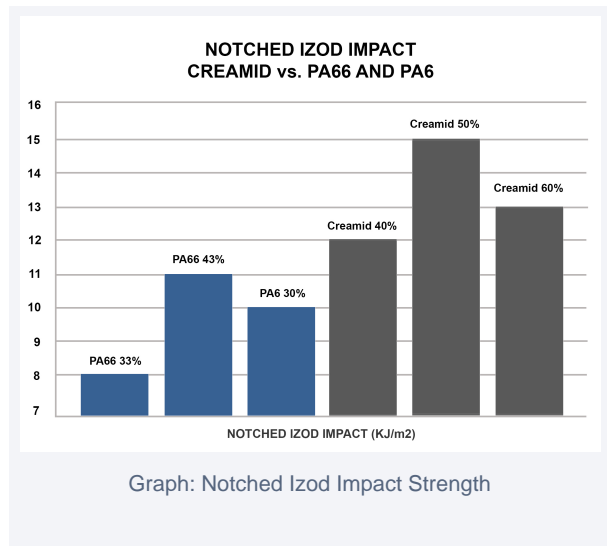


Raw Materials, Additives and Masterbatches



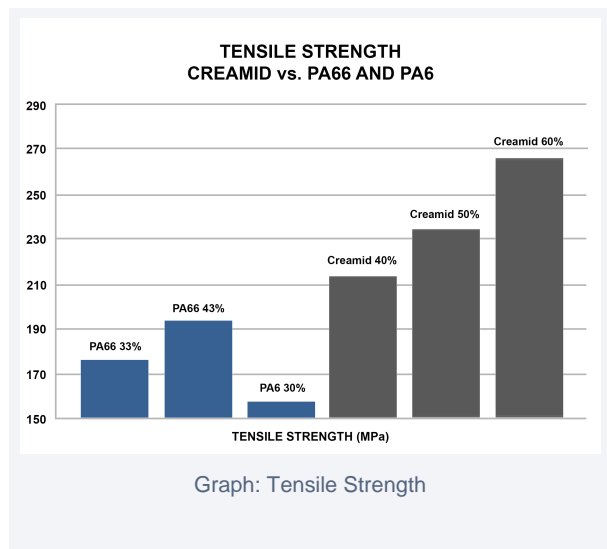
Teknor Apex compounds to replace metals and exotic thermoplastics

A new family of compounds from Teknor Apex Company raises the processability and physical properties of glass fiber-reinforced polyamides to a new level, enabling injection molders to take on more demanding metal-replacement applications or replace alternative thermoplastic materials for greater versatility in processing.



fan blades, spring adaptors, and key fobs.

The processing advantages of Creamid compounds introduce dramatic improvements for injection molders in comparison with standard glass-filled polyamides. When compared with a standard 43% glass-filled polyamide, a 40% glass-filled Creamid compound shows a 68% improvement in spiral flow tests, reaches a 41% lower peak injection pressure, and requires 43% less clamp force. Longer flow length and lower injection pressure translate into a wider processing window, more efficient filling of complex or thin-wall cavities, reduced part warpage, and a possible reduction in the number of gates or knit lines. A lower clamp force also opens the possibility of increasing the number of cavities or running parts in a smaller, less costly molding press.



New Creamid® compounds exhibit higher tensile strength and better flow properties compared with standard glass-filled polyamide counterparts, greater dimensional stability, lower water absorption, improved chemical resistance, and enhanced surface aesthetics.

The compounds differ chemically from standard polyamides and were originally developed in Germany by Plastic-Technologie-Service (PTS), a custom compounder acquired by Teknor Apex in 2016.

Creamid compounds are now commercially available in the Americas and Asia for the first time, bolstered by the experienced application development support and global manufacturing capabilities of Teknor Apex.

Featured grades include: CREAMID-A3H7G8.2S*9217/2 (40% glass loading); CREAMID-A3H7G10.2S*9217/2 (50% glass loading); and CREAMID-A3H7G12.2S*9207/2 (60% glass loading). These compounds have been successfully used in Europe for automotive air vents, spoilers,

In metal replacement applications, Creamid compounds are frequently formulated for a flexural modulus as high as 21 GPa, giving molded parts excellent dimensional stability.

