

THE ECONOMIC TIMES

POLYMERS

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PROJECT MANAGEMENT
PLANT ENGINEERING FOR
POLYMER COMPOUNDING FACILITIES

MARKET OVERVIEW
COMPREHENSIVE LOOK AT THE
GLOBAL BIO-BASED POLYMERS MARKET

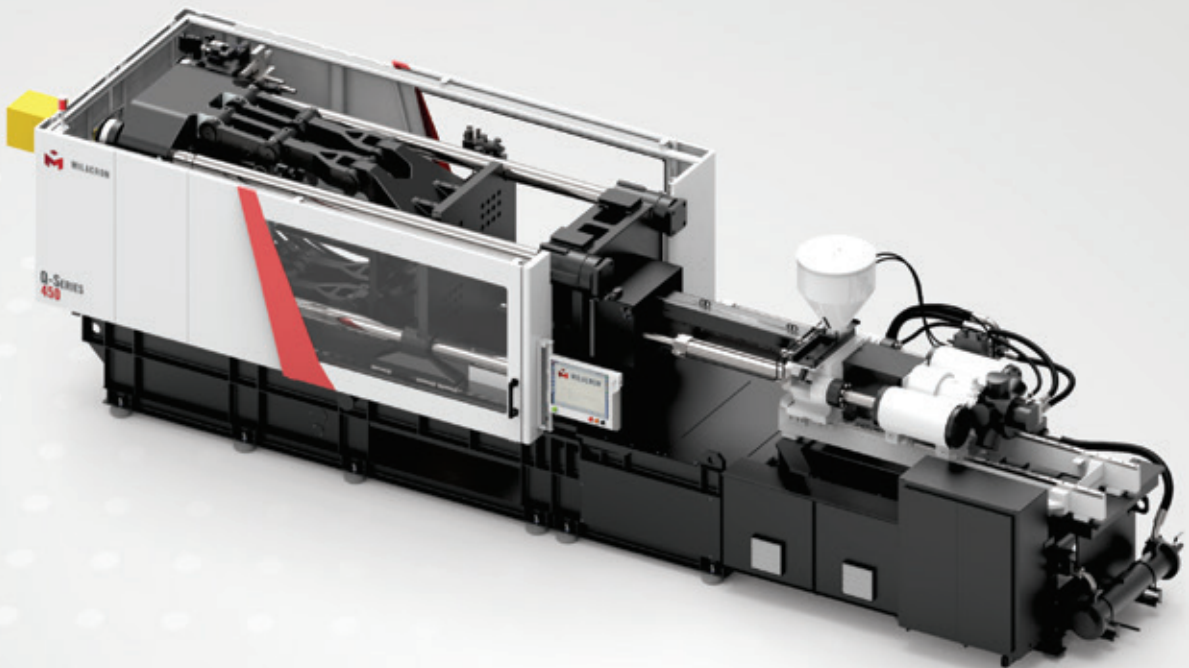


RECOGNISING INNOVATION AND EXCELLENCE

With several yardsticks to measure success available to companies in any industrial sector, being recognised for innovation and excellence remains a major factor. The 5th edition of the ET Polymers Awards did just that – recognised and honoured these achievements in the plastics and polymer industries

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Beating the Odds

The Biblical story of David and Goliath is a well-known parable. The story goes that Goliath, a giant and the champion of the Philistines, challenged the Israelites to send out their champion and decide the outcome of their ongoing war in single combat. None of the Israelites dared to face the fearsome giant...except David. Despite the odds – going against a well-armed and trained warrior– David was undaunted. He brought only a sling and a pouch full of stones, against Goliath's sword and shield. Then, as Goliath charged in for the kill, David found a vulnerable spot in his opponent's armour and slung one of his stones there. His precise throw hit Goliath in the head and knocked him out.

David and Goliath are often referenced as a moral lesson of how underdogs can overcome the odds and be successful – or in the context of today, how even small things can add up to have considerable affect.

The giant pandemic that is COVID 19 is still raging and humanity continues to fight the battle despite seemingly unsurmountable odds. The lesson here? The pandemic, like Goliath, seems unbeatable, but with agility and resourcefulness we can defeat it.

In this issue of ET Polymers, we highlight the 'Davids' of the plastics and polymer industries. Read all about the ET Polymer Awards, put together-successfully- in challenging times. Read about the winners who continued to innovate and excel – some of them creating products and technologies which helped battle COVID – all this and more in our cover story.

We also give you an insight on how 'smaller' polymer compounding facilities can efficiently build their own plants without compromising quality, in our project management section. Our market overview report gives you a comprehensive look on the niche sector that is bio-based polymers. Technology can be a great equaliser and level the playing field – here we look at the processing of PTA, a crucial element in the processing of PET bottles- and how new technologies can make the process more efficient.

Small things add up and make it worth all the time and effort. So, nurture the 'Davids' of your organisations and those within yourself.

Do share with us with your opinions, comments and thoughts at *kruti.bharadva@wmm.co.in*

David and Goliath are often referenced as a moral lesson of how underdogs can overcome the odds and be successful – or in the context of today, how even small things can add up to have considerable affect.

KRUTI BHARADVA

Assistant Editor

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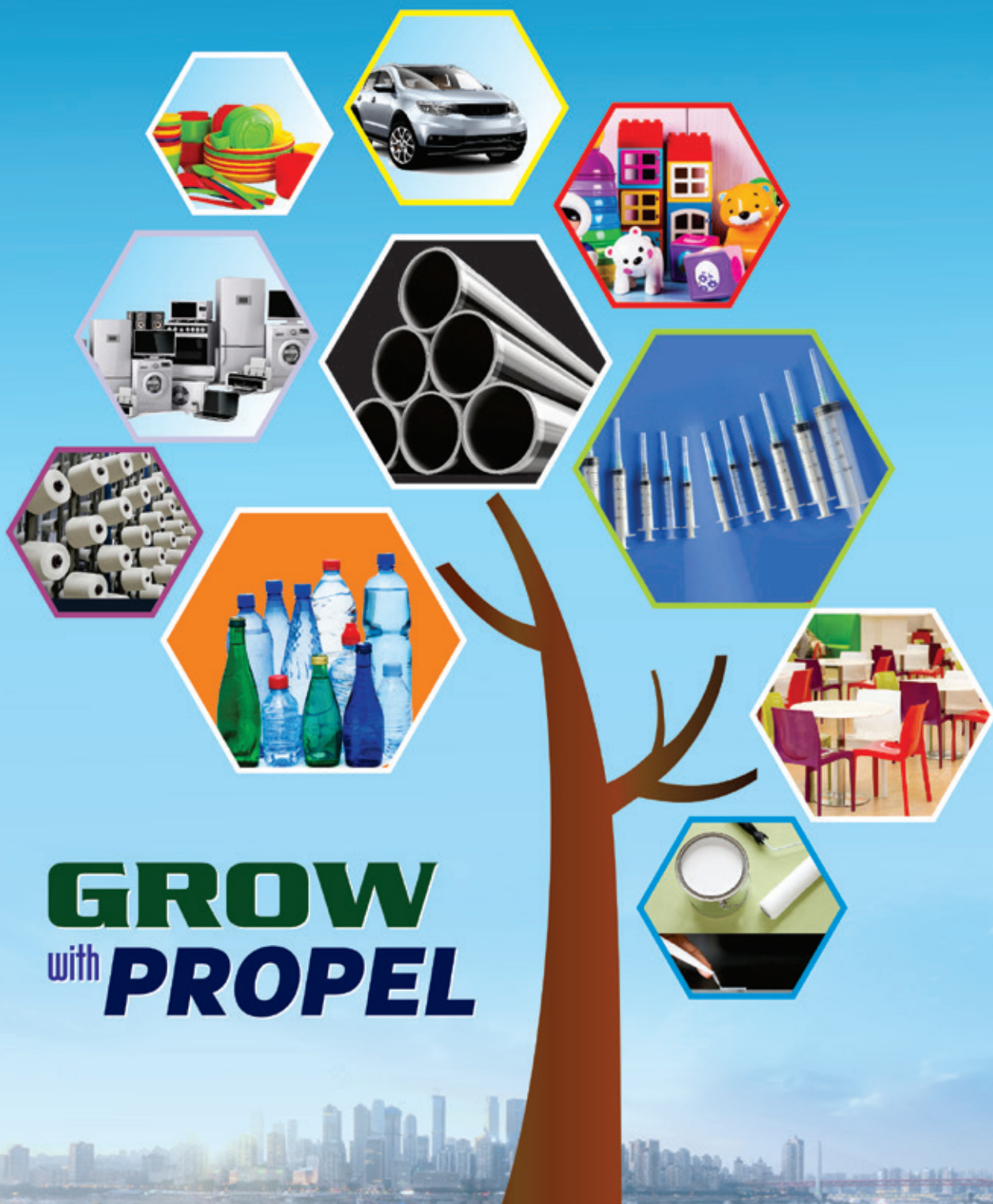
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Ease of Doing Business for MSMEs

The Indian government has set a new quality standard for the domestic producers of polyethylene to adhere to. Department of Chemicals and Petrochemicals under the Ministry of Chemicals and Fertilizers issued an order dated April 15, 2021 that makes it mandatory for petrochemical producers of certain kinds of polymers to meet the new criteria set by Bureau of Indian Standards (BIS).

The order is applicable to three kinds of polyethylene material, the raw material used for making various plastic products: low-density polyethylene (LDPE) (widely used to make grocery bags and packag-

ing material); linear low-density polyethylene (LLDPE) (used in making stronger bags, toys, buckets, pipes) and high-density polyethylene (HDPE) (jugs, plastic bottles, mugs, shampoo bottles). The new standard titled "Specification of Polyethylene Material for Moulding and Extrusion" is labelled under Indian standard IS 7328:2020.

There is also a requirement for overseas importers to obtain a licence to ensure that their product conforms to the new standards imposed by the BIS. It should be noted that India is a net importer of these products and the additional compli-

ance might dissuade many suppliers to export to India.

"India already faces a shortage of these products and the Order might dissuade many exporters in the US and the Gulf countries, especially the smaller players, to send their products to India," said Arvind Goenka, Chairman of trade body for plastic exporters Plastics Export Promotion Council (PLEXCONCIL).

This order will be enforced after 180 dates from the date of publication of the official gazette. It is only applicable for domestic petrochemical manufacturers and not Indian exporters.

Duty Imposed on Chinese PET Resin



India has imposed anti-dumping duty on Chinese bottle-grade PET (polyethylene terephthalate) resin—used to make bottles and jars for mineral water, carbonated soft drinks and pharmaceutical products among other goods—to offset the damage to the domestic industry.

After a year-long investigation, the Directorate General of Trade Remedies (DGTR) in December 2020 recommended imposing anti-dumping duty on the PET resin imported from China, ranging from \$60.92 to \$200.66, depending on quality. IVL Dhunseri Petrochem Industries Pvt. Ltd and Reliance Industries Ltd, the two largest producers of the product in India, accounting for 91 per cent of domestic production, had filed an application before the DGTR, which prompted the anti-dumping investigation in October 2019.

The two companies in their submission to DGTR held that imports from China increased drastically during the period of investigation. "The subject imports are significantly undercutting the prices of the domestic industry. If dumping is not checked, the price of exports may fall further adversely affecting profitability of domestic industry," it added.

STEER Technology used to develop Rice Resin

Technology company STEER Engineering, which specialises in solutions for effectively transforming and functionalising materials in the field of plastics, pharmaceuticals, food & nutraceuticals, biomaterials and biorefining, has announced that its patented technology is now being deployed for the development of biomass resin. This initiative will bring forward several biomass-related solutions as an environment-friendly alternative to oil-based plastics for applications in various industries, including the growing consumer market worldwide.

STEER recently supplied 3 units of Omega 60 class extruders to Biomass Resin Holdings Co. Ltd; (Japan). The extruders help accelerate development and commercialization of compound materials of inedible rice with polyolefin resins, called "Rice Resin"™. Using these compound materials, products such as trash bags, shopping bags, cutlery (plastic utensils), and toys, can be manufactured for end customers. In the long term, these products significantly reduce plastic waste through environment-friendly polymers.

Subodh Jindal, CEO, STEER Engineering, commented, "World over, there is a broad consensus for using alternatives to oil-based plastics owing to various reasons, including environmental concerns. At STEER, we have been pioneering technology that can help transform compounds for biomass-based solutions. We are proud of the fact that our technology is now being deployed by global brands. It is our mission to drive the world towards a simpler, better and more evolved tomorrow."

The Omega series extruders set a new standard in the compounding industry; they come with STEER's patented 'fractional lobe geometry' special elements that are designed to enhance process efficiency and quality of output, while delivering far greater returns on investment. It also enables manufacturers to increase their production capacity by up to 25 per cent due to the increased volume and higher torque capacity.

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Waters and TetraScience Partner to Deliver New Levels of Data Access

Waters Corporation today announced it has entered a reseller agreement with TetraScience, a cloud technology innovator powering transformational changes in life sciences R&D. Through the partnership, Waters will now offer its customers the Empower™ Data Science Link, powered by TetraScience. This unique technology pairs Waters' industry-leading, compliance-ready Empower Chromatography Data System (CDS) with TetraScience's Data Platform and data science tools, providing unparalleled insights into chromatography data.

"So much of the potential for scientific progress and discovery today is held within the laboratory data that scientists work so hard to collect," said Mike Harrington, Waters Senior Vice President, Global Markets. "Our partnership with TetraScience is built on offering scientific organizations the flexible means to access the instrument data connected through Waters' Empower CDS so they can more easily use it to gain new insights and inform decisions. This is another leap forward in functionality for Empower, expanding the value of this market-leading lab informatics solution for our customers."

