Wireless Monitoring Delivers Fast Payback

Genentech checks steam traps and freezers to find energy savings and improve uptime.

by CHRIS STUBBS

Genentech's (www.gene.com) mission is to meet unmet medical needs, so one of the goals of our Corporate Facilities Services department is to operate its plant in South San Francisco as a world-class facility. The key focus area for achieving this goal is continuous improvement of facilities and maintenance systems to reduce operating costs. By driving down operating costs, more funds can be allocated to developing the product pipeline, and achieving the company's mission.

The guiding principles for identifying and executing continuous improvement projects include:

STEAM TRAP MONITORING

Figure 1: Wireless data indicated serious problems with a quarter of Genentech's traps.

- Improving plant asset management by implementing a performance-based maintenance strategy. Genentech has a well-established, time-based asset maintenance program. Transitioning to a performance-based strategy will also allow Genentech to predict equipment failure and understand an asset's life cycle.
- Reducing energy costs. Identifying methods to improve the efficiency of energy consumption will reduce energy costs and improve the bottom line.
- Improving uptime. Research and operations expect the facility and equipment to be functional and reliable. Any downtime in the facility directly impacts the bottom line. Corporate Facilities Services focuses on improving uptime and equipment reliability to help achieve the mission.

Steam Traps and Freezers

Consequently, we identified several assets that could benefit from its performance-based maintenance strategy to reduce energy costs or improve uptime. The first was steam traps. Genentech has an annual steam-trap maintenance program. However, throughout the year, steam traps often fail. Steam loss from failed traps was estimated to cost the company hundreds of thousands of dollars annually. Steam-trap failures could be prevented or found as they occur using a steam-trap monitoring system, resulting in significant energy savings (Figure 1).

The second asset able to benefit from performance-based maintenance was critical research equipment. Ultra-low freezers are critical to research activities. Reliability issues with older, stand-alone freezers result in downtime and potential loss of work product. Maintenance on the freezers is performed frequently to avoid these issues. Performance-based monitoring of these research freezers would allow the maintenance staff to proactively detect issues and prevent failures. This would increase freezer uptime and could potentially extend their useful life.

Avoiding Invasiveness

However, the typical challenges with implementing perfor-

mance-based maintenance on existing systems include cost and invasiveness. In order to monitor the condition of assets, analog instruments must be replaced, or new instruments must be installed to collect data. Traditionally, this work is invasive and requires a process interruption and engineering oversight. Furthermore, the new system must be commissioned for restart. This often includes inspections and leak checks, as well as revalidation in order to return the system to service. These activities often result in an unfavorable cost/benefit ratio.

As a cost-effective alternative, we identified a non-invasive monitoring solution, provided by Cypress Envirosystems (www.cypressenvirosystems.com). Devices are clamped onto existing instrumentation to collect and then wirelessly transmit data to a server for trending and alarming. This method eliminates the need for process interruption for installation and minimizes engineering oversight.

However, we were concerned about the viability of a new wireless technology in the facility. Although the traditional monitoring solution was more challenging to implement, it was a technology that was commonly used on campus. With the non-invasive wireless solution, there were concerns with data integrity, wireless security and data integration into the existing infrastructure. To demonstrate proof of concept, as well as to quantify potential savings, Genentech partnered with Cypress Envirosystems to pilot this technology on specific equipment.

Securing Savings

Subsequently, wireless steam trap monitors (WSTMs) were installed on 56 steam traps at a cost of $42,000. The WSTMs were intended to provide early indication of steam leakage or blockage, which could lead to failure. Data was collected on a "blue box" server for trending analysis.

As a result, 14 steam traps showed signs of failure. The maintenance team investigated, and the traps were replaced. Early detection saved an estimated $53,000 in annual steam loss. The project payback was 10 months.

Also, wireless freezer monitors (WFMs) were installed on 20 critical freezers at a cost of $20,000. The WFMs measured parameters including low-stage and high-stage compressor amperage, internal chamber temperature and door open/close status. The data collected was intended to provide early indication of refrigerant leaks or door seal issues, which lead to freezer failures.

Four freezers showed signs of distress. Even though the temperature profiles of the freezers showed no problems with freezer functionality, the compressor amperage profiles indicated that freezer failure was imminent (Figure 2). The issues were investigated and resolved by the maintenance team without having to replace the freezers. Early detection saved an estimated $20,000 in replacement costs. Furthermore, Corporate Facilities Services repaired the freezers before they failed and minimized the risk of losing any research samples, thus protecting the product pipeline. The project payback was immediate.

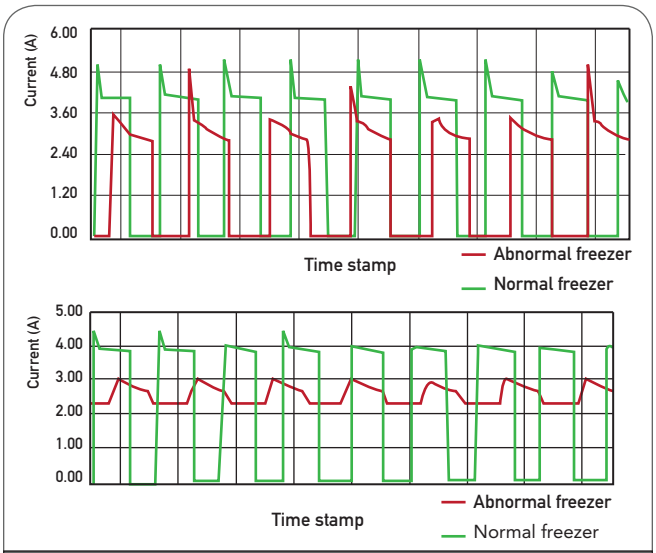

Figure 2: The first graph shows low-stage compressor amperage over time for two freezers. The profile of the abnormal freezer indicates a potential refrigerant leak. The second graph shows high-stage compressor amperage over time for two freezers. The profile of the abnormal freezer indicates an electrical problem in the compressor.

Overall Benefits

In the end, the wireless monitoring pilot projects demonstrated that the non-invasive wireless monitoring solution was a successful tool in implementing a performance-based maintenance strategy. Installation of the non-invasive wireless monitoring solution did not disrupt plant operations. There were no issues found with wireless security.

The data collected was easily integrated into Genentech's existing infrastructure. The overall results showed a payback period of less than one year and certainly point to more extensive use of the technology for such applications and even more broadly.

Since the initial pilot projects, Genentech's effort now has expanded to include monitoring of HEPA filters on backup diesel generators using Cypress Envirosystems' Wireless Gauge Readers.

In addition, our site in Oregon has installed the Wireless Stream Trap Monitoring solution first deployed in our South San Francisco facility.

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