

NEW HIGH SCHOOL IN LAND OF LINCOLN COMES WITH A HYBRID HVAC SYSTEM FEATURING TACO'S LOADMATCH® SYSTEM

High school students in the community of Waterloo, Illinois, a traditionally farm-based but increasingly commuter city across the Mississippi from St. Louis, are attending a brand new school this year. Waterloo High School replaced a former school facility originally built in 1938 that by this decade had become seriously overcrowded. Voters in 2006 approved a bond referendum to build a new school, which today is serving approximately 900 students in grades 9 thru 12.

The building complex was designed by Design Architects, Inc., a sister company to Hurst-Rosche Engineers of Hillsboro, IL. Containing 227,000 sq. ft. of classroom, labs, activities and administration space, to include a 1,800 sq. ft. culinary arts laboratory and an inner courtyard-reflecting pond, the school's campus was designed specifically with



future community growth in mind; Waterloo CUSD5 school officials foresee the school potentially serving up to 1,800 students in the future.

Built on a vacant 62 acre parcel of land just outside town, the school contains a single pipe loop, heat pump-based system featuring Taco's LoadMatch® system and a complete BAS energy management system supplied by Johnson Controls. The mechanical systems at Waterloo High School were not only designed to comply with a new state energy conservation code but also with designed-in redundancy and flexibility, particularly with a possible geothermal option in the future.

"We were looking for energy efficiency in accordance with ASHRAE 90.1," says school superintendent Jim Helton of the design of the school and its mechanical systems. Tom Baker, P.E., President of Hurst-Rosche Engineers, describes the school's HVAC system as a "hybrid system" comprised of 120 Trane constant speed heat pumps, some DX with fluid coolers, boilers and a 100 percent dedicated outside air (DOAS) make-up unit with distributed ventilation. The hydronic LoadMatch option for fluid circulation added redundancy to the heat pumps and simplified the controls for the heat pumps while reducing first costs because of a reduction

in piping and control valves.

Introduced to the LoadMatch concept back in 2007 by Taco rep agency Behrmann Company of St. Louis, Hurst-Rosche Engineers utilized the Taco Hydronic Solutions Software (HSS) system to design and equip the heating and cooling system. "HSS," says Tom Baker, "proved to be a great time saver for us. It helped minimize errors, allowed us to check and then guarantee our design with Taco, and to link in associated disciplines such as electrical, plumbing, condensate piping and controls into the system design."

Since this was the first project that Hurst-Rosche employed the LoadMatch system, there were some initial questions to overcome, particularly with regard to the temperature cascade for cooling and dehumidification. "A temperature cascade will occur with LoadMatch," says Baker, "because the system doesn't incorporate a dedicated return pipe and, therefore, as you go down the piping system, temperatures will rise or decrease depending on whether you're in the heating or cooling mode, and it is more efficient to maintain the same entering water temperature at the last terminal unit on the primary loop as you do on the first." To counter this, Hurst-Rosche specified water source heat pumps for the terminal units and designed the main piping system supply point as the center of the loop, thereby segmenting the building into quarters over both the first and second floors. This helped to minimize temperature cascade and allows the system to maintain maximum heating and cooling to the most distant points in the building.

The installing contractor, Custom Mechanical LLC of Troy, IL, also had not experienced the LoadMatch system prior to this project and they were initially skeptical of its performance. But according to Marcus Frederick, president/owner, "Once we got past the learning curve and became familiar with the system, there were no problems. LoadMatch was easy to install and was quite a timesaver in terms of scheduling and manpower. One pipe really helps in terms of installation time."

Taco KS vertical inline pumps along with Taco expansion tanks and a 4900 Series Air/Dirt Separator support three Lochinvar Intelli-Fin gas-fired mod-con boilers in the heating system mechanical room. On the A/C side there is no central chiller but Trane supplied air handlers. Johnson Controls thermostats within the building are linked to the BAS. Temperature set points are maintained at 70° F in winter and 76° in summer.

"Design Architects and Hurst-Rosche Engineers did a very good job of listening to our needs and then taking those needs and putting them into this project," says Superintendent Helton. As for the Taco LoadMatch system, "We'll definitely use it again, without a doubt," says Tom Baker.

Information supplied by Taco, Inc. www.taco-hvac.com