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The Official Journal of the Organization of Plastics Processors of India

Volume No. 12

• Issue No. 10

• Mumbai

• April 2024

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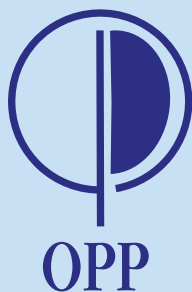
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FROM THE PRESIDENT'S DESK

Mr. Dilip Parekh



Dear Members,

Greetings from Organization of Plastics Processors of India!

During our meetings with the Department of Petrochemicals and Ministry of Commerce, we have been insisting on the review of various FTAs as many of these FTAs contain clauses, which have adverse impact on the Indian Plastics Industry.

We are happy to inform you that Ministry of Commerce has begun looking at several products where duties on input items are higher compared to the finished goods as part of a comprehensive review of its trade pact with the 10-member ASEAN to correct several anomalies that have undermined domestic manufacturing.

Imbalances in import duties, rules of origin and non-tariff barriers will come in for a closer look. The Commerce and Industry Ministry has asked the industry for inputs to identify products where an inverted duty structure is causing a disadvantage to local manufacturers.

The ongoing review of the pact, which came into effect in 2010, is slated to conclude next year.

India has rolled out several measures such as production-linked incentives (PLI) schemes, higher import tariffs and import monitoring to encourage local manufacturing, but several trade agreements negotiated earlier are seen as stumbling blocks.

ACHEMA 2024 will be held at FRANKFURT/Main, from 10th to 14th June 2024. ACHEMA takes the lead and pioneers advancements in the global process industries and their suppliers, as it brings together manufacturers and service providers from more than 50 nations.

Organization of Plastics Processors of India has tied-up with Tibro Tours for ACHEMA 2024 packages. All companies booking Tibro Packages for ACHEMA 2024 through Organization of Plastics Processors of India will be eligible for discount.

With Best Wishes,

Dilip Parekh
President

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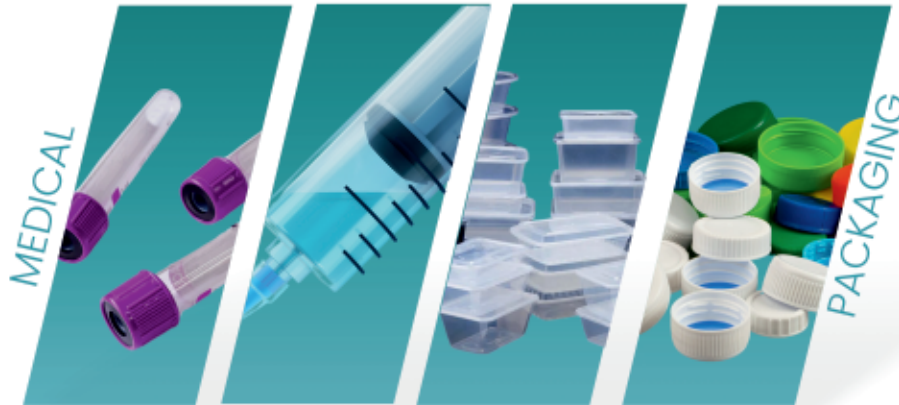
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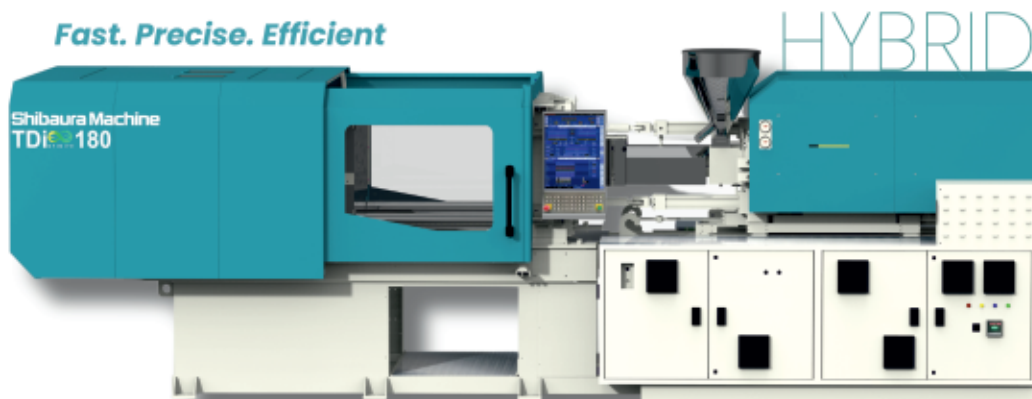


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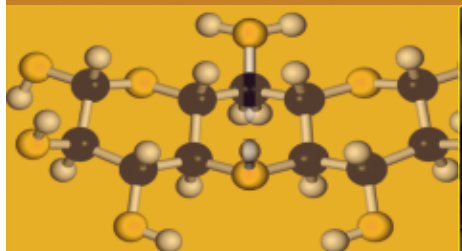
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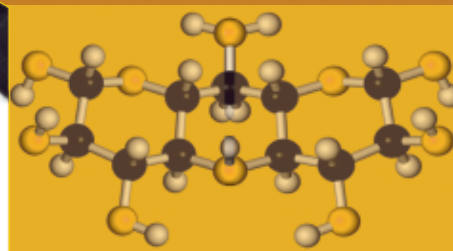
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Plastics, Packaging and Printing Industrial Fair

12th ~ 15th February, 2025

Venue: Int'l Convention City Bashundhara (ICCB)

Organizers: Yorkers Trade & Marketing Service Co., Ltd. Bangladesh Plastic Goods Manufacturers & 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, Thermofforming 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

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- ✓ **Corner fee: Surcharge 10 %**
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ACHEMA 2024

📅 10 – 14 June 2024

📍 Frankfurt/Main, Germany



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Spanning over 110,000 square meters of exhibition area, ACHEMA serves as the hub encompassing the complete range of technology and services across the process sectors. Recognized as the most extensive event for staying updated on industry innovations, it presents practical demonstrations of technology and facilitates worldwide networking opportunities.

ACHEMA takes the lead and pioneers advancements in the global process industries and their suppliers, as it brings together manufacturers and service providers from more than 50 nations.

Organization of Plastic Processors of India has tied up with Tibro Tours Pvt. Ltd. for ACHEMA 2024 packages. All Companies booking Tibro Packages ACHEMA 2024 through Organization of Plastic Processors of India will be eligible for discount.

Please find attached herewith Tibro's Standard Launched packages based on hotel options. Kindly write to us to secure your travel arrangements on confirmed basis.

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GROSS SPACE	23,000 M2
EXHIBITORS	625
BOOTHS	1,100
COUNTRIES & REGIONS	22
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GET IN TOUCH Deepak Lawale, Secretary General, ORGANIZATION OF PLASTICS PROCESSORS OF INDIA



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Organization of Plastics Processors of India Membership Directory 2023 is now available in Pen Drive Format.



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Seminar On-"Crucial Role Of Maintenance In Plastics Processing Industry" Held On 22nd March 2024 At India Habitat Centre, New Delhi.

Organization of Plastics Processors of India organized 12th Edition of Seminar On-"Crucial Role Of Maintenance In Plastics Processing Industry" at India Habitat Centre, New Delhi on 22nd March 2024.

The Inaugural Session of the Seminar was chaired by Mr. Deepak Mishra, Joint Secretary, Department of Petrochemicals.

Lighting of the Traditional lamp was done by all Session Chairmen.

During the Seminar the following Presentations were made: -

Sr. No.	Topic of Presentation	Speaker
1	Adding Life To Your Machines: The Trends To Best Practices	Mr. Pravin Patel & Mr. Anil Parmar B & R Industrial Automation Pvt. Ltd.
2	Selection And Sizing Of Power Unit With Servo System For Injection Molding Machines	Mr. Jitendra Hissaria, Director Ebyts Motion Pvt. Ltd.
3	Adding New Lease Of Life To Old Machines With Energy Conservation - Alternatives For Conventional Systems	Mr. Prashant Kolte (Deputy General Manager) Baumuller India Pvt. Ltd
4	Elevate Manufacturing - Operational Excellence Through Digitalization	Mr. Upendra Potdar, Director - Business Development, KNEO Automation Pvt. Ltd.
5	Advancements In The Ease Of Robot Programming For Injection Molding Machines	Mr. Sanjay Kumar Wittmann Battenfeld India
6	Mobilserv Solutions – Beyond Lubrication	Mr. Nikhil Bapna Exxonmobil Lubricants Pvt. Ltd.
7	Best Maintenance Practices For Improving The Productivity And Reliability Of Injection Moulding Machines	Mr. CK Vijayan (Senior Manager, Customer Care Cell) SHIBAURA MACHINE INDIA PVT LTD
8	Increase Your Uptime And Profitability By Automatic & Accurate Dosing	Mr. Arun Yadav Prasad Koch – Technik Pvt. Ltd.
9	Mould Maintenance	Mr. D. A. Kannan V P – Sales Acme Die Systems Pvt. Ltd.
10	Managing Ageing Plastic Processing Plants	Mr. Subba Bangera, Chairman Active Biz Solutions. Pvt. Ltd

At the end of the day long Seminar “Lucky Draw” was held. Gifts were sponsored by Cello World. The “Lucky Draw” prizes were won by Mr. Gautam Srivastava, MOTHERSON and Mr. Manoj Sharma, HPL Power India Ltd.

Mr. Deepak Lawale proposed Vote of Thanks. He thanked Cello World for sponsoring the Mementos presented to the Speakers and to the Session Chairmen. He also thanked the Gold Sponsors - EXXONMOBIL Lubricants Private Limited and Associate Sponsors – XPRO INDIA, Baumuller India, EBYTS MOTION, Prasad Koch – Technik, and SHIBAURA MACHINE INDIA.

All participants appreciated the Quality of presentations and also the arrangements made for the Seminar.



Left Photo Mr. Deepak Mishra, Joint Secretary (Petro Chemicals) and Right Photo Mr. Dharmendra Gandhi, Managing Director, Mutual Automotive Pvt. Ltd lighting Traditional Lamp. Dr. Anup Ghosh and Dr. Susmita Dey Sadhu are awaiting their turn.



(L to R) Dr. Anup Ghosh, Mr. Deepak Mishra, Joint Secretary (Petro Chemicals), Mr. Dharmendra Gandhi, Mr. Manas Sarkar, and Dr. Susmita Dey Sadhu.



Mr. Dharmendra Gandhi Presenting Bouquet to Mr. Deepak Mishra



Delegates in rapt attention



Mr. Dharmendra Gandhi delivering Welcome Speech



Mr. Deepak Mishra Joint Secretary (Petro Chemicals) delivering Keynote Address



Mr. Deepak Mishra, Joint Secretary (Petro Chemicals) flanked by Mr. Manas Sarkar, Mr. Deepak Lawale, Mr. Dharmendra Gandhi and Mr. Arvind Goenka



Mr. Upendra Potdar, Director, KNEO Automation making his Presentation



Dr. Anup Ghosh Presenting Mementos to (L to R) Mr. Jitenndra Hissaria; Mr. Pravin Patel & Mr. Anil Parmar; Mr. Prashant Kolte.



Mr. Deepak Lawale Presenting Memento to Session Chairpersons--- Dr. Anup Ghosh, Dr. Susmita Dey Sadhu and Mr. Manas Sarkar.



Mr. Sanjay Kumar, Wittmann Battenfeld India Pvt. Ltd. making Presentation.



Mr. Nikhil Bapna, Exxonmobil Lubricants making Presentation.



Dr. Susmita Dey Sadhu giving mementos to (L to R) Mr. Upendra Potdar, Mr. Sanjay Kumar, and Mr. Nikhil Bapna, Exxonmobil Lubricants .



Prof. Ashok Misra, Ex-Director, IIT - B addressing the delegates



Mr. CK Vijayan Senior Manager, Shibaura Machine India making his Presentation.



Mr. Arun Yadav, Prasad Koch – Technik making his Presentation



(L to R) Mr. Arun Yadav, Mr. Deepak Lawale, Mr. Manas Sarkar, Mr. CK Vijayan



Mr. Subba Bangera, Chairman, Active Biz Solutions chaired the 4th Technical Session



Mr. Subba Bangera doing his Presentation



Mr. Subba Bangera giving memento to Mr. D. A. Kannan, V P – Sales, Acme Die Systems.



