting the energy and molecular value from its waste plastics," said co-lead author Susannah Scott, Distinguished Professor and Mellichamp Chair of Sustainable Catalytic Processing at UC Santa Barbara. Conventional plastic recycling methods result in low-value plastic molecules and, thus, offer little incentive to recycle the mountains of plastic waste that have accumulated over the past several decades. But, Scott added, "turning polyethylene into propylene, which can then be used to make a new polymer, is how we start to build a circular economy for plastics."

"We started by conceptualizing this approach and demonstrated its promise first through

theoretical modeling — now we have proved that it can be done experimentally in a way that is scalable and potentially applicable to current industry demands," said co-lead author Damien Guironnet, a professor of chemical and biomolecular engineering at Illinois, who published the first study outlining the necessary catalytic reactions in 2020 with Illinois professor Baron Peters.

The new study published in the Journal of the American Chemical Society announces a series of coupled catalytic reactions that transform PE, which is #2 and #4 plastic that make up 29% of the world's plastic consumption, into the building block propylene that is the key ingredient to produce PP, also known as #5 plastic that accounts for close to 25% of the world's plastic consumption.

This study establishes a proof-of-concept for upcycling PE plastic with more than 95% selectivity into propylene. The researchers have built a reactor that creates a continuous flow of propylene that can be converted into PP easily using current technology — making this discovery scalable and rapidly implementable.

"Our preliminary analysis suggests that if just 20% of the world's PE could be recovered and converted via this route, it could represent a potential savings of GHG emissions comparable to taking 3 million cars off the road," said Garrett Strong, a graduate student associated with the project.

Chemical and biomolecular engineering professor Damien Guironnet and graduate students

Vanessa DaSilva and Nicholas Wang demonstrated a new scalable process that can upcycle plastics. Credit: Heather Coit/University of Illinois

The goal is to cut each very long PE molecule many times to obtain many small pieces, which are the propylene molecules. First, a catalyst removes hydrogen from the PE, creating a reactive location on the chain. Next, the chain is split in two at this location using a second catalyst, which caps the ends using ethylene. Finally, a third catalyst moves the reactive site along the PE chain so the process can be repeated. Eventually, all that is left are a large number of propylene molecules.

"Think of cutting a baguette in half, and then cutting precisely-sized pieces off the end of each half — where the speed at which you cut controls the size of each slice," Guironnet said.

"Now that we have established the proof of concept, we can start to improve the efficiency of the process by designing catalysts that are faster and more productive, making it possible to scale up," Scott said. "Since our end - product is already compatible with current industry separation processes, better catalysts will make it possible to implement this breakthrough rapidly."

The work presented in this publication is highly complementary to a paper published in Science last week. Both groups used virgin plastics and similar chemistries. However, the Science team used a different process in an enclosed

batch reactor, requiring much higher pressure — which is energy intensive — and the need to recycle more ethylene.

“If we are to upcycle a significant fraction of the over 100 million tons of plastic waste we generate each year, we need solutions that are highly scalable,” Guironnet said. “Our team demonstrated the chemistry in a flow reactor we developed to produce propylene highly selectively and continuously. This is a key advance to address the immense volume of the problem that we are facing.”

Dow researchers were also involved in this work. “Dow is taking a leading role in driving a more circular economy by designing for circularity, building new business models for circular materials, and partnering to end plastic waste,” said Dow senior scientist and co-author Ivan Konstantinov. “As a funder of this project, we are committed to finding new ways to eliminate plastic waste and are encouraged by this approach.”

### **UK Plastics Packaging Tax Generates Over £135 Million Since April-Government Under Pressure to Reinvest**

Packaging manufacturer and consultancy Duo is calling on the Government to explain how it will reinvest Plastic Packaging Tax (PPT) revenues to boost UK recycling and sustainability. A Freedom of Information (FOI) request by Duo to HMRC shows the PPT has generated a total of £135,871,000 in the six months since it was introduced on 1st April 2022.



During this time, according to the FOI request 679,143 tonnes of plastic packaging have been liable for the tax. A levy of £200 is applied to every tonne of plastic packaging that does not contain at least 30% recycled plastic.

