CROWN SOLUTIONS
CUSTOMER NEWSLETTER

Saving Money with Automated Boiler Blowdown Control

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The primary and most efficient way to control boiler conductivity is with continuous or surface blowdown from the steam drum. This is the point of the highest dissolved solids in the boiler and ensures a maximum of dissolved solids are removed with a minimal loss of water and heat from the boiler. Continuous blowdown is controlled in one of two ways: manually or automatically.

Manually Blowing Down

How tightly the conductivity can be controlled with manually controlled blowdown will depend upon:

- How frequently the boiler conductivity is tested.
- How sensitive the blowdown valves are.
- How attentive the operators are to the boiler.
- How dynamic the steam load is.

If the average boiler conductivity is too low, too much makeup water will be used, too much blowdown will be generated, too much fuel will be consumed, and too much treatment chemical will be used.

On the flip side, if the average boiler conductivity is too high, the makeup water usage and blowdown rate may be reduced, but the risk of carryover, scale, deposits, sludge, and corrosion are increased.

Figure 1 shows an example of what manually controlling boiler conductivity may look like. The boiler conductivity setpoint is 4,000 µmhos, but the average conductivity being maintained is only 3,755 µmhos. The standard deviation is 336 µmhos.

Those familiar with the Six Sigma management concept know that to achieve process improvement, the average must be moved in a positive direction (closer to the setpoint) and the standard deviation must be reduced. Automating boiler blowdown can achieve both of these goals.

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Automatic Boiler Blowdown

With automatic blowdown, tighter control of the boiler conductivity can be achieved. Figure 2 shows a continuation of the previous example with automatic blowdown control. With the controller, the average conductivity is now 4,000 µmhos, and the standard deviation is just 200 µmhos.

How They Work

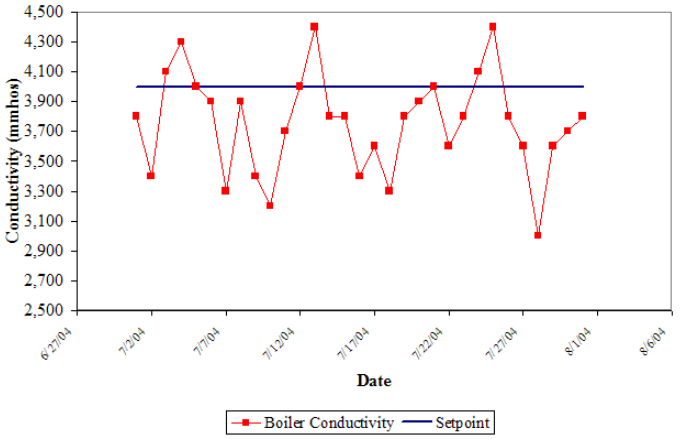
Automatic boiler blowdown controllers are programmed to take a cooled sample of each boiler on a timed basis. Every so many minutes, the cooled boiler water conductivity is checked and compared to the setpoint. If more than one boiler is controlled with the controller, it will cycle through each boiler with enough pre-flush time to ensure an accurate sample of each boiler. If the conductivity is too high, the boiler surface blowdown valve is opened. The next time the boiler is sampled (a.k.a., sample frequency), if the boiler conductivity is still too high, it leaves

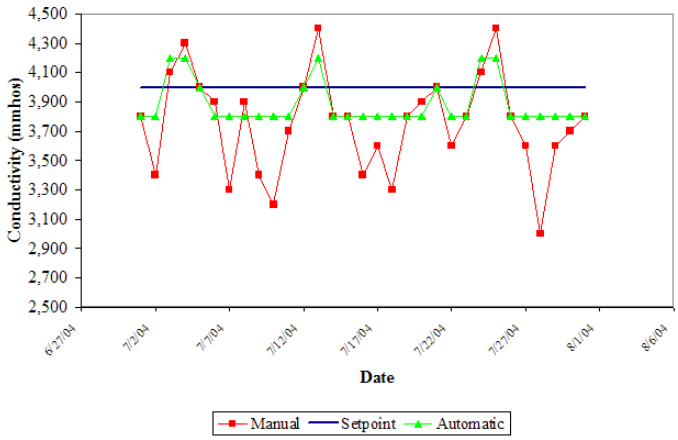
the blowdown valve open. If the conductivity is below the setpoint, it closes the blowdown valve. This is a pretty simple, yet very effective, process.

The secret to a good automatic blowdown controller is a cooled sample. Cooling the boiler water prior to reading the conductivity improves reading consistency, reliability and increases probe life.

Level of Control

The level of control achievable with a boiler blowdown controller will depend upon the boiler system, but a survey of *CROWN* associates indicates that a deadband of 200-400 µmhos is achievable on most systems. With fine tuning, a deadband of 100 µmhos is not impossible. Having a well-kept boiler conductivity also makes controlling chemicals much easier. When controlling internal treatment chemicals, the first thing to consider is the conductivity. If the conductivity is too high, then the phosphate, EDTA, etc. will probably be high. If the conductivity is too low, then these same treatment chemicals should be low too. If the boiler operators don't take this into consideration at all times, they can end up "chasing their tails" to control boiler chemicals. They may turn down the chemical pump setting and increase blowdown at the same or vice versa. Either way, the chemical level will swing much further than expected.





Justification

Automatic boiler blowdown controllers can be justified in several ways:

- Plot the past conductivity data to visually show the level of control and determine the average conductivity and standard deviation.
- If the average conductivity is too low, calculate the amount of water, fuel, sewer, pretreatment, and chemicals savings that would be realized if the average conductivity was at setpoint.

CROWN Associates have the tools available to assist in these calculations.

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