Mr. Subba Bangera, Mr. D. A. Kannan, Mr. Deepak Lawale



Lucky Draw Winner Mr. Manoj Sharma, HPL Power India receiving his gift from Mr. Subba Bangera



Lucky Draw Winner Mr. Gautam Srivastava, Motherson receiving his gift from Mr. Subba Bangera



Mr. Deepak Lawale, Mr. CK Vijayan, Mr. Upendra Potdar, Mr. Subba Bangera, Mr. Jitendra Hissaria, Mr. D. A. Kannan, Mr. Prashant Kolte, Mr. Sanjay Kumar and Mr. Arun Yadav



Mr. V. B. Lal, SCJ Plastics and Mr. Ashok Misra, Ex-Director, IIT-B at the Seminar



NEWS FROM INDIA

Uflex Begins Commercial Production of Poly - Condensed Polyester Chips in Panipat, India



Uflex, India's multinational flexible packaging and solutions company, announces a significant milestone in its journey of expansion and innovation. Starting March 31, 2024, the company has successfully commenced commercializing poly - condensed polyester chips at its manufacturing facility in Panipat.

UFlex's polyester chips manufacturing plant has an impressive installed capacity of 168,000 metric tons per annum (MTPA) and reaffirms the company's commitment to expanding its vertical integration footprint. The Panipat plant will primarily manufacture poly - condensed polyester chips, which

is a key raw material required to produce BOPET packaging films. In addition to catering to its in - house packaging film production, the facility will cater to third - party customers, contributing to the growth and sustainability of the packaging film industry in India. The Panipat facility complements the company's packaging films India footprint in Noida, the National Capital Region, and Dharwad, Karnataka, further solidifying UFlex's presence and capabilities in serving its packaging film customers across the country.

Speaking on the occasion, Mr. Ashok Chaturvedi, Chairman and Managing Director, UFlex Limited, said, "We are extremely buoyant about the commissioning of our Polyester chips plant in Panipat. Now more than ever, our customers are interested in reliability, speed, and quality in their supply chain, and this expansion will allow us to deliver on those expectations. We are relying on our vertical integration strategy to meet the ever - increasing demand of the packaging industry and are betting on new capacities, and the ability to deliver quality, innovation, and customized

solutions that the industry expects from UFlex. Leveraging advanced technology and sustainable practices, the company remains dedicated to delivering superior products and solutions that address the dynamic needs of the packaging market".

Kandui Presents Glow in Dark Masterbatch for Polyolefins



Kandui Industries Pvt. Ltd. has developed the 'Night Glow' series of photoluminescent masterbatch for polyolefins. In daylight, the article appears as a semi - translucent light green colour. In the dark, it generates an attractive and unique green glow. It absorbs light energy from the daylight or from any other light source, and emission of the same gives a glowing effect in the dark.

Plastic Waste Management (Amendment) Rules, 2024



The Ministry of Environment, Forest and Climate Change has notified an amendment to the Plastic Waste Management Rules, 2016, titled the Plastic Waste Management (Amendment) Rules, 2024, on March 14, 2024. Here are the key takeaways for Producers, Importers, and Brand Owners (PIBOs).

1. Definition Of Producer Expanded

Producer now includes entities engaged in manufacturing plastic packaging, intermediate materials, or contract manufacturing using plastic packaging for brand owners or similar arrangements.

2. Registration and Reporting Obligations for Manufacturers and Importers

Manufacturers and importers of plastic raw material are required to apply for registration with the State Pollution Control Board using Form III.

Additionally, they must submit quarterly and annual reports, as specified, by the respective deadlines (last day of month following the quarter and an annual report by 30th June of every year).

3. Introduction of Sellers

Sellers are defined as entities who sell plastic raw material such as resins or pellets or intermediate material used for producing plastic packaging. They are mandated to submit an annual report detailing transactions to the relevant pollution control authorities by June 30th each year.

4. New Biodegradable Plastics Category (v)

A new category for biodegradable plastics (Category V) has been introduced, with specific labelling requirements and separate markings to be designated by the BIS.

5. Thickness Requirement Exemption for Compostable /biodegradable Carry Bags

“Carry bags made of virgin or recycled plastic shall not be less than fifty microns in thickness,” while compostable/biodegradable carry bags are exempted from this requirement.

6. Pre - consumer Waste Processing Obligations

Manufacturers are obligated to process pre - consumer plastic waste generated in the form of reject or discard material at the stage of manufacturing and report these activities to the SPCB/ CPCB.

7. Minimum Recycling Target Introduction

Manufacturers / importers must meet minimum recycling levels for plastic packaging waste as specified in the Extended Producer Responsibility (EPR) targets, categorized and outlined in the provided table.

Minimum level of recycling (excluding end of life disposal) of plastic packaging waste

(% of Extended Producer Responsibility Target)

Plastic packaging category	2024 -25	2025- 26	2026- 27	2027-28 and onwards
(1)	(2)	(3)	(4)	(5)
Category I	50	60	70	80
Category II	30	40	50	60
Category III	30	40	50	60

8. Micro And Small Enterprise Exemption From Epr Obligations

Micro and small enterprises, as per the MSME Development Act, 2006, are exempted from direct EPR obligations. Instead, these obligations are shifted to the manufacturer or importer of plastic raw materials supplying to such entities. However, it is mandated that these entities fulfill the target for the use of recycled plastic content (as per table below).

(% of manufactured plastic for the year)

Plastic packaging category	2025 -26	2026 -27	2027 -28	2028-29 and onwards
Category I	30	40	50	60
Category II	10	10	20	20
Category III	5	5	10	10

9. Price Cap Implementation

The CPCB is tasked with establishing high and low price caps for EPR certificates, ensuring a standardized pricing mechanism.

10. Annual Filing Deadline Extension

The deadline for filing annual returns for the financial year 2022-2023 has been extended until March 31st, 2024.

India Needs to Grow at 9-10% to become \$35 Trillion Economy by 2047: Amitabh Kant

India needs to grow at 9-10 per cent for the next three decades to become a USD 35 trillion economy by 2047, India's G20 Sherpa Amitabh Kant said on Thursday. Kant further said India is going to be the third-largest economy by surpassing Japan and Germany by 2027.

"India must grow at higher rates. India must grow at 9- 10 per cent year after year...for three decades," he said at the Times Now Summit.

India's economy grew at better-than-expected 8.4 per cent in the final three months of 2023, logging the fastest pace in the past one - and - a - half years. The growth rate in October-December helped take the estimate for the current fiscal to 7.6 per cent.

"Our ambition should be that by 2047, not merely we should be a USD 35 trillion economy, but we should be able to raise the per capita income of every single individual to USD 18,000 plus from current USD 3,000," he added.

The size of the Indian economy is currently USD 3.60 trillion. Kant also noted that India needs at least 12 states to become champions of growth, and they need to grow at 10 per cent plus.

Noting that eastern states like Jharkhand, Chhattisgarh and Bihar need to grow at high rates, Kant said, "If these states start firing and growing at 10 per cent plus, then India will grow at 10 per cent plus".

Post-Lok Sabha elections, Mr. Kant said India should herald a huge range of reforms across education, health and nutrition.

"If the quality of governance and implementation improves at the state level, then you will see massive transformation in India's growth story," he said. Kant said India needs many more large companies, as when large companies come in, they produce their own supply chain in tier 2 and tier 3 cities.

Toy Sector Requires a PLI-plus Approach

As the market is highly segmented, the needs of various manufacturers must be recognised and supply chains strengthened



It is heartening to know that a performance-linked incentive (PLI) scheme for toys is on the anvil as indicated by the recent Budget. However, before the approval is made for the PLI, policymakers should note the complex nature of this industry.

States may Get 15% More Soft Loans for Capex; Total Kitty may Swell to Rs 1.5 Trillion

Besides reforms touching on each of the factors of production, the Modi government would likely extend investment and legislative support to key sectors.



The Centre is likely to top up the 50-year interest-free capex loans to states by 15% to Rs 1.5 trillion in 2024-25 from Rs 1.3 trillion provided in the interim Budget. This is because of the increased demand from states for the liberal loan facility aimed at boosting economic activity across the country.

Sources told FE that the additional amount is expected to be part of the reform-linked component of the loans as the Centre embarks on next - generation reforms. Accordingly, the reform-tied loans would rise to Rs 95,000 crore from Rs 75,000 crore earmarked in the interim Budget for Fy25.

To strengthen the hands of the states, the scheme for providing financial assistance to the states for capital expenditure introduced in Covid - hit FY21 has been extended to FY25 as well with an outlay of Rs 1.3 trillion.

Of this, Rs 55,000 crore in untied capex loans has been rolled out from April 1. There form/ project-linked Rs 75,000 crore, which will likely be increased to Rs 95,000 crore, will be rolled out after the new government is formed in June.

Besides reforms touching on each of the factors of production, the Modi government would likely extend investment and legislative support to key sectors.

The Centre will also work with state governments to encourage them to create a modern set of legislation, by-laws and urban planning processes using technology. It could support long-term infrastructure projects with Centre - state - city partnerships with a vision to revitalise urban landscapes. The states are also likely to be incentivised to reduce compliances for small traders and MSMEs to enhance their ease of living and doing business.

According to the 'Viksit Bharat @2047' document, which will be unveiled in July, India will aim for a \$30-trillion economy by 2047 to become a developed nation in its 100th year of independence, propelled by radical policy changes and reforms in governance by 2030.

Even though India has become the most populous country for the first time in recorded history by overtaking China, it has to fix structural issues, including accelerating investment in health-education and undertaking land-labour reforms, to boost economic growth and create more jobs before the demographic dividend peters out. India's growth is closely interlinked with the growth of states. The Centre is also prodding states to prepare their own vision documents.

One of the key impediments in firms going for greenfield projects or expansion of brownfield projects is the labour laws. Even though the Centre has subsumed 44 labour laws into four codes to improve the ease of doing business and attract investment for spurring growth, these have not yet been notified. While some states have drafted rules under the four codes,

some states have yet to do that. The government may incentivise states to roll out labour laws.

The Centre could also incentivise state reforms to address local bodies' capacity constraints and empower these bodies to strengthen governance at the grassroots level to ensure effective service delivery to citizens, the experts said.

States' capital expenditure likely rose by a robust 33% on year in the first 11 months of 2023-24 compared with a 12% rise in the year-ago period, aided by the Centre's interest - free capex loans. In FY24, the Centre extended Rs 1.09-trillion loans to states against the revised estimate of Rs 1.05 trillion.

Crisis of Plastic Waste in the Indian Himalayan Region

- From the top of the tallest mountain to the deepest ocean trench, plastic is present everywhere. It can even be discovered within the placenta and lungs of humans. Large plastic items that are disposed of inappropriately break down and fragment, creating microplastics. There has been evidence of microplastic deposition and buildup in rivers, lakes, streams, and the Himalayan ranges.
- The Indus, Ganges, and Brahmaputra river systems are only a few of the important rivers in India that receive water from the Indian Himalayan Region (IHR). Unscientific plastic waste is depleting the

IHR's biodiversity and contaminating the region's soil and water, which is bad news for the freshwater sources that support people downstream

The Region of the Indian Himalayas (IHR):

- It alludes to the region of mountains in India that contains the whole Himalayan range. It extends from Jammu and Kashmir in northwest India to the northeastern states that share a border with Tibet (China), Bhutan, and Nepal.
- It includes two UTs (Jammu & Kashmir and Ladakh) and eleven states (Himachal Pradesh, Uttarakhand, Sikkim, all northeast states, and West Bengal).

What Recent Signs of Increasing Plastic Pollution in IHR are there? SDC Report:

- A sobering reminder of the problem comes from a recent report published by the Social Development for Communities (SDC) Foundation Dehradun, which highlights the predicament of towns in Uttarakhand that are drowning in plastic garbage.

Results From the NGT:

- The Central Pollution Control Board (CPCB), the Himachal Pradesh State Pollution Control Board, the Ministry of Environment, Forests, and Climate Change, and the National Green Tribunal (NGT) have all received notices regarding rubbish dumping by visitors and commercial businesses in environmentally vulnerable areas.

- This highlights the problems associated with rubbish dumping that occurs without consequence and without much of a deterrent from visitors and businesses.

An Observation Made at the Ramsar Site Deepor Beel:

- Rather than fish from the wetland, larger adjutant storks have been eating on the plastic garbage in the landfill at the Deepor Beel Ramsar site in Assam. River pollution in Manipur, including the Nambul, is on the rise, according to numerous reports.

Himalayan Cleanup Audit Results (2018–21):

- The Integrated Mountain Initiative alongside Zero trash Himalayas and the National Productivity Council of India undertook the Himalayan Clean up (2018–21), which revealed a rise in plastic trash, particularly non-recyclables, in the Indian Himalayan Region.
- According to the results of the Himalayan Cleanup (2022) waste audit, plastic made up 92.7% of the rubbish, with non - recyclable plastic accounting for 72% of the waste.

New Waste Management Technology Could Improve Life in Rural India, Claims Study

A new waste management technology that allows pyrolysis at a community level could help rural Indians cut indoor air pollution, improve soil health, and generate clean power, a recent study has claimed.



Pyrolysis is a kind of chemical recycling that turns leftover organic materials into their component molecules.

It works by sealing the waste inside an oxygen - free chamber and heating it above 400 degrees Celsius. Useful chemicals are produced in the process.