These grades also provide tensile strength up to 260 MPa, a property more commonly expected from die-cast aluminum or zinc, and offer significant savings in part weight.

When combined with longer tooling life and lower material cost, metal-replacement projects with Creamid polyamides typically produce very high returns on investment for OEMs, according to Brian Rickard, director of strategy and business development for the ETP Division of Teknor Apex.

“Creamid compounds provide designers and processors of metal-replacement and other high-specification components with an ultra-high performance alternative to standard glass-filled nylons,” said Mr. Rickard.

“Our introduction of these products is the first commercial initiative by Teknor Apex in what will be an extensive expansion of our portfolio of engineering thermoplastic compounds, drawing on the diverse range of unique ETP technologies developed by PTS.”

Creamid compounds are manufactured at Teknor Apex facilities in the U.S. and Europe and are available worldwide. Teknor Apex also supplies a comprehensive range of reinforced and specially modified polyamide compounds under the brand name Chemlon®, producing them at plants in the U.S. and Singapore. In North America, Chemlon compounds have over 80 specifications from automotive OEMs

New masterbatch for HDPE, PP caps used for bottled water

Clariant, a world leader in specialty chemicals, today launched the SENSEACTION line of color masterbatches intended for use in the production of caps and closures used on bottled water packaging. SENSEACTION masterbatches, which are available in a wide range of colors, are specially formulated, processed, tested, and certified to be free of detectable negative organoleptic (taste and odor) effects.

The new line was developed to meet the high demands of bottled water producers and the processors who supply them with caps and closures, which are typically made of HDPE or polypropylene. Although processors have always utilized safe, food-grade pigments to color caps and closures, there is the potential that pigments in them could contain trace elements that, even in minute quantities, could impart a detectable taste or odor to bottled water or beverages.

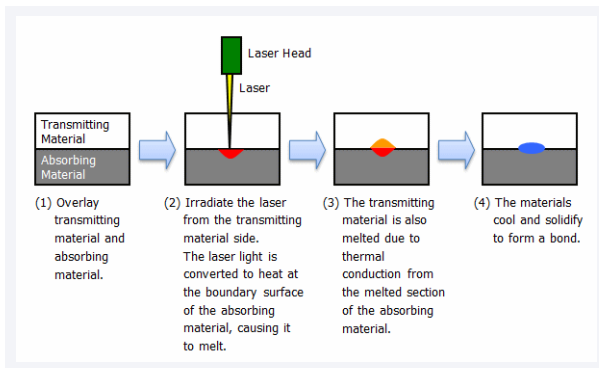
The SENSEACTION product range is designed to reduce the potential impact, explains Alessandro Dulli, Global Head of Packaging for Clariant Masterbatches: "This portfolio will help brand owners make good looking caps that reflect positively on their brand, free of undesirable organoleptic influences." He adds that the new masterbatch brand is built around three pillars: material selection, a dedicated manufacturing process, and a testing/certification process prior to sale.

SENSEACTION color masterbatches start with raw materials that are food-contact compliant, including pigments and carrier resins that are carefully selected for use in sensitive organoleptic applications. Manufacturing takes place exclusively using dedicated processes and special equipment at a dedicated masterbatch site. When manufacturing is complete, each lot of SENSEACTION masterbatch undergoes an exposure in water, which then is tested according to DIN 10995 at an independent external laboratory. A panel of professional testers, specially selected for their acute sense of taste and smell, evaluate the samples for adverse organoleptic effects.

This last measure is especially important, Dulli says, since very sensitive applications such as mineral water require superior organoleptic care compare to a standard food contact approved masterbatch. "In order to protect the reputation of a branded product, it is critical that the entire value chain works together to eliminate any factor that might create an off-taste or smell," he continues. "With our new SENSEACTION masterbatches, converters and their brand-owner customers can be certain they will get all the brilliant color they want in their cap and closures, with none of the unwanted negative organoleptic influences."

