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THE ECONOMIC TIMES

POLYMERS

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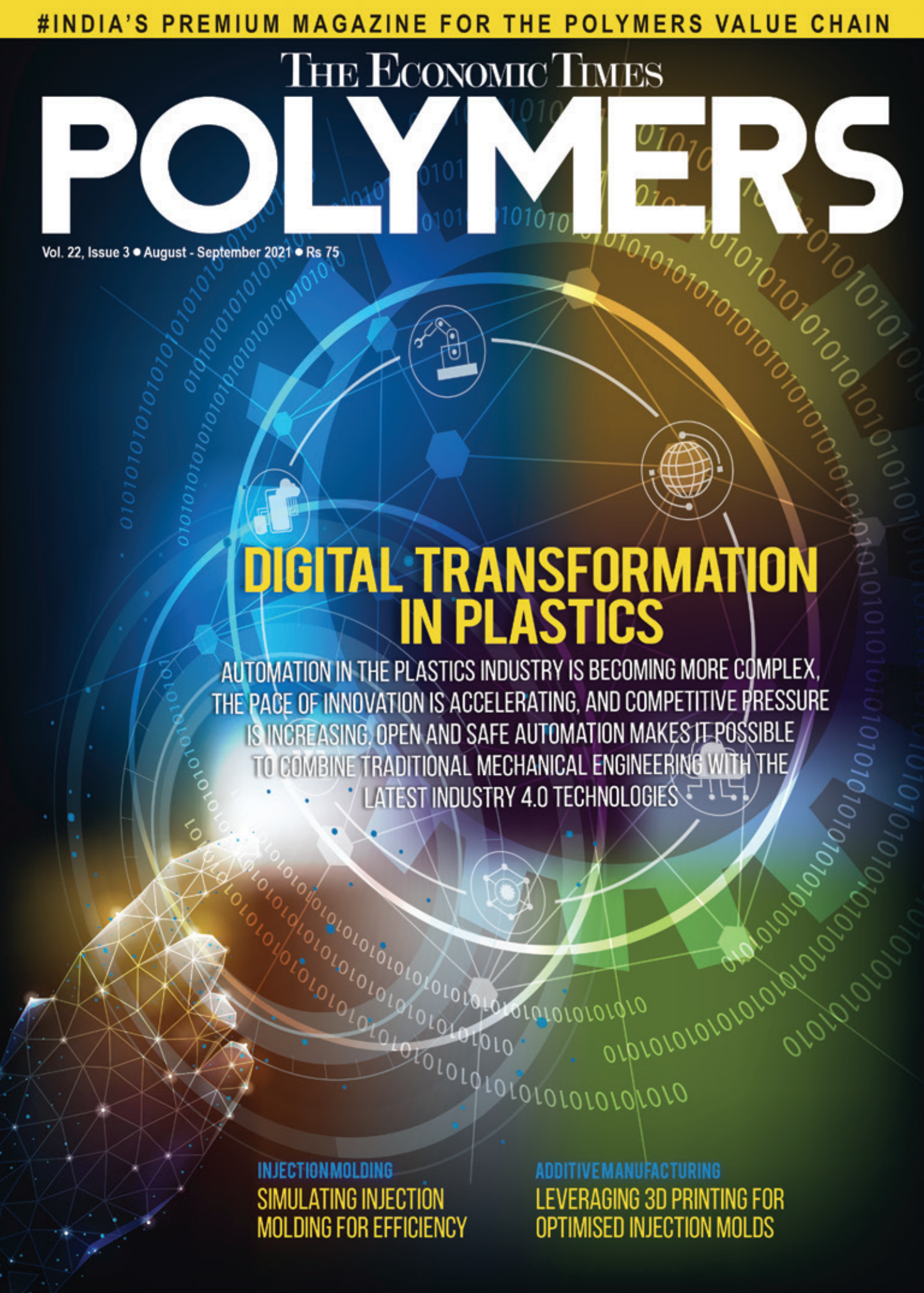

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Mr. Sachin Phadke - Mobile 8291 854026 Email: phadke.sachin@ma.mc-india.co.in
Ms. Winita Dsouza - Mobile 8291 854028 Email: dsouza.winita@ma.mc-india.co.in

2M Business Solutions
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Mr. Prashant Mandewal
Mobile: 9987183330
Email: mm.y@2m2.net.in
prashant_mandewal@yahoo.com

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Making It Count

Lao Tzu, the legendary, almost mythical, wise scholar is credited for telling the world that every large thing begins with smaller inputs – a journey of a thousand miles begins with a single step. As businesses and organisations of all sizes wake up to a 'new normal' and are voluntarily (or involuntarily in some cases) making the changes required to do business in a post-pandemic world– the philosophy of taking small steps towards normalcy, just makes sense. What is even more important is that businesses and individuals, make those tiny steps count in the overall big picture- the largest, mightiest wheel is useless without the small cog.

In this issue of ET Polymers, we look at how digitisation is transforming the world of plastics and polymer processing and manufacturing – and how even the smallest step towards digitisation and automation can help the smallest company compete with larger players – such is the power of digital transformation.

We also look at the different ways in which injection molding is evolving through digital technologies and advancements such as 3D printing and the use of simulation software. Sustainable packaging takes on a whole new aspect in a world where cleaner and safer are bywords – a topic we cover as well in the current issue.

What is even more important is that businesses and individuals, make those tiny steps count in the overall big picture- the largest, mightiest wheel is useless without the small cog.

Be it business, be it personal – take those tiny steps towards transformation and make them count – cultivate the technologies, learn and train yourself and employees, redefine processes, upgrade – make it all count towards a better way of doing things.

KRUTI BHARADVA

Kruti Bharadva

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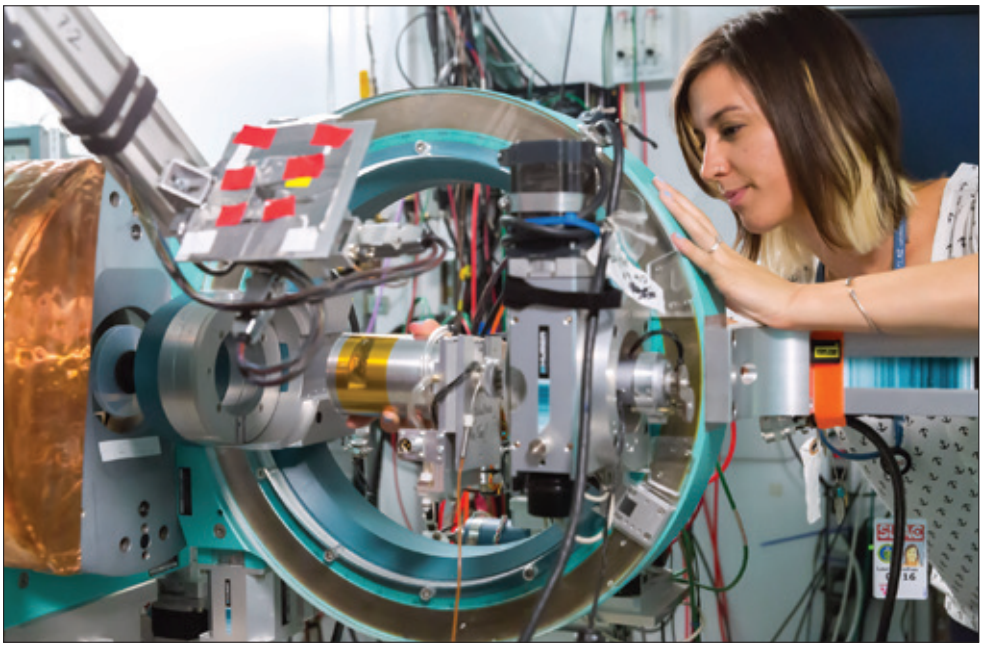

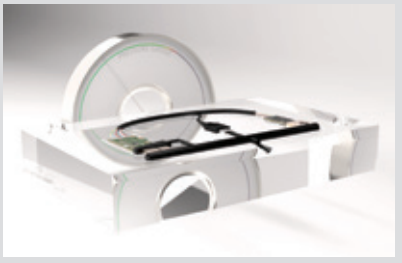

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Mondi And Unilever Serve Up Aluminium-Free Paper-Based Packaging

Unilever, together with Mondi, a global leader in packaging and paper, have developed a new high barrier paper-based packaging material for Unilever's Colman's dry Meal Maker and Sauces range by reducing plastic, increasing paper content, and consequently ensuring recyclability in the existing UK paper waste stream.

By replacing the previous unrecyclable multi-material laminate with recyclable paper packaging, Mondi supports Unilever in its sustainability targets. The aluminium, as well as all unnecessary plastic layers of the previous material, were eliminated. This resulted in a new packaging solution with paper content of 85% and an ultra-thin functional plastic layer that seals the packaging, and provides barrier protection for the food. Mondi and Unilever's R&D teams identified this layer as the minimum acceptable protection needed to ensure a long shelf life while maintaining high quality and reducing food waste.

Mondi and Unilever closely collaborated throughout the entire development process, including

mastering the challenge of limited access to production facilities during the Covid-19 pandemic. Starting with a proof of concept, followed by extensive line trials at both Mondi and Unilever's R&D pilot plants provided the flexibility to quickly prototype and test the unique packaging material before scaling up. This collaborative method goes to the heart of Mondi's EcoSolutions customer-centric approach of working closely with its customers to ensure that the best possible and most sustainable product is created while meeting the customer's requirements, as well as that of its end user and the environment.

Unilever focuses on the principle of a circular economy and the importance of creating value within it. Two of their key targets are to transform the entire packaging portfolio into technically recyclable, reusable or biodegradable solutions as well as to halve the amount of plastic used by 2025, which this new packaging solution addresses.

Fikerte Woldegiorgis, Foods Marketing Director, Unilever UK&I says: "At Colman's, we're big and bold when it comes to our flavours, and we're keen to make equally bold steps when it comes to our sustainability commitments. We are delighted to partner with Mondi to develop this recyclable paper packaging, becoming the first big brand within the category to do so. The new packaging, which uses a paper-base, ensures that shoppers can enjoy the same great tasting product they know and love, and now with the added benefit of being able to recycle the pack.

New CEO at SANITIZED AG

Michael Lüthi, a member of the founding family, will become the CEO of the SANITIZED company group, effective August 1, 2021. He will take over the position from Urs Stalder, who will join the administrative board after working for the company for over 30 years.

Michael Lüthi will assume leadership of a company that, for starters, has a legacy marked by over 80 years' expertise and industry acclaim thanks to its innovative, safe, and reliable products. The additives that SANITIZED develops and markets deliver odour-free textiles, long-lasting hygiene function, protects the material of artificial surfaces, and prevents paints and coatings from degrading in quality due to impurities.

Moreover, Sanitized® is a globally respected and established brand. Around 520 companies actively use the Sanitized® ingredient brand in their final products.

The 38-year-old business economist has been working for SANITIZED since 2018. He previously worked as COO of Senevita, a company that at the time had roughly 30 residences, and he supervised residential complexes for seniors with roughly 2,500 employees. Over the past three years, Michael Lüthi was already a member of SANITZED's management team and helped to shape the course of the company.

"We will continue to combine tradition and innovation: SANITIZED is a fourth-generation Swiss family company, and we will continue to expand our leadership position in the world with our safe and innovative products and services for the textile, polymer, and paint industries," explains the new **SANITIZED CEO Michael Lüthi.** American company Consolidated Pathways was recently acquired with this objective in mind. SANITIZED now has a presence with its own subsidiaries in the U.S., China, the European Union, and India.

STRAPPING LINE

PET

- Cotton industry
- Jute industry
- Textile Industry
- Wooden box packing
- Aluminium industry
- Fibre industry

PP/HDPE

- Wooden box packing
- Corrugated box packing
- Textile cloth packing
- Paper packing
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- Ceramic industry

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Waters to Help Accelerate Biologics Production

Waters Corporation has announced an expansion of its joint work with the Bioprocessing Technology Institute (BTI), a research institute of Singapore's Agency for Science, Technology and Research (A*STAR). Among their new collaborative projects, Waters and BTI have started work on applying analytics that can rapidly identify and visualise complex molecules within glycomics and metabolomics data to help ensure overall safety, accuracy, and speed of biologics manufacturing.

Waters and BTI are engaging in data analytics research meant to eliminate a major bottleneck in the characterisation of biopharmaceuticals, namely the identification and quantitation of complex biomolecules such as released N- and O- glycans and metabolites that influence therapeutic function. Isomerism of both glycans and metabolites is particularly troublesome and can be tackled using Waters' advanced instruments. However, because the data generated is massive, advanced bioinformatics approaches and machine learning techniques are needed to deliver robust and accurate identification for these and other biomolecules to overcome time-consuming and expensive conventional methods and current analytical software that cannot adequately interpret or visualise the data.

As part of the project, Waters will contribute scientific expertise and the use of Waters instruments including the SYNAPT™ series mass spectrometry system along with a BioAccord™ LC-MS System. The SYNAPT instrument features ion mobility mass spectrometry technology to provide complete characterisation of complex compounds and molecules. The BioAccord system can be used to monitor product quality attributes in real time that can affect efficacy and safety of innovator drugs and biosimilars.