In the study, the researchers outlined that three products of pyrolysis — bio-oil, syngas and biochar fertilizer — could help rural Indians live healthier and greener lives. Through it, they could have more productive farmland, the paper said. It also went on to lay out a series of recommendations to maximise the system's economic viability.

Initially, about 1,200 rural households across Odisha were surveyed by the researchers. They analyzed the villagers' experiences of cooking, powering their homes, and farming.

The researchers found over 80 per cent of those surveyed wished to switch from cooking indoors with smoke-producing coal to cleaner options.

Almost all respondents also wanted access to reliable grid electricity on priority. About 90 per cent of them were found willing to sell agricultural waste to support bioenergy.

The survey findings helped inform the researchers' design for 'BioTRIG'— a community-level

pyrolysis system to run on the waste the villagers generate. It would also provide a series of benefits to rural communities living below the poverty line (BPL).

“The syngas and bio-oil are said to facilitate heat and power the pyrolysis system in future cycles. This, along with utilization of surplus electricity to power local homes and businesses,” the authors noted.

The project also envisions using clean-burning bio-oil to replace dirty cooking fuels in homes and using biochar to store carbon, while improving soil fertility.

The BioTRIG system could also be effective in real - world applications. It could help reduce greenhouse gas emissions from communities by nearly 350 kg of CO₂-eq per capita per annum, computer simulations showed.

“Indoor air pollution remains a serious issue in rural India where cooking with fossil fuels in unventilated households disproportionately affects women's and children's health. These communities also face the degradation of arable land from unsustainable farming practices. Access to reliable electricity is an ongoing challenge as well,” Siming You of the University of Glasgow, who led the research project, was quoted in a report published on the university website.

“United Nations has identified all these problems as targets for international sustainable development goals and the Indian government has taken steps to start addressing them. However, the BioTRIG system has the potential to help address all of

these serious problems. This, with a trigeneration approach to turning otherwise unusable waste into three useful sources of bioenergy," he was further quoted as saying.

Scaled across a country the size of India, even a modest uptake of the system could have a big impact on climate emissions and public health, he added.

Two novel business models could lead to widespread adoption of the BioTRIG system.

As quoted by the University of Glasgow report, its professor Jillian Gordon and co-author of the paper said: "Two new circular business models could help smooth the transition to widespread BioTRIG adoption. In one scenario, a private sector partner could provide seed funding to set up the pyrolysis units in exchange for social benefits, creating jobs by training local teams to run operation."

"An alternative would be asking villagers to contribute their waste feedstocks for free. This, in return for free biochar and discounted bio-oil that saves them money."

"We hope that breaking down the climate, health and agriculture impacts along with the economic potential in the same paper will help make BioTRIG a project that governments, funders and NGOs will take a close look at to evaluate the benefits it could bring to the half-billion people living across rural India," added Gordon as quoted.

The study paper, titled Trigeneration based on the pyrolysis of rural waste in India: Environmental

impact, economic feasibility and business model innovation, was first published in the journal Science of the Total Environment last week.

It was a collective effort of the University of Glasgow (United Kingdom), non-profit Gram Utthan (India), CSIR-Indian Institute of Toxicology Research, CSIR-Indian Institute of Petroleum, University of Petroleum and Energy Studies (India), and the University of Queensland (Australia).

Infosys to Acquire 100% Stake in Germany - Based Engineering R&D Services Provider in - Tech

Infosys announced a definitive agreement to acquire in - tech. This strategic investment, Infosys said, further strengthens the company's Engineering R&D capabilities.



Infosys on announced a definitive agreement to acquire in - tech, an Engineering R&D services provider focused on the German automotive industry. This strategic investment, Infosys said, further strengthens the company's Engineering R&D capabilities and reaffirms its continued commitment to global clients to navigate their digital engineering journey

Headquartered in Germany, in-tech, is an Engineering R&D services provider that shapes digitization in the automotive, rail transport and smart industry sectors. in-tech offerings include system design, methodical consulting, advanced electronics platform development and validation of automotive specific software and hardware systems, infotainment, and experience validation.

Dinesh Rao, EVP & Co-Delivery Head, Infosys, said, "Infosys continues to strengthen its Engineering R&D leadership with decades of experience in digital engineering. Together with in-tech, Infosys Topaz, an AI-first set of services, solutions and platforms, and recently acquired InSemi' semiconductor's expertise, we have successfully created deeper capabilities for the next phase of automotive innovation in the arena of software defined vehicles. We are excited to welcome in-tech and its leadership team into the Infosys family."

Jasmeet Singh, EVP and Global Head of Manufacturing, Infosys, said, "The automotive industry today is going through a pivotal change, with connected, autonomous, and electric vehicles, and most importantly software-defined vehicles. Electronics and software will drive value for next generation vehicles. Infosys' leadership with comprehensive offerings serving global auto OEMs, tier-one, and e-mobility start-ups, coupled with in-tech engineering prowess presents a differentiated value to our clients bringing high quality innovative products to market faster."



PLASTIC PRODUCTS AND NEW TECHNOLOGIES

Winpack Leverages Exceed™ XP Performance PE to Help Enable Increased Post - Consumer Recyclate (PCR) in Mulch Films



Challenge: Develop mulch films with increased PCR Winpack Group, a leading converter of flexible films based in Chile, wanted to increase the amount of postconsumer recyclate (PCR) used in its mulch films while improving or maintaining performance compared to its existing films. The company believed that the sustainability benefit provided by increasing the incorporation of recycled content in its film formulations could create opportunities to increase market share through new business opportunities. “Winpack is always looking to improve its competitiveness in an effort to grow market share,” said Luis Martinez, Head of Development and Innovation, Winpack Group. “In this instance, we believed we could increase the incorporation of PCR in our mulch films to

help enhance our ability to respond to market demands. Plus, we needed to ensure that film performance was not compromised.”

Solution: Exceed™ XP can allow increased incorporation of PCR Winpack collaborated with ExxonMobil's polyethylene (PE) business, which is acknowledged as an innovator in film formulation and a leader in developing solutions through value chain collaboration. By combining the strength of ExxonMobil's technical support with Winpack's expertise in film conversion, a 3-layer mulch film solution was developed that not only maintained performance in certain mechanical properties such as stiffness, but helped to increase tear performance compared to the reference film, which is a key requirement for mulch films.

Factsheet: Rotomolded Products with Improved Toughness Using ExxonMobil's Exceed™ Performance Polyethylene

The rotomolding plastic process allows for the fabrication of large hollow parts or components in

almost all shapes and sizes. It is especially suitable for a wide range of applications, including storage tanks, consumer sporting equipment, playground equipment, industrial parts and more. Rotomolded products need to be strong enough to endure harsh weather conditions and long-term use. High-quality rotomolded products with improved toughness and durability are now possible using our Exceed™ performance polyethylene (PE).



Exceed™ 4536 performance PE is great for rotomolding applications and can upgrade linear low-density polyethylene (LLDPE) grade solutions Exceed 4536 PE resins offer manufacturers the opportunity to produce high - performance products with exceptional impact resistance with balanced stiffness, surpassing that of commonly available LLDPE. This enables rotomolders to scope potential thickness reduction in their molded products. Moreover, Exceed 4536 resins deliver significant environment stress cracking resistance (ESCR),

ensuring that tanks and other products can withstand exposure to chemicals and other environmental factors, while maintaining their strength and durability over time. Additionally, Exceed 4536 provides a fine surface finish of rotomolding applications and allows for the incorporation of increased recycled content without compromising the quality of the finished products. Notably, some customers also reported lower production costs and reduced operation cycle times when rotomolding their products using Exceed 4536 performance PE resins because of the low zero shear viscosity.

Borealis and AKVA Launch Workboat from Renewable Feedstock - Based Plastic



Key Highlights:

- Borealis and AKVA group deliver the world's first boat hull made from renewable raw materials.
- AKVA group's Polarcirkel boats are known for their ability to endure extreme conditions, with a substantially reduced carbon footprint.
- Borealis' Bornevables range of renewable polyolefins enables the Polarcirkel series to maintain exceptional

performance standards while driving progress towards a circular economy.

Borealis and AKVA group announced a breakthrough in sustainable aquaculture: a workboat hull constructed from renewable plastic. The boat will be unveiled in Mo i Rana, Norway, in Spring 2024, marking a significant step forward for circularity in marine technology.

Borealis is a provider of advanced and sustainable polyolefin solutions whilst AKVA group is a technology provider to the aquaculture industry.

The Polarcirkel series is known for its practical design, exceptional reliability, and unmatched safety. Used in a wide range of industries, including fish farming, oil and gas, rescue, defense, Arctic tours, and recreational boating, these vessels can endure some of the most challenging conditions on the planet, from -40°C in Arctic regions to +55°C in the tropics.

Using Borealis' Bornevables portfolio of renewable polyolefins, AKVA group can now offer these boats with a substantially reduced carbon footprint. Derived from renewable sources such as used cooking oil, the Bornevables offer the same material performance as virgin plastics, yet decoupled from fossil-based feedstock.

The hull is made from Borealis BorSafe He3490-LS-HW grade, which is composed of 90% renewable content based on a Mass Balance approach. For every kilogram of polyolefin produced, this grade achieves an estimated reduction of 1.9kg of CO₂ equivalent emissions when compared to a fossil-based equivalent.

AKVA group has also taken sustainability a step further, transporting materials to Mo i Rana by train to minimise the transportation carbon footprint.

These measures represent clear and measurable progress towards reducing climate impact and establishing a circular economy. In the near future, the partnership between Borealis and AKVA group is set to expand to cover a wider range of workboat components as well as floating aquaculture constructions made of pipes.

“The aquaculture industry is poised for a circular transformation, and we're excited to lead the charge with the help of Borealis. Our first priority will always be the safety of the people on board our vessels, and it's remarkable that this can now be achieved just as effectively with a much smaller carbon footprint,” said Freddy Bakken Braseth, general manager of the AKVA group department in Mo i Rana. “The use of the Bornevables in Polarcirkel affirms that high-performance standards can be met sustainably. This move is a significant step forward in our EverMinds mission to accelerate the transformation to a circular economy – with this we put reinventing essentials for sustainable living into full action.”

New, Lightweight Closures by Berry for Protein Powder and Wellness Supplements Help Reduce the Carbon Footprint of Nutraceuticals

As people become more health conscious and aware of the need to take preventive healthcare measures, the market for



nutraceuticals – products that combine pharmaceutical - like properties with nutritional benefits – is growing rapidly. According to a recent report by MarketsandMarkets, the U.S. nutraceutical packaging market is projected to reach 4.2 billion by 2028, up from 3.4 billion in 2023. Along with this growth is the need for innovative packaging for vitamins, nutraceuticals, and supplements that support product usability, integrity, safety, aesthetics, and sustainability. As a global packaging leader, Berry offers a wide range of plastic caps and closures – from screw, snap and flip-top caps to over caps and tube closures – with senior friendly, child resistance, and tamper evident options. In addition to our Premium Dispensing VersaCap with a butterfly hinge that snaps and stays open, we recently innovated new lightweight closures for the protein powder market, including our 120 - Special Next Gen Deep Skirt Screw On Closure Ribbed (120 Deep Skirt) and 110/400 Wide-mouth Screw On Closure Ribbed (Lightweight 110/400). Both closures are candidates for 25% postconsumer recycled (PCR) content. These new closures are part of Berry's B Circular Range of packaging and product solutions that leverage our engineering expertise and proprietary processes in the design for circularity to reduce products' impact on the environment, focusing on helping brand owners meet and exceed their sustainability goals. The innovative closure designs use

less material, combining modern design with a reduction of greenhouse gas (GHG) emissions. Moreover, incorporating PCR content into these closures reduces the need for virgin plastic made from fossil fuels. Based on a life-cycle assessment from the Association of Plastic Recyclers, compared to former designs, the: 120 Deep Skirt closure is around 33% lighter, reducing up to 192 MTCO₂e annually – equal to GHG emissions from about 43 passenger vehicles driven for one year. Lightweight 110/400 closure is around 31% lighter, reducing up to 125 metric tons of carbon dioxide equivalent (MTCO₂e) annually – equal to CO₂ emissions from about 289 barrels of oil consumed. Made of widely recyclable polypropylene, the new closures are food-contact safe, available with a standard liner, and feature a fine - ribbed sidewall and stipple top for optimal grip and usability. Both offer precise closure - to - bottle thread contact for a secure, leak-free seal and utilize an inside gate to offer a smooth top surface. Their versatility makes these closures suitable for applications in food, wellness, beauty and personal care, pet care, and many other markets. These closures are popular solutions for protein powders and beauty and wellness supplements, and matching stock bottles are available for a total package solution.

Avient Supports Hager Group to Incorporate Recycled Ocean - bound Plastic in New Waterproof Outdoor Socket and Switch

Avient formulates Social Plastic® from Plastic Bank into custom Maxxam™ REC recycled polyolefins, used to make Hager's new cubyko leaf outdoor socket and switch.



