Extend mechanical seal reliability and life

Seal face materials have always been challenged to provide reliable operation in low-lubricity fluids. In the past, this challenge was addressed by lubricating seal faces with a cool, clean external fluid. Although effective, this solution adds operating costs throughout the life of the seal. Alternatively, dual seals operating on clean barrier fluid offer longevity with lower operating costs, but higher initial cost for the required support system. The ideal solution is to have the mechanical seal faces lubricated by the process fluid. Pure, crystalline diamond grown onto a seal face through a rigorous treatment process, including chemical vapor deposition, enables Flowserve to offer improved reliability in poor lubricating fluids without additional controls.

Features and benefits

- The lowest friction of any seal face material provides cool-running seal faces in poor-lubricity fluids such as hot water.
- Bonding the hardest known material to the seal face’s running surface gives maximum resistance to abrasive particle damage.
- The highest chemical resistance of all seal face materials enables its use in aggressive acids, alkalines and caustics.
- High wear resistance brings forgiveness for off-design operation such as intermittent dry running.
- Fine grain diamond coatings can run against all common mating face materials, including silicon carbide, tungsten carbide and itself.

Applications

Diamond-coated seal faces offer performance benefits in a wide range of mechanical seal applications, including:

**Upstream oil and gas**
- Produced water
- Crude oil pipeline
- Multiphase pumps

**Refinery and petrochemical**
- Dirty hydrocarbons
- Light hydrocarbons
- Caustics

**Mining**
- Abrasive slurries

**Power**
- FGD slurries
- Boiler feed water
- Cooling water

**Chemical**
- Loading and unloading pumps
- Fluids with entrained gases
- Dissolved or hard solids

**General industry**
- Batch processes
- Fibrous slurries

Availability

Most Flowserve seals are available with diamond-coated seal faces, including:

- QB series
- BX series
- ISC2 series
- U series
- D series
- SLM
- HSH
- SLC
- PSS 4
- Pac-Seal®

Consult your local Flowserve representative for information on diamond coating availability in other mechanical seals.
Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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3D analysis and photographic image of the seal face surface reveals no damage to the diamond-coated silicon carbide (right) after more than 4,000 hours of operation in hot water. The pitting damage on the uncoated silicon carbide face (left) was evident after just 200 hours under the same conditions.

Material properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young's Modulus</td>
<td>960 GPa</td>
</tr>
<tr>
<td>Fracture Strength</td>
<td>2.9 to 5.3 GPa</td>
</tr>
<tr>
<td>Thermal Conductivity</td>
<td>550 to 1,800 W/mK</td>
</tr>
<tr>
<td>Hardness</td>
<td>10,000 HV</td>
</tr>
</tbody>
</table>

Operating parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>0 to 140 barg (2,030 psi)</td>
</tr>
<tr>
<td>Temperature</td>
<td>-40°C to 204°C (-40°F to 400°F)</td>
</tr>
<tr>
<td>Speed</td>
<td>up to 46 m/s (150 fps)</td>
</tr>
<tr>
<td>Shaft Sizes</td>
<td>12.7 to 241.3 mm (0.500 to 9.500 in)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.2 to 5,000 cP</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.4 to 2.0</td>
</tr>
</tbody>
</table>

Diamond-Coated Seal Faces

Flowserve diamond-coated seal faces offer the lowest coefficient of friction for cool operation.

Flowserve diamond-coated silicon carbide provides the highest hardness for excellent wear resistance.

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