Empower Data Science Link, powered by TetraScience is a cloud-native technology providing a solution for customers to unlock their Empower data and enable export into third party data analysis tools via standardized formats such as FAIR and Allotrope. Organizations can further accelerate scientific discovery by leveraging TetraScience's cloud-native architecture, state-of-the-art data science tools, and visualization capabilities.

Birla Cellulose Featured in Harvard Case Study List

Birla Cellulose, part of the premium global Aditya Birla Group and one of the world's largest man-made cellulosic fibre producers, has featured in the Harvard Case Study List through its case study 'Birla Cellulose: Spearheading Sustainable Fashion'. Published by the prestigious Ivey Publishing, a leader in providing business case studies with a global perspective, the case is authored by Prof. Utkarsh Majumdar (visiting faculty at IIM Udaipur and a member of the Board of Governors at IIM Raipur) and Namrata Rana, Director of Futurescape.

Speaking on this recognition, Dilip Gaur, Business Director, Birla Cellulose Aditya Birla Group and Managing Director, Grasim Industries said, "Sustainability is at the core of our business strategy. We are happy that our journey towards leadership in sustainability has been globally recognised with the publication of this case study. The case talks about how Birla Cellulose took the sustainability challenges head-on and transformed sustainability into a winning business strategy."

Prof. Utkarsh Majumdar said, "The case touches upon many aspects of crisis management, leadership, managing resources optimally, and utilising sustainability as a competitive advantage."

Ms. Namrata Rana commented, "The case looks at the crisis faced and outlines how the company handled the situation, pointing to lessons on participative leadership and decision-making, characterised by introspection and self-criticism rather than finger-pointing."

FMC Corporation Wins Award

FMC Corporation was conferred the Digital and Technology-Enabled Company award by The Federation of Indian Chambers of Commerce & Industry (FICCI) at its Chemicals and Petrochemicals Awards 2021 ceremony held at the Hotel Taj Palace, New Delhi, India.

The annual awards event recognizes individuals and companies for their contribution towards the Indian chemicals industry across 16 categories, including the Digital and Technology-Enabled Company award category which was added this year. FMC is recognized for its efforts in promoting digitisation of the agriculture value chain, from farmer level interaction to distributor and



retailer engagement.

"It is an honour to be recognized by the industry," said Mr. Pramod Thota, President, FMC India. "The pandemic has affected our country's agricultural industry in a profound way. The FMC team was tenacious in its commitment to support farmers in India through it all. Using digital technology, we reached more than 2 million farmers to provide the know-how and solutions they need-

ed to continue growing their crops without disruption."

Today, agriculture's most pressing challenges are being addressed through advances in artificial intelligence (AI), genomics, robotics, precision agriculture, biopesticides, synthetic biology and other innovations.

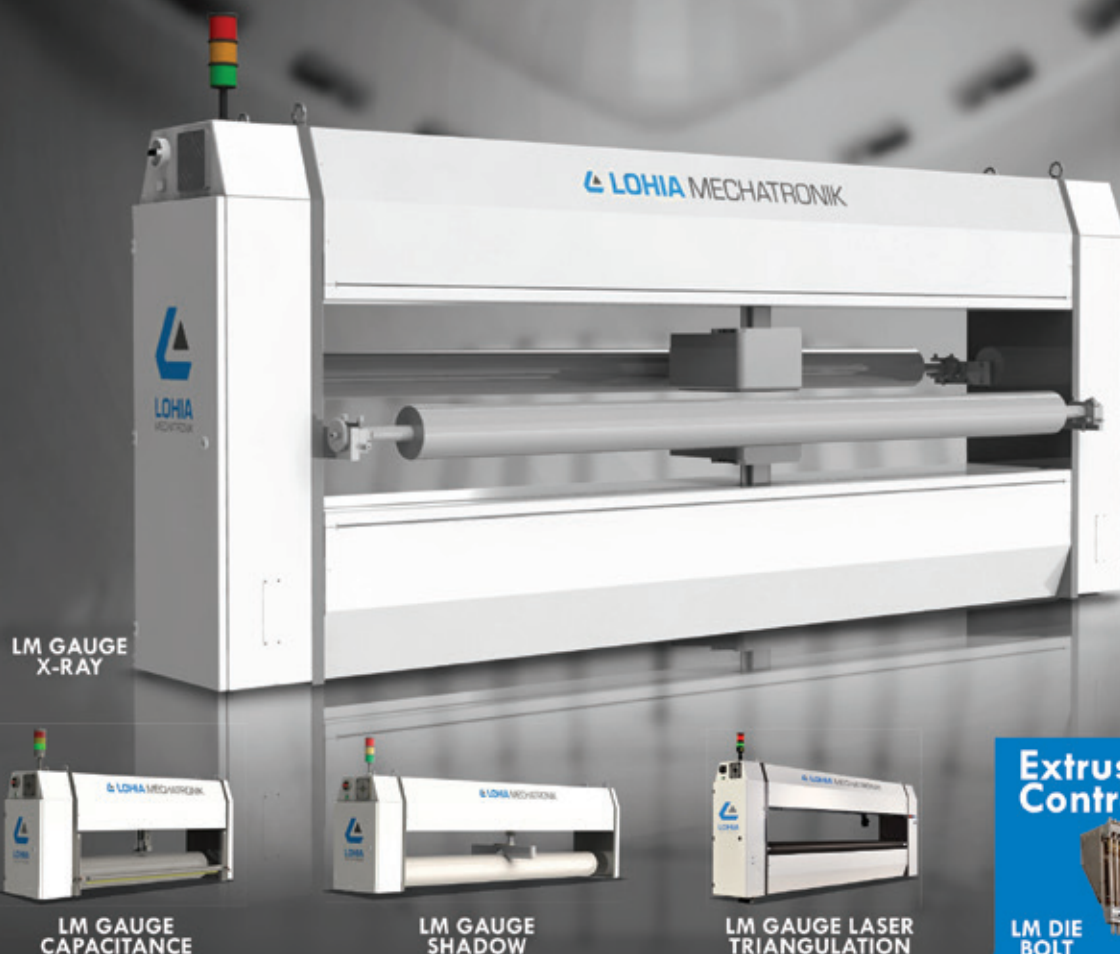
Mr. Raju Kapoor, Director of Public & Industry Affairs, received the award on behalf of FMC, from Shri Mansukh Mandaviya, Honourable Minister of State (Independent Charge), Ministry of Ports, Shipping and Waterways & Minister of State, Ministry of Chemicals & Fertilizers, in the presence of Shri Yogendra Tripathi, Secretary, Department of Chemicals & Petrochemicals, Ministry of Chemicals and Fertilizers, Government of India.

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Indian Ambassador to Thailand Visits Aditya Birla Chemicals

H.E. Mrs. Suchitra Durai, the Ambassador of India to the Kingdom of Thailand, visited the Aditya Birla Chemicals – Advanced Materials’ facilities at MapTaPhut Industrial Estate in Rayong Province on 10 April 2021. Advanced Materials is a leading global manufacturer of Epoxy Resins & Systems and is part of the \$46 billion Fortune 500 conglomerate Aditya Birla Group. Operating in Thailand since 1969, the group has nine manufacturing units, across five lines of business, with 3500 employees.

The Ambassador, with senior members of the Embassy of India, were given a tour of the R&D, Application Development Centre and the manufacturing plant to highlight the journey of the company, Advanced Materials, which commenced operations in 1992, and its successful transformation from a re-

gional commodity manufacturer to a global innovation leader with a focus on sustainability, bio-based materials, and green chemistry

The ambassador took keen interest in understanding Recyclamine, a novel & disruptive technology owned by the company that addresses the longstanding and compelling issue of recyclability of thermoset epoxy plastics. Used extensively in applications like wind energy, aerospace, defence, automobiles, waste generated during processing and at the end of life of thermoset plastic globally is estimated to be 5 million tons per annum. This ends up in landfills or is processed by energy-intensive inefficient processes which result in increased pollution and global warming. Advanced Materials’ proprietary technology, Recyclamine offers a game-changing, lasting

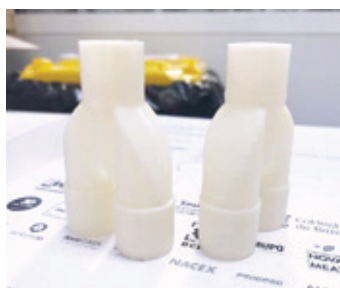
solution. One of its kind globally, it enables recycling of thermoset epoxy plastics while providing superior performance compared to conventional materials.

Unit Head & Joint President, Mr. Yuvraj Patil, stated that Recyclamine technology has been successfully commercialised for customers globally and a pilot plant for seed marketing of Recyclamine and supply to leading composite manufacturers has been commissioned. The company is in the process of establishing a new manufacturing plant for Recyclamine with 10,000 tons per annum capacity, located at WHA Industrial Estate. The plant will subsequently be expanded to 50,000 tons per annum capacity. In coming years Thailand will be the pioneer and hub for Recyclamine and the product will be exported all over the world.

ELIX Polymers joins the fight against COVID-19

Leadng ABS producer ELIX Polymers is collaborating with a large group of companies within ClusterMAV, the Advanced Materials Cluster of Catalonia, Spain, in the fight against COVID-19. The partners are working in collaboration with the National Federation of Innovative Business Groups and Clusters (FENAEIC), which focuses on promoting collaboration between federations, clusters and their partners, within the European Cluster collaboration platform.

ELIX Polymers is donating a medical-grade material, ELIX ABS 3D-FC, in response to high demand from hospitals for medical masks, valves for ventilators and other medical devices. This product, developed for transformation into filaments for FFF (Fused Filament Fabrication) 3D printing, is now being used by Ford Motor Company (which has switched some of its production in automobiles to medical equipment), research organization AIMPLAS,



and two Spanish plastics processors, PESL and SIIM.

Materials developed by ELIX Polymers for the healthcare sector are compliant with the ISO 10993 and USP class VI biocompatibility standards. They have been included in Drug Master Files (DMF) for use in medical and food contact applications in both Europe and the USA.

“Many companies with 3D printing capability are putting their equipment at the disposal of the community to produce medical parts,” says Luca Chiochia, Business Development Manager, ELIX Polymers.

“Demand for 3D printing filaments in Spain is being channelled through the 3Dcovid19.tech digital platform, an initiative linking hospitals’ needs and 3D printing production resources, as well as ClusterMAV, and FENAEIC. Ford and Aimplas are both producing filaments in ELIX ABS 3D-FC, and are also making masks and face protection components in their own AM departments.”

Fabian Herter, Marketing Manager, ELIX Polymers, says: “The availability of specific moulds that could be used for such medical applications has been the key factor, together with the availability of material, to make the injection moulding production feasible so that production volumes can be easily ramped up. But 3D printing has been key in enabling the fast delivery of a solution: it is extremely versatile, so it can produce highly diverse medical device components, without the need for specific tooling. Plus, production can be carried out very close to the hospitals.

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Efficient Packaging from Mondi

Bell Germany is launching a mono-material recyclable WalletPack in March for over 30 products including Seranno, Prosciutto and Savoy sliced ham. The new solution will replace a multi-material non-recyclable plastic solution, using 37 per cent less material compared to standard modified atmosphere packaging. This switch will also reduce plastic waste for Bell Germany by 35 tonnes per year thanks to the lightweight solution. It will also lower waste disposal fees for Bell Germany and meets the design for recycling guidelines of leading retailers.

Created after two years of development, the new Mondi WalletPack operates as a folder, which the consumer opens to unpack the product. It features a re-close function on the back-



side to prevent food spoilage, provides excellent protection for thinly sliced deli meats, and has been verified by the German institute cyclo-HTP as 93 per cent recyclable.

Thomas Kahl, EcoSolutions Project Manager, Mondi, says: "Our aim is to create packaging that is sustainable by design. It should be better for the environment, while protecting the food, and standing out on shelves to represent the Abraham brand. Our unique EcoSolutions approach takes all these elements into consideration: we worked closely with Bell Germany at every stage to ensure that this was the best solution for all their products."

The new packaging was launched with German retailers from March 2021.

DOMO partners with Bamberger Polymers



As part of its growth strategy for the North American market, DOMO Chemicals has named Bamberger Polymers an authorized distribution partner effective immediately. Bamberger will offer DOMO's North American product

portfolio including Domamid, Econamid and Domonyl Nylon 6 and 66 compounds.

For more than 50 years Bamberger Polymers has serviced the plastics industry distributing high-quality, thermoplastic resins to customers worldwide. It offers products to injection molders, blow molders, compounders, extruders, and manufacturers of plastic products.

Bamberger's technical sales team provides a broad reach throughout North America in distribution, technical services, and logistics. The company's current industry relationships allow for the immediate introduction of DOMO's product lines to a tremendous number of new customers.

"Offering DOMO workhorse nylon grades for the automotive industry, while providing custom nylon compounded solutions and specialty compounded products utilizing PPS, TPU, PPA and other base resins, Bamberger is equipped with the entire DOMO Engineered Materials product line at their disposal. Their open-minded approach to problem solving, combined with DOMO's custom compounding business model, results in a relationship that has provided results in a short time. I look forward to growing our relationship with Bamberger as we expand our reach together," said Rob Schultz, General Manager, DOMO Engineering Plastics US, LLC.

Clariant Joins The EU Circular Plastics Alliance

Clarient, a focused, sustainable and innovative specialty chemical company, today announced it has officially joined the EU Circular Plastics Alliance. The alliance aims to enhance plastics recycling in line with the objectives of the EU Circular Economy Action Plan and the Green Deal program. Clariant's engagement is part of the company's active support for the transition towards a more circular plastics economy.

