ENGINEERED WEAR COMPONENTS

How Two Chemicals Companies Saved their Fertilizer Plant Carbamate Pumps from Catastrophic Failure

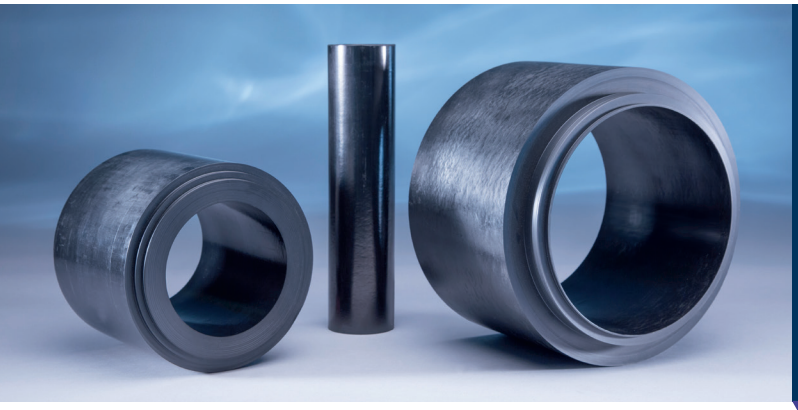
Greene Tweed's WR® 300 PEEK composite bushings and impeller wear rings improve reliability to save millions of dollars

Challenge

Two prominent fertilizer companies – one based in Saudi Arabia and the other in Europe – found themselves grappling with recurrent pump failures at their urea plants. Both used high-capacity, horizontal multistage centrifugal pumps to transfer chemicals, such as ammonium carbamate. These ammonium carbamate pumps, working at a pumping temperature of 130°C (250°F) experienced catastrophic failure, seizing up and bringing production to a standstill. The resulting shutdown led to losses amounting to millions of dollars.

Analysis

The OEM, a major pump manufacturer based in Europe, analyzed the situation and determined that pump seizure could be traced back to the pump's HVOF tungsten carbide overlay at the dynamic interface. The high concentration of Carbamic Acid in Ammonium Carbamate attacked and leached out the nickel coating, which served as a binder for the pump's tungsten carbide overlay. As leaching progressed, it weakened the bond between the tungsten carbide and pump substrate. The weakened bond led to overlay cracking and flaking – resulting in pump failure.



Why WR® 300

- High corrosion resistance
- Non-galling/non-seizing properties
- Impact resistance
- Thermal shock resistance

Greene Tweed's WR® 300 PEEK Composite Bushings, and Impeller Wear Rings Prevented Carbamate Pump Failure and Ensured Uninterrupted Operations.

Solution

To address the problem, the OEM sought a solution that would eliminate the need for the HVOF coating by using pump components made of 316 stainless steel that offers resistance to intermittent contact with the pump rotor, such as dry-run scenarios. Having achieved success with pump components made of Greene Tweed's WR® 300 PEEK composite components at a fertilizer plant in India, the OEM had a deep understanding of its outstanding non-galling and non-seizing capabilities. At the same time, WR® 300's superb chemical resistance would eliminate the chemical compatibility risk, offering a robust, cost-effective solution to this urgent problem. They decided to upgrade the pump's components and started using bushings, and impeller wear rings made of Greene Tweed's WR® 300 PEEK Composite. Greene Tweed expedited the order, quickly manufacturing and shipping the new WR® 300 pump parts to their customer.

The Result

When the four centrifugal pumps at the plant were upgraded with bushings and impeller wear rings made of WR® 300 PEEK composite, they were able to restore the plants back to full production. Since then, no further pump failures have occurred. Encouraged, the end users placed additional spare orders in preparation to retrofit other pumps that were experiencing similar challenges. Based on this success, the OEM has standardized WR®300 in carbamate services.

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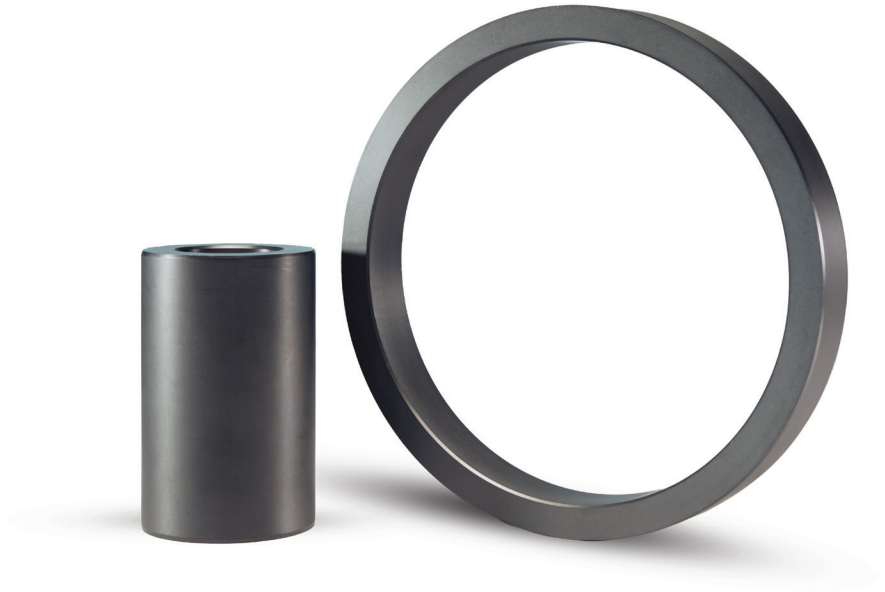

WR® 300 PEEK Composite