

Controls Retrofit Case Study

A West Sacramento Office Building gains control over energy use and earns Energy Star certification

The Problem:

The property manager of a 31,000 sq. ft., 2 story, office building contacted Cooper Oates Air Conditioning (COAC) because they were experiencing significant pains. They explained that their utility bills were increasing to such an extent that they were facing a surcharge from the utility company. In addition, the mechanical systems had not kept up with the changes in the use of the building, resulting in constant tenant complaints (too hot and too cold). These complaints were primarily due to poor systems control and not enough zones to manage the environment. The complaints were significant enough that in some cases tenants terminated leases.

In addition, the building had 4 very large (and expensive) box car units on the roof that were nearing the end of their life cycle and often needing service but the owner did not want to replace them due to only having a 60% building occupancy at the time.

The client engaged COAC to determine the full extent of the problems involved and develop solutions. There were no mechanical plans available to provide the basis of design so COAC reviewed the entire building and all equipment. That review uncovered significant difficulties with the old roof top units including excessive runtimes and deferred maintenance. Upon completion of an energy analysis, which had set the building's EnergyStar Benchmark score at 44, it was determined that the controls were not running properly which allowed the systems to run much longer than was needed. The technicians also witnessed the cooling system fighting with the heating system on a 100° day.

The Solution:

The most cost effective solution to extend the useful life of the rooftop units and to decrease energy use was to effectively manage the run times of the all the mechanical equipment. COAC proposed retrofitting the existing pneumatic controls system to a DDC control system. The new system would provide proper zone control, more effective interlocks between cooling units and the boiler, tighter scheduling, provide an online accessible visual interface to instantly determine temperatures, change comfort schedules and to perform preliminary diagnosis of tenant comfort calls before scheduling a service call. In addition, variable frequency drives were added to provide the units with a "soft start" and to reduce unnecessary fan power. A tighter sequence of operations would also



Quick Facts

Building: 31,000 Sqft, 2 Story
Office Building

Location: West Sacramento, CA

Scope of Project:

Create a set of mechanical as-built drawings, install variable frequency drives on the AC units, and replace the building pneumatic control system with a Direct Digital Control (DDC) system

Documented Annual Savings

- › 129,600 kWh
- › 2,808 Therms
- › Annual Savings **\$20,319**

Additional Benefits

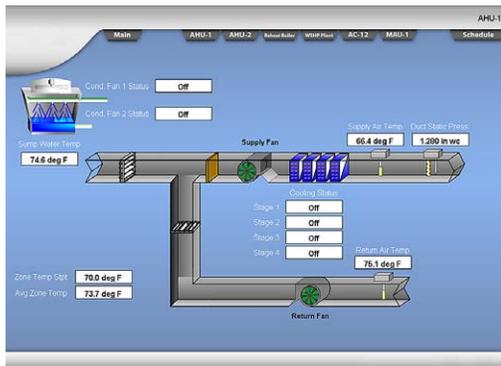
- › Significant decrease in tenant comfort complaints
- › Ongoing energy savings and increased asset profitability
- › Increased performance and longevity of equipment
- › Earned utility rebates that further increased the project's ROI
- › EnergyStar Certified Building with a new BenchMark Score of 81
- › Reduced impact on environment



result in extending the service life of the rooftop units by decreasing their run-time and operating stress.

The Work:

COAC created a set of mechanical *as-built* drawings to allow its professional engineer to establish optimal air flow requirements to bring the building up to Title 24 compliance. The scope of the project included: installation of variable frequency drives to minimize energy use and equipment wear and tear and replacement of the building pneumatic control system with a Johnson Controls Metasys™ Direct Digital Control (DDC) system. The project needed to be completed in parallel with the existing system and with minimal disruption and maximum comfort to the existing tenants. Due to these parameters a 90 day time frame was established for completion.



DDC System provides building control and real-time environmental data

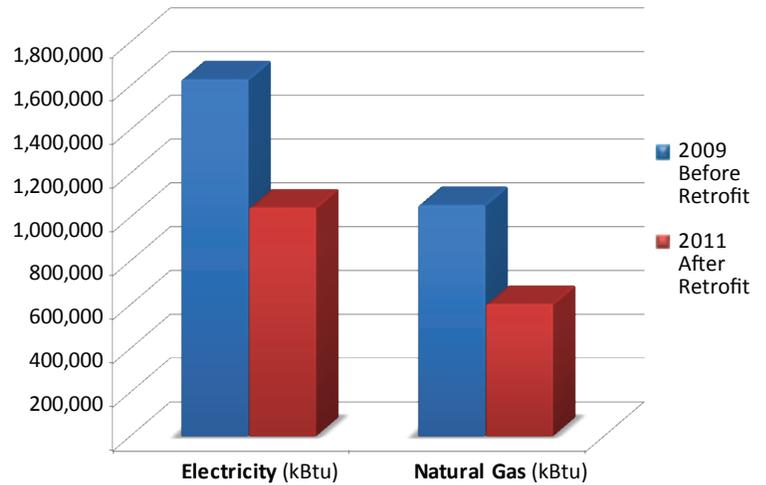
Upon completion, the building realized an immediate 39% reduction in electricity and natural gas usage; they earned utility rebates due to ongoing energy savings, and were eventually able to eliminate the utility surcharge imposed on them. The 39% energy reduction returned over \$20,000/year in utility expenses. The energy savings, in conjunction with rebates and reduced service calls, achieved a 17% return on investment and a simple payback of 3.9 years for this substantial project.



Prior to the project, the building earned a EnergyStar Benchmark score of 44. After the project it achieved a score of 81 allowing certification as an EnergyStar building. And finally, as of early 2012, the old roof top units are still in operation with no major repairs needed since the project concluded.

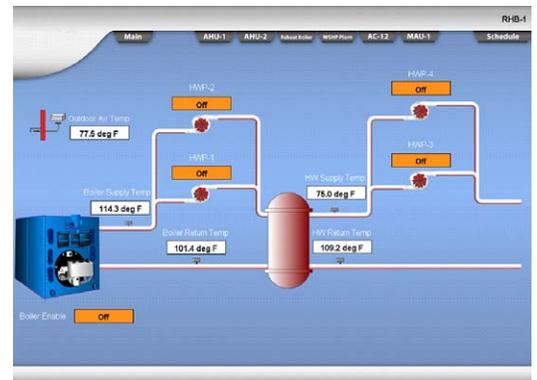
This data-driven project resulted in dramatic and observable proof of the value in creating effective partnerships that solve problems and create sustainable and profitable solutions.

Energy Use Comparison



The Results:

One of the most important results of this project was that during a difficult period of economic recession, the client was able to retain existing and entice new tenants. Those same tenants expressed great pleasure in the building's new comfort levels.



DDC System is accessible from the internet

Cooper Oates Air Conditioning

For 40 years, Cooper Oates Air Conditioning has designed, built, and serviced air conditioning systems for many of the leading properties in the region. We currently service systems covering over 15 million square feet of conditioned space.

Our team has extensive experience designing, installing, monitoring, and servicing a broad range of projects including:

- Commercial Offices
- Industrial / Conditioned Warehouses
- Hospitals / Medical Clinics
- Educational Facilities
- Server / Datacenter / Clean Rooms
- Restaurants / Commercial Kitchens
- Light Manufacturing