"Shifting towards a global circular plastics economy is an immense challenge that can only be brought forward through ambitious commitments, collaborations and an active stakeholder dialog. As part of the Circular Plastics Alliance, Clariant is looking forward to working closely with other key players in advancing plastics circularity throughout Europe," said Bernd Hoegemann, Clariant's Chief Transformation Officer.

Clariant is committed to the Alliance's goal to boost the EU market for recycled plastics to 10 million tons by 2025. The company's focus is on addressing the obstacles that are hampering a higher circularity of products within the plastics value chain, in line with the waste hierarchy principles. Clariant's strategy is based on a smart combination of design for reduction, recycling, and reuse options, as well as solutions for mechanical or chemical recycling.

"Specialty chemicals can act as enablers for new solutions that enhance circularity of plastics by maintaining the value of products, materials and resources in the economy for as long as possible, and by minimizing the generation of waste. Clariant aims to be a leading provider of specialty chemicals that are indispensable to transform a one-way plastics value chain into a circular plastics economy," added Richard Haldimann, Head of Sustainability Transformation.

In 2019, Clariant also established EcoCircle, a company-wide initiative that goes beyond a product focus, looking at the entire value chain.



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Efficient PTA Production

A substance that previously relied on centrifugation to separate its liquid and solid phases is purified terephthalic acid (PTA) - we look at how companies can bring in efficiency to the process

By Kruti Bharadva

You have to spend money to make money. Never has the old adage been truer than in today's world of Industry 4.0, smart engineering advances, and fiercely competitive markets. In the past, to achieve high-quality separation and high purity of certain substances, producers needed to use centrifuge technology to guarantee the requisite product quality. Unfortunately, the very high speeds generated by the machine not only result in high energy bills, but also mounting costs from frequent maintenance and repairs.

One such substance that previously relied on centrifugation to separate its liquid and solid phases is purified terephthalic acid (PTA), a crucial chemical in the petrochemical industry used for PET bottles and polyester fibres, whose rise in global demand shows no signs of slowing. However, volatile crude prices and rising costs for energy and production facilities mean that market prices for PTA can fluctuate wildly. Smaller plants with a nameplate capacity of less than 800 MT per year are at risk of being sunk by bigger competitors during low-price periods unless they have managed to optimize their process and cut OPEX. This article looks at how the earlier PTA production method involving a multi-stage process with pressure and atmospheric centrifuges and a re-slurry tank can be replaced with one stand-alone device – the rotary pressure filter (RPF). An optimized RPF enables complete filtration between the PTA crystallization and drying stages to



be realized in a single, closed step. Using the ANDRITZ Krauss-Maffei pressure drum filter TDF as a reference, the article looks in detail at the design, operating principle, and performance of a state-of-the-art RPF. Reference projects from Indonesia and Russia show how the right separation technology can deliver low OPEX while maintaining the same quality, enabling PTA producers to remain competitive even when prices fluctuate. The obvious choice for greenfield projects, this article shows that switching over to a single RPF process can also be the right option for existing plants looking to future-proof their business by cutting costs without compromising on the quality of their product.

The Importance of PTA

Prized for its excellent weathering properties, hardness, flexibility, and outstanding fluidization characteristics, purified terephthalic acid (PTA) is used as a raw material in the production of polyethylene terephthalate (PET) and polyester fibres,

making it one of the most important chemicals in the petrochemical industry. Growing applications of PTA for the production of polyester resins in several end-use industries such as packaging, textile, and automotive are expected to boost the PTA market in the coming years.

The main process steps in producing PTA traditionally involve paraxylene oxidation to synthesize the crude terephthalic acid (CTA) before crystallization, followed by centrifugation or filtration, then CTA drying and dissolution, and finally hydrogenation, where the CTA is purified to PTA. In earlier PTA plants, decanter centrifuges (pressure and atmospheric) were used to separate the PTA crystals from the PTA slurry in between the final key PTA crystallization and drying stages.

International technology group ANDRITZ went back to the drawing board. A PTA production process that previously required a pressure centrifuge, re-slurry tank, and atmospheric centrifuge has been optimized thanks to technological

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advances in its rotary pressure filter (RPF). What used to be a two-step process can now be realized in a single stage – with the benefits of a lower equipment footprint, lower maintenance requirements, lower consumption of steam and power, and lower investment for greenfield projects. Ultimately, a single-step process equals lower production costs per ton without adversely affecting the quality of this essential chemical.

Technology Overview: The Rotary Pressure Filter

Also known as a pressure drum filter, the rotary pressure filter is a continuously operating unit for all-in-one pressure filtration, cake washing, and drying of slurries with solids of up to 50 per cent. The main components of the RPF are the pressure casing, filter drum, filter cloth mounted on the external surface of the drum, control head, agitator, screw conveyor for material transfer, and rotary valve. The process area is easy to access and the pressure vessel locks fast with a clamp ring. The surface of the drum is divided into several longitudinal filter cells and the filter circumference in turn is divided into various process zones. The cells on the filter drum run through the filter zones by rotating the drum. These filter zones (e.g. for cake filtration, intermediate drying, washing, cake discharge, and bubbling) are connected through a piped connection to the control head.

The control head is used to separate filtrates coming from different zones and to apply different pressure levels to each process zone. The filter drum is placed in the trough (feeding zone), which is in turn connected to the slurry feed line and overflow. The trough has an agitator to prevent the sedimentation of the solids in the slurry and the discharge device – usually a scraper blade – is

also installed in the trough. A screw conveyor is placed under the discharge device. The complete filter is installed in a pressure casing, whereby the pressure can be maintained by process gas or steam.

Not only is the closed design suitable for effective steam pressurization, but the differential pressure can be adjusted for every individual filtration zone. This means that the cake thickness can be varied by adjusting the pressure difference between RPF and filtrate vessels or by the drum speed. Even though the RPF achieves very low residual moisture, the overall cycle time for filtration, cake washing, and drying typically takes less than 60 seconds.

How The Rotary Pressure Filter Performs in the Real World

These PTA filtration developments have been put to the test in recent years. While the single step process is clearly advantageous for greenfield projects in light of the lower initial equipment investment and footprint, is it worth the upgrade for existing operations?


Asia-Pacific is one of the fastest growing regions for PTA production owing to increased end segment demand and accounted for some 77 per cent of the global PTA market share. A plant in Indonesia was using two pressure centrifuges and two atmospheric centrifuges for PTA separation to meet its production capacity of approximately 58 TPH. The main problems with this type of set-up arise with the high-pressure decanter centrifuge. The high speeds required by the equipment not only consume a lot of energy, they also require more maintenance, incur higher downtime, and call for more replacement parts such as seals.

Retrofitting the PTA separation set-up is expected to lead to a significant reduction in OPEX for

this medium-sized Indonesian producer, due to an inevitable decline in power consumption as two atmospheric and two pressure centrifuges with high-tension drives are replaced by the single RPF with low-tension drives.

In a market with a bright future in terms of demand, but where OPEX is essential to future survival, optimizing PTA production equipment is an investment well worth considering. For years it was only possible to achieve the purity of terephthalic acid required for certain applications and effective cake dryness by using a multistage process with pressure and atmospheric centrifuges and a re-slurry tank. The disadvantages of using centrifuges in PTA production mainly lie in the power consumption caused by the high speed of the machine, as well as the higher maintenance, replacement parts, and downtime incurred by the centrifuge technology.

An optimized RPF enables complete filtration between the PTA crystallization and drying stages to be realized in a single, closed step. The fact that one stand-alone device is all that is needed reduces the space required and the capital investment for greenfield projects – an easy choice. For existing PTA producers, the decision may initially seem tougher, but case studies show that it is an investment worth evaluating, especially for smaller producers struggling to compete.

Multiple case studies show that the right separation technology can deliver lower production costs without compromising on quality, enabling PTA producers to remain competitive even when prices fluctuate. Cost savings with an all-in-one rotary pressure filter extend beyond savings on power and water consumption to lower replacement-part and maintenance costs while retaining high output and quality levels. 

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TESLA BEGINS APPOINTING INDIA TEAM

Tesla India has appointed Chithra Thomas as the Country HR Leader. As Tesla firms up its plans to roll out its first all-electric car in India this year, the Elon Musk-run company has hired top executives in the country who has taken charge of some of its operations in the country.

The company has ramped up hiring for top positions and has onboarded Manuj Khurana as Policy and Business Development head for India operations. The company has also hired Nishant as Charging Manager who will head the supercharging, destination charging, and home charging business for Tesla India. He was earlier head of Charging Infrastructure and Energy Storage at homegrown electric vehicle company Ather Energy.

Tesla India now has a Country HR Leader in Chithra Thomas who earlier worked at Walmart and Reliance Retail.

WATERS CORPORATION CONTINUES TRANSFORMATION WITH PLANNED LEADERSHIP TRANSITIONS

Waters Corporation continues its transformation program with the announcement of several planned leadership appointments and executive retirements. Amol Chaubal will assume the role of Senior Vice President and Chief Financial Officer, effective May 12, 2021. Amol brings deep experience in pharma and diagnostics and has led many transformations, including those that brought organic and inorganic growth. Michael Silveira, who has served as Interim Chief Financial Officer since January 2021, will resume his previous responsibilities as Corporate Controller and assume the role of Chief Accounting Officer, reporting to Mr. Chaubal.

The Company also announced that Dr. Mike Harrington, Senior Vice President of Global Markets, and Ian King, Senior Vice President of Global Products, will retire following decades of service to Waters. Following a comprehensive search process, the Company made the following leadership appointments and organizational changes effective May 1, 2021:

Waters has established a dedicated Innovation Board chaired by President and CEO Dr. Udit Batra. The Innovation Board includes R&D, business development and marketing leaders from across the Company and was formed to identify unmet needs in the markets the Company serves, assess technology proof of concepts and monitor the execution of top programs.

Jonathan Pratt has been named Senior Vice President of the new Waters Division, comprising Global Products and Markets, bringing together commercial and R&D under one leader to drive strong cross-functional collaboration and faster decision-making to better meet customer needs. In this role, he will be responsible for Liquid Chromatography and Mass Spectrometry Instruments, consumables, informatics, sales, marketing and service.

Jianqing Bennett has been named Senior Vice President of TA Instruments Division, succeeding Mr. Pratt. Mr. Chaubal, Mr. Pratt and Ms. Bennett will report to Dr. Batra. Kristen Garvey, Vice President of Corporate Communications, will also join the Executive Committee, reporting to Dr. Batra.

"On behalf of the entire Waters team, I want to thank Mike and Ian for their decades of service and contributions to Waters," said Dr. Batra, Waters President and CEO. "I am personally thankful to both Mike and Ian for all they did to bring me up to speed and help our organization navigate the challenges of 2020. Over nearly 40 years with Waters, Ian has been instrumental in leading the expansion of our product pipeline and global product growth efforts. During his 34 years of service to Waters, Mike oversaw numerous transformations that enhanced Waters' operational effectiveness and efficiency. As valued mentors to thousands of Waters employees, Mike and Ian have helped build Waters' deep bench of talent and we wish them both all the best in retirement."

MILLIKEN & COMPANY APPOINTS CINDY BOITER AS EXECUTIVE VICE PRESIDENT

Milliken & Company is pleased to announce Cindy Boiter has been promoted to executive vice president and president of Milliken's Chemical Division. Effective March 15, she will step into the role currently held by David Moody as he transitions to a role outside of Milliken.

"It is an exciting appointment for our company, as Cindy will become the first-ever woman division president at Milliken," shares Halsey Cook, president and CEO for Milliken. "She is uniquely qualified to lead our chemical division thanks to her extensive experience in the division, the acquisitions she has completed and her embodiment of Milliken's purpose."

Boiter joined Milliken's Chemical Division in 2012 as marketing, strategy and business development director and progressed to become the division's CFO, where she played an integral role in its rapid growth. In 2018, she transitioned to Milliken's chief strategy officer, where she led the company's 2025 strategic planning initiatives and oversaw two significant acquisitions. Boiter is a recipient of the Milliken Honors Award for Diversity and Inclusion and is an active ally for associates worldwide.

"We also want to take a moment to thank David Moody for his 33 years of service at Milliken and wish him well as he moves to the next stage of his career," concluded Cook.

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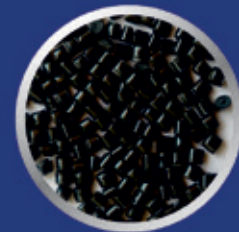
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Recognising Innovation and Excellence

With several yardsticks to measure success available to companies in any industrial sector, being recognised for innovation and excellence remains a major factor. The 5th edition of the ET Polymers Awards did just that – recognised and honoured these achievements in the plastics and polymer industries

By Kruti Bharadva



The 5th edition of The Economic Times Polymers Awards – a platform which recognises and celebrates excellence achieved by Indian plastics processing industry across different segments - including - Automotive, Consumer Durables, Electricals & Electronics, Toys & Playing Equipment, Houseware & Kitchenware, Packaging, Medical Devices & Healthcare Equipment and Recycling – were held on 25th March, 2021 at the Taj Lands End Bandra, Mumbai.

The awards presenting partner was Exxon Mobil Lubricants Ltd and Gold Partner was Yudo Hot Runners India Pvt Ltd. Industry Partners were the All India Plastics Manufacturers Association and Plast Vison India. The event began with the traditional lamp lighting by Mr. Chandrakant Turakhia, President, AIPMA; Mr. Rishi Sutrave, Brand Publisher, World Wide Media and Mr Vishal Agarwal, President, Yudo Hot Runners India Pvt Ltd. This was followed by opening statements from all partners as well as the Assistant Editor of ET Polymers magazine.

