

Performance Plastics Improves Compressor Valve Performance With Poppets Made From VICTREX® PEEK™ Polymer

Manufacturers of check valves and pressure relief valves for hydraulic and pneumatic compressors are constantly looking for ways to improve the performance of their products. Valve performance, more than any other component, determines compressor efficiency.

To achieve reduction in fluid leakage, noise and cost, and extended valve life, Performance Plastics (PPL), suggests replacing the metal poppets with poppets made of VICTREX® PEEK™ polymer, a high performance thermoplastic. Experience has shown that converting to a poppet made from VICTREX PEEK polymer provides tremendous improvements in productivity.

ALLOWS WIDER OPERATING RANGE

One of the major benefits of using VICTREX PEEK polymer is that it allows the valves to operate in high and low pressure applications. It increases the number of applications in which valves and compressors can be used.

SUPERIOR IMPACT RESISTANCE

Another benefit of using VICTREX PEEK polymer is its superior impact resistance. According to Performance Plastics, one of the primary reasons why valves fail are the fissures brought on by repeated impact pressure. PPL has had applications where VICTREX PEEK polymer has passed two million impact cycles and another where it has passed 20 million impact cycles.

BETTER SEALING AND WEAR RESISTANCE

Because VICTREX PEEK polymer is compliant and can conform to the mating seat surface, it provides better sealing performance and less leakage than metal poppets. It also offers excellent wear resistance and improved wear conditions on the mating seat surface. Wear and damage to the mating seat surface is a big issue with metal poppets and re-work of pumps and valve assemblies is both costly and time consuming on the production line.



VICTREX PEEK POLYMER — Ideal Replacement for Metal Poppets

Metal poppets have always posed a number of challenges. They can be difficult and costly to machine and the sealing surface can be inconsistent due to difficulties in machining defect-free seat surfaces. As a replacement for metal, VICTREX PEEK high performance polymer is an engineering solution due to its outstanding combination of properties. Substituting plastic for metal maintains strength while improving corrosion resistance, reducing weight, and allowing for greater design flexibility.

PROPERTIES OF VICTREX PEEK POLYMER

- **High Temperature Resistance** — Can withstand continuous operating temperatures of up to 260°C (500°F). Also maintains short-term mechanical properties at temperatures approaching its melting point of 340°C (644°F).
- **Wear Resistance** — Outstanding wear resistance over wide ranges of pressure, velocity, temperature and counterfacial roughness.
- **Mechanical Properties** — Excellent strength, stiffness and long-term properties, such as creep and fatigue, retained over a wide range of temperatures and environments.
- **Chemical Resistance** — Exhibits outstanding resistance to a wide range of chemical and corrosive environments, even at elevated temperatures up to 200°C (392°F).
- **Hydrolysis Resistance** — Retains high levels of mechanical properties and dimensional stability when continuously operating in water, brine or steam at elevated temperatures and pressures.
- **Dimensional Stability** — Remarkably stable, resisting changes to its properties due to temperature, moisture, chemical attack or physical stress.

METAL REPLACEMENT APPLICATIONS

Metal to plastic conversions and metal part replacement applications are areas of expertise at Performance Plastics. Because of its superb all-around properties, Performance Plastics has used VICTREX PEEK polymer successfully in many metal replacement applications including:

- A poppet made with VICTREX PEEK polymer replaced a two-piece metal assembly, resulting in a significant cost reduction. It also improved initial product quality and reduced customer valve rework from 200 units per month to less than five.
- Poppets made with VICTREX PEEK polymer provided more sensitivity than the metal poppets, resulting in more consistent pressure relief actuation performance. The plastic poppets also provided a lower noise level than the metal poppets.

SUMMARY

Performance Plastics can mold poppets that have functional sealing surfaces with no secondary machining operations required. Performance Plastics is confident that their experience and proven track record in the high performance area can greatly benefit customers by solving some of their most difficult applications.



Victrex is an innovative leading manufacturer of high performance polyketones, including VICTREX® PEEK™ polymer, VICOTE® Coatings and APTIV™ film. These materials are used in a variety of markets and offer an exceptional combination of properties to help processors and end users reach new levels of cost savings, quality and performance. All Victrex material production comes under Victrex's ISO 9001 quality registration.

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Performance Plastics, Ltd., is one of the pioneer molders specializing in injection molding high performance plastics, and other high performance resins. The company develops innovative, cost effective manufacturing solutions for applications that require highly engineered plastics, sophisticated part geometry, tight tolerances, and technical expertise.

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