

Beautiful Performance

Functional polymers to improve design
aesthetics and reduce overall costs



Perfect fit: function and design in harmony

High functionality combined with perfect appearance? That is exactly what customers expect today. But the quality and price must also be right, so that manufacturers can capture the pole position and beat competitors in the race to the customer. Engineering thermoplastics are a key success factor in this. Thanks to continuous further development, they can offer adaptable solutions for challenging individual requirements. Another benefit of Ticona's nearly 50 years of experience is a sophisticated range of materials leading to products that excite customers and increase their profits.

Functionality at a low price

With their broad spectrum of different and variously combinable properties, engineering thermoplastics have very often led the way. In applications as diverse as consumer electronics, household goods and appliances, the bathroom and plumbing sector and the automotive industry, these high-performance materials are meeting

high consumer expectations and setting new standards in quality and price. In many cases, innovative products could only have been developed with engineering thermoplastics and would have been impossible to achieve with metal or other plastics or, at least, not at a realistic market price.

Light and easy way to success

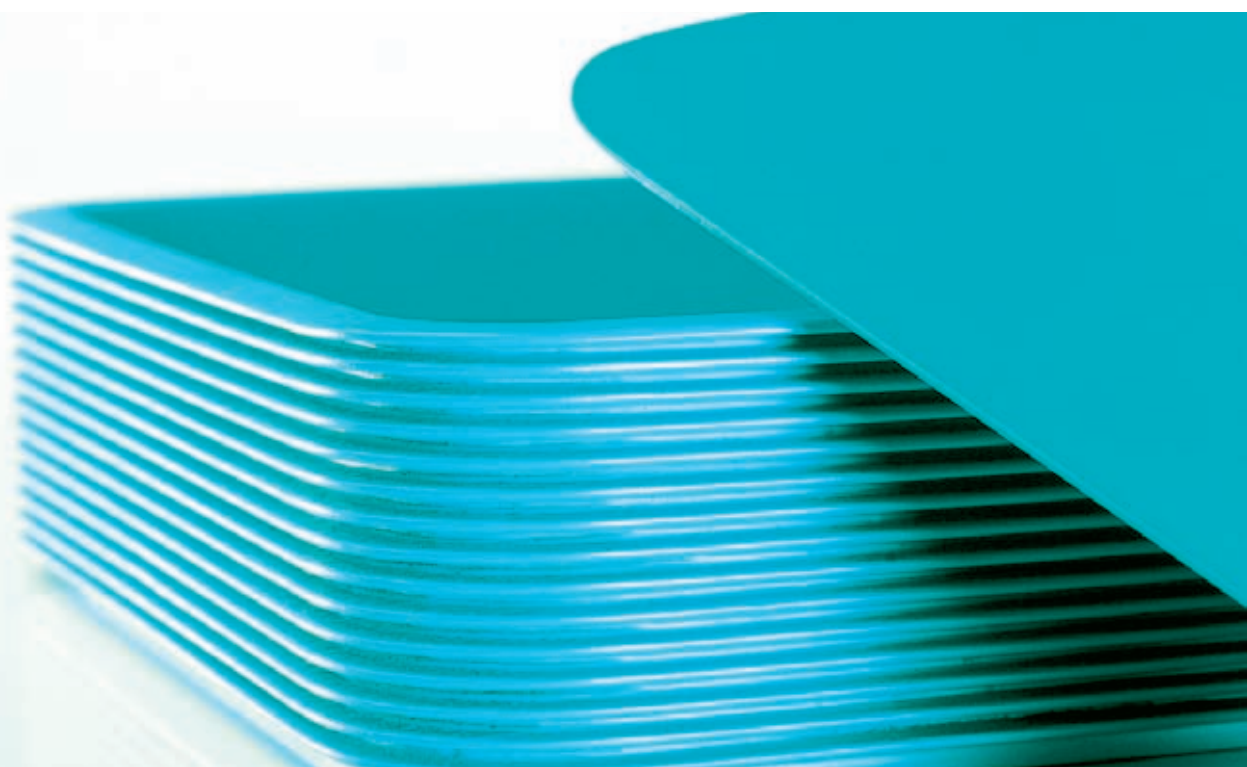
When it comes to the many special uses of engineering thermoplastics with their high thermal stability and mechanical stress resistance, one key factor is often the winner: light weight. Thanks to their considerably lower density, these very robust engineering materials weigh up to eight times less than steel.

