

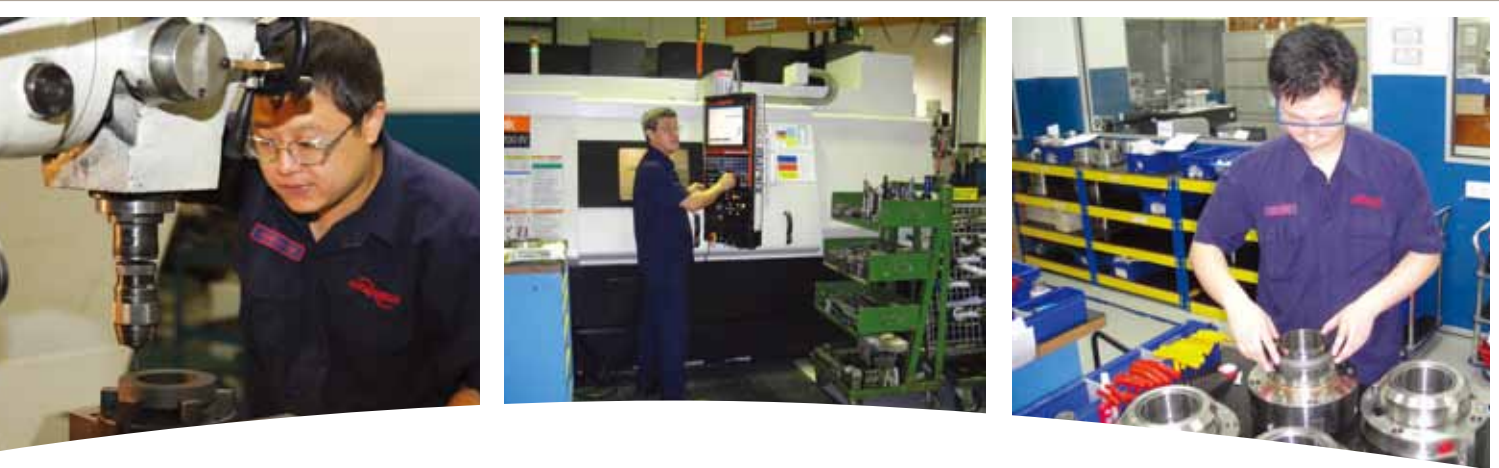


Singapore Changi Quick Response Center

Service and Repair • On-Site Services
Compressor Dry Gas Seals
Pump Seal Change-Outs and Upgrades



Experience In Motion



Repair Service and Technical Support

The Flowserve Singapore Changi Quick Response Center (QRC) is focused on providing customers with uncompromising service and technical support.

Staffed by highly skilled engineers and technicians around the clock, the Changi QRC is available to respond to customer requests for support in troubleshooting problems and providing reliable solutions with their rotating equipment seals.

Premier, Value-Added Service

Combining rotating equipment and seal knowledge, design experience and manufacturing capability, the Flowserve Changi QRC consistently sets the industry standard for value added repair and upgrade services in the region.

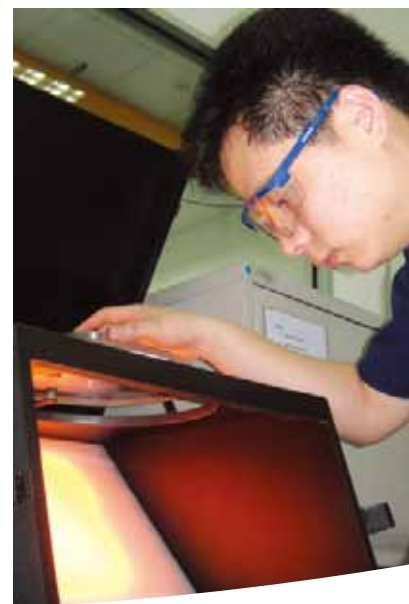
The proven level of knowledge and experience of the Changi engineers and technicians make it possible to service most types of rotating equipment seals, including seals for pumps, compressors and agitators. Flowserve has documented experience with upgrading all types of mechanical seals and associated equipment, including those originally manufactured by other suppliers.

Working closely with our customers to help improve the reliability and performance of their rotating equipment through quick access to the best seal for the application, the Changi QRC is able to ensure the maximum uptime and performance of our customer's key equipment.

