We think about rotary valve reliability, so you don't have to.

FISHER®

EMERSON™
Process Management

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From seals to bearings, springs to diaphragms, everything in Fisher® rotary control valves and actuators is designed to avoid unscheduled maintenance.

In fact, we put every Fisher rotary control valve and actuator to the test long before you do.

You can forget leakage, forget failure, and forget poor control. Instead you will realize improved product quality, safety, and availability.

Rigorous evaluation

Testing of seal prototypes resulted in this collection of seals. We do not just test one part and quit. We continue testing until we are convinced that a Fisher seal is the level quality for you.

Shaft seal technology

Fisher ENVIRO-SEAL® shaft sealing packing systems are compliant with emission control standards. Compliance test to TA-Luft was certified by TÜV. Compliance to ISO 15848-1 Class B tested by Cetim (France).

Forget leakage

The issue of seat leakage is important since leaking valves cause off-spec product, use excessive energy, and require downtime for maintenance.

While ANSI/FCI, IEC, and MSS guidelines determine the ability of a valve to shut off under ambient test conditions, they don't tell you how well the valve will shut off in actual service conditions. Or for how long.

There is no shutoff life guarantee associated with a given leak class. When installed in the field, the typical valve may not maintain a given leak class for long when exposed to service temperatures and pressures.

How do you know Fisher rotary valves will maintain shutoff capability even as they see service?

Because we demonstrate their shutoff in our own research and engineering facilities. Our tests are designed to represent real-world conditions as accurately as possible.

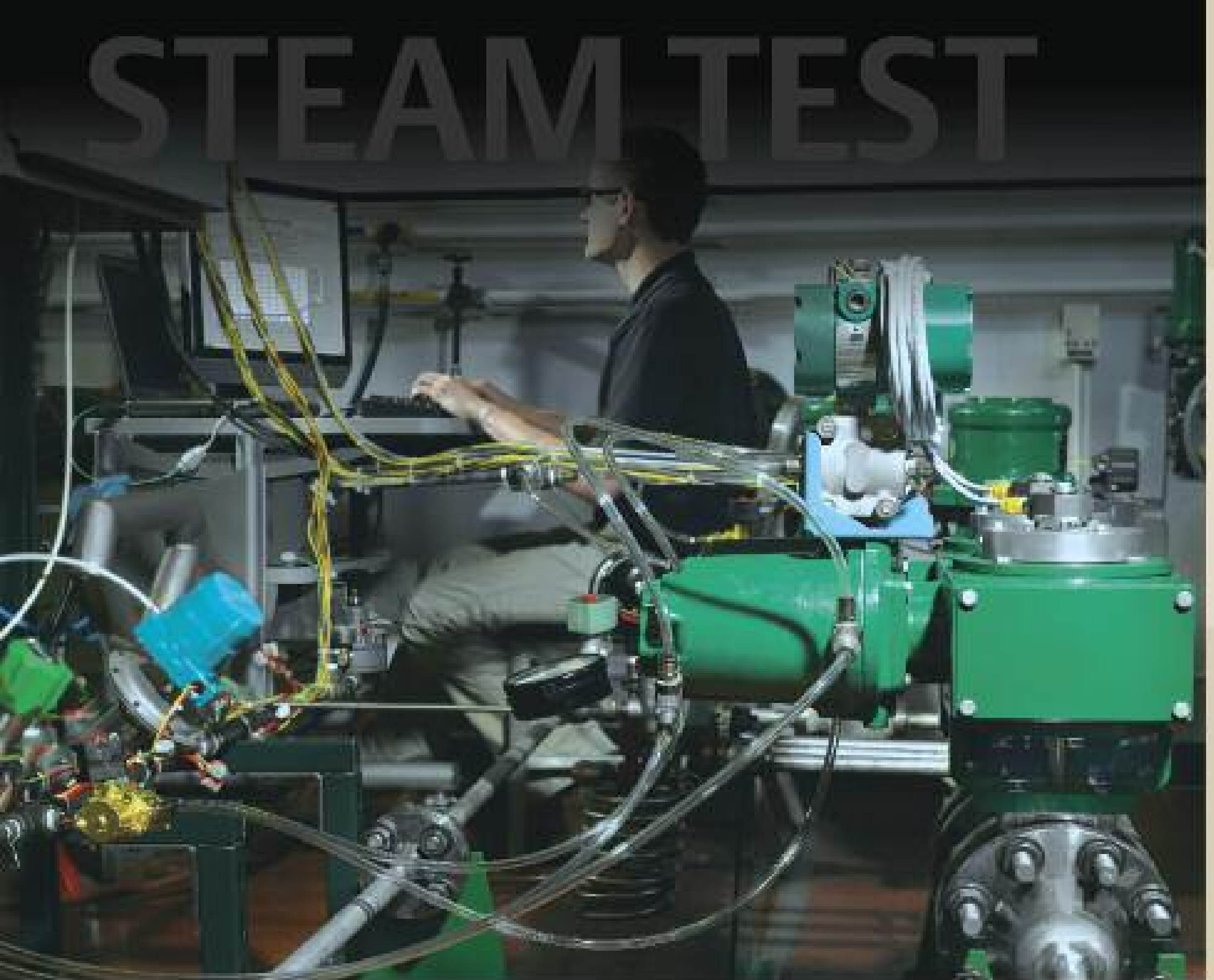
We spend months testing complete Fisher valve assemblies in our lab. So while they're in service, you can be less concerned about leakage.

