

TORLON® 4XCF PAI

Reliable long term performance in High Pressure Microturbine Valve for Off-Shore Equipment



TRENDS

Components used in offshore equipment must perform extremely reliably under severe service conditions of high loads and extreme temperature - often where space is at a premium. Failures can add up to high costs for repair and especially for extended periods of lost production.

QEPP ANSWERS

During the design phase of a micro-turbine system used in the offshore industry, the project engineer consulted with Quadrant to identify a strong, stable sealing material that could withstand extraordinarily high PV loading (pressure and velocity) and temperatures with minimal wear over extended service periods. Quadrant's carbon fibre reinforced TORLON® 4XCF (7130) PAI was the material chosen and machined into precision disk shaped parts for the application.

CUSTOMER BENEFITS

TORLON® 4XCF (7130) PAI has the strength and stiffness to withstand the extreme pressures typical in use. It's unique combination of strength, stiffness and wear-resistance at high temperatures outperforms higher priced materials like polyimides. It's ability to hold precision tolerances over temperature swings, and resist wear from dynamic loading, made it an ideal candidate for use in the micro-turbine environment.



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POST MACHINING ANNEALING

Application requirements	TORLON® 4XCF PAI performance
Micro-turbines are small scale energy generating devices that contain a gas valve with a "shear disk" that acts as a seal for the valve. High pressures create the risk of distortion and leakage problem in the application.	TORLON® 4XCF PAI (30% carbon-reinforced) combines high strength and stability under high pressure conditions to ensure reliable long term performance. The material has a very low coefficient of linear thermal expansion that ensures dimensional stability at temperature extremes.
The high speed of the "shear disk", and the dynamic loads on it create potential wear life problems for the micro-turbine units.	The inherent wear resistance and low coefficient of friction of TORLON® 4XCF PAI allow the shear disk to perform reliably long term.
Precision tolerance control is required to ensure reliable operation of the micro-turbines.	TORLON® 4XCF PAI is easily machined to the close tolerance that the precision parts require.

Other material candidates:

- VESPEL® PI: Lower stiffness and higher coefficient of friction vs. TORLON® PAI resulted in unacceptable build-up of frictional heat.
- KETRON® HPV PEEK: lower mechanical strength did not withstand the pressure extremes required.

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