An Overview

The Indian plastics industry continues to be an important sector contributing towards the economy – comprising of around 25,000 companies and employing over three million people. The domestic ca-



| Shree M P Taparia, MD, The Supreme Industries, winner of the ET Polymers Lifetime Achievement Award

capacity for polymer production was 5.72m tonnes in 2009. The State of Gujarat in Western India is the leading plastics processing hub and accounts for the largest number of plastics manufacturers, with over 5,000 plastics firms. Automotive and packaging remain the highest consumers of plastics in the country.

The growth rate of the Indian plastics industry is one of the highest in the world, with plastics consumption growing at 16 per cent per annum (compared to 10% p.a. in China and around 2.5% p.a. in the UK). With a growing middle class (currently estimated at 50 million) and a low per capita consumption of

plastics, currently 8kg per head, this trend is likely to continue. It is thus vital that innovations and advances in this important sector be recognised – a key goal of the ET Polymer awards.

Mr S K Ray, Honourable Secretary and member of the Executive Council of the Indian Centre for Plastics in the Environment – and jury member for the Awards, commented, “It is indeed a great honour to be associated with the ET Polymer awards right from their inception. The awards serve as an important motivating factor to the industry and an even more important point of contact for all industry stakeholders.”

People Awards

Apart from the product and innovations awards, three other awards were also presented. These were:

- The Economic Times Polymers Award for Lifetime Achievement
- The Economic Times Polymers Award for Outstanding Contribution to the Industry, 2021
- The Economic Times Polymers – Next Generation Leader for the Year 2021

THE INDIAN PLASTICS INDUSTRY CONTINUES TO BE AN IMPORTANT SECTOR CONTRIBUTING TOWARDS THE ECONOMY – COMPRISING OF AROUND 25,000 COMPANIES AND EMPLOYING OVER THREE MILLION PEOPLE



| Nihar Chheda, AVP, Prince Pipes, receiving the ET Polymers Next-Gen Leader of the year trophy from Rishi Sutrave, Brand Publisher, World Wide Media



| Dr Jitendra Sharma, MD, Founder and CEO, Andhra Pradesh MedTech Zone, receiving the trophy for the ET Polymers Outstanding Contribution to the Industry, from Rishi Sutrave, Brand Publisher, Word Wide Media

**THE ET POLYMERS AWARDS 2021
WINNERS LIST**

Sr.no	COMPANY	CATEGORY	SME/LARGE	PRODUCT
1	Arihant PLAY	Play Equipment	SME	ONGC Play System
2	Varroc Engineering Ltd	Automotive	Large	Headlamp reflector with Low weight BMC
3	Faurecia India Pvt. Ltd	Automotive	Large	Dashboard (New Jeep Compass 2021)
4	BAPL Rototech Pvt Ltd	Automotive	SME	Fuel Tank & Adblue
5	Pitte Polymers Pvt. Ltd	Automotive	SME	Automotive Battery Container and Lids and Caravan Products
6	Maitri Plastic Industries	Houseware	SME	Plastic chair box shaped
7	Jyoti Plastics	Houseware	SME	Magnifico - Multi Purpose Storage Box
8	Tata Motors Limited	Recycling	Large	"Enhancing Pre-consumer Waste Nylon for Automobile Structural Applications"
9	Garware Technical Fibres Ltd	Recycling	Large	GAR-Fuel
10	Huhtamaki India	Packaging	Large	Bottom's Up Pouch
11	Max Speciality Films Ltd Chandigarh, India	Packaging	Large	Max-Shield: Protecting Brands & Consumers with an Antimicrobial and Virucidal Flexible Packaging Innovation
12	Save Grain Advanced Solutions Pvt Ltd	Packaging	SME	Save Grain Bags
13	Mahika Packaging (India) Ltd	Packaging	SME	Premium Tubes for the Cosmetic & Personal Care Industry
14	Robosurg Medtech Pvt Ltd	Medical Equipment	SME	SSI MANTRA Surgical Robotic System
15	Romsons Group Private Limited	Healthcare	SME	Eye Protection Goggles
16	Borkar Polymers	Healthcare (Covid-19 Innovation)	SME	Boroplast Namaste (Contactless Touchfree Sanitizer Machine)
17	KPRT Enterprises	Open - Infrastructure	SME	LED Curbstones
18	Fibro Plastichem (India) Pvt Ltd	Open - Infrastructure	SME	Walkover bridge of FRP
19	The Shakti Plastic Industries	Open - Infrastructure	SME	Tiles



The ET Polymers Award for Lifetime Achievement was presented to the **Shree M P Taparia, Managing Director, The Supreme Industries Ltd.**

Incorporated in 1942 at Wadala Mumbai, Supreme Industries has been consistently increasing its capacities in the plastics processing industry. Today it has one of the largest plastic processors in the country with a product range catering to both the industrial and consumer segment. Over the years it has gone into almost all segments of plastic products and put up plants at various locations in the country. The person at the helm of this company is Shri M P Taparia, who made it his life's mission to take the company to greater heights. Due to the current health protocols and considering Mr. Taparia's age and health, we requested him to accept the award at his office.

He commented on receiving the award, "I am truly honoured to have been awarded this recognition for my humble service to the industry. Plastics are highly versatile, and we are still on its learning curve. Used in diverse fields of economic activities, plastics have in fact saved millions of lives during the ongoing COVID pandemic. Unfortunately, the perception of plastics continues to remain negative, and this is a paradox

which we need to set right."

The Economic Times Polymers Award for Outstanding Contribution to the Industry, 2021 was presented to the **Andhra Pradesh MEDTECH Zone.**

The need for cutting edge, state-of-the-art facilities in the medical sector has never been so evident than in the past year. In such a scenario, the Andhra Pradesh MedTech zone, rose to the need of the hour. Spread over 270 acres and dedicated to medical devices manufacturing, the zone has 200+ single storey, plug and play, pre-built manufacturing units


Also has state of the art common scientific facilities such as Gamma Irradiation Lab, Biomaterial Testing Lab, EMI/EMC Testing Lab, 3D Design, Prototyping and Rapid Tooling facility, common commercial facilities like food courts, business centre, seminar and exhibition halls and warehouses. The zone has been actively involved in the fight against COVID by developing rapid test kits as well as manufacturing of ventilators and was also responsible for the setting up of India's first mobile COVID testing lab – which could be deployed to remote and inaccessible areas

The award was accepted by Dr. Jitendra Sharma, Managing Director, founder and CEO, Andhra Med Tech Zone.

The Economic Times Polymers – Next Generation Leader for the Year 2021 award was bestowed upon a young and dynamic personality- **Nihar Chheda of Prince Pipes.**

Nihar Chheda is the Associate Vice President- Strategy at Prince Pipes. He has been driving the company's IPO in 2019. Since, he has been involved in high-level engagement with the key external stakeholders across the industry. He has been working closely with the team focussed on expanding global associations and PPFL's robust pan India distribution network. He was also responsible for striking the partnership with Lubrizol in 2020 which will take Prince Pipes growth to the next level. Nihar has successfully introduced a culture of 'humanising growth' approach to the organisation, which has helped Prince Pipes immensely in driving sales across the company.

Apart from his active role in different departments of Prince Pipes, he is also responsible for anchoring the company's raw materials procurement strategy that has illustrated encouraging results, an area where he works alongside with his spirited and visionary grandfather Mr. Jayant Chheda, Founder and Chairman, Prince Pipes

This last set of awards brought to end the ceremony of this year's ET Polymer Awards, and this was followed by networking and lunch – all socially distant and safely. We look forward to seeing you all at the next edition of the ET Polymer Awards 2022. 

PLASTICS ARE HIGHLY VERSATILE, AND WE ARE STILL ON ITS LEARNING CURVE. USED IN DIVERSE FIELDS OF ECONOMIC ACTIVITIES, PLASTICS HAVE IN FACT SAVED MILLIONS OF LIVES DURING THE ONGOING COVID PANDEMIC

Toy Manufacturing Under One Roof

In line with the initiatives to 'Make in India' the Aequs group has recently begun work on its Koppal toy cluster – a manufacturing zone for the toys industry. Here is a brief view of the facilities which will be available and the need for such zones in India.

By Kruti Bharadva

Manufacturing sectors such as automotive, aerospace and pharma generally take centre stage in putting India on the global manufacturing map, but these are not the only players. One such sector is that of toys manufacturing and one organisation is doing much in bringing this sector to the forefront by its 'cluster zone.'

Aequs has recently conducted the ground breaking of its Koppal Toy Cluster. The 400+ acre toy manufacturing ecosystem will house over 100 units with a potential to generate over 25,000 direct jobs apart from 100,000 indirect jobs over the next decade. The campus has been designed to house an entire toy manufacturing ecosystem comprising the Special Economic Zone (SEZ), Domestic Tariff Area (DTA) and the Free Trade Warehousing Zone (FTWZ). Designed to global standards, the campus will support the entire manufacturing value chain. It also facilitates training and need-based skill development apart from social infrastructure and residential accommodation for the workforce within the same complex to enhance ease of operations.

The Koppal Toy Cluster marks a strategic shift in how the global manufacturing mindset is moving towards a cluster-based approach with the 'asset-light' principle to deliver more value to all stakeholders through invested resources. The cluster has been established with a rich experience of creating facilities and operations for multi-national corporations and understanding



THE KOPPAL TOY CLUSTER MARKS A STRATEGIC SHIFT IN HOW THE GLOBAL MANUFACTURING MINDSET IS MOVING TOWARDS A CLUSTER-BASED APPROACH WITH THE 'ASSET-LIGHT' PRINCIPLE TO DELIVER MORE VALUE TO ALL STAKEHOLDERS THROUGH INVESTED RESOURCES

their needs to excel in the manufacturing establishment for global requirements. Designed with a view of housing everything under one roof, the cluster is an inclusive ecosystem of ancillary suppliers, industrial and social infrastructure, dormitory habitation amenities and housing, healthcare, power, water and sewage treatment, etc.

One can experience state-of-the-art facilities and concierge services that will help fast-track the idea of 'Concept to Commission' within record time and adds holistic value to the resources spent towards enabling exponential growth.

Facilities and Technologies Available

According to Mr. Aravind Melligeri, Chairman & CEO, Aequs Inc, "A cluster-based concept can holistically provide solutions to manufacturers and meet industry requirements, enable the development of ecosystems dedicated to world-class manufacturing while offering skilling, upskilling and reskilling value addition to employees all within one assembly line."

The Koppal Toy Cluster is an

initiative of Aequs Infra, a part of the larger Aequs Group.

Aequs Infra offers a fully capable manufacturing ecosystem that effectively meets the wide-ranging demands of customers from around the world with a varied product range. Spread over 400 acres, the campus has been designed to house an entire toy manufacturing ecosystem to support more than 100 industrial units. It is a fully integrated ecosystem comprising SEZ, DTA and FTWZ. It has been designed with global standard of infrastructure and facilities to support the entire manufacturing value chain. The campus also facilitates social infrastructure and residential accommodation to aid the workforce, within the same campus, to enhance ease of operations. The cluster also offers strategic location advantage with connectivity to major trade hubs like Hubballi and Bengaluru. Other advantages include:

- abundant access to raw materials both locally and from other Indian and global manufacturing hubs
- precision ancillary manufacturers such as model making and tooling enabling the move from



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The project is a representation of the government's drive to provide world-class manufacturing facilities within the state by providing an atmosphere that is congenial to doing business, easing regulatory requirements, providing financial incentives, and affordable workforce and skilling initiatives.

At the India Toy Fair

In line with the country's vision for an Atmanirbhar Bharat, the Prime Minister of India, Narendra Modi, recently inaugurated The India Toy Fair 2021 to boost the domestic toy manufacturing industry. The virtual toy fair conducted over four days witnessed participation from various exhibitors and industry experts, who interacted over panel discussions to exchange ideas on the potential and development of the Indian toy industry.

The final day of the event was marked by a panel discussion reviewing the importance of skill enhancement for promoting India's toy industry, led by Mr. Aravind Melligeri, Chairman & CEO, Aequs Inc. The



panellists included Shri Praveen Kumar, Secretary of the Ministry of Skill Development and Entrepreneurship, K A Shabir, General Manager, Funkskool, Ashwini Kumar, Co-founder and CEO, Smartivity Labs and Professor Shekhar Bhattacharjee of the National Institute of Design.

The session explored how skill enhancement of toymakers and craftsmen can increase the Indian domestic toy market and how youth engagement, skills diversification and entrepreneurship can boost the toy manufacturing sector in India.

The panellists emphasised on the need for addressing the training needs for the sector by designing specialised courses and building a pool of skilled workers. Augmentation of short-term and long-term courses along with apprenticeship and multi-disciplinary programs can enable individuals to learn skills with a focus on the toy industry for designing, conceptualization, manufacturing, merchandising, safety, and quality control will help the industry to export Indian toys and meet inter-

national standards.

The global toy market stands at \$90 billion and the domestic market at \$1.75 billion, progressing to \$3.3 billion in the next five years. However, India constitutes less than 0.5 per cent of the global market, with 80 per cent of the domestic toy demand being met by international and neighbouring countries. With toy clusters such as Aequs's Koppal toy ecosystem, the country has aimed to encourage domestic entrepreneurs to cater to international demand while also serving domestic markets.

Mr. Melligeri further stressed on the importance of expanding tool design and tool manufacturing capabilities as it is an evident skill-gap persisting in the industry currently. "Filling these gaps is necessary to accelerate the production processes and acquire a stronger edge over competitive pricing and global manufacturing", he added.