Avient Corporation, a premier provider of specialized and sustainable materials solutions and services, is pleased to announce a successful collaboration with its longstanding and valued customer, Hager Group. Avient supported Hager to incorporate 27% recycled ocean-bound plastic in its new cubyko leaf waterproof outdoor sockets and switches, providing its customers with a more ecoconscious option. This success was achieved in further collaboration with Plastic Bank, which provides the recycled ocean - bound plastic waste that Avient formulates into high - performing polyolefin materials. Avient helped achieve this success by developing customized versions of its Maxxam™ REC Recycled Polyolefin Formulations, which contain 50% recycled ocean - bound plastic content, using Social Plastic® feedstock from Plastic Bank. As a result, the final assembly of the Hager cubyko leaf includes 27% ocean-bound plastic content. These formulations effectively replace the previous prime materials used by Hager, meeting the required technical specifications, including coloration to specific RAL colors, while also providing good resistance to ultraviolet (UV) light, scratches, and impacts. "We are proud to have been part of the collaboration with Plastic Bank and Hager and have the opportunity to transform discarded ocean - bound plastic into high-performing polymers," said Matt Mitchell, Director of Global Marketing, and Specialty

Engineered Materials at Avient. "This project demonstrates our commitment to innovation and sustainability, and we are pleased to help Hager meet its sustainability goals." "This collaboration is a great example of how businesses can work together to create a regenerative future and reduce plastic waste in our environment," said David Katz, Plastic Bank's Founder and CEO. "Every product made with Social Plastic® feedstock gives consumers a chance to support a circular economy, and this is no exception. We look forward to working with Avient and Hager to empower more retailers and customers to take action for a better world."

Dürr Develops New Paint Supply System for Industrial Applications



Dürr (Southfield, Mich.) introduces the Eco Supply P Core, a revolutionary modular paint supply system built on pigging technology, marking a significant advancement beyond its successful implementation in automotive painting. Now adaptable across various industries, including construction, woodworking, and automotive suppliers, the Eco Supply P Core efficiently handles the application of different paint colors in small quantities while minimizing waste and optimizing color changes

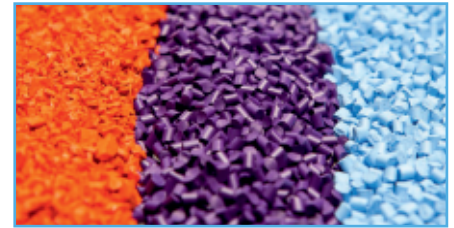
The demand for diverse color options transcends automotive needs, with industries like construction and plastics relying on a spectrum of shades to meet customer preferences. However, traditional paint supply systems incur significant losses in paint and rinsing agents during color changes, leading to increased costs, especially with minimal quantities

Dürr's innovative pigging technology revolutionizes the process by utilizing specially designed "pigs" to optimize efficiency and reduce consumption of paint and rinsing agents. The pig, fitting snugly within the hoses, facilitates the transfer of paint while removing any residual rinsing agents. This streamlined process enables faster color changes and simplified maintenance, with the EcoSupply P Core available in both single-pass and circulating versions, suitable for water and solvent-based paints.

The modular design of the EcoSupply P Core allows for flexible configuration and integration with existing systems, offering a seamless solution tailored to user requirements. Dürr's starter kit includes all essential components, along with sensors for monitoring and maintenance tools, ensuring a comprehensive and user-friendly experience.

The sales launch for Dürr's EcoSupply P Core is planned for early summer.

Ensuring Quality Beyond the Injection Moulding Process



BP & R sat down with Gabby Day, communications manager at Pentagon Plastics, to discuss Pentagon's post - moulding procedures for adding features, maintaining quality control, and alignment with sustainability goals.

How does Pentagon Plastics' experience with "filled and unfilled thermoplastics" translate into benefits for their clients (e.g., wider material selection, better product performance)?

Pentagon has been processing high engineering grades of thermoplastic materials for more than fifty years and the use of fillers greatly increases the choice of materials available to our customers and can provide advancements to the final function of the finished product.

Materials with glass filler offer benefits of improved strength, structural rigidity, and dimensional stability. Glass-filled nylons also have lower moisture absorption and are therefore less prone to taking in moisture compared to unfilled nylon, which can help ensure greater dimensional stability and reduce the risk of part failure in high-humidity environments. Material selection is largely based on the parameters surrounding the end use of the plastic component and the

environment in which it will be used. The versatility of thermoplastic materials is advancing all the time which offers customers and their design engineers a wealth of options.

We are also using materials with carbon or steel fillers that make them semi - conductive. This can be useful in environments where static electricity can be an issue, providing Antistatic & ESD protection, preventing electrostatic discharges. Some conductive plastics are also used in Electromagnetic Shielding, reducing EM interference.

Pentagon's breadth of processing knowledge delivers multiple benefits to customers, sound material advice within the design stage coupled with optimal mould tool design that is aligned with specific material behaviors and properties. Our optimized injection moulding processes allow for manufacturing efficiencies that lead to repeatable quality products delivered with efficient lead times.

Have you encountered any recent advancements in plastic materials that have significantly impacted your approach to injection moulding ?

In line with the modern environment and the hard focus on sustainability within the polymer industry, the current crop of recycled materials that are available are much better than the products of a few years ago. Benefiting from much greater consistency allowing for a repeatable process in the

moulding machine. This in turn increases our confidence in offering them as an alternative to traditional virgin polymers. This is particularly attractive to customers who want to be more environmentally sustainable or are simply looking for ways to reduce costs on high - volume parts. Although our approach to injection moulding remains consistent this advancement in recycled material options does enhance the polymer industries offerings.

In terms of Pentagon's process Beyond the Mould, could you walk us through the process of post - moulding and how you ensure quality throughout?

Processes beyond the mould are secondary operations to the injection moulding of the part, usually carried out for component features that are not compatible with the moulding process but are necessary to the finished product or to keep some of the initial cost out of the mould tool. This includes things such as drilling or insert fitting, milling, trimming and light assembly. Within the department quality checks take place every 1-2 hours whereby sample components that are being worked on are taken by the quality inspectors, checked, and measured using equipment such as co - ordinate measuring, calipers, micrometers, pin / thread gauges, and custom-built product specific jigs or gauges.

The results are then recorded and monitored; this enables the quality team to see if overtime any changes have occurred and

maintains consistent accuracy of post moulding operations. The strict quality processes allow us to capture, report and rectify any quality concerns before they become an issue that may impact fulfilment of a customer order.

Pentagon Plastics recently acquired a Deltron CNC Coordinate Measuring Machine from Vision Engineering. Could you elaborate on the specific features and functionalities of this equipment and how it will contribute to your quality assurance processes ?

Pentagon operates under ISO9001 : 2015 standards spanning both mould tool manufacture and plastic injection moulding and quality is vital throughout our manufacturing processes. The recent investment in to the Deltron CNC Coordinate Measuring Machine advances our quality process to the next level for mould tool manufacture. The compact machine brings high level measurement accuracy and repeatability directly to the shop floor allowing the technicians to check their own work at every stage and to produce extensive reports when required. Saving measurable amounts of time on the existing manual processes this state - of - the - art technology will predominantly be used for electrodes, cores, cavities, and other tooling components it will deliver greater accuracy for quality checking. The investment will support the reduction of tool manufacturing lead times and reduce the additional resources for reworking or remaking items.



PLASTIC RAW MATERIALS

INEOS Styrolution's High Performing Luran® S SPF60 Selected for Automotive Application

INEOS Styrolution's Luran® S XA SPF60 offers excellent weather resistance, UV stabilisation, and enhanced deep black appearance for automotive exterior applications.

A leading European automotive brand has selected INEOS Styrolution's Luran S SPF60 for the blackening panel of the company's line of trucks. The selection was made due to the product's superior surface quality in combination with its weather resistance.



INEOS Styrolution has had a long-standing relationship with the automotive company and its application supplier. The two companies have previously collaborated on development projects using INEOS Styrolution's Luran S 778T material and the SPF30 additive package. Thus, it

was a natural next step to test the enhanced XA SPF60 package as soon as it became available. Initial tests were positive and subsequently, the new material was approved for the company's automotive applications.

Laura Nübling, Product Manager Luran S, EMEA says: "Luran S XA SPF60 was developed for demanding outdoor applications that require superior UV resistance and high gloss surfaces. When we developed the product, we had deep black automotive applications for automotive components like exterior trims, rear-view mirrors, and dual design front grilles.

I am very excited to see our Luran S SPF60 material cruising down the road." Luran S is an ASA2 polymer featuring high surface quality, good impact strength and enhanced colour fastness. Luran S products deliver superior long-term performance when exposed to UV irradiation and heat. They also provide excellent chemical resistance. To strengthen its position as the benchmark styrenic polymer for weather resistance, the enhanced Luran S SPF30 and Luran S SPF60 packages were developed, offering state-of-the-art UV stabilisation. A broad portfolio of advanced

Luran S products is addressing solutions in industries including automotive, construction, toys, sports & leisure, electronics, healthcare, household and packaging. Luran S 778T, the material used for the blackening panel, is one grade out of the range of Luran S materials. It is specifically optimised for high heat and chemical resistance and can be found in many automotive applications.

About INEOS Styrolution - INEOS Styrolution is the world's leading styrenics supplier, with a high-performing portfolio of styrene monomer, polystyrene, ABS and advanced styrenic products. With more than 90 years of innovation in materials science, INEOS Styrolution is focused on customer satisfaction with differentiated solutions that provide a competitive edge as well as investments in technology that enable closed loop recyclability for styrenics while reducing our carbon emissions. INEOS Styrolution applications can be found in many everyday products across multiple industries: including automotive, electronics, household, construction, healthcare, packaging, and toys / sports. Operating 17 production sites in nine countries,

the company is a wholly owned subsidiary of INEOS Group Limited and employs approximately 3,000 people. Sales were 4.5 billion euros in 2023. www.ineos-styrolution.com

Sirmax Presents the "Naturally Inspired" Material Series: Sustainable Thermoplastic Granules for the Furniture Sector at Milan Design Week 2024's Materially Now Space

Milan, April 16, 2024 – Plastic stands as a pivotal element in material sustainability. While recycling serves as the initial step towards product innovation, the current focus lies on upcycling — the process of transforming plastic waste into something of greater value than its original form.

Sirmax, a company based in Cittadella (Padua), has been producing thermoplastic granulates for all types of applications for sixty years. It processes virgin and recycled plastic, creating formulations based on precise customer requirements. The company produces ready - to - use compounds for applications in the appliance, automotive, electrical, furniture, and accessories sectors.

Thanks to the integrated recycling and compounding process that takes place within its plants, Sirmax is able to process post - consumer plastic waste through the stages of sorting, washing, and shredding. Additionally, it can ennoble waste by adding mineral fillers or reinforcing fibers until it

becomes a material ready for the production of durable goods.

The thermoplastic resins produced by Sirmax are high added - value materials that transform packaging waste – which arrives at the plants as a low - value raw material from urban waste sorting – into structural or aesthetic components that are stronger, better performing, and have a lower carbon footprint. By way of example, **pasta packaging, spreadable cheese tubs, and yoghurt pots can be transformed, through Sirmax's finishing process, into raw materials that can be used for car dashboards.**

By elevating recycled plastic to a higher quality level through upcycling, Sirmax achieves comprehensive product sustainability. This integration into durable goods reduces the reliance on virgin raw materials, thereby decreasing CO2 emissions and diminishing the consumption of fossil resources.

To provide a tangible illustration of this concept, Sirmax will showcase a range of distinctive products named 'Naturally Inspired' within the Materially Now space at Design Week 2024. These products are designed to emphasize a unique aesthetic effect. Through precise pigmentations and carefully calibrated concentrations of recycled materials, Sirmax has formulated granules capable of evoking the natural characteristics of elements found in nature, such as sand, stone, or marble, once molded into the desired artifact.

The materials showcased, obtained through an upcycling process, intentionally highlight

their recycled content, effectively communicating the concept of sustainability to consumers. They are crafted from a PP (polypropylene), ABS, or PC (polycarbonate) polymer base, with customizable finishes available upon request. Many of these materials were specifically conceived to meet the needs and preferences of designers and planners in various sectors including automotive, furniture, electrical, and electronics. Sirmax's adaptability to diverse technical requirements allows for this compound to be molded for an extensive range of applications. There are no limits to the imagination!

Sirmax's production process and the exceptional quality of its products will be showcased in a presentation led by Leonardo Forner, Sustainability Manager of Sirmax Group. The presentation will take place on Sirmax - Internal Document Wednesday, April 17th, at 12 noon, followed by a discussion at 5:30 p.m. in the Congress Area of Materially Now.

