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PLASTISCOPE

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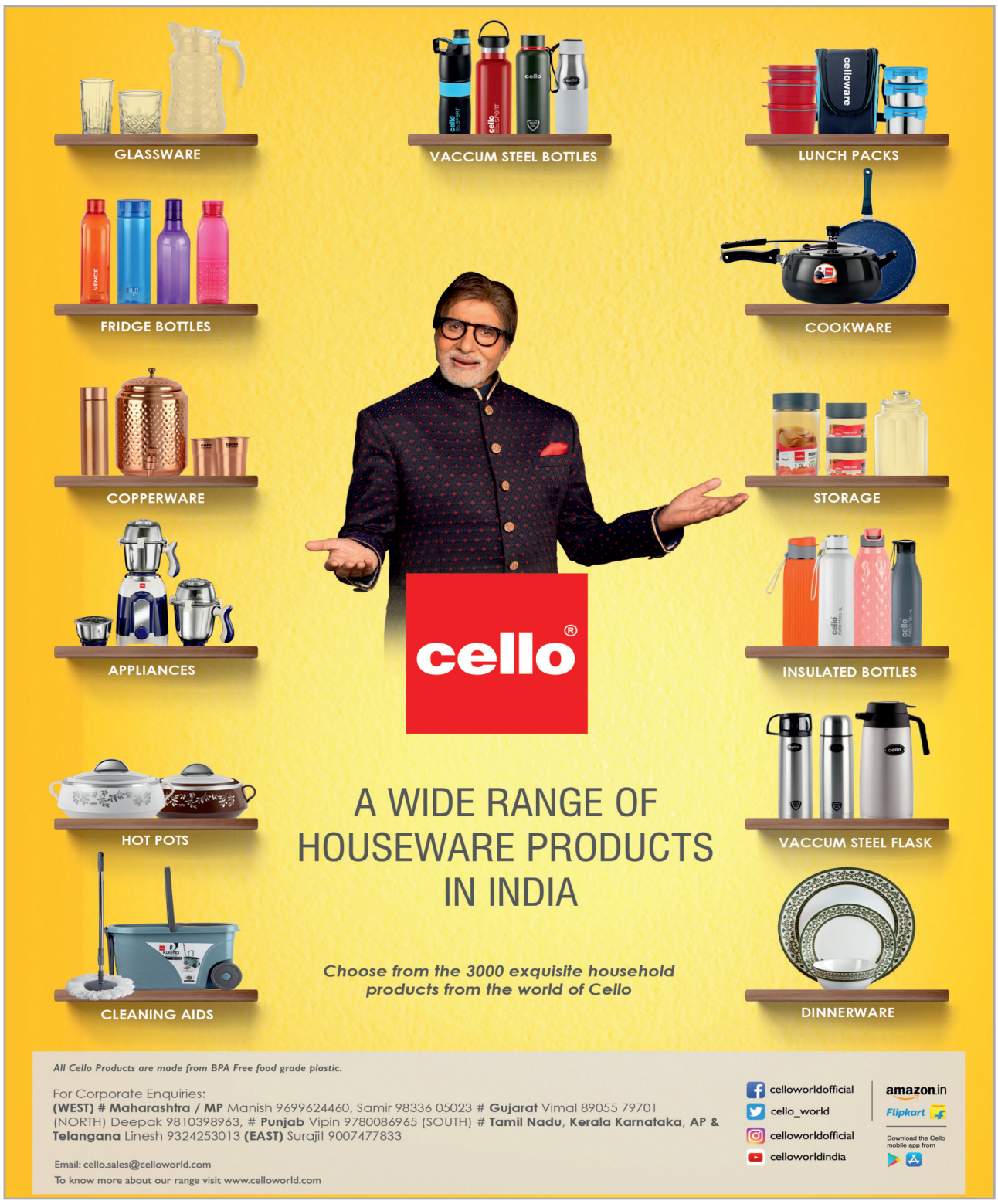

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FROM THE PRESIDENT's DESK

Mr. Dilip Parekh

OPP

CONTENTS

Dear Members,

Greetings from Organization of Plastics Processors of India!

The festival time is just around the corner. I wish you and your families a very happy, prosperous and peaceful Dussehra and Diwali.

The plastics processing industry is growing rapidly in spite of several challenges – market fluctuations, raw material shortages, evolving regulatory standards and lack of skilled manpower. With this objective in mind the Government of India and Maharashtra Government have established dedicated departments and institutions to give fillip to the skilling of manpower.

In order to overcome the lack of skilled manpower PlastIndia International University (PIU) commenced its operations at Vapi on 5th September 2024. PlastIndia International University is offering B. Tech. in Plastics and Polymer Engineering. The admissions for the academic year 2024 – 2025 are in progress. You may visit their website. University of Massachusetts Lowell partners with PIU to prepare 21st century workforce. The university was established on 9th May 2016 vide Gujarat Private Universities (Amendment) Act, 2016. PlastIndia International University (PIU) is India's first institution dedicated to plastics and sustainability, established under the aegis of PlastIndia Foundation. The mission of PIU is to train professionals who can lead sustainable initiatives in the plastics industry. PIU offers specialized courses and continuing education programs to align with industry needs.

This year the entire country received good rainfall giving hope for bumper agriculture production. This will enhance the demand for agriculture pipes, micro irrigation, agriculture films, etc.

We are working on several programs for members. OPPI Secretariat will inform you about the same.

With Best Wishes,

Dilip Parekh
President

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Editor: **DEEPAK LAWALE**

THE 17TH BANGLADESH INTERNATIONAL

Plastics, Packaging and Printing Industrial Fair

12th ~ 15th February, 2025

Venue: Int'l Convention City Bashundhara (ICCB

Organizers: Yorkers Trade & Marketing Service Co., Ltd. Bangladesh Plastic Goods Manufactures & Exporters Association

2024 KEY FIGURES

18,000 SQM / 800 BOOTHS / 354 EXHIBITORS / 18 COUNTRIES AND REGIONS / 25,974 INT'L BUYERS

- **Plastic:** Plastic Bending Machinery, Blow Molding Machines, Extruding Machines, Plastic Compounding Equipment, Plastic Cutting Machines & Cutters, Die Cutting & Casting Machines, Plastic Dryers & Mold Heaters, Injection Molding Equipment, Mold Cleaning Equipment, Spin Casting Equipment, Thermoforming Machines.
- **Quality Detection Instrument and Equipment:** Measuring & Detection Equipment, Temperature Controller & Components, Electronic Automatic Instrument, Monitoring Device.
- **Machinery Parts and Accessories**
- **Packaging:** Converting Machinery, Packaging Machinery, Packaging Materials, Raw Materials & Auxiliaries, Fiberboard Packages, Paper Bags and Folding Cartons, Rigid Packages, Glass Bottles & Tin Cans. Flexible Packaging, Quality Control Systems, Dosing, Coding & Marking Systems, Physical Distribution Systems, Logistics, Research Centers, packaging Magazines & Associations.
- **Printing:** Printing Machinery & Accessories, Packaging Print & Process Systems, Printing Materials & Supplements, Post-Printing Machinery & Equipment, Coating Equipment.

PLASTIC

- Local annual sales is around TK28,000 crore (US$3.25 billion)
- Export in the first 5 months of FY22 is 29.8% higher compared to the same period of FY21
- New investments focus on personal protective equipment, medical equipment and toys
- Government promotes industry-friendly policies to develop skilled manpower, attract foreign investment, ensure technological advancement and the overall development

PRINTING

- Printing market size in Bangladesh is around TK12,000 crore (US$1.39 billion)
- Earnings from paper sector in the July - November period of FY22 is 15.3% higher than that of FY21
- Workplaces and educational institutions reopening after pandemic make the demand for paper and paper products increase
- The country's first printing industrial park will come into operation in 2024, expected to propose more new investments

PACKAGING

- Export surges bring in new possibilities for Bangladesh packaging market
- The budding e-commerce accelerates digital economic growth and supports corrugated packaging
- Packaging paper market revenue size is projected to grow at a CAGR of 5.2% during 2021-2027
- International leading packaging enterprises such as Tetra Pak and ALPLA plan to build factories in Bangladesh to seize market share and provide innovative packaging solutions in food & beverage, personal-care, and pharmaceuticals sectors

BOOTH PRICES

- **Corner fee: Surcharge 10 %**
- **The prices below do not include 5% VAT**

Shell Scheme: USD$ 320/sqm, Min.9sqm=3m x 3m= 9 sqm = USD$2880

9sqm including : carpeting, 3 folding chairs, 1 reception desk (with lock), 1 round table, 3 spot lights, 1 waste basket, wall partitions, fascia name, one 5-AMP power point

Bare Space
USD$ 290/sqm, Min. size 18sqm

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VIETNAMPLAS 2024

22nd Vietnam International Plastic & Rubber Industry Exhibition
16th to 19th October 2024
Saigon Exhibition & Conference Center (SECC)
Ho Chi Minh City, Vietnam

We have the pleasure of inviting you to participate in Vietnam Plas 2024 scheduled from 16th to 19th October 2024 at Saigon Exhibition & Conference Center (SECC), Ho Chi Minh City, Vietnam

Subsidy under IC Scheme of Ministry of MSMEs available

SHOW REPORT 2023

GROSS SPACE	23,000 M2
EXHIBITORS	625
BOOTHS	1,100
COUNTRIES & REGIONS	22
VISITOR	18,507
EXHIBITOR SATISFACTION	94%
VISITOR SATISFACTION	93%

PARTICIPATION FEES:

- Shell Scheme (Minimum 9 sqm): USD 330
- Including Needle Punch Carpet: Wall Partitions, Carpet, Company Fascia, 3
- Folding Chairs, 3 Spotlights, 1 Reception Table, 1 Round table, 1 Dustbin, 1 Single Phase 5 amp/ 220v Plug.
- Raw Space Only (Minimum 36 sqm): USD 300/sqm

Please fill up the contract form attached herewith and Email scanned copy of filled Application form to secretarygeneral@oppindia.org

GET IN TOUCH **Deepak Lawale, Secretary General,** ORGANIZATION OF PLASTICS PROCESSORS OF INDIA

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8th International Plastics, Rubber, Petrochemicals, Chemicals, Fertilizers, Plastics Recycling, Printing and Packaging Industry Exhibition & Conference 2024

Venue:

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JPFL Films to Invest INR 250 Cr for New BOPP Line

- New BOPP line to have a capacity of 60,000 TPA
- Expected to be commissioned in the second half (H2) of FY 25-26

JPFL Films Private Limited, a subsidiary of flexible packaging giant Jindal Poly Films Ltd, has announced a capacity expansion with a new BOPP line in Nashik, Maharashtra. The new line, expected to be commissioned in H2 FY 25-26 will see a capex commitment of INR 250 cr.

The capacity expansion is part of the company's strategic play in the BOPP segment and is in line with the company's aim to increase market share amidst challenging demand - supply imbalances leading to ongoing pricing pressures in the sector. The expansion comes in the backdrop of impressive top - line growth accompanied by a 142% rise in EBITDA in Quarter 1 of FY'25 and to maintain its market leadership despite business headwinds.

The new line is expected to be the most advanced in the market, boasting superior width and output capabilities, along with exceptional reliability, equipment quality, and process efficiency. It can produce high - OD rolls up to 1,700 mm, optimizing efficiency for downstream processes such as metallizing.

Sharing his views on the strategic expansion, Mr. Vinod Kumar Gupta, Chief Executive Officer, JPFL Films put it in perspective, “Building on the momentum of our strong Q1 performance, this investment is a strategic step to further strengthen our market position and drive sustainable growth. The packaging industry is fundamentally a cyclical business, and the industry is witnessing a market correction at this point of time. Going forward the new BOPP line positions us to deliver exceptional value to our customers. With this expansion, we are enhancing our ability to meet and exceed customer expectations with a diverse range of high-performance films. Moreover, this move aligns perfectly with our goals of improving operational efficiency and sets us up well to leverage business upturns as we continue to maintain market leadership.”

The commissioning of the new line will bolster Jindal Poly Films Ltd.'s growth story. It highlights the company's commitment to technological advancement, quality enhancement, cost optimization and innovation, leading to enhanced customer satisfaction. As the flexible packaging market continues to evolve, Jindal Poly Films Ltd through its subsidiary JPFL Films, is better equipped to meet the challenges and opportunities that lie ahead, reinforcing its status as an industry pioneer and reliable flexible packaging partner for businesses worldwide.

Centre Advises States and UTs to Use Plastic Waste in Road Construction in Cities

The government has advised states and UTs to use plastic waste up to 8% of the weight of bitumen in roads within cities, including internal roads of housing colonies and office complexes.

The states and UTs were also asked to take up the issue with their major road construction departments, including PWD, Rural Development Department and Panchayati Raj. (File)

To tackle the challenge of plastic waste management, the central government has recently advised states and Union Territories to use plastic waste in the construction of roads in cities, The Indian Express has learnt. The government has advised states and Uts to use plastic waste up to 8% of the weight of bitumen in roads within cities, including internal roads of housing colonies and office complexes.

In 2013, the Indian Road Congress had published guidelines for use of plastic waste in road-making and in 2015, Ministry of Road Transport and Highways (MoRTH) issued an order making it mandatory to use plastic waste mixed with bitumen in roads within 50km periphery of urban areas with population of 5 lakh and above.

The Housing and Urban Affairs Ministry wrote to states and UTs on July 8 asking them to take steps to implement the Indian Road Congress guidelines. They were asked to use "plastic waste in bituminous roads wherever they may be constructed such as all departmental roads including internal roads in housing colonies, treatment plants for water supply, sewerage and solid waste, office complexes etc. to give a fillip to proper utilization of non - recyclable plastic waste with suitable changes in bid documents".

The states and UTs were also asked to take up the issue with their major road construction departments, including PWD, Rural Development Department and Panchayati Raj. Three central government secretaries –Vini Mahajan (Department of Drinking Water and Sanitation under Ministry of Jal Shakti, Anurag Jain (MoRTH and MoHUA) and Shailesh Kumar Singh (Ministry of Rural Development), had on June 28 written to all chief secretaries to encourage use of plastic waste.

"...it is requested to ensure the availability of appropriate quality waste plastic and review the usage of waste plastic in road construction within respective states/UTs... States/UTs must priorities establishing a comprehensive framework for utilization of waste plastic in bituminous road construction across all types of roads..." the secretaries wrote.

They said that the required changes should be made to the Detailed Project Report (DPR), tender and Engineering Procurement and Construction (EPC) documents prepared for road projects. Some experts, however, caution against viewing its use in roads as the only or best solution to the problem of mounting plastic waste.

"Using plastic waste in road making is a form of end of life disposal, which is the least preferred option compared to mechanical recycling and co-processing. Reduction of plastic waste should be the first and most preferred option, followed by mechanical recycling and co - processing," said Siddharth Ghanshyam Singh, programme manager for the Centre for Science and Environment's for municipal solid waste and circular economy unit.

According to CPCB's latest figures, 4.12 tons of plastic waste was generated in 2020-21. Around 60% of that is recycled. For each kilometer of road with 3.75 m width, using 1 tons of plastic waste mixed with bitumen can save `6.3 lakh, according to a 2019 MoHUA plastic waste management document.

ADB to give $200 MN Loan to India for Solid Waste Management in 100 Cities

ADB's support will upgrade and establish solid waste processing and management facilities such as bio-methanation plants and composting plants.

Asian Development Bank and the Government of India recently signed a $ 200 million (about Rs 1,700 crore) loan to improve solid waste management and sanitation in 100 cities across eight states in the country. The signatories to the loan agreement for the Swachh Bharat Mission

2.0 - Comprehensive Municipal Waste Management in Indian Cities Program were Ms. Juhi Mukherjee, Joint Secretary, Finance Ministry, and Mio Oka, Country Director for Asian Development Bank (ADB) - India Resident Mission, the Manila - based multilateral funding agency said in a statement.

The Programme Will Build Urban Local Bodies' Capacity For Waste Management And Sanitation.

After signing the loan agreement, Ms. Mukherjee said that the programme supports the objectives of the government's Swachh Bharat (Clean India) Mission - Urban 2.0 by enhancing sanitation and solid waste management infrastructure, including waste segregation, collection and disposal.

"This programme is guided by lessons derived from ADB's experience in urban infrastructure development across several states and will incorporate international best practices, new digital technologies, and mainstream climate - and disaster - resilient approaches in municipal solid waste management to promote a clean environment free from garbage and pollution," Oka said.

ADB's support will upgrade and establish solid waste processing and management facilities such as bio-methanation plants, composting plants, managed landfills, material recovery facilities, and plastic waste processing facilities, it said.

The programme will build urban local bodies' capacity for waste management and sanitation, encourage peer-to-peer learning, and proactively engage with the private sector, it said. It will help conduct annual reviews and progress updates of city-wide solid waste and sanitation action plans, it added.

Circular Economy Initiative to Recycle 32,000 Tones of Plastic Waste and Reduce 15,000 Tones of CO2 Annually

Building a self-sustaining, at-scale, zero waste to landfill and circular economy model in plastics waste management with active community participation in ensuring effective waste segregation.

Marico chairman Harsh Mariwala and Re Sustainability group CEO Masood Mallick at the launch. (Photo source: Sharrp Ventures)

Sharrp Ventures, the investment office of the Harsh Mariwala family, and Re Sustainability, a leading integrated sustainability solutions provider, joined hands to launch the plastics circularity initiative in an effort to tackle plastic waste, with plants in Hyderabad, Telangana, and Raipur, Chhattisgarh.

Masood Mallick, management director and group CEO of Re Sustainability, said his company has 85% stake in the partnership, while Sharrp Ventures has a 15% stake. Harsh Mariwala's Marico Innovation Foundation will be the implementation partner in the deal, while Sharrp Ventures will "mostly be a silent partner".

Speaking at the launch, Marico chairman Harsh Mariwala said with an initial investment of Rs 50 crore in the first year, "we want to prevent 15,000 tonne of carbon dioxide emissions annually, recycle 32,000 tonne of plastic waste, and provide livelihood to 2,000 people." Mariwala added, "I have a lot of confidence that we are on the right path. By increasing the supply of high-quality recycled materials and creating sustainable waste management practices, we are setting a new standard for innovation and responsibility in the industry."

Masood, agreeing with Mariwala, mentioned that they want to create a viable solution to plastic waste since it's a "resource problem, economic problem, and geopolitical problem too since we import crude oil that we turn into plastic." He added: "There is untapped economic value, resource conservation, carbon abatement opportunity as well as pollution mitigation impact associated with every kilogram of waste we generate; harnessing this 'value' across all these dimensions by way of this initiative is a significant step towards achieving a more circular FMCG industry in India. By re-evaluating how we manage and repurpose waste, we can transform it into valuable resources, ignite innovation, and pave the way for a cleaner, more sustainable environment and a better future for generations to come."

The duo said that while these are pilot projects, they want to take the learnings from managing plastic waste to then scale this venture to over 25 cities in the coming years. They added that this is the first prototype of its kind in India, where the focus will be on segregation at the source since the cost of recycling plastics is very high when it gets contaminated with other waste.

Ahmedabad - Based NEPRA to Invest ₹650 Cr in Expanding Waste Treatment in North & North-East India

Company is in the process of raising money, which will be a mix of equity and structured debt.

NEPRA Resource Management Pvt. Ltd., a waste management company based in Ahmedabad, is looking to invest ₹650 crore in setting up waste treatment and segregation infrastructure in cities in North and North-East India.

"The company handles 1,000-plus tons of waste every day in Ahmedabad, Indore, Pune, Jamnagar and Bengaluru. We have already parked an investment of ₹250 crore for handling solid dry waste in these cities and going forward, we are looking to invest ₹650 crore-plus, in next two years, for expanding into cities in North India and in North - East," Sandeep Patel, CEO of NEPRA Resources, told businessline.

"We are currently in the process of raising the money. It will be a mix of equity and structured debt," Patel said, adding that the company was looking to expand into states like Uttar Pradesh, Haryana, Rajasthan and Maharashtra and set up waste treatment and segregation infrastructure also known as Material Recovery Facilities (MRF's).

The company has an annual consolidated revenue of about ₹250 crore and has been clocking an 80 per cent year-on-year growth annually. "Every year we also supply almost three lakh tons of fuel RDF (Refuse derived Fuel) to cement kilns to lessen their requirement for coal. We send them to Ultratech, India Cements, ACC, Dalmia Cements," Patel said.