Six firms have offered to make investments through MoU's in the Koppal Toy Cluster. They are, Aequs Force Consumer Products (\$ 80 million), Aequs Engineering Plastics (\$ 60 million), Micro Plastics (\$ 40 million), Playgro (\$15 million), Sterling (\$ 10 million) and Hotshot (\$ 6 million). On implementation, these agreements have a revenue potential of about \$ 450 million (Rs 3300 crore) over the next five years. The MoUs demonstrate the strong commitment of the industry to the Koppal Toy Cluster. 📍

THE PROJECT IS A REPRESENTATION OF THE GOVERNMENT'S DRIVE TO PROVIDE WORLD-CLASS MANUFACTURING FACILITIES WITHIN THE STATE BY PROVIDING AN ATMOSPHERE THAT IS CONGENIAL TO DOING BUSINESS, EASING REGULATORY REQUIREMENTS, PROVIDING FINANCIAL INCENTIVES, AND AFFORDABLE WORKFORCE AND SKILLING INITIATIVES

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The Rise of Bio-Based Polymers

A comprehensive and in-depth report on the dynamic global bio-based polymer market, and its growth in recent times

By Kruti Bharadva

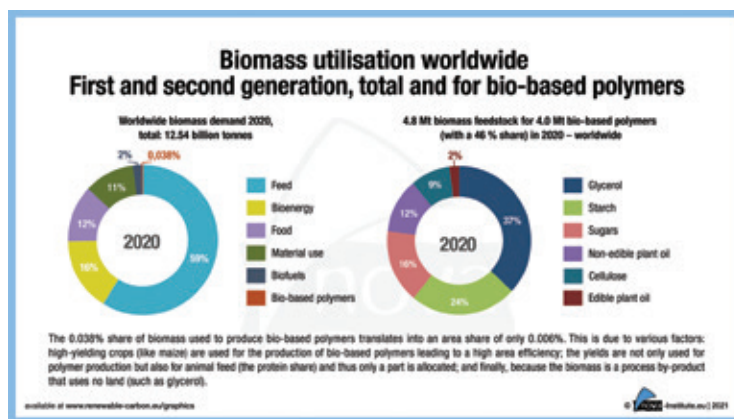
The year 2020 was a promising year for bio-based polymers: Sold out PLA in 2019 has led to the installation of increased capacities, PE and PP made from bio-based naphtha are breaking ground and future expansion for bio-based polyamides as well as for PBAT, PHAs and casein polymers is on the horizon. A lower production is only observed for bio-based PET.

Several global brands are already expanding their feedstock portfolio to include, next to fossil-based, sources of renewable carbon, CO₂, recycling and especially biomass, increasing the demand for bio-based as well as biodegradable polymers.

Counting the Numbers

In 2020, the total production volume of bio-based polymers was 4.2 million tonnes, which is 1 per cent of the total production volume of fossil-based polymers. For the first time in many years, the CAGR is, with 8 per cent, significantly higher than the overall growth of polymers (3–4 per cent) – this is expected to continue until 2025.

Overall, the global land requirement for bio-based polymers is only 0.006 per cent of the global agricultural land. The major biomass feed-



stock used for bio-based polymer production is glycerol as a biogenic by-product (37 per cent).

Capacity Increase

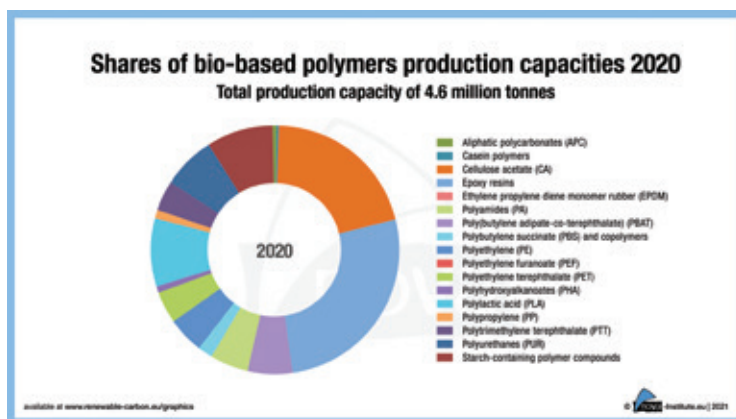
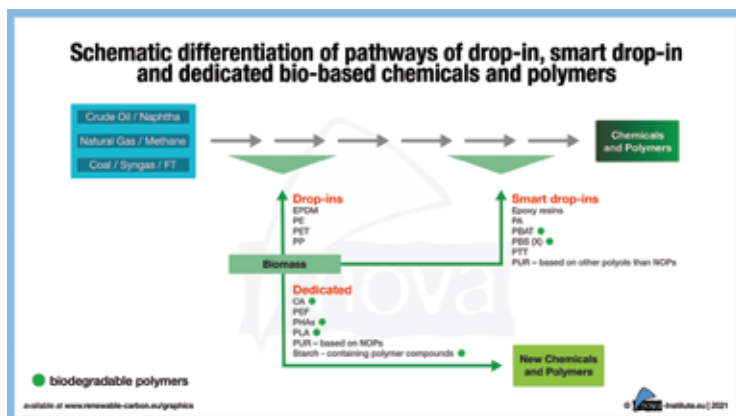
The increase in production capacity from 2019 to 2020 is mainly based on the expansion of polylactic acid (PLA) and poly(butylene adipate-co-terephthalate) (PBAT) production in Asia and the worldwide epoxy resin production. Also, increased and new production capacities for polybutylene succinate and copolymers (PBS(X)) and bio-based polyethylene (PE) and polyurethanes (PUR) were reported in 2020. Especially polyamides (PA) and polypropylene (PP) will continue to grow sig-

nificantly (about 36 per cent) until 2025. While capacities for polyhydroxyalkanoates (PHA) will grow in Asia and North America, casein polymers in Europe will increase by 32 per cent until 2025, followed by increases in PE in South America and Europe, PLA mainly in Europe and PBAT in Asia with about 8 per cent.

Bio-based Feedstocks

Considering the steadily increasing demand for bio-based polymers, the need for biomass feedstocks should be taken into account as an important factor. This is especially true for the recurring debate on the use of food crops for bio-based polymer production. Figure 2 shows the worldwide biomass utilisation in 2020. The total demand for biomass was 12.5 billion tonnes for feed, bioenergy, food, material use, biofuels as well as bio-based polymers. While the majority of the biomass (59 per cent) is used for feed production, only 0.038 per cent are needed for bio-based polymer production. That results in a biomass feedstock

SEVERAL GLOBAL BRANDS ARE ALREADY EXPANDING THEIR FEEDSTOCK PORTFOLIO TO INCLUDE, NEXT TO FOSSIL-BASED, SOURCES OF RENEWABLE CARBON, CO₂, RECYCLING AND ESPECIALLY BIOMASS, INCREASING THE DEMAND FOR BIO-BASED AS WELL AS BIODEGRADABLE POLYMERS



lion tonnes of man-made fibres are from bio-based resources.

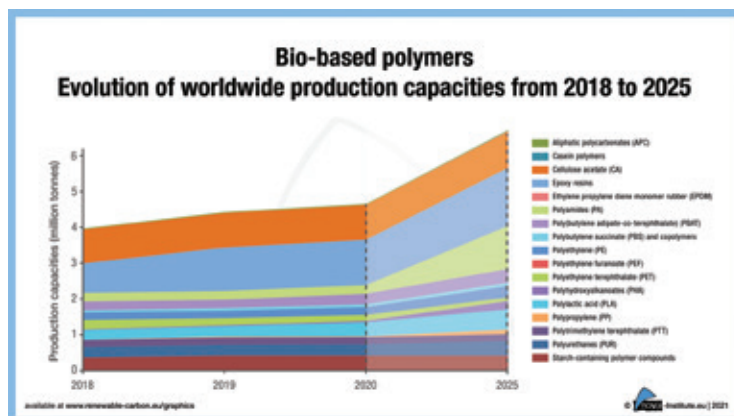
Figure 4 shows all (semi-)commercial pathways from biomass via different intermediates and building blocks to bio-based polymers. As in previous years, several pathways and some new intermediates were added. Bio-based building blocks and polymers analysed in detail within the report are highlighted in bold.

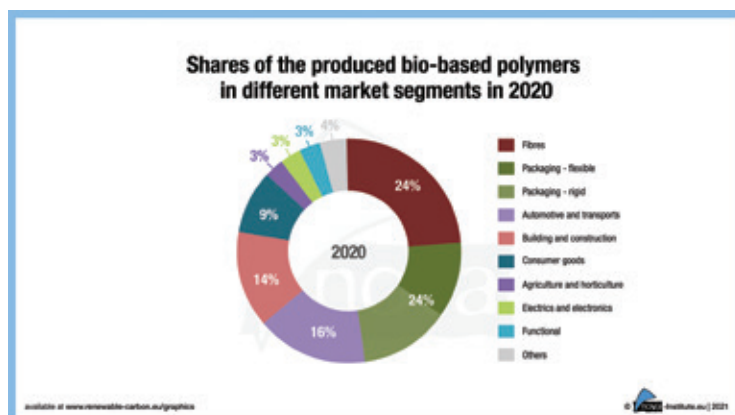
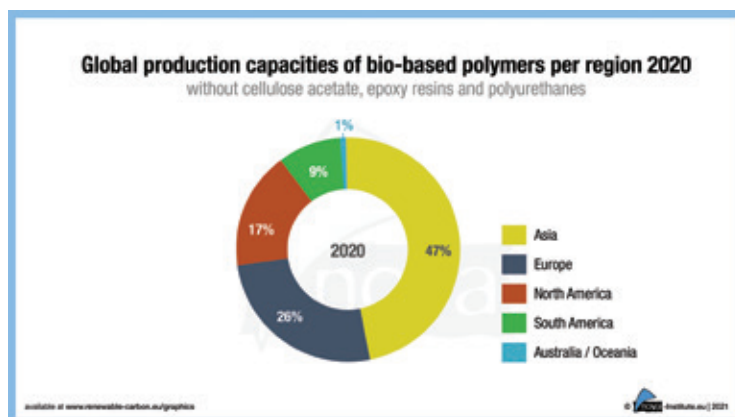
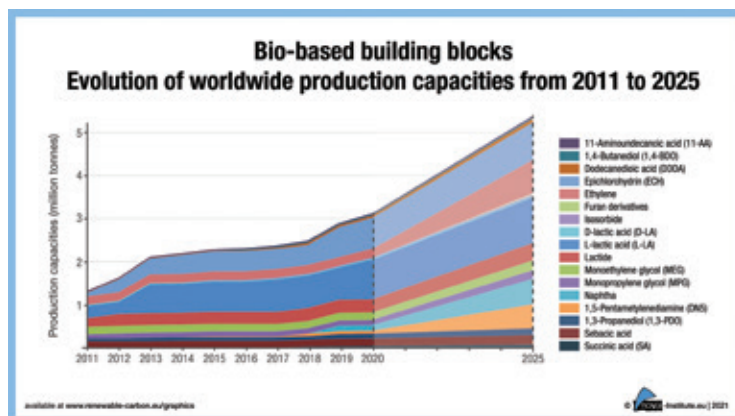
Figure 5 shows the different pathways of bio-based “drop-in”, “smart drop-in” and “dedicated” inputs within the chemical production chain. The different bio-based polymer groups are subject to different market dynamics. While drop-ins have direct fossil-based counterparts and can substitute them, the dedicated ones have new properties and functionalities that petrochemistry

does not provide. Both have their own advantages and disadvantages from a production and market perspective. While bio-based drop-in chemicals are bio-based versions of existing petrochemicals, which have established markets and are chemi-

cally identical to existing fossil-based chemicals, smart drop-in chemicals are a special sub-group of drop-in chemicals. Even though they are chemically identical to existing chemicals based on fossil hydrocarbons, their bio-based pathways provide significant process advantages compared to the conventional pathways. Additionally, these bio-based pathways can be built on completely new approaches, such as epichlorohydrin, where the fossil feedstock propylene is not substituted by bio-based propylene but with glycerol from biodiesel production.

Figure 6 and Figure 7 summarise the results of the report and show the share of the bio-based polymer production capacities in 2020 and the development of capacities from 2018 to 2025 on the basis of forecasts by current and some new producers. An increase to 6.7 million tonnes capacity in 2025 is expected, indicating an average compound annual growth rate (CAGR) of about 8 per cent. The following polymers show an even higher increase significantly above the average growth rate: PA will continue to grow by 37 per cent and PP by 34 per cent until 2025. Casein polymers in Europe will increase by 32 per cent until 2025, followed by 8 per cent increases in PE and a 7 per cent growth for PLA and PBAT.





Bio-based Building Blocks

Figure 8 illustrates the development of capacities for the main bio-based building blocks used for the production of polymers from 2011 to 2025. The building blocks are utilised for the synthesis of structural and func-

tional polymers as well as ingredients in various other applications such as food, feed, cosmetics or pharmaceuticals, and therefore show a higher average CAGR than polymers.

The overall production capacity of bio-based building blocks in-

creased about 7 per cent (212,000 t/a) in 2020. This increase is mainly based on L-lactic acid and epichlorohydrin (ECH). The overall forecast for bio-based building blocks worldwide indicates a growth by 11 per cent (CAGR) until 2025, with 1,5-pentamethylenediamine (DN5), naphtha, ethylene and different furan derivatives being the main drivers.