The use of engineering thermoplastics also cuts production costs. Unlike in cost-intensive metal processing, additional operations such as painting or coating are unnecessary with these plastics. The aims of material

substitution include greater functionality, higher functional integration or fewer components, plus a longer service life for the complete product or individual components. All this must be achieved without any significant changes in behavior, appearance or surface touch over time.

Diversity of applications

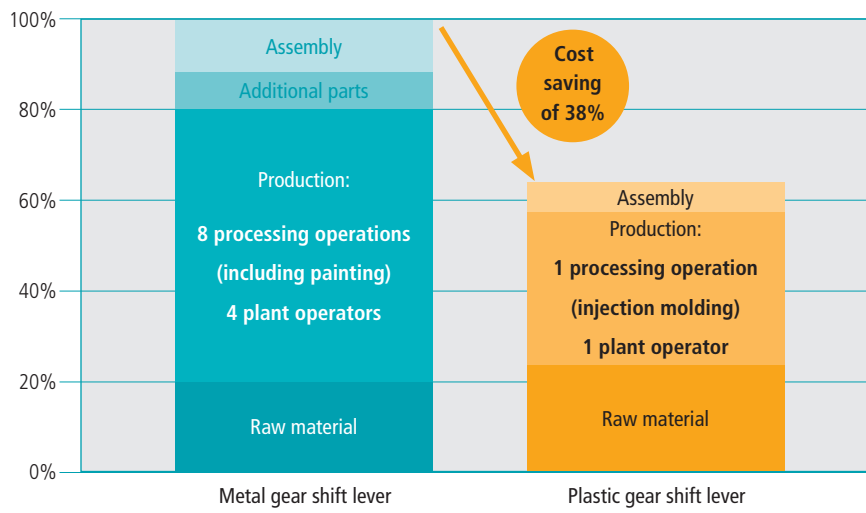
- Automotive industry: door handles, control knobs, loudspeaker covers, ventilation and associated decorative trim elements for dashboards, centre consoles and door structures
- Bathrooms and plumbing: showerheads, taps, pipes and brackets and decorative trim, also swimming bath and spa components
- Household appliances: knobs, handles, housings, racks, faceplates/covers, air vents and decorative trim elements





Plastic beats metal

Cost reduction with example of a gear shift lever



To create surfaces that look right, a wide range of colors, special metallic or matt effects, high scratch resistance and good UV stability are extremely important. With Ticona's special materials, rusting metal and peeling paint are now a thing of the past. There are other very important advantages for processors, manufacturers and consumers: depending on the requirements of the intended application or processing method, Ticona can supply polymers that are emission-free, inherently fire-retardant (without heavy metal additives or halogen compounds), and suitable for lead-free soldering. Some polymers even have the necessary approvals for use in contact with food or medicines. Special laser-markable plastics offer additional opportunities – not just in medical technology but also in automotive engineering and the electrical/electronics sector.

- + Good functional integration allowing the number of components and/or assembly costs to be reduced
- + Wide design freedom in terms of form, function and coloration
- + Many special effects such as metallic look, matt finishes, laser-markable colors
- + High cost-saving potential: additional operations (painting, coating) and the associated handling, transport and quality control costs are eliminated
- + Lower weight – four to eight times lighter than steel
- + High resistance to chemicals and corrosion
- + Recyclable and eco-friendly
- + Long service life without compromising function and appearance
- + Suitable for large and very small components

Function meets design: the right material for a successful product

Individual solutions through wide choice of materials

Hostaform® POM

The all-rounder: Hostaform® POM is used in almost all industries and sectors. This polyoxymethylene copolymer from Ticona has excellent material properties, which can be combined or modified in many different ways. Over 50 specialty products, customized with high-quality reinforcing materials or additives, are available for functional design solutions.

