

SOUTH EDUCATION CENTER - ID 287

Richfield, Minnesota

Founded in 1967, Intermediate District 287 was born out of a common goal to provide students with new options in vocational education. Over the course of 40 years, the district has added a reputable list of academic specialty areas, and has grown into 13 west Minneapolis area districts. When the time came to create a learning space for special needs students, including programs for autism and an alternative learning center, the district went to every effort to ensure the building would be worry free; as dynamic and innovative as the education. By enlisting the help of TSP engineering and design expertise, as well as applied HVAC solutions from Midwest Mechanical Solutions, ID 287 can proudly boast their new South Education Center as one of the most efficient and sustainable buildings in the entire state of Minnesota.

NOTED SUSTAINABLE FEATURES:

- Geothermal system for heating and cooling
- Received all 10 points in EA credit-1 in LEED scoring system
- "Green" cleaning and maintenance program
- 64% more efficient than energy benchmark
- Ultra low 44kbtu per square foot
- Energy cost is \$1.06 per square foot
- Rain gardens for stormwater control
- Roofing reflects sunlight for cooling efficiency

AWARDS

- LEED Certified
- ACEC Engineering Excellence Award
- SCEC Award
- Xcel Energy's "Most efficient building designed and built for 2009"

PROJECT HIGHLIGHTS:

BUDGET:

25.5 Million

SIZE:

3 Stories, 108,000 square feet

DESIGN:

TSP

MECHANICAL CONTRACTOR:

Pearson Mechanical

MECHANICAL EQUIPMENT PROVIDER:

Midwest Mechanical Solutions

QLCI, DESIGNED BY TROX, DISPLACEMENT

One of the most important pieces of equipment in the classrooms at South Education Center are the floor mounted displacement induction ventilation units. These units utilize induction of ventilation outside air (OA) with a low velocity air delivery method known as thermal displacement ventilation. This form of air delivery reduces the amount of OA required to the space by raising the ventilation effectiveness compared to a mixed air system. This decrease in required OA greatly reduces the cooling and heating energy required to serve the space. By using water in the zone/classroom to condition the air rather than taking the air back to a central station AHU, the amount of heating and cooling required is also greatly reduced. Displacement induction ventilation also provides fresh clean air directly occupied zone, by carrying the contaminants off-gassed from objects and people up to the unoccupied space. Once in the unoccupied space, the same contaminants are exhausted from the building.

QLCI displacement induction ventilation diffusers possess a combination cooling and heating coil to condition, and heat or cool the return air in that zone. This provides excellent, independent temperature control of each zone. The return air is pulled through the coil by the induction nozzles, mixed with the ventilation outside air, and supplied to the space down low at a very low velocity and slightly lower temperature than the space set point temperature. In addition, there are no moving parts or filters in the unit, which greatly reduces maintenance requirements. QLCI units provide the quietest air delivery method available. With no moving parts or fans placed in the classrooms, they can be designed quiet enough to meet ANSI S12.60 standards (35 dba). These units provide a space with fresh, clean air, low CO₂ levels, and replace typically noisy mechanical equipment with a quiet and low maintenance alternative. Such benefits result in healthier, distraction free learning environment.



“ The QLCI provided a single product that is under the control of the mechanical contractor while delivering an effective displacement ventilation solution.

- Paul Dvorak PE, LEED AP,
Design Engineer



TROX MODEL DID-300 CHILLED BEAMS

Active chilled beams are used in the corridors, offices, administrative offices, and conference rooms of the South Education Center. Through induction, the chilled beam mixes ventilation (OA) air with the zone return air to deliver conditioned air through a 2-way linear diffuser. In this case, the air delivery method is at the ceiling and the zone is a mixed air zone. By using chilled water to condition the air directly at the zone rather than sending air back to a central station AHU, the amount of fan energy and heating and cooling energy required are greatly reduced. The chilled beams have a heating and cooling coil which provides precise control of each zone. The chilled beams come in sizes from 3 feet to 14 feet long. By using active chilled beams in this facility the owner is able to save energy and provide precise control to individual zones.

“ “When a non-condensing chilled water is available, this device allows for treating small and variable occupant spaces effectively. Where displacement ventilation was not practical, the chilled beam was used because it allowed for a primary air system and non-condensing chilled water to deliver conditioned air. A more costly mixing system using a fan coil with traditional diffusers would have taken up more ceiling space and been more costly.