Global Production Capacities of Bio-Based Polymers by Region

After Asia as leading region, which has installed the largest bio-based production capacities worldwide with 47 per cent in 2020, Europe follows with 26 per cent, followed by North America with 17 per cent and South America with 9 per cent, respectively (Figure 9). With an expected CAGR of 16 per cent between 2020 and 2025, Asia displays the highest growth of bio-based polymer capacities compared to other regions of the world. This increase is mainly due to higher production capacities for PA, PBAT, PHA and PLA.

Market Segments for Bio-Based Polymers

Today, bio-based polymers can be used in almost all market segments and applications, but the various applications per polymer can be very different. Figure 10 shows a summary of the applications for all bio-based polymers covered in the report. In 2020 fibres including woven, non-woven (mainly cellulose acetate (CA) and polytrimethylene terephthalate (PTT)) have the highest share with 24 per cent. Packaging, flexible and rigid, also have a 24 per cent share in total, followed by automotive and transport with 16 per cent (mainly epoxy resins, PUR and aliphatic polycarbonates (APCs)).

Market data based on research conducted by the Nova Institute

Over 100 Million PET Bottles Upcycled

SABIC has helped divert more than 100 million single-use 16.9 oz. (50 cl) PET water bottles from landfills and incinerators. This portfolio of globally available polybutylene terephthalate (PBT) materials is produced from post-consumer polyethylene terephthalate (PET) water bottles through a unique chemical upcycling process.

By Kruti Bharadva

SABIC, a global diversified chemicals company, headquartered in Riyadh, Saudi Arabia, manufactures on a global scale in the Americas, Europe, Middle East and Asia Pacific, making distinctly different kinds of products: chemicals, commodity and high-performance plastics, agri-nutrients and metals. One of the company's key goals is to support its customers by identifying and developing opportunities in key end-use applications such as construction, medical devices, packaging, agri-nutrients, electrical and electronics, transportation and clean energy. Production in 2020 was 60.8 million metric tons

Since the introduction of LNP™ ELCRIN™ iQ materials in late 2019, SABIC has helped divert more than 100 million single-use 16.9 oz. (50 cl) PET water bottles from landfills and incinerators. This portfolio of globally available polybutylene terephthalate (PBT) materials is produced from post-consumer polyethylene terephthalate (PET) water bottles through a unique chemical upcycling process.

SABIC also recently completed a Life Cycle Assessment (LCA) comparing virgin PBT and LNP ELCRIN iQ resin, which underwent third-party critical review in accordance with ISO 14040/14044 standards. Results indicated that LNP ELCRIN iQ resin lowered global warming impact by 29 percent and cut cumulative energy demand by 43 percent compared to virgin PBT. LNP ELCRIN iQ resins also show



favourable LCA results compared to data for other virgin base resins, such as polyamide (PA) 6,6 and PA6, extracted from Plastics Europe Eco-Profiles.


“Our innovative LNP ELCRIN iQ materials help address environmental megatrends such as the circular economy and the reduction of plastic waste to benefit customers and society at large,” said Joshua Chiaw, Director, Business Management, LNP & NORYL, SABIC.

“Not only do our resins deliver independently verified sustainability benefits, but they can serve as a drop-in replacement for virgin PBT to help manufacturers increase the sustainability of end products. With many different grades available, including glass- and mineral-reinforced products and non-halogenated flame-retardant formulations, LNP ELCRIN iQ resins could be considered for a wide range of applications, including consumer electronic enclosures and components, automotive exterior parts, healthcare applications and personal care prod-

ucts.”

To provide independent verification of recycled content and responsible sourcing practices, SABIC engaged SCS Global Services (SCS), a leader in third-party environmental, sustainability, food safety and quality certifications, to audit the processes used to source and manufacture its LNP ELCRIN iQ resins. These certifications help customers make better-informed decisions when choosing materials that can strengthen their position on sustainability.

“SABIC is focused on helping customers achieve their sustainability goals by providing plastic materials that support circularity without sacrificing the mechanical performance, chemical resistance or colorability required for the end use product,” said Maureen MacDonald-Stein, Director, Growth OEM & Markets, SABIC. “The manufacturing processes for our LNP ELCRIN iQ resins have been audited for adherence to the SCS Recycled Content Standard and the supply chain has been audited for responsible sourcing including social, environmental health and safety requirements, enabling customers to quantify the contribution of our materials to their sustainability targets.”

These certificates are conveniently posted on the SCS Certified Green Products Guide. The responsible sourcing verification, which covers multiple LNP ELCRIN iQ products, attests to SABIC's focus on environmental impacts across the entire value chain. 

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Plant Engineering for Polymer Compounding Facilities

While small compounding companies, typically specialized in some niche products and mainly having a regional importance, build their plants themselves with the support from their plant engineers, the large polymer producers require a professional engineering team. Here is an in-depth look at what such projects entail

By Kruti Bharadva

While small compounding companies, typically specialized in some niche products and mainly having a regional importance, build their plants themselves with the support from their plant engineers, the large polymer producers require a professional engineering team providing them engineering support like in the development and construction of a large polyolefins plant. Such a task typically is provided by engineering houses taking responsibility for the complete planning, engineering, procurement, construction and commissioning process.

These EPC companies typically execute projects in the range of 100 million to 4 billion US\$. The cost of a compounding facility, however, ranges between 10 and 100 million US\$ and thus is too small for large EPC contractors. Thus, engineering houses normally do not cater

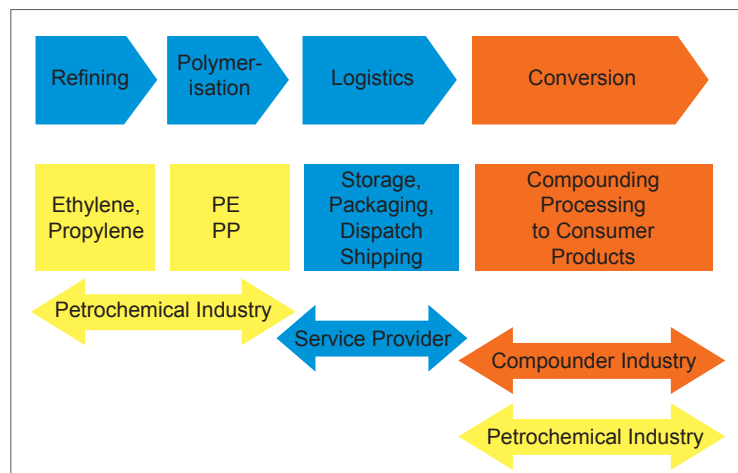


Figure 1: The Polymer Chain

for this type of business and the large polyolefin companies building compounding plants are left on their own. This vacancy now can be filled by consortia of equipment supply companies with in-house plant engineering capabilities. These plant engineering companies have developed

substantial experience in building systems for the polyolefins industry, but also serving the polymer processing industry.

Plants for compounding of polymers have become more complex due to growing capacities. Many of the companies operating these plants are petrochemical producers needing engineering services comparable to polyolefin production facilities. However, project size is too limited for large EPC-contractors to be interested. Thus, equipment suppliers with experience in executing turn-key projects for polymer producers have to fill the gap.

Typical Applications

The polymer production, i.e. typically the major petrochemical companies, used to be the inventor and

THESE PLANT ENGINEERING COMPANIES HAVE DEVELOPED SUBSTANTIAL EXPERIENCE IN BUILDING SYSTEMS FOR THE POLYOLEFINS INDUSTRY, BUT ALSO SERVING THE POLYMER PROCESSING INDUSTRY. SUCH A CONSORTIUM REQUIRES THE KNOW-HOW OF COMPOUNDING, THE SOLIDS HANDLING TECHNOLOGIES, THE LOGISTICS, THE CONTROL SYSTEM DESIGN CAPABILITIES AND THE CIVIL CONSTRUCTION FOR INFRASTRUCTURE AND BUILDINGS.

producer of a diversified range of polyolefin products, including compounds and blends. Typical applications are the automotive industry and household goods. In the last decade, however, the polymer producers have focused more on improving the production technology and plant efficiency through larger plant capacities and a global network of production plants and licensees. The resin producers have started to outsource the compounding of their products to sub-suppliers, especially for grades with low capacities.

Polymer compounding here, refers to the process to produce customized polymers using polyolefins and other primary polymers, mixing them with additives and other ingredients and then extruding them into pellets for further processing into consumer products, household products, automotive parts, profiles and cables. Some of the ingredients may be liquids which are either pre-mixed with the solid components or which are injected directly into the extruder. In this context, compounding consists, in general, of conveying, metering, mixing, extrusion, palletizing and packaging of polymers and additives. The polymer components may be powders or pellets.

The Polymer Compounds Market

Since a few years, another trend has become visible: With the margins in the polyolefins production being squeezed considerably due to more competition from new players, regionally advantageous feedstock prices and mega plant capacities, some polyolefin producers have returned to appreciating the added value from compounding. This trend is being lived in the polyolefins industry, but also in special polymers like PC and PA.

One of the major markets for

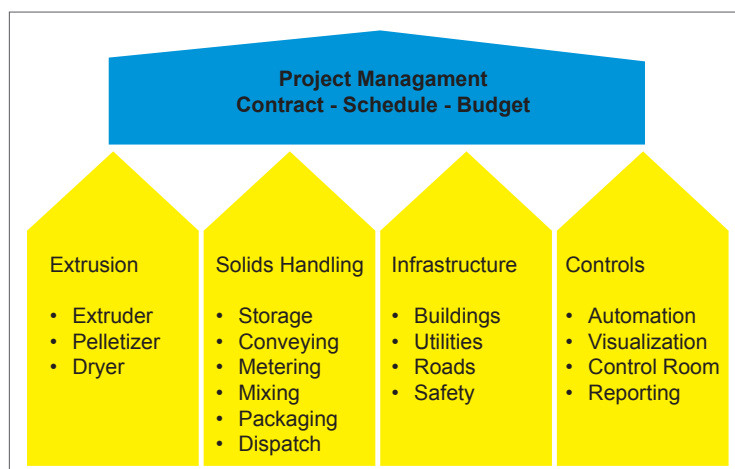


Figure 2: Consortium Structure

WITH THE MARGINS IN THE POLYOLEFINS PRODUCTION BEING SQUEEZED CONSIDERABLY DUE TO MORE COMPETITION FROM NEW PLAYERS, REGIONALLY ADVANTAGEOUS FEEDSTOCK PRICES AND MEGA PLANT CAPACITIES, SOME POLYOLEFIN PRODUCERS HAVE RETURNED TO APPRECIATING THE ADDED VALUE FROM COMPOUNDING

polymer compounds is the automotive industry. Polymer producers have started early to serve this industry which consumes more than 50 per cent of the PP-compounds in Europe. Special compounding plants located close to major automotive manufacturers have thus been built, such as the facility originally being built by Himont in Germany. Today, approximately 2/3 of the polymer compounds are produced by the resin producers – with increasing plant capacities [2]. The future development of this industry is forecasted to grow at a rate of 3 per cent p.a. and is forecasted to head in the following directions:

- Increased forward integration of resin producers
- Increased backward integration of large plastic processors

- Increased specialization of independent compounders

The forward integration of resin producers has become a strategic approach, especially due to reduced margins in the polyolefin production. For large resin producers, these large-capacity plants have become major investments and thus the complete process of design, engineering, procurement and construction has become similar to that of petrochemical plants.

The Engineering Process

Engineering houses normally do not cater for this type of business and the large polyolefin companies building compounding plants are left alone – and this in a time where their own engineering capacities have been reduced dramatically in order to cut

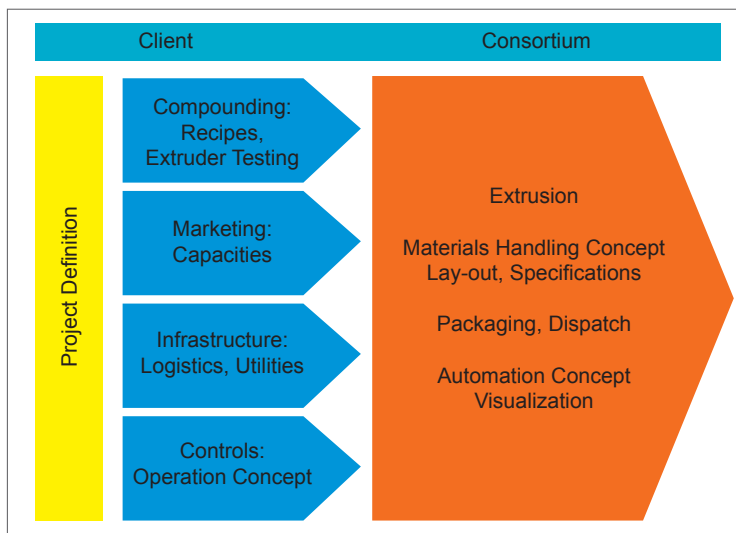


Figure 3: Project FEED Study Scope

cost and to focus on the core business of polymer development and production. This vacancy now can be filled by consortia of equipment supply companies with in-house plant engineering capabilities.

Of course, compounding requires the input from the polyolefin respectively compounding company to define the product requirements and the additive packages. Typically, the compounding company will run respective tests with one or more extruder suppliers and will pre-select one or more extruder suppliers. Once these requirements are defined, then the consortium can start with a FEED or feasibility study to define the basic design of the plant. Since this will require quite some work, this will take at least several weeks to months and is a service provided by the consortium. The result of such a FEED is a basic layout and a specification of the major equipment. Sub vendors for related equipment and services are selected and their input is reflected in the FEED study. This FEED will also define a first cost estimate and a time schedule for the project execution which does allow the owner to make a decision on the

economic justification of the project.