The plastic waste that is converted into RDF is sourced from various urban local bodies that the company has tied up with.

GDA bans use of Plastic Bottles in Gulmarg

To keep the tourist resort Gulmarg plastic-free, the Gulmarg Development Authority (GDA) has directed hoteliers to stop using plastic water bottles within hotel premises and switch to glass bottles.

"In furtherance of our collective responsibility to keep Gulmarg plastic - free, hoteliers are requested to refrain from using plastic water bottles within their hotels and replace them with glass bottles," the GDA stated.

A circular issued by the Chief Executive Officer (CEO) of the GDA also commended Gulmarg hoteliers for their previous green initiatives, such as anti - polythene drives and eco-tourism conclaves. The GDA mentioned that necessary measures for this transition should be implemented within a month to ensure a complete switchover to glass bottles.

The Tourism Development Authority noted that Gulmarg is an eco-fragile zone and keeping it plastic-free is a collective responsibility.

"In line with the efforts of the GDA, local municipality, and stakeholders to keep Gulmarg clean and plastic-free, it has become imperative to enforce a complete ban on plastic within Gulmarg."

(**Source**: Daily Excelsior / 05.08.2024)

Startup Replaces 6 Million Plastic Bags with Prototype Made from Corn Waste that Decomposes in 180 Days

Mohammed Azhar Mohiuddin with eco-friendly plastic bags – BioReform

An Indian entrepreneur is using sugar, cellulose, and corn fibers to make a plastic-like carrier bag for small Indian businesses. His company Bio Reform has already replaced 6 million plastic bags in the checkout counters of stores all over India.

Based in Hyderabad, Mohammed Azhar Mohiuddin first got the idea during the general mayhem that arose during the pandemic. Mohiuddin was looking at global environmental issues with the hope of finding one his entrepreneurial spirit had the capacity to tackle.

He would eventually settle on plastic use, the overreliance on it in society, and the dangers of plastic contamination in the form of micro plastic particles. Specifically, he wanted to find an alternative to one of the most common plastic products used today: the plastic shopping bag.

Mohiuddin saw the largest brands substituting plastic ones for those made of paper or even jute, but for medium and small businesses that power the majority of the Indian economy, the small increase in costs from using biodegradable bags was too prohibitive.

According to The Better India, he started studying a biodegradable polymer that was first formed and researched in the 1980s called PBAT (Polybutylene adipate-co-terephthalate). At the time, it was made with corn and potatoes. After dodging scams and government - mandated quarantines to identify a suitable class of machinery to manufacture the PBAT bags in Gujurat, his presentation on PBAT landed nearly $100,000 (RS1 crore) in seed funding that allowed him to launch the project.

"I tried to balance both my studies and the operations of the company—from collecting raw material, assisting workers to manufacture bags, delivering the products in the market," Mohiuddin told The Better India. "I used to sleep in a corner in the factory." Overcoming bankruptcy, university studies, and a long backlog of unfulfilled orders, Bio Reform finally started to turn a profit, and today manufactures almost 500,000 bags per year at a gross revenue of $ 180,000.

"Issues related to plastic pollution are not limited to affecting aquatic life and animals anymore. Today, micro plastic has reached our bloodstream. Bottled water contains micro plastics. Addressing this is an important and urgent problem," he told TBI.

"I am glad I am able to contribute my part. It is sometimes taxing to not lead a regular college life but in the end, it is all worth it. I feel content when I go back to sleep. But much more needs to be done to make India plastic-free, and I will continue to strive for it," he adds.

LOHIA CORP Expands Global Footprint with Acquisition Of J. J. Jenkins INC and Strategic Joint Venture with OMGM

LohiaCorp Limited (LCL) is pleased to announce two significant milestones that mark their expansion in the global market.

Lohia Corp has successfully acquired J. J. Jenkins Inc. a respected name in machine manufacturing for high - tech industries, through US subsidiary, Leesona Corp, a 130-year-old pioneer in winding machines. This acquisition aligns perfectly with strategic vision to expand Lohia's specialty yarns and tapes portfolio in medical and defence applications.

In addition, Lohia has formed a strategic Joint Venture with Italy's O.M.G.M. sas, leading to the creation of OMGM Extrusiontechnik Srl. with LCL holding the majority stake. This JV represents a significant diversification of our product portfolio, introducing solutions in Extrusion and Winding systems for a variety of technical applications.

These advancements are not just about growth; they're about bringing cutting-edge solutions to the customers and contributing to industries that make a difference. Stay tuned for more updates as Lohia Corp continues to push the boundaries of technology and engineering excellence.

Mr. R. K. Lohia, Chairman & Managing Director of Lohia Corp Limited, expressed his enthusiasm about the new ventures "Both these new partnerships are a pivotal move that will broaden our product offerings and provide our customers with even more choices and will enhance our presence in the North America and European market, at the same time strengthen our presence in all other global markets."

(**Source**: LohiaCorp / 20.08.2024)

INDORAMA and VARUN BEVERAGES Plan Recycling Operations in India

Increased demand for recycled PET expected in response to escalating recycled content regulation.

INDORAMA Ventures is collaborating with VARUN BEVERAGES, a bottling company for PepsiCo, to create several recycling facilities in India. Two of the facilities are currently under construction and expected to be complete in 2025. One facility is in Kathua within the Jammu division of the Indian Union territory of Jammu and Kashmir, while the other is in Khurdha within the state of Odisha. The aim is to reach 100,000 metric tons of annual capacity for recycled PET combined across all facilities.

Yash Lohia is chairman of the ESG Council for Indorama Ventures. Source: Indorama Ventures

The initiative aligns with a growth in demand for recycled PET in India. Volumes are projected to increase from 400,000 metric tons in 2028-2029 to over 1 million metric tons by 2031. The Indian government has set rules requiring 30% recycled content in plastic packaging by 2025-2026, which escalates to 60% by 2028-2029. Many Indian beverage brands have set targets for the use of recycled content.

"This partnership underscores our steadfast commitment to sustainability and our support for the region's escalating demand for rPET content," says Yash Lohia, representative of IVL Dhunseri, an Indorama subsidiary. "Anticipated to substantially diminish plastic waste, these new PET recycling facilities will convert postconsumer PET bottles into valuable resources."

According to Indorama Ventures, the company had recycled the equivalent of 100 billion PET bottles by 2023, and set a target of recycling 750,000 metric tons annually by 2025.

"Our collaboration with Indorama Ventures represents a strategic foray for VARUN BEVERAGES into the recycling market," says Varun Jaipuria, executive vice chairman of Varun Beverages. "We believe this joint venture will yield environmental dividends and generate substantial value for our stakeholders. As India's recycling landscape undergoes a paradigm shift, we take pride in spearheading this transformation alongside Indorama Ventures. Through this joint venture, we endeavor to harness our expertise to cater to the escalating demand for sustainable packaging solutions."

(**Source**: Plastics Technology / 09.09.2024)

'HPCL Refinery is Dream Project of Rajasthan'

Rajasthan Principal Secretary Mines and Petroleum T Ravikant said that more than 90 per cent of the work of 10 process units of the refinery has been completed at HPCL Refinery Project while about 81 per cent of work has been done in the project area. He emphasized the need to expedite the execution of the remaining pending works of the refinery.

He added that Rajasthan Refinery is the dream project of the state government and it will add to the industrial and economic development of the state. HPCL Rajasthan Refinery Limited (HRRL), a joint venture company of HPCL and the Rajasthan government, has expedited the work of BS-6 standard ultramodern Rajasthan Refinery of 9 million tons annual capacity at Pachpadara Barmer. He informed that Rajasthan Refinery cum Petrochemical Complex will bring investment in the field of petrochemical products like polypropylene, butadiene, LLDPE, HDPE, benzene and toluene etc. in addition to petrochemical products petrol and diesel. This will increase employment and revenue along with industrial investment.

HPCL Rajasthan Refinery Chief Executive Officer Kamalakar Vikhar and Executive Director Reji Mathew informed about the progress of refinery construction work and mechanical works. He said that under CSR, works related to education, health, roads etc. of the region are also being done by the refinery. Additional Director Petroleum Ajay Sharma informed that world class products will be produced in the refinery. HPCL Rajasthan Refinery Limited is a joint organization of Hindustan Petroleum Corporation Limited (HPCL) and the Government of Rajasthan. The project, in which HPCL has a 74 per cent stake and the Rajasthan government holds the remainder, was due to be completed by December 2022 but shutdowns due to the pandemic delayed the plans. HPCL also operates a 300,000 bpd Vizag refinery in southern Andhra Pradesh state and its 196,000 bpd Mumbai refinery in western India.

PET Bottle-To-Bottle Recycling to Mitigate Effects of Climate Change

The Indian PET recycler Ganesha Ecopet ramps up its PET bottle-to-bottle recycling capacities with two Starlinger recycling lines to a total of 42,000 tons per year.

It aims to recycle 25% of India's PET bottle waste by 2026. The two new Starlinger recoSTAR PET 165 HC iV+ recycling lines are set up at the recycling facility of Ganesha Ecopet Private Ltd. in Warangal, Telangana State. The company, a subsidiary of Indian PET recycling pioneer Ganesha Ecosphere Ltd., already produces recycled PET flakes and pellets for food-grade packaging as well as for filament yarns and fibres on two Starlinger lines installed in 2022. The new recycling lines are in operation since mid-2024 and triple Ganesha Ecopet's annual production of bottle-grade rPET, raising it from 14,000 tons to a total of 42,000 tons.

COSMO Plastech Announces Participation in Indian Ice Cream Expo 2024; will Showcase its Rigid Packaging Solutions

New Delhi, 28 Aug 2024: COSMO Plastech, the rigid packaging business of Cosmo Films, a global leader in specialty films announces participation in Indian Ice Cream Expo, Gujarat 2024, a premier B2B event in South-Asia for the ice-cream trade and manufacturing industry. COSMO Plastech will be showcasing its rigid packaging products at Stand No. K6 in the exhibition that is scheduled to take place from 3-5 September, 2024.

During the exhibition, COSMO Plastech will exhibit its diverse range of technical films and rigid packaging solutions. These include products that can be beneficial for the ice cream industry to preserve the quality of the product while also offering unique properties that support in value addition and attracting customers. Few of the products that will be showcased are:

Sheets (HIPS, PP, PET), Injection molded products, Thermoformed containers, In-mold label films, Pearlized and White Films, Lidding Films and Matte Cold Seal Films.

Speaking on the participation, Mr. Sanjay Chincholkar, Business Head (Rigid Packaging) Cosmo First said, "Cosmo Plastech is our new business vertical, and within a short time span we have been able to build immense trust for our products among our customers. Exhibitions like IICE further provides us with an opportunity to tap new potential customers. We look forward to making the best use of the platform and show to the visitors our unique sustainable rigid packaging offerings."

COSMO Plastech's rigid packaging solutions are specifically designed to meet the unique needs of the ice cream industry. These containers offer excellent aesthetics, protection, durability, and reliability, manufactured using high-quality materials through injection molding and thermoforming techniques. With moisture-resistant and tamper-proof properties, COSMO Plastech's packaging ensures the freshness and quality of ice cream products.

PLASTIC TAX, LEVY & PENALTY (2024)

GB United Kingdom: £217.85 Tax per ton of plastic packaging with less than 30% recycled content

US United States: $0.20 Proposed tax per pound of virgin plastic (for 2026, if REDUCE Act passes)

ES Spain: €450 Tax per ton of non-recycled plastic packaging

IT Italy: €450 Tax per ton of single-use plastic items (implementation postponed to July 1, 2026)

DE Germany: Up to €100,000 Penalty for non-compliance with the Single-Use Plastics Fund Act (EWKFondsG). Annual levy on single-use plastics (effective January 1, 2024, first payments due 2025). Specific levy rates to be set by ordinance.

EU European Union: €800 Levy per ton of non-recycled plastic packaging waste (paid by member states)

NL Netherlands: €0.25 Levy per single-use plastic cup (effective July 1, 2023)

NL Netherlands: €0.50 Levy per meal in single-use plastic packaging (effective July 1, 2023)

PT Portugal: €0.30 Tax per non-reusable plastic packaging

ZA South Africa: ZAR 0.32 Levy per plastic bag

KE Kenya: KSh 150 Proposed eco-levy per kg on plastic packaging materials (not yet implemented)

TW Taiwan: NT$15.33 Recycling levy per kg for PET plastic packaging

ID Indonesia (World Bank Recommendation): $280 Recommended tax per ton on common plastic consumer products with <30% recycled content

CO Colombia: $0.01 (20 Colombian pesos) Tax per single-use plastic bag (introduced July 2017, increases 50% annually)

AE United Arab Emirates (UAE): 25 fils ($0.07) Tariff on single-use bags for carrying goods (implemented in Dubai, 2022)

Global plastic waste is projected to surge from 353 million tons in 2019 to approximately 430 million tons by 2025 and 600 million tons by 2040. To combat this, the OECD (Organization for Economic Co-operation and Development) projects plastic packaging taxes could reach $1,000/ton by 2030 in the EU and globally by 2040. **Combined with levies like the EU's €0.80/kg on non-recycled plastic packaging, global plastic-related taxes, levies, and penalties could potentially exceed $200 billion annually by 2030.**

(**Source**: APCemi / 27.08.2024)

Delivering Increased Benefits to Greenhouse Films

Baystar's Borstar technology is helping customers deliver better, more reliable production methods to greenhouse agriculture.

Polyethylene (PE) films are commonly used in agricultural applications for many different purposes. They bring advantages to food production by helping increase crop yields, protecting crops from adverse conditions and reducing the need for water and chemicals in the production process.

There are several different agricultural applications where PE films have an advantage, and today Baystar is focused on bringing Borstar performance resins to greenhouse films used in crop production. This is an area that is expected to see continued growth between now and 2028.

Advantages of Greenhouse Films

Borstar technology delivers unique advantages to greenhouse film applications due to its unique molecular architecture. Borstar technology relies on a broad bimodal molecular weight distribution of polyethylene copolymers to enhance performance and processability of material, making a film that is readily processed on film equipment and mechanically strong and tough to provide enhanced crop protection.

These variables grant engineers and product development technicians significant design freedom to create products over a wide density and molecular weight range, allowing for precise performance of the material for a particular application.

Borstar resin provides better durability with increased toughness, environmental stress crack resistance (ESCR) and weatherability. Because of the improved

processability and mechanical properties of Borstar resins, demanding agricultural applications can gain from a longer service life of the film, reducing the total carbon footprint of the entire agricultural operation.

Additionally, the unique optical properties of Borstar, which are also derived from its molecular design, bring a natural ability to diffuse light while maintaining high transmission rates. The matte appearance of the film naturally diffuses sunlight across the interior of the greenhouse and does not tend to reflect light the way a clear film would. This performance is achieved without the use of additional fillers or other additives to diffuse or absorb the light.

Good light distribution in the greenhouse allows the crops better conditions for photosynthesis and microclimate development. Additionally, the PE film and greenhouse structure protect from too much direct sunlight, high winds, extreme temperatures and variable rainfall. These types of greenhouse films are suitable for crops such as vegetables (including non-native varieties- tomatoes, cucumbers, and peppers), lettuce, melons, flowers and other crops that thrive under consistent conditions.

Borstar FB2230 was evaluated for the agricultural film greenhouse application owing to its physical and optical properties. Because of the unique molecular structure, a naturally matte surface finish occurs when making blown film (Figure 1).

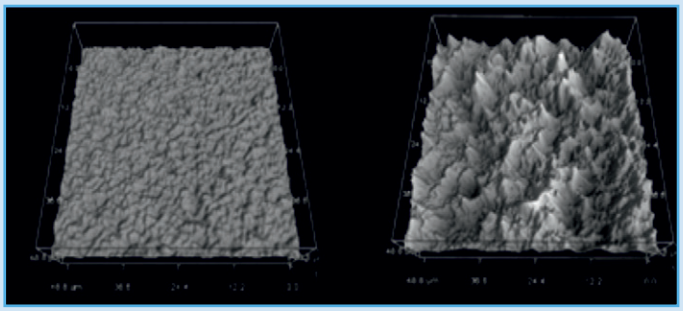


Figure 1: Unique molecular structure creates naturally matte surface finish.

This matte surface finish is what allows even distribution of the light which was shown to improve crop yields in a study of tomato growth in the Netherlands1. Compared to a clear control film, a moderately hazy film (45% haze) showed an 8% increase in crop yield. When the haze value was increased from 45% to 71%, a further 3% increase in crop yield was seen (Figure 2).

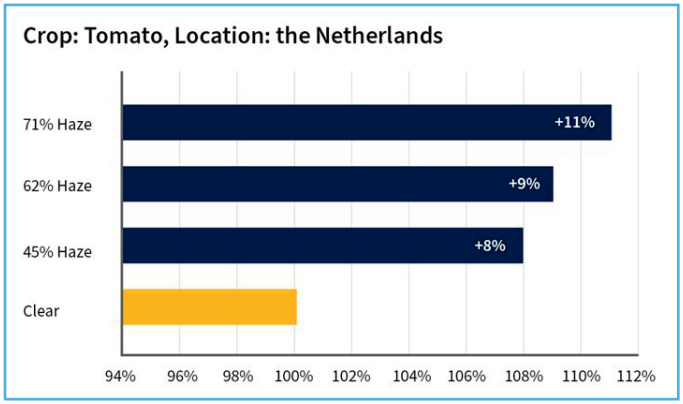


Figure 2: Crop yield improvements with Borstar.

While the production advantage of crops is clear from the use of Borstar film, it is also essential that the film be able to hold up mechanically to use in the field. While durability can be improved by using thicker films, 3-4 mil film is typical for single-season growing while 6-10 mil film is more common for multi season use, the addition of UV stabilizers can also bring increased longevity and durability to the film as well. By including a UV stabilizer in the Borstar FB2230 film, the retained elongation over 30 months was improved from just 10% in the MD reference, to over 70% in the modified film examples (Figure 3)[2].

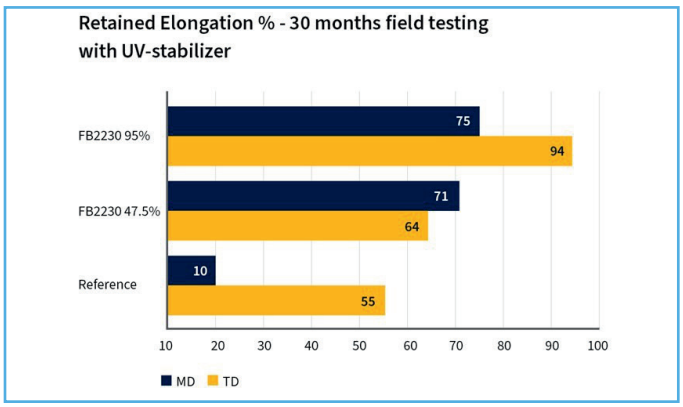
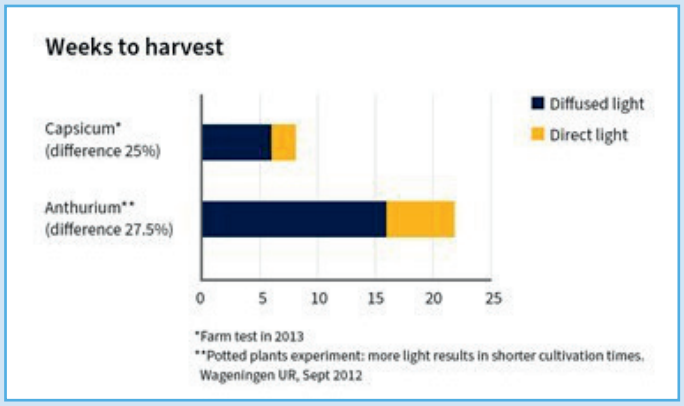


Figure 3: UV stabilizers improve life of film.

In other studies, growth acceleration and production increases were also measured. By using a film that diffuses light, the time to harvest for different plants was reduced by about 25% while increasing the total weight of finished product by about 6% (Figure 4). These kinds of improvements in agricultural operation allow for increasing the value per square foot of farmland and bringing better, more reliable production methods to the market.