- Paul Dvorak PE, LEED AP, Design Engineer ”

HAAKON CUSTOM ENERGY RECOVERY UNIT



If you call the geothermal well-field and water to water heat pumps the “heart” of an HVAC system then surely you can call these Haakon energy recovery units the “lungs”. The South Education Center utilizes two 12,500 CFM units. The enthalpy wheels in these units recover both sensible and latent energy; they are 70% effective in recovering the energy from the return air stream and transferring it to the outside air stream. Built-in heating and cooling coils condition the air prior to delivering it to the space. These units are equipped with the latest safety devices and are designed for easy maintenance for the building facilities staff. In addition, Haakon units have the industry’s lowest leakage rate of less than 1% at +/- 12” of static pressure. This low leakage rate saves the owner energy and reflects the excellent quality of construction. Finally, a single point

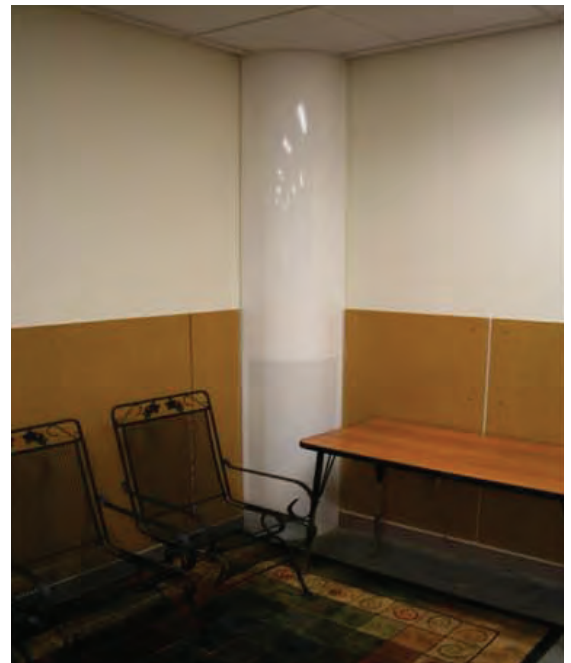
power connection feeds variable frequency drives on the fans that ramp up and down based on duct static pressure. The use of VFD’s saves the school fan motor energy.

“ I have been involved in HVAC design for nearly 20 years. Rarely does a product stand out due to the quality AND the level of service from the manufacturer. Haakon has provided exceptional engineering guidance and a response time second to none. The use of Haakon DOAS units with energy recovery wheels, water coils, correctly sized fans and uncompromising air path design helped us deliver primary air to the air delivery devices in a very effective and dynamic manner.

- Paul Dvorak PE, LEED AP, Design Engineer ”

TROX DISPLACEMENT DIFFUSER

Displacement Diffusers are used in the common areas, the gymnasium, and in various other specialty areas. Similar to the QLCI unit, these diffusers are a displacement system with a low air delivery method known as “displacement ventilation”. This form of air delivery reduces the amount of outside air required to the space by raising the ventilation effectiveness from 0.8 to 1.2. The resulting decrease in required ventilation (outside air) greatly reduces the cooling and heating energy required to serve the space. Air is mixed and conditioned at a fan coil or air handler and supplied to the displacement diffuser at low velocity. This provides a quiet and comfortable space.



FLOW CONTROL PRESSURE INDEPENDENT VALVE

All cooling and geothermal control valves at the South Education Center are pressure independent to provide precise control of the water GPM, regardless of pressure changes to the system. This accuracy increases the delta T on the system and saves cooling energy. The Flow Control pressure independent valve functions as a balancing valve, flow limiter, control valve, and flow meter all in one. The 100:1 turndown provides control at low flows where conventional control valves do not work. Flexibility in controls is an additional benefit, as pneumatic, electric proportional, 2-way or shut off actuators can be used depending on what fits each project best. Flow Control's industry leading technology and experience is backed by the industries first and only delta T guarantee.

“ These [Delta P Values] have a complex integrated pressure independent feedback mechanism that is unbelievably accurate and reliable. A device with such ability contained in a single housing creates a very easy installation and operation

- Paul Dvorak PE, LEED AP, Design Engineer ”



SUMMARY OF ALL EQUIPMENT PROVIDED AT THE SOUTH EDUCATION CENTER BY MMS

- Addison Geothermal Water to Water Heat Pumps
- Armstrong Pumps
- Armstrong Air Separators & Expansion Tanks
- Armstrong Plate Heat Exchangers
- Cesco Gravity Relief Ventilators
- Enviro-Tec Air Handler
- Enviro-Tec Fan Coil Units
- Fan Tech Dryer Booster Fan
- Haakon Energy Recovery Air Handlers
- Haakon Make-Up Air Unit
- Kees Pressure Relief Doors
- K-Flex Flex Connectors
- Trox QLCI Utility Cabinets & Duct Covers
- QLCI, designed by TROX, Displacement Ventilators
- and Diffusers
- Trox Chilled Beams
- Trox Flow Rate Controllers & Attenuators
- Twin City Fan Exhaust Fans