"Complex structural analyses of a molecule may hold the key to the development of novel therapies, including biologics and cell & gene therapies. The understanding of complex glycan and isomeric compound structures is largely constrained by the ability to rapidly and accurately analyse these structures from raw mass spectrometry data," said **Associate Professor Andre Choo, Deputy Executive Director of BTI.** "Leveraging BTI's deep domain expertise in bioprocessing technologies and advanced bioanalytical capabilities, BTI and Waters will develop methods that combine data analytics with extensive bioinformatics libraries to ease complex data annotation. Our aim is to make data interpretation easier and faster for scientists to accelerate discovery, for conventional biologics and novel therapeutics."

"Appropriate Technology" Approach At Its Best

The well attended Rajoo Kohli's Lamex open house streamed live from Balaji Multiflex demonstrated the "appropriate technology" approach at its best. It was attended by over 500 participants from all around the world. **Ms Khushboo Doshi, Managing Director of Rajoo Engineers,** launched the event with a warm welcome and highlighted the current trend and opportunities for the flexible packaging sector, as well as how the current Lamex line meets specific needs of converters and processors.

Mr Pranav Bhalara, CEO of Balaji Multiflex Pvt Ltd and owner of Lamex – 360, stated, "During the decision-making process about going for another machine extrusion lamination, I was in dilemma, but after seeing Rajoo Kohli machine, I decided to go for it. And the line has been running at more than 350 mpm for the past three months."

The machine is equipped with winders suitable for reel diameters of 1000 mm and reel weights of 1000 kgs and specially designed for automatic splicing at maximum production speed of 350 mpm. Infeed web tension is precisely controlled by a servo motor. Gravure coating and the drying hoods are designed to ensure maximum efficiency with minimum energy consumption. Two extruders mounted on a platform are equipped with 3 axis movements.

The automatic die from Cloeren, USA working in synch with the beta thickness sensor established the low 'grams per square m (gsm)' of the laminate variation across the width which ultimately controls the cost of packaging. Yet another example of successful integration by Rajoo of another bought-out system with the main equipment.

The machine is embedded with ReLEX 4.0 technology, which provides real-time data on production speeds, output levels, productivity, set-up times, downtime for preventative maintenance and repairs with remote access.

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Avery Dennison Releases Latest Cleanflake™ Label Materials

What began as a breakthrough solution for PET plastic bottles can now make PET packages in a range of markets more recyclable: today Avery Dennison announced the latest iteration of its award-winning CleanFlake™ filmic label materials, which are now suitable for PET packaging in food, home and personal care and other segments in addition to beverages.

"More than ever, CleanFlake™ helps brands keep the promise of PET," said **Avery Dennison product manager Mariya Nedelcheva.** "Companies that use PET packaging no longer have to choose between true recyclability and outstanding performance when it comes to their labels. We are closing the gap between CleanFlake™ materials and conventional, general purpose label materials. For companies that care about recyclability, the question now

is not why they would use CleanFlake™, but why they wouldn't."

First introduced in 2013, CleanFlake™ technology solves a critical problem in PET plastic recycling by helping to ensure that a label's adhesive stays with the label and not on the package so that all label material fully detaches during the recycling process. The resulting washed PET flakes can then be recycled into new PET packaging. Flakes that are otherwise contaminated by conventional label materials must be downcycled or sent to landfills or incinerators.

With a new proprietary adhesive, SR3011N, CleanFlake™ materials look and perform like any other self-adhesive label material. An upgrade to a best-in-class topcoat provides outstanding printability, and CleanFlake™ materials are designed to deliver fast, flawless application on high-speed labelling machines. CleanFlake™ facestocks offer the same attractive, "no-label" look as comparable Avery Dennison materials.

"We are proud to offer a solution that helps keep PET plastic containers out of the waste stream and helps to increase the global supply of rPET," said Avery Dennison's Mariya Nedelcheva. "Our CleanFlake™ portfolio is one more way we're helping to build a circular economy in Europe and around the world."

Nippon Launches Weatherbond PRO

Nippon Paint (India) Private Limited (Decorative Division) Asia's leading paint manufacturer launched the advertising campaign for Weatherbond PRO – the high durable exterior emulsion offering up to 15 years of protection against extreme climate conditions like prolonged exposure to heat, and heavy spells of rain. Based on extensive research done by Nippon Paint's R&D team, this product was developed for customers who need advance protection for their home exteriors in terms of extended fresh look, strong waterproofing and protection from Algal and Fungal attacks.

Some of the key features of Weatherbond PRO are Extreme durability with up to 15 years performance warranty, algal and fungal resistance, dirt pick-up resistance, low VOC and water-resistant film that gives a polished look for years to come. These high-performance features ensure that homes are protected from climatic incursions, which lead to chalking, flaking, dampness and mouldy surfaces. Weatherbond PRO provides good film integrity and excellent colour retention, which ensures that exterior walls stay beautiful for years to come. Weatherbond PRO is a pure acrylic elastomeric exterior paint, powered by fibres, which aid in crack bridging and protection from hairline cracks. The Weatherbond PRO system provides effective waterproofing and anti-carbonation properties as well.

Emphasizing the need for such a breakthrough product in the market, **Mr. Mahesh S. Anand, President – Nippon Paint (India) Private Limited (Decorative Division)** commented, "We are excited to launch this new advertising campaign on Weatherbond PRO featuring next Gen actors Ashwin Kumar, Tanya Hope and of course the Weatherbond Blobby. With Weatherbond PRO, we wish to offer our customers a paint that can protect their home exteriors all year round to withstand extreme weather conditions. We have noticed that customers are increasingly aware of exterior paint's role in not just beautification but also for protection from external elements. We are positive that the recovering markets combined with this advertising campaign will boost interest in the product amongst discerning homeowners. In addition, all of Nippon Paint's products are green and eco-friendly."

Talking about the brand campaign, **Mr. Mark Titus, Director of Marketing - Nippon Paint (India) Private Limited (Decorative Division)** said, "With the advent of monsoon in Tamil Nadu, we expect a surge in demand for Weatherbond PRO as the paint addresses the various challenges faced by homeowners in maintaining their home exteriors."

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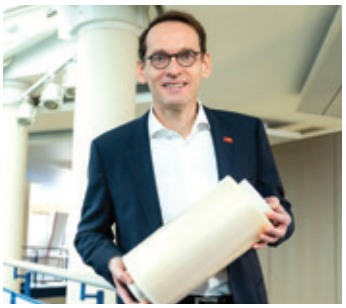
BASF Focuses on Sustainable Solutions Through VALERAS

BASF has focused the sustainable solutions of its plastic additives' portfolio under the new global brand VALERAS™. VALERAS bundles the company's long time experience, innovative solutions, and regulatory support with the aim to increase the sustainability of plastics along the entire polymer value chain. Later this year, the portfolio will expand to include the company's additive packages for mechanically recycled plastics and their applications.

"The trend towards sustainability has been accelerating, driven by consumer demand and more stringent legislation. Our customers are facing increasing pressure regarding sustainable innovations and challenges of plastics recyclability," says **Dr. Thomas Kloster, President, Performance Chemicals, BASF.** "With VALERAS, we create new value for plastics by supporting our customers on their sustainability journey with novel solutions and services. VALERAS shows our broader ambition: to establish a platform that covers all our additive solutions that contribute to the sustainability goals of our customers."



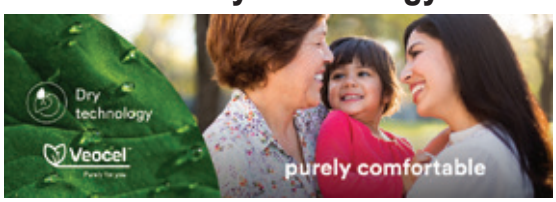
| Dr. Thomas Kloster, President of BASF's Performance Chemicals division, holds a roll of agro films stabilized by Tinuvin® NOR® 356. This thermal stabilizer contributes to resource efficiency and is part of VALERASTM, the new portfolio of sustainable solutions.

VALERAS includes BASF's existing plastic additives that bring a significant sustainability value to plastic applications by improving durability, saving energy, reducing emissions, and promoting biodiversity.

The VALERAS portfolio will continuously evolve to support customers from the plastics industry on their sustainability journey. With more than 100 experts and 5 competence centres around the world, BASF Plastic Additives is already working on the development and introduction of new VALERAS offerings for a sustainable future.

Lenzing's VEOCEL™ Brand Launches Hydrophobic Lyocell Fibres With Dry Technology

In its quest to drive greater sustainability in the personal care and hygiene industry, the VEOCEL™ brand has launched a new offering: VEOCEL™ branded lyocell fibres with dry technology which are naturally smooth and gentle on skin, ensuring comfort for sensitive skin. Absorbent hygiene products are an indispensable part of many consumers' lives and are relied upon daily. As these are essential items, it is important that they should offer maximum comfort and relief to the user. This is demonstrated by the new VEOCEL™ branded lyocell fibres which have the capacity to provide a high level of comfort, softness and dryness, when applied in these types of products.



Combining high-performance with sustainability

Increasingly, consumer expectations are extending beyond functional needs, to focus on natural materials and ingredient transparency. However, consumers should never have to compromise between functionality, comfort and sustainability, and it is critical that such intimate products provide both – as the new VEOCEL™ branded lyocell fibres can offer. While most hydrophobic fibres are fossil-based fibres, dry technology by Lenzing allows cellulosic VEOCEL™ branded lyocell fibres to achieve similar liquid-controlling properties built on a biodegradable, botanic-derived material. The fibres are also soft to touch and gentle on the skin, thus beneficial for applications that have direct contact with skin, such as in femcare and period care products, adult incontinence products and baby diapers.

"We have observed a growing trend of consumers who are mindful of product ingredients, so we created a product that can offer both sustainability and performance," said **Jürgen Eizinger, Vice President of Global Nonwovens Business at Lenzing.** "Our new VEOCEL™ Lyocell fibres with dry technology are certified biodegradable and compostable – therefore, offering an eco-friendly and quality alternative to fossil-based materials. The VEOCEL™ brand is continually expanding its capacities and innovations for wood-based specialty fibers as a means to reduce the industry's reliance on fossil-based materials in personal care products."

Not only are the hydrophobic VEOCEL™ branded lyocell fibers with Dry technology environmentally friendly, but they also provide great comfort and a feeling of dryness for the wearer, which comes from enabling strategic fluid distribution. This is a particularly useful trait in absorbent hygiene products as it helps to manage bodily fluids, keeping the surface dry and the touch soft even after encountering liquid. Overall, this contributes to a comfortable personal care experience for the wearer and allows them to feel as if their skin is next to nature."

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Exceptional Warpage Control

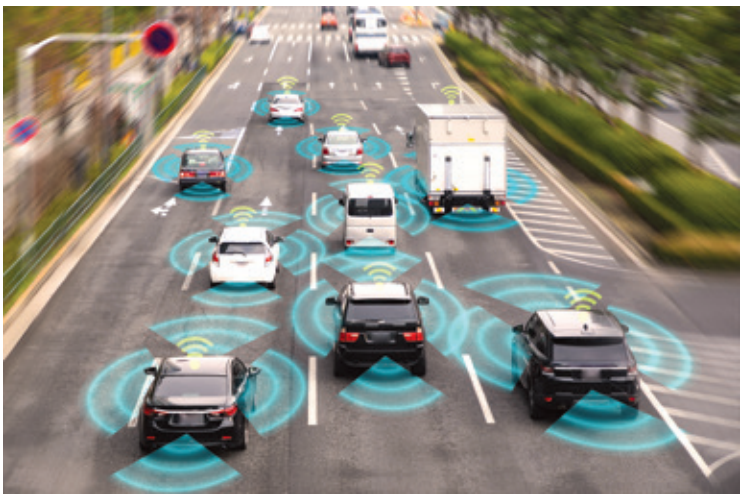
SABIC's new LNP™ THERMOCOMP™ compounds deliver exceptional warpage control

By Kruti Bharadva

As urbanisation propels the development of self-driving technology and broader implementation of advanced driver assistance systems (ADAS), automotive OEMs and tiers are actively seeking high-performance materials that can optimise the capabilities of today's higher-frequency (>75 GHz), millimetre-wave (mmWave) radar units. To help meet this need, SABIC is launching two new materials, LNP™ THERMOCOMP™ WFC06I and WFC06IXP compounds, developed for the front and back enclosure covers (respectively) of next-generation radar units.

The new glass fibre-reinforced polybutylene terephthalate (PBT) grades offer a very low dissipation factor (Df) and dielectric constant (Dk) to help support the transmission of higher-frequency radar signals. They also feature super-low warpage that allows designers to potentially create new, thinner covers that improve signal transmission. Furthermore, these new SABIC products can contribute to efficient radar unit assembly by supporting high-speed, high-precision laser welding. LNP THERMOCOMP WFC06I compound provides excellent laser transmission performance among PBT materials currently available.

"Advancements in ADAS are accelerating rapidly as the automotive industry develops new vehicle technologies aimed at alleviating traffic congestion and improving safety in expanding urban areas," said **Joshua Chiaw, Director, Business Management, LNP & NORYL, Specialties, SABIC**. "SABIC is aggressively developing new materials to help ADAS designers achieve goals related to size and weight reduction, signal transmission accuracy and reliability improvements, and seamless integration with the vehicle. We work closely with companies at all levels of the ADAS value chain to understand fast-changing and demanding requirements and deliver tailored, high-performance material solutions that address them."



