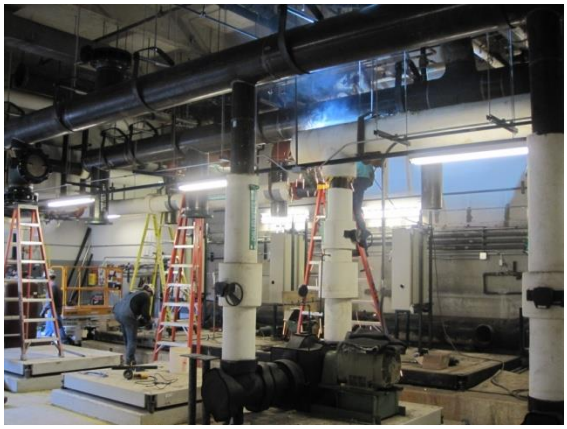
Loyola University - Health Science Campus
Chilled Water Independence Project

Loyola University's Health Science Campus is located in Maywood, Illinois and was previously part of a combined healthcare and educational campus of approximately 15 buildings. The south portion of the previous campus consists of four educational buildings (totaling 627,657 sq. ft incorporating laboratory, office and fitness spaces), which now compose the Loyola Health Science Campus (LHSC). An additional 230,000 sq. ft. Center for Translational Research Education (CTRE) building is scheduled to complete construction in fall of 2016. Chilled water utilities as well as normal and emergency power for LHSC are intermingled with the healthcare campus which is under separate ownership.

A utilities master plan was completed for the LHSC Campus in 2010 and included recommendations for the separation of chilled water production and distribution from the healthcare campus with significant savings at the plant and distribution systems as well as future cost avoidance. Loyola University implemented these recommendations which included the installation of a new 2,200 ton variable speed chilled water plant in the existing LHSC Cancer Center building (in place of two existing inefficient 550 ton absorption-style chillers). The new LHSC chilled water plant consists of two, 1,100 ton, high-efficiency, variable speed, series-counter flow electric chillers and a new two cell, variable speed, cross flow cooling tower. The new 2,200 ton chiller plant was installed within the chiller room which was originally constructed to contain the existing 1,100 ton chiller plant. As a result the physical constraints of the new chiller plant were a significant challenge. The equipment ingress path allowed for less than an inch clearance on all sides of the chillers when lowered into the basement chiller room. In addition to the physical constraints of the chiller room, there were also physical constraints relative to the new cooling tower location that allowed us to go higher but not a larger footprint without incurring significant additional cost. This drove our decision to go series counter flow where we could increase the delta T on both the condensing water system and the chilled water system without incurring a significant energy penalty. The new series-counter flow chillers serve a campus network of chillers where the system is variable primary with pumps in series and plants in different locations.

There is an oversized main header system with near net zero pressure drop in the middle of the campus that facilitates the control and sequencing of chillers. This new plant was designed at a highly efficient Integrated Part Load Value (IPLV) of 0.370. In addition, the new controls system eliminated the manual control of the chilled water plant and automatically operates the chillers, cooling tower, and pumps which were commissioned and functionally tested to ensure optimum energy efficiency.

Chilled water distribution was also optimized to eliminate all chilled water bypass and common piping throughout the campus ensuring maximum utilization of the produced chiller water before returning to the chillers, thus increasing campus distribution efficiency. The existing main piping distribution was reconfigured to reduce balancing and pressure drop required to circulate chilled water throughout the campus. All piping changes were made throughout campus at minimal cost with no affect on the operation of the existing equipment and no impact on occupants. Two new chilled water pumps were installed with Variable Frequency Drives (VFD's) and operated based on local chilled water requirements as well as campus wide chilled water usage to allow all campus secondary pumps to reduce speed or completely turn off thus saving energy from a holistic pumping approach. Three new 60 HP condenser water pumps were installed in place of three existing 100 HP pumps, a major achievement considering the new plant capacity doubled the existing plant's capacity. The new cooling tower was installed with VFD's on the fans as well as measures to reduce flow through the cells without greatly affecting cooling tower efficiency. The controls system was also expanded to encompass the control of the building secondary pumps to ensure optimized pumping energy in each building.



Finally, to implement this work, an upgrade and separation of the 13.2Kv normal electrical power for LHSC was necessary. The new chilled water plant and associated electrical upgrade were completed in 2013 and have received $177,200 in incentive funding from local utility providers.

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