

RenewAire Case Study: Two Harbors High School



History Class

For some years now, the Lake Superior School District in northeastern Minnesota has been making do with and making fixes to a 65-year-old high school building. The building suffers with systemic and physical problems that are beyond the reach of any renovation or retrofit. The outdated heating and ventilation systems make for chilly rooms, stale air and high energy costs. The electrical system doesn't support the computers and other technology needed for teaching and administration. The building lacks the space and equipment to meet special and community education needs such as computer science and industrial technology. "If you took away everything that needs to be fixed," says principal Bob Nyberg, "We wouldn't have any building left!"

Meanwhile, the district's current enrollment of about 2,000 students is projected to get even smaller in the coming years. That would seem to make the building of a larger new school counterintuitive. But the district isn't adding more space; it's consolidating as it updates. It will close the existing middle school and shift two grades to the lower school and one grade to the new high school.

It's fitting, then, that the engineers who designed the heating system were also thinking smaller. They will make efficient use of the district's space and budget by installing a RenewAire C/P series ERV unit.

Here's the Problem

Two Harbors, Minnesota, where the new high school is located, is a cool place. On the northwest shore of Lake Superior, residents enjoy only about 200 hours a year of temperatures above 75°. In fact, temperatures average below 10 degrees for the entire month of January (occasionally freezing over the entire surface of the lake)! So while Two Harbors High School won't need air conditioning, it will need a powerful heating and ventilation system. One whose up-front and operating costs won't break the district's budget and that will keep heating and refreshing the school's air on the coldest winter days.

Engineers also needed to solve the problem of temperature control in a building where no two rooms will make the same demands on the heating system. Some classrooms will be full of students and others, empty. The cafeteria will be busy with people preparing, serving and eating food for only half the day. Locker rooms will fill up periodically with kids, the moisture from their showers and, let's be frank, the scent of ripe socks. Using a single setting for the whole building was as impractical as putting thermostats in every room.

Who's Got the Answer?

LHB, Inc., an engineering and architectural consulting firm in Duluth, had no trouble coming up with the right answer to Two Harbors' dilemmas. Radiant floor heat plus energy recovery ventilation. "In this climate, ERV is the only thing that makes sense, and we probably tried every kind from plate-to-plate to the wheel," says David Williams, lead engineer on the Two Harbors project. LHB found that few of these systems could stand up to the cold of northern plains winters. Williams related, "They'd

freeze up, sometimes before the temperature got to zero! I told some clients to turn off their ERV units in extreme cold.”

LHB learned about the RenewAire ERV system a few years ago and has used it on every large job since then. RenewAire’s exchange core is made of highly engineered hydroscopic resin plates that allow heat and moisture to transfer from one air stream to another. Heat and moisture recaptured from the exhaust air stream warms the glacial incoming air. So the high school won’t need as large a heating system and it won’t pay exorbitant heating bills. Also, since the RenewAire ERV transfers moisture as a gas, it eliminates the need for drains or condensate pans, as well as the risk of damage from frozen condensate, i.e. *ice*.

LHB is partial to RenewAire’s C/P series units, commonly referred to as *Applied Products*. In these units, cabinets of the core material are stacked together and attached to an air handler. On large jobs like Two Harbors, this approach is less expensive than building the ERV into an air handler and it results in a more compact system.

Proving the Equation

The new Two Harbors High School will open in September 2005. In the meantime, condensing gas boilers and more than 20 miles of tubing will be installed to provide the radiant floor heat. To address the temperature control problem, it will keep the air near the floors at room temperature (about 72°) throughout the building. Then each room will set its own temperature as it’s warmed by the bodies and equipment in it. To ensure that germs, cooking and locker room odors won’t flow back into the school, the ventilation system will use 100% outside air. The RenewAire ERV is definitely up to that task, since it is ARI Certified ERV with 0% exhaust air transfer at normal at balanced operating conditions.

- Maintenance for the RenewAire ERV is quick, easy and safe. That will save the district more money, which it can invest in instructional programs.
- RenewAire has no rotating wheel or dampers, so it won’t create unwanted noise in classrooms or performance areas.
- Because Applied Products can be installed in virtually any orientation, interconnecting ductwork is kept to a minimum. This makes RenewAire ideal for any application where available mechanical room space is limited.
- The total separation of air streams in the core means that the RenewAire ERV will get the job done in other controlled exhaust applications such as restaurants and health care facilities.

Although Two Harbors High School will not test the efficiency of the RenewAire C/P series ERV for a year, David Williams of LHB is confident about its performance. “We’ve used this system in four schools in the past three years, and **we expect that each one will pay for itself within the first four years of operation.** And I haven’t gotten one call saying ‘The heat’s not working!’”