Improving Radar Image Resolution

Many ADAS designers are adopting higher frequency mmWave radar technology because its improved image resolution and greater range can enable safer driving under a variety of conditions. However, frequencies in the 76 – 81 GHz band present greater transmission challenges compared to lower frequencies. To improve wave transmission, radar covers require very low Df and Dk, thinner walls and a simplified design without support structures. Incumbent glass-filled PBT materials typically do not meet these transmission optimisation requirements; for example, they have a Df performance that is greater than 0.01. Also, as semi-crystalline polymers, they have a high tendency to warp when used in thin-wall parts without support structures, potentially leading to part failure during assembly, transport and use.

SABIC's new LNP THERMOCOMP compounds surpass incumbent PBT compounds in Df/Dk performance and warpage control and can reduce attenuation of electromagnetic waves passing through the

LASER WELDING OF PLASTIC COMPONENTS OFFERS ADVANTAGES INCLUDING THE ABILITY TO PRODUCE MINIATURISED AND HIGHLY INTRICATE PARTS AND ELIMINATE CONSUMABLES SUCH AS ADHESIVES AND FASTENERS

UPCYCLING

UNEXPECTED VALUE

High performance degassing chamber and twin screw extruder provide for the recycling and adding value to heavily printed, wet and highly contaminated materials.

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CONTAMINATED MATERIALS

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radar covers to help improve image resolution and range. They also enhance transmission and minimise side cones of the signal beam for improved image quality. In addition, the new LNP THERMOCOMP compounds provide higher ductility for improved impact resistance, and equivalent moisture and chemical resistance vs. incumbent PBT materials.

Facilitating Laser Welding

Laser welding is a fast and highly efficient automotive process that can accelerate throughput. Laser welding of plastic components offers advantages including the ability to produce miniaturised and highly intricate parts and eliminate consumables such as adhesives and fasteners. Precise, strong welds can protect sensitive electronics against dust and moisture.

SABIC's LNP THERMOCOMP WFC06I compound for radar front covers features a laser transmission rate of over 60 per cent – 20 per cent higher than the nearest competitor's. Customers can use its wide laser window and low laser power to potentially increase yield rates. The other new grade – LNP THERMOCOMP WFC06IXP compound – acts as the absorbing layer for laser welding.

"Reaching the full potential of automotive radar for assisted and autonomous driving requires improvements in design, performance and production efficiency," said **Jenny Wang, Director, Formulation & Application, APAC, Specialties, SABIC.** "SABIC continues to break new ground in material science to solve our customers' challenges in optimising ADAS designs. Our new glass-filled PBT compounds contribute by supporting the adoption of new technologies like mmWave radar with enhanced features."

Source: SABIC, Riyadh, SA

UPDATE

Manjushree Technopack Limited to Acquire Classy Kontainers

Advent International Backed Manjushree Technopack Limited (MTL), India's largest rigid-plastics packaging company, today announced that it is entering into a Business Transfer Agreement with Classy Kontainers to acquire its commercial operations and manufacturing facilities subject to customary closing conditions and regulatory approvals.

The proposed acquisition will help MTL consolidate its position as a leader in the segment while reinforcing its technical strength. MTL will have access to all production units of Classy Kontainers - located in 5 cities and serve the latter's existing marquee clientele in the Paints, Adhesives Speciality Chemicals and FMCG segments.

With over 40 years of packaging expertise in India, MTL caters to the packaging requirements of the FMCG, F&B, homecare, personal care, agrochemicals, pharmaceutical, and liquor industries. With a manufacturing capacity of 1,90,000 MT per annum and a turnover of around Rs 1200+ crore, MTL is amongst the top mid-sized companies in India.

Speaking about the acquisition, **Mr. Sanjay Kapote, MD & CEO of Manjushree Technopack Limited,** said, "The acquisition is in line with our aggressive, inorganic growth and business diversification plans. It will allow us to consolidate our position as leaders in the rigid-packaging sector and diversify our presence into new rigid packaging market segments - paints, adhesives, and speciality chemicals space. Given our success in acquisitions till date, we expect a seamless integration of Classy Kontainers with the rest of the MTL group. We aspire to be the supplier of choice that everyone in the packaging industry turns to and will continue to deliver value for our customers."

He added, "MTL's technological strength, product range and geographical spread, coupled with Classy Kontainers' robust business will help us deliver complete packaging solutions to our customers in the future. Post-closing of the transaction, the promoters will continue to work with MTL to ensure smooth transition and future business growth."

Mr. Rajiv Mehta, Partner at Classy Kontainers, said, "Classy Kontainers is a pioneer when it comes to innovative solutions for rigid packaging in India with a passion for customer service. With the strength of our team and MTL's nationwide customer base in every segment we are confident this partnership will add tremendous value to our Customers and help us take the business to next level of growth."

Mr. Dhruman Gandhi, Partner at Classy Kontainers, "Classy Kontainers focuses on engaging with its customers to provide unparalleled speed of execution, from design to commercial launch, that coupled with MTL's infrastructure and experience would go a long way in reinforcing the quality of our services and enhance incremental future engagements with our customers."

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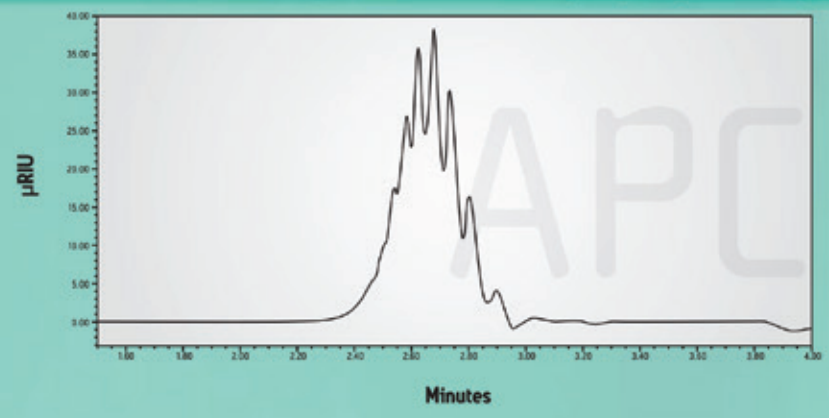
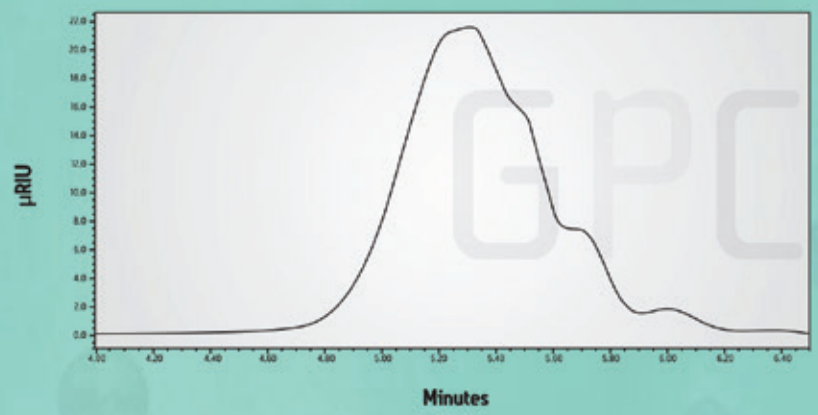
APC vs. GPC with narrow standard polystyrene Mp = 510





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The Changing Face of Mobility

A brief look at the salient points on how plastics is transforming automotive manufacturing

By Kruti Bharadva

The demands on the modern automotive industry are ever challenging – motorists want high performance cars but at the same time they are looking for improved reliability and safety, greater comfort, fuel efficiency, style, competitive pricing and, increasingly, reassurance about environmental impact. There is one family of materials that is rising to the challenge of these potentially conflicting demands: plastics. With their unique combination of properties, they are key to providing technological innovation with cost-efficiency and sustainability in mind

Many debates at a global level are influencing car design, from cleaner air to the management of cars at the end of their useful life. It is a challenge to all players – legislators, manufacturers and consumers – to ensure that all activities are undertaken in synergy in the overall drive for better safety and environmental protection.

Image Source: EPMA

Growing Demand

The demand for plastics is simple to explain; they are strong yet light weight, versatile and flexible allowing technological innovation and design freedom. The automotive engineer demands a material which can adapt to sophisticated aesthetics, safety, comfort, fuel efficiency, engineering demands and electronic performance in a cost-effective way – plastics meet this need and continue to help designers and engineers innovate and take performance further.

Technological innovation by the plastics industry is a key feature in the continuing development and use of plastics in cars. Today, they provide multi-component, tailormade solutions for many new requirements, replacing more traditional and heavier materials in the process.

Plastics' versatility allows for advanced shapes and forms without compromising the safety, comfort or stability of a car. This makes them very attractive materials for designers. Their strength and durability have also played an important part in expanding the average life span of a car to over 12 years, for example by providing better protection against corrosion.

Some of the innovation with plastic include the use of computers to control engine performance and creating novel applications for plastics where metal parts could not perform. As cars change from mechanical to more 'electronic' machines, the need for car components to provide electronic shielding as well as heat- and chemical-resistance increases. The result is greater demand for engineering thermoplastics.

Quick Facts

- In 1997, 1.7 million tonnes of plastics were used by the automotive industry, representing six per cent of total plastics consumption
- Compared to 20 years ago, the use of plastics in automotive manufacturing has grown by1,096,000 tonnes or 114 per cent –this represents an average increase of 30kg per car, from 70 to 100kg

Increased Safety

Thanks to their strength and impact properties, plastics provide essential safety features, from shock absorption for bumpers to air bags, side impact protection and seat belts.

Lowering Costs

By using plastics, manufacturers have been able to reduce vehicle assembly time and costs. Bumpers, fenders and dashboards can now be moulded as single parts. In the past,

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Recovery options for plastics waste

Image Source: EPMA

these elements were made of traditional materials which required the production of many parts and multi-component assembly.

Improved Performance

Because plastics are also championing of source reduction – using less to do more – their use in car design helps minimise environmental impact and save resources. Greater use of plastics is vital to produce ever more energy efficient cars. Technological innovations mean lighter, thinner yet stronger plastics parts are being used to perform a growing range of roles in the modern car. Despite their widespread use, the natural resources needed to produce automotive plastics represent just 0.3 per cent of global oil consumption. At the same time, the weight savings achieved through plastics' use are significant – approximately 100kg of plastics in a modern car replaces 200 to 300kg of traditional materials. All other factors being equal, this has cut fuel consumption in the average car by 750 litres over a life span of 150 000km. Additional calculations suggest that this reduces oil consumption by 12 million tonnes and consequently CO2 by 30 million tonnes per annum.

The Sustainability Factor

Apart from selecting plastics for the benefits they bring to automotive design and performance, manufacturers are increasingly choosing these materials for their environmental benefits and contribution to sustainable development– using the world's resources in a way which does not limit the range of economic, social and environmental options open to future generations.

Plastics have a major role to play in developing the sustainable car of tomorrow and shaping the future success of the automotive industry. As well as contributing to minimising emissions which effect climate change and conserving resources –

Plastics' use by type and weight in an average car

PART	MAIN PLASTICS TYPES	WEIGHT IN AVERAGE CAR (kg)
Bumpers	PP, ABS, PC	10.0
Seats	PUR, PP, PVC, ABS, PA	13.0
Dashboard	PP, ABS, PA, PC, PE	15.0
Fuel systems	PE, POM, PA, PP	7.0
Body (including body panels)	PP, PPE, UP	6.0
Under the bonnet components	PA, PP, PBT	9.0
Interior trim	PP, ABS, PET, POM, PVC	20.0
Electrical components	PP, PE, PBT, PA, PVC	7.0
Exterior trim	ABS, PA, PBT, ASA, PP	4.0
Lighting	PP, PC, ABS, PMMA, UP	5.0
Upholstery	PVC, PUR, PP, PE	8.0
Other reservoirs	PP, PE, PA	1.0
Total		**105.0**

Image Source: EPMA

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two of the key environmental goals of sustainable development – through improved fuel efficiency, extension of car life and increasing options for recovery.

Considering environmental impact within the wider framework of sustainable development encourages innovation throughout the whole lifecycle, rather than just recovery at the end of life. In the past, an end-of-life focus has often dominated environmental improvement discussions to the potential detriment of fuel efficiency, total resource savings and safety performance. Prevention – reducing the use of natural resources in the first place – is the first environmental goal and focus on recovery must not reduce the significant opportunity to save natural resources during life. Nevertheless, the plastics industry is actively and continuously researching ways to develop optimum recovery options, ensuring that end-of-life vehicles are treated in a way that achieves maximum environmental gain.

Materials used in European automobile production

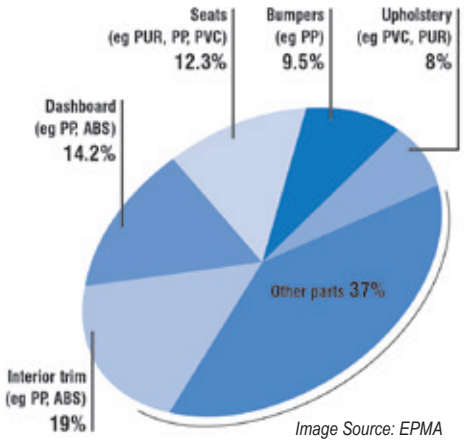

Image Source: EPMA

The Road Ahead

Thanks to plastics, the cars we dreamt of yesterday are already being developed – offering high performance, cleaner driving and advanced safety and convenience features As we enter an era of mass customisation, where products will increasingly be tailored to meet individual requirements, diversity will become the new rule. Cars will come in all shapes and sizes, metamorphosing into new 'part-carport-truck' combinations. The versatility and flexibility of plastic will support the trend in the automotive industry to build very different cars based on the same chassis and a core set of components, thus reducing research and development time and the retail prices.

