Case Study

Single Duct Terminal Unit

Project & Location
University of Nebraska, Omaha,
College of Business Administration

Designed By
Architect: Holland Basham Architects
Engineer: Farris Engineering
General Contractor: Kiewit Corp.
Mechanical Contractor: Midwest Mechanical

Krueger Representative
Air-Side Components
www.airside-hvac.com

Krueger Product Used
LMHS Single Duct Terminal Unit
with LineaHeat Option

Photo courtesy of cba.unomaha.edu

About the Project

Founded as Omaha University in 1908, the current day University of Nebraska at Omaha is now the third-largest institution for higher education in Nebraska. It occupies over 158 acres of land and serves over 15,000 students and faculty. As a part of its expansion, they are adding a new LEED Silver Certified College of Business Administration named Mammel Hall.

This new building, standing at three stories with an atrium, occupying over 120,000 sq. ft. of space, is an exciting new part of the campus. In fact, they have a dedicated construction web camera updating every 15 minutes so that everyone can see the latest progress. Inside, versatile classrooms will be equipped with cutting-edge technology, including state-of-the-art laboratories for investment science, collaboration science, innovation and entreprenuership, accounting, statistics, and computing. Also planned is a corporate-style boardroom with corresponding outdoor deck, a 200 seat lecture hall, and dedicated space for executive education and professional development curricula.

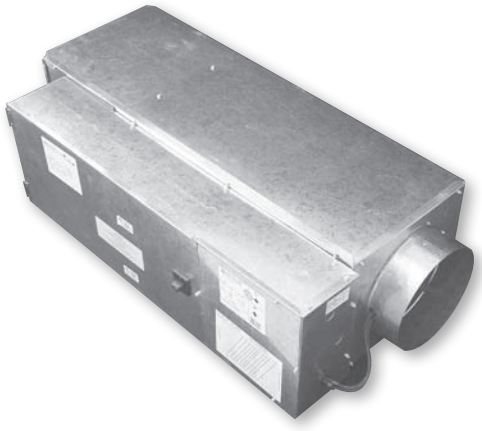
With a goal of providing occupant comfort year-round, the owner wanted to insure that the indoor climate would be controlled through potentially humid summers as well as severe winter conditions.

Challenges & Considerations

The Engineer's original specification called for the addition of a boiler and significant hot water piping. This option would require a boiler to be on standby for the inevitable reheat request in order to maintain humidity control.

When asked to consider electric heat as an alternative, recommended by the local Krueger Representative, Air-Side Components, the Engineer originally rejected it, stating that three-state heating was too imprecise and SCR electric heat was too expensive (often adding as much as $400/zone between heater and controls).

It is true that for Nebraska's summer climate that some reheat is essential for good control of humidity. Reheating at the air handler would mean some critical high load zones would not get sufficient cooling. Three-stage electric heat is typically too imprecise for the 'trimming' needed to keep from sub-cooling some spaces.



Model LMHS
with Electric Heat

Case Study :: Single Duct Terminal Units, Model LMHS

University of Nebraska, College of Business Administration (Mammel Hall)

Product Solution

It was not until subsequent discussions with both the Local Representative and Dan Int-Hout, Krueger's Chief Engineer, that the Engineer switched the specification to electric heat. It actually offered a lower first-cost than the first option because the once needed hot water piping could be eliminated. However, we still had to address an issue with uniformly cooling all spaces.

Fortunately, Krueger already had an electric heat solution that would fit that need as well as provide an opportunity to earn LEED points towards their Silver certification.

Krueger's patented LineaHeat™ option features a single-stage, time-proportional solid state relay to provide only the required amount of heat to the space. The LineaHeat controller optimizes both flow and reheat at a much lower first-cost than SCR electric heat and it has more flexiblity when it comes to controlling it. LineaHeat can accept up to seven different types of input signals, including ON/OFF, 0-10 VDC, and 3-point floating. All seven options are designed to work with standard DDC controllers currently offered on the market today, which can create an opportunity for significant first-cost savings. Additionally, there is an option to allow for precise control of discharge temperatures to maintain space temperatures. This too can be beneficial when there is a need to cost-effectively control humidity.

A Green Solution

Using LineaHeat on a project helps to show compliance to two standards required for achieving a LEED certification.

Standard 62.1 - Ventilation for Acceptable Indoor Air Quality

IEQ prerequisite 1 requires compliance to the ventilation rate procedure of Standard 62.1. Increasing the ventilation rate above this can earn IEQ Credit 2. Managing the electric reheat with proportional control, the terminal unit is able to operate at minimum airflows, meeting the ventilation requirements of 62.1 and IEQ Credit 2. Applied properly, this prevents the potential for sub-cooling the space during periods of low occupancy (likely during the summer at a university). Additionally, the discharge temperature sensor can limit the leaving air temperature of the electric reheat to a 15° heating ΔT. Standard 62.1 states a leaving air temperature above the 15° heating ΔT requires the introduction of 25% more outside air.

Standard 55 - Thermal Comfort

To show evidence of compliance with Standard 55 is required for all Thermal Comfort related LEED Credits: Limiting discharge temperatures, managing space temperatures to a close tolerance, and preventing vertical stratification is a requirement of Standard 55.

To demonstrate the adherence to limiting the discharge temperature, LineaHeat offers an optional discharge temperature sensor. When used, the desired discharge temperature can be set by a dial provided on the LineaHeat control board. Regardless of what the capacity of the electric heater is, LineaHeat will only allow the discharge temperature to reach the pre-determined temperature that is set on the LineaHeat control board.

To document compliance of vertical stratification requirement, an ADPI (Air Diffusion Performance Index) analysis can be performed on a zone. An ADPI greater than 80% has been shown to limit temperature stratification in the occupied zone to within the 5.4° limits required by Standard 55. The proportional control of reheat that LineaHeat offers allows the terminal unit to operate at minimum airflows and still be controlled within the ADPI limitations of the diffusers. This allows an ADPI analysis to be performed. Find Krueger's published ADPI charts for all diffusers within Krueger's Product Catalog, which makes it quick and easy to document compliance.

The End Result

Krueger was pleased to have provided 150 LMHS units with LineaHeat for this application and the opportunity to help achieve LEED Silver Certification on this building. The Engineer also stated that the installation has gone smoothly and that they are on target to open in August of 2010.

LineaHeat allows a simple startup with little field adjustment required. The optimization of energy use that LineaHeat provides has assisted the customer in obtaining his LEED Silver rating.

More Information

"Green" and LEED certification requirements are on the rise. For more information on Krueger's LMHS terminal unit, VAV energy saving options, or other green air distribution solutions, simply contact your local Krueger representative or visit us on the web at www.krueger-hvac.com.

For 24-hour access, visit
WWW.KRUEGER-HVAC.COM

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Transfer

Chilled Beams

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Engineering Information

Krueger continues to lead the industry in the development of innovative products and air distribution solutions. To learn more about what we can do for you, contact your local Krueger representative or visit us on the web at www.krueger-hvac.com.

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Supporting Sustainable
Green Building Design

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