



PASSION • INNOVATION • PERFORMANCE

Automotive Transmission Applications

Automotive manufacturers are faced with the challenge of designing transmission gear boxes that deliver greater fuel efficiency with the same, or preferably improved performance as measured by higher torques and smoother gear changes. In Europe, significant challenges to improve vehicle CO₂ emissions have been set by the European Union and other European national governments. High CO₂ emission vehicles will be increasingly penalised by taxation and high fuel cost possibly negatively impacting market success. Consequently, vehicle manufacturers will need to downsize engines and gear boxes as well as integrate functions with start-stop micro-hybrid systems to meet consumer demands for smoother gear change and reduced fuel consumption.

To meet these challenges, Victrex offers a range of high performance polymers which have successfully replaced metals and other polymers in seal rings, thrust washers and bearings, bearing cages and check valves. With one of the best overall property profiles of any high performance material, Victrex polymers offer an excellent solution for improved performance, lower weight and reduced cost for transmission and other automotive applications. Parts made from Victrex polymers are more cost effective to produce when compared with parts made from metals, polyimide (PI) and polyamide-imide (PAI) as they can be injection moulded to tight tolerance, and require no post treatment or machining.

KEY FEATURES

- ▲ High temperature and wear resistance
- ▲ Thermal expansion in-line with metal
- ▲ High compressive strength = low creep
- ▲ Vibration damping
- ▲ No swelling



Sealing element

- ▲ Resistance against latest transmission fluids
- ▲ Excellent processability with narrow tolerances
- ▲ Minimal or no post machining
- ▲ RoHS and GADSL compliant



Today's automotive transmission design requires smaller size with more functionality and improved fuel efficiency

Victrex Polymer Solutions has developed numerous wear grades over the past few years in response to requests from design engineers and OEMs for increased durability to meet the requirements of more demanding applications in the automotive and industrial equipment industries.

KEY BENEFITS FOR TRANSMISSIONS

- ▲ Longer life
- ▲ Reduced noise and vibration
- ▲ Improved energy efficiency
- ▲ Lower weight
- ▲ Reduced mass offers low moment of inertia
- ▲ Continuous use beyond 150°C without performance loss
- ▲ Can continue to perform in a dry-running emergency
- ▲ Overall system cost reduction

Having long term success in seal rings and thrust washers, independent of the transmission type, Victrex set the benchmark with VICTREX PEEK 450FC30. The primary benefit of this compound is its very good dry running properties – even without oil lubrication. In dry tribological systems with very high circumferential speeds, it forms a transfer film on the wear counterpart, which minimizes the coefficient of friction and wear rate.

For High Performance and Design Efficiency

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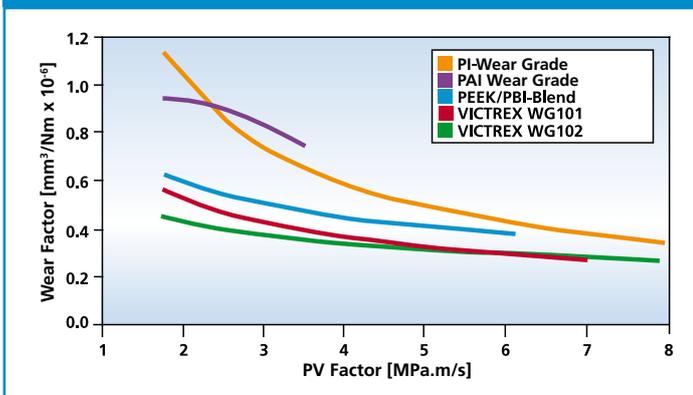
Victrex Polymer Solutions, a division of Victrex plc, is the world's leading manufacturer of Polyaryletherketones, high performance polymers, which are sold under the brand names VICTREX® PEEK polymers, VICOTE® coatings, APTIV® films, and VICTREX Pipes™. With production facilities in the UK backed by sales and distribution centres serving more than 30 countries worldwide, our global market development, 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.

While VICTREX PEEK 450FC30 remains the standard product for the majority of wear application developments, VICTREX® WG™ polymers, WG101 and WG102 premium wear grades, are the newest solution for even more demanding wear applications and environments. Tribological studies confirm that under dry and wet conditions, when compared with PI and PAI polymers, VICTREX WG grades offer a lower wear rate (Figure), reduced coefficient of friction, reduced counterface temperature, and an improved compressive strength. This wear performance translates to extended service life and reduced failure rate for transmission applications.



Gerotor pump wheel and thrust washer

FIGURE: Wear Factor D3702 Thrust Washer Testing, 1m/s Test Speed



SUMMARY

Automotive components made of Victrex materials can meet or exceed performance criteria and be economical to produce by eliminating secondary operations, such as machining, and consolidating a number of metal parts into one injection-moulded component. In summary, automotive suppliers and manufacturers can meet difficult design challenges while satisfying other key requirements in the industry including reduced weight, increased performance and longevity, and improved energy efficiency. We welcome the opportunity to work with you to overcome your challenges!

Detailed information on Victrex polymers is available upon request from a Victrex Market Developer or by emailing Victrex.

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