New plastics are increasingly being tailored to meet the needs of the electronic car of the future. Looking forward, plastics in automotive applications will continue to contribute significantly to the drive towards building better, safer and cleaner cars. The plastics industry will continue to work closely with the automotive industry to meet this challenge by developing technologies and products to turn mobility dreams into a reality.

UPDATE

Reliance To Double PET Recycling Capacity

Reliance Industries Ltd has said it will double its capacity to recycle plastic bottles after a third-party recycled polyester staple fibre (PSF) manufacturing facility is set up in Andhra Pradesh.

The move, the company said, is part of its commitment to lead the industry on circular economy, enhance its sustainability quotient and bolster the entire polyester and polymer value chain.

"As a part of this endeavour, Srichakra Ecotex India Pvt Ltd will build and operate exclusively for RIL the new recycled PSF – Recron GreenGold and PET flakes washline in Andhra Pradesh," the company said in a statement.

This will help RIL to more than double its recycling capacity to 5 billion post-consumer PET bottles and ensure India maintains over 90 per cent recycling rate, the statement said.

RIL currently recycles PET bottles at its Barabanki, Hoshiarpur and Nagothane plants. The post-consumer PET bottles are used as raw material for manufacturing re-cycled polyester fibre. The fibres manufactured through this process are branded as Recron GreenGold.

At present, RIL converts more than 2 billion post-consumer PET bottles into fibres annually. With the addition of Srichakra capacity, RIL will be instrumental in converting about 5 billion used PET bottles into value-added fibre.

Vipul Shah, COO - Petrochemicals Business, RIL, said the company is committed to the development of the entire value chain and it shares expertise and technical know-how with the entrepreneurs to produce top-quality products at the lowest possible costs.

"RIL has underwritten the entire production from Srichakra's facility to provide support for the development of the business," he said.

Srinivas Mikkilineni, Director - Srichakra Ecotex Pvt Ltd, said the agreement with RIL provides an opportunity for his firm to expand its footprint into the recycled polyester staple fibre market. "The alliance will propel Srichakra's commitment to reduce plastic pollution and facilitate both organisations to advance the circular economy for plastic waste in India."

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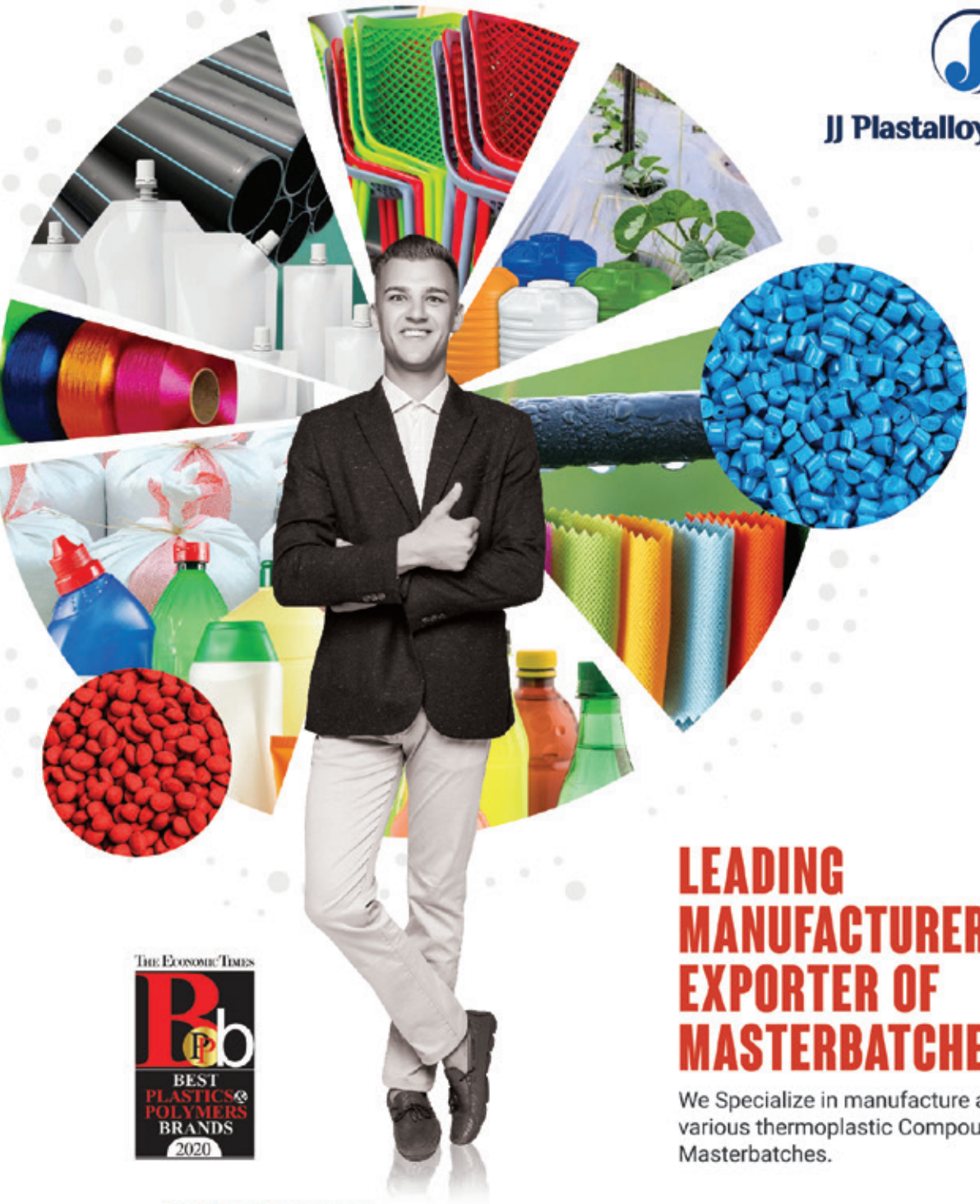

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Simulating Injection Molding for Efficiency

Producing high-quality, plastic injection-moulded parts more quickly and cost-effectively has become a critical factor for manufacturing success in today's global market. Instead of engaging in slow, expensive prototype iterations and test cycles to satisfy manufacturing requirements, designers, mold makers, and manufacturing professionals can leverage SOLIDWORKS® Plastics mold-filling simulation software to optimise parts for manufacturability, refine tooling to improve quality and shorten cycle times to reduce manufacturing costs

By Kruti Bharadva

In nearly all types of product development—from consumer electronics and automobiles to children's toys and medical devices—they use of components made from plastic materials has steadily increased. There are several reasons for the continuation of this trend, which began decades ago. Plastic parts are generally less expensive to make and don't rust or corrode like metals. Plastics are lighter in weight than traditional materials, and because plastics are very pliable, they can be molded into more complex patterns and shapes, with more elaborate surface details. In short, plastics are better suited for meeting the product development needs of a growing number of today's manufacturers.

However, anyone involved in the production of plastic components knows that making plastic parts is more challenging and complicated than designing in metal. More than 80 per cent of the plastic parts used in products today have to be injection-moulded—the process of injecting liquefied plastic materials into a mold, cooling/solidification of the material, and ejection of the molded part. In many ways, injection molding is as much an art as a science.

IN MANY WAYS, INJECTION MOLDING IS AS MUCH AN ART AS A SCIENCE. SUCCESSFULLY PRODUCING INJECTION-MOULDED PARTS THAT ARE FREE OF MANUFACTURING DEFECTS REQUIRES A COMPLEX MIX OF TIME, TEMPERATURE, PRESSURE, MATERIAL, AND VARIATIONS IN TOOLING OR PART DESIGN

Successfully producing injection-molded parts that are free of manufacturing defects requires a complex mix of time, temperature, pressure, material, and variations in tooling or part design. Designers, mold makers, and manufacturing professionals must balance all these variables to make quality parts.

Part designers often rely on iterations with the mold maker and the mold maker's expertise to evaluate the manufacturability of a part, and balancing industrial design and

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manufacturing considerations takes time. Although moldmakers draw upon their experience and expertise to develop molds, they still need to create prototype molds to validate mold performance, typically after completing trial-and-error iterations that add time and cost to the process. Charged with optimising production run cycles, manufacturing professionals frequently need to iterate with designers and mold makers. Unfortunately, improving part quality at this stage is often difficult and generally only resolved through mold rework – a costly and time-consuming proposition.

Injection Molding Challenges

Every professional involved in the development and production of injection-molded parts and tooling—from the original designer to the mold maker to production personnel—face unique challenges. Each has its point of view, focus, and specific types of issues. Designers care about the design aesthetics—the look and feel of a part. Moldmakers contend with quality considerations and want to make sure that their tool produces acceptable parts. Manufacturing personnel want to make sure that production runs as smoothly and efficiently as possible. Despite having different perspectives and roles, everyone involved in the injection-molding process will benefit from having access to a plastics simulation environment.

ALTHOUGH MOULD-MAKERS DRAW UPON THEIR EXPERIENCE AND EXPERTISE TO DEVELOP MOLDS, THEY STILL NEED TO CREATE PROTOTYPE MOLDS TO VALIDATE MOLD PERFORMANCE, TYPICALLY AFTER COMPLETING TRIAL-AND-ERROR ITERATIONS THAT ADD TIME AND COST TO THE PROCESS

While a designer initially concentrates on design requirements—including form, fit, and function—he or she increasingly needs to assess whether a particular design is manufacturable, especially for injection-molded plastics parts. The most beautiful and elegant possible design has no business value if the geometry cannot be manufactured at volume and then assembled and sold at a profit. Even though designers have access to tools for checking draft angles and wall thicknesses, they typically rely on their moldmaker's recommendations and the results of iterative testing conducted with prototype molds to minimise a range of potential manufacturing issues—tests that add time and cost to the process.

What Can Happen?

The potential for encountering quality issues on injection-molded parts is great, and because these issues need to be resolved before moving to production, so is the probability of unplanned iterations and modifications to both part and tooling designs. Manufacturing defects occur for a variety of reasons related to the mix of variables that influence injection-mold performance. For instance, part warpage, also called "potato-chipping" because of the wavy appearance of the part, happens when a part deforms after it is ejected from the mold. When a mold does not fill, air traps, sink marks, and flow marks can appear on the part. Did the designer allow for shrinkage of the part? Are the parting or weld lines (where different parts of the mold come together) in the preferred location?

Collaboration Demands Communication

Because designers need to eliminate a wide range of manufacturing defects from injection molded parts, as well as work with manufacturing partners to optimise production, they need to collaborate effectively with their tooling and manufacturing colleagues to make changes related to manufacturability without overly compromising the industrial design of a part. Language and time barriers can complicate this task, and designers need to understand the costs and delays associated with multiple design iterations with both the mold maker and production personnel.

Moldmakers Under Pressure to Cut Costs

To compete successfully, mold makers are increasingly under pressure to develop tooling that produces quality injection-molded parts as quickly and affordably as possible. Of course, experienced mold makers have broad knowledge regarding

Producing Injection Parts – Main Factors

- Does the part geometry meet to draft and wall thickness requirements?
- How long should the injection/cooling/ejection cycle be? What's the optimal temperature for the material, cooling channels, and mold?
- What's the right filling/packing pressure and best material to use for a particular part?
- Will the use of special inserts, side actions, additional injection gates, special secondary operations, or unique cooling channel designs improve part quality or shorten cycle times?

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part manufacturability and the impact of changing the variables related to injection-molding production, particularly with simple part geometries. Nevertheless, as designers strive to imbue products with innovation and sophistication, even the most experienced moldmakers need to create a series of prototype molds and shoot many samples until they find the precise mix of injection-molding variables that will produce clean, blemish-free parts.

How Many Prototype Molds Are Necessary?

Although veteran mold makers take pride in their ability to gauge the manufacturability of specific part geometries and know things like the minimum thickness of ribs to support ejection from a mold, predicting the exact number of prototype molds required for configuring the injection molding process, or the time and cost involved, is not as clear-cut. In addition to needing to validate that the final mold design will perform well, producing high-quality samples before ramping up to full-scale production, mold makers usually need to conduct other trial-and-error prototype studies to reach the final mold design and specific injection recipe. For example, optimising injection gate diameters, locating gates in the most advantageous locations, improving cooling channel performance, or using special secondary operations generally requires additional time and iterations.

Balancing Design and Quality Sensitivities

Moldmakers face the same communication and collaboration challenges as designers of injection molded parts. They need to be able to explain why the original part design geometry has to be changed due to manufacturability issues. This is why prototype mold cycles are so entrenched in the injection-mould tooling enterprise because they serve to justify why design changes are necessary by demonstrating the defects and quality issues associated with strictly adhering to the initial design. Designers want to know the reasons why the part design that they laboured over needs to be altered, especially when such changes negatively impinge upon the design aesthetic. Moldmakers want to make quality parts, designers want to manufacture their designs, and prototype mold cycles are often the only way to reconcile the two.

