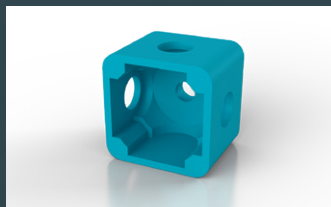


Engineered Thermoplastic Aerospace Solutions



Engineered Molded Solutions

Torlon® (PAI - Polyamide-Imide)

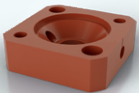


Trelleborg Sealing Solutions is a certified Torlon® PAI processor for all injection molding grades. Polyamide-imides combine the processing advantages of thermoplastic materials with thermoset performance. PAI's are amorphous polymers that demonstrate exceptional mechanical, thermal and chemical resistance.

- Unfilled resin has the tensile and flexural strengths almost equal to polycarbonate and polyamide at room temperature.
- Exceptional strength at 260°C (500°F)
- Material is available in structural and bearing grades. Bearing grades can be enhanced with lubrication and dry surface treatments.

Torlon® is a registered trademark of Solvay.

HiMod® PEEK (Polyetheretherketone)



Seals in aerospace applications must withstand extreme conditions. To meet virtually any sealing requirement, Trelleborg Sealing Solutions offers a full range of PEEK manufacturing capabilities. PEEK materials can be manufactured to almost any shape to fit nearly any application, from the most basic components to the unique custom parts that

may be required for structural components, housings & bearings.

PEEK material is prepared for machining using a process of injection molding the material into tubes or billets. Final geometries in PEEK material are either injection-molded or near size pieces are injection molded and then machined for higher precision.

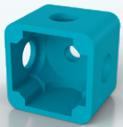
PEI (Polyetherimide)



PEI resin is an amorphous thermoplastic offering exceptional elevated thermal resistance, high strength and stiffness, and broad chemical resistance. PEIs are available in transparent and opaque custom colors, as well as glass-

filled grades. PEI resins create a balance of both mechanical properties and processability, enabling design engineers to generate uniquely crafted solutions for diverse operating conditions and environments.

PPS (Polyphenylene Sulfide)

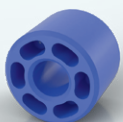


PPS compounds are high performance, engineered thermoplastics:

- Thermal Stability: maximum service temperature 218°C (424°F) with short-term temperature resistance up to 260°C (500°F)

- Dimensional Stability: complex parts can be molded to very tight tolerances and will maintain dimensional stability at elevated temperatures
- Chemical Resistance: resistant to a wide variety of solvents and corrosive chemicals

Polyimide-based plastics

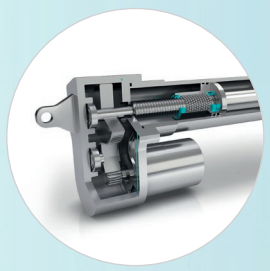


Trelleborg's polyimide-based plastics withstand high service temperatures and demonstrate good chemical resistance, electrostatic control and low outgassing.

Polyimide-based plastics offer extremely high temperature and creep resistance and can be used in high heat environments where other thermoplastic materials lose their mechanical properties. Our wide variety of formulations includes low friction and wear grades.

- Thermal Stability: exhibits very low creep and high tensile strength during continuous use at temperatures up to 232°C (450°F) and as high as 704°C (1299°F) for short periods
- Dimensional Stability: outstanding dimensional stability with low particle shedding
- Durability: used in demanding applications where exceptional strength and impact resistance are desired.

The aerospace industry is continuing to evolve. There is a long-term trend towards the adoption of new, greener materials and solutions that provide weight reduction without compromising performance or life.



Hydraulics & Actuation

From Piston Rings to Clamp Blocks, Trelleborg offers a wide range of thermoplastic components and assemblies used in hydraulics and actuation systems. Our expertise and resources utilize the most advanced technologies and designs to ensure ultimate reliability in high pressure, high cycle and high sideload applications.



Structures

Lightweighting is an effective way to increase the efficiency of aircraft. Trelleborg continues to develop and expand its portfolio of high-performance thermoplastics, which can be used in place of traditional metal structures.