Laser welding for bonding thermoplastic resin parts

Polyplastics offers an extensive range of engineering thermoplastics which facilitate laser welding of housing components for the automotive and electrical/electronics industries. Materials such as DURACON[®] POM and DURANEX[®] PBT are highly compatible with laser welding and are finding broader end-use applications.



Laser welding is a bonding method that utilizes the laser transmissibility of a plastic material on one side (transmitting material) and another material containing additives such as carbon black that absorb laser light (absorbing material) on the other side. The wavelength of lasers, such as diode lasers or YAG lasers, is approximately 800-1200nm which is slightly longer than the wavelength of visible light.

Polyplastics' slate of laser welding grades includes DURANEX PBT, a cost-balanced resin that exhibits excellent heat resistance, moldability, and electrical properties for housings. The company has optimized its DURANEX PBT family by re-examining the rubber content, together with its compounding agents, to develop DURANEX PBT 730LW which enables laser welding of workpieces as thick as 2mm which could not be achieved with a predecessor material.

Another key product is DURACON POM which exhibits excellent light transmissibility, even when compared to other semi-crystalline engineering plastics. It also has a low melting point, allowing the laser output required for welding to be kept low, Polyplastics has released DURACON POM M90LP, which uses pigments that do not inhibit laser transmissibility.

Polyplastics not only performs grade selection and development suitable for the laser welding method; it also offers CAE product design support and an evaluation system that utilizes an actual laser welding machine.

DURACON[®] is a registered trademark of Polyplastics Co., Ltd. in Japan and other countries.

DURANEX[®] is a registered trademark of Polyplastics Co., Ltd. in Japan and other countries and is used by WinTech Polymer Ltd. under license.

About Polyplastics

Polyplastics Co., Ltd. is a global leader in the development and production of engineering thermoplastic solutions. The company's broad product portfolio includes POM, polybutylene terephthalate (PBT), polyphenylene sulfide (PPS), and liquid crystal polymer (LCP). The company has the largest global market share of POM. With more than 50 years of experience, the company is backed by a strong global network of R&D, production, and sales resources.

Next-generation family of glass-reinforced polypropylene

Asahi Kasei North America, a leading global supplier of high-performance thermoplastic compounds, has launched Thermylene® P11, a next-generation family of glass-reinforced polypropylene (PP) compounds with unprecedented strength, expanding the performance envelope for conventional glass-reinforced PP design and opening opportunities for thinwall molding of interior and exterior automotive parts. Asahi Kasei discussed the new family of PP compounds at [the NPE2018](#) May 7-11 at the Orange County Convention Center in Orlando, Fla.

The Thermylene® P11 family of chemically coupled PP compounds, available in 30%, 40%, and 50% glass loadings, delivers the highest tensile strength without sacrificing other performance attributes. It provides an optimum balance of properties and facilitates thinwall molding for a range of applications. “The Thermylene® P11 family is a step change improvement which enables OEMs and tier suppliers to fine tune the necessary performance without worrying about any compromise,” said Vive Apte, application development engineer for Asahi Kasei North America.

Thermylene® P11 provides a 40% improvement in measured tensile strength at 80°C and 120°C compared to conventional glass-filled PP. Thermylene® P11 GF40% boasts flexural modulus of 10,000 MPa, tensile strength of 125 MPa, and a heat distortion temperature of 155°C.

The new family of Thermylene® P11 compounds offers higher tensile strength at elevated temperature, greater room temperature tensile, and improved fatigue and creep resistance versus the predecessor material family, Thermylene® P10. Thinwall molding is possible thanks to Thermylene® P11’s melt flow of 3-10 – specifically tunable to customer needs. P11 PP compounds can also be processed at a lower temperature and a higher fill rate, resulting in energy and cycle time savings. Thinner wall thicknesses can be achieved in new designs due to the high tensile and flexural modulus properties. Due to the material’s high flow, parts can be packed more efficiently resulting in lower porosity/voids.

Asahi Kasei is targeting a range of structural parts in the automotive and appliance markets. In interior automotive, key applications include door modules, center consoles, load floors, and instrument panels. Underhood automotive parts include fan shrouds, battery trays, front end modules, and grille shutters. In appliance, Thermylene® P11 is targeted for heat-exposed dryer components such as lint trays.