Manufacturing Personnel Pushed to Reduce Cycle Times

Once manufacturing personnel receive the final mold from the mold maker, they too need to evaluate the tool from a production standpoint to determine if other modifications can be made to reduce cycle times without opening the door to additional manufacturing issues. When you are shooting 500,000 to one million parts at a time, saving one, two, or three seconds in cooling time per part can result in dramatic time and cost savings. However, just like moldmakers, manufacturing personnel are blind to what's going on inside the mold and have to rely on samples and tests to confirm that the tool will produce quality parts or discover that the mold requires additional rework.

Is Mold Rework Required to Speed Production?

The first question manufacturing professionals need to answer is: Will this mold, material, and injection recipe produce quality parts or not? It's critical for production personnel to verify mold performance because if they don't, they may end up shooting a million bad parts. Similar to the prototyping performed by mold makers, manufacturing personnel need to run samples to confirm that there are no structural weaknesses in the parts, no undesirable deformation in large-sized parts, and no poorly reproduced areas on parts with features having high aspect ratios. They can use the same trial-and-error approach to try to speed production, but ultimately have to determine if speeding up production will save more money than the cost of mold rework.

Optimising Injection-Molded Tooling

In their attempts to optimise production cycle times for specific injection molds, production personnel may try different recipes, changing the length of cooling time in the mold, or raising or lowering injection pressure during filling and packing. They may also adjust temperatures in the mold cooling system as part of their efforts to shorten cycle times. Yet, just like designers and mold makers, what they need is access to a common mold-filling simulation environment that provides them with a view of what's happening inside the mold and insights into the effects of changing these variables without having to shoot apart. This common platform can also improve collaboration with the designer and mold maker regardless of language and time barriers.

Mold Injection Simulation And Analysis

Everyone associated with the de-

velopment and production of injection-molded parts and tooling—including part designers, mold makers, and production personnel—can contribute to streamlining the process by having access to software such as SOLIDWORKS Plastics simulation and analysis software. With a common, visual injection molding simulation environment, you can overcome language barriers and collaborate more effectively, enabling you to evaluate part manufacturability, validate mold designs, and optimise injection-moulded tooling without incurring the delays and expense of making prototypes, conducting tests, and shooting

Such software enables plastics part designers to evaluate the manufacturability of injection-molded parts during the early stages of design. By simulating the mold injection process, you will understand how the mold will fill, whether there are any air traps or voids, and where parting/weld lines will be. With these tools, you will consistently deliver designs that don't require manufacturing modifications—reducing the need for multiple iterations with the mold maker—and be able to confer with mold makers and manufacturing colleagues anywhere in the world.

As more and more of today's successful products contain plastic components and the trend toward greater use of plastics continues, manufacturers can gain a substantial competitive advantage by leveraging SOLIDWORKS Plastics simulation technology to shorten injection-molded parts and tooling development cycles, while simultaneously improving the quality of injection-molded parts. Instead of continuing to absorb the delays and expenses related to conducting traditional prototype mold iterations and test cycles to satisfy manufacturing requirements, your company can utilise SOLIDWORKS Plastics simulation software to optimise parts for manufacturability, refine tooling to improve quality and shorten cycle times to reduce manufacturing costs.

Sources: Solidworks
PlasticsWorld
Injection Molding for Today

UPDATE

India's Plastics Export Increased By A Strong 55 Per Cent

India's plastics export increased by a strong 55 per cent to USD 3,417 million (cumulative value) during April-to-June 2021 as compared to USD 2,211 million during April-June 2020, as per The Plastics Export Promotion Council (PLEXCONCIL), the apex nodal trade body of plastics exporters. India exported plastics worth USD 1,301 million (up 60.4 per cent) in June 2021 vis-à-vis USD 811 million in June 2020. Despite the pandemic, India's cumulative exports of plastics were nearly USD 10 billion in FY21.

Panels such as consumer and houseware, composites / FRP products, floor coverings, leather cloth and laminates, pipes & fittings, woven sacks and FIBCs registered good triple digit growth over 100 per cent growth in global exports during Q1FY22. Panels such as writing instruments (74 per cent), rigid packaging & PET preforms (52.6 per cent), cordage & fishnets (60.9 per cent), polyester films (34.7 per cent), and plastics raw materials (16.9 per cent) also showed high double-digit growth in Q1FY22.

During the first quarter, PLEXCONCIL took several initiatives to increase exports – it joined hands with the Indo-French Chamber to boost India's plastics export to France and Europe. Companies can now find reliable alternate Indian partners for all their sourcing needs. India's exports of value-added plastics to France have the potential to grow by nearly USD 5.6 billion.

India and the United Kingdom (UK) adopted an ambitious 'Roadmap 2030' to elevate bilateral ties to a "Comprehensive Strategic Partnership" in May 2021. PLEXCONCIL is taking several initiatives to ensure that India's plastics' exporters seek a greater share of the UK's annual plastics' imports of USD 30-32 billion. India is exporting plastics valued at around USD 365.7 million to the UK comprising Plastic Packaging items, Woven Sacks/ FIBCs, Plastics Sheets and Films, Optical items, and other moulded and extruded items.

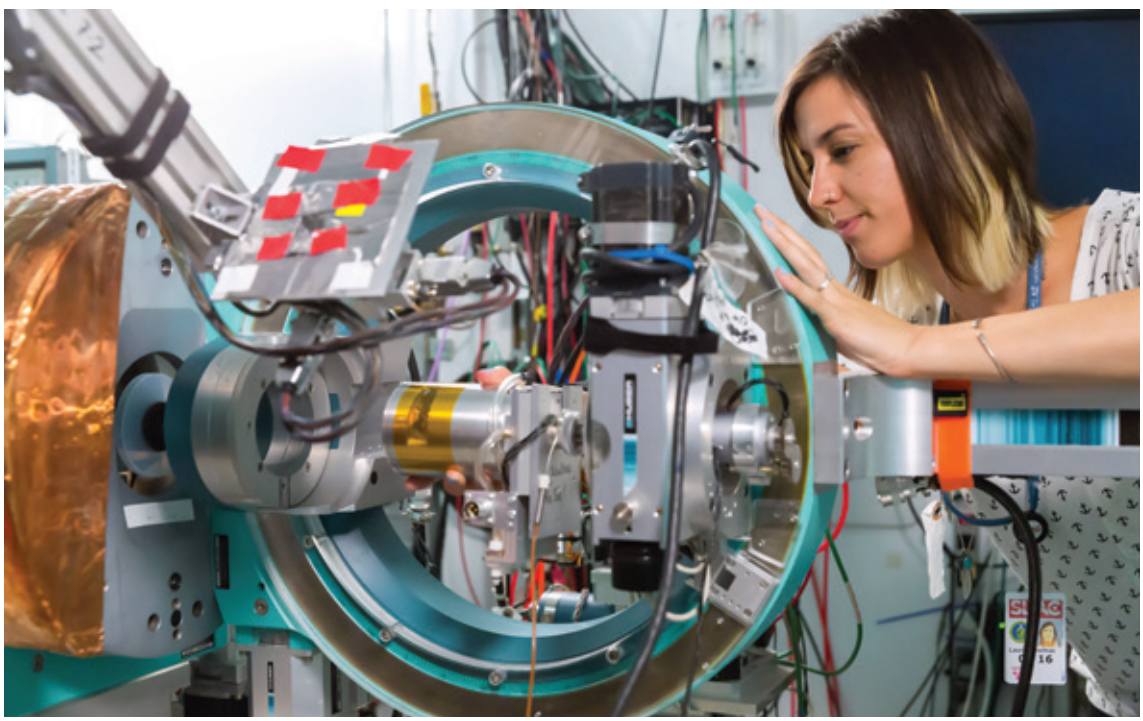
Mr Arvind Goenka, Chairman, PLEXCONCIL, said, "The growth in plastics' exports in the first quarter of FY2022 reflects the tremendous efforts and the entrepreneurial spirit of Indian exporters, who posted growth despite facing many challenges during the pandemic. PLEXCONCIL has been taking several proactive initiatives to target global suppliers and sourcing majors in an evolving supply-chain management scenario. The US, UK, EU and France offer several opportunities for increasing exports of Make in India plastics."

Indian plastics exporters have been asking the government to consider free trade agreements (FTAs) and enhanced trade partnerships to make Indian goods competitive; subsidised warehousing in the UK, US and EU; and counter-guarantee to Indian status holder exporters to borrow at cheaper interest rates in the UK, US and the EU among others.

Digital Transformation in Plastics

Automation in the plastics industry is becoming more complex, the pace of innovation is accelerating, and competitive pressure is increasing. Open and safe automation makes it possible to combine traditional mechanical engineering with the latest Industry 4.0 technologies – Lets take a look at how Industry 4.0 is transforming the plastics sector

By Kruti Bharadva



The plastic industry in India is believed to have come to international recognition in 1957, with the production of polystyrene. Today, the industry has greatly diversified, spans the country and hosts more than 2,000 exporters. It employs about 4 million people and comprises more than 30,000 processing units, 85-90 per cent of which are small and medium-sized enterprises.

According to an industry report by McKinsey, the engineering plastics market in Asia-Pacific is expected to achieve a growth rate at a CAGR of 5.7 per cent over the forecast period of 2018-2023. The study further estimates that polyethylene terephthalate (PET) resins are projected to stand out in the segment, with a 51 per cent share in the engineering plastics' product share and a growth of 6.6 per cent over the next five years.

Plastics will be the fastest-growing part of the chemical industry through 2030 while considering factors such as economic recovery, the end of the pandemic and other variables. Demand for plastic, in part, could also be attributed to public perception of it as being COVID-19 repellent. The reason may be that masks, gloves and other protective equipment are made from plastics, as are products like delivery packages and soda bottles. I

In FY20 (till January 2020), plastic exports stood at US$ 7.045 billion with the highest contribution from plastic raw materials at US$ 2.91 billion; plastic sheets, films, and plates at US$ 1.22 billion; and packaging materials at US$ 722.47 million.

(Source: Directorate General of Com-

mercial Intelligence and Statistics (DGCIS)

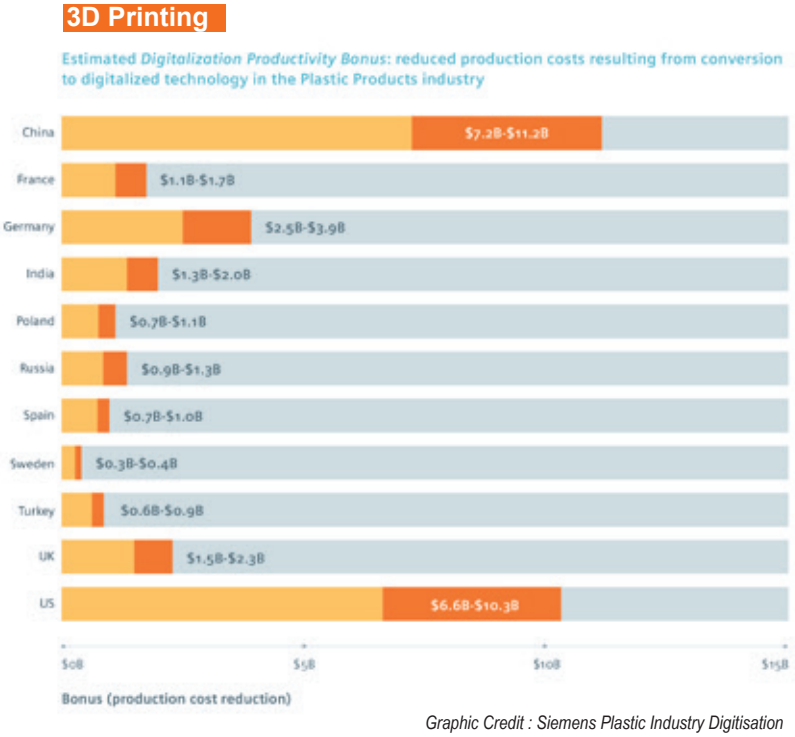
What Is Industry 4.0

There is no longer a debate about whether the Fourth Industrial Revolution – Industry 4.0 – is under way; the conversation has moved on to address where, how much and how quickly it is being implemented. Digitalisation of the manufacturing environment and its processes forms the foundation of Industry 4.0, adoption of which, varies from country to country and economy to economy. In some parts of the world and in certain industries, the emphasis is placed on automating previously manual processes. Automated systems are, by definition, programmed and controlled through digital systems; and where automation is already widespread, further digitalisation is taking the form of the Internet of Things. This development involves the widespread installation of sensors in the physical environment and the ability to rapidly enhance production economics through real-time performance data analysis.

Some digitalisation pioneers are using digital controls and digital data analyses to improve a wide range of processes, including production capacity, job setup and turnaround, uptime maximisation, predictive maintenance, supply-chain logistics and just-in-time distribution. There are even instances of manufacturers improving their competitive edge through mass customisation, a technique where tailored products are offered with much the same economies formerly associated with mass production.

How Does Industry 4.0 Affect The Plastics Industry

The advent of Industry 4.0 automation and digitalisation is having a fundamental effect on the plastics industry – not simply in terms of process and production efficiency and agility, but also disrupting the landscape of international competition by allowing smaller manufacturers to achieve the market access and technological capabilities that previously could only be attained by medium-to-larger players. Robotics, virtual testing, economic prototyping and real-time machine data are just a few of the advantages that plastics manufacturers are seizing to improve their competitive position.



