

## CASE STUDY

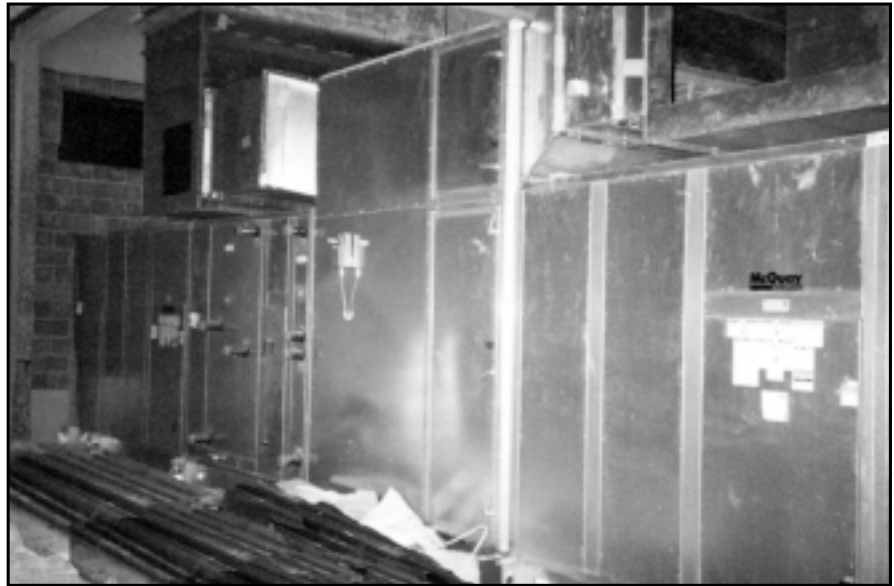
# HVAC System Enhances Educational Objectives at Innovative New High School

Educators and school boards are increasingly challenged, not only to adequately prepare students for work in our technological society, but also to graduate well-rounded individuals. As a result, HVAC engineers and contractors are equally challenged because making the grade in terms of indoor comfort can make a major difference in a school's learning environment.

At least that was the conclusion of the officials in Bemidji, Minn., when they decided to replace the existing high school building with a new state-of-the-art facility that would provide students with a number of benefits more conducive to learning.

Scheduled to open in the fall of 2000, the new Bemidji High School is a 400,000 square-foot facility that covers almost three blocks. While the facility itself is large, it breaks out of the conventional school building "box" with a configuration that physically differentiates specific functions to maintain a sense of community in each discipline.

The high school includes everything to enhance the educational and extracurricular options of the student population. It has science labs; a music area with



*Bemidji High School turned to the Vision™ customized air handler from McQuay to meet their specific requirements for an HVAC system.*

performance and practice spaces; a university-size gymnasium and natatorium; and an industry and technology education center. There are traditional classrooms, in addition to several meeting rooms and collegiate-style lecture halls. While the building's dynamic design provides maximum educational opportunities for the students, it presented a challenge when it was time to specify an HVAC system.

The engineering project manager, Jerry Vaughn, senior mechanical designer with Haack Engineering in Bemidji, considered a variety of

options for the HVAC system before finally deciding on a chilled water system with air handlers. Although chilled water systems are a fairly standard choice for educational institutions, the system installed at Bemidji is anything but conventional.

"Ground water is used for cooling which, even in a colder climate such as northern Minnesota, is not typical for such a large building," said Vaughn. "Since the school is closed part of the summer months, its cooling needs are less, and there is a chiller for backup in the event of unusually hot weather.

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Consequently, the ground water system works just fine.”

Because Bemidji High School is designed with so many different uses, zones and occupancy levels, it requires 24 air handlers of varying sizes. When it came time for Vaughn to specify the equipment, he looked for a unit that had maximum flexibility. The Vision™ customized air handler from McQuay International proved to offer just that. With its custom-modular platform design, the Vision can be tailored to create the exact system required, which was a major advantage from Vaughn’s perspective.

“We had to consider each zone individually as well as to think about what special requirements needed to be addressed,” he said. “For example, in the auditoriums and music rehearsal areas, we used sound attenuators. In other areas, we took advantage of fan options to get blow-through and draw-through plenums as needed.”

The school also required a variety of air handler sizes because the system had to cool everything from small classrooms, to large lecture halls with high occupancies —

even a humid natatorium. Since the Vision is available in a wide range of sizes, it met the school’s broad requirements, from 1,500 to 27,000 cfm.

Meeting the ASHRAE standard for ventilation in schools was a particular challenge for this project. To maintain acceptable indoor air quality in schools, large amounts of outside air are required. This requirement can, however, reduce overall efficiency unless a heat reclaim system is included.

“We looked into the conventional heat reclaim with coils and found it would require adding coil units almost as big as the air handlers themselves,” said Vaughn. “The penthouse mechanical room on the building would be as tall as 20 feet to accommodate this type of unit. Not only would this have been obtrusive looking, it would have added substantially to the cost.”

Resolving the heat reclaim dilemma required an innovative solution. “We created a custom-plate-type heat exchanger that attaches to the air handlers,” Vaughn explained. “The exchangers protrude slightly above the units, but they also work as the

duct connection for the discharge air, which allows the mechanical room to keep itself a manageable 12-feet tall.”

Peterson Sheet Metal’s Dean Solberg, who was responsible for installing the air handlers, said he particularly appreciated the Vision’s modular construction. “When it came time to install the equipment, the roof was already on the building,” said Solberg, “and we had to get the units through a hole in the wall. But since the Vision units are designed for quick re-assembly, it was very easy to bolt them back together once they were in the larger space.”

When the new Bemidji High School opens, the entire community can be proud of this innovative school that, by its design, supports and encourages the various academic and extracurricular activities of its diverse student body. Because school officials and the HVAC design team both shared a common vision, the entire community will now be able to share in the benefits a better learning environment has to offer.