Asahi Kasei has received strong interest in the new family of glass-filled PP compounds with material evaluations currently underway at leading OEMs and tier suppliers.

About Asahi Kasei North America

Asahi Kasei North America Inc., based in Fowlerville, Mich., is a leading supplier of high-performance thermoplastic compounds for OEMs and tier suppliers around the world. The company produces a range of high-performance PP, nylon, and POM compounds for the automotive, electrical/electronics, construction, and industrial markets. Asahi Kasei offers custom designed formulations, global technical service support, and automotive and regulatory approved grades. The company opened a new U.S. manufacturing facility in Athens, Ala. in 2016.

Solvay introduced new specialty polymers portfolio

Solvay has unveiled a broad portfolio of medical-grade specialty polymers for single-use biopharmaceutical manufacturing applications. Encompassing select grades from five of its most recognized product families, Solvay's portfolio aims to support the industry's shift toward single-use peripherals, filtration, bioreactors and containment. In more practical terms, it will help biopharmaceutical manufacturers achieve greater flexibility, faster product development, reduced capital costs and increased speed to market.

The five product families from which Solvay assembled its new biopharmaceutical manufacturing portfolio include:

- Radel® polyphenylsulfone (PPSU)
- Udel® polysulfone (PSU)
- AvaSpire® polyaryletherketone (PAEK)
- KetaSpire® polyetheretherketone (PEEK)
- Ixef® polyarylamide (PARA)



In qualifying materials for single-use applications, Solvay evaluated the effect of gamma irradiation up to 50 kGy on each polymer to ensure it would retain excellent mechanical performance and other application-critical properties. Results confirmed each material's compatibility with gamma irradiation, the preferred sterilization method for single-use systems.

All materials are certified under United States Pharmacopeia (USP) Class VI test standards – before and after gamma irradiation – to ensure they meet stringent industry requirements. Solvay is also following industry guidelines to evaluate leachables and extractables for its biopharma portfolio.

A leading supplier of specialty polymers, Solvay brings over 25 years of healthcare industry experience, reliability and innovation to the biopharmaceutical industry. In addition to the five product families covered here, the company offers a broad selection of other high-performance polymers ideally suited for single-use peripherals, filtration, bioreactors and containment.

Solvay Specialty Polymers manufactures over 1500 products across 35 brands of high-performance polymers – fluoropolymers, fluoroelastomers, fluorinated fluids, semi-aromatic polyamides, sulfone polymers, aromatic ultra-high performance polymers, and high barrier polymers – for use in Aerospace, Alternative Energy, Automotive, Healthcare, Membranes, Oil and Gas, Packaging, Plumbing, Semiconductors, Wire & Cable, and other industries.

About Solvay

Solvay is a multi-specialty chemical company, committed to developing chemistry that addresses key societal challenges. Solvay innovates and partners with customers in diverse global end markets. Its products and solutions are used in planes, cars, smart and medical devices, batteries, in mineral and oil extraction, among many other applications promoting sustainability. Its lightweighting materials enhance cleaner mobility, its formulations optimize the use of resources and its performance chemicals improve air and water quality. Solvay is headquartered in Brussels with around 27,000 employees in 58 countries.

Precise and reproducible adjustment of the relative viscosity

With BRUGGOLEN® TP-M1417 BrüggemannChemical is now offering compounders and producers the possibility to precisely adjust the relative viscosity of polyamides. This newly developed modifier thus allows the upcycling of high-viscosity polyamide scrap to produce quality injection molding grade material and offers compounders significant cost benefits over the use of virgin polymers.

Mechanical properties the same as virgin material

The addition of BRUGGOLEN® TP-M1417 to high-viscosity polyamide scrap gives producers a material that has the desired relative viscosity as well as mechanical properties that are on the same level as those of virgin polyamide injection molding grades. With their high stiffness, tensile strength and impact strength, these upcycled materials are suitable for the same applications as virgin material of corresponding viscosity.

Ease of processing

BRUGGOLEN® TP-M1417 is supplied as dust-free granules suitable for accurate metering. It is easy to process and compatible with the polyamide matrix which makes it ideal for compounding.