Fisher rotary valves are checked for reliable shutoff and for virtually no deterioration in performance while under pressure and temperature extremes.

They are cycle tested with hot air (325°F and 725°F) and high-pressure water at 290 psi, 400 psi, and 740 psi. They are also cycled against steam at 400 psi and 700°F.

Rotary valves intended for cryogenic temperatures are submerged in a liquid nitrogen tank, then tested for tight shutoff capability. Our fire-tested seal constructions undergo testing in 1300°F flames to meet API 607 Rev 5 / ISO 10497-5:2004.

Not only do we look for fluid leaking past the disk seal downstream, we also check for fluid leaking past the shaft packing into the atmosphere, to help prevent safety and environmental issues.



Steam test skid
A fully instrumented skid was installed at a power plant to test Fisher rotary valves in steam service. The skid isolates steam supply and records leakage while the valve assembly is at elevated temperature.

Cycle life
We cycle test rotary valve bearings and seals at elevated temperatures in a hot air system to evaluate their performance and reliability.

Field trials
Prototypes of Fisher rotary valves undergo field trials in actual plants. This prototype valve is installed in a vacuum system application in a pulp and paper mill.

Fatigue failure
This square-end shaft was tested in the drivetrain fatigue apparatus described on the opposite page. The test was stopped shortly after the fatigue crack started. By determining how long our drivetrain components last under certain loading conditions, we can establish load limits to provide long life and high reliability.

Design optimization
By optimizing the size of the hole for the valve disk-to-shaft connection, the fatigue life of the entire joint is improved. A larger hole makes the shaft weaker but allows the pin to be stronger. A smaller hole through the shaft does the opposite. Through testing we have proven that the joint as a whole is significantly stronger.

Forget failure

In addition to leakage, failure in rotary valves is an important concern. Whether rotary valve components fail slowly or suddenly, the end result is downtime. Slow failure due to lost motion can be extremely detrimental to performance.

How do you know Fisher rotary valves are built to last?

We subject each valve design to numerous mechanical tests to determine cycle life, fatigue life, vibration resistance, temperature limits, and pressure limits.

Such tests determine, for example, whether a seal can last with the shaft in a vertical orientation, or whether a disk-to-shaft connection can withstand its maximum rated torque level without shearing. We can simulate a lifetime of use in a matter of days.

In addition to mechanical tests, material tests are performed on Fisher valves.

Materials for the valve body, closure member (plug, ball, disk), seals, shaft, and bearings must offer resistance to conditions that could lead to deterioration in performance, such as galling, wear, and corrosion.

Our state-of-the-art materials lab is used to verify that materials and coatings will perform to expectation physically and mechanically.

We reject metals, elastomers, fibers, and plastics that don't meet our stringent standards.

Not everything can be replicated in our research and engineering laboratories; therefore, every Fisher valve design is also field tested in actual plants prior to release.

This previews a valve's ability to control the process while interacting with upstream and downstream variables. Plus it previews a valve's ability to handle pressure drops for a longer amount of time. Field trials also expose Fisher valves to process media and environments that may attack metals or affect soft parts.

Drivetrain testing

Our test apparatus determines the fatigue cycle life of drivetrain components. It monitors parts and stops cycling after a crack starts. Spline- and square-end shafts of various sizes and materials are tested in addition to disk-to-shaft connections.

Cold box testing

To enable Fisher rotary actuators to withstand the demanding requirements of various applications, we use an environmental chamber to test the springs, rod-end bearing, and diaphragms.

Optimal control
With its characterized disk, the Fisher Control-Disk™ valve controls within the optimal loop gain of 0.5 to 2.0 from 15 to 70 percent valve travel.

Lowest friction bearings
Patented Fisher bearings support the valve trim to maintain minimal friction throughout product life. Fisher rotary valve bearings have been tested in use for the past fifty years.

Characterized disk
With a contoured edge on one side, this unique and patented disk creates a flow clearance to give the valve an inherent equal percentage flow characteristic. This enables more precise flow control through a large operational travel range.

Forget poor control

A final concern is poor control. Since control valves are the only devices in the process loop that actually "move" to adjust the process, their performance is fundamental. Quality issues occur when a valve does not move, does not move fast enough, or does not give the right process loop gain. At stake is the ability to make on-spec product.

The first control problem is when a valve does not move. When a rotary valve has high deadband, it does not produce a measurable change in the process variable. By controlling friction and backlash, deadband is minimized. We verify in the lab that friction is low in our valve bearings and that actuator-to-shaft and shaft-to-disk connections are tight to eliminate backlash.

Another control problem is when a valve does not move fast enough. Response speed is influenced by the valve positioner's design, configuration, and tuning.