Experience is that the client then will ask for options to cut the total investment cost. Once the FEED results in a decision to build the compounding plant, the consortium can adjust the scope according to the latest requirements and can establish a final bid package, eventually leading to a firm price for turn-key project execution.


Alternatively, if time permits, the FEED package can be used to issue a bid inquiry to various bidders. This however, required a more detailed and thus more expensive FEED study and will also require considerably more time until project completion – not a good option in times where time-to-market has become a crucial element in investment decisions.

Examples of Successful Projects

The compounding of technical polymers in China started with a FEED study to define the scope. The base polymer is received from a near-by production site, but also in bulk (truck or container) or in big bags. For the compounding process the

base polymer is mixed with respective additives and colours, then are fed to the extruder. The finished product is blended and finally packaged and dispatched. Due to the plant location being in China and all partners for supply of the equipment originated from Europe, the client had opted for supplying infrastructure and installation services himself but requiring supervision for installation and start-up. An incredible help for the execution of this project for compounding of 50 kta of technical polymer compound was provided for local sourcing in the global network. Silos, blenders, dryers and BigBag stations were sourced locally from pre-qualified Chinese vendors according to Zeppelin's engineering specifications and drawings. Extruders including pelletizers and bagging lines were supplied from Zeppelin's partners in Europe. This split of the project into an onshore (domestic) and an offshore (imported) portion also has helped to reduce the foreign investment for this project – a situation occurring with many international projects, not only in China.

This project is an example for rather conventional design of a compounding plant, i.e. all equipment items were supplied individually to site and then were assembled on site. This was due to the fact that the virgin polymer as the main ingredient was produced on site and thus a plant infrastructure for building plants was available. Additionally, due to the capacity of the plant, the storage silos for the raw and finished products needed to be so large that they needed to be supplied and installed locally.

Thus the client will receive an engineering process comparable to the process of building polyolefins plants and equipment proven to work under the requirements of a petrochemical plant. Thus, the growing compounding market has its source for engineered plants. 

Investing in the Future

Umesh Anand, Managing Director, HPL Additives Limited talks to us about his company and its focus on innovation and sustainability

By Kruti Bharadva

HPL Additives Limited is one of the leading manufacturers of Polymer Additives in India with global presence in 50+ countries. The organisation was the first Indian polymer additives manufacturer to get ISO9001; ISO14001 and OH-SAS 18001 accreditation. It manufactures chemicals which are added to the base polymer to improve processability, prolong life span, and/or achieve the desired physical or chemical properties in the final product.

Below are the excerpts from an interview with Mr. Umesh Anand – Managing Director of HPL Additives Limited.

Tell us about the various product categories that HPL Additives has presence in.

HPL Additives started as Chemical Blowing Agent manufacturer in India and organically diversified into Antioxidants, Azo-initiators and other speciality chemicals in five decades of journey. The organisation's expertise lies in developing and manufacturing polymer additives and speciality chemicals especially for the plastics and rubber industry and the pharmaceutical intermediates sector.

Our three state-of-the-art manufacturing plants located in North India help us to offer a wide range of products to various industries. All our plants have dedicated lines with multiple purpose capabilities. We have recently added Oxo-Biodegradable Additives (OBA - a licensed technology for Indian market only) to our existing range of products.

Tell us about HPL Additives'



THE FOCUS HAS BEEN ON INVESTING TOWARDS BUILDING WORLD-CLASS FACILITIES AND ENSURING SUSTAINABILITY IN ALL ASPECTS OF OPERATIONS AND BUSINESS AND NOT JUST THE CONTINUITY OF BUSINESS OR FINANCIALS

manufacturing capabilities and its overall manufacturing footprint.

HPL Additives has four manufacturing sites in India – three in Haryana which are dedicated to manufacturing polymer additives and one plant in Punjab dedicated to manufacturing of Industrial Chemicals. All the manufacturing sites have state-of-the-art DCS/PLC controlled manufacturing facility with glass lined & stainless steel reactors enabling on-line process control during production without manual intervention while providing flexibility for the product & process change.

Except for HIGREN OBA, all our products have been researched, developed and scaled-up in-house. This has been possible because of the organisation's continuous focus on the polymer additives market, identifying and anticipating customer needs and using R&D competency as an enabler.

We make it a point to invest regularly in R&D to create new products, adopt new applications, strengthen processes, develop new markets and enhance existing market share. Our R&D labs possess the capability to carry out any application tests.

Quality plays an important role in the manufacturing of polymer additives and our Quality Control labs are equipped with world-class equip-

ment.

The fact that HPL Additives has been bestowed with numerous awards of recognition for its research and manufacturing capabilities speaks volumes about the organization.

The COVID-19 outbreak has been one of the biggest disrupters seen by the human race. How has it impacted HPL Additives and how have you been dealing with the same?

The COVID-19 pandemic has unprecedentedly affected the global economy at once within a span of few weeks and the impact has been harsh. It's ramifications are evident in human health, social and economic aspects of the life. Global disruptions due to state mandated lockdowns reduced individual remunerations & earnings, social interaction and mobility. It also led to businesses downsizing, closure of factories and unemployment. The cataclysmic impact of the pandemic is still being felt by both large and smaller business houses alike.

This, as we see, is now unfolding into volatile raw materials prices, rise in all commodity prices, higher labour and energy costs combined with difficulties in arranging exports logistics. The organisation now looks to delicately balance the

“resource- stripped” business opportunities in the markets that have recently opened up and the rising costs on the other hand. The businesses would need to do more than just streamline resources or slash costs.

On a positive note, plastics demonstrated its value in the healthcare industry through a wide spectrum of application areas in the battle against COVID-19 and has helped people understand the importance of single-use plastics. As we have been saying for many years now, the problem is the disposal and irresponsible use of plastics and not the plastics itself. Safety and cost-effectiveness were always the strong points for plastics in comparison to other alternatives, but now we have ways for safe disposal of plastics today by oxo-biodegrading them. HPL Additives has taken the lead in this respect in India and has launched its HIGRENTM OBA range of oxo-biodegradable additives for various applications.

What kind of business numbers are you looking at for the ongoing fiscal in terms of turnover and growth?

We expect that the need for sanitizing, disinfection and mitigating the risk of contracting / spreading of infections (not just COVID-19) will fuel the growth of Personal Protective Equipment (PPE) & medical instruments industry in specific and the plastics industry in general thus allowing impetus to polymer and polymer additives market.

The proactive efforts and measures taken by the government as well as corporates have strengthened the expectations of positive growth. The key economic and business indicators have instilled the expectations of a sustainable rebound in FY 2021-22.

As per the current trend from July 2020 onwards, our top and bottom lines have gone to pre-COVID levels and hopefully, we will achieve

the turnover and profitability mark of the previous financial year, i.e. 2019-20. In face of estimated 8-9 per cent contraction of national GDP and still struggling developing economies, this would be a remarkable achievement.

What would be your market share in India in these respective segments?

HPL Additives has a large presence in the India market across all market segments (polymer additives and speciality chemicals) and it would be safe to say that the market share ranges from 40 per cent to 80 per cent depending upon the product and product categories.

Give us an overview of your exports business.

On an average, 50 per cent of the organisation's turnover comes through exports to Europe and Americas. Our vast distribution network across India & abroad, branch offices in India, USA & China support our business interests at home and 50+ countries across the globe. For smooth and seamless distribution, HPL Additives has two warehouses – One in Antwerp, Belgium and the second in New Jersey, USA.

We have been recognised for our export performances by various government authorities over the years, some of which have been listed below:

- Two Star Export House Certificate issued by the Ministry of Commerce and Industry Department of Commerce, Government of India for excelling in export performance
- Haryana State Certificate Of Merit For Outstanding Export Performance by Industries & Commerce department, Government of Haryana, India in recognition of outstanding performance in exports
- Export performance awards by

Basic Chemicals & Cosmetics Export Promotion Council (CHEMEXCIL) Ministry of Commerce & Industry, Government of India


How important is sustainability for HPL Additives?

The focus has been on investing towards building world-class facilities and ensuring sustainability in all aspects of operations and business and not just the continuity of business or financials.

For us at HPL Additives, sustainability means to contribute significantly to pay back to the society and the environment, and not just being a manufacturer with financial success. We do it by contributing to the fields of education and employment, healthcare and resource preservation.

HPL Additives is a participating member in the chemical industries' “Together for Sustainability” (TFS) initiative. TFS goal is to establish a uniform global programme for the responsible procurement of goods and services in the chemical industry, to achieve transparency in relation to sustainability performance throughout the supply chain. The organisation also adheres to EcoVadis assessments too.

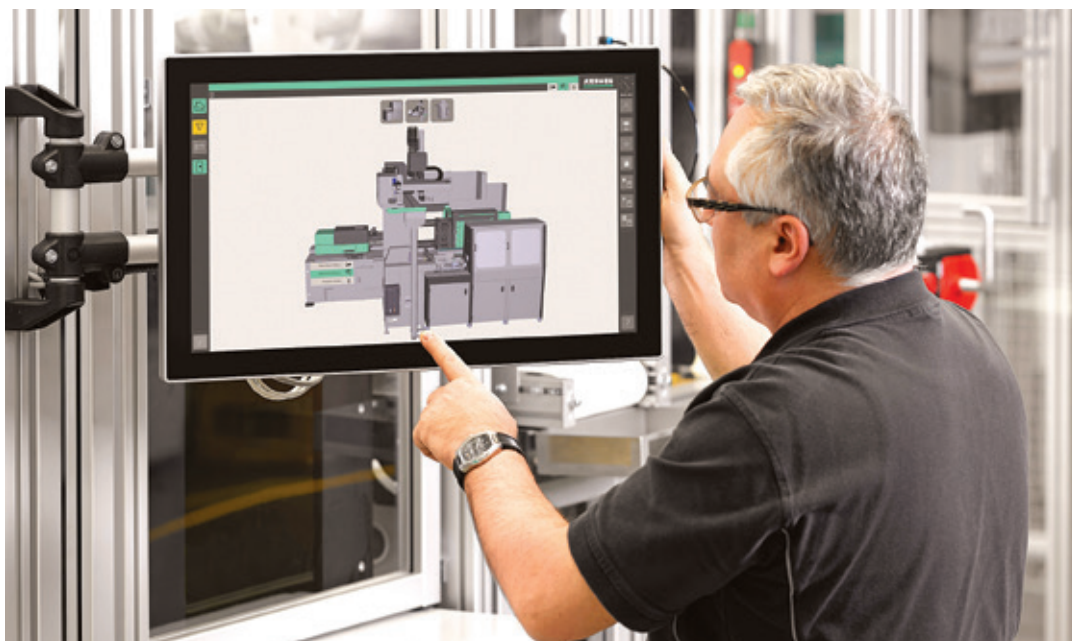
Tell us something about your focus on innovation.

Innovation is the way of life for all of us at HPL Additives. Besides being a manufacturer of additives, we would like to expand our footprint in R&D. We are in the process of evaluating newer opportunities, i.e. setting up an independent arm for pure research and applied research across various fields. This Innovation Centre will be set up to undertake Contract Research, kind of R&D BPO for domestic and international markets. Needless to say, it would continue to be the backbone of our growth as well. 

Innovative Turnkey System

The Hannover Messe Digital Edition 2021 saw Arburg present a new turnkey system that will raise the bar in aspects of digitalisation, automation and the circular economy in plastics processing

By Kruti Bharadva



| In the fully-automated production cell of drinking cups the Arburg Turnkey Control Module (ATCM) SCADA system visualises all relevant process and quality data

Arburg, a leading manufacturer of plastic processing machines whose product portfolio encompasses Allrounder injection moulding machines with clamping forces of between 125 and 6,500 kN, the Freeformer for industrial additive manufacturing and robotic systems, customer and industry-specific turn-

key solutions and further peripheral equipment, recently presented a turnkey system at the Hannover Messe Digital Edition.

The company is a pioneer in the plastics industry when it comes to production efficiency, digitalisation (Industry 4.0) and sustainability. Digitalisation, automation and smart assistance systems are all tools

that make it easier to work on and with injection moulding machines on a daily basis. Based on an electric Allrounder 370 A with a clamping force of 600 kN, Arburg's exhibit demonstrated a system that not only documents production processes seamlessly, but also enabled them to run smoothly, efficiently and reliably.

Automated and 100 per cent Traceable

The exhibit used a single hot runner mould from Haidlmair to produce a crumpled PP cup. The handling work was the responsibility of a new vertical robotic system, the Multilift V 20, with a 20 kg load capacity and a transverse design. Once they are

BASED ON AN ELECTRIC ALLROUNDER 370 A WITH A CLAMPING FORCE OF 600 kN, ARBURG'S EXHIBIT DEMONSTRATED A SYSTEM THAT NOT ONLY DOCUMENTS PRODUCTION PROCESSES SEAMLESSLY, BUT ALSO ENABLED THEM TO RUN SMOOTHLY, EFFICIENTLY AND RELIABLY



| With its numerous interactive apps and smart functions, the arburgXworld customer portal facilitates the daily work associated with injection moulding

ONCE POLISHED, THE CUP'S SURFACE IS ALSO ADORNED WITH TWO DM CODES: ONE CONTAINING THE PROCESS DATA FOR TRACEABILITY PURPOSES AND THE OTHER CONTAINING THE MATERIAL INFORMATION WITH RECYCLING IN MIND

removed from the mould, the cups were first sent for plasma treatment and then made their way to a digital printing station. This means that the product enhancement stage was integrated directly into the production cell. It is possible to choose from three different images on a tablet in order to print the crumpled surface of the cup. Once polished, the cup's surface is also adorned with two DM codes: one containing the process data for traceability purposes and the other containing the material information with recycling in mind.

