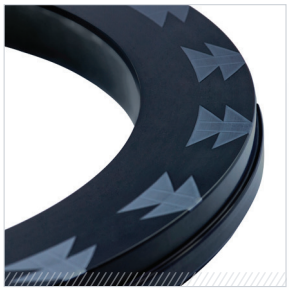
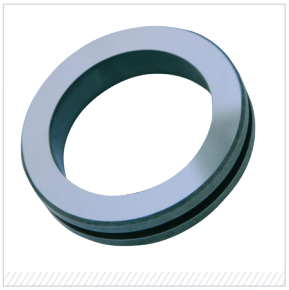
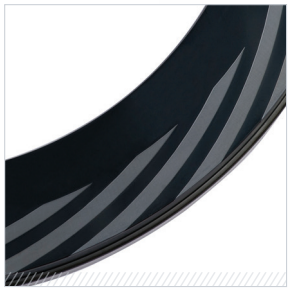
john crane | Your Name Is How We Make Ours

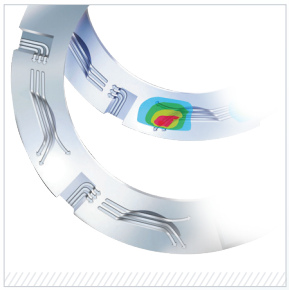
SEAL FACE TECHNOLOGIES

FOR MECHANICAL SEAL FACES









The industry's most comprehensive family of seal face technologies on the market today

SERVICE BENEFITS

- Reduced seal face friction
- Improved seal face lubrication
- Enhanced boundary layer
- Greater equipment asset optimization
- Increased reliability
- Reduced operational costs
- Longer seal life

Maximizing operational performance and reliability

Mechanical seal applications are limited by available seal face lubrication. Seal face materials, fluid properties, pressure and temperature have an enormous effect on seal life and equipment uptime. John Crane has developed a family of innovative engineered seal faces that have changed the sealing industry and dramatically improve the mean time between repair of mechanical shaft seals by improving and sustaining seal face lubrication. Seal faces operating with advanced micro machined patterns and features match the required lubricating features to each unique mechanical seal application, delivering the right face technology for the right application. When seal faces operate completely dry with the benefit of nanocrystalline diamond surfacing, gas-lubricated seals, bidirectional gas-lubricated seal faces and John Crane's exclusive, game-changing Dynamic Lift seals that actually generate and sustain lubrication pressures that are unmatched in the sealing industry today.

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SEAL FACE TECHNOLOGIES

FOR MECHANICAL SEAL FACES

John Crane family of face technology:

Committed to delivering the right seal face treatment to solve unique application challenges

The following information below describes these technologies and the incredible reliability that optimized seal face lubrication will provide to maximize the performance of rotating equipment in any process industry.

HYDROPADS

What it Does
Enhance seal interface cooling, promoting lubrication in low-lubricity services

Where used
Turbo and non-turbo compressors, process pumps, general process pumps in HPI/CPI processing viscous fluids that have difficulty generating fluid film

Problem Solved
Poor lubrication causing higher heat generation and friction leading to increased seal wear

Benefits
Minimized frictional heat generation and wear, extended PV capability over standard plain face seal, improved seal life, higher operational limits

STANDARD SPIRAL GROOVE FOR GAS

What it does
Promotes hydrodynamic lift to minimize face generated heat and enhance lubricity in poor lubricity conditions

Where used
Compressors, pumps and equipment pumping supercritical fluids such as CO_2, ethane, ethylene and mixtures of these. Turbo and non-turbo compressors, process pumps, general process pumps in HPI/CPI

Problem Solved
Friction caused by poor lubrication leads to premature seal wear causing a reduction in seal life

Benefits
Minimal power consumption, no heat generation, extended seal life

BI-DIRECTIONAL GROOVE FOR GAS

What it does
Promotes hydrodynamic lift to minimize face generated heat and enhance lubricity in poor lubricity conditions

Where used
Turbo and non-turbo compressors, process pumps, general process pumps in HPI/CPI

Problem Solved
Friction caused by poor lubrication leads to premature seal wear causing a reduction in seal life

Benefits
Minimal power consumption, no heat generation, extended seal life, simplified support systems, tolerates CW and CWW rotation, plus simplified installation and minimized inventory for double ended pumps

DYNAMIC LIFT UP-STREAM PUMPING FOR LIQUIDS

What it does
Delivers dual-pressurized seal benefits without the support system complexity, isolating face lubrication and process fluid

Where used
Pulp and paper solids processing, high-pressure water injection pumps, process pumps and general process pumps in HPI/CPI

Problem Solved
High heat generation, abrasion and barrier system complexities

Benefits
No wear, easy to install and simple support system, reliable — simple barrier system

LASERFACE

What it does
Provides active control of the sealing interface, augmenting face lubrication while minimizing frictional heat generation and leakage

Where used
Applications with a high-pressure temp margin close to boiling point where cooling flow is limited, such as hydrocarbons methane, ethane, propane, NGLs and non-hydrocarbon applications

Problem Solved
Poor lubrication leads to higher heat generation, causing increased friction in applications with volatile fluids or fluids close to their boiling point

Benefits
Reduced friction, allows operation of single seal close to Saturated Vapor Pressure (SVP)

JOHN CRANE DIAMOND™

What it does
Improves the reliability of rotating equipment through diamond seal face coating to address intermittent dry running conditions

Where used
Electrostatic discharge (EDS) — typically associated with boiler feed applications, slurries and combi treatment plants

Problem Solved
Intermittent dry running episodes, poor lubricating conditions and high abrasion rates leading to excessive leakage and water waste

Benefits
Reduced power consumption, reduced wear, extended MTBF and reduced lifecycle/operating costs

Y GROOVES

What it does
Enhances fluid film formation in high speed applications

Where used
Any compressors where spiral groove technology not used

Problem Solved
High-speed oil applications that experience high seal face leakage

Benefits
Low seal wear for longer life than conventional seal technology, lower barrier fluid consumption than standard plain face seal

THE **RIGHT FACE TECHNOLOGY** FOR THE **RIGHT APPLICATION**

Together, we will work with you to keep your mission-critical operations up and running, with support and guidance from our experienced team.

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