

Boiler Water Monitoring



Success in this application can be applied to a variety of other applications with similar challenges

Facts about Steam Boilers:

Steam boilers are critical to the operation of the plant and are very expensive to replace if not maintained correctly. Water quality is monitored in the boiler to prevent:

- Tube fouling which affects efficiency and performance
- Corrosion which reduces the life expectancy of the boiler and causes unsafe working conditions
- Poor control over the condensate which can lead to wasted water, chemicals and efficiency when excessive blowdowns occur due to poor water chemistry



Water Quality Monitoring to Optimize Boiler Performance

— Using pH, DO, and Conductivity

Steam boilers are necessary for both power generation as well as several other types of industrial processes. Therefore, the characteristics of the boiler might differ slightly depending on the facility. Regardless, the importance of the below three analytical measurements remains the same.

pH Measurement

An essential component of steam boilers is the tubes. The pH of the boiler water is typically alkaline, which facilitates the formation of a thin oxide layer on the tubes.

This oxide layer acts as a protective barrier against corrosion. Sodium phosphate & sodium hydroxide promotes oxide formation, but too much of these chemicals can cause problems. Continuous pH monitoring can help prevent these issues. The Knick SE 558 pH electrode with special internal KCL reservoir operates in low ionic activity liquid to maximize sensor longevity in the boiler water.

Oxygen Measurement

Oxygen significantly impacts the boiler's lifespan. Too much oxygen will cause pitting and corrosion even at trace (ppb) concen-

trations. Most steam boilers use chemicals like hydrazine as an oxygen scavenger to prevent this problem. The SE 707 oxygen sensor will easily monitor the ppb range of dissolved oxygen and enable proper control of the hydrazine levels to prevent the damaging effects of oxygen.

Conductivity Measurement

Conductivity measurements can identify the concentration of contaminants in the boiler water. Increased concentrations may occur from overdosing chemicals or a break in a tube. When the conductivity levels become too high, a boiler blowdown may be needed, or an inspection may be required to see if there is a failure somewhere in the steam system. Knick's SE 605 conductivity sensor operates in very low conductivities, such as those in a typical boiler water system. The accurate conductivity reading helps warn of contaminants and protects the overall health of the entire boiler system.

Boiler Water pH, Conductivity, and Oxygen with Smart Technology

The analytical sensor and cable connection are typically potted to prevent moisture ingress. Unfortunately, this forces users to dis-



Knick Smart Digital Sensors in flow-through fittings

connect the cable from the transmitter when exchanging sensors. To avoid this situation entirely, M4 Knick uses Memosens sensor connections. These connections are inductive and unaffected by moisture.

When using the Memosens smart digital technology, technicians can perform all calibrations in the analyzer shop or lab. For example, when techs want to replace a sensor, they take a pre-calibrated sensor to the field.



M4 Knick Coolers for sample conditioning

Then, they quickly swap by disconnecting the inductive Memosens cable and connecting the new sensor. The transmitter collects the calibration information automatically and is ready to measure without additional steps.

Boiler Water Sample Conditioning

Due to the harsh conditions inside the boiler, it is impossible to make these measurements directly. Instead, facilities use sample lines to funnel the boiler water to installation locations that are more convenient for access. The temperature and pressure

of the boiler water are still extremely high, which is not favorable for measurements.

Therefore, it's common to utilize sample conditioning equipment that reduces the harshness of the environment by lowering temperature and pressure. Conditioning panels from M4 Knick with all three measurement parameters are available and include hardware such as coolers and high-pressure relief valves.

What was this Customer's Return on Investment?

- **Reduction in Maintenance Time and Costs:**
By using Knick Memosens sensors and transmitters, the operators significantly reduce the need for calibrations and frequent sensor replacements. As a result, maintenance will have fewer trips for recalibrations and sensor replacements, which reduces maintenance and sensor costs.
- **Built for Wet Environments:**
The sensor's inductive connections and sealed transmitter design allows the system to operate in very wet locations. As a result, operators no longer have to worry about corrosion of the loop and damage to exposed transmitter circuit boards. In addition, the Knick transmitter comes with a three-year warranty.
- **Conditioning The Sample:**
Sample conditioning equipment reduces the process's temperature and pressure, enabling cost-effective sensor options and extending sensor life. By controlling harsh process conditions, you are also limiting sensor replacement needs. Therefore, users yield time savings and decreased costs in overall sensor inventory.