The FOI request also shows that during the six - month period (Apr – Sept 2022), a total of 1,162,776 tonnes of plastic packaging was exempt from the PPT. This means that approximately 63% of declared plastic packaging during this time contained at least 30% recycled plastic content.

In a HMRC policy paper in July 2021, it was estimated that the PPT would generate £235million in its first year from 2022 – 2023. It was also estimated that HMRC would incur capital costs of £10-£20m for developing a new system to support the tax, together with £22m in staff and other resource costs.

Zoe Brimelow, a Director at Duo believes trends during the first six months of the tax suggest that estimated first - year PPT revenues will exceed £270m. She said: “There have been two tax-return periods so far, with relatively small variances in the reporting and packaging usage across both. The second period from July – September saw around 70,000 tonnes less in the overall volume of declared plastic packaging, compared to April – June.

“Similarly, the total volume of PPT exempt packaging has remained reasonably consistent, with a difference of approximately 56,000 tonnes between the two returns periods. If these trends continue, it's reasonable to assume total Plastic Packaging Tax revenues for the first year will easily surpass HRMC's original estimation of £235 million. We'd be looking at a figure closer to £270million.

“Taking these numbers into account, it's clear that the tax has been successful in creating greater demand for recycled plastic packaging and has generated a huge amount of money. The UK needs serious investment in closed - loop recycling infrastructure to meet increased demand for recycled material, and the funds generated by the tax present an opportunity to build a world-beating recycling infrastructure that can provide high value, high quality recycled materials to reduce dependency on virgin materials. PPT revenues could deliver this. At the very least, businesses that have invested in compliance to pay these taxes or invested heavily in new equipment and processes that contribute to a closed-loop recycling infrastructure should be informed about how hundreds of millions in new revenues will be used.”

### **Rebound Plastic Exchange Looks to Set out Roadmap for British Plastic Waste**

Rebound Plastic Exchange, a quality assured global trading platform for recycled plastics, aims to ensure transparency whilst facilitating cross border trade to aid circularity worldwide.



UK now adheres to the Basel Convention Amendments, which means quality assurance is now key to ensuring not only high-quality plastic waste, but that be uncontaminated and ready to be recycled.

The UK is the second biggest producer of plastic waste in the world. In 2021, its exports added up to two-thirds of the country's plastic waste, now reduced by 13%, according to Basel Action Network (BAN). The amount of the UK's plastics exports dropped by 94% between 2017-18, which it was quick to divert to Malaysia, Turkey, Poland and Indonesia. In 2020, the UK shipped 7,133 metric tonnes of waste to non-OECD countries, adding Pakistan and Vietnam to its portfolio.

Maryam Al Mansoori, General Manager, Rebound Plastic Exchange said: "More investment and collaborations are needed to undergo sound recycling ventures where infrastructure lags. Active buyers and sellers on our platform come from over 21 countries, allowing Rebound Plastic Exchange to help source plastic feedstock at the preferred price ranges," So far, the British Plastics Federation (BPF) has been the most active UK circular economy investor over the past four years, with 12 deals in total, of which 33% have been done in the manufacturing and industrials sector.

In partnership with BPF, Recycling Association, and RECOUP, the Quality Standard for Recycled Plastics outpaces current regulations on the quality of post-consumer plastic materials set for export. It builds upon the ESA (Environmental Services Association)'s Standard for Responsible Export, released in 2020.

RECOUP's endorsement of Rebound Plastic Exchange to run specification sheets, each tailored according to the listing found on the global B2B marketplace.

Industry members, whether buyers or sellers of recycled plastics, can register on Rebound Plastic Exchange free of charge and access a global marketplace for quality assured feedstock.

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### 2023: What are the Current Trends in Smart Waste Management?



At the end of 2022, Sensoneo, a global provider of waste management solutions conducted research into trends and patterns that have been noticeable within the industry. The company claims the trends are also reflected in Sensoneo's project of 2022, which include deposit return scheme integration in two countries (Slovakia and Malta), complex waste monitoring deployments in Argentina, Island, Saudi Arabia or Norway, or implementing smart bin access management.

