



REDRAVEN™

INDUSTRY INSIGHTS

# Increasing Power Steam Cycle Reliability and Efficiency

## IoT Solutions for Seals

### Maintaining power output while reducing costs

Power generation plant operators can avoid unplanned downtime and extra costs for maintenance and repairs by improving the reliability of mechanical seals within critical boiler feed, condensate extraction and cooling water pump systems. Comprehensive internet of things (IoT) solutions provide condition monitoring and predictive analytics of key equipment throughout the power steam cycle — including mechanical seals in addition to pumps and valves. As a result, power generation output can be maintained while also enabling operators to reduce costs and enhance efficiency.

### Avoid downtime in critical steam cycle processes

Industries around the world depend on reliable power supplied by steam cycle generation plants. So do commercial and institutional power users as well as billions of residential consumers who heat and cool their homes with the electricity from these facilities. Therefore, steam cycle plant operators must minimize unplanned downtime to produce the power needed by end users of all sizes.

Reliable uptime of ultra-critical equipment must be maintained in boiler feed, condensate extraction and cooling water pump systems.

### Monitoring boiler feed pumps, valves and now seals

Boiler feed water is an extremely demanding service, and a boiler feed pump system contains some of the most critical pieces of rotating equipment in the steam cycle. A typical installation will include two pumps, each rated at 50% of the required capacity. A third (spare) pump also is rated at 50% of capacity and must be available at a moment's notice to maintain full power generation. The pumps themselves may be monitored, but their mechanical seals more likely will not.

### Seeing inside boiler circulating water systems

In addition to boiler feed, older steam cycle plants often have boiler recirculation systems with pumps that use high-pressure/high-temperature seals. The seals are under heavy load, and failure can be dangerous to personnel as well as costly to plant operations. RedRaven seal monitoring can give early warning of coming seal problems to help operators understand when maintenance is required before it is too late.

Ensuring that all the infrastructure operates continuously requires advanced technology that monitors pump, valve and seal conditions — without steam cycle plant operators having to analyze all the data. You need solutions for condition monitoring and predictive analytics to help anticipate equipment failures, enabling employees to take preventive actions and avoid unnecessary disruptions.



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## Industry Insights

### Eliminating surprises that disrupt power generation

Availability of steam cycle process equipment shouldn't be a surprise. Neither should the reliability of stand-by pumps and mechanical seals.

Instead, you need early warning of pressure changes that can indicate clogging or seal chamber condition variances that predict leakage of the boiler feed, condensate and cooling systems. Reliable data about seal conditions in addition to an understanding of what the real-time data means provides the evidence you need to take action.

While condition monitoring is widely utilized for pumps and valves, operators across industries which include power generation have not applied the technology to mechanical seals — even though conditions inside seal chambers and support systems can provide early indicators of overall system health. That makes condition monitoring of mechanical seals the best tool to help you improve reliability in pump and seal systems for power steam cycle processes, including boiler feed, condensate extraction and cooling water.

### Count on reliable seal data from valid measurements

A lack of knowledge or options about how to avoid equipment failure — or how to fix it when it occurs — are issues for some power steam cycle plant operators and technicians. You need reliable data about equipment conditions at valid measuring points. That's the only way you can be certain about the root cause of seal and/or pump failure.

Power generation plants are expensive to operate, so meeting power output targets and staying within budget are critical. However, the lack of condition monitoring can cause operators to spend time and money on the maintenance of pump systems for boiler feed, condensate extraction and cooling water processes that do not need it when those resources could be better directed toward equipment and processes that are near failure. Having the ability to discover conditions inside mechanical seals in these pump systems enables you to understand the best operating point for the longest system life.

In addition, better understanding of seal conditions can enable operators to schedule seal maintenance when it's truly needed during regularly scheduled downtime for major overhauls of the turbines that drive the power generators.

### Monitoring mechanical seals to extend uptime

Condition monitoring of mechanical seals is one of the best ways to improve the reliability of pump systems. RedRaven IoT solutions enable plant operators and technicians to discover

and understand conditions inside the seal chamber and support system in order to:

- Monitor temperatures, pressures, levels and flows in near real time
- Analyze and predict seal performance, enabling operators to avoid unplanned downtime, proactively plan maintenance, and optimize processes
- Alert you when a mechanical seal deviates from normal operating conditions

RedRaven securely collects data from equipment sensors and transmits it via an encrypted network. It then begins analysis with technology designed specifically for mechanical seals in addition to pumps and valves in your steam cycle processes. As a result, you can better understand how to increase the efficiency, productivity and reliability of the equipment you use every day.

### Understanding seal conditions and leveraging real-time insights

RedRaven works with your existing mechanical seals for a comprehensive view of steam cycle pump system health, often without the need to add new sensors. The end-to-end IoT solution can be used with mechanical seals from Flowserve as well as equipment supplied by other manufacturers.

And, by partnering with Flowserve, you have the option to seek additional insights about seal conditions from our experienced RedRaven specialists. Trend reports provide deep understanding into equipment performance over time, while emails and alerts inform you when a seal experiences a problem so you can take immediate action to address it.

### RedRaven from Flowserve: Your complete IoT solution

RedRaven from Flowserve is a comprehensive IoT solution for seals in addition to pumps and valves. You can expand your knowledge and options about how to avoid equipment failure or what to fix when it occurs. You can improve root cause analysis (RCA) because RedRaven monitors equipment conditions at previously unavailable points.

You'll also save time and money by avoiding unnecessary equipment maintenance while directing resources to troubled assets, equipment and processes that require attention.