For precise positioning accuracy and fast response to small step changes, Fisher rotary valves are paired with Fisher FIELDVUE® digital valve controllers. They work together to meet the EnTech Control Valve Specification for performance.

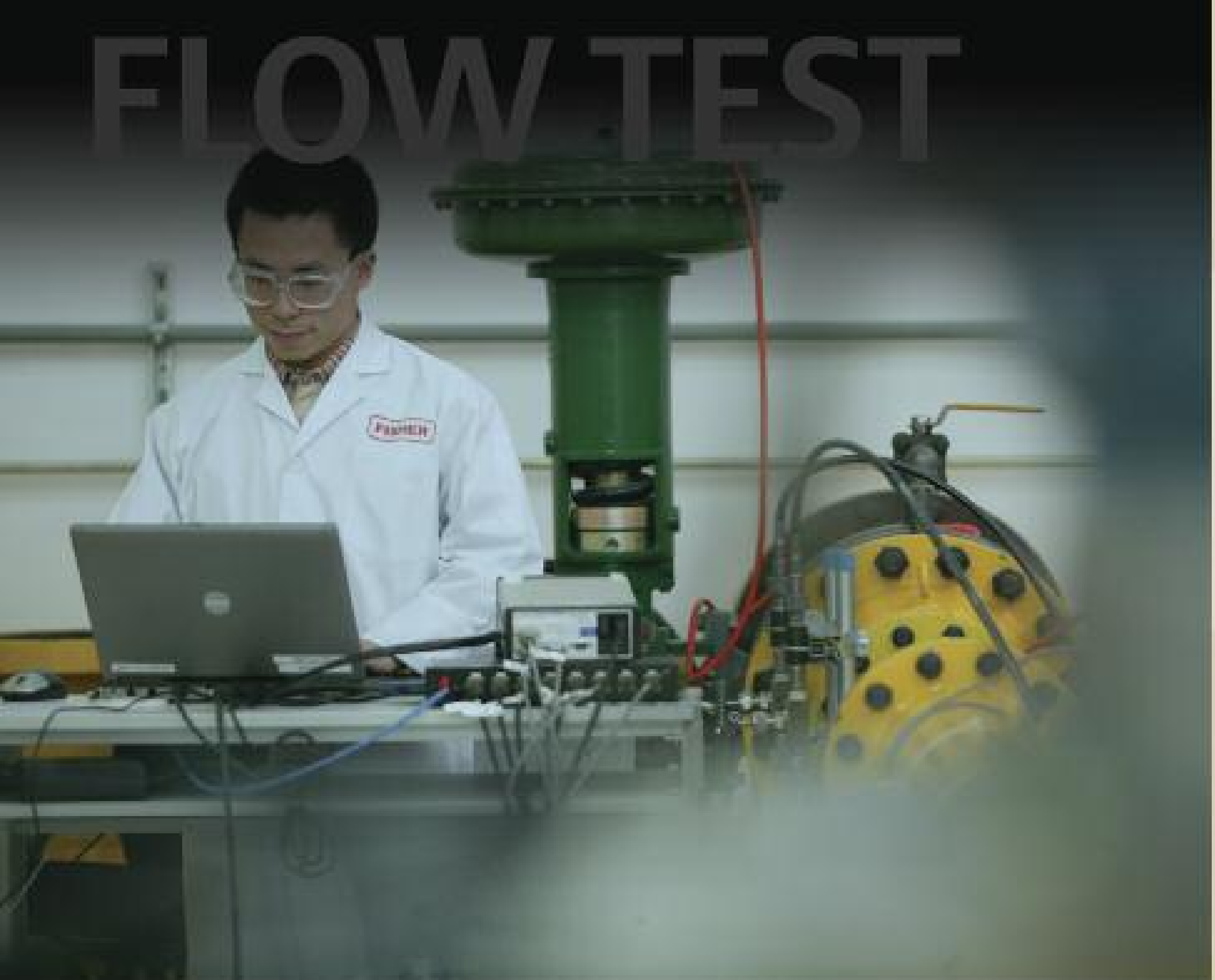
A third control problem is when a valve does not give the right process loop gain. Industry experts agree that process loop gain—the flow rate change with respect to valve travel—should remain between 0.5 and 2.0. Outside of this range, good control is lost. A loop will either become unresponsive or unstable, and product quality will suffer.

LoopVue® simulation software lets us model the process loop gain for a valve as it operates over its normal range. We verify that our valves keep gain relatively constant between 0.5 and 2.0 for tight control and on-spec quality.

Summary

Understanding your requirements is a top priority for us. In fact, millions of dollars are invested annually to test Fisher rotary valve designs using up-to-date equipment and procedures.

You can forget about unscheduled rotary valve maintenance when you use Fisher rotary valves and actuators from Emerson.



Flow testing

Every Fisher rotary valve design undergoes rigorous and extensive flow testing to determine sizing coefficients, hydrodynamic torque requirements, and to investigate actual flow performance.

Performance Testing

Complete valve assemblies undergo in-line dynamic performance testing. We evaluate the assembly's ability to reduce variability. This testing highlights the importance of having low friction and an assembly that is sized appropriately for the application.

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