FLY TOWARDS FUTURE PERFORMANCE
PEEK POLYMER SOLUTIONS FOR THE AEROSPACE INDUSTRY
Fuel costs account for more than 35% of an airline’s overhead. This volatile cost, along with fossil fuels being a limited natural resource, has put added pressure on aircraft manufacturers to deliver new levels of fuel efficiency. Analysts also believe that 35,000 new aircraft will be needed over the next 20 years in order to replace ageing fleets and to meet civilian flight demands. The industry is booming and airplanes need to fly off the assembly line to fulfill the backlog of orders. Aerospace engineers facing these challenges are seeking innovative technologies to develop fuel-sipping, easily-assembled, and low maintenance aircraft. One key to achieving this is metal replacement. Victrex has been working with leading companies for more than three decades to deliver PEEK polymer solutions that replace metals, thermosets and other plastics and can be found flying on more than 15,000 aircraft today. With our cutting-edge polymeric solutions and technical expertise, we can work together to soar past the obstacles of today into a brighter tomorrow. 

Reducing manufacturing and operating costs, helping the environment, improving assembly efficiency, and a reliable track record…that’s future performance.
**YOUR BENEFITS**

**LIGHTER COMPONENTS**
VICTREX® PEEK solutions are up to 70% lighter than metals while maintaining an equivalent strength and stiffness. Scrapping 45kg (100 lbs.) of metal per plane in a fleet of 500 can result in up to $5,000,000 in fuel savings along with 17,000 tons of CO₂ emission reductions each year.

**SMARTER DESIGNS**
Simplify, standardize, and consolidate parts by designing a highly-functional injection molded VICTREX PEEK component. Optimized components have led to 75% faster part assembly times. Our customers have realized faster cycle times and lower manufacturing costs with smarter thermoplastic designs.

**LONGER LIFE**
An unscheduled production downtime for a single-aisle aircraft can cost $120,000 per day. Whether it’s aggressive aerospace fluids or a broad temperature range, VICTREX PEEK can help your parts survive the extremes and reduce maintenance cycles. Along with high mechanical properties and low fire, smoke, and toxicity emissions, these thermoplastic solutions can help achieve a new level of reliability.

**REST ASSURED**
VICTREX PEEK has been specified by aerospace engineers from Airbus, Boeing, COMAC, the FAA, and military organizations for 25 years. Our solutions are flying on more than 15,000 aircraft today.

**ON-TIME DELIVERY**
Our investment in a 70% capacity increase, a presence in more than 30 countries, and 3-7 day lead times shows our dedication to providing a stable supply chain for our customers.

**70%**
LIGHTER THAN METAL PROVIDING EQUIVALENT STRENGTH AND STIFFNESS

$5,000,000
REMOVING 45 KG (100 LBS) ON 500 AIRCRAFT RESULTS IN UP TO 5,000,000 USD IN ANNUAL FUEL COST SAVINGS

**75%**
FASTER PART ASSEMBLY TIME

15,000+
PEEK FLYING ON MORE THAN 15,000 AIRCRAFT

**SMARTER DESIGNS LIGHTER COMPONENTS**
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VICTREX is the inventor of PEEK and has focused on developing high performance polymeric solutions for more than three decades. This dedication provides us with a wealth of polyketone knowledge that no other material supplier has. By working together, we can turn the toughest challenges into benefits. Our collaborative approach in providing only the most innovative and highest-quality solutions enables the industry to reach new heights today and tomorrow.

VICTREX® PEEK

VICTREX® PEEK is THE metal replacement material that can enable optimum performance. Optimize the designs of your next-generation components to achieve significant weight savings with our vast portfolio of polymers.

- 70% lighter vs. steel
- 55% lighter vs. titanium
- 40% lighter vs. aluminum

Injection molding unfilled, carbon-fiber reinforced, and glass-filled grades

Proprietary grades available to achieve thinner wall sections, higher modulus, and minimal wear

VICTREX® PEEK is THE metal replacement material that can enable optimum performance. Optimize the designs of your next-generation components to achieve significant weight savings with our vast portfolio of polymers.

APTIV® FILM

Take advantage of the properties of VICTREX® PEEK in a thin film format for demanding aerospace systems. By offering unmatched processing opportunities, APTIV film allows for the design of durable, lightweight solutions.