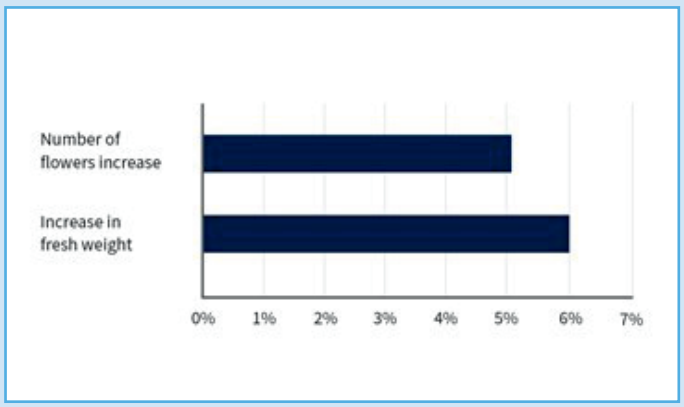


Figure 4: Harvest time is reduced with Borstar film usage.

Conclusion:
Several case studies have shown how the advanced optical and mechanical properties of Borstar films can significantly benefit agricultural and greenhouse applications. Increases in yields, decreases in production time and ease of use and durability are all inherent advantages of this technology.

Products like Borstar FB2230 are well positioned to serve this growing market segment and to continue to bring performance to a demanding application that is critical to our modern supply chain infrastructure. PE resins with unique and tailorable molecular designs for demanding applications continue to push the boundaries of what is possible and help deliver efficient and effective solutions to the market.

(**Source**: Plastics Technology)

Scandinavian Gold Standard: Two-In-One Wheelie Bin

In the ever - evolving landscape of waste management, efficiency and environmental responsibility are paramount. New to the UK, the Twin Compartment Wheelie Bin System from CRAEMER stands as a testament to innovative design and practical functionality by facilitating the effective collection of separated waste and recyclables right at the source. This type of waste management has been tried and tested in Scandinavia for many years. Its effectiveness in promoting cleaner and more organized waste streams is well - documented, setting a gold standard for the UK and other nations to follow.

The Twin Compartment Wheeled Bin System was recently demonstrated at CRAEMER UK's annual joint CIWM & LARAC Midlands conference in Telford, Shropshire. This event, held in conjunction with municipal vehicle suppliers NTM-GB Ltd, showcased the synergy between CRAEMER Twin Compartment Wheelie Bins and NTM's K-2K split-compartment vehicles.

Designed for chassis with gross vehicle weights of 12 to 18 tons, the Kidderminster based company's K-2K vehicle complements the functionality of CRAEMER 240L and 360L waste bins perfectly. The delegates to the conference, both public and private waste industry professionals, were impressed by the demonstration of the effective separate collection of a variety of waste streams with nil cross contamination.

Dual Waste Stream Collection

The NTM K-2K truck, paired with CRAEMER Twin Compartment Wheeled Bins, offers a functional and practical solution for dual waste stream collection. This combination results in cleaner, more manageable waste stream management, and a potential reduction in the number of containers required at customer premises, particularly advantageous in either residential or commercial locations where space is at a premium.

The CRAEMER system offers flexible configuration options, enabling bins to be set up with either 40/60 or 50/50 compartments. This adaptability ensures suitable segregation of various materials, including card and paper, plastics, metal, glass, and residual waste. The compartments can be clearly defined with color - coded lid inserts and iconography, making it straightforward for users to identify and separate materials correctly.

State - of - the - Art UK Based Production

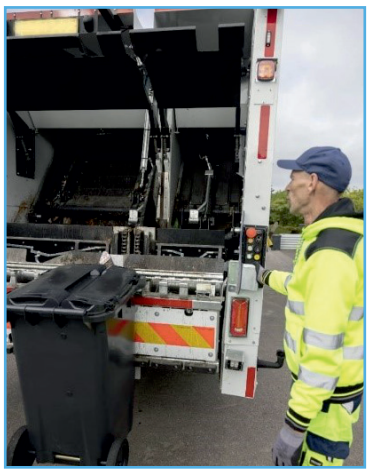
CRAEMER Group's commitment to high quality, durability, innovation and service is reflected in their state-of-the-art production facility in Telford. Each year the facility produces tens of thousands of twin-compartment wheelie bins for the Northern European market in addition to standard two and four wheeled bins for both the UK and for export, ensuring a reliable supply for municipalities and organizations looking to enhance their waste management practices.

As municipalities and private collectors strive for more efficient, sustainable and simpler waste management solutions, the CRAEMER Twin Compartment Wheelie Bin System stands out as a forward-thinking option. The bin's proven design, adaptable configurations, and compatibility with advanced collection vehicles represents an ideal opportunity to enhance recycling rates and reduce environmental impact.

Scandinavian scene. Photo: Unsplash

The CRAEMER Twin Compartment Wheeled Bin with saloon lid and partition wall allows two different waste fractions to be presented for collection in separate compartments within a single container.

Advancing toward a cleaner, more sustainable future, the CRAEMER Twin Compartment Wheeled Bin System enables efficient collection of segregated waste and recyclables directly at the point of disposal. The NTM K-2K refuse collection vehicle, paired with CRAEMER Twin Compartment Wheeled Bins, offers a functional and practical solution for dual waste stream collection.



Scandinavia's twin compartment bin system demonstrates a proven track record of success in waste management. Photo: CRAEMER Group

CRAEMER Group's commitment to high quality, innovation and service is reflected in their state - of - the - art production facility Site B in Telford. The 'Made in Britain' logo represents the safeguarded collective emblem of British manufacturing.

Tetra Pak Recart: Digital Display

At Anuga FoodTec, Tetra Pak highlighted its solutions for the prepared foods sector, addressing the increasing consumer demand for ready-to-eat (RTE) products. The solutions are designed flexibility, allowing producers to switch between different products and recipes, thereby maximizing operational efficiency.

The company also showcased its Tetra Recart, which claims to be the first restorable carton in the world. It is designed to replace traditional cans and glass jars. Ideal for a range of shelf-stable foods, such as sauces, purees, and ready meals, Tetra Recart offers environmental benefits, including up to an 81% reduction in carbon emissions compared to steel cans and glass jars.

Made from 69% renewable paperboard and certified by the Forest Stewardship Council (FSC), Tetra Recart ensures that the materials used are responsibly sourced.

(**Source**: WhatPackaging? / 29.08.2024)

APTAR Closures Introduces New Lightweight 2" Disc Top Lite Closure for Beauty, Personal and Home Care

The low-profile, 2” Disc Top Lite closure offers lighter weight combined with premium customization options.

APTAR Closures, an industry leader in dispensing solutions for over 50 years, has introduced a new lightweight, more sustainable disc top closure. Named **2” Disc Top Lite**, the premium closure is the third in a series of novel disc top dispensing solutions the company has introduced globally for beauty, personal care and home care products this year.2" Disc Top Lite builds upon the success of APTAR'S traditional disc top closures but with a significantly lighter, low - profile design. This new disc top closure has a 2-inch diameter and weighs just 10.2 grams – 23% lighter than standard 2" disc tops. The reduced part weight translates to a substantial decrease in plastic usage, which in turn can help brands meet their sustainability goals without compromising performance.

2” Disc Top Lite is available in polypropylene (PP) and is available in post-consumer recycled (PCR) content, further improving sustainability for brands. Featuring a crab claw closure, 2” Disc Top Lite is produced in a 24mm custom thread neck finish, with a 3mm x 8.5mm orifice. The closure is suitable for medium - to - thick viscosities, offering compatibility with a wide variety of applications.

2” Disc Top Lite's sleek design portrays a premium aesthetic, making it an attractive choice for a broad range of products. It is available in a variety of frost and gloss finishes, and brands can customize the closure with logos or other marketing messages for even greater shelf appeal and differentiation.

“At APTAR Closures, we are constantly seeking ways to innovate while minimizing our environmental footprint,” said Erin Harmon, North America Product Line Director at APTAR Closures. “The 2” Disc Top Lite is a prime example of how we can deliver on both sustainability and functionality, providing our customers with a premium solution that supports their sustainability initiatives without sacrificing quality.”

(**Source**: APTAR)

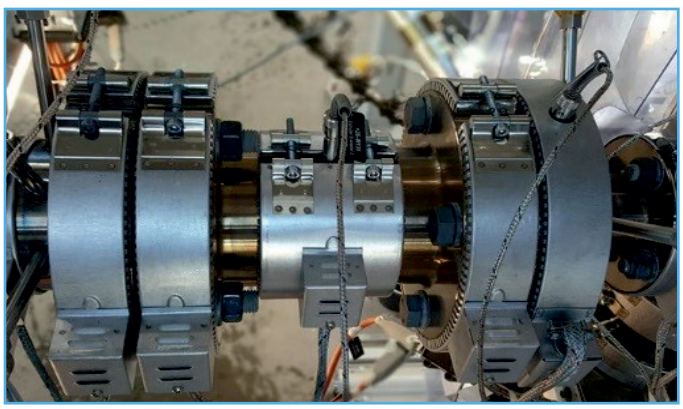
Inline Viscometer for Extrusion

Compatible with all common extruder designs and can be retrofitted to existing systems.

The inline viscometer Visco-P from Promix Solutions is designed to stabilize and monitor the extrusion process at the same time. A modular device, it homogenizes the polymer melt and measures the actual viscosity of the entire melt under process conditions and in real time.

The measuring module also serves as a capillary rheometer for online viscosity measurement. The real viscosity is determined using known process parameters such as material type, throughput, melt temperature and the pressure loss across the mixing module and output in real time as a graph and numerical value. In addition to the viscosity, the current melt temperature and the shear rate are displayed graphically. All other important parameters are displayed and saved as numerical values.

The conversion from real viscosity to solution viscosity for PET is also included, as is the conversion of viscosity to melt flow rate for polyolefins and similar materials. This makes it easier for the user to compare the displayed values with the specifications.



Promix measuring module with pressure and temperature sensors. Source: Promix

User-selectable upper and lower limits for the viscosity trigger an alarm and show the operator the current deviations from the target value. Subsequent adjustments and their effects on the process and thus the viscosity are displayed directly on the Visco-P and make it easier for the machine operator to take corrective measures to optimize quality.

As all relevant data is stored for 12 months, corresponding evaluations can also be read out and assessed after the end of production. There are three ways to do this with the Visco-P. The data can be sent directly to another control unit via an external interface (FieldBus, ProfiNet, etc.) and processed there. The data can be read out via TeamViewer or a USB stick, saved and evaluated by an external computer. The third option is integrated in the Visco-P and creates a report on the viscosity with all relevant framework conditions and statistical evaluation with maximum value, minimum value, average value, deviation, Cp and Cpk. In addition, the viscosity is displayed graphically over the observation period with upper and lower limits.

The graph can be adjusted on the X and Y axes according to the user's requirements. The start and end time of the report can also be freely selected by the user. The creation of such a report is particularly convenient using the start-stop function. The machine operator starts recording the values in a report using the start button and ends the recording with the stop button. The Visco-P immediately generates a report for the batch produced. This report can be attached to the batch and thus supplements the quality data of the finished product.

This is said to make the Visco P an ideal addition to quality control before and after production. The improved mixing of the components with simultaneous monitoring of the viscosity facilitates the processing of recycled material or viscosity-influencing additives such as chain extenders for PET.

The Visco-P is compatible with all common extruder designs and can be retrofitted to existing systems. It can be used for almost all polymers and is said to be very easy to operate.

(**Source**: Plastics Technology / 04.09.2024)

Banner Solutions for Every Application by PIEDMONT Plastics

Durability Meets Design

Piedmont Plastics, a leading supplier in the plastics industry, is renowned for its wide range of high-quality plastic materials. The SupraFLEX® line of banner materials is a testament to our commitment to tailored solutions. Whether you need vibrant, single-sided prints, roll-up displays, durable, double-sided printing, or materials for outdoor settings subject to high wind, we have you covered. Each type of SupraFLEX® material is crafted to provide exceptional print quality and durability, accommodating a wide range of digital printing techniques such as eco-solvent, solvent-based, and UV-curable inkjet inks.

Advantages of Vinyl and Fabric Banners

Traditional vinyl banners are known for their durability and resilience in outdoor settings. They are waterproof, fade-resistant, and budget-friendly, making them ideal for long-term exterior use. **Fabric banners, on the other hand, offer an aesthetic appeal with a more elegant and less reflective finish, suitable for indoor environments where light absorption and a high-end look are important.**

Piedmont Plastics' SupraFLEX® materials enhance these benefits by catering to both indoor and outdoor applications with specialized products like the Eclipse (Block out) for double-sided printing and the Breeze (Mesh) for high wind resistance.

Understanding Different Banner Materials

Piedmont Plastics' SupraFLEX® line offers a diverse array of banner materials, each designed with specific features to meet the unique demands of different applications. From outdoor ruggedness to indoor chic, these materials provide adaptable solutions for nearly any setting:

- **Horizon (Front lit)**: Ideal for vibrant, eye-catching displays, this Front lit material is perfect for indoor and outdoor use, such as in retail environments and at outdoor events.
- **Curl Free (Scrim less)**: Specifically designed for indoor use, this scrim less material offers a smooth appearance, making it ideal for high-end roll-up displays and pop-up banners at trade shows.
- **Eclipse (Block out):** With its double-sided printing capability, Eclipse is suited for applications requiring opacity and durability, such as street banners and promotional flags visible from both sides.
- **Breeze (Mesh):** Engineered for outdoor use in windy conditions, this mesh material allows air to pass through, making it perfect for large-scale outdoor banners, building wraps, and event signage in exposed areas.

Customization Tips for Effective Banners

For outdoor settings where durability against weather elements is key, vinyl offers robust options with excellent print quality and longevity, particularly Piedmont Plastics' Breeze (Mesh) or Horizon (Front lit).

For indoor environments where elegance and less light reflection are desired, the Curl Free (Scrim less) fabric or the Eclipse (Block out) from Piedmont ensures a high-end appearance without glare, making them ideal for trade shows and luxury event spaces. Incorporate clear, vibrant graphics and legible text into your design to catch the eye quickly. Additionally, it's important to consider the viewing distance and installation logistics in order to determine the size and placement of grommets or pole pockets.

What about Sustainability?

Piedmont Plastics is committed to sustainability, a core value reflected in its SupraFLEX® line of durable and environmentally friendly materials. Our company is taking significant strides to ensure that these materials, such as the recyclable vinyl used in its banners, contribute to reducing the environmental footprint.

This commitment extends to optimizing manufacturing processes to minimize waste and improve energy efficiency. Piedmont Plastics meets its customers' functional demands and supports eco-friendly initiatives by focusing on its products' longevity and recyclability.

How to Pick the Right Material?

Selecting the right banner material is essential for both durability and effective communication. Here's a simplified guide and checklist to help you choose the best material for your banners:

Selecting the Right Banner Option

1. Purpose and Setting: Determine if the banner is for indoor or outdoor use and consider environmental factors like wind and sunlight.
2. Durability Needs: Assess how long the banner should last and under what physical conditions.
3. Material Choice: For outdoor use, opt for Breeze (Mesh) in windy areas or Horizon (Front lit) for general use. For indoor use, choose Curl Free (Scrim less) for smooth displays or Eclipse (Block out) for visibility from both sides.
4. Printing and Finish: Ensure the material is compatible with your printing technology and desired finishing methods (e.g. grommets, hems).

Get Exactly What You Need

Choosing Piedmont Plastics' SupraFLEX® for your banner needs means accessing a wide range of top-quality materials perfectly suited for any setting, from stylish indoor venues to challenging outdoor environments. Whether you need the radiant display of Horizon (Frontl it), the sleek look of Curl Free (Scrim less), the versatility of Eclipse (Block out), or the wind-resistant Breeze (Mesh), SupraFLEX® has something for every project.

(**Source**: Piedmont Plastics)

Master Batch Creates Cavities, Helping Film Processors Boost Sustainability, Recyclability

Additive technology creates air pockets in film during orientation, cutting down on the amount of resin needed while boosting opacity, mechanical properties and recyclability.New additive technology promises to enable film processors to utilize less plastic and boost recyclability by creating nano scale air pockets or cavities in the film while it is being stretched via either machine or biaxial orientation equipment. Orientation of the film is critical because the additives are designed to separate from the polymer during stretching to create these material-saving pockets. Between cavitation and orientation, processors utilizing this technology can expect to cut their resin usage by up to one-third.

So says VOID Technologies, the developer of the additive VO+, which is available as a pellet master batch. The technology was originated by Kimberly-Clark as part of a research initiative to promote more sustainable polymer applications. In 2015, VOID was launched as an independent company with the purpose of expanding the technology from lab-scale concept into a commercial product. Today, it has a 25,000-square-foot R&D lab and manufacturing facility in Neenah, Wisconsin, equipped with lab- and commercial-scale twin-screw co-rotating compounding extruders for R&D and production, and a pilot-sized blown film line with machine direction orientation (MDO) for R&D and trial work. VOID also has commercial teams in Canada and Europe.

“Kimberly-Clark developed the technology, and I had a good relationship with them as we had previously worked together on other projects,” says James Gibson, VOID's co-founder and CEO, who led the spinout from K-C. “They thought it was really exciting and innovative technology, but also felt it was more relevant to markets outside of their core focus.”

This led to what Gibson describes as a “two-year incubation project where we took the value proposition of putting cavitation into polymers and figuring out whether anyone in the world cares about it.” The “overwhelming feedback” Gibson received from visiting companies throughout the flexible packaging supply chain was that light weighting polymers without sacrificing mechanical properties was extremely appealing. Gibson says, “I had to figure out very quickly what section of the very large plastics industry we were going to focus on and, after a couple of twists and turns, we decided to heavily focus on opaque films, primarily polyethylene.”

VOID's plant in Wisconsin houses twin-screw compounding extruders for R&D and production runs. Source: VOID Technologies

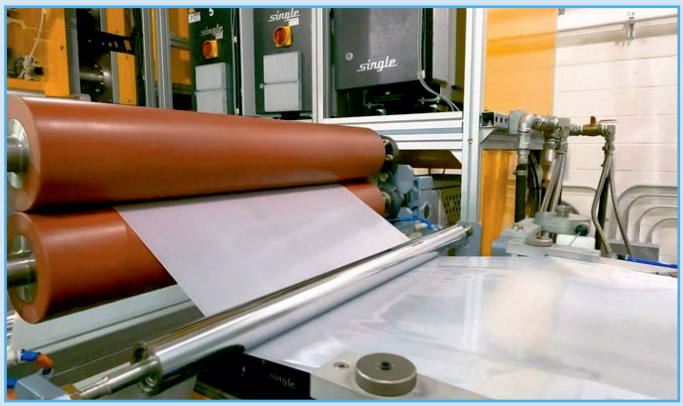
Gibson notes that, over the last few years, more and more film processors are adding orientation equipment to their production lines to develop recycle-ready PE packaging applications. He elaborates, “We're seeing a big adoption of MDO technology in the film market. Some film processors are on their third, fourth lines already, and with more on order.”

The technology is covered by roughly 35 patent families with more than 300 territory patents. Gibson divulged that its proprietary master batch formula “relies on multiple polymers with different types of chemistry” to create the cavities, which he explains result in density reductions. What's more, the voids in the polymer diffract light, which he says creates high levels of opacity without need for TiO_2.

“What's unique about the master batch is that different parts of the formulation can be tuned to achieve different attributes,” Gibson adds. So you can tailor for more density reduction or more opacity driven, and that's why we think polymeric cavitation is really special.” The master batch is available in pellet form. The master batch is typically dosed at about 10% of the overall formulation, Gibson says, adding, “You end up with only about 6% of non-PE additive in the final film structure, and that's super important for recyclability.”

Trial Runs

VOID has conducted several commercial-scale R&D trials using VO+ technology in Germany at the global headquarters of both Windmoeller & Hoelscher and Hosokawa Alpine. Utilizing blown film lines equipped with inline MDO, the trial focused on a variety of PE film structures for applications such as all-PE laminates (sealant films and mid-ply), wicketed bags and flow wrappers, Gibson explains. The properties of these voided films varied depending on the PE used and the specific production conditions, such as extrusion and MDO stretch ratio/temperature.



In Wisconsin, VOID also houses pilot-sized blown film and orientation equipment to trial formulations.

