It’s Time to Scrap Metal Gears
LIGHTWEIGHT FOR HEAVY USE

Across all industry sectors, engineers designing gears are facing many simultaneous challenges. Solutions need to contribute to improved reliability, reduced noise, vibration, harshness (NVH) and greater efficiency, fit the trend for smaller components, and at the same time provide more design freedom and lower overall system costs compared to precision metal gears. VICTREX PEEK polymer is being used in an increasing number of applications where traditional metal components have been specified but no longer meet engineering requirements and it is well on the way to becoming the new reference in high performance gear applications.

Gears made of VICTREX® PEEK offer the following benefits compared to metal

- Up to 70% weight reduction
- Up to 80% reduced moment of inertia
- Up to 50% (3 dB) noise reduction
Many companies still rely on metal gears only – but many others, for good reason, don’t! Industry leaders are now deploying new materials for their performance and cost benefits. Many of these innovations already rely on the advantages of our highly versatile VICTREX PEEK polymers.

Are you an OEM, designer or processor, who wants to move ahead of the competition? The outstanding mechanical and tribological properties of VICTREX PEEK meet the spectrum of complex mechanical demands for gear wheels perfectly. Being a true metal replacement option VICTREX PEEK performs successfully under extreme conditions and provides key benefits during all phases of the manufacturing process.

**VICTREX® PEEK used in reliable and efficient gear solutions**

▲ Higher comfort, less noise and vibration from a high damping capacity and extended design options

▲ Lower energy consumption due to significant weight reduction

▲ Improved responsiveness from a reduced moment of inertia

▲ Enhanced lifetime and extended service intervals due to very low friction and wear, corrosion resistance, and reduced need for lubrication

▲ Can be used in the most demanding environments due to its excellent resistance to chemicals, oil particle contamination and all known automotive fluids

▲ No swelling or loss of strength due to moisture absorption

**Superior to metals:**

**Manufacturing at lower costs**

▲ Lower investment for high-volume production due to injection-molding manufacturing process compared to precision metal gears

▲ Faster production ramp-up and greater design freedom

▲ No secondary machining, hardening or finishing operations required

▲ Possibility of hybrid technology with metal, composites and other plastics

To support your decision to **scrap metals and rely on VICTREX PEEK** we can provide you with all the information you need. For example: data on noise and vibration or durability as well as further advice depending on your individual challenges.

Just ask our experts and trust in our application testing and development capabilities with two state-of-the-art test rigs for polymer gears.

Many of our partners already know VICTREX PEEK’s proven outstanding material properties for use in gear applications and its benefits compared to metal. **We invite you to join their experience.**
Significant rattle noise reduction:
Perception of quality via the senses

Gears made of VICTREX PEEK run noticeably smoother. This results from the high damping capacity of the material and leads to reduced contact stress and higher contact ratios. For the human ear, up to 50% noise level reduction can be achieved by the lower noise, vibration, and harshness of VICTREX PEEK gears compared to metal gears.

Sound level comparison between iron and VICTREX® PEEK gears at various loads and speeds

Thermal resistance for enhanced lifetime and reduced maintenance costs

Because of its high retention of mechanical properties at elevated temperatures and in hostile chemicals and moisture, VICTREX PEEK offers significant advantages over other gear materials and meets the industry’s requirements for longer lifetime in more demanding environments.

The next generation

Vicrez has developed a new PEEK for use in gear applications, improving the already excellent properties of VICTREX PEEK 450G, and offering enhanced lifetime in lubricated applications. The new VICTREX PEEK confers the technical and economic advantages of PEEK to even the most demanding gear applications, for example in automotive engines and transmissions, high speed printers and copiers and pumps in medical devices.
Success Stories of VICTREX® PEEK Gear Applications

Every industry has its own requirements. By talking and listening to our customers, we can contribute the right know-how and material solution according to the given needs. This level of support enables our partners, OEMs, and Tiers or their suppliers, to develop the right solution.

**Balance shaft gears: Smoother running and higher system efficiency**

To move ahead of its competitors, Metaldyne, an industry leader in balance shafts and balance shaft modules based in the US, relies on VICTREX PEEK 450G replacing metal gears in a balance shaft module to enhance performance and improve fuel efficiency.

The design engineers of Metaldyne, together with the US gear designer and producer Kleiss Gears, and in close collaboration with Victrex’s specialists, developed a novel gear design that delivers durability, reliability and improved efficiency.

▲ 3 dB improvement in NVH compared to cast iron gear set means 50% noise reduction
▲ 68% weight reduction resulting in 78% reduction of the moment of inertia compared to iron gear
▲ 9% less torque required to operate

**Increased operating range for heating, ventilation and air conditioning**

In HVAC actuator applications, VICTREX PEEK 450G has been used in spur gears. The system requirements were challenging for a compact actuator: temperature resistance up to 80°C; alternating movement +/- 90°; and torque level > 10 Nm. The required lifetime is 250,000 cycles.

**The use of VICTREX® PEEK results in higher system efficiency**

▲ More than 100% torque improvement
▲ Temperature range increased to 80°C
▲ Identical system dimensions / installation space
▲ Reduced number of parts

Applications also benefit from VICTREX PEEK’s high dynamic fatigue performance and dry running capabilities. The potential for cost reduction when compared to post treated sintered metal is also proving attractive for new system solutions.

**Excellent properties – alternative to metals**

▲ Retains high mechanical properties at temperatures of -40°C to 250°C
▲ Resistant to automotive fluids, especially long life engine and transmission oil
▲ Good dimensional stability – low CLTE
▲ Excellent dynamic fatigue resistance
▲ High durability in gear applications (up to 12,000 rpm)
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