Sirmax Group - With headquarters in Cittadella (Padua), is Europe's leading independent manufacturer, and among the top global manufacturers, of polypropylene compounds, engineering polymers, post - consumer compounds and bio-compounds used across all sectors: automotive, household appliances, power tools, electrical, electronics, construction, and furniture. Active since the 1960s, Sirmax now boasts 13 production plants: Six in Italy (Cittadella, Tombolo, Isola Vicentina, San Vito Al Tagliamento, Salsomaggiore Terme, and Mellaredo di Pianiga), two in Poland (2006-2019), one in

Brazil (2012), two in the US (2015-2020) and two in India (2017). Sirmax also has a sales office in Milan, Italy, and other branches in France, Spain, and Germany. Sirmax has acquired significant market shares in Europe, North & South America, and Asia, and has become a global player on the international market. Sirmax employs 850 people and had a 2022 turnover of €501 million. www.sirmax.com

BioPowder Replaces Synthetic Components with Bio-Composites



Key Highlights:

- BioPowder is shifting towards natural materials like plant-based polymers and functional fillers in the composites industry.
- BioPowder aims to reduce environmental footprints while enhancing functional properties, partnering with manufacturers to create genuinely sustainable products.
- They transform olive oil by-products into high - quality powders with unique characteristics, making them highly suitable as natural fillers and reinforcing fibres in composite materials.

BioPowder is a specialist for innovative fibre additives and functional composite fillers originating from the circular

economy. By transforming olive oil by-products into powders of high quality with unique characteristics such as excellent stability, homogeneous particle shape and a bright colour, they become highly suitable natural fillers and reinforcing fibres for composite materials.

Composites are materials made of two components that have distinct physical and chemical properties. In combination, the two components ensure enhanced characteristics of the finished compound.

In recent times, there has been a strong trend of making natural composites, i.e. nature-inspired materials with a reduced carbon footprint and better recyclability. Most manufacturers take the approach of replacing synthetic components, e.g. glass or plastics, with natural and renewable materials - above all natural fillers and fibre composite additives. The result are bio-composites (also called natural composites), i.e. new materials with a certain percentage of natural and/or plant-based ingredients.

Fibre Additives Made from Upcycled Olive Stones

In recent years, a variety of plant-derived fibre additives have been used in composite manufacturing: wood fibres, starch, flax, hemp and corn cob, bagasse and coconut fibre – just to name a few. Depending on the final application, these materials have their advantages and shortcomings. In addition to not always producing satisfactory mechanical properties, many natural fillers are not necessarily sustainable, in spite of their herbal origin.

At BioPowder numerous circular raw materials, i.e. agricultural side-streams, have been tested. In a comparative fashion, sustainability criteria and mechanical performance parameters were analysed. The bottom line: refined, pulverised olive pits, i.e. olive oil production by-products, demonstrated the best performance, i.e. excellent results due to their physical and chemical particle structure. As a consequence, its fully bio-based and biodegradable line of functional composite fillers was born. Marketed under the brand name Olea FP (Functional Powder), BioPowder fibre additives are an optimized solution made from sustainable raw materials. Compared to other plant fibres, these natural fillers and reinforcing fibres offer the following advantages:

High stability: olive stone powder does not expand in contact with liquids and maintains its shape. Its particles can be customized to any grain size range that will remain stable, even when bearing load.

Low water and oil absorption: Olea FP composite fillers do not change their shape or texture in oily or watery formulations such as coatings. Therefore, they are easy-to-handle reinforcing fibres that guarantee predictable results.

Hardness and abrasion resistance: composite additives made from pulverised olive stones have a hardness of 3.5 (Mohs scale). When used as reinforcing fibres in natural composites, BioPowder natural fillers can significantly enhance tensile strength, resistance and durability of the finished material. As fibre reinforcement in resin and /

or polymer compounds, they improve the end products' abrasion resistance and are therefore suitable for use in numerous performance composites.

Light weight: with a bulk density of 500-550g/l / specific gravity of 1.1-1.1kg/l, its fibre additives are ideal natural fillers for lightweight composites used in aviation, shipbuilding, automotive and medical applications. In addition, different types of performance coatings (water- and bio - based) can be enhanced accordingly.

Variety of texture effects: this is made possible through custom sizes of powdery and granular fibre additives and natural fillers. Fine powders are the solution for plain surfaces while coarse granules can add visible texture and anti-slip effects.

Environmental and human sustainability: BioPowder fibre additives are made exclusively from side-stream products, i.e. upcycled agricultural residues. No plantations and the associated use of soil and water resources are needed. This is of particular relevance for life - cycle assessments (LCAs) of natural composites: most material developers are conscious about the carbon footprint and/or the Co2 balance of all input materials and are keen on evaluating its reinforcing fibres accordingly. The production of its composite fillers is completely emission - free and only a reasonable amount of electricity is required. The latter can partially be derived from

renewable sources of energy such as solar panels or biomass boilers.

Proven examples of fibre additives in biocomposite applications

BioPowder composite fillers offer a number of benefits when used in composites for the following applications:

Natural fillers and reinforcing fibres for rubber compounds

The company's Olea FP product line of micro-powders can add significant value to rubber compounds for tyres, seals and hoses, shoe soles and similar items. Strength and stability can be improved when adding fibre additives in varying doses. Besides, the environmental impact of micro plastics, generated through the abrasion of rubber items (tyres, soles, etc.), can be significantly reduced when natural composite additives are added.

Enhancing Polypropylene Performance with Hyperform® HPN® by Milliken



Hyperform® HPN® by Milliken is a high - performance nucleating agent for polypropylene. It enhances productivity via reduced cycle times, along with the proven energy savings.

Evonik Advances Sustainable Production with Green Electricity for Specialty Acrylates



- DEGACRYL® specialty acrylate production now powered from renewable energy sources
- Annual savings of around 1,400 tons of CO2
- Specialty acrylates from Darmstadt serve a broad range of uses

Darmstadt, Germany Evonik's Coating & Adhesive Resins Business Line has achieved a significant reduction in carbon emissions by powering the production of DEGACRYL® specialty acrylates in Darmstadt with electricity from renewable sources. This initiative, effective since the start of the year, results in an annual CO2 savings of around 1,400 metric tons. The shift to renewable energy aligns with the business line's commitment to sustainability. "In addition to a strong focus on products that provide our customers with more sustainable solutions through the handprint, this also includes reducing the carbon footprint of DEGACRYL®," says Dr. Claudia Meister, Head of Specialty Acrylics. With lower CO2 emissions, the business line is helping to achieve its own sustainability goals and at the

same time meet market requirements: "The customers are increasingly asking for sustainably manufactured products. We can now support our customers even better in this area and reduce our Scope 1/2 emissions at the same time," says Meister. The supply of electricity from renewable energy sources is ensured via green electricity certificates and special supply contracts known as Power Purchase Agreements (PPAs). The integration of green electricity into the production process is another building block in the more sustainable production of specialty acrylates. For many years, the steam necessary for production has been sourced from a local waste-to-energy plant, utilizing waste heat to generate additional value.

The DEGACRYL® specialty acrylates produced in Darmstadt are used in a wide range of applications. In the packaging industry, they are essential for heat-sealing lacquers used in dairy products packaging, among others, promoting the creation of eco-friendly packaging solutions. In addition, these acrylates play a crucial role in the medical sector as a raw material in dental prostheses and bone cement, as well as in adhesive applications.

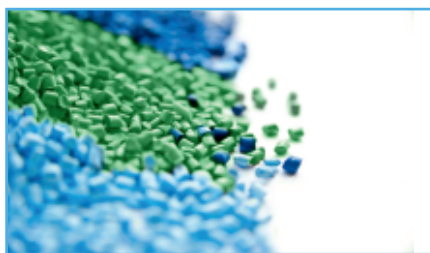
Company information: Evonik is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world and generated sales of €15.3 billion and an operating profit (adjusted EBITDA) of €1.66 billion in 2023. Evonik goes far beyond chemistry to create innovative, profitable, and sustainable solutions for customers. More than 33,000 employees work

together for a common purpose: We want to improve life today and tomorrow.

About Smart Materials: The Smart Materials division includes businesses with innovative materials that enable resource-saving solutions and replace conventional materials. They are the smart answer to the major challenges of our time: environment, energy efficiency, urbanization, mobility and health. The Smart Materials division generated sales of €4.46 billion in 2023 with more than 8,100 employees.

Disclaimer: In so far as forecasts or expectations are expressed in this press release or where our statements concern the future, these forecasts, expectations or statements may involve known or unknown risks and uncertainties. Actual results or developments may vary, depending on changes in the operating environment. Neither Evonik Industries AG nor its group companies assume an obligation to update the forecasts, expectations or statements contained in this release.

Neste and Lotte Chemical Team up on Renewable Chemicals and Plastics



• Collaboration targets replacing fossil resources with renewable raw materials in the manufacturing of chemicals and plastics

• Potential to provide lower-emission solutions for chemicals and plastics used in various industries

Neste and South Korean chemical company Lotte Chemical are teaming up to make chemicals and plastics more sustainable. The companies embark on a strategic collaboration to replace fossil resources with renewable raw materials in the manufacturing of chemicals and plastics. This will enable products and applications with a lower carbon footprint compared to those produced from fossil resources. The collaboration will see Neste providing renewable Neste RE™, a raw material for chemicals and plastics that is made from 100% renewable raw materials. Lotte Chemical will use Neste RE at the company's Korean sites to produce various common types of plastics and chemicals in Lotte Chemical's broad product portfolio. These plastics and chemicals may be used in multiple applications and in supply chains for various products ranging from packaging to construction and from textiles to electronics. The quality and performance of the end products remain unchanged. With chemicals and plastics still largely depending on fossil resources, both companies see an urgent need to make a switch to more sustainable alternatives. "We are looking forward to increasing the share of renewable solutions in collaboration with Lotte Chemical," says Jeroen Verhoeven, Vice President Value Chain Development for renewable polymers and chemicals at Neste. "Together, we can pave the way to more sustainable supply chains and lower emissions for a wide range of sectors and applications.

Fundamentals of Polyethylene – PE Performance



HDPE parts colored with masterbatches were cracking due to gradual increase in crystallinity after molding. Only parts colored black to hide mixed-color regrind used a high enough level of black LLDPE masterbatch to effectively lower the average density of the parts, reduce crystallinity and avoid cracking.

Don't assume you know everything there is to know about PE because it's been around so long. Here is yet another example of how the performance of PE is influenced by molecular weight and density.

Before we leave the topic of polyethylene grade selection, it may be productive to look at one more practical example of how the performance of PE is influenced by the dual considerations of molecular weight and density. This case study involves a relatively large molded part that was being produced in a variety of colors in an HDPE with a melt-flow rate of 7.0 g/10 min and a density of 0.952 g/cm³. Periodically the supplier of these parts would receive complaints from the field about cracking. It was assumed that these cracks occurred due to relatively high mechanical stresses that were part of the application.

However, when this problem became significant enough to start tracing it back from the field through the manufacturing process, a review of parts in inventory showed that cracking was occurring spontaneously in parts that had never been in service. It was further determined that parts that had been recently molded were free of the defect, but parts that were older did show evidence of cracking, and the older the parts were the more extensive the cracks appeared to be.

This is not an uncommon problem in PE. The combination of stresses from poor design elements such as sharp corners and rapid changes in wall thickness coupled with the ability of the material to increase in crystallinity over time produces a condition where the inherent strength of the material is exceeded and cracks begin to form. Over time these cracks can grow to be significant. The problem is almost always related to the density of the material being too high.

Color Performance

When the various colors were examined it was found that all colors were susceptible to this failure mode, with the exception of black. So, what was different about the black material? It turns out that black parts were molded from a mixture of reground colors that were then made black by the addition of a color concentrate. This concentrate was based on LLDPE. In actuality, all the colors were produced using concentrates based on LLDPE. But coloring natural material only required a letdown ratio of 2 lb of concentrate per 100 lb of

natural. Getting a good black color when using a mixture of colors required a much higher concentrate loading.

Adding this concentrate at the level needed to achieve a satisfactory color was effectively reducing the density and therefore the crystallinity of the material, making it less susceptible to brittle failure. Although it is often the case that a reduction in density results in lower strength and stiffness, in this case a lower density did not compromise the performance of the parts because the nominal wall of the part was relatively thick. There was no noticeable difference in the load-bearing performance of the black parts compared with any other color.

This pointed to a solution for the other colors. A recommendation was made to reduce the density and, if possible, increase the average molecular weight of the material used to produce the parts. Often it is important to the processor that they can remain with a given material supplier, so the product line for that supplier must be reviewed for viable options. For this particular product line, the next step down in density was to 0.946 g/cm³ and a grade with this density was available with a melt-flow rate (MFR) of 5.0 g/10 min.

Weight and Density

This provides the opportunity to make two changes that both improve the toughness of the material. The lower MFR is associated with an increase in the average molecular weight of the polymer and the lower density provides a reduction in the

crystallinity of the part. Given the relatively small change in MFR, it is anticipated that an improvement in performance will be attributable primarily to the reduction in density. As expected, the short - term mechanical properties of the part were not altered in any noticeable way.