Says Gibson, “For example, we've run several trials on W&H and Alpine equipment to produce films for applications such as mid webs, sealant films and wicketed bags. These applications are typically based on LLDPE/m-LLDPE-rich film structures. During these trials, we have produced 25-90 μm voided films with low density (0.80-0.85g/cm3) and opacity without TiO2 (50-70% depending on film gauge). These films have also been able to achieve excellent Dart Drop performance (for example, >1000g in a 50μm film), which can enable customers to down gauge and save even more material.

“We've also run trials to produce film structures for flow wrappers for confectionery packaging. This application requires relatively high stiffness and high opacity in a thin film, so we used HDPE resins (for stiffness) and a small amount of TiO2 to boost opacity. In these trials, we've been able to produce 30-40 μm films with densities between 0.83 and 0.90g/cm3 and opacity as high as 70%.

"Importantly for this application, it's not possible in films thinner than 35 μm to achieve the high opacity requirements with just TiO2 without increasing density above limits for recyclability set by the Association of Plastics Recyclers/How2Recycle (0.996g/cm^3) and RecyClass (0.970g/cm^3). Gibson notes that at thickness levels below 35 μm, film processors that need a high level of opacity in their structure traditionally add relatively high levels of TiO_2. This results in film density reaching the levels of 0.97-1.00 grams/c3. Such films, he says, are deemed to not be recyclable by APR or RecyClass in a sink float separation system. "Processors want high-opacity thin films, but they can't do it with TiO_2 alone because it's heavy.”

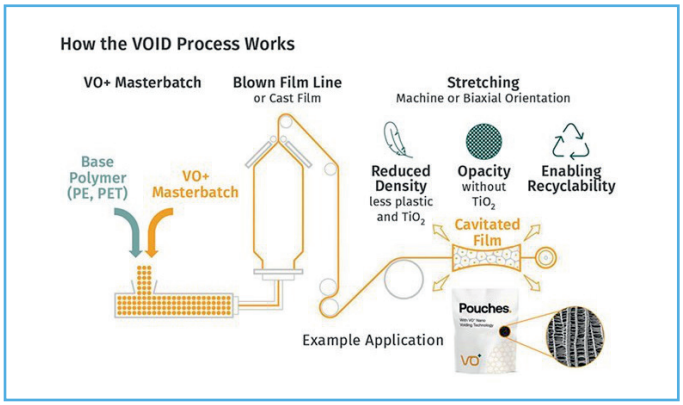


Figure 1 – VOID explains that PE film cavitation created by its proprietary master batch during orientation results in low density and high opacity, with the internal structure scattering light instead of pigments.

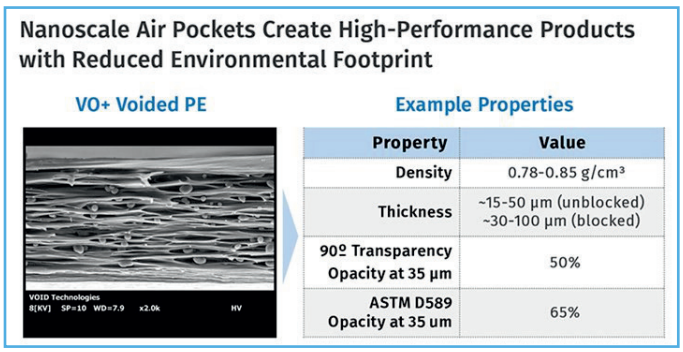


Figure 2 – VOID says its VO+ patented additive creates nano scale air pockets that create high-performance films with a reduced environmental footprint.

In cast film, Gibson notes that, as with blown film, its additive technology requires a post extrusion orientation step to generate cavitation. He notes, “Initial pilot-scale tests in cast biax PE film have shown very positive results, and we plan to conduct larger scale tests in 2025. We have also achieved very encouraging results from pilot-scale tests using a different VO+ master batch in polyester films (cast film with transverse direction stretch) for applications such as labels.” While VOID has

conducted trials with inline orientation, Gibson notes that the additive technology can also be used by film processors that run their stretching equipment offline.

Commercial Launch

In addition to VOID's R&D trials on Alpine and W&H lines, Gibson notes its customers are also doing an extensive amount of converting trial work, including end-to-end supply chain trials, to develop new MDO-voided films and packaging applications. In fact, earlier this year Charter Next Generation (CNG) expanded its GreenArrow line of sustainable films with a new line of cavitated recycle-ready PE films for flow wrap and confectionery applications. Using VOID's patented VO+ master batch on an MDO-equipped blown film line, CNG produced high-performing PE film structures that are opaque yet compatible with existing PE recycling streams.

Adoption of MDO PE film is a rapidly growing industry trend as it enables recyclable, high-performing flexible packaging. By using VO+ Master batch, CNG can now produce thin-gauge voided MDO PE films that offer a combination of low density and high opacity not achievable with mineral additives such as TiO2 pigments or CaCO3 cavitation agents. This innovation creates a unique PE-based, recycle-ready alternative to conventional polypropylene-based substrates that often require biaxial orientation.

“CNG continues to raise the bar and reinvent packaging with a sustainability-first mindset. Using VOID's patented VO+ technology enables us to achieve the high opacity, ease of processing and recycle-ready performance we are targeting for these films. This in turn allows our customers to reduce their use of virgin materials and process their packaging in existing polyethylene film recycling streams,” says Brent Greiner, CNG's vice president of technology.

Building on initial launches, over the next month's Gibson says VOID and customers both in North America and elsewhere in the world are expected to conclude more than 30 industrial-scale production trials utilizing the VO + technology.

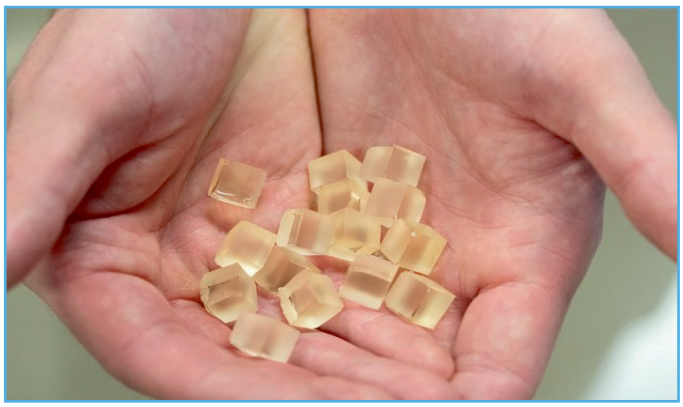
(**Source**: Plastics Technology / 02.09.2024)

NREL Builds and Tests Wind Turbine Blade with Recyclable Resin

Material can be sourced from biomass and chemically recycled, enabling sustainable end-of-life management.

Researchers at the Department of Energy's National Renewable Energy Laboratory (NREL) published a paper in the journal Science describing the manufacture and testing of a composite wind turbine blade using a resin that is chemically recyclable and made from materials that can be bio - derived.

The new resin, nicknamed PECAN (polyester covalently adaptable network) performs on par with the current industry standard of blades made from a thermoset resin and outperforms certain thermoplastic resins intended to be recyclable.



Cubes of the PECAN resin developed by NREL, made from bio-derivable sugars. Source: Werner Slocum, NREL.

Using incumbent technology, wind blades last about 20 years, and afterward they can be landfilled or shredded for use as concrete filler. The PECAN resin enables blades to be recycled using heat and methanol, producing materials that could be reused to manufacture new blades.

“It is truly a limitless approach if it's done right,” says Ryan Clarke, postdoctoral researcher at NREL and first author of the paper. Clarke says the chemical recycling process was able to break down the 9-m prototype blade in about 6 hours.

“Nine meters is a scale that we were able to demonstrate all of the same manufacturing processes that would be used at the 60-, 80-, 100-meter blade scale,” says Robynne Murray, also an author on the paper.

Composites made from the PECAN resin held their shape, withstood accelerated weatherization validation and could be made within a time frame similar to the existing cure cycle for how wind turbine blades are currently manufactured.

The work was conducted by investigators at five NREL research hubs, including the National Wind Technology Center and the BOTTLE Consortium. The researchers demonstrated an end-of-life strategy for the PECAN blades and proposed recovery and reuse strategies for each component.

“The PECAN method for developing recyclable wind turbine blades is a critically important step in our efforts to foster a circular economy for energy materials,” says Johney Green, NREL's associate laboratory director for Mechanical and Thermal Engineering Sciences.

(**Source**: Plastics Technology / 29.08.2024)

Thin, High-Performance Nylon / PE Barrier Film for Thermoformed Packaging

Südpack's Multifol Extreme film is well suited for greasy, protein - rich and frozen foods. A high-performance multilayer flexible film made of special resin grades of nylon and PE have been developed for thermoformed packaging of fatty, protein-rich or sharp-edged products such as fresh or frozen fish by global plastic film manufacturer Südpack (U.S. office in Appleton, Wisconsin). In addition to its excellent barrier performance, the Mutlifol Extreme film is said to be the perfect combination of maximum functionality and minimum added weight, due to its outstanding sealing performance and high puncture resistance.

According to the company, even if the sealing surfaces are contaminated, the excellent sealing performance of Multifol Extreme provides top production reliability and high package quality with a very low degree of leakage. Furthermore, the optimized high-performance film weighs approximately 30% less than conventional nylon/PE structures commonly used. In concrete figures, this means that the merely 150-μm Multifol Extreme film can replace conventional thermoforming films with a thickness of 200 μm — without compromising on product protection. Producers can achieve further material savings by combining a Multifol Extreme base film with a

Source: Südpack

lidding film from the same product family. Südpack's new development has also been shown to offer outstanding thermoforming properties with large drawing depths and good processability on all common thermoforming packaging machines.

(**Source**: Plastics Technology / 02.09.2024)

XEIKON CX500 Enables FLEXIFORMS Packaging to Produce Sustainable Flexible Pouches

XEIKON is pleased to announce that FLEXIFORMS Packaging, a leader in high-quality stand-up pouch and bag production will utilize the XEIKON CX500 Press for manufacturing of their flexible packaging products. The XEIKON dry toner technology allows FLEXIFORMS to maintain the commitment to their customers to provide eco-friendly and sustainable products.

"We are excited to have been chosen by FLEXIFORMS Packaging to support their sustainability goals," said Mark Pomerantz, Sales & Marketing Director at XEIKON North America. "The CX500 Press, known for its superior quality and efficiency, combined with our food safe dry toner, will help FLEXIFORMS produce a high quality product in the most efficient and sustainable process available.”

“XEIKON has been very supportive to FLEXIFORMS in many ways beyond our purchase of their CX500 press” states FLEXIFORMS Managing Director, Peter Segal. “The process to manufacture these unique products goes well beyond just print, and XEIKON'S experience and expertise has been a valuable factor in our success. Sustainability is critical for us and our customers, and the XEIKON technology is the proven industry leader”.

About XEIKON: XEIKON, a division of Flint Group, is a leader in digital printing technology, offering state-of-the-art solutions for various industries. Focused on sustainability and efficiency, XEIKON provides innovative digital printing presses and related technologies to help businesses achieve their environmental and operational goals.

About FLEXIFORMS Packaging: Based in Sunrise, FL, FLEXIFORMS Packaging delivers superior packaging solutions with a focus on quality, innovation, and customer satisfaction. Our pouches are manufactured under strict quality control procedures to meet stringent FDA standards.

(**Source**: XEIKON / 12.08.2024)

Sealed Air Launches BUBBLE WRAP® Brand Ready - To - Roll Embossed Paper

New fiber-based packaging solution for elite protection during shipping.

Sealed Air introduces BUBBLE WRAP® brand Ready-To-Roll Embossed Paper, combining the proven effectiveness of BUBBLE WRAP® brand cushioning with curbside - recyclable embossed paper.

Perfect for pack station environments, this durable, lightweight solution conforms to a variety of shapes as it wraps and protects. Designed with an embossed pattern mirroring the traditional design of BUBBLE WRAP® cushioning, the embossed paper wrapping offers product protection, light cushioning and abrasion elimination during shipping. Plus, the Ready - to - Roll dispenser provides easy - tear convenience and doesn't require additional equipment for setup.

Eric Davis, Product Manager, Paper, explains, “Ready-To-Roll Embossed Paper represents a significant advancement in paper wrapping with a strong innovation pipeline behind it. This launch is part of SEE's broader sustainability initiative aimed at showcasing our wide range of paper packaging solutions.”

Similar Sealed Air packaging solutions include:

- **BUBBLE WRAP® brand High Recycled Content Bubble Cushioning** made from at least 90% recycled plastic and approved for use with the appropriate How 2 Recycle (H2R) label.
- **BUBBLE WRAP® brand Recycled Content Inflatable Air Pillows** are made from a minimum of 50% recycled plastic content, of which 30% is post-consumer recycled plastic and approved for use with the appropriate How2Recycle (H2R) label.
- **BUBBLE WRAP® brand Paper Bubble Mailers**, which contain at least 38% recycled paper content and are curbside recyclable and approved for use with the appropriate How2Recycle (H2R) label.

(**Source**: Sealed Air / 22.08.2024)

The Developer of the Carbon Flat for Wind Blades

Key Highlights:

- In 2000, Vestas Wind Systems approached FibreForce wanting assistance to develop a carbon/wood composite stiffener, a predecessor of the 'spar cap'.
- Vestas chose FibreForce because it was the largest pultrusion company in the UK and because it had the project-based R&D expertise to meet the company's needs.
- Under Dr. Hartley's leadership FibreForce went from single- to three- and eventually six-stream production and from hand - cutting to a fully automated saw system that cut and chamfered in-line.

Wind energy accounted for 17% of the electricity consumed in Europe during 2022, 41 years after 'Towards 2000', the world's first wind farm, was commissioned in 1981. In that time, engineers have optimized turbine design to produce far more energy than was originally available. Here, Dr. John Hartley, global head of R&D for wind at composites manufacturer Exel Composites and developer of

the 'carbon flat' spar cap for turbine blades by pultrusion, explains his role in developing wind energy technology to reduce human reliance on fossil fuels.

Dr. Hartley has worked in the composites industry since 1986, after graduating from Sheffield Hallam University with B.Sc. (Hons) Mechanical Engineering in 1982. One of his first jobs was with the John Shaw Wire Rope company, where he developed a pultruded composite rod to act as a tension member for fiber optic cables, and he has championed composites ever since.

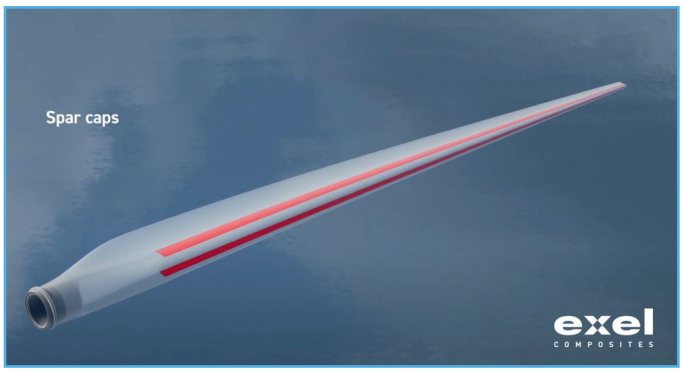
While working for FibreForce, the UK trading arm of Exel Composites, Dr. Hartley led the project to design a structural reinforcement for wind turbine blades, aiming to facilitate longer blades to improve energy efficiency. The carbon flat was the result; it takes the strain imposed by the wind force and stops the blade from flexing too much under the wind load and hitting the tower. Today, any modern wind turbine stationed offshore, where you find the longest blades, uses carbon flats.

How the Carbon Flat was Designed?

Carbon fiber is the best material for this application because of its unmatched stiffness / weight ratio. Specifically, carbon fiber produced using pultrusion has a high fiber/volume fraction, uniform quality, and superb mechanical properties. These properties in spar caps allow energy engineers to lengthen turbine blades by maintaining a low weight and high rigidity, which leads to more energy captured.

In 2000, renewable energy service provider NEG MICON, now Vestas Wind Systems, approached FibreForce. It wanted FibreForce's help to develop a carbon/wood composite stiffener, a predecessor of the 'spar cap'. NEG Micon, as it was, chose FibreForce because it was the largest pultrusion company in the UK and because it had the project-based R&D expertise to meet the company's needs.

In the early days of the development process, Dr. Hartley led the sales, technical planning, day-to-day operations and project management. Despite the scale of the task, product development was relatively fast. From the in-house testing stage, FibreForce moved through the development phase to initial production over two years. By 2002, the carbon flat was in full serial production with multiple machines and the company was manufacturing around 6,000 meters of carbon flat per day.



Spar cap

Development of the manufacturing method enabled this rapid progression from prototype to full production. Under Dr. Hartley's leadership FibreForce went from single - to three - and eventually six - stream production, and from hand-cutting to a fully automated saw system that cut and chamfered in-line.

The carbon flat evolved from a 40x6 mm carbon fiber strip, then 35x6 mm before Dr. Hartley's team and the customer settled on a 38x6 mm carbon vinyl ester plate with peel ply. Production continued until 2009, when the introduction of an alternative technology took the industry beyond the wood/carbon composite blade. In 2011, Mark Hancock of Vestas Wind Systems reintroduced carbon flats back into wind turbines, this time without the wood, and the 'spar cap' as it is known today was Introduced.

Product designers and engineers still use those original mechanical performance measurements of the 38x6 mm products in technical specifications, although this is approaching its performance ceiling. Over the last ten years, technological advances such as the use of epoxy resins have allowed the new 'spar caps' to exceed previous mechanical limitations. Now that this technology is established, wind turbine blades are pushed further and driven harder than before, leading to an increase in output capacity and a continuing increase in blade length.

Dr. Hartley is an active part of Exel Composites' expert - driven R&D process. Exel Composites works closely with the customer at all stages of research and design to ensure timely and cost-efficient delivery of its projects. As an expert

in pultrusion, the global manufacturer can bring guidance about all the possibilities for a range of customer applications.

(**Source**: Interplas Insights / 30.08.2024)

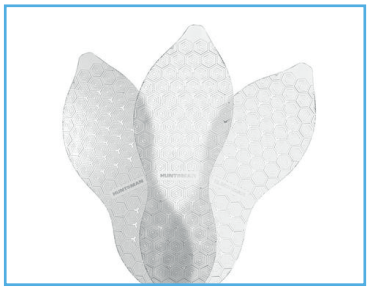
HUNTSMAN Launches Thermoplastic Soling Solution for Footwear

Key Highlights:

- HUNTSMAN has developed a new range of innovative, high - performing thermoplastic polyurethane (TPU) materials for the footwear industry that offer new possibilities for soling applications.
- The new AVALON GECKO TPU portfolio offers a series of products that have exceptional grip and durability and have been developed with circularity in mind.
- HUNTSMAN developed three grades of AVALON GECKO TPU: AVALON 6044 AG – an opaque, injectable grade, AVALON 6053 AG - a transparent, extrusion grade and AVALON 6055 AG - transparent, injectable grade.

HUNTSMAN has developed a new range of innovative, high - performing thermoplastic polyurethane (TPU) materials for the footwear industry that offer new possibilities for soling applications. The new AVALON GECKO TPU portfolio offers a series of products that have exceptional grip and durability and have been developed with circularity in mind. Tailor made for use in high performance soling applications, the range includes an extrudable grade for creating super thin outsoles and a product that can be foamed to produce a very low density and super soft material with a unique touch and feel.

Drawing inspiration from the extraordinary grip of geckos, products in the AVALON GECKO TPU portfolio offer comparable slip performance to rubber in both wet and dry conditions. A great choice for outsoles for running, hiking and safety shoes, the new GECKO TPU portfolio contains products that are soft (shore 60-65A) yet highly durable with excellent abrasion resistance.



To help ensure ultimate design and production versatility for its customers, HUNTSMAN has developed three grades of AVALON GECKO TPU:

- AVALON 6044 AG – an opaque, injectable grade that is ideal for safety shoes
- AVALON 6053 AG – a transparent, extrusion grade optimized for running applications
- AVALON 6055 AG – a transparent, injectable grade for exceptional wet slip performance.

The extrudable GECKO grade, AVALON 6053 AG TPU represents a major step forward in footwear – enabling the creation of outsoles that are up to 50% thinner and lighter than conventional outsoles, without compromising quality, performance or durability. The injectable AVALON 6044 AG grade has been developed to offer fast cycle times for improved productivity.