### 1. Increasing prices for collection and treatment of waste

Inflation, rising cost of labour and increasing prices of energy and fuel are only one part of the reason why cost of waste collection and processing is going up.

Sensoneo claims the costs can be cut significantly with a waste monitoring system, which optimises waste collection routes and frequencies, resulting in route reduction by at least 30 %.

In 2022 Sensoneo partnered with Urbetrack on a large sensor deployment in Buenos Aires, Argentina. The company is using their own software platform which collects data from Sensoneo sensors located in 2000 bins. As Pablo Ader, CEO of Ubertrack said: *"Right now the data from waste monitoring is used to understand how the bins are operated and for optimization of bins placement - whether some apartment blocks need less or more bins. That is the first stage. As we are collecting very valuable data about bin fullness, the city plans to use them when concluding a new contract for waste collection. With such data it is possible to switch from fixed collection frequency to a dynamic one, optimising collection routes and collecting only the bins that are full."*

Buenos Aires is the first city in the region to deploy bin sensors on such a large scale. According to Pablo Ader: *"Technology has not yet deeply penetrated the waste industry in Latin America. We want to set an example for other cities and countries, as we already see from the data gathered that there is a less*

*expensive and more efficient approach to waste collection. Currently we are expanding the monitoring into more bins, deploying additional 2,500 sensors.”*

### **1. Incentivizing citizens to create less waste and recycle**

There is a call for fairer fees for citizens, motivating people to create less general waste and pay only for the waste they produce. The municipalities or housing associations are exploring several options. One is smart bin access management, allowing access only to authorised people. This can be paired with a pay - as - you - throw model or volume - based fees. Installing smart locks helped Slovak town Dubnica, which had issues with so - called waste tourism. According to Janka Beniaková, head of the town's environment department: *“After deploying semi-underground bins everyone started bringing their waste there and we wanted the opposite – that the waste collection will be specific only to certain house apartments. We wanted to make sure that our citizens only pay for the waste they generate, and that is why we initiated proper recording and tracking of the bins.”*

Last year Sensoneo claims it provided a solution to one of the largest waste collector companies in Latvia, which decided to monitor, automate, and digitise its waste collection thanks to the installation of Watchdog on 25 collection trucks and RFID tags on 27,000 bins.

### **Middle East as one of top regions for implementing smart waste solutions**

Sensoneo installations in the region include the United Arab Emirates, where sensors are monitoring recycling centres since 2018, and some of the company's biggest recent deployments were in The Kingdom of Saudi Arabia. The country previously installed 1500 sensors to monitor general waste in the historical town Al-Ula, while in 2022 one of the largest deliveries was made to the futuristic city of NEOM.

### **Novel ways to waste monitoring**

Sensors are monitoring waste bins in several Norwegian islands, where production of waste varies with the season. As the collection is done by boat, efficient use of the boat as well as manpower is required.

As Håkon Fält Hardli from Elteco said: *“The islands are busiest during the summer season, and the number of visitors largely depends on the weather and water conditions. For instance, if we expect warm water and nice weather for the weekend, it is best to check and empty bins beforehand, instead of having an overflowing bin on Saturday.”*

Norway also implemented underground water level monitoring in manholes which tend to overflow. According to Håkon Fält Hardli: *“Installing sensors is an affordable solution that serves for two purposes: the first one is the data on how much water goes through the overflow,*

*i.e. how big of a problem we have. Another important aspect is to detect a manhole that is getting too full and be able to drain it before it spills.”*

### **1. Implementing deposit return schemas in more countries**

According to Martin Basila, Co-Founder and CEO of Sensoneo, *“such a step is necessary, since it helps the governments which are facing strong resistance from lobbying groups. We saw some countries really struggling with bringing DRS because of such opposition, and the directive solves this issue. There is a big potential in the deposit return scheme, as it can be applied to more waste streams, for example to carton or tires, but the possibilities are endless.”*

Sensoneo claims it is the first and only system integrator in two countries, Slovakia and Malta, and two more countries have given us the confidence to cooperate on their DRS system. Slovakia's deposit return scheme was launched on 1 January 2022, already trespassing 70 % collection rate with almost 760 million bottles and cans returned to the system. DRS in Malta was launched on 14 November and more than 8500000 beverage containers were collected. Malta was the first Mediterranean country to launch a deposit return scheme, aiming to increase collection rates from 20 to 90 %.