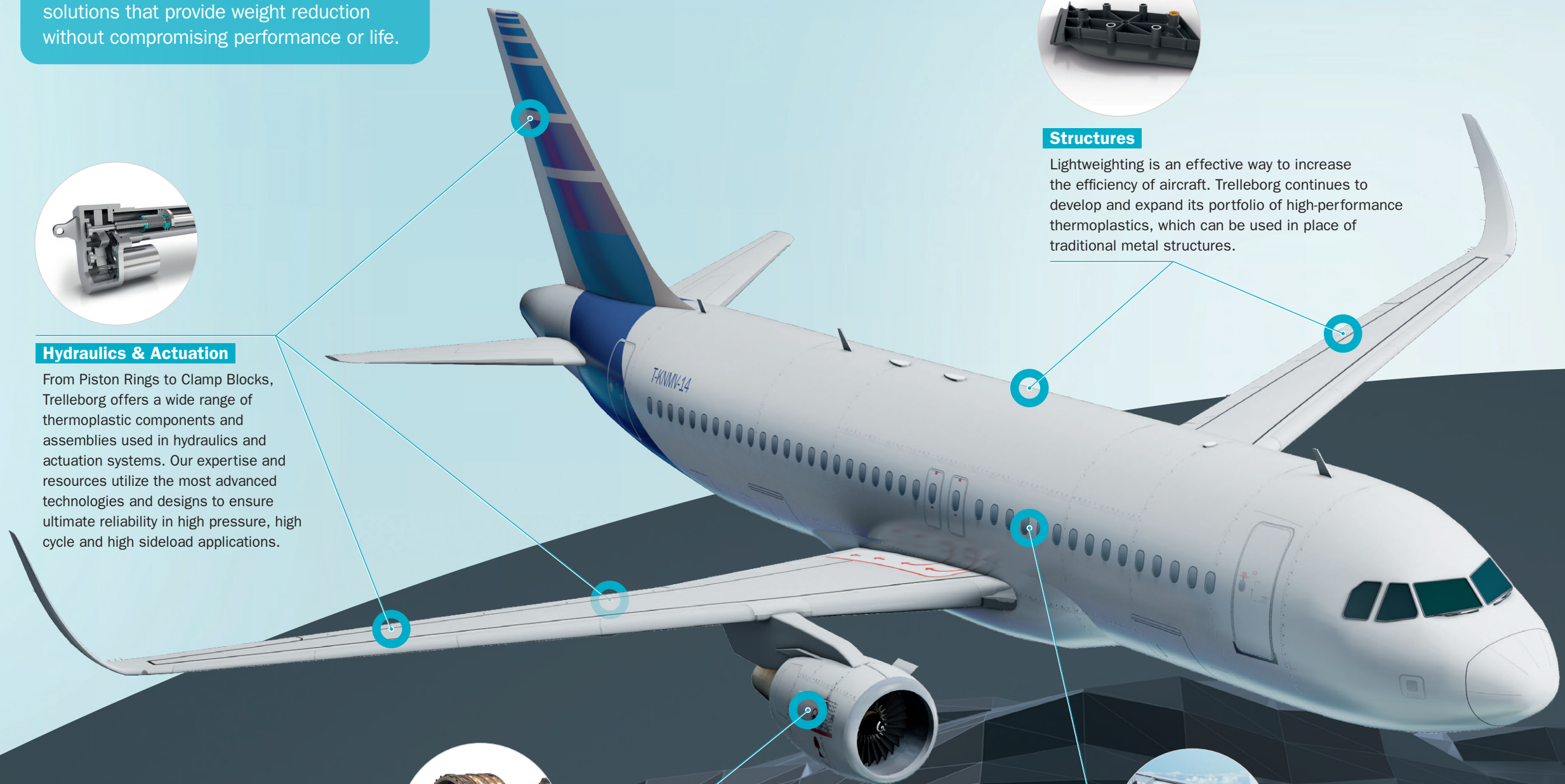
Engines

Trelleborg offers a wide range of thermoplastic components and assemblies for use in and around aircraft engines. From fairings to washers and bushings, complexity, size and design depend heavily on the application. Typical requirements include operation within a wide temperature range, media resistance, and long-lasting performance.



Interior Components

From fully custom parts to housings and bezels, Trelleborg offers manufacturing and engineering support to develop and produce a range of aircraft Interior components.

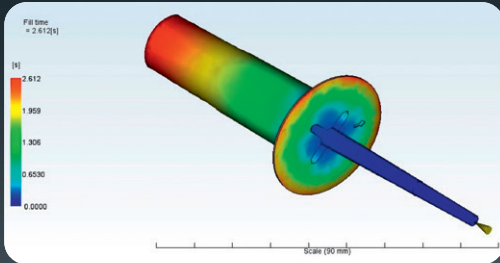


- Engine**
 - OGV Fairings
 - Fan Cowling Vent
 - Shrouds
 - Bearings
 - Gears
 - Ball valves
 - Washers
 - Bushings
 - Clamp Blocks & Grommets
 - Hydraulics & Actuation**
 - Hydraulic Piston Rings
 - Backup Rings
 - Scrapers
 - Gears
 - Bushings and Bearings
 - Thrust Washers
 - Clamp Blocks & Grommets
 - Landing Gear**
 - Bushings and Bearings
 - Interior Components**
 - Brackets/Supports
 - Housings
 - Corners and Caps
 - Bumpers
 - Bezels
 - Ventilator System Components
 - Structures**
 - Routing and clipping
 - Wear pads
 - Specialized fasteners
 - Wing components
 - Fuselage components
 - Fuel system components
-
- Value-added services:**
- Machined Prototypes
 - Injection Molding – 17 to 900 tons
 - Assembly – automated and manual
 - Special cleaning (cleanroom)
 - Custom kitting solutions
-
- Certifications & Approvals:**
- AS9100
 - ISO 9001-2015
 - ISO 14001
 - OHSAS 18001
 - FAA TSO/C-150

SIMULATION CAPABILITIES

Mold Flow Analysis

Trelleborg Sealing Solutions utilizes advanced software for plastic injection molding simulation, to streamline new product introduction and reduce manufacturing defects.