In addition, all AVALON GECKO TPU grades offer adhesive-free bonding when paired with other TPU midsole materials and, thanks to their compatibility, can be mechanically recycled with minimal impact on material performance*. They can also be easily colored and engineered to create different textures and surface finishes.

Matthew Canoy, global marketing director PU Elastomers at HUNTSMAN, said: “The development of AVALON GECKO TPU represents a significant advancement towards achieving circular footwear. Developed to be dependable, durable, and with circularity in mind, AVALON GECKO TPU materials ensure that sustainability and high performance are in lock step with one another, with no compromises. The feedback we've received from customers that have tested AVALON GECKO TPU products has

been incredibly positive. We are excited to launch the range and continue our conversations with footwear brands that want to get a gecko-like grip in their soling applications."

AVALON GECKO TPU was officially launched at the NW Materials Show in Portland, Oregon on August 28, 2024.

* Tests performed by HUNTSMAN on outsoles produced using regranulated AVALON GECKO TPU showed no signs of degradation in performance. The ability to perform mechanical recycling is dependent on end of life take-back programs and a recycling ecosystem are in place.

*Assuming End of Life take-back programs and a recycling ecosystem are in place.

(**Source**: Interplas Insights / 30.08.2024)

In Single Screw Extruders, Mixing Starts in the Melting Process

While the melting process does not provide perfect mixing, this study shows that mixing is indeed initiated during melting.

The melting process for plasticating, single-screw extruders is also an excellent mixing process. A low level of mixing can occur during pellet blending before being placed in the hopper. But the first major mixing process occurs during melting.

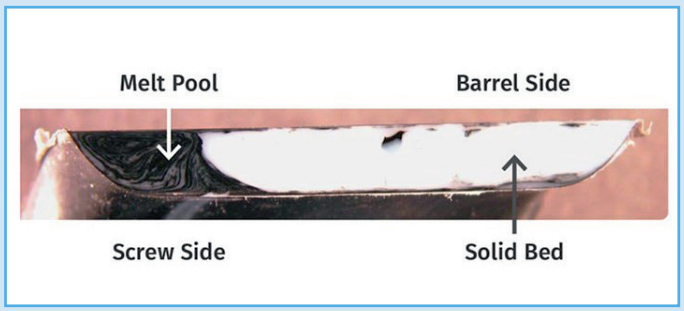


Figure 1 – ABS resin in the transition section after a Maddock solidification experiment. The feedstock mixture was 200 parts white ABS and one part black ABS in pellet form.
Source: M. Spalding

This mixing is obvious by studying the photograph in Figure 1. Here the feedstock was a mixture containing 200 parts of a white ABS terpolymer to one part of black ABS, both in pellet form. The cross section was taken from a Maddock solidification experiment where the feedstock was extruded and then the screw rotation was stopped. Next, full cooling was applied to the barrel.

After the ABS was solidified and at room temperature, the screw and plastic were pushed out of the barrel, and the plastic was cut off the screw. The areas that are white were solid, compacted pellets when screw rotation was stopped. The melting process occurred mostly in a thin melt film between the solid bed and the barrel wall. The molten resin was then conveyed to the melt pool by the rotation of the screw.

At the 200:1 ratio noted, the concentration of black pellets was so low that not a single black pellet is observed in the white region of Figure 1. The rotation of the screw causes energy to be dissipated in the melt film via high shear rates and shear stresses. The thickness of the melt film is between 0.010 and 0.020 inches. The energy dissipated conducts into the solid bed and melts the resin at the solids-melt film interface. The high shear stresses cause the mixing process to occur in the melt film. The melt pool where the freshly melted resin accumulates is relatively uniform in color, indicating the effectiveness of the mixing process during melting.

As shown, color striations between gray and black bands exist, indicating that mixing is not perfect. But going from a feedstock of mostly white pellets to a melt pool that is essentially black indicates the melting process is a great mixing process.

The excellent level of mixing occurs because the melt film is very thin, causing a high level of material elongation during melting. For example, the velocity of the solid bed is on the order of a few cm/sec in the downstream direction. When melting at the interface occurs, the molten material is stretched and accelerated in the cross-channel direction at a velocity nearly 10 times higher. Moreover, materials from many pellets are accelerated and mixed at the same time. Statistically, about 1/220 of the area at the melt film-solid bed interface would have a black pellet, yet the material at the entire surface at the barrel wall is tinted black once melting has started, as shown by Figure 2.

Figure 2 – A screw from a Maddock solidification experiment.

In this figure, the first three diameters of the screw do not contain any plastic. Here the pellets were at ambient temperature and very low pressure such that the pellets would not compact into a solid bed. They fell off the screw and to the floor when the screw was removed from the barrel. At diameter 4, the pellets were compacted but have not started to melt as indicated by the white color. That is, no melting and no mixing. By diameter five and all diameters downstream, the outside surface of the plastic was tinted black due to mixing during melting.

The melting process, however, does not provide perfect mixing, as shown by the melt pool in Figure 3. As melting occurs in the melt film, it is dragged over into the melt pool. The material entering the melt pool from the melt film creates a recirculation flow counterclockwise, creating color striations. These striations are clearly visible in Figure 3. For many applications, these striations would cause color defects in the final product. This imperfect mixing can be completed using a secondary mixing process such as a Maddock mixer positioned near the discharge of the screw. Operation and design of Maddock mixers was discussed in the March 2024 issue of Plastics Technology.

Figure 3 – Blowup of the melt pool in Figure 1 with the counterclockwise flow shown by the arrow.

The Maddock solidification experiment presented here clearly shows that primary mixing occurs during the melting process. The mixing occurs because of the thin melt film between the compacted solid bed and the barrel wall where the shear rate and shear stress are high. A secondary mixing process is needed downstream to guarantee a homogenous extrudate before forming the final product.

(**Source**: Plastics Technology / 10.09.2024)

GM, HYUNDAI Motor Agree to Explore Joint Vehicle Development Projects

The US and Korean automakers said they had signed a non-binding memorandum of understanding to consider ways to leverage their complementary scale and strengths to reduce costs.

The Two Car Companies Agreed In April 2022 To Develop A Series Of Lower-Priced EVs Based On A New Joint Platform. | FILE PHOTO: REUTERS

General Motors and HYUNDAI Motor Co said on Thursday they have agreed to explore future collaboration across key strategic areas including potential joint vehicle development, supply chain issues and clean - energy technologies.

The US and Korean automakers said they had signed a non-binding memorandum of understanding to consider ways to "leverage their complementary scale and strengths to reduce costs and bring a wider range of vehicles and technologies to customers faster."

Automakers face tens of billions of dollars in capital costs to build new electric vehicles and batteries, secure supply chains and develop advanced technologies like self-driving vehicles as they face stringent vehicle emissions regulations and heavy competition around the globe.

Potential collaboration projects "center on co-development and production of passenger and commercial vehicles, internal combustion engines and clean - energy, electric and hydrogen technologies," GM and HYUNDAI said.

Both companies have announced aggressive plans to ramp up electric vehicle production.

The two companies will also review potential combined sourcing in areas like battery raw materials and steel and plan to immediately begin assessing "opportunities and progression towards binding agreements."

The framework agreement was signed by Hyundai Motor Group Executive Chair Euisun Chung and GM Chair and CEO Mary Barra.

"Our goal is to unlock the scale and creativity of both companies to deliver even more competitive vehicles to customers faster and more efficiently," said Barra.

HYUNDAI Motor includes flagship Hyundai and its affiliate Kia, which together are the world's number three automaker by sales, while GM is the largest US automaker.

The automakers will "evaluate opportunities to enhance competitiveness in key markets and vehicle segments, as well as drive cost efficiencies and provide stronger customer value through our combined expertise and innovative technologies," Chung said.

In October 2023, HONDA Motor and GM scrapped a plan to jointly develop affordable electric vehicles, just a year after they agreed to work together in a $5 billion effort to try to beat Tesla in sales.

The two car companies agreed in April 2022 to develop a series of lower-priced EVs based on a new joint platform, producing potentially millions of cars from 2027 onwards.

(**Source**: Business Standard / 15.08.2024)

APTAR'S Nasal Unidose System to Deliver neffy® (epinephrine nasal spray), the First and Only FDA - Approved Needle - Free Treatment for Type I Allergic Reactions, Including Anaphylaxis

AptarGroup, Inc. (NYSE: ATR), a global leader in drug and consumer product dosing, dispensing and protection technologies announced that its Unidose Liquid System (Unidose) is the delivery system approved with NEFFY® (epinephrine nasal spray), the first and only needle-free treatment approved by the U.S. FDA for the emergency treatment of patients with allergic reactions (Type I), including anaphylaxis. This marks the first regulatory approval worldwide for nasally - delivered epinephrine.

APTAR'S Unidose is a single - use, ready - to - use, one - step nasal delivery system used to administer NEFFY to a patient during a severe allergic reaction. During such an event, the patient, healthcare professional, caregiver or user presses a small plunger on the bottom of the nasal spray system to release the drug in a single spray into the nostril.

Stephan B. Tanda, APTAR President and CEO, stated, “APTAR has been a leader in nasal delivery of medication for more than 30 years. We are proud of our role in the pharma industry to increase the use of nasally delivered medications that help promote adherence and ease of use for patients.”

Unidose (UDS) and Bidose (BDS) Technology Platforms

APTAR'S UDS and BDS technology platforms are designed to be robust, reliable and intuitive systems for easy administration by patients or caretakers. These drug delivery systems are designed and manufactured with strict quality controls intended to meet FDA's guidelines for reliability. They offer biotech and pharmaceutical company's effective and reliable single or two-shot intranasal delivery for a variety of medicines including for emergency use and treatments of severe conditions. They can also be integrated with wireless connectivity technologies.

Accelerated Development Support via APTAR PHARMA Services

This novel treatment for severe allergic reaction is an example of a Combination Product submission, and benefited from APTAR PHARMA'S SERVICES offering, a comprehensive portfolio of stage-specific development packages. APTAR'S dedicated Regulatory Affairs experts and analytical scientists help customers proactively address regulatory needs to help accelerate approval.

“The approval of NEFFY, which uses our Unidose System, and is the first nasally-delivered epinephrine treatment for severe allergic reaction, including anaphylaxis, once again demonstrates APTAR PHARMA'S 'formulation to patient' focus on helping our customers develop complex, innovative treatments,” stated Gael Touya, President, APTAR PHARMA. “When we combine our nasal systems' capabilities with our APTAR PHARMA Services offering, we bring added value to our customers, and aim to provide further convenience for patients and their caregivers worldwide.”

(**Source**: APTAR)

VTT Opens a Pilot Plant Utilizing Captured Carbon Dioxide in Espoo, Finland – Aiming to Process Biogenic Industrial Emissions into Long - Lasting, Recyclable Plastic

VTT, LUT University, and companies have opened a pilot plant in Espoo, Finland, to process captured carbon dioxide into compounds that can replace fossil raw materials in plastic products and chemicals. The pilot plant, built in sea containers, started operations in August. Renewable energy, the hydrogen economy and bio-based carbon dioxide emissions from industrial sectors open significant opportunities for Finland to create new sustainable industrial activity.

Finland wants to utilize bio-based carbon capture as one way of reducing greenhouse gas emissions. For example, the Government Programme aims to significantly increase the use of technological carbon sinks.

The Forest CUMP research project of VTT and LUT University has investigated how bio-based carbon dioxide from, for example, the forest industry and waste incineration can be captured and converted into high-value products such as polypropylene and polyethylene. The promising results will now be put into practice as VTT and its partners open a pilot plant built in sea containers in the Bioruukki pilot center in Espoo, Finland.

"Finland has huge potential to be one of the leading countries in utilizing bio-based carbon dioxide," says Juha Lehtonen, Research Professor at VTT.

"Finland produces around 30 million tonnes of bio-based carbon dioxide per year. If captured and converted into products, Finland could become a major producer and exporter of polymers and transport fuels made from carbon dioxide and hydrogen."

Polypropylene and polyethylene are the most common plastic types used in everyday life, which are currently mainly produced from fossil raw materials. Plastics play an important role in sequestering carbon dioxide in long - lasting products.

"The technology creates a significant export opportunity for renewable high-value-added products. Due to its extensive forest industry, Finland has a huge potential to utilize bio based carbon dioxide. Outside the Nordic countries, large sources of bio-based carbon dioxide are rare," Lehtonen says.

The business ecosystem covers the chain from factory pipes to plastic products

The Forest CUMP project is implemented in close cooperation with business partners as part of Business Finland's Veturi ecosystem, which supports sustainable development. One of the Veturi companies is Borealis. Forest CUMP is part of Borealis' SPIRIT programme, which promotes the green transition of the plastics industry.

"This is a significant development project to support our vision of capturing and utilizing industrial carbon emissions by producing long-lasting or fully recyclable plastic products that can sequester carbon for a long time," says Ismo Savallampi from Borealis.

The research project has studied the entire production chain from carbon capture to ethylene and propylene production. Ethylene and propylene are the raw materials for polyethylene and polypropylene. At this stage, they are produced at VTT Bioruukki from flue gas carbon dioxide. In the future, the technology can be brought into production wherever bio - based carbon dioxide is produced, such as in forest industry or waste incineration plants.

The Forest CUMP project, funded by Business Finland, is part of the Business Finland Veturi ecosystem, which develops various solutions towards sustainable development and national carbon neutrality together with major Finnish companies. The project started in August 2022 and will run until the end of 2024. The project involves the leading companies Borealis, Neste and ABB, as well as Metsä Spring, Kemira, Vantaa Energy, Stora Enso, Kleener Power Solutions, Carbon reuse Finland, Fortum and Essity. In addition to VTT, LUT University is a research partner.

VTT's pilot equipment for converting carbon dioxide into synthesis gas. Synthesis gas produces ethylene and propane gases for polymer production.

(**Source:** VTT / 15.08.2024)

Study Claims Basic Polymers can be Recycled up to 10 Times

Scientists conducting the study used extrusion, granulation and grinding to simulate the recycling of polymers including HDPE, PP and PVC, among others.

The Moscow - based Russian Chemists Union and the Chemical Industry Development Aid Fund have completed a large-scale study at Rosbiotech University centered on the quality of repeatedly recycled polymers. The study claims that after being recycled as many as 10 times, these materials retain operational properties comparable to those of primary polymers.

Scientists involved in the study used extrusion, granulation and grinding to simulate the recycling of basic polymers. To assess the quality of the materials, they used criteria comprising six indicators: molecular weight, breaking stress, relative elongation at break, oxygen - containing groups, yellowing and melt flow.

Scientists say the study shows that high - density polyethylene (HDPE) and polyvinyl chloride (PVC) retain their operational properties after being recycled 10 times; low - density polyethylene (LDPE) nine times; polypropylene (PP) eight times; and polystyrene (PS) five times.

The researchers say results were obtained without using stabilizers — additives that protect polymers from degradation, adding that the study confirmed that polymers offer “excellent potential for use in a circular economy.”

The Russian Chemists Union shared its findings with the Russian government. The group has proposed developing a methodology for recycling basic polymers and identifying areas where they could possibly be used, saying "advances in recycling will help reduce the environmental fees that polymer processors will have to pay in the future.”

The Russian Chemists Union is a nonprofit organization that includes companies in the chemical sector, industry researchers and educational institutes, as well

as chemical unions and associations. Currently, the union claims around 600 enterprises and organizations as members.

(**Source:** Recycling Today / 05.08.2024)

LYB to Acquire APK AG Recycling Technology

Expands Company's Technology Portfolio and Circular Hub

- Acquisition increases LYB Circular and Low Carbon Solutions Business and diversification of innovative recycling technologies
- Transaction encompasses existing assets and planned growth projects

ROTTERDAM, Netherlands, Aug. 22, 2024 / PRNewswire/ -- LyondellBasell (LYB) today announced it entered into an agreement to acquire full ownership of APK AG in Merseburg, Germany. Enabled by its technology, the acquisition positions LYB to grow and upgrade its Circular and Low Carbon Solutions business.

Closing of the transaction is subject to customary closing conditions. LYB believes APK's solvent-based recycling technology is a perfect fit with its already existing mechanical and advanced recycling technologies. Therefore, it already invested in the company in the past and made collaborative efforts on bringing the technology to scale. By acquiring APK, LYB secures the future of the company after it entered into insolvency at the end of May 2024.

"We see APK's solvent based recycling technology as a vital addition and complementary to our existing and future mechanical and advanced recycling operations. This is an important further step toward reaching our goal to produce and market at least 2 million metric tons of recycled and renewable based polymers annually by 2030," says Yvonne van der Laan, LyondellBasell Executive Vice President, Circular and Low Carbon Solutions. "The highly motivated culture of APK will be an excellent fit for LYB. We want to build on the excellent progress of APK and fully leverage its expertise of R&D, project engineering and operations teams, solidifying our position as an industry leader in sustainability."

"We are very pleased that we entered into an agreement with LYB, securing the future of the company," says Steve Döring, CEO of APK AG. "With its ambition to be a global leader in circular solutions and technologies, LYB is a perfect strategic fit that allows investments into growth opportunities ensuring that our unique solvent recycling technology can realize its full potential."

The recycling technology is a unique solvent-based kind for low density polyethylene (LDPE). LYB aims to increase the recycling of hard-to-recycle flexible plastic waste materials – which today make up the majority of mixed plastic waste from the consumer sector. The technology separates the different polymers of hard to recycle, flexible plastic waste materials and produces recycled materials with a high degree of purity suitable for new flexible packaging of, for example, personal care products. The materials produced will be sold under the LYB Circulen portfolio.

In March 2023 LYB revealed its pivotal, new company strategy aiming at establishing LYB as an industry leader in sustainability. LYB has formulated ambitious plans to create access to best - in - class innovative and differentiated technologies, and as a key element of its new strategy formed a dedicated Circular & Low Carbon Solutions (CLCS) business. CLCS has started to make substantial investments upstream in plastic-waste sorting and recycling operations in Europe, the United States and Asia.

(**Source:** PR Newswire / 22.08.2024)

Broadway Launches Grapheme - Enhanced Master Batches

Key Highlights:

- Broadway is introducing GrapheneXcel, a new range of graphene - enhanced master batches as a result of strategic partnerships with leading graphene suppliers.
- GrapheneXcel significantly increases the tensile strength of plastics, making molded components much stronger and more durable.
- GrapheneXcel enhances the elastic modulus of plastics, making them stiffer and more rigid. This improvement allows for better performance under mechanical stress and is ideal for structural applications.

Colored Plaques including GrapheneXcel

Broadway is introducing GrapheneXcel, a new range of graphene-enhanced master batches. This launch is the result of strategic partnerships with leading graphene suppliers. It enables the ISO-certified, UK master batch specialist to bring the numerous advantages of graphene to a diverse customer base within plastic manufacturing.

GrapheneXcel leverages the unique properties of graphene to improve the performance of polymers used across many industries, including automotive, defence, packaging, and consumer goods. The benefits include significant improvements in strength and durability, as well as improved barrier properties and the opportunity for product light weighting.

GrapheneXcel is a made to order additive master batch, with formulations customized to meet individual customer requirements. Thanks to polymer-specific carrier systems, GrapheneXcel offers compatibility with a range of polymers including polyolefins and PET.

What is graphene?

Graphene was discovered just 20 years ago at the University of Manchester. This remarkable material has rapidly gained attention for its extraordinary properties. Like diamond and graphite, graphene is composed entirely of carbon. However, uniquely, it consists of just a single layer of carbon atoms arranged in a honeycomb nanostructure. This arrangement includes numerous double bonds, contributing to its exceptional characteristics.

Graphene's atomic structure gives it unparalleled strength– as a single layer it's the strongest material ever measured, boasting a tensile strength 200 times greater than that of steel. This offers immense potential to a range of industries, including plastic manufacturing.

What are the benefits of use in plastics?

Broadway now brings the benefits of graphene into plastic manufacturing, via GrapheneXcel – their new range of graphene-enhanced master batches. Even at low addition rates, the incorporation of graphene into plastics can dramatically enhance the performance of the material, providing improved strength, durability and versatility.

Different forms of graphene offer different qualities. Thanks to partnerships with leading suppliers, Broadway is able to provide cost-efficient, customized variations of GrapheneXcel – tailored to deliver the specific advantages each customer requires.