The problem now becomes one of verifying that the change that was made is sufficient to solve the field problem. It was determined that at room temperature, spontaneous cracking of the parts molded in the higher-density material occurred in about 12 months. Exposure to elevated temperatures is often used to accelerate a failure and allow for a rapid determination of fitness for use.

In this case, parts molded in the higher - density material were placed in an oven set at 93 C (200 F). Cracks began to appear in these parts in a little less than 8 hr. It is tempting in situations like this to establish an equivalence between the elevated temperature and room temperature without establishing the mechanism for the acceleration. In PE, exposure to higher temperatures can promote multiple processes that can lead to cracking. One of these, and the one that is of interest here, is an acceleration in the rate at which additional crystallization occurs. However, other processes such as oxidation can also contribute to a loss in toughness. So, it is important to establish that the old material and the new material contain sufficient stabilization so that oxidation cannot occur.

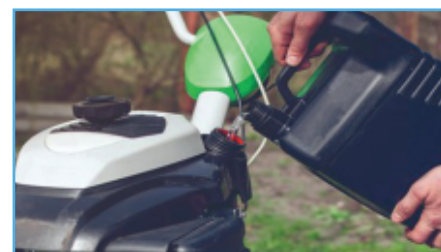
Assuming that this is done, tests on the new material with the lower density and the higher molecular weight can be performed as a comparison. In this case, the new material did not show cracks until the aging time reached 130 hr, about 16 times longer than in the original higher - density material. This represents a single data point generated at a relatively high temperature. In order to establish a reasonable calculation for an anticipated lifetime for the new material, it is advisable to perform this comparison at one or two additional temperatures in order to determine whether this 16-fold improvement can be relied upon.

But even if the degree of improvement is somewhat more modest, the results of these tests indicate that lowering the density of the material by a relatively small amount will likely extend the life of the product to a very significant degree. In addition, the lower density and higher average molecular weight of the new material will provide for improved performance under the influence of the stresses associated with field use.

This is one more example of the importance of understanding the role of molecular weight and density in selecting a PE. Too often we refer to materials as commodities because of their relatively low cost. This gives the impression that we don't need to put much thought into the selection process. And after 80 years of using PE we perhaps assume that we know everything there is to know. But the experience of dealing with field failures suggests that we have a lot to learn.

ABOUT THE AUTHOR Mike Sepe is an independent, global materials and processing consultant whose company, Michael P. Sepe, LLC, is based in Sedona, Ariz. He has more than 40 years of experience in the plastics industry and assists clients with material selection, designing for manufacturability, process optimization, troubleshooting, and failure analysis. Contact: (928) 203 - 0408 mike@thematerialanalyst.com.

Polyethylene Fundamentals – Failed HDPE Case Study



Injection molders of small fuel tanks learned the hard way that a very small difference in density — 0.6% — could make a large difference in PE stress-crack resistance. Small gas tanks, the type used on equipment like lawnmowers and snowblowers, have typically been produced from high-density polyethylene (HDPE). Automotive gas tanks are subject to rigorous emission standards that require multilayer constructions employing barrier materials designed to prevent diffusion of gasoline through the tank wall. Small gas tanks are not required to conform to these standards. In addition, they are of a size that allows them to be produced, in most cases, by injection molding. The typical small tank is a two - piece design produced in a family mold.



PLASTIC MACHINERY

Extruder Controls Make for More Energy Efficiency



NPE2024: Twin-screw extruders packed with features to optimize energy consumption.

Bausano's next-generation MD 92 Nextmover twin-screw extruder comes equipped with the Multidrive system and Digital Extruder Control 4.0, both aimed at optimizing energy consumption.

Multidrive is a patented transmission system that enables the distribution of the coupling force over four shaft motors, controlled by a single static frequency converter, for constant rotation and perfect synchronism of the motors.

Bausano's Digital Extruder Control 4.0 is a screening tool for extruder and end-of-line energy performance. It is an intuitive interface, enabling screw speed to be adjusted, temperature to be controlled and alarm thresholds to be set, even remotely, with a view

to vertical integration of control technologies. In addition, the ability to customize multiple configurations and to consult, at any time, the archive of statistics, facilitates predictive and preventive maintenance activities, with positive results in terms of overall equipment effectiveness.

Bausano is also displaying the Smart Energy temperature control system, developed to keep the temperature of the processed material constant and reduce heat loss. The innovative technology applies the principles of electromagnetic induction to the extrusion process for faster and more uniform heating, guaranteeing consistent extrudate quality and efficiency, as high as 95% for net energy savings of 35%.

TOMRA Launches Food-Grade Plastics Sorting Solution Using AI Technology

Key Highlights:

- TOMRA Recycling, announced the launch of three applications to separate food-grade from non-food-grade plastics for PET, PP and HDPE.



- The breakthrough was made possible by the company's intensive research and development in deep learning, a subset of AI.
- By combining its traditional near-infrared, visual spectrometry or other sensors with deep learning technology, TOMRA has achieved purity levels of about 95%.

Thanks to TOMRA's continued investment in GAIN – the company's deep learning-based sorting add-on for its world-renowned AUTOSORT units – it is now possible for the first time to quickly and efficiently separate food-grade from non-food-grade plastics for PET, PP and HDPE on a large scale.

Until now, food-grade sorting has proved a real challenge for the industry as food and non-food packaging are often made of the same material and visually very similar which makes it difficult for any sorting system on the market

today to differentiate and separate. Hygiene concerns and increasingly stringent industry regulations add a further layer of complexity to handling food waste in recycling.

However, TOMRA's GAIN technology – rebranded to GAINnext in tribute to the product's significant evolution – can now resolve all of these challenges by further enhancing the sorting performance of the company's AUTOSORT units so they are capable of identifying objects that are hard and, in some cases, even impossible to classify using traditional optical waste sensors.

Purity levels of over 95%

By combining its traditional near-infrared, visual spectrometry or other sensors with deep learning technology, TOMRA has developed an accurate solution that's now available on the market. And the degrees of purity that this solution is achieving – upwards of 95% for the packaging applications in customers' plants across UK and Europe – will open up opportunities for new revenue streams for TOMRA's customers.

TOMRA is also launching two non - food applications that complement the company's existing GAINnext ecosystem: an application for deinking paper for cleaner paper streams, and a PET cleaner application for even higher purity PET bottle streams.

Bottle-to-bottle quality

Dr. Volker Rehrmann, EVP, head of TOMRA Recycling, commented: "We have used AI technology to improve sorting performance for decades, but this latest groundbreaking application marks

another industry first for us. AI has the power to transform resource recovery as we know it, and our latest sophisticated applications of deep learning and AI reinforce our position as a pioneer in this field.

"With its sophisticated use of deep learning, GAINnext enables food-grade sorting and bottle-to-bottle quality, tasks that have posed significant challenges for our industry for many years. The use of AI is driving material circularity at a time when it is needed most, with tightening regulations and increasing customer demand for technologically advanced solutions. At TOMRA, we're proud to be driving the change in sorting."

Solving the most complex sorting tasks

Indrajeed Prasad, product manager Deep Learning at TOMRA Recycling, added: "The use of deep learning technology not only automates manual sorting but also enables the industry to achieve high-quality recycles through more granular sorting. Thanks to its ability to detect thousands of objects by material and shape in milliseconds, GAINnext solves even the most complex sorting tasks. Plus, with its integrated deep learning software, it offers the opportunity to adapt to future demands.

"We are delighted to be able to launch these innovative and much - needed solutions to meet the ever more stringent quality requirements for sorting outputs, driven by the increasing demand from consumer brands for more high purity recycled content."

Field - Proven Technology

GAINnext's deep learning technology has been proven in the field for many years. TOMRA was the first in the industry to introduce deep learning technology in 2019 with an application to identify and remove PE-silicon cartridges from polyethylene (PE) streams. An application for wood chip classification soon followed in 2022. To date, more than 100 AUTOSORT units with GAINnext are installed at material recovery facilities across the globe.

Among the early adopters of the brand new applications are market-leading plants such as Berry Circular Polymers' flagship facility in Leamington Spa, Viridor Avonmouth in Bristol - one of the UK's largest multi-polymer facility – and the French Nord Pal Plast plant, which is owned by the European Dentis Group.

Feedback from the market on the latest GAINnext developments has also been positive.

Professor Edward Kosior, founder and CEO of Nextek Ltd and its NEXTLOOP initiative that aims to create food-grade recycled polymer from advanced mechanical recycling, was among the most recent visitors to TOMRA's test centre and confirmed: "TOMRA's groundbreaking AI system, GAINnext, has propelled the recycling industry to an exciting pivotal juncture in plastic packaging sorting and creates new opportunities for closing the loop on many plastics in food-grade applications. GAINnext is poised to accelerate the most simplified, cost-effective and highly efficient sorting system on the market.

We're immensely proud to see our industry moving forward on this transformational journey.”

How to Configure Your Twin-Screw Extruder for Mixing:

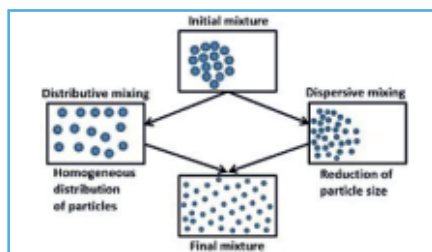
Understand the differences between distributive and dispersive mixing, and how you can promote one or the other in your screw design.

The two main types of mixing in compounding are dispersion and distribution. Quite often, new engineers and nontechnical professionals confuse these terms. We will claim we need to improve dispersion when we really want an additive to be uniformly distributed throughout the polymer matrix. Or we will design the screw with distributive mixing elements, but the material tends to agglomerate and needs to be dispersed before it can be distributed.

Let's explore these types of mixing and how we can promote one type over the other. When material is fed into the twin-screw extruder, the material falls onto the feed screws as it drops from the feeder(s). For this discussion, we will assume that each material is separate and independent as if being fed individually. In reality, materials may be fed separately via individual feeders or the material might be pre-blended into a single batch.

Figure 1 shows how one specific ingredient can be mixed during compounding. Raw materials are fed as the initial mixture. In the diagram, one particular ingredient is shown where large particles of that ingredient are grouped together. We can assume that

the white area in the box is the molten polymer matrix. The diagram implies the material is agglomerated into larger particles which have to be broken down and then spread throughout the polymer.



- Dispersion is the action of breaking larger particles into smaller particles until they are at their ultimate minimum particle size. Dispersion is required to break apart cohesive materials that tend to agglomerate.
- Distribution is uniformly mixing the particles throughout the polymer matrix.
- In a twin-screw extruder, these two mechanisms mostly occur simultaneously but can be tailored to favor one or the other as required.
- A material can be distributed but not dispersed. This is shown on the left-hand side of Figure 1. The particles are distributed evenly throughout the polymer but still remain as large agglomerates. This can create uneven concentrations of the additive throughout the material. For a colorant, the part may look blotchy and nonuniform.

A material can also be dispersed but not distributed. The right-hand side of Figure 1 shows the particles have been reduced to

their ultimate, minimal size. But they are concentrated in one area of the polymer. This may be due to surging within the extruder, uneven or inconsistent feeding of the additives or a bad premix that is not being distributed by extruder screws.

Of course, we need both dispersive and distributive mixing to produce an homogenous compound as shown in the diagram. Designing the screw with the proper mixing elements provides the correct amount of shear forces to ensure that dispersion and distribution are both utilized when appropriate.

When Dispersion is Needed

For many compounding operations, dispersion is often not required. Many additives and fillers are already supplied as free-flowing, distinct individual particles. They primarily need to be distributed throughout the polymer to be fully incorporated.

Dispersion is required for materials that tend to stick together in clumps or agglomerates. Carbon black is one of the best examples of a cohesive material that has a high affinity to agglomerate. Individual particles of carbon black are fused together during the combustion reaction to form aggregates. These aggregates are the primary particle of carbon black and are the smallest size that carbon black can be broken down to during compounding. Carbon black aggregates are held together by weak forces to form agglomerates. The agglomerates must be dispersed within the polymer to produce a compound that fully and uniformly develops the desired black color.

Mixing in Twin-Screw Extruders

The primary elements that are used in a twin-screw extruder for mixing are the kneading blocks. Kneading blocks impart shear forces onto the materials being compounded to mix these materials via dispersion, distribution and homogenization.

Figure 2 shows a typical kneading block. The three key attributes of the kneading block with regard to mixing are the length of the element, the number of discs and the stagger angle of the discs relative to each other. In the picture shown here, the kneading block is 60-mm long and there are 6 discs. Each disc, therefore, is 10-mm wide. If the kneading block was shorter, say 30 mm long, then each disc would only be 5-mm wide. Of course, if the kneading block were twice as long, then each disc would be proportionately that much wider assuming the number of discs is constant.