The range of services offered by the Changi QRC includes:

- Engineering and manufacturing of mechanical seals and systems, including wet seals, dry gas seals and mixer seals
- Seal change-outs, upgrades and repairs
- Installation and commissioning services
- On-site repair and diagnostic services
- Field supervision
- Service maintenance contracts





Seal Repairs to the Flowserve Standard

The QRC has in-house capabilities to perform quick repairs to seals, including:

- Ultrasonic cleaning
- Seal face lapping
- Repair or replacement of worn parts
- Parts measurement and testing
- Seal testing, including ISO 21049/API 682 standards
- Packaging
- Bellow seal leak testing

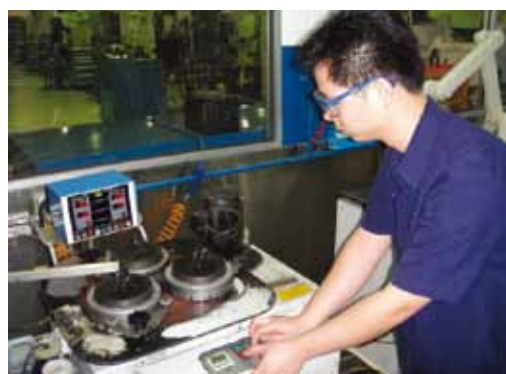
This center is equipped and staffed to support our alliance partners on a 24-hour basis. Key manufacturing capabilities include:

- Five-axis machining centers
- Vertical and radial milling machines
- High precision lathes
- Keyway slotting machine
- Seal lapping machine
- Heat treatment oven
- Ultrasonic cleaning equipment
- Optical flatness equipment
- Surface roughness tester
- Compressor dry gas seal tester

Customer Focused Service

To ensure the availability and quick turnaround of standard parts, the center has real-time access to information regarding inventory available in Singapore, Europe and U.S. facilities. The Changi QRC also has access to supply chain consignment stock to meet urgent customer requirements.

When requested, the Changi QRC will supply root cause analysis reports on the returned seals. Recommendations regarding repairs or upgrades are also provided to ensure improved performance of the equipment once placed back into the field.





Seal Change-Outs, Upgrades and Repairs

To assist customers who need to turn equipment repair around as quickly as possible, the Changi QRC can design and manufacture engineered seals to meet specific applications within a few days. Strategic inventory stocking of standard seals and spare parts within the facility is a critical component of this capability.

Through real-time electronic access, the Changi QRC engineers can retrieve the latest design drawings and bills of material information. QRC engineers can utilize the Flowserve application engineering program to simulate operating conditions allowing them to validate the correct seal selection and system configuration for the application.



Extended Seal Life Through Upgrades

Utilizing the proven knowledge and expertise of the Flowserve Rotating Equipment Specialists, together with the application of best practices and the latest technology, Flowserve is able to offer an extensive array of seal upgrades to extend the life of our customer's key seals in operation throughout their facilities.



2010 Flow Control Innovation Award Winner
Flowserve ISC 2 Series Cartridge Mechanical Seal



On-Site Services

Installation and Commissioning Services

Customers are often fully engaged in the operation of their plants and do not have the necessary time to devote to supervising the ongoing equipment-related activities. The Flowserve Changi QRC provides valuable on-site services to help lighten the customers' manpower constraints.

The Changi QRC field service team can provide support with customer start-up requirements, including:

- Troubleshooting seal-related problems.
- Supervising the removal and installation of seals and associated equipment.
- Providing assistance during change-out of seal parts.
- Ensuring correct seal installation and start-up.

Manufacturing Hub for Seals and Accessories

The Changi QRC also functions as the Flowserve Asia Pacific manufacturing hub for an extensive line of seals, including:

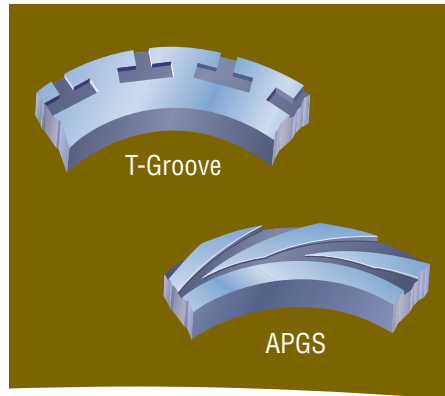
- Pusher seals, metal bellow seals, standard cartridge seals, slurry seals, mixer seals, lift off and dry running seals, outside mounted seals, compressor dry gas seals, steam turbine seals and special duty seals and accessories.
- Bearing protection devices, barrier gas panels, buffer fluid reservoirs, seal guards, closed loop system, piston transmitters, seal coolers (standard and ISO 21049/API 682 compliant), air cooled seal coolers, circulators and pressurizers, magnetic separators, cyclone separators, synthetic lubrication devices, quench containment devices and erosion protection devices.



