Realizing ongoing energy and cost savings

Fault detection in a research laboratory ventilation system

CUSTOMER BENEFITS

- Assurance that system maintenance achieves the desired objectives
- Investment protection to secure and track investments over the long term
- A digital history of building performance
- An information front-end to consolidate building data and make it accessible to all vendors

PROJECT AT A GLANCE

Location
Massachusetts, USA

Facility
Research lab
450,000 sq. ft. (137,160 sq m)

Monitored Systems
Central and zone ventilation system

Setup Costs
$23,190 (€17,800)

Maintenance Cost (annual)
$35,407 (€27,100)

Projected Annual Savings
$286,000 (€219,000)

Equipment Installed
The following work was done as a result of Building Analytics findings:

- 84 VAV boxes were re-commissioned.
- 52 VAV box reheat valves were replaced.
- 12 VAV box actuators were replaced.
- An air handler chilled water valve was rebuilt.
- Multiple controls adjustments were made.

Overview

In the fall of 2010, monitoring services were provided for a 450,000 square-foot (137,160 sq m) research laboratory in the greater Boston area. The five-year-old facility was equipped with state-of-the-art energy efficient HVAC systems, including 10 ventilation units with capacity exceeding 50,000 CFM and several hundred variable air volume (VAV) boxes, to serve a mix of laboratory, office, and educational space.

Building Analytics provides facility teams with continuous system fault detection to automatically evaluate and organize the condition of equipment. This information enables proactive building maintenance while ensuring persistent energy efficiency, which could result in significant ongoing energy and cost savings.

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The Challenges and Solutions

Leaking Cooling Coil Valves in Air Handlers

Challenge: One air handler was found to have a leaking cooling valve resulting in a loss of approximately $2,200 (€1,700) per week during the heating season due to simultaneous heating and cooling of air supplied to the building.
Solution: The air handler was repaired and produced annual savings of $61,400 (€47,000).

Overridden Valve in Air Handler

Challenge: One preheating coil valve that also functions as a heat recovery coil valve was put into manual override during the summer months. Once heating season began, the overriden valve began to cause simultaneous heating and cooling.
Solution: The valve controls were corrected, resulting in savings of $137,000/year (€105,000/year).

Leaking Reheat Coil Valves in Terminal Units

Challenge: Nearly 200 of the building's terminal unit reheat valves were found to be leaking, caused by unfiltered hot water during the building startup. Building Analytics prioritized the most wasteful leaking valves to fix and confirm the success of these repairs, rather than rely on hot/cold calls to identify problems.
Solution: Eighty-four VAV boxes with the highest losses were re-commissioned, resulting in the replacement of 52 reheat valves and 12 actuators as well as some controls changes. The total savings due to repairs was $77,100 per year (€59,000 per year).

The Bottom Line

Through the Building Analytics diagnostics and reporting, several major problems were identified, including leaking and malfunctioning cooling coil valves in three air handlers and leaking heating coil valves in almost 200 VAV boxes. Based on the recommendations provided, the operations team was able to schedule repairs by prioritizing the most wasteful leaks first. Repairs resulting in $286,000 (€219,000) in annual savings have already been completed with additional repair work ongoing.

Due to repaired VAVs, two Air Handling Units also contributed to savings with reduced energy for $10,500/year (€8,040/year). Additional opportunities, including optimizing economizer controls, reducing air handler static pressure setpoints, or adjusting energy recovery control sequences, were identified and are under review for implementation. The building is still being monitored using Building Analytics, and the service is being used to discover faults, to accelerate retro-commissioning activities, and to automate verification of energy investments.

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