



AR[®]1 BUSHINGS INCREASE RELIABILITY OF VERTICAL MIXED FLOW PUMPS FOR SEAWATER APPLICATION

CUSTOMER BACKGROUND

Vertical mixed flow pumps are used worldwide as cooling water pumps in power stations, brine recirculating pumps in sea water desalination plants, vaporizing, irrigation or dewatering pumps, and sea water intake pumps in water works. A leading Japanese pump OEM specializing in vertical mixed flow pumps for seawater applications was having difficulty in a steel production facility in Brazil.

CUSTOMER GOALS

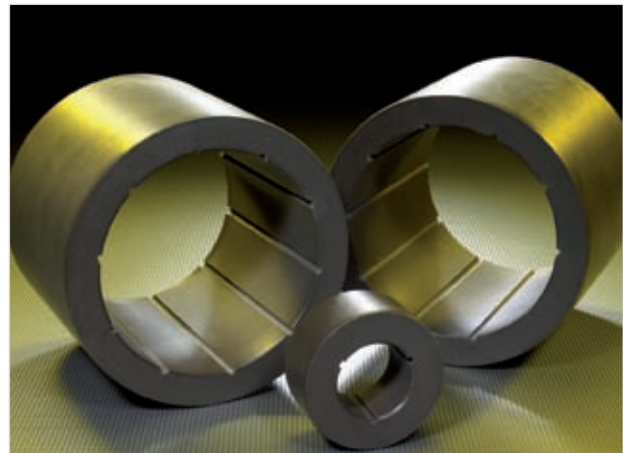
- Improve performance (quality) of the pump
- Double MTBF (mean time between failure) by reducing repairs from two to at least four years
- Minimize vibrations and shaft runouts
- Reduce overall running costs/save energy

CHALLENGE

The challenge was with vertical mixed flow pumps located (partially) subsea in saltwater with sludge at a temperature of 95°F (35°C). The customer experienced shaft runouts, heavy vibrations and the short life cycle of bearings in his vertical mixed flow pumps. The customer was using PTFE slats molded in an elastomer material and encased in a steel housing.



AR1 Bushings



AR1 Materials

SOLUTION

Based on the performance results of AR[®] inhouse testing conducted by the customer it was decided to replace the previous PTFE rubber material with AR[®]1 bushings. AR outperforms metallic, carbon, graphite and rubber cutlass products in seawater, riverwater and some slurry services. It can be used for bushings and bowl rings in sump applications.

Technical Data

Pump head: Between 9.8' and 328.1' (3 – 100 m);
actual case: 108.7' (33 m)

Capacity of the pump: Between 600 – 78,000 m³/h (2,642 to 343,424 GPM.)
actual case: 3,200 m³/h

Bore: 15.75" – 118.1" (400 – 3,000 mm);
actual case: 47.2" (1,200 mm) bore/bell bottom of the pump with 7.1" (180 mm) IDØ bushing installed in the top and middle bearing

Media: Abrasive media with sludge





BENEFITS

- **Improved abrasion resistance**—AR material is perfect for use in bearings that often come into contact with seawater and sludge.
- **Less vibration**—AR materials allow pump users to operate their equipment at tighter running clearances than the previous PTFE rubber bearings (now: .011" – .013"/0.28 mm – .0.33 mm, before: 0.22" – .031"/0.56 mm – .0.80 mm). This reduced vibration amplitude and increased rotor stability. The combination of closer clearances and the excellent intermittent dry run capability of AR composites improves process reliability.
- **Intermittent dry-run protection**—The lower coefficient of friction and the nongalling/nonseizing properties aid survival in 'off design' pump conditions better than traditional materials. No in feed of water is necessary (in the case of the original rubber bearings) nor increased clearances (for the later fitted PTFE rubber bearings) are needed to prevent dry running.

RESULTS

- **Improved reliability/MTBF**—The pump's MTBF increased from two to four and a half years and continues to run without problems.
- **Reduced running cost**—AR materials contributed to reduce overall running cost less than ½ of the former material (= customer statement).




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