Flexibility for polymer producers

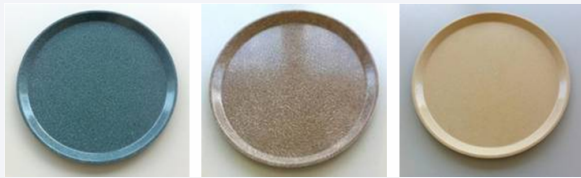
Another benefit of BRUGGOLEN®TP-M1417 is that it can be used to diversify the relative viscosity of virgin polyamide. Polymer manufacturers can tailor relative viscosities during the compounding stage without having the burden of product change-over on a continuous polymerization plant. This results in a significant gain in flexibility and also considerably reduces the amount of off-spec material.

About BrüggemannChemical

BrüggemannChemical, L. Brüggemann GmbH & Co. KG is a renowned manufacturer of specialty chemicals with some 200 staff. Founded in 1868, the company, headquartered in Heilbronn, Germany, specializes in developing and manufacturing high performance additives for engineering thermoplastics with a focus on polyamides, as well as zinc derivatives and sulfur-based reducing agents. Customers from more than 60 countries have come to value the company's flexibility and innovative product solutions, while subsidiaries in the USA and Hong Kong emphasize its international outlook. The cornerstones of corporate policy are in-house research and development activities, a consistent focus on customer requirements, and major investment in know-how and plant.

Fire resistant, sprayable and ecologically friendly

Fibre reinforced plastics (FRP) have been a standard in lightweight construction for a while now. One alternative trend in manufacturing, however, has turned to natural materials, which can be produced with lower energy costs and are biodegradable. The thermoset specialists at Lorenz Kunststofftechnik, for example, have developed a Bulk Moulding Compound (BMC) with jute, cotton or sisal fibre, that exhibits, depending on the composition, similar properties to traditional FRP. The fibre's length can be selected according to the requirements of the intended use and the material can accordingly be produced through compression or injection moulding. In addition, the different natural materials open up new possibilities of use; the cotton thermoset, for example, is easy to paint, laminate or finish and can thus also be used for design objects.

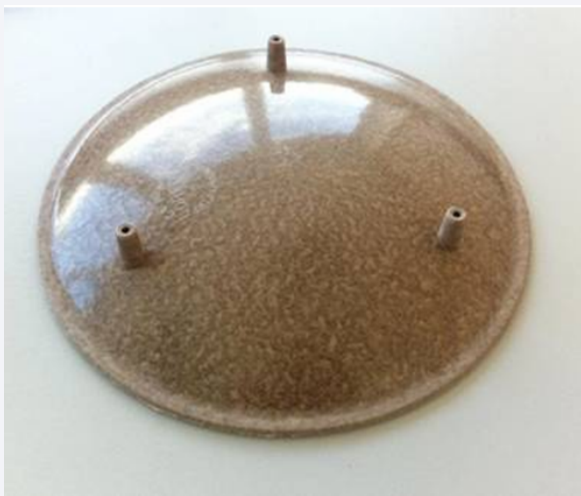


Cotton, jute or sisal: the new eco-friendly BMC by Lorenz Kunststofftechnik save energy during production by replacing the standard glass fibres with natural materials

This new development is based on the tried and tested BMC 0204, which already contained two eco-friendly materials with calcium-carbonate as a bulking agent and ATH as a flame retardant. The new natural fibres also replace the glass fibres, which leads to lower energy consumption during production, which in turn leads to an improved carbon footprint. The type and length of the fibre to be used can be chosen according to the intended use; for instance, compounds with sisal are characterised by a very low degree of processing shrinkage of -0.1 to -0.3 percent, while cotton-reinforced thermosets have a high elasticity modulus of over 8,000 MPa and a low abrasion. They all have a very low density of 1.65 to 1.7 g/cm³, which leads to lower weights, even in comparison with FRP. This makes the produced parts ideal for lightweight construction.