- Up to 60% lighter vs. polyvinyl fluoride (PVF) film
- Laminate, seal, weld, metallize, and many more
- Available in thicknesses from 5 to 750 microns

Lightweight tubing manufactured from VICTREX® PEEK polymer can be used for protective sheathing, cable conduits and low pressure fluid transport systems. Benefit from the ability to custom design tubing systems to fit your spacing requirements.

- 60% lighter vs. stainless steel
- 45% lighter vs. titanium
- 33% lighter vs. aluminum
- Bend, form, fit, flare, and clamp

Excellent corrosion resistance and fire, smoke, and toxicity properties

VICTREX® PIPES™

Lightweight tubing manufactured from VICTREX® PEEK polymer can be used for protective sheathing, cable conduits and low pressure fluid transport systems. Benefit from the ability to custom design tubing systems to fit your spacing requirements.

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Proprietary grades available to achieve thinner wall sections, higher modulus, and minimal wear

POLYMERS FOR COMPOSITES

Combine strength and light weight by specifying VICTREX® PEEK as a composite matrix material. This innovative technology allows engineers to design for the most demanding environments.

- Up to 70% lighter than metal alloys
- 5x higher specific strength
- 4x higher specific stiffness vs. aluminum

Bend, form, fit, flare, and clamp

Excellent corrosion resistance and fire, smoke, and toxicity properties

VICOTE® COATINGS

Durable VICTREX® PEEK coatings enhance the lifetime of metal substrates while being friendly to the environment. Enhance the performance of your components with Victrex liquid and powder dispersions.

- Up to 60% lighter vs. polyvinyl fluoride (PVF) film
- Laminate, seal, weld, metallize, and many more
- Available in thicknesses from 5 to 750 microns

Excellent resistance to wear, abrasion, high heat, creep, and chemicals

Halogen-free with no additives

PERFORMANCE BY DESIGN
Victrex collaborates with industry-leading companies to turn demanding challenges into benefits. We have seen it all from weight reduction goals and design optimizations to performance in harsh environments and system cost-downs.

Our PEEK expertise allows us to provide unmatched application development support to help in the manufacture of next-generation components.

Involve us from the beginning – we can get there together.

**APPLICATIONS**

**RIGOROUSLY TESTED.**

**CUSTOMER APPROVED.**

Amphenol PCD designed a new lightweight connector from VICTREX® PEEK polymer. The durable polymer helps engineers reduce installation times while increasing the lifetime of the part.

**CONNECTORS**

**Fasteners**

- Up to 9% weight savings vs. metal
- Passed requirements after being tested in 70°C (160°F) hydraulic fluid for 1,000 hours

**Connectors**

- Up to 80% lighter vs. metal
- Up to 4x higher fatigue strength vs. metal
- Passed requirements after being tested in 70°C (160°F) hydraulic fluid for 1,000 hours

**Clamps and Stand-Offs**

- 20% weight reduction vs. metal
- 30% faster to install vs. metal
- Elimination of anti-corrosion treatments

**Structural Brackets**

- Up to 70% lighter vs. metal
- Manufacture parts in minutes compared to hours for thermosets
- Elimination of anti-corrosion treatments

**Thermal Acoustic Insulation**

- Up to 60% lighter vs. PVF film
- Film supplied in standard widths to meet aircraft insulation formats
- Passes latest FAA burn-through barrier and cover film laminate testing

**Tubing Systems**

- Up to 33% lighter vs. metal
- Bend, flare, and form to meet spacing requirements
- Excellent corrosion resistance and low fire/smoke/toxicity emissions

**Connectors**

- Up to 9% weight savings vs. metal
- Consolidated several clips into a one-piece component

**Fasteners**

- Up to 80% lighter vs. metal
- Up to 4x higher fatigue strength vs. metal
- Better corrosion resistance and vibration dampening vs. metal

**Amphenol PCD worked with our team to specify VICTREX® PEEK in system attachments for the Boeing 787. The lightweight, ergonomic, and highly durable design is helping engineers reach new heights.**

**Clamps and Stand-Offs**

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Blow Molded Ducting
Burn-Through Barriers for Cargo Holds
Burn-Through System Cover Film
Cargo Door Nut Plate
Cargo Liner Support
Door Hardline Drain Ports
Electric Wire Bundle
Clamps