Here's a summary of the key benefits:
Improved mechanical strength and impact resistance

GrapheneXcel significantly increases the tensile strength of plastics, making molded components much stronger and more durable. This is especially important in applications where durability and safety are paramount, such as in automotive parts and protective packaging. Typically, in polypropylene (PP) and polyethylene (PE) applications, the addition of graphene at a loading of just 0.2% – 0.5% can result in a 10% – 20% improvement in impact resistance and tensile strength.

GrapheneXcel master batch samples

Increased elastic modulus

GrapheneXcel enhances the elastic modulus of plastics, making them stiffer and more rigid. This improvement allows for better performance under mechanical stress and is ideal for structural applications.

Weight reductions (through thin - walling)

Despite its strength, graphene is lightweight. The inclusion of GrapheneXcel allows manufacturers to reduce the wall thickness of plastic components while maintaining or even increasing their strength. Light weighting can be highly advantageous in packaging and automotive components, where weight reductions can lead to cost savings, tax reductions, improved efficiency and increased range in the case of Evs.

Impressive barrier properties

The tight, hexagonal lattice structure of graphene is impermeable to gases and liquids, making it an excellent barrier material. GrapheneXcel can bring this property to packaging, where the prevention of gas exchange andreduction of UV light penetration is crucial for extending the shelf life of perishable goods.

Favourable processing conditions

The addition of GrapheneXcel can improve the flow properties of plastics during processing, leading to more efficient manufacturing processes and improved consistency in moldings. Reduced cycle times have been achieved, delivering productivity improvements, alongside reductions in energy demand and carbon emissions.

Improved fire retardancy

GrapheneXcel can enhance the fire retardancy of plastics, making them safer for use in various applications, including construction and electronics.

With which polymers is GrapheneXcel compatible?

As they do with colors, Broadway will formulate customized variations of GrapheneXcel. Supplied as an additive master batch, various carrier resins can be used to ensure optimum compatibility with the customer's molding material. Broadway provides polymer specific master batches for use in HDPE, LDPE, PPCO, PPHO, PET, PBT, GPPS, HIPS, ABS, PA66, PA6, SAN, PETG, TPE and TPU. The type of graphene and the loading can also be adjusted to suit specific manufacturing conditions and end user requirements.

Can GrapheneXcel be used in recycled plastics and bio plastics?

Bio-based and recycled polymers often suffer from reduced mechanical strength, so the addition of GrapheneXcel can counteract this. This is increasingly relevant, with PCR and bio plastics being more widely used in packaging and single use applications.

What impact does it have on color?

When GrapheneXcel is used in its uncolored form, it imparts an appealing, metallic grey finish to molded components. This distinctive finish comes from the inherent color of the graphene. This grey tint does limit the range of colors that can be achieved in the end component. Broadway's expertise in color formulation allows them to mitigate the impact of graphene on color to some extent. When using modest loadings of graphene, Broadway is still able to achieve a variety of colors in the final product.

Costs, samples and technical support

GrapheneXcel is surprisingly cost effective. The low addition rates help to make GrapheneXcel a commercially appealing option. Broadway's customers have nothing to lose in requesting a free material sample to trial. Broadway's value extends far beyond supplying high quality materials. From their Suffolk-based manufacturing facility, they promise security of supply, attentive customer service, and expert technical support. Their in-house testing capabilities enable thorough analysis of GrapheneXcel's impact on molded samples, allowing customers detailed insights into the material's benefit.

Technical Director Dr. Stephen Rayner said: “Broadway is proud to launch this new range of graphene enhanced master batches (GEM). Our GEMs unlock a new era of enhanced materials, allowing our customers the possibility of new and improved applications. The breakthrough combination of strength, conductivity, and versatility will redefine what is possible for our customers. Broadway continues to strive towards and support a future where performance meets sustainability.”

(**Source**: InterplasInsights / 05.09.2024)

NPE2024 Materials: Spotlight on Sustainability with Performance

Across the show, sustainability ruled in new materials technology, from polyolefins and engineering resins to bio based materials.

In its return for the first time in six years this past May, NPE2024 was excellent in terms of plastics manufacturing technology on display, including new materials. Also significant: the fact this event is reported to have been the largest gathering for bio plastics companies in America.

Also noteworthy was the presence of two major polyolefin newcomers: Shell Polymers, which participated in NPE2018, with its broad range of LLDPE and HDPE for all key PE markets; and Heartland Polymers, which began commercial production in 2023, highlighting its broad range of PP resins. Yet another, was the presence of two new global engineering resin entities: SYENSQO, the December 2023 spinoff of Solvay Specialty Chemicals, and Envalior, which emerged in April 2023, bringing together the complementary suppliers DSM and Lanxess. Sustainability, in one way or another, was at the core of nearly all new developments but always with performance attributes and an emphasis on collaborative efforts for a range of resins from polyolefins and engineering resins to bio based materials.

Enhanced and Sustainable Polyolefins

Nearly all the key polyolefin suppliers have been launching and expanding on new, more sustainable resin offerings between the K2022 and NPE2024 shows. Certified circular polymers — generated by mechanical or chemical recycling — with PEs and Pps available from ExxonMobil, SABIC and LyondellBasell, as well as PEs from NOVA Chemicals, Braskem and Dow (PE), were a big part of expanded portfolios. Additional material and design advances were shown, particularly in the packaging arena, which enable less plastic use while offering enhanced performance.

ExxonMobil launched Enable 1617, an ethylene 1-hexene copolymer designed to deliver enhanced processability and films that exhibit superior optical properties such as haze and gloss, particularly in thin-gauge, hand-wrap stretch-film applications. This performance PE delivers improved tenacity for higher load stability and stronger holding force. This resin is said to combine two key and seemingly opposite features — high flow and high tenacity — which result in improved cast film processing, exhibited by faster line speeds, lower pressures and lower motor loads when compared to incumbent high-tenacity grades. The balanced properties provide the opportunity for thinner gauge film and consistent extrusion, which is one of the most important stretch-film qualities. As reported in PT's July issue, Colines' AllRollEx line produced high-tenacity hand-wrap film at a thickness of 8 microns containing 35% postconsumer recycled (PCR) material along with Enable 1617.

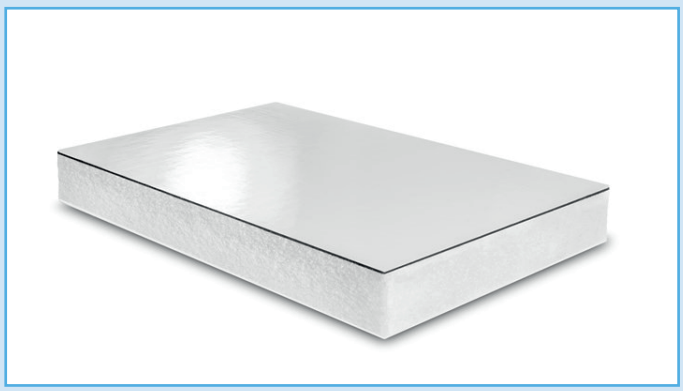
Enable 1617 combines two seemingly opposite features — high flow and high tenacity — which results in great cast film processing. Source: ExxonMobil

Nova Chemicals highlighted its capital investments to grow its thin - wall injection molding (TWIM) product portfolio, and to reintroduce Surpass IFs730 and IFs932 high - melt index injection molding grades. Both are designed to meet the demands of fast - paced injection molding processes and provide versatility and compatibility when run on different production/conversion lines. Key features include enhanced shear thinning for processability; fast cycle times; antiwar page properties; and broad food contact and end-use compliance. NOVA also undertakes at-line testing of its resins during production to supply consistent, defect-free PE.

Heartland Polymers emphasized the positive engagement it has received in the PP film extrusion market with one of the “highest quality resins” in the nonwoven and thermoforming sectors. The company is also adding random copolymers to its production mix this year, which it positions as well suited for the food and packaging industry.

Structural and insulative properties in blow - molded air ducts for automotive applications have also been demonstrated with PP - UMS. Source: SABIC

A very high melt strength PP that boasts outstanding foamability was highlighted by SABIC in two diverse transportation applications. SABIC's PP - UMS (polypropylene - ultra melt strength) enables the extrusion of PP foams with very low density, excellent impact resistance and VDA 278 emissions regulations compliance. SABIC PP-UMS foam resins processing versatility enables PP foams, subject to user testing, to be used in structural cores for sandwich panels in delivery vans, trucks and recreational vehicles (RVs), and to provide structural and insulative properties in blow-molded air ducts. Examples of both applications were displayed to illustrate the suitability of this foam resin for broad use in transportation components that can benefit from significant weight reduction and potential cost optimization.



PP - UMS foam resin's processing versatility enables PP foams, subject to user testing, to be used in structural cores for sandwich panels in delivery vans, trucks and RVs. Source: SABIC

SABIC also highlighted its new STAMAX 30YH570 long-glass fiber PP for electric vehicle (EV) batteries by sharing test results that underline the potential of thermoplastic - based thermal runaway barrier solutions to prevent fire spread in EV batteries. The SABIC subsystem level test series showed that a battery module box made from this resin with intercellular thickness as low as 1 mm has the potential to provide the needed thermal insulation and flame resistance to reduce the chances of cell-to-cell propagation in a thermal runaway scenario, mitigating the risks of a catastrophic safety incident.

Range of Engineered Resins

Polymer Resources features an unfilled, impact-modified PBT grade for diverse electrical applications, such as telecom enclosures; electric vehicle charging infrastructure covers; residential and commercial plugs, switches and outdoor enclosures for sprinkler controls; and industrial electrical and cable boxes. The new TP-FR-IM3 PBT is said to deliver a complete array of high - performance properties, including excellent weatherability; high chemical and impact resistance; and flame retardance for outdoor, intermittent outdoor and indoor components like enclosures and housings.

TP - FR - IM3 PBT is said to deliver excellent weatherability; high chemical and impact resistance; and flame retardance for outdoor, intermittent outdoor and indoor components. Source: Polymer Resources

Injection molding TP-FR-IM3 resin has earned all-color certification under UL743C F1, demonstrating UV and water resistance for excellent weatherability. It is also said to boast better chemical resistance than competitive UL F1-certified grades, enabling it to resist degradation from exposure to organic acids, inorganic aqueous salts, alcohols, and mild acid and base solutions, which can lead to stress cracking. It meets both the UL94 V0 and UL94 5VA standards for flame retardance at 1.5 mm (0.06 in.), and provides good mechanical performance, including high impact resistance.

Another high-performance PBT, VALOX HX325HP, as previously reported, is a new high-flow medical grade from SABIC developed for the injection molding of high-precision parts used in diabetes management. Included are components of insulin delivery pens, insulin pumps, auto injectors and continuous glucose monitors, where this resin is said to offer outstanding processability with high chemical resistance and validated biocompatibility.

Polymer Resources highlighted its expanded portfolio of sustainable engineering resin compounds, containing at least 50% recycled content, as previously reported. Initial commercial offerings include a low -, medium - and high - flow PC, as well as a PC/ABS. The portfolio has been expanded to include several flame-retardant products listed by Underwriters Laboratories (UL) in natural, black or custom colors.

SYENSQO showcased its extended OMNIX ECHO portfolio of circular nylon 6 and 66 resins, with five new high - performance grades providing mass-balanced allocated recycled content between 33% and 98% from postconsumer and/or postindustrial (PCR/PIR) sources, including fibers. This included food - and nonfood contact grades.

Other new nylons launched included long - chain versions such as 610 and 612 grades from Nylon Corp. of America (NYCOA) as part of the company's 'transformation' into a specialty nylon company, as reported previously. They are suitable for a wide range of processes, including injection molding, extrusion, blow molding and roto molding.

NYCOA also launched the new NXTamid L family, said to exceed the performance of nylon 11 and 12 in many applications with a broad range of customization options. Also new from NYCOA is the NXTamid L nylon family, said to exceed the performance of nylon 12. Compared to standard nylon 12, NXTamid L features a tunable backbone, higher service temperature and low extractable. It delivers sustainability benefits with a 25-60% bio based composition.

NYCOA has also developed amorphous 6I/6T nylons called NY-Clear, which are said to offer higher temperature resistance, lower moisture absorption and better retention of properties compared to nylons 6 and 66. Intended uses are in flexible food packaging that requires high strength and stiffness, as well as hydrolysis resistance.

Bio based and PUR / PIR Recycled - Content Materials

PHA (polyhydroxyalkanoate) producer CJ Biomaterials introduced Phact S1000P semi crystalline PHA (scPHA), which is TÜV OK - certified for home and industrial composting, as well being a TÜV OK-certified marine and soil biodegradable material.

The company entered the PHA market in 2022 when it introduced Phact A1000P, its amorphous PHA (aPHA) solution. Compared to scPHA and crystalline PHA, aPHA is a softer, more rubbery version of the biopolymer which offers different performance characteristics. The new PHACT S1000P is a more rigid variety of PHA better suited for applications that require high heat stability. It can be processed using various conversion technologies, such as injection molding, thermoforming and extrusion. Phact S1000P is also included on the U.S. FDA Inventory of Effective Food Contact Substances (FCS), joining Phact A1000P. As such, CJ Biomaterials' aPHA and scPHA can both be used to manufacture food-contacting packaging materials that are sold in the U.S., including rigid and flexible packaging, food service ware and other products.

BASF showcased two mechanically recycled engineering resins for automotive and other applications. NYPEL nylon, which can be made from PCR and/or PIR materials, is currently being used to produce air intake manifolds in automotive. Petra thermoplastic polyester, which is based on 100% PCR and PIR PET, is currently used in serial automotive production for large structural parts.

KRAIBURG TPE presented both a new line of TPE compounds incorporating PIR and / or PCR materials, and a new line of bio based TPE compounds, tailored for consumer goods, industrial and automotive applications.

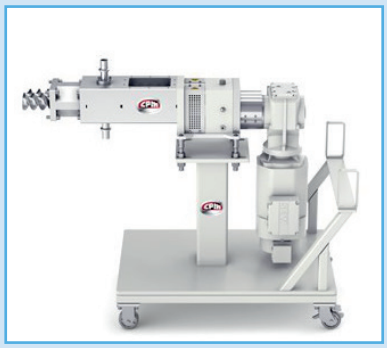
The former are PP-based TPE compounds while the latter, Thermolast R, are derived from renewable raw materials that are said to reduce carbon footprint by up to 50% compared to conventional non-renewable alternatives.

TEKNOR APEX, exhibiting together with UBQ Materials (the Israeli climate tech developer of advanced materials made from unsorted household waste), highlighted the deepened collaboration of its more than 2-year partnership with TEKNOR'S expanded development of sustainable TPE compounds containing UBQ materials. The focus is on durable goods, ranging from industrial to consumer applications.

(**Source:** Plastics Technology / 13.09.2024)

High - output side feeder for compounding

Unit is designed to match the requirements of feeding low bulk density fillers and materials in the compounding process.



CPM's newest side feeder is designed to match the requirements of feeding low bulk density fillers and materials in the compounding process. The design focuses on applying vacuum on a micro porous filter in - liner, which can be frequently back flushed and installed into a standard side - feed barrel. The filter element will avoid any blocking of the vacuum unit by emerging powder / particles and can be manually back flushed by compressed air.

The vacuum level is adjusted according to the bulk density of the material to achieve the most efficient conveying effect of the low bulk density material. The liner is divided into two vacuum sections which are controlled individually to enable continuous densifying during purging cycles.

Benefits include:

- Improved feeding efficiency for low bulk density materials
- Double vacuum chamber for continuous densifying effect
- Enlarged vacuum surface area
- Automated suction / back flushing controls
- Fast and easy adaption to any machine
- Wear protection
- Fast changeover time with quick removable system
- System available with screw diameter from 25 mm to 120 mm.

(**Source:** CPM)

Slide Retainer Features Positive Locking Connection

Hasco's Z1899/... compact slide retainer applies a ball catch for reliable locking.

Hasco has expanded its range of square, round and rectangular slider housings/locking heels and slide retainers with the new Z1899/... slide retainer.

Providing a positive locking connection for secure slide positioning, the slide retainer uses a ball - catch mechanism for reliable locking.

The compact shape and the screw-joint design of the slide retainer enable simple and fast replacement, with assembly and removal possible from the tool's parting plane. The slide retainer has high - temperature resistance up to 250°C, with retention forces of 16 to 63 N.

Hasco's Z1899/... new compact slide retainer features a ball-catch locking mechanism. Source: Hasco

(**Source:** Plastics Technology / 19.08.2024 / Tony Deligio)

KraussMaffei Unveils Cost - Effective Power Molding Machinery Range

KraussMaffei introduces the powerMolding range, a cost - effective solution manufactured in Asia, fully backed by KraussMaffei's European center of excellence and global servicing network.

These two-platen injection molding machines offer the reliable quality, service and aftersales support expected from KraussMaffei, with automation integration and a lower cost of ownership and quick delivery.

Designed to meet the demands of today's fast-paced manufacturing markets, powerMolding machines offer:

Simple

- Cost - effective price point
- Fast availability
- Easy to operate

Reliable

- High precision and repeatability
- Proven and robust machine design
- Ongoing support from KraussMaffei UK and the Global KraussMaffei service team

Flexible

- Easy to connect linear and industrial robots
- Digital data exchange and tracking
- Pick - and - place with LRX Easy Control

With the release of the PowerMolding range, KraussMaffei aims to support and advise a wider range of manufacturing companies in the UK and Ireland, in a variety of industries.

Three Key Decisions for an Optimal Ejection System

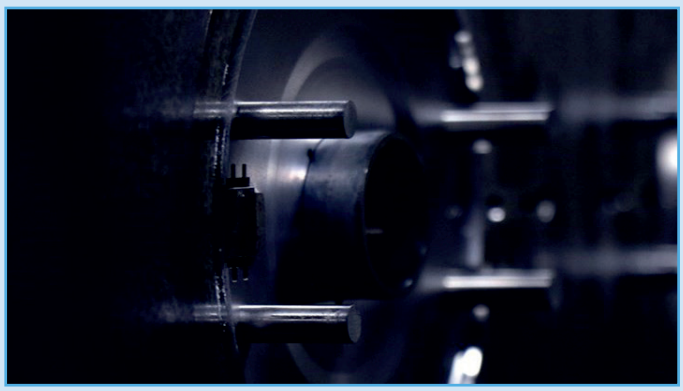
When determining the best ejection option for a tool, molders must consider the ejector's surface area, location and style.

Injection molders want plastic parts to eject easily, consistently, quickly. Parts getting stuck causes damage and can break mold components, resulting in longer cycle times, manufacturing delays and increased costs. An experienced mold maker knows how to manage the complexities of your mold design with the necessary ejection strategy, improving your part quality and saving you time and money over the life of your mold. For the optimal ejection system, your primary considerations should include ejection surface area, location and type. Let's delve into these separately.

Ejection Area — Smaller Features, Bigger Problems

Proper ejection is based on part size and geometry. Applying an insufficient ejection surface area results in component breakage, part deformities and slower cycles. Instead, you want to steer towards larger ejection surface areas.

Smaller ejection features on the plastic part require smaller ejection components. These smaller components can introduce both installation difficulties and wear and breakage risks during use because of their fragility. These factors ultimately increase costs for both the tool build and long-term maintenance. Best practice tells us to avoid using knockouts (KOs) under 3/64-in. diam. Thin walls in plastic parts require custom-made thin-wall ejector sleeves. Molders should know that these types of sleeves are not only expensive to manufacture but they will also not last as long as a standard sleeve.

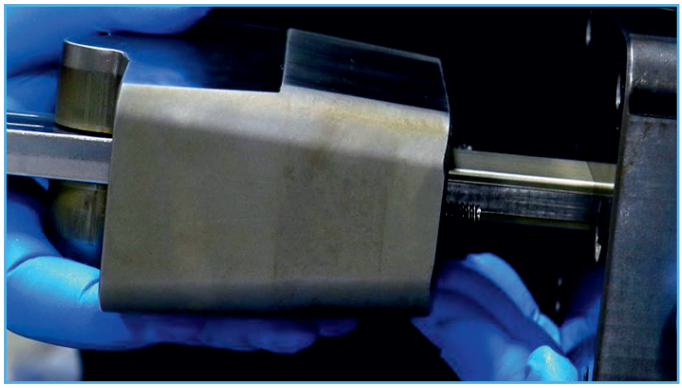


Ejector pins offer the simplest and most cost-effective ejection system.