Flame retardant, moisture resistant and flexibly processable

Natural fibre-reinforced plastics (biocomposites) generally offer good thermal and acoustic insulation. By changing the actual composition of the BMC, the specific properties can also be adjusted individually. This allows giving the normally highly flammable natural fibres excellent fire resistant properties. In UL94 flammability tests, a 1.5 mm thick sample could be put out within ten seconds. This result corresponds to the best classification, V0. The problem of moisture absorption, very common in biocomposites, could also be solved through the right material composition so that, measure according to ISO 62, it is only at ?0,5% for the eco-friendly BMC with cotton, ?1,3 % with jute and ?1,8 % with sisal.



As BMC, the Lorenz eco-material composites can be produced not only through compression moulding, but also in injection moulding

Unlike the traditional, often thermoplastic biocomposite panels, the production as BMC also opens up different processing options. It allows for parts to be produced not only in compression moulding processes, but also in injection moulding. This means that more complex and delicate parts, which up until now could only be produced from FRP, can be produced from biocomposites as well. The required moulding temperature in the cylinder is 20 to 40 °C and, in the mould itself, 140 to 170 °C. This means that the material is suitable for various fields of application; from large parts, for instance in car interiors, to tiny components, for example in electronics.

All Lorenz natural fibre thermosets can be recycled; 100 percent of cutting and punching waste can be reused, in accordance with their material composition. Energy recovery of the fibres is carbon-neutral and they burn without residue. Since the RoHS conforming composites also contain neither halogens nor any heavy-metal compounds, they are overall highly ecologically friendly and harmless to humans and the ecosystem. To further enhance this, the experts at Lorenz are already at work on an organic resin matrix which is to replace the polyester resin currently used. With this, a composite material made entirely of natural substances is achieved.

About Lorenz Kunststofftechnik

Lorenz Kunststofftechnik GmbH was founded in 1966 by Siegfried Lorenz and has been in its second generation of family management under Thomas Lorenz since 1996. Originally specialising in the production of various glass-fibre products, the company expanded its expertise to SMC and BMC production in the ensuing years. Today, Lorenz operates in the fields of semi-finished products, research & development, material development to customer or component specification, and duroplast recycling. It supplies custom-configured semi-manufactured products to its customers in the vehicle, electrical, construction, sanitary and chemical industries as well as domestic appliance manufacturers and rail carriage producers. The company employs a total of 65 people at its 9,000m² company headquarters in Wallenhorst near Osnabruck. In addition to its production facilities, the plant maintains its own laboratory and workshop. The plastics experts attach great importance to the aspects of research and development. The company cooperates with a number of higher education institutes in the region.

Liquid UV stabilizers for improved end-product

Diverse UV light stabilizers from Riverdale Global come in liquid form, providing lower additive costs than pellet masterbatch and improved end-product quality. +Shield™ light stabilizers are available in seven standard grades for use in injection molding, blow molding, and extrusion.

+Shield™ Additive	Product Description	Target Resins	Regulatory Compliance	Letdown Ratio, %
LST-100	Hindered Amine for resins containing antioxidant	Polyolefins, Styrenics, Polyamides, Acetals, TPE, TPO	Calif. Prop. 65	0.05 to 0.25
LST-265	Hindered Amine blended with phosphate heat stabilizer	Polyolefins, Styrenics, Polyamides, Acetals, TPE, TPO	Calif. Prop. 65	0.10 to 1.00
LST-296	Hindered Amine blended with processing-heat stabilizer and antioxidants	Polyolefins, Styrenics, Polyamides, Acetals, TPE, TPO, TPU	Calif. Prop. 65	0.05 to 1.00
LST-302	UV absorber providing protection up to 390 nm	PET	Calif. Prop. 65; FDA	0.04 to 0.20
LST-310	High molecular weight (HMW) Hindered Amine	Polyolefins, Polyamides, ABS	Calif. Prop. 65; FDA	0.04 to 2.00
LST-314	HMW Hindered Amine light stabilizer and UV absorber with antioxidants	Polyolefins, Engineering resins	FDA	0.40 to 2.00
LST-315	Benzotriazole UV absorber	Polyolefins, PET	FDA	0.10 to 1.00

Source: Riverdale Global

Depending on grade, they are recommended for use with polyolefins, styrenics, PET, TPEs, and engineering thermoplastics. Four of the grades are FDA-approved, and two of these can also be used as UV absorbers in packaging applications.