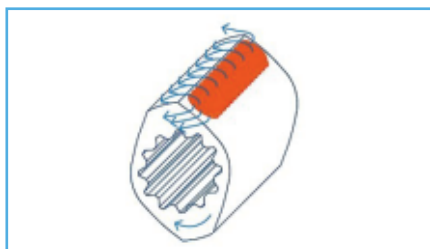
The width of the disc has a direct impact on the shear forces that are imparted to the polymer. Figures 3 and 4 each show an individual disc from a kneading block. The wide disc in Figure 3 forms a pool of molten polymer in front of the disc as it rotates around the screw shaft. The disc plows through the polymer, smearing the materials as it forms a furrow through the material. Shear forces here are quite high which promotes dispersion.

As the disc width narrows, the polymer flows around the disc as shown in Figure 4. The narrow discs of a kneading block slice through the polymer in a scissoring action. This action promotes distributive mixing by essentially stirring the polymer and additives. The melt is divided by one disc and then covered over by another.

Therefore, the first consideration in screw design regarding mixing is the width of the disc. If dispersion is required, then wide discs are beneficial. If the material only needs to be distributed throughout the polymer matrix, then the narrow discs are preferred.

Stagger Angle

The stagger angle is the next consideration when it comes to mixing. The shallower the stagger angle, the more the polymer is conveyed downstream in the extruder. As the stagger angle increases, the forward motion in that area of the screw decreases, causing the polymer to back up in the extruder. As material is held back, the work on the polymer increases because the forward motion of the compound per screw revolution decreases, thereby enabling more intense mixing.



When the stagger angle reaches 90 degrees, the material does not move at all due to the rotation of the screws. A 90-degree kneading block is a neutrally conveying element. The forward

movement that does occur is due to material being forced from upstream elements that pushes the compound along the extruder.

Reverse pumping elements (aka left-handed elements) pump the material upstream in the extruder against the forward motion within the overall extruder. This balance between the upstream forward conveying elements and the neutral or reverse conveying elements causes the mixing section to be highly filled with material. In contrast, a mixing section that consists of only forward conveying kneading blocks — maybe all 45-degree angle kneading blocks — would have minimal material in this section as it would be pushed out as quickly as it arrived.

It may be tempting to trend toward strong mixing in all cases. Then you can be assured that everything is dispersed and distributed fully. This would be a mistake.

How Much Mixing Is the Right Amount?

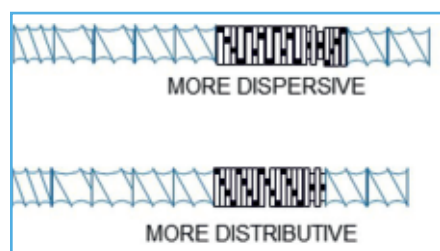
The more intense the mixing, the more work that is imparted to the compound. Melt temperature will increase significantly as the amount of work is increased.

Wider discs generate higher shear forces, which leads to increased melt temperatures. A more restrictive mixing section (many reverse or neutral kneading blocks) will cause the compound to be worked more, which again leads to higher melt temperatures. A restrictive mixing section must also be designed to ensure there is sufficient forward motion so the rate is not impeded.

Likewise, too gentle of a mixing section could result in uneven mixing and poor quality product.



Mixing sections from two screw designs are shown in Figure 5. The top screw is more intense, resulting in a more dispersive characteristic. This mixing section uses wider discs, a larger stagger angle for two of the kneading blocks followed by a neutral kneading block and a reverse kneading block. A design such as this would likely be used with a high loading of a difficult to mix pigment or filler. The bottom design only shows forward conveying kneading blocks followed by a single neutral kneading block. The idea here is to gently stir the additive into the polymer with minimal restrictions. A design such as this might be used when mixing fiberglass or glass beads.



One point to note regarding the “end” of the mixing section. As I mentioned in earlier articles, screw design is a combination of science and art. Every screw designer will approach a design in a different way. I prefer to end the majority of my mixing sections (>90%) with either a neutral kneading block, a reverse

kneading block or even a reverse conveying element (the most severe pumping element). The purpose for this is to ensure the degree of fill in the mixing section is such that the mixing is reasonably efficient.

Some designers will put in a distributive mixing section that consists of all conveying elements. While this design is intended to gently stir the mixture, my experience has shown that this results in a relatively empty mixing section that is inefficient at best. Also, as a result of the low degree of fill in this mixing section, these kneading blocks tend to “whip” the polymer like a beater. This whipping action actually can increase the melt temperature and damage the aspect ratio of certain additives such as fibers. Mixing sections seem to work more efficiently and more gently when they have a higher degree of fill. This must be balanced against a severe reverse flow that can overwork the material. Balance is the key.

Vacuum Degreaser Cleans up a Messy Situation

By replacing its immersion parts washer with a vacuum degreasing system, this machine shop is much more efficient, saving the company money, man hours and the health of the operators.

All automation connected to the iFP KP 100 vacuum degreaser is controlled by the management software. The software, programmed by iFP Europe, observes the procedures provided by the Industry 4.0 standard. Source: Gosige



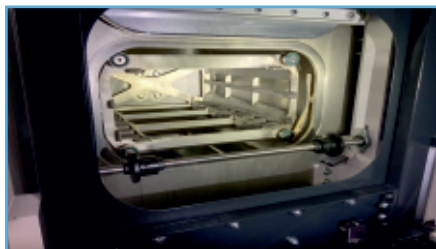
A lack of labor resources, difficulty reaching cleaning specifications and environmental standards are among the most common problems manufacturers face in their cleaning processes, according to Mike Bishop, east coast regional manager at Gosiger, and who provided information for this article.

AMPG (Accurate Manufactured Products Group) in Indianapolis, Indiana, was experiencing these frustrations with its cleaning process prior to implementing an automated vacuum degreasing system that positively influenced cleaning results, efficiency and costs.

This manufacturer of precision fasteners and components was using an immersion parts washer with a petroleum-based solvent. The process was not only labor-intensive, but ineffective and unhealthy for the machine's operators.

When the shop began to search for a new way to clean its parts, an automated system was at the top of the list as well as one that could clean oils and chips off various metal types without the need for multiple cleaning chemistries. The management team also hoped to eliminate the use of compressed air to dry all part types and eliminate solvent mist. Ultimately, the shop wanted a long-term solution for cleaning without risk of future Environmental Protection Agency (EPA) solvent bans.

The iFP automated vacuum degreaser parts washer, distributed by Gosiger, checked all the boxes for AMPG. Most importantly, the machine washed 10 million parts at the shop in 2023, while saving the business from paying fees to plating vendors that charged for unclean parts.



The wash chamber of the iFP KP100 can hold two standard baskets (standard basket dimensions are 471 mm L x 321 mm W x 200 mm H). Source: AMPG

A Parts Washer that did Not Clean

Prior to the implementation of its vacuum degreaser in 2018, AMPG was not only struggling to keep up with a recent part volume increase with its purchase of more Swiss lathes, but its cleaning process was ineffective. The petroleum-based cleaning solvent used by the company's immersion parts washer was not adequately removed from the parts being cleaned. When preparing the parts for shipment, solvent often dripped out of part cavities, leaking onto the shipping boxes. This issue often led to shipment refusals.

But even when shipments were successful, meeting the cleaning standards of the recipient often was not. Because the parts were still dirty with solvent, cutting oil or metal chips, the zinc and black oxide plating companies

to which AMPG was shipping would charge cleaning fees prior to processing the parts.

The shop's work environment was also compromised because of the inefficient cleaning process. To dry what were supposed to be clean parts coming out of the washer, operators used compressed air. This process created solvent mist and a large fog cloud in the shop that was unhealthy for the employees.

Out with the Old, in with the New

The vacuum degreaser, considered an automated system, typically necessitates 20 minutes of operator attendance out of every hour. The operator places baskets of dirty parts onto the machine and then removes the baskets of clean parts. At the start of the cleaning process, the operator loads four washing baskets in a queue and then walks away from the machine. At that point, the system takes over and starts washing. Once complete, the system's automation will unload the product and load the next queued wash load.

The automated iFP vacuum degreaser only requires about 20 minutes out of an hour of an operator's time to load and unload baskets. Video source: AMPG

Besides the vacuum degreaser, the 130,000 - square - foot headquarters houses nine large diameter turning centers with bar feeders, seven 20-mm Star Swiss lathes with bar feeders, 43 32-mm Star Swiss lathes with bar feeders, four 38-mm Star Swiss lathes with bar feeders, four thread rollers and two milling centers. The facility runs 24/7/365 with 63 full-time employees.

Clean, Dry Parts, Finally!

Finally, AMPG could enjoy all the advantages this vacuum degreasing system provides. It not only cleans cutting oils and metal chips off the parts but leaves them bright and shiny, unlike the immersion cleaner's results. And because this cleaning process has no air voids, cleaning chemistry can effectively access all complex parts features, such as blind holes and internal threads that are often challenging to penetrate and cleanse.

Vacuum drying is another benefit of the iFP system. By pulling a deep vacuum on the washing chamber, all the solvent is evaporated from the chamber and off the parts without creating fog in the shop. Not needing to dry the parts coming out of the system was a huge labor savings for AMPG as well.

By using modified alcohol as the cleaning chemistry in the vacuum degreaser, there were no concerns with the materials that must be washed, which include steel, stainless steel, aluminum, brass, titanium and Monel. And according to Gosiger, it is a future-proofed solvent. Modified alcohol is not classified as an HAP (hazardous air pollutant) by the EPA, it has low GWP (global warming potential), is halogen compound free, it does not contain CFC, HFEs, or HFCs substances, and it does not contain PFAS substances.

Although AMPG's capacity has grown since it first implemented the iFP unit, the cleaning process has continued to provide the business with its cleaning needs. Now, the shop floor houses 70 lathes, and the one vacuum degreaser has no problem keeping up with the part volume increase.

CIRCULAR ECONOMY/ BIO-PLASTICS/ RECYCLING

Triple Force for Change: Women Lead World Ocean Clean - up



Key Highlights:

- Women are playing pivotal roles in a collaborative effort between Summit Systems, Chase Plastics, and Ocean Integrity to tackle ocean plastics pollution.
- Marta Podowska and Louise Aplin from Chase Plastics, along with Emma Gray, Kelsey Taylor, and Meghan Jordan from Summit Systems, are among the women driving the recycling initiative, from overseeing the recycling process to marketing RECOTHENE Ocean rPE pellets.
- Harri Jordan, managing the Indonesia operation for Ocean Integrity, leads efforts to clean up oceans, engage indigenous fishermen, and ensure recovered plastics are recycled rather than ending up in landfills or incineration

Introduction

Each March, both the contributions of women to society and the ongoing campaign for gender equality are highlighted through Women's History Month and International Women's Day. To mark these events, we are focusing on women working across an innovative three-way partnership to tackle ocean plastics pollution through the retrieval and recycling of plastic waste.

Women Working together to make a Difference

In recent years the many benefits of plastic as a lightweight, durable and versatile material - used across a variety of applications in a host of industries - have been overshadowed by discarded single use plastic packaging that finds its way into our rivers and oceans. The widely publicized ocean plastic pollution problem has emphasized the urgent need for improved waste management and greater investment in recycling facilities however, in the meantime, the need to clean our oceans remains.

Determined to help make a difference, two UK plastic businesses – Summit Systems

and Chase Plastics have partnered with global enterprise Ocean Integrity, to recover and recycle Low Density Polyethylene (ocean LDPE) for re-use in the UK manufacturing supply chain. Whilst this sustainability initiative has been wholly embraced by each business, key to the success of the project is the hard work of several women across all three organizations.

At the start of the ocean LDPE chain is Ocean Integrity. Dedicated to cleaning up the world's oceans and to ensuring that 100% of recovered plastics are recycled and do not end up in landfill or incineration, their Indonesia operation is managed by Harri Jordan.

Harri is on a mission to address plastic pollution, foster sustainable practices and combat greenwashing. To achieve this she undertakes a number of practical roles in helping to organize the ocean clean-ups. This includes working with indigenous fishermen, providing them with nets, helping them input their data into the Ocean Integrity collection app and importantly ensuring that they get paid an above average local wage.

Once the recovered plastic has been landed, Harri oversees its delivery to the warehouse for washing, drying, sorting, bailing and auditing before it heads off for recycling and reintegration into the manufacturing supply chain. In the UK, Harri focuses her efforts on finding buyers and recyclers for the recovered material in addition to working with businesses to help them achieve plastic neutrality - especially if they manufacture products using virgin polymer.

Initially Ocean Integrity worked with ancillary equipment manufacturer Summit Systems to develop a feasible process for the recovery of ocean plastics. Harri then fostered a working relationship with established UK recycler Chase Plastics, whose 60+ years of plastic recycling experience made it an ideal partner for reprocessing the ocean LDPE recovered from the rivers and seas of Indonesia.