### **1. Factories embracing ESG goals**

Factories are setting their ESG goals, which are in some cases even stricter than those imposed

## CIRCULAR ECONOMY/ BIO-PLASTICS/ RECYCLING

by governments. Environmentally conscious businesses are striving to meet the Paris Agreement targets way before the set deadline. It is not possible to reach waste diversion rates without digitization.

### SABIC Collaborates with Scientex to Develop Flexible Food Packaging Made from Ocean Bound Plastic

SABIC has collaborated with Scientex in the packaging value chain to enable the manufacturer to develop material for what they claim is world's first flexible food packaging made based on advanced recycled ocean bound plastic (OBP), using SABIC certified circular polypropylene (PP). The material is being used in a branded noodle packaging sold in Malaysia.



Abdullah Al Otaibi, General Manager, Engineering Thermoplastic & Market Solutions Business Unit for Petrochemicals at SABIC said: "We are proud to offer our customers circular solutions to reduce plastic waste that could otherwise end up in our rivers and oceans. This flexible food packaging containing OBP connects with our TRUCIRCLE program of circular solutions designed to help protect our planet."

OBP is abandoned plastic waste found in areas up to 50 km inland from waterways that may eventually be washed into the ocean by rainfall, rivers or tides.

Paul Ng Kok Leong, Head of BOPP Film Division, Scientex Group said: "Thanks to this highly efficient collaboration with SABIC, we are able to bring the world's first advance recycled flexible PP food packaging to the Asian market, using circular OBP. This successful initiative demonstrates the feasibility of tackling the plastic waste issue through dedicated value chain collaborations and sets a milestone in shaping a circular plastics economy in Malaysia and across South East Asia."

The OBP used in the project is recovered and converted to pyrolysis oil in an advanced recycling process. SABIC uses this oil as an alternative feedstock to produce certified circular PP polymer for further processing to BOPP film. Scientex then manufactures and prints the noodle packs from this film.

With a mass balance accounted OBP content of 30%, the company claims that the certified circular PP from SABIC performs the same way as incumbent fossil-based virgin PP and could be used as a direct drop - in alternative in this flexible food packaging application, without the need to change its existing assets and processes.

### Chemical Recycler Secures \$150 Million to Expand Pyrolysis Operations

Cox Enterprises becomes majority owner of Nexus Circular.

Nexus Circular announced it has agreed to a \$150 million equity raise led by Cox Enterprises. The deal will fund expansion of Nexus's pyrolysis operation for plastics recycling, and will make Cox the majority owner of Nexus.

Nexus has diverted seven million lb of plastic waste thus far, using its proprietary pyrolysis technique to produce ISCC Plus - certified products. A new line under construction at the company's Atlanta site is expected to start up later this year, adding 30 million lb/yr of capacity. Future plans include an additional US facility and a goal of increasing capacity to process 250 million lb/yr.



Waste plastic film feedstock ready for reprocessing at Nexus.

Cox Enterprises is a 124-year-old, privately owned conglomerate with communications and media operations that include the website Autotrader. The company also makes strategic investments in emerging technologies for health care, the public sector, and cleantech.



Nexus Circular produces synthetic oil from waste plastics using a proprietary pyrolysis process.

## Asahi Kasei Collaborates on Development of High - Quality Recycled Carbon Fiber

Working with academic partners, Asahi Kasei has developed new technology for recycling carbon fiber plastic compounds.



A new technology for recycling carbon fiber plastic compounds has been developed by Asahi Kasei together with the National Institute of Technology at Kitakyushu College and Tokyo University of Science. Carbon fiber reinforced plastics (CFRP) are highly attractive for various industries in demanding application fields due to their unique balance of rigidity, mechanical strength and light weight – also compared with conventional glass fiber reinforced plastics. However, CFRPs are expensive and challenging from a recycling perspective, as it is difficult to extract the carbon fibers from the resin after usage.