Properties

- Long-standing experience (over 40 years)
- High strength and stiffness
- Good heat resistance (continuous service temperature up to 100 °C)
- Good conductive and non-conductive properties (CTI 600)
- Inherently abrasion-resistant, low wear
- Resistant to environmental stress cracking
- Good light and weathering resistance
- Comfortable haptics
- Excellent resistance to chemicals such as fuels and strong alkalis (pH 4 to 14)
- Moisture-resistant (0.2%)
- Low emissions (XAP grades)
- High toughness (down to -40 °C)

Celanex® PBT

Tough performer: Celanex® PBT is the plastic for top-quality components designed to withstand high service stresses. Its excellent strength, stiffness and impact resistance, even at high temperatures, are exploited to advantage in automotive engineering, the electrical/electronics sector, household appliance manufacture and medical technology. This polybutylene terephthalate (PBT), with or without glass- or mineral-fiber reinforcement, can be very successfully processed by, for example, injection molding and extrusion or also MuCell®-microfoam technology* to produce relatively lightweight parts in fast cycles.

Properties

- High hardness, stiffness and strength
- Impact strength and heat resistance up to 140 °C
- Resistant to many different chemicals, solvents, oils and fats
- Very good sliding friction properties
- Excellent dimensional stability
- Low moisture absorption (< 0.2%)
- Excellent electrical properties, high insulation resistance
- Flame retardant as per UL-94 flammability test (V-0 at wall thicknesses up to 0.8 mm, in some cases 5 VA)
- Easy to process, excellent flow properties, minimal flash

Riteflex® TPC-ET

Enormously flexible: elasticity is one of the special advantages of thermoplastic copolyester elastomers. All Riteflex® TPC-ET grades have rubber-like properties but, like thermoplastics, can be processed exceptionally easily and cost-effectively. Thanks to their sophisticated combination of hard and soft segments, they also achieve many properties characteristic of thermosetting elastomers.

Properties

- Very high elasticity
- High impact resistance and ultimate tensile strength and excellent tensile and flexural fatigue strength over a wide temperature range from -40 °C to +120 °C
- Extremely good dimensional stability, low wear due to high abrasion resistance
- Excellent chemical resistance and aging stability
- Good moisture resistance
- Excellent surface properties and good coloration properties
- Easy and cost-effective melt processing
- Different shore D values 35 – 77

*MuCell® is a registered trademark of Trexel, Inc.

Vectra® LCP

For that little extra: the characteristic feature of liquid crystalline polymers is their combination of very high heat resistance and tensile strength. This makes them superior to many other high-temperature plastics. Vectra® LCP can be used as an efficient alternative to ceramic materials, metals or thermoset resins. Our comprehensive range of patented LCP polymers includes glass-fiber- and mineral-reinforced injection molding grades as well as special grades for improved metalizability, slip properties, anti-static properties and other performance characteristics. Ticona supplies Fortron® PPS high-temperature plastic as another material for high-performance applications.

Properties

- Very high precision, dimensional stability and low thermal expansion coefficient, ideal for close tolerances (+/- 0.005 mm)
- High stiffness without warpage, even in thin-walled profiles up to 0,8 mm
- Very low heat of fusion (very fast cycles possible)
- Very good chemical and oxidation resistance
- Continuous service temperatures from -196 °C to +280°C
- Inherently flame retardant (UL 94 V-0, in some cases 5 VA)



Celstran® LFRT

Three in one: function, comfort/appearance and safety are the hallmarks of our long-fiber-reinforced thermoplastic (LFRT), which – like Fortron® PPS – is a very good substitute for metals. Wherever the aim is to replace metals cost-effectively by modern, weight-saving, 100% recyclable materials, and filled or short-fiber-reinforced thermoplastics cannot satisfy certain component requirements, Celstran® LFRT is the material of choice. LFRT technology is not confined to glass fibers. Stainless steel, carbon, aramid and other reinforcing fibers can also be incorporated to obtain the right property profile for a variety of challenging applications.

Properties

- Twice the impact strength of short-fiber-reinforced materials; three times the notched impact strength
- Low creep, warpage and shrinkage
- High dimensional stability
- Impact strength, stiffness and hardness maintained over a wide temperature range
- Excellent resistance to heat deflection under load
- Good sliding properties and abrasion resistance
- Cost-effective processing and fast cycles in component production





Special effects

Color sells

Ticona brings color into play: pre-mixed with pellets and granules at the molecular level. The great advantage of this is that components and products are just the right shade and colored right through, and are thus less prone to visible scratching. Cost-intensive painting or coating, with the extra logistics costs and environmental pollution they bring, are now a thing of the past.