Cable Conduit Tubing
Cable Ties and Harnesses
Electrical Connectors
Mounts and Spacers
Electromagnetic Effects Spacers
Engine Bearing Cages
Engine Seals Engine Stators and Fans
Environmental Control Systems Ducting Insulation
Fasteners Floor Panels and Engine Nacelles/Housing

Fluid Sensor Housing Fuel/Hydraulic Brackets
Fuel Level Probe Brackets Fuel Line Isolators
Fuel Tank Manhole Covers Fuselage Structures
Impeller Blades Inlet Guide Vanes
Internal Laminations Landing Gear Hubcaps
Lightning Strike Protection Film Laminates
Low Pressure Ducting with Pressure Valves
Pylon Fairings Quarter Turn Clips
Radomes Spanner Brackets
Speed Sensors Stand-offs

Thermal Acoustic Bracket Insulation Films
Tube Connectors and Fittings
Tubes, Ducts, and Convoluted Tubing Tubing Clamps
Wall Panel Composite Structures
Water Separator Wire Coating
Wire Harness Protection Wire Labels

APPLICATIONS
Take advantage of talking to the people that invented PEEK and can reference the largest polyketone database of testing in the world. Our scientists and engineers go the extra mile to make sure that our customers have all of the information they need when designing their critical components.

We welcome the opportunity to use our three decades worth of knowledge to help speed up your application developments.

HIGH MECHANICALS AT LIGHTER WEIGHTS

VICTREX PEEK 90HMF40 injection molding grade and VICTREX PEEK-based composites can provide engineers with equal part stiffness and strength at up to 55% lighter weights when compared to aerospace metals as seen in Figures 1 and 2.

STABILITY ACROSS BROAD TEMPERATURE RANGE

With some applications enduring long-term exposure to high temperatures, VICTREX PEEK is able to maintain its tensile strength with no performance loss over 5,000 hours at 260°C (500°F). (Figure 3). VICTREX PEEK also exhibits high mechanical properties at extremely low temperatures down to -65°C (-85°F).

FATIGUE RESISTANCE

VICTREX PEEK 90HMF40 polymer provides up to 100x longer fatigue life than typical aerospace aluminum alloys as seen in Figure 4.

PERFECTION IS A SCIENCE
MATERIAL DATA

PERFECTION IS A SCIENCE

CHEMICAL RESISTANCE

VICTREX PEEK is widely regarded as having excellent resistance to chemicals over a wide temperature range as seen in Figure 5. VICTREX PEEK has also been specified in areas that are exposed to insecticides as the chemical compound can cause damage to critical components made from other plastics such as PEI.

LOW FIRE, SMOKE AND TOXICITY RATING

VICTREX PEEK performs well when subjected to fire due to its inherently flame retardant. When compared to other plastic materials, this thermoplastic has the lowest value of specific optical density of all the materials tested (Figure 6).

DIMENSIONAL STABILITY

Filled VICTREX PEEK grades are comparable to metals in that polymers reduce the coefficient of expansion ultimately leading to less risk arising due to differential expansion.

HIGH STRENGTH-TO-WEIGHT RATIO

Reinforcing VICTREX PEEK with chopped glass or carbon fibers helps the material meet or exceed the strength and stiffness of aerospace metals. This thermoplastic also delivers high mechanical properties well past the glass transition temperature due to its semi-crystalline structure (Figure 8).

Figure 5: Retention of Tensile Strength of VICTREX PEEK 450G After 4 Weeks Immersion in a Range of Chemical Species

Figure 6: Forced Combustion Chamber Smoke Results for a Range of Polymers

Figure 7: Coefficient of Linear Expansion in Flow Direction of VICTREX PEEK Polymer-Based Materials in Comparison with Other Common Aerospace Materials

Figure 8: Specific Strength of VICTREX PEEK Polymer-Based Materials in Comparison with Other Common Aerospace Materials
Victrex is an innovative world leader in high performance polymer solutions with products sold under the brand names of VICTREX® PEEK, VICOTE® Coatings, APTIV® film and VICTREX Pipes™. With production facilities in the UK backed by sales and distribution centers serving more than 30 countries worldwide, our global sales and technical support services work hand-in-hand with OEMs, designers and processors offering assistance in the areas of processing, design and application development to help them achieve new levels of cost savings, quality, and performance. www.victrex.com

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