Graphic Credit : Siemens Plastic Industry Digitisation

Mass production of Individualised Parts

In another area of application, the plastics industry is leveraging Industry 4.0 technology to create individualised, customised component parts as virtually a mass production process, along with shortened development, setup and start-up times. One good example of this is the smart addition of three-dimensional individualised designs on apiece-by-piece basis to deliver personalised products at mass-production speeds and costs.

Efficient and Flexible Production

Vertical integration enables the acceleration of information forwarding and the use of all relevant information that allows the autonomous optimisation of existing production processes.

Injection molding firms, in particular, are also using virtual simulation technology to examine flow simulation in extrusion dies, mainly to optimise process quality and reduce defects, which both have a considerable effect on commercial efficiency and customer satisfaction.

Digitalising the production process makes it possible to capture and retain a detailed audit trail of production. This is enormously important for ensuring traceable safety standards, such as those that apply to toy manufacturing, right through to minute and provable compliance with stringent regulatory standards, such as those that apply to medical device manufacturing.

3D Printing

When considering plastic product fabrication using the most iconic

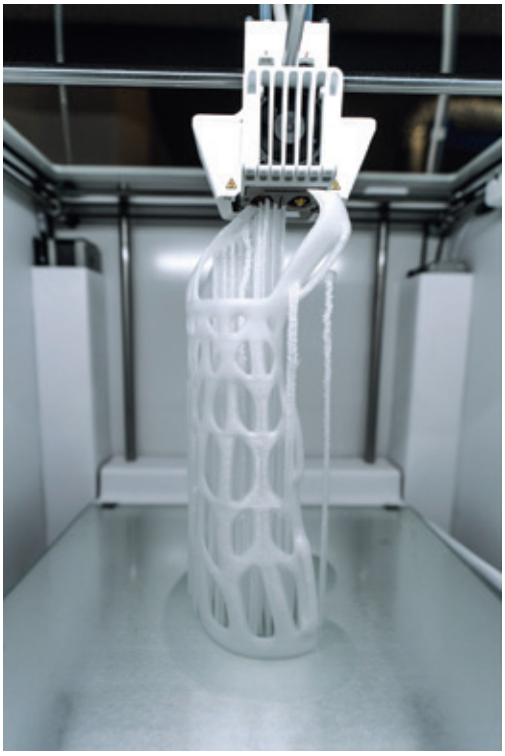
Industry 4.0 technology – additive manufacturing (3D printing) – most people think of prosthetics and implants. In fact, great effort is being made to place prototypes into the hands of surgeons and other healthcare specialists so they can rapidly test the usability of a series of designs before manufacturing the product and bringing it rapidly to market. There are even instances of the soft plastic manufacture of an individual patient's affected body part so that surgeons can practice prior to the actual operation.

Internal Innovation

The plastics industry is itself also inventing smart products that help optimise uptime across the manufacturing industry. One such innovation inserts sensors (RFID chips) into plastic wiring and connection units that can then be networked with a communications module to provide direct integration with the manufacturer's IT infrastructure, making automated continuous condition monitoring and predictive maintenance possible. This same innovation canals connect with a data cloud, which opens up the possibility of automatically ordering an external maintenance crew or replacement parts. This constitutes a significant step toward realising the benefits of the Industrial Internet of Things

Prediction of Process and Product Quality

The significance of the digital shadow of processing processes for the prediction and optimisation of part quality and process flow is constantly increasing. Software tools will improve the prediction accuracy of quality forecasts and in turn enable optimisation of the entire product life cycle.



Key Requirements For Plastics 4.0

Intelligent Machinery

Machines within a plastic manufacturing smart factory can use data to make every process more efficient. For example, an injection moulding machine will begin to preheat only when it has received data that the previous process is nearing completion.

This communication between devices could help to reduce the amount of time that an injection moulding device is sitting on standby. Generating and maintaining the required level of heat to melt plastic requires a significant amount of energy. As a result, intelligent machinery can help to reduce wasted energy which is beneficial for the manufacturers and the environment.

The abundance of real-time data allows accurate forecasting to be produced. This means that customers can be kept up to date with the progress throughout the production.

Predictive Maintenance

Smart factories will be so data-rich that components within machines could generate diagnostic reports on their own functions and communicate failed, or weak points. This will allow the factory to plan pre-emptive maintenance when a machine indicates that a repair is imminent. This will aid productivity by ensuring that there are significantly fewer interruptions to manufacturing due to unexpected machine failure and the associated delays in sourcing and repair.

The advanced nature of the predictive maintenance allows manufacturers to establish alternative plans to ensure that production is not delayed or slowed, and customer orders remain on track.

The ability to connect every machine on the factory floor together via a single cloud network makes the factory a single entity working together towards one purpose instead of separate elements. The machines can collect, analyse and share this data to make decisions that maximise repeatability in the injection moulding process, consistent quality and avoid unplanned downtime.

Simulation In Twin-Screw Extrusion Processes

It could reduce the number of tests to obtain a formula, foresee productions, optimise screws or perform industrial scale-up, minimise development costs (regarding raw materials, energy and human resources) and reduce the time-to-market (TTM).

Advanced Sensors

They would help companies to better understand the process. This concept could be divided into two main fields: extruder complementary sensorisation to monitor the thermal evolution, pressure, etc. of

- India exported plastics raw material worth **US$ 280.38 million** in March 2021, and the export during April 2020 to March 2021 was **US$ 3.29 billion**.
- The total plastic and linoleum export during April 2020 to March 2021 was **US$ 7.45 billion** and for the month of March 2021, it was **US$ 719.15 million**.
- In April 2021, export of plastic and linoleum stood at **US$ 726.74 million**.
- In FY20, plastic and linoleum export from India stood at **US$ 7.55 billion**.
- In FY21 export of plastic sheets, films, and plates stood at **US$ 1.53 billion** and packaging material was **US$ 863.62 million**.
- The Indian plastics industry produces and export a wide range of raw materials, plastic-moulded extruded goods, polyester films, moulded/ soft luggage items, writing instruments, plastic woven sacks and bags, polyvinyl chloride (PVC), leather cloth and sheeting, packaging, consumer goods, sanitary fittings, electrical accessories, laboratory/ medical surgical ware, tarpaulins, laminates, fishnets, travel ware, and others.
- The Indian plastics industry offer excellent potential in terms of capacity, infrastructure, and skilled manpower. It is supported by many polymer producers, plastic process machinery and mould manufacturers in the country.
- Among the industry's major strengths is the availability of raw materials in the country. Thus, plastic processors do not have to depend on imports. These raw materials, including polypropylene, high-density polyethylene, low-density polyethylene, and PVC, are manufactured domestically.

(Sources: Directorate General of Commercial Intelligence and Statistics
Press Information Bureau)

the compound, as well as the possible inline measurement of properties such as colour, electrical conductivity and maybe dispersion or mechanical properties in the future, thus saving time and resources in the performance review.

Big Data

It is related to the amount of data a system can collect to analyse the factors that have an influence on the process efficiency and act on the most critical factors to minimise their adverse effects. A system to collect and store data and analyse tools is essential. Some of its objectives are energy consumptions, assessment of response variables of the machine or productions and comparison with process parameters to optimize quality and production.

Additive Manufacturing in Plastics

Factories of the future are expected to implement new integrated design-manufacturing approaches to go towards 'advanced manufacturing'. Additive manufacturing (AM, or 3D-printing) actually offers new opportunities to the plastics processing industry to meet this challenge when developing applications for high-tech industrial (aerospace, medical/dental, automotive) and consumer (home, fashion and entertainment goods) markets. As far as plastics and polymer composites are concerned, the most popular 3D-printing processes are selective laser sintering, stereolithography, fused deposition modelling, and material jetting.

The ever-growing success of 3D-printing is due to its advantages over conventional manufacturing- virtually unlimited design freedom, ability to produce parts without moulds, high degree of complexity achievable even in fine details, ability to get local texturing or functionally-graded structures when using multi-materials, etc.

Understanding and Applying 4.0

The term 'Industry 4.0' has been on everyone's lips for several years now. However, only very few can formulate it in concrete terms, what exactly 4.0 means for the plastics industry. It is certain that the implementation of 4.0 technologies requires automation specialists with profound expertise in hardware and, above all, software.

Additionally, Industry 4.0 must not only be something for the big players among the plastics processors but must also be made available for small and medium-sized enterprises - the simple and cost-optimised implementation of 4.0 technologies for everyone is the true art of automation.

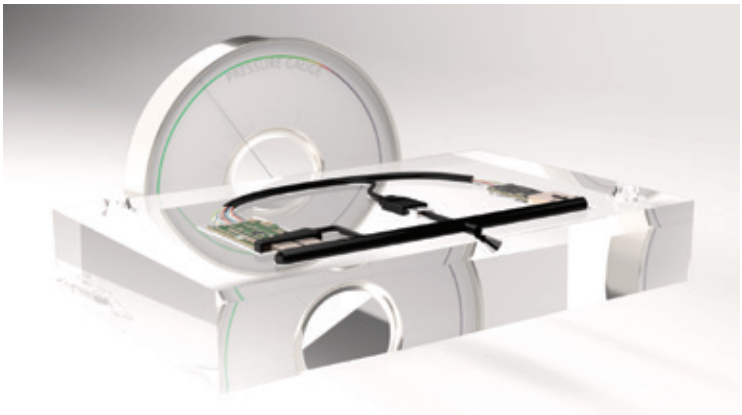
Sources: IBEF
Directorate General of Commercial Intelligence and Statistics
Siemens Whitepaper on Plastics Industry Digitisation
Additive Manufacturing (Science Direct)
McKinsey & Company
Plastics Technology Online

Low-Pressure Molding Adopted Across Industries

Henkel's Technomelt Low-Pressure Molding technology meets demands for encapsulation of electronics and medical components

By Kruti Bharadva

Henkel's Low-Pressure Molding technology for encapsulating electrical and electronic components in its Technomelt polyamide adhesive molding compounds is increasingly being adopted for medical, electronic components, power and industrial automation, HVAC and lighting applications. The technology offers numerous economic, process control, design and environmental advantages over alternative systems such as potting with reactive resin systems and high-pressure injection molding.



Various Process Advantages

Technomelt Low-Pressure Molding (LPM) technology was invented some 30 years ago by Henkel (formerly called Macromelt Molding). The technology enables the quick encapsulation of delicate components by using specialised polyamides in combination with standard processing equipment and low-cost molds. Because the material is injected at a lower pressure compared to conventional injection molding processes, and non-abrasive materials are used, the risk of damage to the electronics during the encapsulation process is far lower.

The technology is particularly adept at encapsulating discrete areas in complicated assembly where wiring is attached to a printed circuit board (PCB), PCBAs and other rigid components. One reason for this is that Technomelt resins, which are all unfilled, are resistant to high stresses and at the same time very flexible.

Matthew Hayward, Global Key Account for Power & Industrial Automation at Henkel highlights: "I see Technomelt as an exciting part of our Circuit-Board Protection portfolio. It is particularly well suited to high-mix low-volume applications where throughput is key. The ability to apply this material only where is needed is a huge benefit. This enables one to 'skyline' an application (encapsulating only the components that require protection), or to significantly reduce the weight due to substantially less material usage."

THE TECHNOLOGY IS PARTICULARLY ADEPT AT ENCAPSULATING DISCRETE AREAS IN COMPLICATED ASSEMBLY WHERE WIRING IS ATTACHED TO A PRINTED CIRCUIT BOARD (PCB), PCBAS AND OTHER RIGID COMPONENTS

The encapsulating material provides exceptional electrical insulation, as well as resistance to a broad range of chemicals, extreme thermal cycling across high and low temperatures, and vibrations. The internal electronics are fully protected against outside elements, including ingress of water and dust, and long-term UV exposure.

Michael Otto, Key Account Manager Engineering Adhesives for Low Pressure Molding at Henkel explains: "Unlike traditional two-component reactive potting compounds, the polyamides used in the Technomelt Low Pressure Molding process are single-component thermoplastics, molding cycle times are shorter, and there are no emissions of volatiles. Whereas conventional potting can take as long as 24 hours to complete, the Technomelt Low Pressure Molding process has a cycle time that can be as short as 30 seconds."

High Sustainability

The Technomelt polyamide resins are

compliant with the European RoHS (Restriction of Hazardous Substances) Directive and REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) regulations. "An additional important environmental feature of these polyamides, and one that is increasingly appreciated, is that they are largely bio-based, with up to around 80 per cent of their content coming from renewable vegetable sources," Otto adds.

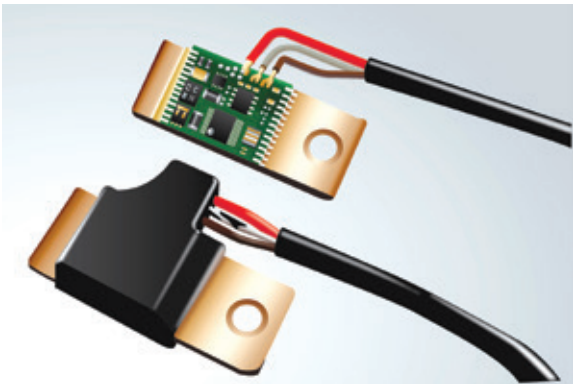
Henkel offers a range of Technomelt Low Pressure Molding resins that have been formulated for specific applications. Some, for example, have extra thermal resistance, others have improved toughness or especially good adhesion to particular substrates.