At Chase Plastics, the team working on the ocean LDPE initiative includes production manager Marta Podowska and chartered marketer Louise Aplin. Once the ocean LDPE is received on site, Marta oversees the recycling operation and the manufacture of RECOTHENE Ocean rPE pellets to the agreed specification.

To raise awareness of the Ocean rPE project and highlight the environmental benefits of using RECOTHENE Ocean rPE over virgin polymer, Louise liaises with Harri from Ocean Integrity and Emma Gray, Kelsey Taylor and Meghan Jordan at Summit Systems - which also distributes the Ocean rPE product in the

UK - to provide finished product information and marketing support materials.

As sales manager – Materials at Summit Systems, Emma works with businesses to help achieve their sustainability goals including offering them alternative compounds to virgin polymers using recycled plastics. As marketing manager and marketing co-ordinator respectively, Kelsey and Meghan focus on promoting RECOTHENE Ocean rPE and the innovative three way partnership that make it possible across a variety of channels.

Societal pressure for greater sustainability and the diversion of waste has helped stimulate greater use of recycled polymers. Recycling plastics uses less energy than extracting, refining and producing virgin polymers which in turn conserves energy resources and reduces greenhouse gas emissions. Aside from these environmental benefits, this ocean LDPE recycling initiative also benefits indigenous communities in Indonesia through deploying their traditional fishing skills to help stimulate local economies while also improving their local environment.

While this year's theme for Women's History Month is 'Women who advocate for Equity, Diversity and Inclusion', past themes have included 'Women taking the lead to save our planet'. In this case, it's good to see examples of both these themes in action.

Borealis Further Expands its Advanced Mechanical Recycling Capacity with Closing the Acquisition of Integra Plastics AD



Borealis closes the acquisition of Integra Plastics AD, a Bulgarian advanced mechanical recycling player. The acquisition enhances Borealis' portfolio of advanced mechanical recyclates by adding more than 20,000 tons of recycling capacity per year, strengthening its ability to meet growing customer demand for more sustainable solutions. The transaction represents a proof point of Borealis' EverMinds™ commitment to accelerate the transition to a truly circular economy.

On November 29, 2023 Borealis announced that it had signed an agreement to acquire a 100 % stake in Integra Plastics AD, an advanced mechanical recycling player based in Elin Pelin, Bulgaria, subject to inter alia customary regulatory approvals. Today, the companies announce the successful closing of the transaction. Integra Plastics AD operates a modern advanced mechanical recycling plant built in 2019 with state-of-the-art equipment and an annual output capacity of more than 20,000 tons. Integra Plastics has the ability to transform post-consumer waste into high-quality polyolefin recyclates suitable for demanding applications. The

acquisition strengthens Borealis' specialty and circular portfolio, enabling the company to meet growing customer demand for more sustainable solutions. Combining Integra Plastics' expertise and capacity in advanced mechanical recycling with Borealis' know-how and innovation leadership, contributes considerably to advancing circularity in the plastics industry. The move also represents a further proof point of Borealis' EverMinds™ commitment to accelerate the transition to a truly circular economy. "We are thrilled to announce that we continue making steady progress on our circularity journey by adding Integra Plastics AD to our portfolio. This move strengthens our ability to deliver on our advanced mechanical recycling ambition and simultaneously, enables our customers to meet their sustainability targets. A true testament to the fact that we are reinventing essentials for sustainable living," says Craig Arnold, Borealis Executive Vice President Polyolefins, Circular Economy Solutions and Innovation & Technology. "Borealis is one of the world's leading providers of advanced and sustainable polyolefin solutions, and an innovative European leader in polyolefin recycling. I am pleased to see Integra Plastics' Borealis closes the acquisition of Integra Plastics AD, a Bulgarian advanced mechanical recycling player. The acquisition enhances Borealis' portfolio of advanced mechanical recyclates by adding more than 20,000 tons of recycling capacity per year, strengthening its ability to meet growing customer demand for more sustainable solutions. The transaction represents a proof point of Borealis' EverMinds™ commitment

to accelerate the transition to a truly circular economy capacity and expertise contributing to Borealis' goal of further advancing circularity. I am confident that Borealis and Integra Plastics will face a future of growth and innovation, offering a wider range of advanced mechanical recyclates to their customers," comments Julian Stefanov, CEO of Integra Plastics AD.

NPE 2024 : Starlinger Presents Solutions for Food - Grade Recycled Post - Consumer PE, PP, PS and PET



Super-cleaning and odor reduction solutions for the most popular consumer packaging materials: The two Starlinger business units viscotec and recycling technology have joined forces to offer high-end solutions for producing food-grade recycled PP, PE, PS and PET. Based on Starlinger's vision "food-grade without compromise", the combination of the proven post-consumer pelletizing line recoSTAR dynamic with the new viscoZERO melt phase decontamination technology and the downstream pellet flushing unit PCUplus provides super-cleaning and odor reduction not only for PET but also for PP, HDPE and PS. "With this new machine setup we present a super-cleaning solution for post - consumer packaging made of polyolefins such as PP and PE or polystyrene at this

year's NPE", said Paul Niedl, Commercial Head of Starlinger recycling technology. "Especially PP, PS and HDPE post-consumer packaging waste degrades during recycling; thus, the produced material can only be used in lower-grade applications. With the new technology, the material is upgraded in the process and thus suitable for use in high - grade applications including direct food - contact packaging."

Re - Cycling Instead of Down - Cycling

The newly conceived recycling process ensures the thorough decontamination of postconsumer PP, PE or PS food packaging, producing food - safe, odor-reduced regranulate that can be reused in the production of food-contact packaging instead of other, lowergrade types of packaging. The recycling system consists of a recoSTAR dynamic recycling extruder with / without degassing, a continuous melt filter or power - backflush filter, the viscoZERO melt phase decontamination reactor, a subsequent belt melt filter or power backflush filter before the underwater or watering pelletizer, and the optional PCUplus pellet flusher at the end of the process. Depending on the components in the line setup, the system produces recycled resin in various grades, ranging from food-safe to highly decontaminated and odor-treated. The viscoZERO reactor in combination with the PCUplus pellet flusher produces recycled PE, PP and PS that meets the highest standards for packaging with direct food contact. The viscoZERO melt phase decontamination reactor can also be installed as a turn-key stand-alone solution for decontaminating

different types of high-viscosity materials fast and efficiently. “The viscoZERO reactor opens new business opportunities as it provides plastics recyclers with the flexibility to process a wide range of input materials into resins of outstanding quality”, said Gerhard Bräuer, Product Manager viscoZERO at Starlinger viscotec. “You can recycle post-consumer PP, PE, PS, and PET and achieve highest output quality for the respective material so that it can be used in food-contact packaging.” During the decontamination process in the reactor volatile contaminants are removed effectively and the material is cleansed and homogenized. Unwanted odors or substances such as spin finish are removed effectively. When processing PET, it is possible to increase the IV to the desired level. At NPE, Starlinger is showing the recoSTAR dynamic recycling extruder, PCUplus pellet flusher and viscoZERO melt phase decontamination reactor at their booth in the West Hall. Closing the loop for industrial plastic packaging Being the world market leader for machinery and process technology for woven plastic bags, Starlinger also supplies the entire machine range for this type of packaging – from tape extrusion lines and circular looms to lines for coating, printing and sack conversion. With the ground - breaking “Circular Packaging” concept the company offers the first closed-loop solution for industrial packaging made of PP or PET tape fabric such as FIBCs. “Continuous reuse of plastics in the same application is the highest form of recycling”, said Harald Neumüller, CSO of Starlinger. “That’s why we develop machines that allow our

customers to re-cycle plastic scrap instead of down-cycling it. Our technologies to process used big bags made of polypropylene or PET and turn them into new ones are unique. They constitute one step on the way to move the plastic packaging industry towards circularity.

Chase Plastics Highlights True Cost of PPT for Manufacturers



Key Highlights:

- Plastic Packaging Tax (PPT) receipts have exceeded HMRC's initial estimates, indicating many manufacturers haven't fully embraced recycled content to avoid the tax.
- Chase Plastics is concerned that UK manufacturers risk competitiveness by not utilizing recycled content, especially with the PPT rising.
- The company's Cost Comparison Guide highlights the cost advantages of incorporating recycled polythene (rPE).

With Plastic Packaging Tax (PPT) receipts having significantly surpassed HMRC's year one estimate, it seems many manufacturers have yet to embrace the use of recycled content to mitigate the tax. Reflecting their concern that the

PPT is impacting the competitiveness of UK polythene packaging manufacturers - especially with the rate increasing to £217.85/tonne on 1st April - Chase Plastics has published a useful Cost Comparison Guide. This handy guide highlights how, for every tonne of polythene packaging made without the required recycled content, the actual cost of the PPT on the 300kg of virgin material used is some £726 per tonne.

Chase Plastics has a genuine concern that UK based manufacturers are risking their competitiveness through not embracing the opportunity presented by rPE. The company highlights that in addition to the relative price disadvantage created by paying the tax, 100% virgin polymer products do not appeal to many end users seeking to embrace the circular economy through the use of more sustainable packaging.

“Understanding how the costs of a virgin polymer formulation compare to one with 30% recycled content is key to protecting margins and competitiveness, especially with the PPT rising again on 1st April,” said David Harris, chairman of Chase Plastics.

“Our Cost Comparison Guide includes a costing ready reckoner which highlights the breakeven price points for the recycled content required in order to avoid the PPT and appreciably reduce overall blend costs.”

He continued: “The PPT was designed to provide an economic incentive for the use of recycled content but as the year 1 tax

receipts demonstrate, the financial incentive has not yet been realized by all manufacturers. As we approach year 3 of the tax, it is essential that UK based polythene packaging manufacturers fully appreciate the cost of the PPT.

"To support this, we are publishing a cost comparison guide to highlight the savings possible through the use of our RECOTHENE rPE product. We hope this straightforward guide will encourage greater use of recycled content which, in turn, contributes to the Circular Economy."

Copies of the Cost Comparison guide are available upon request from Chase Plastics. With over 60 years of recycling experience, Chase Plastics manufactures the RECOTHENE range of recycled polythene pellets at their EUCertPlast accredited factory in Suffolk.

Global Plastic Recycling Strategic Business Report 2024: The Future Hinges on Molecular Recycling Techniques - Forecasts to 2030

Global Plastic Recycling Market to Reach \$86.7 Billion by 2030

The global market for Plastic Recycling estimated at US\$48.9 Billion in the year 2022, is projected to reach a revised size of US\$86.7 Billion by 2030, growing at a CAGR of 7.4% over the analysis period 2022-2030. PET, one of the segments analyzed in the report, is projected to record a 7.9% CAGR and reach

US\$23.8 Billion by the end of the analysis period. Growth in the Hdpe segment is estimated at 7.1% CAGR for the next 8-year period.

The COVID-19 pandemic has had a significant impact on plastic recycling, causing disruptions across the supply chain. Collection rates of recyclable plastic decreased in 2020 as lockdowns and restrictions limited recycling activities and disrupted waste management systems. In response to the crisis, traditional waste management practices experienced a resurgence, as concerns about virus transmission led to a preference for single-use plastics over reusable alternatives. However, despite these challenges, there is optimism that plastic recycling will rebound, driven by a renewed focus on sustainability and circular economy principles.

In the competitive landscape, with 130 players worldwide in 2023, companies are actively pursuing opportunities in the plastic recycling market. They are leveraging various recycling methods and technologies to address the growing demand for recycled plastics. Governments, researchers, and startups are prioritizing plastic recycling initiatives, recognizing the importance of mitigating pollution and promoting environmental sustainability.

PET (polyethylene terephthalate) emerges as a major category in the plastics recycling market, with packaging being a high-growth end-use segment. Despite the challenges posed by the COVID-19 pandemic, the plastic recycling

industry is expected to bounce back, supported by ongoing efforts to promote recycling infrastructure, improve collection systems, and raise awareness about the importance of recycling.

Recent market activity reflects the dynamic nature of the plastic recycling sector, with companies investing in research and development, strategic partnerships, and expansion initiatives to capitalize on emerging opportunities. As sustainability concerns continue to drive consumer preferences and regulatory measures, plastic recycling is poised to play a pivotal role in the transition towards a more circular economy.

The U.S. Market is Estimated at \$4.4 Billion, While China is Forecast to Grow at 8.1% CAGR

The global market outlook for plastic recycling is promising, with innovation playing a key role in shaping its future trajectory. Concerns about pollution levels and increasing awareness about environmental issues are driving growth in the plastic recycling market.

The Asia - Pacific region, in particular, dominates the global market, fueled by rapid industrialization and urbanization.

The Plastic Recycling market in the U.S. is estimated at US\$4.4 Billion in the year 2022. China, the world's second largest economy, is forecast to reach a projected market size of US\$33.9 Billion by the year 2030 trailing a CAGR of 8.1% over the analysis period 2022 to 2030.



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