Major Chemical Manufacturer Audits Utility System

A customer requested a utility system survey be conducted at their facility to identify issues with the steam and condensate systems and to provide a mitigation plan for improvements.

Main Objective

The primary objective of the utility system audit was to investigate the imbalance in condensate flows that were causing the upper condensate tank to overflow into the tank farm area, corrosion damage to the tank bottoms from overflows, as well as excessive energy and water use due to lost condensate. Other areas of concern were the random firing of the boilers, excessive venting of steam, condensate and overall steam trap performance.

Customer Results

A comprehensive report was issued with system modification recommendations included. The recommendations, when implemented, alleviated current performance problems and led to a well-maintained and efficient system.

Application Description

- **Steam Flows**
  The operating conditions of the two fire tube boilers were observed. The boilers were located at different location in the plant, but connected to a common header; variations in pressure drop across the header were causing each boiler to fire randomly. A base boiler operation was initiated to correct this situation since both boilers had only high-low fire control. By operating the boilers in this manner, boiler short cycling and the associated energy loss was nearly eliminated. One boiler now operates in low fire maintaining base system pressure, while the other boiler follows the load by transitioning from high to low fire as necessary. If demand is not satisfied and the steam header pressure continues to drop, the lower boiler will operate at high fire.

- **Condensate**
  The condensate system is a pressure return design. Due to the pipe layout, all the condensate is returned to only one condensate receiver. This caused overflows that were troublesome to the client. The overflows had significant energy impact since it required excess boiler water makeup in the lower boiler. The entire condensate piping and flows were mapped and documented. This provided the information necessary to locate and properly isolate existing valves to ensure condensate flow in the proper direction. Significant water, energy and chemical savings were achieved with these changes.

- **Steam Traps**
  The steam traps in use throughout the facility were surveyed. It was observed that orifice and disc traps were commonly utilized. Usually these type traps are chosen based on cost; however, they had been found to be the most reliable at this facility due to the exposure to freezing. Balancing energy performance with maintenance costs ensuring overall lowest life cycle cost is critical to maximizing performance. This facility's unique experience was factored into the recommendation that the remainder of the float and thermostatic traps be replaced with disc traps.

Corrective Actions

1. Isolated existing valves to provide proper condensate flows.
2. Provided instruction to operators to ensure long term performance of the condensate system.
3. Set boiler controls to provide proper base boiler low cycling operation.
4. Review chemical treatment program to ensure proper system pH.
5. Recommended appropriate trap replacements to reflect the operating conditions.
6. Selected and specified condensate receivers and pumps to improve heat exchanger performance.
7. Identified poor piping practices and provided low cost repair solutions.

The MAVERICK Difference

The MAVERICK consultant was able to study, identify and resolve deficiencies of the steam system to provide true value to the customer that resulted in significant water, energy, and chemical savings.

MAVERICK Technologies, LLC
265 Admiral Trost Road | PO Box 470 | Columbia, IL 62236 USA
618.281.9100 | Fax 618.281.9191
info@mavtechglobal.com | www.mavtechglobal.com