Customer Training

To support customer efforts to improve the operational efficiency of their facilities, Flowserve offers a small group training program within the Changi QRC for key operational and maintenance staff. Through this program, the customer's staff become better equipped to handle the operation and maintenance of their rotating equipment and associated seals.





Compressor Dry Gas Seals, Systems, Repair and Testing

Compressor Seal Systems

The Flowserve Singapore Gaspac group offers design, manufacture and supply of a complete range of compressor seal support systems which meet ISO 10438/ API 614 standards. The ability to retrofit existing systems, including installation and commissioning of seal support systems, is another key capability of the Changi QRC.

Quality parts complying with OEM specifications for the entire range of Flowserve product brands are readily available through the Changi QRC. As all parts conform to original design and materials specifications, customers are assured of reliable operation and lower equipment ownership costs.

The Changi QRC can also re-engineer and produce non-Flowserve components for equipment that is obsolete or for original equipment for which a manufacturer cannot be located.

With a goal to maximize the availability and reliability of compressors installed in customer facilities throughout Asia Pacific, the state-of-the-art Flowserve Gas Seal repair and test center has been located near many of the world's leading logistics companies within Singapore's Changi International Airport logistics hub to ensure quick response capability.

With our uniquely designed systems for enhancing the performance of dry gas seals and reliability of compressors, our Gaspac group supports end users beyond routine gas seal repair and refurbishment. Providing engineered technology-driven upgrades and modifications of seal control systems positions Flowserve as a leader in supplying seal control systems within Asia Pacific.

Compressor Seal Repair Service

The Flowserve Changi QRC offers comprehensive compressor seal repair capability to customers throughout Asia Pacific from this strategically located facility. The adaptive hardware for seal testing is also fully interchangeable allowing for seal testing to global standards.

Capabilities

- Speed: 25 000 rpm
- Pressure: 250 bar
- Shaft diameter of Gaspac seal: up to 7"/175 mm





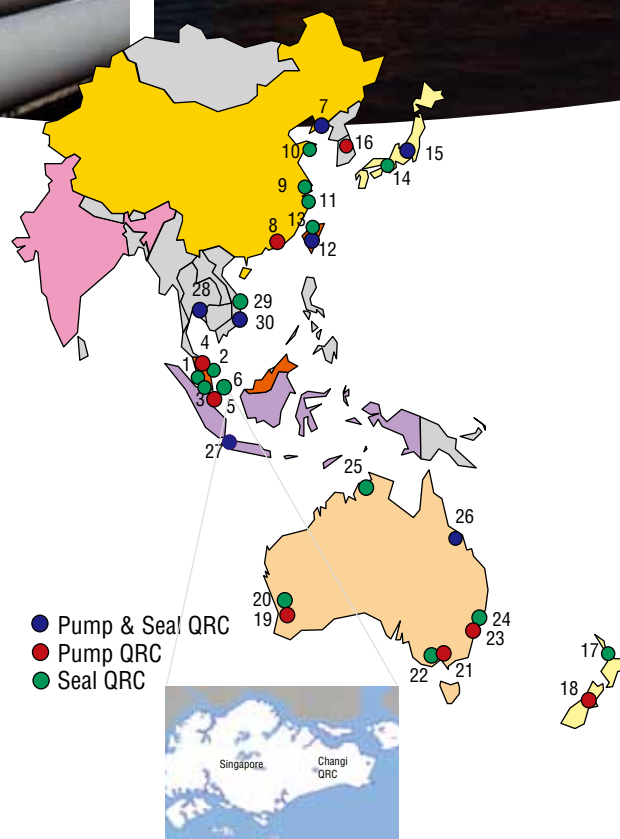
Global Presence Serving Key Industries

Strength of Experience, Commitment to Excellence

Flowserve, through the Singapore Changi QRC, serves customers from various industries daily to ensure superior equipment performance and service life. Key industries currently served by the Changi QRC include:

- Oil and gas production
- Hydrocarbon processing
- Chemical processing
- Power generation
- Mining and mineral processing
- Pharmaceuticals
- Water resources
- Pulp and paper
- Municipalities
- Marine
- Pipeline
- General industry

Products offered conform to a wide spectrum of applicable industry standards, including API, ANSI, ISO, DIN and EN 12 756.



