

**TACO ADVANCED HYDRONICS SYSTEMS:** Case Study in Real World Technology

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# Northland Pines High School

NEW CONSTRUCTION • EAGLE RIVER, WI



## TACO ADVANCED HYDRONICS SYSTEMS: Case Study in Real World Technology

The Northland Pines School District in Eagle River, Wisconsin is the proud owner of the first LEED® Certified School in the Badger State – and not just LEED but LEED Gold. The school district located in the north woods turned to a firm with extensive experience in designing and constructing sustainable schools in cold climates: Hoffman LLC, located in Appleton, Wisconsin. Hoffman provides fully integrated planning, architectural design and construction management services using a design-build approach.



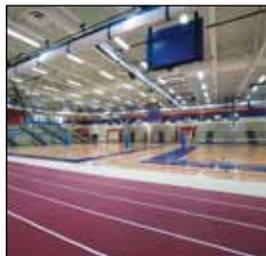
*1600 Series In-Line Pumps, Plus Two Multi-Purpose Valves and Suction Diffusers*



*FI Series Base Mounted Pumps*



*Atrium "commons" area*



*Extensive field house with track and basketball courts*



*Performance auditorium*

The Northland Pines High School Project presented a number of challenges, including a tight design and construction schedule that had to accommodate the long northern Wisconsin winters and a fixed budget set by referendum at a time of rapidly increasing materials costs between ground breaking in the fall of 2004 and completion date for school opening in September 2006. These challenges were amplified by the need to work immediately adjacent to the existing high school building that was deconstructed after school was out in June of 2006.

The school district is located in a pristine region with mature forests, hundreds of lakes, and a community legacy of conservation and environmental protection. Consistent with this legacy, the school district was looking for high levels of indoor air quality, site protection, energy conservation, and water conservation.

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The Hoffman design-build approach, **TPM**<sup>®</sup> Total Project Management: Vision Taken to the Power of Green, provided a single project team from planning through construction and post occupancy monitoring. The design-build approach also provided a single responsible party in working closely with the Northland Pines School District. These were key elements in delivering a LEED Gold project at \$115 per square foot on budget and on schedule. Having a single team was extremely productive in coordinating the various planning, design, and construction management challenges involved in meeting LEED requirements.

Northland Pines High School, which opened for the start of the 2006-2007 school year, encompasses 250,000 square feet contained within a brick two-story building that includes an atrium "commons" area, a performance auditorium, and an extensive field house with a track and basketball courts. Hoffman completed the project for \$29 million, including LEED certification-related costs and the enhanced commissioning requirement for LEED. Per square foot for all design and construction costs and fees other than the land came in at \$115 per square foot.

Hoffman recommended Fredericksen Engineering of Mequon, Wisconsin to design the school's HVAC system. Hoffman and Fred-

ericksen have worked together on many projects, and experience has taught them how to meet an owner's budget and performance expectations while squeezing out unnecessary costs. In the case of the Northland Pines High School not only did they manage to live within the owner's budget, they did so while achieving LEED Gold certification status.

**"The client is very happy with the building and the HVAC performance, as we are."**

— Mark Hanson, Hoffman LLC

Fredericksen's design for the HVAC system was guided by a need to balance three critical considerations: to keep an eye on first costs, to achieve energy savings, and to provide a healthy, comfortable indoor environment. The wet side of the HVAC system consists of a hot water boiler plant and a chilled glycol cooling plant. The boiler plant pumping is configured in a primary-secondary arrangement. The system comprises eight Patterson Kelly Mod-U Fire non-condensing boilers for optimal heat recovery, two Taco FI Series base mounted pumps to serve the secondary loop, and eight Taco 1600 Series inline pumps to serve the primary hot water loop. The secondary pumps are served by variable frequency drives to allow the pump flow to match the building's load.

The chilled glycol plant pumping is also configured in a primary-secondary arrangement. The system is comprised of a 425 ton air-cooled Trane chiller and two base-mounted Taco pumps. The secondary pump is served by a variable frequency drive to allow the pump flow to match the load in the building.

While many facilities have pumps sized for the total connected load, the Taco pumps for the Northland Pines High School were sized to match the anticipated peak load only. This not only reduces installation costs it also results in more efficient pump operation for the life of the building.

Additional installed Taco equipment includes sixteen Plus Two Multi-Purpose Valves, four suction diffusers, two CA and one PS expansion tanks, two air separators and over 100 Taco Accu-Flo balancing valves.

Fredericksen designed the heating system for -25°F, reflecting the harsh winter conditions experienced in Eagle River. The harsh winter, however, does not preclude the need for air conditioning in summertime; the chiller was sized for 88°F summer conditions. Tower Mechanical Services of Oshkosh, Wisconsin provided the HVAC system installation. The HVAC system's design and energy efficiency merited seven points under the LEED certification process (Energy & Atmosphere category).

# Taco Advanced Hydronic Systems

Taco is a leader in the development and manufacture of advanced hydronic equipment and systems for today and tomorrow's leading edge commercial and institutional building projects.

From a wide range of pumps, heat exchangers, air-dirt separators, expansion tanks and valves, to systems like LoadMatch® and LOFlo™ Injection Pumping, Taco offers the products and systems, backed by advanced software programs and solid technical expertise, that consulting-specifying engineers, design-build mechanical firms, and building owners are looking for.



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