IBM

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Company Background

IBM has been a leader in the technology industry for the better part of a century. The IBM Rochester facility was established just over 60 years ago. At 3.1 million square feet with 33 buildings on its campus, the Rochester site had its hand in manufacturing, chemical distribution, data centers, labs, hardware and software. Presently, manufacturing and chemical distribution have been removed, and now a variety of tenants lease the vacant space. IBM has managed to decrease its footprint from 33 to 8 buildings. Reducing costs in these buildings served as the focus of this project.

"You can have all of the data in the world to back up your claims, but unless you make your project matter to the people who use it, nothing will be done. Progress requires a partnership between people who are doing what they think is best. When goals align, things can move forward." ~DS

Project Background

Opportunities were identified and presented to MnTAP by the site mechanical engineer with three major goals: 1) Reduce peak power draw in the utility plant by dropping the load on the chillers using a thermal storage tank; 2) Identify cooling coils that have been fouled and design a system that will prevent them from becoming larger issues; and 3) Present an alternative corrosion inhibitor to the current molybdenum based one on-site that will reduce the waste the site generates.

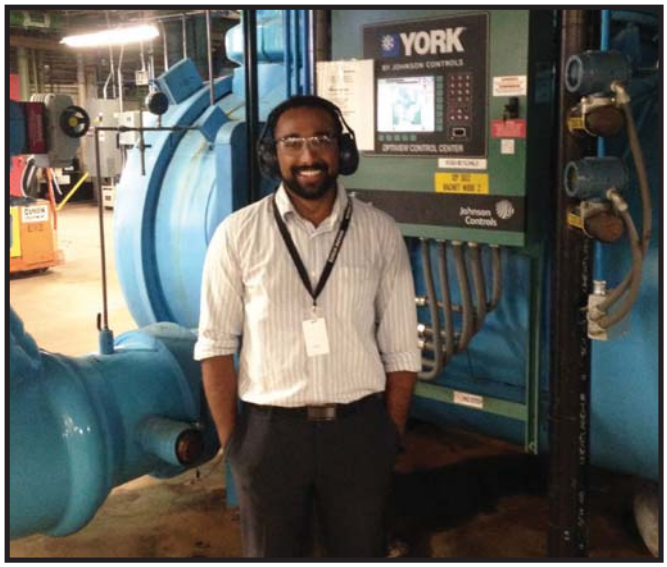
Incentives To Change

IBM is a global leader in innovation and historically has a reputation for environmentally conscious practices. Since 1973, IBM has pushed a climate change initiative, including reducing energy consumption and greenhouse gas emissions. The company has a 4% annual energy reduction target. At the site level, reduced energy costs reduce the cost to operate the facility, and this lowered expense improves the bottom line for IBM and businesses that share the facility.

SOLUTIONS

Use Thermal Storage Tank as Thermal Battery

There is an onsite thermal storage tank full of water that has previously been used as an emergency backup for the facility. This tank has extra capacity that can be used during the day to reduce peak demand of the onsite chillers. As the site power consumption approaches 700 kW of the peak draw from 2015, the storage tank water is used and chillers are turned down or off. The goal is to maintain this 700 kW difference between the reference value and the actual power draw. Utility demand charges are based on the 15-minute window of highest energy consumption each month. Therefore, if the schedule is followed diligently every day, there is a potential to decrease the peak power by 700 kW each month for 8 months of the year for an annual savings of $104,000.



Install Pressure Independent Valves on Large Air Handlers

The site operates over 450 air handling units; often, there is more chilled water than is necessary sent through the air handlers. Pressure independent valves will restrict flow to prevent overflowing and optimize heat transfer to reduce flows and energy draw overall. Inside the valve control mechanism in the chilled water system, an electronic control is calibrated to each HVAC unit. This controls flow to prevent overflowing of water and wasted energy. A previous case study showed results in a system larger than IBM's. Pressure independent valves are recommended for installation in larger units where payback will be noticeable. Potential annual savings is 1,100,000 kWh and $93,000.

Clean Exterior of Coils Due to Fouling

Build-up on the surface of cooling coils can result from debris or dust in the system. When this happens, the heat transfer between the air and the fouled cooling coils is diminished. The system compensates by demanding more water to achieve the same amount of cooling. Fouled coils have been identified using an infrared camera and documented for recommended cleaning. Cleaning of these coils is planned with an estimated annual savings of 26,200 kWh and $37,000.

Purge Plugged Coils

When water from the larger sized pipe headers drops down into the much smaller pipes of the air handlers, there can be buildup of solid materials. This does not create a problem in the large header, but in the small pipes it can cause plugging. If left unchecked, the plugging can cause the whole coil to become clogged which requires a full coil replacement. Coils with potential for plugging have been documented and recommended for purging. This is being implemented with an estimated annual savings of 5,000 kWh and $24,000.

Maintain Coils with Infrared Camera

Existing air handler maintenance audits annually inspect dampers and air flow. In order to prevent the large scale issues associated with severe clogging of coils, it will be beneficial for an additional duty to be added to this maintenance procedure. It is recommended that maintenance take pictures of the coils with an infrared camera to check for signs of fouling or plugging during the annual damper check in order to address minor problems before they become more costly issues with a potential annual savings is $15,000.

Replacing Molybdenum-based Corrosion Inhibitor

IBM is limited in what it can safely discharge from its chilled water system due to the presence of molybdenum in its corrosion inhibitor. This results in roughly 41,000 gallons of hazardous water shipments per year due to 170 pounds of molybdenum in this wastewater. By removing the molybdenum based corrosion inhibitor and installing a less hazardous alternative, the hazardous shipments of wastewater will be eliminated, saving $41,000 per year. This project will be modeled after the project completed in 2011 by the IBM branch in Raleigh, North Carolina.

Recommendation	Annual Reduction	Annual Savings	Status
Use thermal storage tank as thermal battery	700 kW peak	$104,000	Implemented
Install pressure independent valves	1,100,000 kWh	$93,000	Recommended
Clean exterior of coils	26,200 kWh Coil maintenance	$37,000	Implementing
Purge plugged coils	5,000 kWh Coil maintenance	$24,000	Implementing
Maintain coils with an infrared camera	N/A	$15,000	Recommended
Replace corrosion inhibitor	170 lbs waste	$41,000	Recommended