The Allrounder is equipped with an IIoT gateway as standard, providing a standardised form of networking. Software such as the Arburg host computer system or an ERP tool makes it possible to record and analyse production data in real time and significantly increases production efficiency and transparency. In


this application, the Arburg Turnkey Control Module (ATCM) SCADA system visualises all relevant process and quality data and merges it for specific parts. To achieve this, the injection moulding machine, automation systems and peripheral equipment – in this case, the digital printer – each send the relevant data to the ATCM. This makes every individual cup 100 percent traceable.

Digital Twin Ensures Correct Sorting

Since 2019, Arburg's circular economy and resource conservation activities have been grouped together under the arburgGREENworld programme – helping the company tread a path towards becoming a system provider that ensures sustainability as part of the circular economy. As an exclusive mechanical engineering partner in the R-Cycle project ini-

ated by the company Reifenhäuser, Arburg is using its crumpled cup production as an application example to demonstrate how high-quality recycled material can be recovered from plastic waste after the products have been used, closing the materials loop. At the heart of R-Cycle is a database containing a full set of information about the substances used in plastic products, which means that each product has a digital twin. Data relating to aspects such as raw materials and colouring agents are transmitted as early as the injection moulding stage, and the product then receives a machine-readable DM code. When the code is read at recycling facilities, the product can be sorted as appropriate.

Smart Machine Controller

In the future, smart machines will open up all kinds of networking options, monitor and adaptively control their processes, and provide active support for operators in every situation. Machine controllers will play a central role in this, providing input in process control, quality assurance and traceability – and several features of the exhibit have been designed with this in mind. The Allrounder with Gestica controller, for example, is equipped with the "aXw Control FillAssist" tool, which makes it possible to run filling simulations directly on the controller screen. The filling level of the component is animated in relation to the current position of the screw as a 3D graphic in real time. Three other control systems – the aXw Control ScrewPilot, PressurePilot and ReferencePilot – enable adaptively regulated injection. They use control strategies that build upon one another and provide solutions for essential quality requirements, such as maintaining constant shot weights and ensuring that moulds are filled evenly. 

Enhanced Performance in Mulch Films

Borouge, along with Parth Poly Woven, developed an advanced mulch film with improved mechanical properties for better service life and enabling zero damage during tractor laying

By Rakesh Pandya, General Manager, Regional Market Development, Packaging, Indian Sub-Continent, Borouge

Borouge, a joint venture between ADNOC and Borealis, is a leading petrochemicals company that provides innovative plastics solutions for the energy, infrastructure, mobility, packaging, healthcare and agriculture industries. Borouge is working in close collaboration with the Parth Poly Woven team in India to developing differentiated solutions based on emerging market needs. A leading manufacturer of multi layered polyethylene (PE) films based in Junagadh, Gujarat, Parth Poly Woven Pvt. Ltd specialises in agricultural mulch films, crop cover, grow bags and liquid packaging films.

Widely used in the agriculture sector, mulch films bring about many agronomic benefits. Mulch films aid in weed control, prevents damage from insects and soil solarisation, thereby reducing the use of conventional pesticides as well as keep soil-borne diseases to a minimum. While still allowing rainfall to permeate the soil, mulch films help conserve moisture, reduce frequent irrigation requirements and raise soil temperature, supporting early seed germination. They also facilitate effective application of fertilisers and reduce the loss of plant nutrients through leaching.

An Advanced Mulch Film

However, the quality of mulch films often raises concern around light reflection capability and challenges around its service life. Poor mechanical properties of PE films not only contribute to these challenges, but also pose a threat to the environ-



WHILE STILL ALLOWING RAINFALL TO PERMEATE THE SOIL, MULCH FILMS HELP CONSERVE MOISTURE, REDUCE FREQUENT IRRIGATION REQUIREMENTS AND RAISE SOIL TEMPERATURE, SUPPORTING EARLY SEED GERMINATION

ment. Once the service life is over, proper removal of the mulch film is important as poor mechanical properties of PE films lead to accumulation of plastics residue in the soil, which results in soil pollution and environmental damage.

Borouge worked closely with Parth Poly Woven to develop an advanced mulch film, with improved mechanical properties for better service life and enables zero damage during tractor laying. The mulch film is made with Anbiq™, Borouge's latest Linear Low-Density Polyethylene (LLDPE) resin produced using proprietary Borstar bimodal technology and an advanced smart catalyst system. It is an enhanced LLDPE offering a unique balance of mechanical properties, sealing performance, easy processing and good optics in practical applications.

The three-layer, 30-micron mulch film based on 70 per cent Anbiq™ FM1818 usage in the formulation produced the desired results, meeting Parth Poly Woven's requirements of looking for good processability of resin and good bubble stability while producing blown film of lower thickness on their machine. The Anbiq™ FM1818 mulch film also successfully resolved

the tearing issues which were faced during the automatic laying process previously.

Along with excellent mechanical properties, Anbiq™ FM1818 also delivered the following benefits as compared to Parth Poly Woven's existing solution with other LLDPE on their blown film line:

- Excellent bubble stability
- Reduced melt pressure (8 per cent) and melt temperature (almost 10°C lower)
- Reduced motor load (5 per cent)

Overall, Borouge's Anbiq™ FM1818 based formulation offers excellent tear and puncture resistance, as well as improved shelf life of the film. Improved mechanical properties also enable improvements in the automatic laying process. In addition, the Anbiq™ FM1818 based solution performed much better in terms of gloss when compared to existing ones based on other LLDPEs.

Given its strength which helps reduce issues of film punctures or tears, its excellent gloss, competitive value pricing and excellent processability, Parth Poly Woven has since switched to Borouge's Anbiq™ FM1818 based formulation for their mulch film applications. 📌

Waters Peptide Multi-Attribute Method for BioAccord System Boosts Innovator and Biosimilar Drug Development

Waters Corporation today introduced a new peptide multi-attribute method (MAM) workflow for the Waters™ BioAccord™ LC-MS System, enabling drug development, manufacturing, and QC scientists to monitor efficacy and safety through the analysis of critical quality attributes (CQAs) of monoclonal antibodies (mAbs) and other protein-based drugs.

The BioAccord System moves attribute-based monitoring out of centralized MS labs and into the hands of more scientists in regulated and quality control laboratories who may not have extensive experience operating mass spectrometers,” said Jeff Mazzeo, Ph.D., Vice President – Global Marketing and Scientific Operations, Waters Corporation. “With this new method for the BioAccord System on the waters connect platform, scientists have a single, sensitive multiplexed method to accurately assess the most important attributes of protein-based drugs that enable rapid decision-making



for product development, manufacturing, and release.”

The peptide MAM workflow for the BioAccord System monitors for:

- Product variants
- Product degradation and impurities
- Process stability-indicating modifications

Quality Assistance, a leading contract research organization based in Belgium, uses the Waters BioAccord System as part of a comprehensive portfolio of mass spectrometry services it provides to the pharma-

ceutical industry.

“Investing in state-of-the-art equipment is essential for remaining at the forefront of analytical sciences,” says Dr. Arnaud Delobel, R&D Director, Quality Assistance. “Our Waters BioAccord System strengthens our ability to meet the needs of customers for robust and reproducible results with full traceability and data integrity from injection to reporting. Automated workflows for intact mass, peptide mapping and monitoring as well as for released N-glycans analysis provide us with reliable results quickly.”

The BioAccord System pairs the ACQUITY™ UPLC™ I-Class Plus with the ACQUITY RDa™ Mass Detector featuring SmartMS™ enabled usability features. The system offers a wide range of users with varying MS experience, industry-leading automated setup and self-diagnosis capability delivered through modern instrument control software and an intuitive user interface, all within a small footprint

Bausano Renews Its Extrusion Lines For Pipes

The global demand for plastic pipes has grown exponentially and, over the next few years, is set to increase for a large variety of applications: from water and gas supply networks, rainwater drainage and the transport of various fluids to energy supply systems and sprinkler systems. In this market context we announce that we have completely revamped our ranges for the extrusion of soft and rigid, transparent, filled or press-filled PVC, PP and PE pipes in order to meet the ever-increasing demands of manufacturers for excellent melt homogeneity, flexible processes, maximised output and reduced energy consumption.

The main innovations include



the launch of a new generation of extrusion heads. In particular, for the manufacture of PVC pipes, Bausano offers a range of models, either double (up to 110 mm) or single outlet (from 10 to 800 mm), for a maximum output of 2,000 kg/h. As for the extrusion of polyolefin (PO) pipes, Bausano's technology is designed to ensure high hourly throughput with reduced energy

consumption.

The heads have a compact design for single-layer or multilayer production: radial spiral, ensuring better melt distribution within a smaller volume and with reduced pressure build-up, or helical spiral. These are modular systems where the number of layers can be easily increased by adding special modules. A combination of both, helical and radial, is also possible depending on the structure of the pipe, materials and dimensions. The offer also includes an internal air pipe cooling system, which cools the pipes more quickly, thus improving their quality and taking up less space when installing the line.

Print Wear-Resistant Parts For Food Contact With New igus Filament

Special hygienic solutions are the be-all and end-all in the packaging and food industry. For this reason, many users are already using the FDA-compliant iglidur plain bearings and bar stock made of high-performance polymers from igus. To enable the users to have even more design freedom in the construction of their machine, igus has now developed its temperature-resistant, long-lasting and proven material iglidur A350 as a 3D printing tribo-filament.

In times of competitive pressure and short-term deliverability, machines in the packaging and food industry must function faster and more flexibly for different formats. Accordingly, the requirements for functional components in special dimensions and small quantities are high. "As the machines in the



packaging and food industry are becoming more and more customised, solutions for plain bearings and wear-resistant parts in special shapes are required", explains Niklas Eutebach, Additive Manufacturing Development Engineer at igus GmbH.

"In order to give the user even more design freedom in the construction of their system, we have now developed iglidur A350 as a tribo-filament."

The lubrication-free and maintenance-free material is specifically

designed for use in food and packaging technology and has been proven in countless applications, because iglidur A350 is already available as a plain bearing in standard dimensions and as bar stock directly from stock. The high-performance polymer is very impressive with its high long-term temperature resistance up to 180 degrees Celsius, it can also be easily cleaned with chemicals.

The iglidur A350 material complies with EU Regulation 10/2011 and the FDA and is therefore officially approved for contact with food. At the same time, it also meets the fire protection requirements of the United States Federal Aviation Authority (FAA) for aircraft interiors.

For more information contact Nitin Prakash, Product Manager: nitin@igus.net

Blend colours launches the uht black masterbatch, redefines milk packaging

With product specifications validated in compliance with the proven and accepted ASTM standards, and Blend Colours being a well-accepted brand by the global markets, the UHT Masterbatch will help processors with its significant value proposition. 'Making in India' for the world! A statement well substantiated by the R&D team at Blend Colours with the successful launch of its UHT Masterbatch.

BLEND BLACK D441628 provides a huge advantage to the Indian dairy industry of global quality, at local price. With product specifications validated in compliance with



the proven and accepted ASTM standards, and Blend Colours being a well-accepted brand by the global markets, the UHT Masterbatch will help processors with its significant value proposition.

This PE carrier resin comes with 40%±1% carbon content, no filler, excellent dispersion with heat stability at 280 - 300°C; well-suited for preservation of UHT processed milk with an unrefrigerated life of 6 - 9 months. It is used with LLDPE, tie-layer as the second inner layer. Most suitable for 5-layer / 7-layer products, the barrier properties of this product contribute to a higher shelf-life. No gel formation, suitability to be used on high-speed filling lines, high barrier properties and filterability, high opacity at less dosage and being recyclable are attributes that are fundamental to this product.

Kandui's answer to Counterfeiting

Kandui Industries Pvt. Ltd. has developed Thermo-chromic masterbatch, a kind of additive masterbatch which brings reversible colour changing properties to the fiber or moulded items. These masterbatches have an activation temperature. The end product becomes fully coloured below the activation temperature & colourless above

the activation temperature. This property is utilised in the secret coding of fabrics and other moulding items, adding a security feature to the original branding. It is also extensively used in children toys such as bottles/ ice-cube storage containers wherein the toy will change colour if refrigerated.



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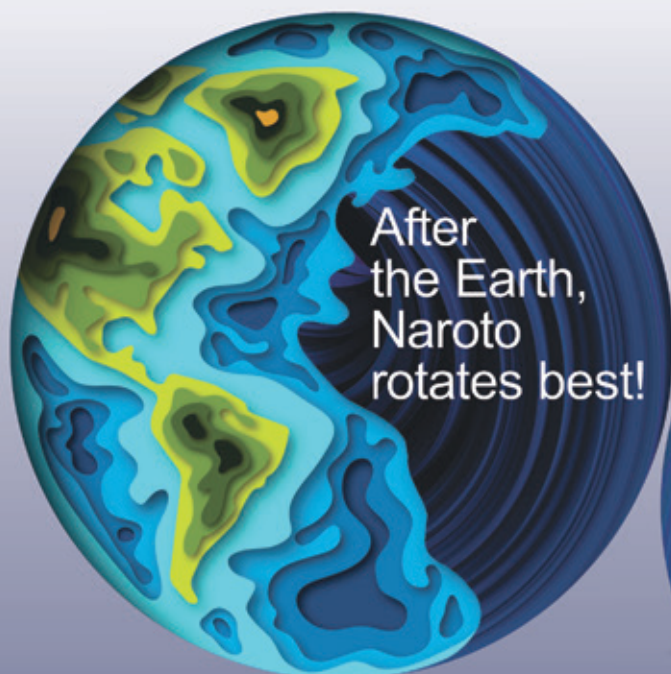
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