MARCH 2015

PJM Mechanical Contractors Publication
Phone: 609.921.1394

PJM Pipeline

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PROJECT PHOTOS

PJM HVAC optimization project

PJM recently completed a large HVAC optimization project that included the **replacement of an existing absorption chiller with a high-efficiency centrifugal chiller** and exchanging two large boilers with several smaller, more energy-efficient boilers.

The largest single user of natural gas in the client's facility was the absorption chiller, which led to skyrocketing gas usage during summer months. The replacement centrifugal chiller uses more electricity than the existing absorption chiller, but the increase in electrical load was offset by a dramatic reduction in natural gas usage. Electricity use was further minimized by eliminating the primary chilled water pump and the addition of variable frequency drives (VFDs) for the condenser water pump and cooling tower fans. Primary and secondary piping systems were modified for the new chiller equipment, and the Building Automation System (BAS) was piped and programmed with new points and sequences to optimize efficiency.

INSIDE THIS ISSUE

Removal of the absorption chiller significantly decreased the facility's steam load, so the facility's two large 5,000 MBH boilers were replaced with six 1,000 MBH modular high-efficiency boilers. Boilers operate more efficiently at higher load, and the existing boilers would often be required to run at lower efficiency to satisfy a low heating load. The new modular units run only when needed at higher, more efficient rates, resulting in a substantial reduction in utility costs.

PJM worked closely with the design team and equipment vendors on the installation and startup of the various systems, as well as the commissioning effort, to ensure the new equipment and controls operated to the design intent.

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PJM plate and frame heat exchangers

A plate and frame heat exchanger is a type of heat exchanger that uses a series of metal plates to transfer heat between two fluids. The large channeled surface area of the plates, in combination with the thinness of the chambers, promote maximal exchange of heat.

Proper Setup + Preventive Maintenance = Optimal Performance
Plate and frame heat exchangers are silent have no moving parts, but overlooking their maintenance is a common and sometimes costly mistake. Narrow gaps between the plates tend to trap foreign matter and debris, and lack of preventive maintenance can lead to fouling or scaling of the plates or clogging. When foreign materials are allowed to accumulate, heat exchange is decreased because the plate surfaces will not have direct contact with fluids. Fluids are forced to make their way through a smaller space, which causes the pressure drop - and operating costs - to increase. Failed gaskets can allow leaks into the environment, and cracks in the plates can lead to cross contamination between fluids.

If fouling, clogging, or scaling are recurring problems, it is important not only to remedy the immediate issue but to identify and correct the underlying causes. Poor water quality is a large contributor to such problems, so it is important to equip a system with adequate filtration, particularly when connected to an open loop.

To track performance and monitor for unexpected temperature or pressure changes, sensors or gauges should be used at inlet and outlet ports. Loss of heat transfer or an increase in pressure drop can indicate problems that require attention. Instrument accuracy should be checked once or twice a year depending on equipment criticality. Finally, much like a heating or cooling coil, ensuring proper flow rate and direction is critical, even on clean, new systems.

PM Guidelines
Preventive maintenance of a plate and frame heat exchanger is minimal compared to other types of equipment and relatively simple to perform. Units should be back flushed on a regular basis to remove foreign material and visually inspected for leaks, and gaskets should be checked for brittleness. A mechanical cleaning should be performed every few years, depending on the condition of the water and frequency of back flushing. Gaskets should be changed every five to ten years, and plates should be sent back to the manufacturer or other authorized cleaning facility every ten to fifteen years for reconditioning.

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SERVICE PHOTO ALBUM

Here, a small plate and frame exchanger is being installed for a processed cooling system. Many plate and frame systems are used for heat exchange from glycol to non-glycol systems. Water quality and glycol percentage, along with proper flow, are key to optimizing heat exchange between two systems.

This large plate and frame heat exchanger is for a cooling tower system. Because heat exchangers connected to an open system tend to accumulate particulates and bioload between plates over time, this system is equipped with back flush capability to help keep plates clean. Regular monthly PM is also required for the tower water treatment, filtration system, and plate frames.

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PJM PROFILES

PJM's Kim Johnson

In this month's Pipeline we are focusing on estimating coordinator Kim Johnson.

Though Kim has only been with PJM for just under a year, **she has gained wide recognition within the company as an important part of our team**. Her role at PJM is to coordinate all incoming bid requests and provide bidding support to the construction office and plumbing and HVAC estimators.

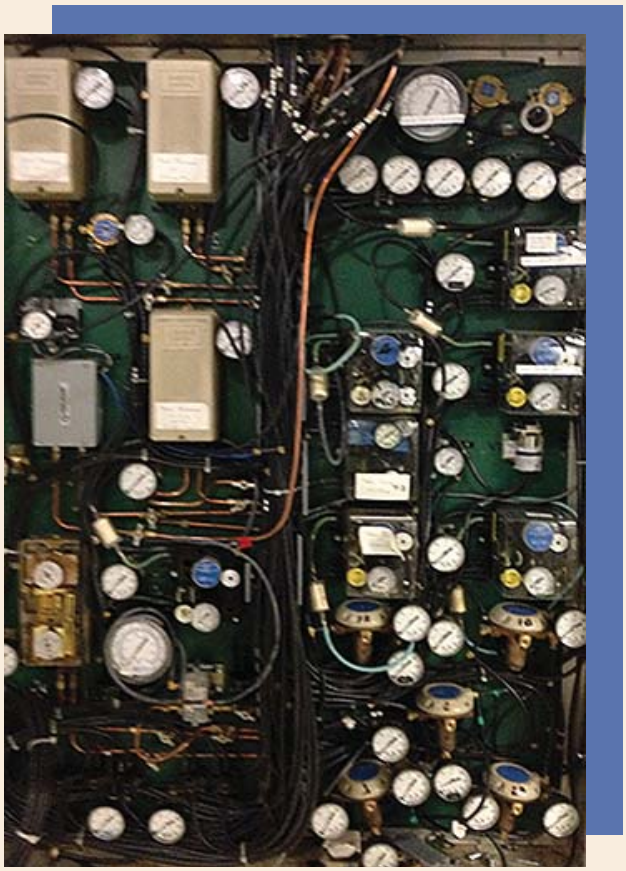
Prior to joining PJM, Kim was a project assistant for a general contractor and worked for General Electric for 18 years.
Kim lives in Hamilton, NJ with her 17 year-old son Daniel, a junior at Steinert H.S. and a junior firefighter-in-training at DeCou Fire Company. Kim's hobbies include photography and ceramics, and she is the current president of Daniel's high school football team Booster Club.

PJM hodgepodge of controls

The functionality of a mechanical room or central utility is only as good as its control systems.

In many older buildings, mechanical systems featured pneumatic controls. But, as time marches on, repairs and replacements occur. Electric/DDC systems are often mixed and merged with existing pneumatic controls, leading to overcrowded panels with little to no labeling as to what is what. Old, nonfunctioning controls are abandoned, left in place for someone else to figure out when something goes wrong. Further compounding problems are electric-to-pneumatic or current-to-pneumatic devices scattered throughout mechanical areas. These devices often have sloppy, inaccurate control, leaving temperature, airflow and humidity subject to a wide range of operability, leaving occupants uncomfortable and unhappy. Failures and alarms often go unnoticed until it is too late.

If you can relate to the above scenario, or if the photo below has a familiar look, the best thing to do is to take a holistic approach toward establishing a master plan for control system replacement and performing the upgrades in phases, from most critical to least.



PJM can help clients create and carry out a comprehensive, budget-sensitive strategy to eliminate the hodgepodge effect and streamline their facility's controls.