Efficient Use Of Material

An advantage of Technomelt Low Pressure Molding over traditional potting systems is that it is much more economical in the amount of material it uses in the finished part. In potting operations, the normal approach is to build a box around the component to be encapsulated, and then fill the box until the component is covered.

With Technomelt Low Pressure Molding, the component is placed into a mold that has a cavity geometry similar to that of the component, so that when the polyamide is injected, it forms a skin around the component that is more or less the same thickness at all points. This means that the amount of encapsulating material used per shot can be considerably less.

Costs of mold production are relatively low, especially as they are often made out of aluminium, which is much less expensive than tools made out of steel used in high-pressure injection molding. In recent years, even more, cost-effective additive manufacturing techniques have also been adopted to make the molds.



UNLIKE TRADITIONAL TWO-COMPONENT REACTIVE POTTING COMPOUNDS, THE POLYAMIDES USED IN THE TECHNOMELT LOW-PRESSURE MOLDING PROCESS ARE SINGLE-COMPONENT THERMOPLASTICS

Providing Value To Various Markets

The need for efficient low pressure encapsulation of electronics has never been as great as it is today. The Internet of Things (IoT) and Industrial Internet of Things (IIoT) depend on a foundation of sensors and associated electronic connections and components to support all sorts of devices in the home, at work, and on the move. This trend has also led to increased network connectivity demands for data and power cables and connectors that function in the harshest environments. In the world of healthcare, patient diagnostics and sensing in real-time require new electronic devices like wearable devices that are used in and outside of controlled medical environments. Technomelt Low Pressure Molding responds to all of these trends.

Jason Spencer, Henkel's Medical Market Segment Manager, notes: "Patient diagnostics and sensing in real-time require new electronic devices that are worn in and outside of a controlled medical environment. Wearables for vital sign monitoring are becoming more important in patients' everyday lives as healthcare becomes more digitally connected."

For certain types of medical applications, Technomelt can also be used in applications that go beyond the encapsulation of electronics. For example, it is suitable for attaching flexible tubing in liquid delivery systems, since it does not distort the tubing and provides a permanent, leakproof junction. Henkel introduced, Loctite PA 6951, specifically for this purpose. Loctite PA 6951 has been tested to Henkel's protocols based upon ISO-10993 biocompatibility standards, with certificates available on request.

Partnerships With Equipment Suppliers

In collaboration with partners producing processing equipment around the world, Henkel provides a total solution for low-pressure injection molding. "These partners are critical for our success," says Otto. "Technomelt is a total system that brings together materials, machines, molds, and technical service and engineering. Our partners have their own sales forces, which adds to our ability to access and assist the vast global market."

Additionally, Otto highlights "many developments are pushing up requirements for high-quality, low-cost component encapsulation.

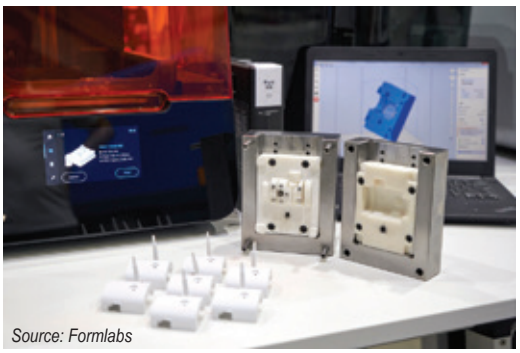
Sources: Henkel AG & Co. KGaA, Germany

Leveraging 3D Printing for optimised Injection Molds

A guideline from Formlabs on the factors to consider before using stereolithography (SLA) 3D printed molds in the injection molding process to lower costs, reduce lead times, and bring better products to market

By Kruti Bharadva

Injection molding is one of the leading processes for manufacturing plastics. It is widely used for mass-producing identical parts with tight tolerances. It is a cost-effective and extremely repeatable technology that yields high-quality parts for large series. It can produce volumes from 1,000 to 100,000+ of parts at very low unit costs.



Source: Formlabs

Injection molding has a short cycle time, with each machine capable of building new parts every 15 to 60 seconds. It is a fast, intensive process where high heat and pressure are involved to melt thermoplastic and force it inside a mold. Because of these extreme molding conditions, the tools are traditionally made of metal by using a CNC machine or electric discharge machining (EDM). These are expensive industrial methods that require specialised equipment, high-end software, and skilled labour. As a result, the production of a metal mold typically takes four to eight weeks. For smaller part quantities, the cost, time, specialised equipment, and skilled labour required to fabricate the mold out of common tooling metals and manufacturing methods often makes injection molding at this scale unobtainable.

However, there are alternatives to machining molds out of metal. Leveraging 3D printing to fabricate injection molds for prototyping and low-volume production significantly reduces cost and time compared to metal molds, while still producing high-quality and repeatable parts. Desktop 3D printing is a powerful solution to fabricate injection molds rapidly and at a low cost. It requires very limited equipment, saving CNC time and skilled operators for other high-value tasks. Manufacturers can benefit from the speed and flexibility of in-house 3D printing to create the mold and couple it with the production force of injection molding to deliver a series of units from common thermoplastics in a matter of days. They can even achieve complicated mold shapes that would be difficult to manufacture traditionally and can be used on both desktop and industrial molding machines, enabling development teams to be more innovative. Furthermore, product development benefits from the ability to iterate on the design and test the end-use material before investing in hard tooling.

Even though 3D printing molds can offer these advantages when used appropriately, there are still some limitations to be aware of. One should not expect the same performance from a 3D printing polymer mold as from a machined metallic one. Critical dimensions are harder to meet, cooling time is longer because the thermal transfer occurs slower in plastic, and printed molds can more easily break under heat and pressure. However, companies across industries are continuing to implement 3D printed molds into their short-run injection molding workflows, enabling them to quickly produce hundreds to thousands of parts. From designing functional prototypes with end-use materials, fabricating parts during pilot production, or manufacturing end-use parts, 3D printing injection molds is a cost-effective and quick way to produce parts in limited quantities

Fast Fabrication Of Short-Run Injection Molds

Stereolithography (SLA) printing technology is a great choice for molding. It is characterised by a smooth surface finish and high precision that the mold will transfer to the final part and that also facilitates demolding. 3D prints produced by stereolithography (SLA) are chemically bonded such that they are fully dense and isotropic, producing functional molds at a quality not possible with Fused Deposition Modelling (FDM). Desktop SLA printers, like those offered by Formlabs, can seamlessly be integrated into any

injection molding workflow as they are easy to implement, operate, and maintain. Formlabs Rigid 10K Resin is an industrial-grade, highly glass-filled material that serves as an ideal molding material for a wide variety of geometries and injection molding process conditions. Rigid 10K Resin has an HDT of 218°C @ 0.45 MPa and a tensile modulus of 10,000 MPa, making it a strong, extremely stiff, and thermally stable molding material that will maintain its shape under pressure and temperature to produce accurate parts

High Temp Resin is an alternative material that can be considered when clamping and injection pressures are not too high and Rigid 10K Resin cannot meet the required injection temperatures. High Temp Resin has a heat deflection temperature (HDT) of 238°C @ 0.45 MPa, the highest among Formlabs resins and one of the highest among resins on the market, allowing it to withstand high molding temperatures and minimise the cooling time

This is a powerful solution to produce medium series quickly. The printed mold can be replaced as the design evolves or fails. It allows for creating molds on-demand with elaborate geometries that would be difficult to manufacture traditionally while still running multiple shots. High Temp Resin, however, is quite brittle. In the case of more intricate shapes, it warps or cracks easily. For some models, reaching more than a dozen cycles can be challenging. To solve this challenge, there is Grey Pro Resin from Formlabs. It has a lower thermal conductivity than High Temp Resin, which leads to a longer cooling time, but it is softer and can withstand hundreds of cycles.

These factors can be mitigated by reducing the injection pressure, optimising the CAD file, and adapting the demolding process. These three parameters will largely influence the success of the operation. The complexity of the injection molding process is mostly driven by the complexity of the part and the mold structure. A broad range of thermoplastics can be injected with 3D printed molds such as PP, PE, TPE, TPU, POM, ABS, PC, ASA or PA.

A low viscosity material will help reduce the pressure and extend the lifetime of the mold. Polypropylene and TPEs plastics are easy to process at a high amount of cycles. In contrast, higher melt index materials or filled plastics like PA will allow a lower number of runs. The handling of a release agent helps to separate the part from the mold, in particular for flexible materials such as TPUs.

LEVERAGING 3D PRINTING TO FABRICATE INJECTION MOLDS FOR PROTOTYPING AND LOW-VOLUME PRODUCTION SIGNIFICANTLY REDUCES COST AND TIME

Factors To Take Into Account When Using 3D Printed Injection Molds

- Dimensional accuracy of the mold: it is important to note that the dimensional accuracy of a 3D printed mold may not be as good as a metal machined mold. However, many choose to sand or machine the 3D printed mold to better meet critical dimensions.
- Breakage or cracking of the mold under pressure and heat: 3D printed molds typically have a shorter lifetime than metal molds and therefore are recommended for lower volume production.
- Cycle time: the cooling time is longer than with a metallic mold as the thermal transfer occurs slower in plastic parts. However, cooling methods such as using compressed air or having interchangeable stacks are a great way to reduce cycle time with 3D printed molds

Demolding process:

1. Adhesion of the part to the mold can cause deterioration of the mold during extraction. Demolding agents can be used to assist with this part of the process
2. Flashing may occur and slow down the demolding step. This is an excess of material coming out of the mold during the injection when the mold is overfilled, or if the parting plane is not perfectly flat

Design Guidelines

When designing an injection mold that is to be 3D printed, common design for manufacturing principles should be followed. It is good practice to adhere to the rules of design for additive manufacturing as well as the general rules for injection mold design, such as including two to five degrees of draft angles, maintaining a uniform wall thickness across the part or rounding up the edges. 3D printed molds can incorporate the same components as metal molds including mold halves, runner systems, inserts, and ejector pins.

Here are a few tips from users and experts, specific to polymer printed molds:

To optimise dimensional accuracy:

- Plan stock allowance on the mold to post-process and adjust sizes.
- Print one set of the mold before production to understand dimensional deviations. Edit your

WHEN DESIGNING AN INJECTION MOLD THAT IS TO BE 3D PRINTED, COMMON DESIGN FOR MANUFACTURING PRINCIPLES SHOULD BE FOLLOWED. IT IS GOOD PRACTICE TO ADHERE TO THE RULES OF DESIGN FOR ADDITIVE MANUFACTURING AS WELL AS THE GENERAL RULES FOR INJECTION MOLD DESIGN

CAD model to account for these deviations in your mold design

To extend the lifetime of the mold:

- Open up the gate to reduce the pressure inside the cavity
- When possible, design one side of the stack flat while the other side carries the design. This will lessen the chance of misalignment during mold clamping and reduce the risk of flashing
- Include large air vents (0.05mm depth) from the edge of the cavity to the edge of the mold to allow the air to escape. This yields a better flow into the mold, minimises pressure and alleviates flashing in the gate area to decrease cycle time.
- Avoid thin cross-sections: surface thickness less than 1-2 mm may deform with heat. Negative features smaller than 0.5 mm can be challenging to get a good definition on, while standing features smaller than 0.1 mm can be prone to break off.

To optimise the print:

- Adjust the back of the mold to minimise material: reduce the cross section in areas that are not supporting the cavity. It will save costs in resin and diminish risks of print failure or warpage
- Add chamfer to help to remove the piece from the build platform
- Add centring pins at the corners to align both prints

To optimise dimensional accuracy:

- Print molds flat, directly on the build platform without support to reduce warpage whenever possible. Eliminating supports also save printing time, labour, and resin
- Select a base surface that will minimize overhangs
- If your design does require support, avoid contact on molding faces to improve surface quality
- Post-process the printed mold: desktop milling, drilling or hand-sanding will help to fit both halves of the mold together and avoid flashing

To extend the lifetime of the mold:

- Keep the injection pressure and speed low
- Support all free-hanging cores, in particularly small diameter cores
- Place the printed mold inside a metallic frame or print the insert and machine the outside of the mold to provide support against the downward pressure and heat of the injection nozzle. Standard aluminium frames are readily available from injection molder manufacturers. Another option could be to use a metallic modular mold base system, such as the Master Unit Die Quick-Change or similar solutions, allowing you to quickly switch and replace printed mold inserts.

To facilitate the demolding process and reduce cycle time:

- Employ interchangeable stacks to run new cycles while the other sets cool to decrease the cooling time, which compensates for the low thermal conductivity of a plastic mold
- Cooling can be accelerated by applying compressed air to cool the mold
- Apply a release agent for some technical thermoplastics

Choosing The Right Resin

Injection molds need to withstand clamping pressures, injection pressures, injection temperatures, and any coolants or mold release agents that may be used. Doing so ensures the mold can be repeatedly used over time and consistently produce parts true to the original design.

The conversation around 3D printing and injection molding is often oppositional, but it's not always a question of one versus the other. By directly 3D printing parts or using alternative workflows such as 3D printing injection molds for prototyping and low-volume production, your company can leverage the benefits of both technologies. This will make your manufacturing process more time- and cost-efficient and allow you to bring products to market faster. With rapid tooling for injection molding, it is possible to shorten the time from concept to production while delivering a series of parts in traditional thermoplastics.