The economic and product-quality advantages of +Shield light stabilizers over pellet masterbatch result from the lower and more precise dosing made possible by their liquid form and their improved rate of

dispersion in the polymer, according to Charles B. Irish, vice president of product development.

Also available for use with +Shield light stabilizers is the Riverdale Gravimetric Stand (RGS), in which a liquid-containing drum is mounted on a self-calibrating loss-in-weight scale that continually reports the weight of the contents to the controller as a means of ensuring that the target let-down ratio is maintained.

“Use of Riverdale Global’s gravimetric metering system provides an additional level of precision, allowing for controlled conditions over the entire production run,” said Mr. Irish. +Shield light stabilizers are available in pails or drums, in custom blends with liquid colors, or as one of the GlobalPlus™ range of liquid additives.

GlobalPlus products are single-additive liquid dispersions designed for processors who run clear or natural resins or who need to supplement the additive packages in pre-compounded or masterbatch materials.

In the GlobalPlus system, each additive is supplied in a drum with a built-in pump that stays sealed from the moment it arrives at the processor’s loading dock, through storage, handling, and metering into the process, and during return to Riverdale Global for replenishment.

About Riverdale Global

Riverdale Global specializes in liquid color management for the plastics industry through our sealed color technology and global service network. The company’s world headquarters is in Aston, Pennsylvania, U.S.A., with international offices based in the United Kingdom, Dubai, Singapore, and China. The Riverdale legacy dates back to the early 1900s as a supplier of dyes and industrial chemicals with a focus today on economy through process automation, sustainability and local service.

Pioneering Polymer Solutions and Successes

Victrex, a world leading PAEK expert, is providing further proof points that the company is more than “just” a high-performance polymer (HPP) producer. A new broad food grade portfolio, a novel solution for e-motors and gears in automotive, impellers in electronic home appliances, investments in building a supply chain for the use of thermoplastic composite parts for aerospace as well as partnerships in Additive Manufacturing (AM), with new AM PAEK products in development, are all representative indicators that the global company is progressing solutions based on VICTREX™ PAEK polymers. In selected areas this also includes forms and parts, such as composite brackets for aerospace. The invention and development of PEEK 40 years ago and Victrex's dedication to focusing on PAEK/PEEK thermoplastics are the foundation of this impressive catalogue of success.



“Innovator” and “solutions provider” may seem overused these days. However, they exactly describe Victrex's portfolio and services based on the high-performing Polyaryletherketone (PAEK) polymers on which the company has focused ever since it was established. Today, thermoplastics of this family, and in particular VICTREX™ PEEK, are used in countless applications, spanning aerospace, automotive, electronics, energy, manufacturing & engineering and medical.

Food & Beverage: Advancing applications based on

To help OEMs to meet the stringent regulatory and quality demands affecting the food equipment industry, Victrex is introducing a dedicated PEEK food grade portfolio at the Fakuma show. Compared to metals, the new “VICTREX FG™” family of high-performing thermoplastics offers additional benefits in terms of cost-effectiveness, productivity and performance for OEMs – and the neutral taste expected by consumers. Applications range from cookware and beverage dispensers for commercial and domestic use to industrial applications involving food-contact components in conveyor systems, aseptic processing, sensors, gears and nozzles. A “Forum” presentation during Fakuma on “3 Things to Consider for Reliable, Regulatory-Compliant Food Applications” will provide further insights.

Electronic appliances: lighter vacuum cleaner components with enhanced durability enabling lower noise and increased energy efficiency

In home appliances, the high-performance polymer has allowed designers to explore new approaches to the design of smaller, yet powerful, vacuum cleaner components. The ability to injection mould VICTREX PEEK to produce high engineering tolerance parts that are able to cope with high speeds, in some cases faster than 100,000 rpm (noting that jet engines only rotate at 15,000 rpm), while noise can be reduced by up to 50%, is impressive. The material's high stiffness-to-weight ratio also allows the impeller to maintain its shape at these high speeds, potentially resulting in stronger suction compared to more ductile materials. In addition, when replacing machined metal parts it can enable reductions in the weight of parts, thus reducing the size of motors and the components needed, and is resistant to a wide range of household chemicals, and heat and moisture. Injection molding contributes to potential cost savings for manufacturers compared to the machining parts from metals, and it also enables the rapid scaling up of new designs, shortening time to product launch and allowing faster, less capitally intensive, scaling up of manufacture.