Ejector Location — Flatter Is Better

The ideal surface for ejection is a flat one allowing the use of KO pins ground to the proper height. In the case where a feature does not provide a flat surface, the ejector component can conform to the part geometry. In some cases, severe contours could actually require part-design alterations. Keep in mind that recessed flats promote proper ejection because they provide a surface parallel to the parting line, making the plastic part easier to knock out.

Insufficient ejectors cause plastic part imperfections and ejector breakage, so molders should err on the side of more ejectors than might be required. However, that principle must be weighed against the fact that too many ejectors ultimately increase wear and cost of the mold. In addition, ejectors placed too closely together will result in thin-wall conditions in the steel mold.



Primarily used to form undercuts, lifters can provide ejection functionality in conjunction with other ejection systems.

An adept mold maker optimizes the number of ejectors while maintaining proper steel conditions. You want your mold maker to balance the layout of the ejector locations to uniformly lift the part.

Ejection Type — Pros and Cons

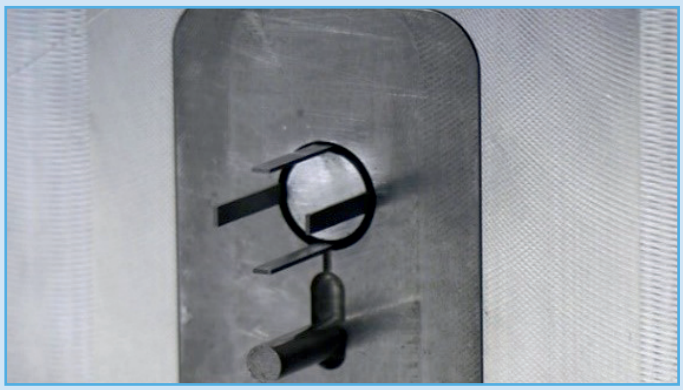
In an ideal world, your mold maker would use only KO pins in your plastic injection mold. However, most injection molded parts are just not that simple. Common ejector options include pins, blades, sleeves, bars, stripper plates and lifters — and each option brings its own tradeoffs. Different ejection options will leave different sizes and shapes of marks on the part and require different levels of maintenance.

Ejector pins offer the simplest and most cost-effective ejection system. As the default ejection system, they leave solid circular ejection marks on the part. The injection molding process subjects ejector pins to a great deal of pressure during ejection, so larger pin diameters present a safer option. When ejector pins cannot fit within the allowable ejection area, blade ejectors offer a good alternative. These flat, rectangular pins can eject on thin part regions. Blades have more surface area than pins, so they can wear down more quickly. Because of their high wear, blade ejectors can be integrated into the mold as inserts for easier replacement.

Ejection sleeves distribute force evenly across small, circular features. The mark left on the part at the end of ejection mirrors the shape of the sleeve.

Maintenance for sleeves involves checking the fit of the outside of the core pin to the inside of the sleeve. Checking this reduces the risk of plastic flashing into the ejection system. Ejector bars offer a good option for ejection on lengths of flat surface. Ejection bars utilize multiple pins topped by a flat bar that evenly distributes their force. Unlike the preceding ejection systems, these tend to be larger and can utilize multiple pins beneath the bar. Because of their bigger size and high customization, ejector bars are typically high - cost and high-maintenance as the mold gets more wear.

Stripper systems eject a part on its perimeter. Maintenance involves ensuring that the stripper plate or block sits flush with the rest of the mold. At the part level, the need for mold maintenance can be evaluated by checking for flash on parts at the parting line of the stripper plate or bar.



Ejector blades have more surface area than pins and can therefore wear down more quickly.

Used primarily to form undercuts, lifters also provide ejection functionality in conjunction with other ejection systems. Unlike vertical ejection systems, lifters angle in the core plate. This allows the lifter to clear the undercut for ejection to take place.

The injection mold designer should follow the preferred order of ejection types. KO pins are reliable, inexpensive to purchase, easy to install, easy to maintain and easy to modify. Sleeves increase the expense to purchase and install. KO blades require extra cost for the pocket and fitting. Strippers offer the most expensive of the ejection options since they are a completely custom component driven by the part geometry.

A robust ejection strategy will improve the quality of the parts, optimize the immediate and long-term costs related to the mold, and increase the time the mold spends making parts, while the wrong ejection system can decrease uptime and curtail the life of your mold.

Servo - Electric Core - Pulling Units

SERVOMOLD to introduce SLY-type core pulls with ball-screw drives to position slides, cores and plates with micron - level accuracy.

SERVOMOLD, a supplier of injection mold tooling automation, is presenting a new generation of SLY-type, servo - electric, core - pulling units, positioning them as a compact, powerful and clean alternative to hydraulic and pneumatic cylinders. Equipped with ball screw drives, the core-pull units can achieve positioning of slides, cores and plate movements in injection molding tools with accuracy down to the micron, according to SERVOMOLD.

To ensure such accuracy, the unit's carriage contains precision bores with special, fine-centering elements for the assembly of universal slides. In addition, linear guides are integrated into the units versus slide guides inside the mold frame. SERVOMOLD says placing these outside the mold frame enables more compact tools and reduces maintenance costs.

Typical applications for the cleanroom-compatible linear motion systems are sleeve-shaped parts, including medical housings and cartridge holders for applications like auto-injectors. All versions are suitable for mounting on both new and existing molds as a retrofit.

The SLY-S-150 core pull has a 150-mm stroke, with a 100-mm stroke for the SLY-S-100 and 75-mm for the SLY-S-075. Thrust of 6 kN is standard, and a retrofittable planetary gear box can double that value to 12 kN. SERVOMOLD says different slider bodies can be mounted on the carriage, enabling application-specific systems, while multistage movements can be tailored to a specific demolding process. Optional motor brakes securely hold the system in position in the event of a power failure.

All actuators are controlled via the Servo MoldControl (SMC), which includes a touchscreen and automatic switching between different encoder systems. Depending on the configuration, the system can control up to eight servo drives. SERVOMOLD products are distributed in the U.S. and Canada by DME.

(**Source**: Plastics Technology / 9.26.2024)

SIRMAX Adapts Integrated Recycling Approach to US Supply Conditions

Integrating compounding and recycling to leverage untapped post-industrial recycling feedstocks.

In the automotive industry, recycling plastic was a way to cut cost and seen as a quality compromise — something that suppliers might do, but certainly would not advertise. The Italian compounder SIRMAX defended its reputation by avoiding recycling entirely.

"Until recent times, we prided ourselves on not using any recycled materials. We were only making prime, because that was what highly technical applications were demanding. Things have changed," says Lorenzo Ferro, U.S. country manager for SIRMAX

Today, brands (including vehicle brands) are competing to outdo each other for buyers who want the greenest product, making pledges to use sustainable materials like recycled plastics. In the EU, where SIRMAX still has its largest footprint, forthcoming changes to the End of Life Vehicle directive are expected to mandate that 25% of plastic used in new vehicles come from recycling. But competition could boost ratios even higher.

For quality control and the security of long-term supply, SIRMAX has opted for preparing its own recycled materials from available postconsumer sources. "We wanted to do recycling with the same quality controls we do today for compounding, and apply those standards in recycling," Ferro says. SIRMAX purchased a recycling plant in Italy in 2019, where the company processes polypropylene from post-consumer sources.

Different Recycling Approaches for Europe and North America

SIRMAX has undergone a global expansion in the past 10 years, seeking to provide its customers, which are also global, with service local to their manufacturing operations in the Americas and Asia as well as Europe.

The SIRMAX compounding plant and adjacent recycling plant in Anderson, Indiana, on the former site of Guide Lamp.
Source: SIRMAX

SIRMAX came to North America in 2015, with the construction of a compounding plant in Anderson, Indiana. The location was a brownfield site, formerly home to Guide Lamp, a division of General Motors. In 2022, SIRMAX started up a new recycling plant, immediately adjacent to the original plant, with the goal of supplying the company with its own recycled content.

The company found that sources of PCR were inadequate when it came to polypropylene. Polypropylene in the United States is increasingly collected as part of single stream curbside recycling programs in some municipalities, but collection programs vary widely and the resulting product is often contaminated with other materials such as HDPE.

Many companies have been successful using PCR PP for applications where a mixture of resin materials has limited or no real downside. But SIRMAX sells more technical products used in such applications as automotive interiors, which need to meet rigorous dimensional and performance standards, and have low odor and low emissions.

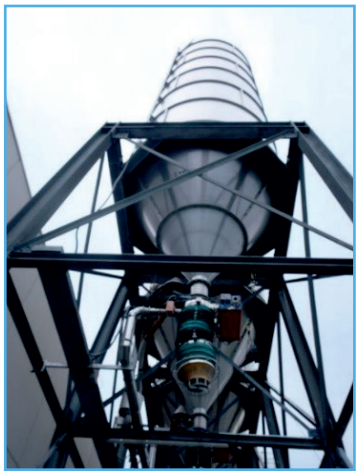
SIRMAX was also concerned with the consistency of supply. However, sources of post - industrial or pre - consumer polypropylene abound. Supply of good quality industrial material is more abundant in the U.S. than in Europe. "In the U.S., we found sources of material that have not been available in Europe for the past 20 years," says Marco Pavin, U.S. product director at SIRMAX.

SIRMAX found that sources of PP-based flexible packaging, non-woven and hard-to-recycle streams were underutilized and readily available. The difficulty of handling and processing these lightweight materials have kept many away, but SIRMAX has been able work with equipment suppliers to develop procedures and equipment configurations to successfully process these materials. By using integrated recycling operations, the company has greater visibility into any future changes in availability. The recycling plant can also purpose - make material for the compounding plant.

"The compounding plant has a reliable supplier of recycled raw material, that they can ask, 'Ok, I need this material with these properties, can you make it for me?' and the recycling plant will based on the materials available, control and produce for that application," Ferro says. The integration also serves as a diversification for SIRMAX If the compounding business faces economic headwinds, the recycling business can carry on making and distributing recycled polypropylene into other industries.

Anticipating Long - Term Growth in Recycling

For quality and consistency, SIRMAX focuses on PIR for now. In the future, if changes improve and homogenize the U.S. recycling infrastructure, SIRMAX can shift to processes it has developed for PCR in Italy. Capacity for recycling is currently up to 40 million lbs/yr and the adjacent compounding plant can produce up to 105 million lbs/yr. In addition, SIRMAX has room to expand and build even more capacity on the 35 - acre Anderson site.



This SIRMAX loading station can load a bulk container in 20 minutes.
Source: Matt Stonecash

“Today, 90% of what we are producing is completely virgin,” Ferro says. “But, most of the samples that are going out to customers for new projects have recycled content inside, and in 90% of the meetings we have with customers, there is sustainability and recycling involved.”

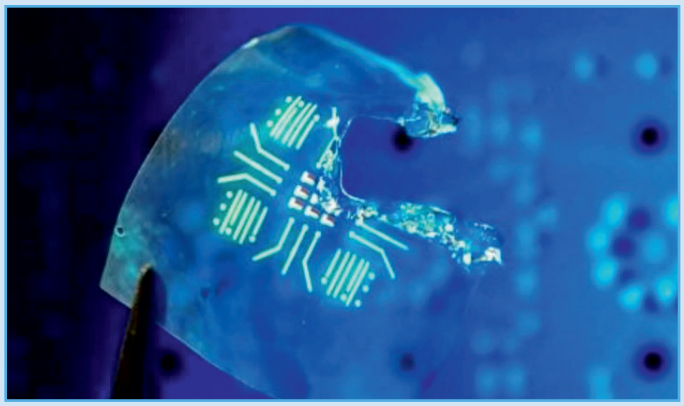
U.S. collection infrastructure and regulatory framework around recycled materials may be lagging at present, but SIRMAX has shown that the company has enough confidence in the long-term arc to make significant investments. The state of Indiana is also investing. Last year, the Indiana Department of Environmental Management awarded $2 million to recycling activities in the state, including a $296,000 grant to SIRMAX, which went toward the expansion of recycling operations.

Toward Biodegradable and Recyclable Luminescent Polymers

Research suggests that incorporating tert-butyl esters in luminescent polymers could facilitate recycling.

An investigation into making luminescent polymers more recyclable was published in the journal Nature Sustainability. The materials are commonly used in electronics. Incumbent methods of making them recyclable negatively impact functionality.

Researchers incorporated a ter-butyl ester into thermally activated delayed fluorescence (TADF) polymers. This creates a functional group that enables subsequent thermal or acid depolymerization.



Argonne National Laboratory, part of the U.S. Department of Energy, is conducting research to improve the recyclability of electronics. Source: Jie Xu and Yukun Wu.

The team tested the material's luminescent efficiency to be 15.1%, ten times higher than existing degradable luminescent polymers. The polymer can be degraded at the end of life under mild acidic conditions or heat treatment of around 410°F. The resulting monomers could be isolated and polymerized for reuse.

Scientists from Argonne National Laboratory, the University of Chicago, Yale University and Purdue University collaborated on the study. "We were able to make this material biodegradable and recyclable without sacrificing the functionality," says project lead Jie Xu, a scientist in the Center for Nano scale Materials at Argonne. "This work serves as an important benchmark in addressing the urgent need for sustainability in the design of future electronics."

The team aims to make future electronics more sustainable by making it easier to degrade them for recycling. They also want to expand the usability of these products into other fields.

"Design is still compatible with process ability and in the end, you have to use this in real applications," says Yuepeng Zhang, a materials scientist at Argonne and publication co-author. The researchers predict this new polymer can be applied to existing technologies, such as displays and medical imaging, and enable new applications.

Next steps for scaling the technology include moving it from the lab to electronics such as cell phones and computer screens with continued testing.

AXALTA Partners with CESVIMAP and the Move2Green Sustainability Program

AXALTA collaborates with CESVIMAP to bring the Move2Green program to refinish customers, providing sustainability assessments and actionable steps to improve environmental impact.

AXALTA, a leading global coatings company, announced a partnership with CESVIMAP R&D Centre, a leader in research and development for the collision repair industry. Through this partnership, AXALTA'S refinish customers will have access to CESVIMAP's Move2Green sustainability program which offers an online, self-assessment questionnaire to evaluate the current environmental impact of body shops.

Once an auditor analyzes the data, AXALTA customers will receive a detailed roadmap with actionable steps to improve their sustainability initiatives as well as the Move2Green certification to promote their commitment to reducing their environmental footprint.

As a global refinish paint manufacturing partner of CESVIMAP and the Move2Green program, AXALTA continues to provide sustainability resources and expertise to customers as part of its BELEAF initiative. By analyzing the body shop's energy efficiency, water resource management, waste management, responsible consumption, carbon footprint, sustainable mobility and general actions, CESVIMAP provides a detailed action plan to increase the use of sustainable business practices.

"We are thrilled to partner with CESVIMAP and the Move2Green program," says Troy Weaver, president of global refinish at AXALTA. "This partnership reaffirms our commitment to providing our customers a smarter way to refinish by offering access to resources that evaluate and improve the sustainability of their business."

CESVIMAP, MAPFRE's Road Safety and Experimentation Centre, focuses on technological research to reduce accident rates, define more efficient repair processes, reduce costs and develop new products. With sustainability at its core, CESVIMAP contributes to the after-sales sector by transforming business models, developing value proposals and improving results for vehicle manufacturers, insurance companies, mobility solution providers, and after-sales companies.

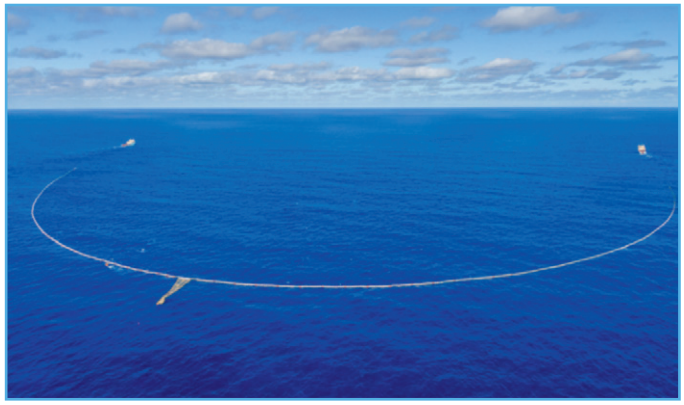
The partnership will initially launch in the Europe, Middle East and Africa (EMEA) region to AXALTA customers in the United Kingdom, Ireland, and Benelux with expansion plans for additional countries in the near future.

(**Source:** Products Finishing / Published 28. 07. 2024 / JENN CAMMEL)

Captured Ocean Plastics Recycled by Hydrothermal Liquefaction

Researchers processed plastic from the Pacific Ocean into oils.

Researcher's successfully trialed real samples of ocean cleanup plastic in their study of hydrothermal liquefaction. The technique uses supercritical water to break down plastic into oils. The North Pacific garbage patch is a region of ocean with high concentrations of plastic debris, which accumulates there because of the currents of the North Pacific gyre. The Ocean Cleanup is a nonprofit foundation that has set a goal of cleaning up half of this plastic by 2027.



The Ocean Cleanup's System 03 was deployed in August 2023. The new research study was conducted on plastic from a previous expedition. Source: The Ocean Cleanup

Debris was sourced from waste collected by The Ocean Cleanup during its operations in the North Pacific in 2019. The debris included hard plastics, nets and ropes. The hard plastics, composed mostly of polyolefins, were selected for analysis. The materials were characterized by FTIR, and placed into a study designed to characterize the oil outputs' dependency on feed characteristics and the process parameters temperature (420-480°C), dwell time (60-120 minutes), pressure (225-275 bar) and plastic load (30-60%).

After the reactor treatment, samples were analyzed to determine the composition of the solid residue and liquid phase oils. The liquid phase oils were composed of paraffins, aromatics and olefins. Researchers noted that the resulting oil is not an ideal naphtha, and would require further processing to be used as a feedstock for olefin production.

The research team concluded that hydrothermal liquefaction has potential for converting ocean waste plastics into a synthetic crude oil, and that the reaction parameters' dwell time, temperature and dry feed matter can be modified to maximize oil production and tuned to produce aromatic or aliphatic (olefin and paraffin) rich oils.

These findings have been published in the scientific journal Resources, Conservation and Recycling by Juliano Souza dos Passos and Patrick Biller of Aarhus

University; Chantal Lorentz and Dorothée Laurenti of Claude Bernard University Lyon 1; and Sarah-Jeanne Royer and Ioannis Chontzoglou of the Ocean Cleanup.

Ambiente Brings Odorous Films and Bottles Back into the Loop

Key Highlights:

- Ambiente tackles the challenge of getting strongly smelling agricultural films and detergent bottles back into the plastics loop.
- The company produces high-quality deodorized regranulate from washed agricultural films and detergent bottles on a Starlinger recoSTAR dynamic 165 C-VAC recycling line with the aim of keeping more plastic products in a closed loop.
- To accommodate a wide range of input materials, the entire recycling process can be individually adapted according to the contamination and odour intensity of the input material and the desired specifications of the produced regranulate.

Often heavily contaminated, with high humidity levels and strong smell: post-consumer plastic waste is anything but a recycler's dream. The Portuguese plastics recycling company Ambiente S.A. has taken on the challenge and produces high-quality deodourised regranulate from washed agricultural films and detergent bottles on a Starlinger recoSTAR dynamic 165 C-VAC recycling line with the aim of keeping more plastic products in a closed loop.

The Starlinger line took up operation in June 2024 in Ambiente's new factory in Leiria, north of Lisbon, where the company recycles both industrial and domestic post-consumer plastic waste. A large share of it consists of discarded LDPE agricultural films and HDPE detergent bottles which Ambiente converts into pellets for film extrusion and blow molding applications.

"For us it is important that we produce a high-quality recycled product that can be reused in the same application," said Paulo Pires, managing director of Ambiente S.A. "Our goal is to establish a circular economy. This means circularity within the respective application – for example, irrigation pipes become irrigation pipes again, agricultural film becomes agricultural film, food packaging becomes food packaging, and so on.

"Furthermore, we want to explore new applications for input materials with strong odours and high contamination levels. For this, all contaminants need to be eliminated as thoroughly as possible in the recycling process. That's why we are investing in the best available technologies – from washing, extrusion and filtration to odour treatment. Our objective is to generate economic and environmental benefits by offering the plastics industry feedstock that is sustainable as well as competitive to make a circular economy become reality."