FEA

Trelleborg supports custom simulation requests for various aspects of a part development and assembly. Utilizing our analytical lab, we can also create material models that can be tested in different simulations to ensure more accurate and timely predictions.

THERMOPLASTIC DEVELOPMENTS

Research & Development

- Material optimization for: wear resistance, temperature profiles, strength, electrical properties
- Lubrication additives, including PTFE, graphite and MoS₂
- Customer application testing and support
- Rapid prototyping
- Material characterizations and analytical laboratory



MATERIALS

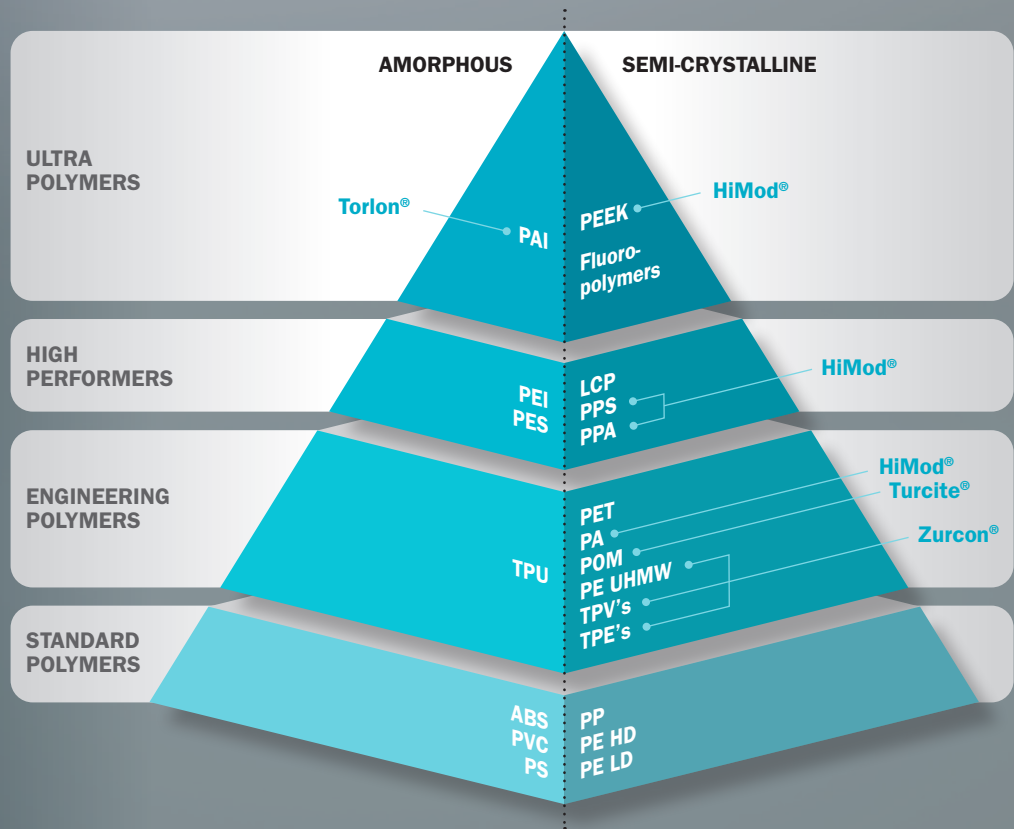
AMORPHOUS

- PAI:** Polyamide-Imide
- PEI:** Polyetherimide
- PES:** Polyethersulfone
- TPU:** Thermoplastic Polyurethane
- ABS:** Acrylonitrile Butadiene Styrene
- PVC:** Polyvinyl Chloride
- PS:** Polystyrene

SEMI-CRYSTALLINE

- PEEK:** Polyetheretherketone
- LCP:** Liquid Crystal Polymer
- PPS:** Polyphenylene Sulfide
- PPA:** Polyphthalamide
- PET:** Polyethylene Terephthalate
- PA:** Polyamide
- POM:** Polyoxymethylene
- PE UHMW:** Polyethylene Ultra High Molecular Weight
- TPV:** Thermoplastic Vulcanizate
- TPE:** Thermoplastic Elastomer
- PP:** Polypropylene
- PE HD:** Polyethylene High Density
- PE LD:** Polyethylene Low Density

HiMod®: Trelleborg proprietary materials modified for improved performance



Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

Trelleborg Sealing Solutions is a leading developer, manufacturer and supplier of precision seals, bearings and custom-molded polymer components. It focuses on meeting the most demanding needs of aerospace, automotive and general industrial customers with innovative solutions.

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