Defying ultraviolet waves: like new, even after years of exposure

The sun gives plastics a hard time. They fade and become brittle. But not with UV-resistant polymers. To ensure that components exposed to ultraviolet rays retain their function and appearance over many years, Ticona has provided a range of its plastics with extremely effective additives.

Colored polymers

- Optimally matched shades
- Rapid adaptation to color trends
- Lower component costs
- No additional processing operations such as painting or coating
- Better environmental and cost balance as a result of reduced handling, transport and quality control costs

UV-resistant polymers

- Light resistant and weathering-resistant over many years
- Supplied in special colors for automotive interior applications
- Soft-touch effect possible (Riteflex® TPC-ET)
- weathering-resistant for outdoor applications

Brilliant effects with MetaLX™ polymers

Metal effects and the design freedom offered by high-quality thermoplastics: Ticona MetaLX™ polymers help manufacturers impress their customers with attractive design achieved at low cost. Plastics no longer need to be painted, so eliminating the problem of paint scratching or flaking. When used to replace metals or painted plastics, these special polymers not only reduce production costs but also contribute to environmental protection. And in just the same way, MetaLX™ polymers – Hostaform® POM, Celanex® PBT, Riteflex® TPC-ET and Vectra® LCP – also make something special out of your products.

Advantages of MetaLX™

- Excellent mechanical properties
- UV- and heat-resistant colors
- Attractive finishes with accurate mold surface replication
- Excellent documented resistance to automotive fuels and fluids
- Dirt-repellent and good scratch resistance
- Match metal parts perfectly or enhance them in an optimum way
- Do not conduct heat, unlike metals
- Do not show fingerprints

In-mold decoration: successful double act

In-mold decoration (IMD) offers far-reaching design freedom in the production of complex components. In this process, materials such as metal, fabric, wood veneer or glass are combined with engineering thermoplastics in a molded part. By using IMD, it is possible to obtain completely new decorative and surface effects such as cool-touch, metallic-look, scratch-proof, heat-resistant or textured surfaces. But technical functions, such as electrical or thermal conductivity can also be integrated in this way.

Advantages of IMD

- New primer technologies allow Ticona polymers to be bonded with other materials
- The combination of plastic with a decorative material opens up completely new design opportunities
- Functional integration through the use of Ticona plastics
- Production in a single processing step, resulting in high flexibility and cost-efficiency

Laser marking: clearly the best

Abrasion-resistant, high-contrast markings for functional or decorative applications: with laser marking, characters and letters remain permanently legible. Even parts with complex geometries can be rapidly and precisely marked with a laser after the injection molding operation. Thanks to special software, design changes can be quickly implemented. Ticona supplies a range of polymer grades, specially developed for laser marking, which increase productivity and speed up cycles through the elimination of additional operations.

Advantages of laser marking

- Permanently clear, sharp markings or images on surface of parts
- Precision placement of markings and letters on parts with complex geometries (including irregular and curved surfaces)
- Rapid design changes thanks to programmed softwares, i. e. equential bar coding
- No pre- or post-molding treatment required
- No rejects from additional marking steps
- No use of solvents, so no solvent disposal required
- No adverse effects due to surface wetting of the part
- Relatively low operating and maintenance costs through elimination of consumables such as ink



Plastics know-how at first hand

Our skills and experience for your application

Ticona, a business of Celanese Corporation, is one of the world's leading manufacturers of engineering polymers. The company has been established for many years in the area of injection molding applications in key markets such as the automotive, electronics and telecommunications industries and medical technology. Thanks to their high-performance characteristics, the plastics successfully used there also offer promising potentials for other technologies and fields of application – especially for extrusion.

Ticona is more than just a materials supplier. As a manufacturer of plastics, the company offers its customers comprehensive customer service. Along with intensive project consulting, this also includes support in the selection and development of materials. In the area of injection molding applications, we support our customers in the design of components and molds, CAE calculation and the optimization of production processes.

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