MALAYSIA

1. Kuala Lumpur (Seal)
2. Kemaman (Seal)
3. Malacca (Seal)
4. Kuantan (Pump)

SINGAPORE

5. Tuas (Pump)
6. Changi (Seal)

CHINA

7. Dalian (Pump & Seal)
8. Huizhou (Pump)
9. Shanghai (Seal)
10. Qingdao (Seal)
11. Ningbo (Seal)

TAIWAN

12. Kaohsiung (Pump & Seal)
13. Mailiao (Seal)

JAPAN

14. Osaka (Seal)
15. Kawasaki (Pump & Seal)

KOREA

16. Cheonan (Pump)

NEW ZEALAND

17. Auckland (Seal)
18. Christchurch (Pump)

AUSTRALIA

19. Welshpool (Pump)
20. Henderson (Seal)
21. Mulgrave (Pump)
22. Mulgrave (Seal)
23. Wetherill Park (Pump)
24. Marayong (Seal)
25. Darwin (Seal)
26. Townsville (Pump & Seal)

INDONESIA

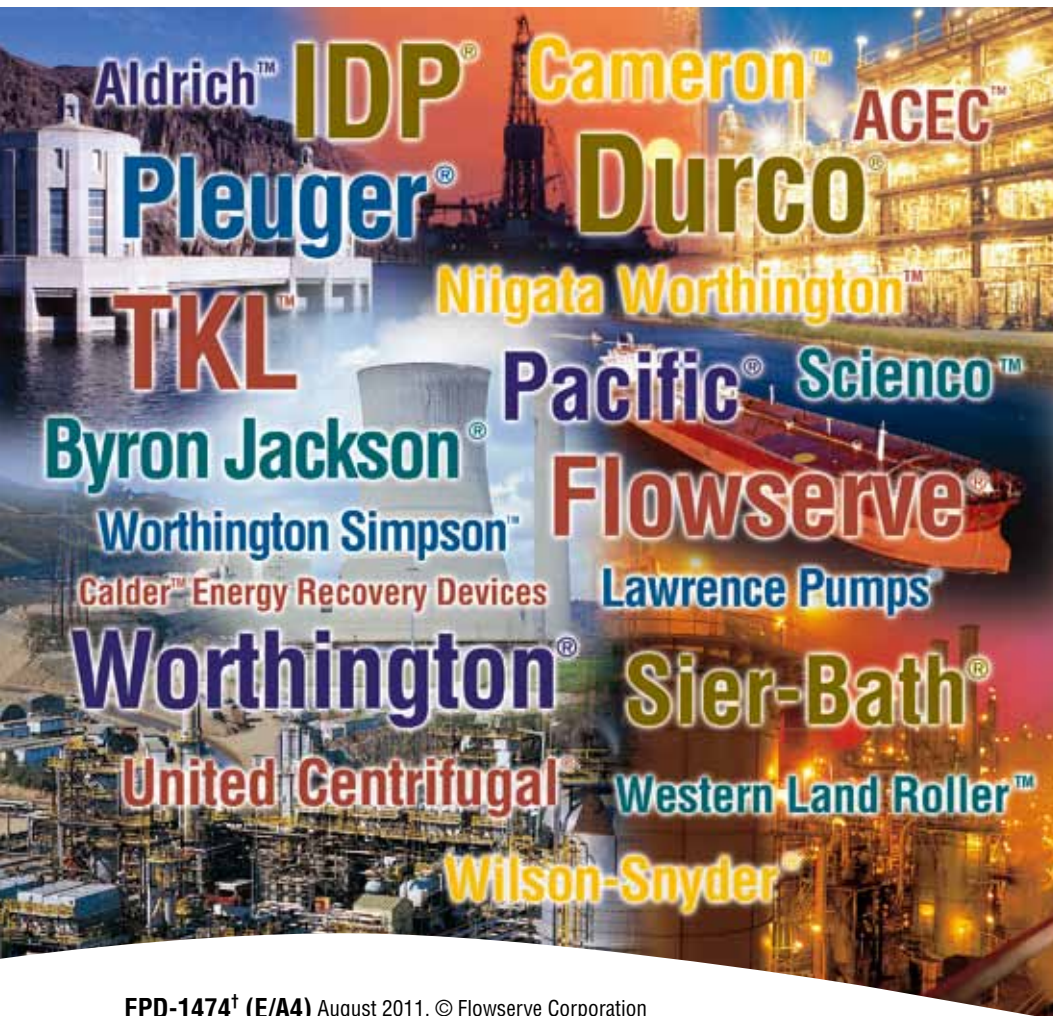
27. Jakarta (Pump & Seal)

THAILAND

28. Rayong (Pump & Seal)

VIETNAM

29. Dung Quat (Seal)
30. Dong Nai (Pump & Seal)



FPD-1474¹ (E/A4) August 2011. © Flowserve Corporation

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