Odour - improved recycled pellets

The recoSTAR dynamic 165 C-VAC recycling line installed at Ambiente features Starlinger's renowned odour reduction technology and processes detergent bottles made of HDPE and washed post-consumer agricultural LDPE films. "Agricultural films are used for various applications – for example in greenhouses, as crop covering, or for silage. This results in organic residues being present even after washing which create gases in the subsequent recycling process," explained Paul Niedl, commercial head of Starlinger recycling technology. "In case of packaging applications such as detergent bottles the smells of their contents migrate into the packaging material during their shelf life and usage time. Our odour reduction technology is designed to permanently remove such odours so that the produced regranulate is suitable for high-level applications. Instead of downcycling it can be reused in the same application, which creates circularity."

To accommodate a wide range of input materials, the entire recycling process can be individually adapted according to the contamination and odour intensity of the input material and the desired specifications of the produced regranulate. The process starts with cutting and homogenising the input material in the SMART feeder where the material is also heated until it reaches the ideal operating point. Highly volatile odours are extracted already during this process step.

After the main extruder the melt passes through continuous melt filters where solid contaminants are removed so that they cannot release odours during the following process steps. In the subsequent C-VAC module the melt surface is increased by 300 %, achieving extremely high degassing efficiency. This ensures that even deeply embedded odours are permanently extracted. In the final step, the produced recycled pellets are treated in the pellet conditioning unit (PCU) at the end of the recycling process to extract the most persistent odours. This ensures permanently odour-improved regranulate that can be used for manufacturing a wide range of plastic products.

ProAmpac Rolls Out Curbside Recyclable Packaging for Tissue Products

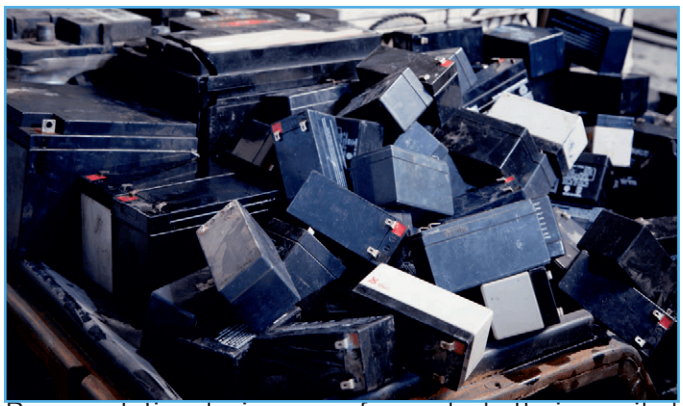
ProAmpac, a global leader in flexible packaging and material science, is excited to announce the commercialization of its fiber - based ProActive Recyclable RP-1050 product line. Initially launched in North America, RP-1050 has experienced tremendous commercial success, replacing traditional film overwrap with a fiber-based curbside recyclable option. The platform is also available in Europe and includes local manufacturing of this innovative product, further demonstrating ProAmpac's commitment to global sustainability.

This solution provides brands with a curbside recyclable alternative to traditional plastic film commonly used for overwraps. "RP-1050 is a prime example of a sustainable product with multi-regional applications, helping brands worldwide achieve their sustainability goals. This platform has high water resistance and excellent seal characteristics designed for high-speed fin and lap seal form-fill-seal applications," says Jim Tierney, vice president of product development for ProAmpac.

RP-1050 is designed especially for bathroom tissue, paper towels, and feminine care products. Utilizing ProAmpac's high-definition flexographic printing, RP-1050 enhances brand visibility and consumer engagement in natural kraft or bleached versions.

Flash Recycling Breakthrough Achieves 98% Efficiency in Battery Recovery

The researchers rapidly heated battery waste to 2,500 Kelvin, transforming it into structures with distinct magnetic shells and stable cores.



Representational image of used batteries piled randomly in big container.

Researchers have developed a new method to successfully extract purified active materials from battery waste. The method will help to properly separate and recycle battery materials at a low cost. The method will also contribute to the greener production of electric vehicles and tackle the environmental issue of efficiently recycling lithium - ion batteries.

The research team at Rice University led by James Tour, the T.T. and W.F. Chao Professor of Chemistry and professor of materials science and nano engineering proposed that magnetic properties could facilitate the separation and purification of spent battery materials.

Sustainable recycling method

"With the surge in battery use, particularly in Evs, the need for developing sustainable recycling methods is pressing," Tour said. Battery recycling techniques used to involve breaking down the energy storage devices into their elemental forms through energy - intensive thermal or chemical processes that were expensive and have a concerning environmental impacts.

In this study, researchers used the solvent - free flash Joule heating (FJH) method, which involves passing a current through a moderately resistive material to rapidly heat and transform it into other substances.

High battery metal recovery

Using FJH, the researchers heated battery waste to 2,500 Kelvin within seconds, creating unique features with magnetic shells and stable core structures. The magnetic separation allowed for efficient purification, according to RICE researchers. Their method resulted in a high battery metal recovery yield of 98%, with the value of battery structure maintained.

During the process, the cobalt - based battery cathodes — typically used in EVs and associated with high financial, environmental, and social costs — unexpectedly showed magnetism in the outer spinel cobalt oxide layers, allowing for easy separation.

Metal impurities were significantly reduced

"Notably, the metal impurities were significantly reduced after separation while preserving the structure and functionality of the materials," said Tour. "The bulk structure of battery materials remains stable and is ready to be reconstituted into new cathodes." The research published in the journal Nature Communication presented the method combined with magnetic separation to restore fresh cathodes from waste cathodes, followed by solid-state relithiation. The entire process is called flash recycling.

Cathodes reveal intact core structures

After FJH, the cathodes reveal intact core structures with hierarchical features, implying the feasibility of their reconstituting into new cathodes. Relithiated cathodes are further used in LIBs, and show good electrochemical performance, comparable to new commercial counterparts.

The study highlights that flash recycling offers greater environmental and economic benefits compared to traditional destructive recycling processes. The study maintains that the FJH process can presumably be integrated into a similar continuous system for spent LIB recycling.

In addition, recent works have demonstrated that the same FJH process and carbothermal shock method can be used to achieve the effective regeneration of the graphite anode from spent graphite, indicating that flash recycling method can simultaneously solve both cathode and anode recycling problems arising from spent battery accumulation.

Since the FJH process is being industrially scaled to 1 ton per day per facility, manufacturability is attainable while minimizing dependence on freshly mined metal ores to produce LIBs, according to the study.

(**Source:** Interesting Engineering / 03.08.2024 / Prabhat Mishra)

Singapore University Finds Bioresearch Application in Recycled Plastic

Researchers at Nanyang Technological University have converted plastic scrap into hosts for tumors in medical laboratory applications.

Motivated by a global plastic recycling rate of around 10 percent, researchers at Nanyang Technological University (NTU) in Singapore have been developing ways to convert discarded plastic into scaffolding for tumors cultivated for laboratory testing purposes.

The project is one of three at NTU that have been designed to divert plastic scrap streams, including obsolete electronics and marine sector discards using new methods. The laboratory tumors scaffolding application involves acrylonitrile butadiene styrene (ABS) commonly used in computer equipment. The NTU researchers say they have developed a synthetic matrix for culture cells using ABS from discarded keyboards.

"The matrix is porous like a sponge and functions as a support structure, providing a framework for cells to attach and grow," the university says.

The matrix can host spherical clusters of cells, called cancer spheroids that resemble actual tumors more accurately than many existing cell cultures.

"The matrix supported the growth of breast, colorectal and bone cancer spheroids [that] had properties similar to those grown using commercially available matrices and may be used for biomedical applications such as drug testing," NTU says.

The research findings were reported in the "Resources, Conservation & Recycling" ScienceDirect publication earlier this year.

"Our innovation not only offers a practical means to reuse e-waste plastics but could also reduce the use of new plastics in the biomedical industry," says Associate Professor Dalton Tay of NTU's School of Materials Science and Engineering, who led the research. Another NTU project involved converting marine plastic litter into hydrogen and carbon additives for polymer foams.

The researchers used high temperatures and the absence of oxygen to break down the molecules into solid carbon and hydrogen. The solid carbon can be added to polymer foam to increase its strength and resistance to abrasion for cushioning applications, according to NTU, and the hydrogen produced can be collected and used as fuel.

"We have developed a feasible approach to repurpose hard - to - recycle plastics, which is an important aspect of the circular economy," says lead investigator Associate Professor Grzegorz Lisak of NTU's School of Civil and Environmental Engineering.

A summary of the project has been published in the Journal of Hazardous Materials, which also is a ScienceDirect publication. In the third NTU project, researchers say they developed a process to convert a wide range of plastics, including polypropylene (PP), polyethylene (PE) and polystyrene (PS), into chemical compounds that can be useful for energy storage.

"The reaction uses light-emitting diodes (LEDs) and a commercially available catalyst and occurs at room temperature," NTU says. "Compared to conventional plastic recycling methods, the process requires much less energy."

The plastic scrap is first exposed to a solvent, and the resulting solution is mixed with the catalyst and directed through transparent tubes, where LED light shines on it. The resulting end products are compounds such as formic acid and benzoic acid, which can be used to make other chemicals employed in fuel cells, and liquid organic hydrogen carriers (LOHCs), which NTU says are being explored by the energy sector as a storage media for hydrogen.

According to Associate Professor Han Soo Sen of NTU's School of Chemistry, Chemical Engineering and Biotechnology, who led the study, the breakthrough provides a potential end market for plastic scrap while also reusing the carbon trapped in these plastics instead of releasing it into the atmosphere as greenhouse gases through incineration.

Findings from this NTU research project were published last year in the journal Chem, which is part of Cambridge, Massachusetts-based Cell Press.

(**Source**: Recycling Today / 28.07.2024 / Brian Taylor)

ALPLA and ZEROOO Create First Reusable PET Bottle for Cosmetic Products

Launches in Germany in September with a 300-millilitre bottle.

ZEROOO is now producing reusable PET packaging for bathroom and kitchen: packaging and recycling specialist ALPLA and ZEROOO initiator SEA ME GmbH have developed a standardized solution for cosmetics and care products. From September, the first brands will be presenting shampoo, shower gel, detergent, body lotion and dental care products in 300-millilitre PET bottles. This reusable and fully recyclable plastic packaging is available in three colors and is suitable for all caps. A laser-engraved 2D data matrix code provides information on the contents of each bottle and its circulation.

ZEROOO stands for reusable packaging that fosters the circular economy in the cosmetics industry. The system offered by start - up SEA ME GmbH offers brand manufacturers safe, affordable and sustainable PET bottles, in addition to glass bottles, for the first time. Together with ten brand partners and packaging and recycling specialist ALPLA, the company has developed a fully recyclable solution. The reusable PET bottle, with a volume of 300 milliliters, is available in clear, milky white and brown versions. It is suitable for all caps and can also be used as a shatterproof alternative for toiletries in the shower. Further formats are planned.

From September, the first manufacturers in Germany will present cosmetics and care products in PET containers from the ZEROOO reusable system, with Austria following suit in October. In addition to SEA ME's own brand, these include sodasan, i+m Naturkosmetik, Speick, Denttabs, 4 people who care and Aveo from Müller. Empties can be returned to the approximately one thousand collection points of ZEROOO retail partners for a deposit of €0.50.

Reusable PET Boosts the Plastics Cycle

As a globally active packaging manufacturer and recycling specialist, ALPLA is promoting closed 'bottle-to-bottle' cycles with its own plants. The company contributes its expertise as a system supplier and also supports customers with design. The ZEROOO reusable PET bottle was developed in tandem with the SEA ME GmbH team at ALPLA's in-house STUDIOa design center at the company's headquarters in Hard.

'With “Design for Recycling”, we are setting the course early on for optimum recycling and the longest possible service life. Every detail counts when it comes to shape, color and material. The reusable system extends the life cycle of the plastic bottle, saves material and reduces its carbon footprint,' emphasizes Alexander Tränkle, Industrial Designer at ALPLA.

'With its wealth of knowledge, the ALPLA development team provided us with significant support in implementing the brand and reusable packaging requirements. We are proud to have succeeded in integrating the individual serialization of bottles directly into the production process for the first time. This innovation enables groundbreaking data applications for packaging in the context of reuse,' explains Mirko Waraszik, Director of Supply Chain and co-founder of ZEROOO at SEA ME GmbH.

Innovative serialization code: transparency and quality Each ZEROOO reusable PET bottle is unique. A laser-engraved 2D data matrix code – the ZEROOO ID – provides information about the content and circulation history. 'The digital labelling enables transparency and ensures the quality of the bottles. By combining it with the information from the label, it can also be complemented with further product data,' explains Jörg Schwärzler, Senior Technology Manager at ALPLA. The reusable PET bottle is compatible with all automatic return systems. At the end of their life cycle, the bottles and caps are sorted and recycled.

(**Source**: ALPLA)

New Process vaporizes Plastic Bags and Bottles, Yielding Gases to Make New, Recycled Plastics

Credit: Robert Sanders/UC Berkeley Graduate student RJ Conk adjusts a reaction chamber in which mixed plastics are degraded into the reusable building blocks of new polymers.

A new chemical process can essentially vaporize plastics that dominate the waste stream today and turn them into hydrocarbon building blocks for new plastics.

The catalytic process, developed at the University of California, Berkeley, works equally well with the two dominant types of post-consumer plastic waste: polyethylene, the component of most single-use plastic bags; and polypropylene, the stuff of hard plastics, from microwavable dishes to luggage. It also efficiently degrades a mix of these types of plastics.

The process, if scaled up, could help bring about a circular economy for many throwaway plastics, with the plastic waste converted back into the monomers used to make polymers, thereby reducing the fossil fuels used to make new plastics. Clear plastic water bottles made of polyethylene tetra phthalate (PET), a polyester, were designed in the 1980s to be recycled this way. But the volume of polyester plastics is minuscule compared to that of polyethylene and polypropylene plastics, referred to as polyolefins.

"We have an enormous amount of polyethylene and polypropylene in everyday objects, from lunch bags to laundry soap bottles to milk jugs — so much of what's around us is made of these polyolefins," said John Hartwig, a UC Berkeley professor of chemistry who led the research. "What we can now do, in principle, is take those objects and bring them back to the starting monomer by chemical reactions we've devised that cleave the typically stable carbon-carbon bonds. By doing so, we've come closer than anyone to give the same kind of circularity to polyethylene and polypropylene that you have for polyesters in water bottles."

A Circular Economy for Plastics

Polyethylene and polypropylene plastics constitute about two-thirds of post-consumer plastic waste worldwide. About 80 percent ends up in landfills, is incinerated or simply tossed into the streets, often ending up as micro plastics in streams and the ocean. The rest is recycled as low-value plastic, becoming decking materials, flowerpots and sporks.

To reduce this waste, researchers have been looking for ways to turn the plastics into something more valuable, such as the monomers that are polymerized to produce new plastics. This would create a circular polymer economy for plastics, reducing the need to make new plastics from petroleum, which generates greenhouse gases.

Two years ago, Hartwig and his UC Berkeley team came up with a process for breaking down polyethylene plastic bags into the monomer propylene — also called propene — that could then be reused to make polypropylene plastics. This chemical process employed three different bespoke heavy metal catalysts: one to add a carbon-carbon double bond to the polyethylene polymer and the other two to break the chain at this double bond and repeatedly snip off a carbon atom and, with ethylene, make propylene (C3H6) molecules until the polymer disappeared. But the catalysts were dissolved in the liquid reaction and short-lived, making it hard to recover them in an active form.

In the new process, the expensive, soluble metal catalysts have been replaced by cheaper solid ones commonly used in the chemical industry for continuous flow processes that reuse the catalyst. Continuous flow processes can be scaled up to handle large volumes of material.

Conk first experimented with these catalysts after consulting with Bell, an expert on heterogeneous catalysts, in the Department of Chemical and Bio molecular Engineering.

Synthesizing a catalyst of sodium on alumina, Conk found that it efficiently broke or cracked various kinds of polyolefin polymer chains, leaving one of the two pieces with a reactive carbon-carbon double bond at the end. A second catalyst, tungsten oxide on silica, added the carbon atom at the end of the chain to ethylene gas, which is constantly streamed through the reaction chamber, to form a propylene molecule. The latter process, called olefin metathesis, leaves behind a double bond that the catalyst can access again and again until the entire chain has been converted to propylene.

The same reaction occurs with polypropylene to form a combination of propene and a hydrocarbon called isobutylene. Isobutylene is used in the chemical industry to make polymers for products ranging from footballs to cosmetics and to make high - octane gasoline additives.

Surprisingly, the tungsten catalyst was even more effective than the sodium catalyst in breaking polypropylene chains.

"You can't get much cheaper than sodium," Hartwig said. "And tungsten is an earth-abundant metal used in the chemical industry in large scale, as opposed to our ruthenium metal catalysts that were more sensitive and more expensive. This combination of tungsten oxide on silica and sodium on alumina is like taking two different types of dirt and having them together disassemble the whole polymer chain into even higher yields of propene from ethylene and a combination of propene and isobutylene from polypropylene than we did with those more complex, expensive catalysts."

Like a String of Pearls

One key advantage of the new catalysts is that they avoid the need to remove hydrogen to form a breakable carbon - carbon double bond in the polymer, which was a feature of the researchers' earlier process to deconstruct polyethylene. Such double bonds are an Achilles heel of a polymer, in the same way that the reactive carbon-oxygen bonds in polyester or PET make the plastic easier to recycle. Polyethylene and polypropylene don't have this Achilles heel — their long chains of single carbon bonds are very strong.

"Think of the polyolefin polymer like a string of pearls," Hartwig said. "The locks at the end prevent them from falling out. But if you clip the string in the middle, now you can remove one pearl at a time."

The two catalysts together turned a nearly equal mixture of polyethylene and polypropylene into propylene and isobutylene — both gases at room temperature — with an efficiency of nearly 90 percent. For polyethylene or polypropylene alone, the yield was even higher.

Conk added plastic additives and different types of plastics to the reaction chamber to see how the catalytic reactions were affected by contaminants. Small amounts of these impurities barely affected the conversion efficiency, but small amounts of PET and polyvinyl chloride — PVC — significantly reduced the efficiency. This may not be a problem, however, because recycling methods already separate plastics by type.

Hartwig noted that while many researchers are hoping to redesign plastics from the ground up to be easily reused, today's hard-to-recycle plastics will be a problem for decades.

"One can argue that we should do away with all polyethylene and polypropylene and use only new circular materials. But the world's not going to do that for decades and decades. Polyolefins are cheap, and they have good properties, so everybody uses them," Hartwig said. "People say if we could figure out a way to make them circular, it would be a big deal, and that's what we've done. One can begin to imagine a commercial plant that would do this."

Other co-authors of the paper are graduate students Jules Stahler, Jake Shi, Natalie Lefton and John Brunn of UC Berkeley and Ji Yang of Lawrence Berkeley National Laboratory. Shi, Hartwig and Bell are also affiliated with Berkeley Lab. The work was funded by the Department of Energy (DE-AC02-05CH11231).

(**Source**: University of California /05.09.2024)

COVERIS Set to Showcase Sustainable Food-to-go Innovation at Lunch! 2024

Leading European packaging manufacturer, COVERIS, is set to unveil its exclusive range of innovative and sustainable food and hot-to-go packaging solutions at lunch! 2024.

Lunch! The definitive event for food-to-go serves as the perfect platform for COVERIS to showcase its commitment to developing innovative and sustainable packaging for the sector. Taking place on Wednesday 18th and Thursday 19th September 2024 at ExCeL London, COVERIS will be unveiling a new range of designed for recyclability convenience products:

HEAT: The future of hot-to-go packaging

Driven by consumer trends towards hot-to-go, COVERIS' latest product development provides a new cook-in-pack, shelf-ready, hot-hold solution that combines innovative functionality alongside sustainability, efficiency and waste reduction for both retailers and consumers.

MILACRON®

PROVIDING OPTIMAL PERFORMANCE FOR LARGE STRUCTURAL APPLICATIONS.

- Infrastructure
- ATV / Watercraft
- Material Handling
- Re-process up to 100% recyclable scrap

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