

MCFI Services– Monitor and Controls Study



Existing Condition

After a major energy upgrade that included a heat pipe, DCV (Demand Control Ventilation) economizer with entropy, BAS control with advanced analytics and lighting energy savings that was being tracked started to deteriorate.

During this time, real-time monitoring and control was lost.

This 60,000 sq.ft. facility was LEED certified and had the latest of energy saving technology

Before starting the project the building had a modern energy management system in place with VFD's on the drive and supply motors and VAV's in all the rooms. The drives however were only balancing static pressure in the ducts. The air was also over cooled for de-humidification and being reheated at the AHU.

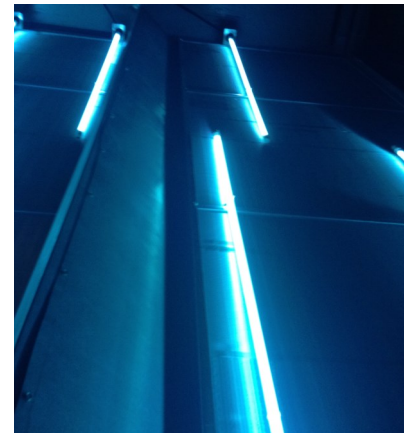
HEAT PIPE ADDED TO EVAPORATOR COILS TO ACHIEVE REHEAT

To eliminated the costly reheat a heat pipe was added in front of and behind the evaporator coils to both pre-cool and pre-heat the air coming from the return and outside air intake. This technology transfers heat from the return side to the supply side via a change in state in the gas in the coil. This is done without pumps or motors and will save an equal amount of cooling energy since the additional cooling does not have to be done to overcome the differential. All together this saved 46 tons of cooling.



BAS REPROGRAMMED TO MAXIMIZED UTILIZATION OF VFDS ON STATIC PRESSURE

The entire VAV air flow settings were customized so that each area had it's own flow that matched actual demand. Stock settings from the factory have no relevance to actual occupancy. VAV "tuning" involves monitoring and control to spot variances off set-point during seasonal changes. It can take 18 months to tune the system properly and maximize savings. This allowed the 80 hp of supply and return motors to modulate to 35-45hz and save between 50-80% of electrical energy to run the system. Ultra Violet lighting was added to minimize coil maintenance and improve air quality.



THERMS PER MONTH BASED ON RECOVERY ALONE

DATE	2014	2015-16	SAVINGS
6/22/16	3775	888	\$2,136
7/22/16	2835	2112	\$535*
8/22/16	2298	1420	\$649*

Note: Savings based year over year after monitoring was lost.

TWO MONTH LOST SAVINGS WITHOUT CONTROL: \$ 2,500

SUPPLY AND RETURN PRESSURE SETTINGS CHANGED TO INCREASE FLOW

Standard supply settings were 20% over return which was restricting flow causing back pressure in the rooms. To correct this, Tower Energy increased return speeds 3% higher than the supply which quieted the building and improved return flows substantially. This also allowed for lower general static pressures and fan speeds for the entire facility.

SAVING CHANGES AFTER MONITOR AND CONTROL WAS REGAINED

DATE	2013	2015-16	SAVINGS/MONTH
6/19/16	150,606	120,660	\$ 2,726
7/19/16	163,170	153,300	\$ 1,285
8/19/16	152,310	175,350	\$ -2,999
9/19/16	156,570	133,320	\$ 2,909
10/19/16	143,670	98,370	\$ 5,898
MONITOR AND CONTROL SAVINGS IN ONE MONTH			\$ 8,865.00

Note: Savings are calculated as the difference of 8/19/16 and 10/19/16 year over year compared to before the project.

1 YEAR PROJECTED SAVINGS \$121,380



MECHANICAL PROBLEMS SPOTTED WITH REAL TIME

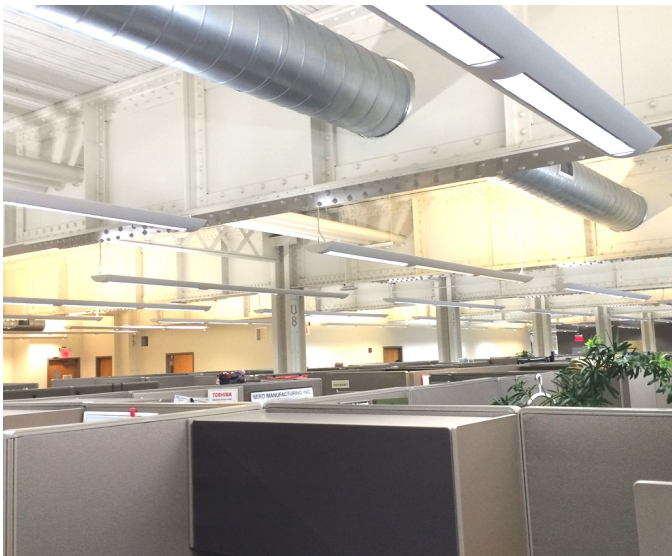
After 36 months of operation a dramatic rise in therm usage and electrical costs were noticed which required investigation. Although the summer temperatures were a lot higher than average, the spike in energy use was not expected and was higher prior to all the improvements.

Real-time monitoring was not available for these months and when it was regained we immediately realized the boiler valves were opening during unoccupied times and heating the entire building all summer.

This happened after a BAS software upgrade and was not noticed. After the problem was corrected the savings made a 33% swing and were back on track.

PROJECTED RETURN ON INVESTMENT 5 days

6000 %



LED lighting was used to upgrade the entire facility and reduce maintenance costs. These uplights had a new fixture insert that was also dimmable for maximum versatility and savings.

TOWER ENERGY MECHANICAL:

Licensed mechanical contractors with 30+ years of experience.

Licensed master electricians specializing on controls.

Practical customized engineering experience to spot opportunities and estimate payback and costs.

Real Time Monitoring and Control:



Real time monitoring and controls spot problems in the BAS and plant operations based on energy usage not just performance. Usage spikes out of the norm indicate equipment or control malfunctions long before they would normally show up on the utility bill.

Other issues concerning parts failure are also spotted in advance preventing costly maintenance.