In collaboration with its academic partners, Asahi Kasei has developed a recycling method that allows carbon fibers to be extracted from CFRP or carbon fiber reinforced thermoplastics (CFRTP) used in automobiles. This reportedly results in high-

quality, inexpensive continuous carbon fiber that can be recycled perpetually, contributing to circular economy. Unlike carbon fiber that is chopped up during the recycling process, Asahi Kasei's method allows carbon fiber to be extracted from a plastic compound seamlessly, resulting in continuous strands of carbon fiber that can be reapplied in exactly the same manner while retaining properties identical to the original substance.

According to the company, the conventional technologies for recycling carbon fibers by chopping and re-applying them results in a product with lower quality and less durability, insufficient for high-performance applications. To address this issue, Asahi Kasei developed an “electrolyzed sulfuric acid solution method” that allows the carbon fiber to retain its original strength and continuous nature while fully decomposing the resin the carbon fiber is embedded in. This allows for its continued use in high-performance applications and presents an inexpensive, circular solution to the end-of-life dilemma of carbon fiber plastic compounds.

As such, carbon fiber compounds present in vehicles for weight reduction can be easily and inexpensively broken down at end-of-vehicle-life and reapplied to new vehicles in the future. In addition, Asahi Kasei is developing a carbon fiber reinforced thermoplastic unidirectional tape (CFRTP-UD tape) that utilizes both recycled continuous carbon fiber and the company's Leona nylon resin. Boasting a higher strength than metal, this CFRTP-UD tape can

be applied to automobile frames and bodies, further enabling the recycling of end-of-vehicle-life parts into different, new automobile parts. This is said to present a solution to the long-term challenge that carbon fiber usage for vehicles has posed on the industry and is expected to economically benefit and strengthen carbon fiber's usage within the automobile industry on a global scale. Moving forward, Asahi Kasei will perform demonstrations and develop the business, aiming for practical application around 2030.

## Sea Vegetable may Replace Single -Use Plastic

Food companies are widely implicated in the global problem of plastic waste, and as single-use plastic serves as the most common form of this non-biodegradable packaging, each meal, snack or drink becomes an add-on to the millions of tons of discarded plastic that goes directly to a landfill.

But there are businesses out there that refuse to sit idly by and accept the status quo: enter Notpla, a company that recently gained the attention of the committee behind the prestigious Earthshot Prize.

Earthshot is a global environmental prize that was founded by the UK's Royal Foundation and Prince William. The group, established in 2020, calls this time period a “critical decade for the planet” and has set out to award millions of prizes each year between now and 2030, to help innovative companies scale solutions for environmental problems.



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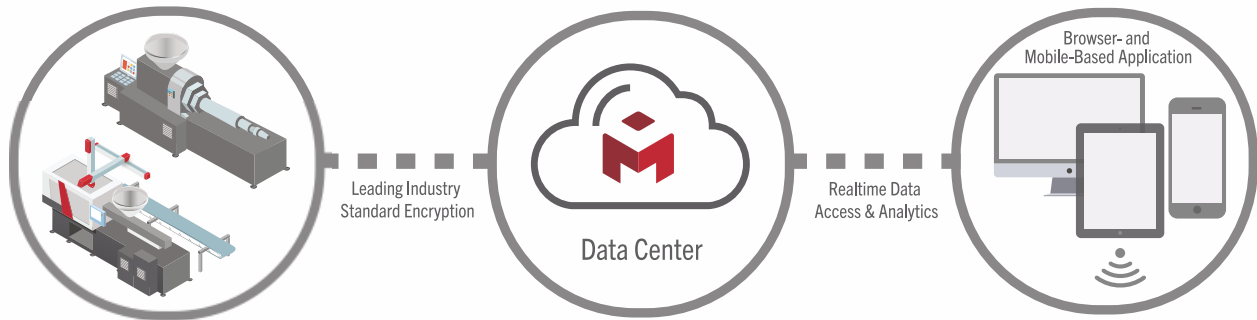
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