Heating Plant Efficiency Improved with Advanced Steam Temperature Controls

RESULTS:

- Improved temperature control with automatic operation of steam loop.
- Increased efficiency and monitoring of steam generation process.
- Added ability to isolate and maintain system with redundant backup.

APPLICATION
Industrial power co-generation plant optimization.

CUSTOMER
Midwestern university produces natural gas-generated steam for heating campus buildings.

CHALLENGE
The heating plant is responsible for keeping the 65,000 people who work and study on campus in more than 300 buildings comfortable. The facility delivers steam at 600 to 175 PSI at temperatures up to 725 degrees F, via the desuperheater station. Within it, a Fisher spraywater valve provides water to a Fisher TBX-T cooler section to cool steam down to 430 F.

However, the operators are unable to adequately control the steam temperature. As a result, if steam is too hot, it could potentially damage auxiliary equipment; if too cold, there will not be effective heat transfer. Also, there are serious concerns about the wide differential stressing the system piping. The root cause of the problem: The design process operating conditions that were originally specified are not now in line with the actual plant functioning conditions.

SOLUTION
Initially, the service team inspected and replaced spraywater nozzles that were plugged and/or stuck open; and replaced undersized strainer to keep debris from plugging nozzles. The team also installed reduced port trim for better control at lower required flows.

Then, engineering services determined current process conditions, performed tuning, control logic and application engineering to confirm sizing of TBX, temperature sensor lengths, and resized the spraywater valve. Their prescription included a reduced trim in the spraywater control valve from 2″ to ¾″ port; and added Rosemount temperature transmitter to accommodate the longer temperature sensor length requirements at higher steam flows.

(Continued on back side.)

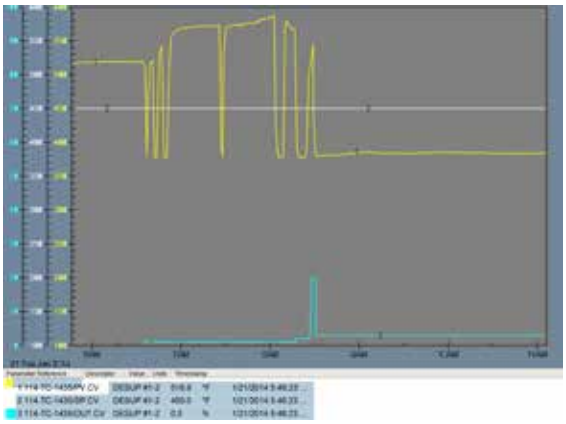
"The temperature is controlling as it was designed to. We can now use the system to its full potential in automatic and react to loadswings."
– Chief Plant Engineer

Cooling tower water-circulation pumps at the main heating plant are critical to the efficient function of the steam generating facility.

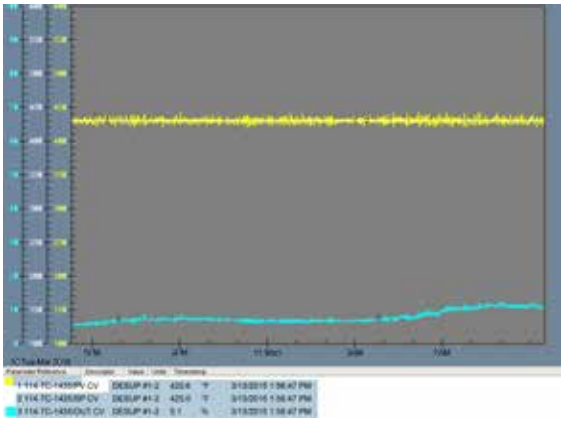
novaspect

EMERSON™

(Continued from front side.)



Above: spray water valve Cv performance before changes and, below, after replacement with the recommended 2-inch EZ with Microform Trim. Note the DeltaV screen shot above shows wide temperature swings between 380 and 490 F, versus the narrow range below after replacement, holding steadily around around the 425 F setpoint.

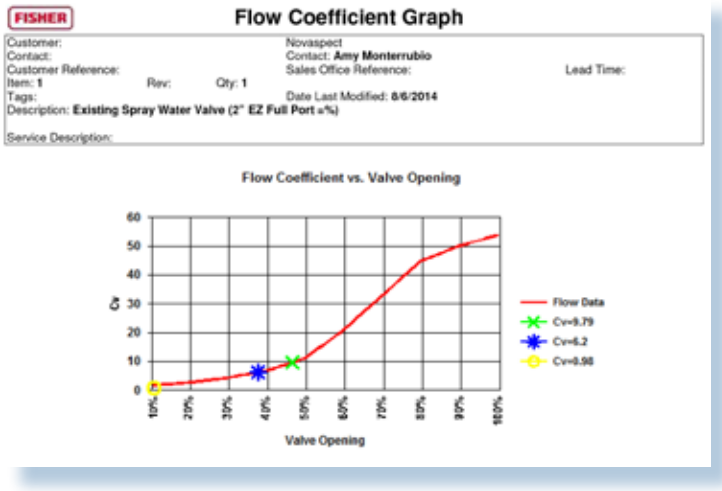


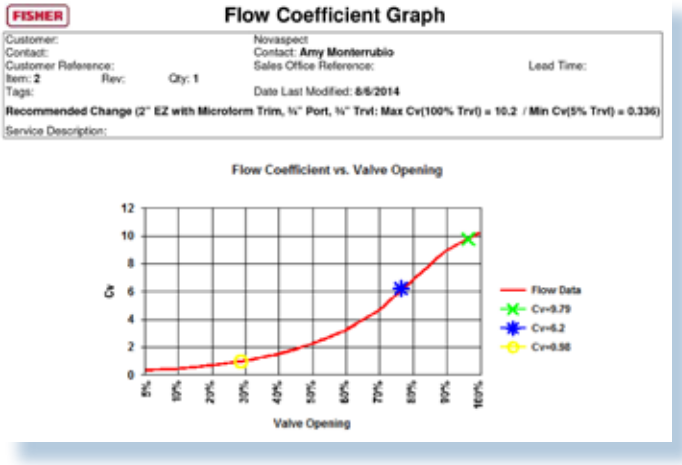
Above: undersized strainer before replacement showing clogged opening holes and accumulated scale; at right, magnified view of debris grit particles removed from the old water strainer.

BENEFITS & MEASUREABLE RESULTS

The operators gained improved temperature control to enable the heating plant to operate the steam loop in automatic mode. In addition, they now enjoy the benefits of a redundant system with the ability to isolate a portion of the plant and perform maintenance when required. Improved heat transfer in the heating systems was also added, as well as decreased fatigue stress on system piping.

To discuss how Novaspect can solve your challenging application, contact us today.





Above: performance chart of flow coefficient versus valve opening: existing spray water valve (2-inch EZ full port); below, improved performance of the same valve with the recommended trim change (2-inch EZ with Microform Trim, 3/4-inch port, 3/4-inch travel, maximum Cv (100%) travel) equals 10.2 / minimum Cv (5% travel) equals 0.336).

Novaspect Inc.
1124 Tower Road | Schaumburg, IL 60173
PH: 847.956.8020 | FX: 847.885.8200
Contact Us: www.novaspect.com