The cost and lead time of producing parts in limited volume can often be a barrier to introducing a new product. With 3D printed injection molds, engineers, manufacturers, and product designers can reduce costs, shorten lead times, and bring better products to market. 3D printed injection molds are a great option for those looking to design functional prototypes with end-use materials, fabricate a series of identical pre-production prototypes, or even manufacture custom or limited series of end-use parts.

Sources: Formlabs
Additive Manufacturing World

TotalEnergies and Jindal Films To introduce Certified Circular Polypropylene

TotalEnergies and Jindal Films have joined forces to produce more sustainable flexible food packaging and labels. Using advanced recycling technology from Plastic Energy, TotalEnergies will supply Jindal Films with Certified Circular Polypropylene produced from post-consumer plastic waste. This new value-chain collaboration will divert plastic waste currently destined for incineration and landfill because it is too complex to recycle through existing schemes.

In 2023, TotalEnergies will start-up France's first advanced recycling industrial plant on its future zero-crude platform in Grandpuits, in partnership with Plastic Energy. With a processing capacity of 15,000 tonnes of plastic waste, the plant will produce a recycled oil called TACOIL through a pyrolysis process. This TACOIL will then be used as feedstock in the production of virgin-like polymers at TotalEnergies' multiple ISCC PLUS (International Sustainability & Carbon Certification) European petrochemical sites, thus making the full product portfolio available as Certified Circular Polymers. This technology allows for the

improvement in circularity of highly demanding labelling and packaging applications, such as chocolate bars, snacks and biscuits, pet and dry food.

These Certified Circular Polymers will be converted by Jindal Films into certified sustainable BOPP (Biaxially Oriented Polypropylene) films made from post-consumer waste*, without any compromise on the final films' properties, their food contact approvals, and their further recyclability. With identical characteristics and performance properties to current references, these films will allow quick implementation by customers. They will be part of a full range of sustainable and recyclable solutions offered by Jindal Films to help the industry move towards easier to recycle mono-material laminates - both PP and PE based, now also including post-consumer certified recycled content.

"This announcement with Jindal films fully supports our ambition to produce 30 per cent of recycled and renewable polymers by 2030, as it makes it possible to address circularity commitments pledged by many brand owners for highly technical flexible food packaging and labels," said **Valérie Goff, Senior Vice President, Polymers at TotalEnergies.**

"We are excited to offer films made of TotalEnergies Certified Circular Polypropylene as it strongly complements our sustainable films strategy and enables our customers to have packaging made with post-consumer recycled content," said **Mirek Tokaj, Marketing Director, Jindal Films.**

"We are pleased that our TACOIL made from the conversion of post-consumer plastic waste is being used in the manufacturing of recycled packaging for TotalEnergies and Jindal Films. Our advanced recycling process reduces resource depletion and supports the circular economy, paving the way for incorporating more recycled content into flexible packaging," said **Carlos Monreal, Founder and CEO of Plastic Energy.**

DOMO's ECONAMID® Sustainable Polyamide - Now Even More Eco-Friendly

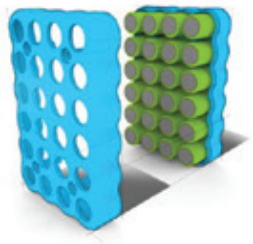
DOMO Chemicals, a leader in sustainable polyamide solutions, has begun using a new sustainable black masterbatch based on recycled material to complement the recycled base polymer in its ECONAMID® brand of sustainable polyamides. ECONAMID®, based on recycled industrial waste, is a benchmark in the industry when it comes to performance level and quality consistency, lot after lot.

The new ingredient is Cabot Corporation's TECHBLAK™ PE1003 black masterbatch. This uses a post-industrial recycled PE carrier as an alternative to virgin polymer, with similar mechanical processing characteristics. TECHBLAK™ PE1003 black masterbatch has been developed for standard compounding and is specifically designed to help the industry lower its carbon footprint, as well as increase the amount of recycled content in end products.

The introduction of this new recycled masterbatch helps meet the evolving circularity needs of the plastics industry and helps the company support sustainability targets across a wide variety of industries, while maintaining optimal performance.

"As the industry seeks more sustainable solutions to comply with global environmental and labelling standards, we are pleased to offer masterbatches that increase the amount of recycled and secondary content in end products," said **Rainer Bechtold, Global Marketing Director, Specialty Compounds, Cabot Corporation.** "We are proud that our product has a strong sustainable benefit and helps plastic manufacturers around the globe lower their carbon footprint."

Covestro Makes Cylindrical Cell Battery Part Design Easy



Whist the market for electric vehicles is still in a nascent stage, but it is likely to grow at an exponential rate in the future. With rising fuel prices, environmental issues, and focused intervention in clean energy, the electric vehicle industry is going to get a boost. However, to compete with the existing products in the market, the industry needs to manufacture e-vehicles that have a promising performance.

Designing high-performance electric vehicle batteries have always been a challenge, especially the tight-fitting of components in the battery packs. This hugely affects the durability, performance, and reliability of the batteries. This, in turn, impacts the performance of electric vehicles.

The Bayblend grade cylindrical holders by Covestro have helped in overcoming these challenges and have also helped the battery manufacturers in designing durable and high-performance batteries during the assembly and packaging of components.

The Bayblend grade by Covestro already has a proven track record of performance in Lithium-ion (Li-ion) battery packs used in Information Technology, consumer electronics, and health equipment. The cylindrical cell holder design provides support and precise cell placement with sub-millimetre features, enabling the manufacturing of premium quality batteries.

Efficiency In Automated Assembly

A typical cell used in a battery by any manufacturer may vary in size which may cause problems during cell fixation, impacting the balance and putting extra strain on the components.

It is thus extremely important to place the cylindrical cells into a module using tight tolerances to safely pack all the components together. This becomes even more important during the mass assembly of the module packs.

The Bayblend grades are ductile, which ensures that an optimal balance is achieved during the placement of cylindrical cells and that the cell holder material does not suffer high elastic deformation during the process. This has been achieved after years of thorough research and experimentation by Covestro, assessing the advantages and disadvantages of the design.

To further help the designers in speeding up the mass-assembly process, Covestro has also introduced the clamshell design for the cylindrical cells to be more efficiently placed between two-part halves using ultraviolet (UV) – curable adhesives.

All the traditional properties of Bayblend grades are retained in the clamshell design, which is named Bayblend® FR3040 EV PC+ABS. Along with that, the design provides additional benefits like curing the adhesives within five seconds making the automated assembly process much faster

Bayblend grade T88 GF-20 (PC+SAN blend), used in a clamshell design, is 20 per cent fibre-enforced to provide extra stiffness generally required for long and thin parts.

Additionally, since the material's coefficient of linear thermal expansion (CLTE) is similar to that of aluminium, these parts can be used in combination with other metal components without the risk of stresses arising from different expansions over the temperature range.

Therefore, it can be said with confidence that the Bayblend grades are an excellent choice for designers. The Covestro team is additionally well equipped to support and guide the customers in choosing the right formulation as per their requirement which will enhance their product development.

Thermochromic Masterbatches

Kandui has developed a Thermochromic 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 and 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.

New S Series Hot Runner System From Oerlikon HRSflow

Oerlikon HRSflow will be presenting the new, particularly small hot runner systems of the S series with their low space requirement in the mould. The main field of application is the production of small-format technical components.

Depending on the application, the new S series can be equipped with screwed-in or non-screwed-in (face-to-face) nozzles. The inner bore size can be selected according to the shot weight. The design allows a compact mould structure with a minimum nozzle pitch of 37 mm. In the valve gate version, the S series is combined with either a compact cylinder 62 mm high or, in the version with adjustable needle position, with a 70 mm high cylinder. Extensive internal laboratory tests have ensured an optimal sealing and thermal profile along the whole nozzle. In addition, a special channel geometry enables fast colour changes.

The new S series is suitable for low shot weights, multi-cavity molds and thin-walled components. Typical applications include consumer goods, technical and electronic components as well as small automotive parts such as emblems, interior switches, knobs for sound systems or air conditioning components.

At Fakuma, Oerlikon HRSflow will showcase the application of the new S series for a so-called Hydration Reminder made of polypropylene (PP). Attached to bottles or glasses, it reminds the user by signal to drink regularly. The S series made it possible to meet the requirements for a low part weight with a wall thickness of only 1 mm as well as for quick colour changes.

iglidur I151 for FDA-compliant, Detectable, Wear Resistant Parts In Food Technology

igus has developed a blue, food-compatible tribo-filament for cost effective 3D printing of special parts. iglidur I151 is blue, prints easily, and has an optimal coefficient of friction and wear. The new tribo-filament is a refinement of the easy-to-machine igus iglidur I150 all-rounder filament. Because it is blue, it can be used to manufacture special parts that are optically detectable in the food industry. Food compatibility according to the FDA and to EU Regulation 10/2011 also qualifies the high-performance polymer for use in the food and cosmetics industries.

igus has included iglidur I150, its all-rounder material, in its 3D printing materials range since 2017. The filament is very easy to use with conventional 3D printers. This allows special parts to be manufactured quickly and cost-effectively with the FDM process. "Many customers, primarily from the food industry, have requested a blue, FDA-compliant filament with properties similar to those of iglidur I150. That is why we have now developed iglidur I151," says **Tom Krause, Head of the igus GmbH Additive Manufacturing Business Unit.** The new tribofilament is suitable for printing components with great wear resistance. Because the material is enriched with solid lubricants, no additional lubrication is necessary. This rules out any contamination hazard. The printed components comply with the requirements of the FDA and of EU Regulation 10/2011, making them ideal for use in the food and cosmetics industries. The blue colour provides the required optical detectability. iglidur I151 can be used with any 3D printer that can be set to a nozzle temperature of 250 degrees Celsius.

iglidur I151 exhibits mechanical properties comparable to those of iglidur I150 with respect to stability, toughness and layer adhesion. iglidur I151 was also impressive in wear testing in igus' in-house test laboratory with a service life that is one hundred times that of such standard plastics as ABS and nylon. The new filament can be ordered from igus in the online shop as roll material. Users can also commission the igus 3D printing service to manufacture their wear-resistant special parts. Just upload the STEP data, choose the material, calculate prices, and order the customised wear-resistant part directly. igus will introduce the new tribo-filament for the food industry from 20th-23rd April 2021 at the Ultimaker Transformation Summit. iglidur I151 will also be available shortly at the Ultimaker Marketplace. Here, users of Ultimaker 3D printers have an advantage because the material profiles are already included, allowing printing to begin immediately without any preliminary adjustments.

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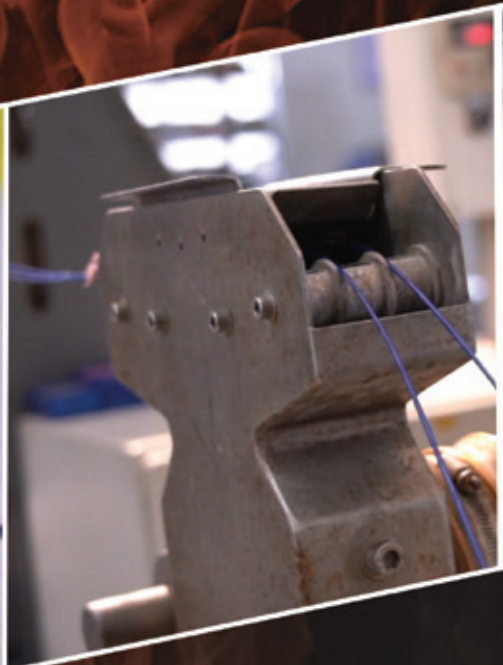

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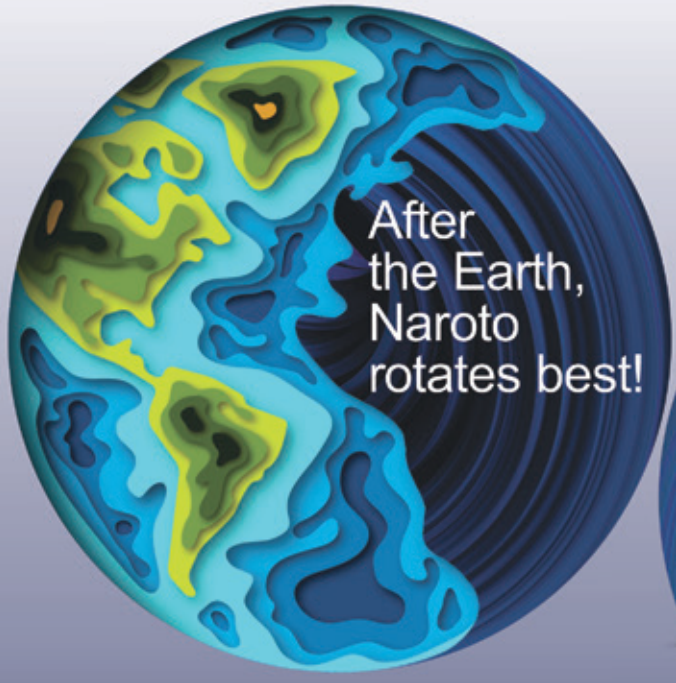

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www.naroto.com

ruchika@naroto.com
+91 99099 51748