Automotive E-motors: Will APTIV™ film end the quest for the ideal slot liner material?

With the automotive industry transitioning to electric vehicles, the quest for more efficient high-density e-motors and lower cost is still on. Most motor manufacturers have opted to use the Permanent Magnet Synchronous Machine (PMSM) since this type of motor has a higher efficiency and occupies less volume compared to other types of e-motors. As the PMSM is designed to cut off at temperatures that threaten to

damage its internal insulation, thermal management is a crucial performance factor for e-motors for electric vehicles – the design of the insulating system is, clearly, instrumental.

In search of the "dream" slot liner insulator, Victrex engineers undertook a simulation of replacing a 250-micron meta-aramid-PET-laminate slot liner material with 150-micron PEEK polymer based APTIV™ film. This simulation used a 40% thinner and more thermally conductive thermoplastic slot liner film which was shown to enable improved heat flow from the wire windings to the stator iron and outer-water-jacket cooling system. Additional simulations have shown the excellent thermal conductivity of APTIV™ film which enables improved thermal management and reduction of peak winding temperatures by 2-3°C compared to traditional laminates and helps the e-motor stay cool. With improved thermal management and thinner slot liners the simulations observed a potential increase in copper density (i.e. the slot-fill factor) of 2%. Last but not least, the simulations found a 5% increase in continuous torque output – this could translate into higher power output for a same-size machine.

Gearing up with PEEK polymers in powertrain applications

In automotive, VICTREX PEEK is already frequently used in powertrain components such as seal rings, thrust washers, bushings and bearings, whereas gears in demanding powertrain applications sound a rather unlikely candidate for metal-replacement by the polymer. However, with smaller and downsized engines, NVH (noise, vibration, harshness) is, today, one of the biggest challenges for OEMs and Tier1s, and Victrex's polymer gear solutions have shown a reduction in rattle and noise issues in engine applications by up to 50% (3dB). Compared to powdered metal gears, the weight and moment of inertia is also considerably lower with VICTREX HPG™ gears, contributing to higher system efficiency.

Game-changing composite solutions for aerospace

At the Fakuma show Victrex will also display a variety of VICTREX™ PAEK-based composite and hybrid overmolded composite parts for use in Aerospace. The company is currently partnering with customers to meet their engineering challenges through the use of innovative solutions that offer continuous manufacturing processes and cycle times measured in minutes versus hours for thermoset alternatives. Compared to their thermoset counterparts, which are in frequent use today, thermoplastic composites are vital to drive Aerospace build rates. To build the necessary supply chain, Victrex is also investing in a joint venture, TxV Aero Composites, with long-standing development partner Tri-Mack Manufacturing.

PEEK turns 40: reasons behind the success of a relatively young HPP

The inert properties of the versatile PAEK polymers are one of the main reasons for its success. This family of polymers is ideally suited to extreme and demanding environments. While alternative materials can meet specific needs, PAEKs/PEEKs are located at the top of the polymer pyramid and can support multiple requirements. Their properties include light weight, high strength, and high resistance to wear, temperature, fatigue and aggressive fluids/chemicals. Together, they can contribute to enhanced fuel efficiency, extended part life, greater comfort (smooth operation, less noise), more design freedom and greater cost efficiency.

The second important reason is that Victrex decided to strategically focus on this particular family of PAEK HPPs. As a result, over the last four decades, pioneering material developments, strategic decisions and close cooperation with customers set a course that arrived at, and then moved beyond, many milestones. Having achieved that progress, today Victrex continues "to shape future performance" with its PAEK/PEEK solutions, and that unwavering commitment to innovation and success is the focus and overarching motif at the company's Fakuma booth. It will also cast a first glow on PEEK's 40th anniversary in November.