AAON

Case Study

SOUTHERN OREGON UNIVERSITY

Packaged Rooftop Units with AAONAIRE® Energy Recovery Wheels

Located in downtown Medford, OR, the Southern Oregon University (SOU) and Rogue Community College (RCC) Higher Education Center is part of the education core of Medford's downtown revitalization. The building is expected to become the first LEED® certified project in southern Oregon. "The Higher Education Center was developed to create a closer partnership between Southern Oregon University and Rogue Community College, to eliminate the perceived barrier between the two colleges, and to offer the building as a model of sustainability," said Larry Blake, the Director of Campus Planning & Sustainability for SOU.

SOU and RCC began collaborating in 1996 to facilitate transfer between the two colleges and to provide greater access to higher education in the Rogue Valley of southern Oregon. The main SOU campus is located in Ashland, which is about 15 miles south of Medford. RCC has three campuses across southern Oregon, including the Riverside campus where the Higher Education Center is located.

Objectives of developing the Higher Education Center were to increase enrollment at both colleges, ease student transfer between the colleges, consolidate services, increase classroom and office space, provide learner-centered classroom space, and to integrate with the Medford business community. One-third of the building space is used for shared services and the remaining space is divided equally between SOU and RCC. The Higher Education Center was a 22.2 million dollar project, funded equally by each school, and replaced three leased RCC buildings and one SOU building.

At 68,700 square feet over three floors, the Higher Education Center includes 28 classrooms, 3 computer labs, a large lecture hall, a tiered presentation hall, 2 biology/chemistry labs, 1 physics lab, office space for faculty and staff of both SOU and RCC, an atrium style entryway, student study and lounge areas, a coffee bar, and a business resource center.

A building must include a variety of "green" features to become LEED certified, including an environmentally friendly and high performance HVAC system. Stefan Lidington, the AAON sales representative with Oregon Air Reps in Portland,

noted, “The Higher Education Center’s HVAC system needed to provide benefits such as energy savings, improved indoor air quality, and the use of an environmentally friendly refrigerant to contribute to the building’s LEED certification.”

Leadership in Engineering and Environmental Design

The LEED rating system was developed by the U.S. Green Building Council as a third party certification program for high performance green buildings. It has become the nationally accepted benchmark for the design, construction, and operation of green buildings. LEED rating programs exist for different building types including new construction, existing buildings, commercial interiors, core and shell projects, homes, neighborhoods, schools, retail, and multiple building/campus projects. The level of certification a building obtains, Certified, Silver, Gold, or Platinum, is determined by the number of LEED points the building achieves. The six different categories where points can be earned are sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmenal quality, and innovation and design process.

The categories which HVAC systems can contribute to LEED points are energy and atmosphere, indoor environmenal quality, and innovation and design process.

Energy and Atmosphere

For energy and atmosphere, an energy efficient HVAC system can drastically reduce the energy usage of a building and help it earn Energy Performance points. By using an environmentally friendly refrigerant, such as R-410A, an HVAC system can help a building earn Refrigerant Management points.

Indoor Air Quality

An HVAC system with CO_2 measurement or outside airflow measurement can help a building earn the Outdoor Air Delivery Monitoring point. By providing additional ventilation outside air to the space an HVAC system can help a building earn the Increased Ventilation point. Being able to perform a flush-out of the indoor air with ventilation outside air prior to occupancy can help a building earn the Construction IAQ Management Plan: Before Occupancy point. If an HVAC system provides individual space thermal comfort controls it can help a building earn the Controllability of Systems: Thermal Comfort point.

Innovation and Design Process

If an HVAC system is exceptionally energy efficient, improves a building’s indoor air quality considerably, or includes an innovative design with other “green” benefits it can help a building earn up to two Innovation and Design Process points.

AAON Packaged Rooftop Units

A 210 ton RL Series packaged rooftop unit conditions the air of the Higher Education Center’s Variable Air Volume (VAV) system. The VAV system cools and heats the entire building, except the science labs, with cooling provided by the RL Series unit and hot water reheat provided in VAV terminal units.

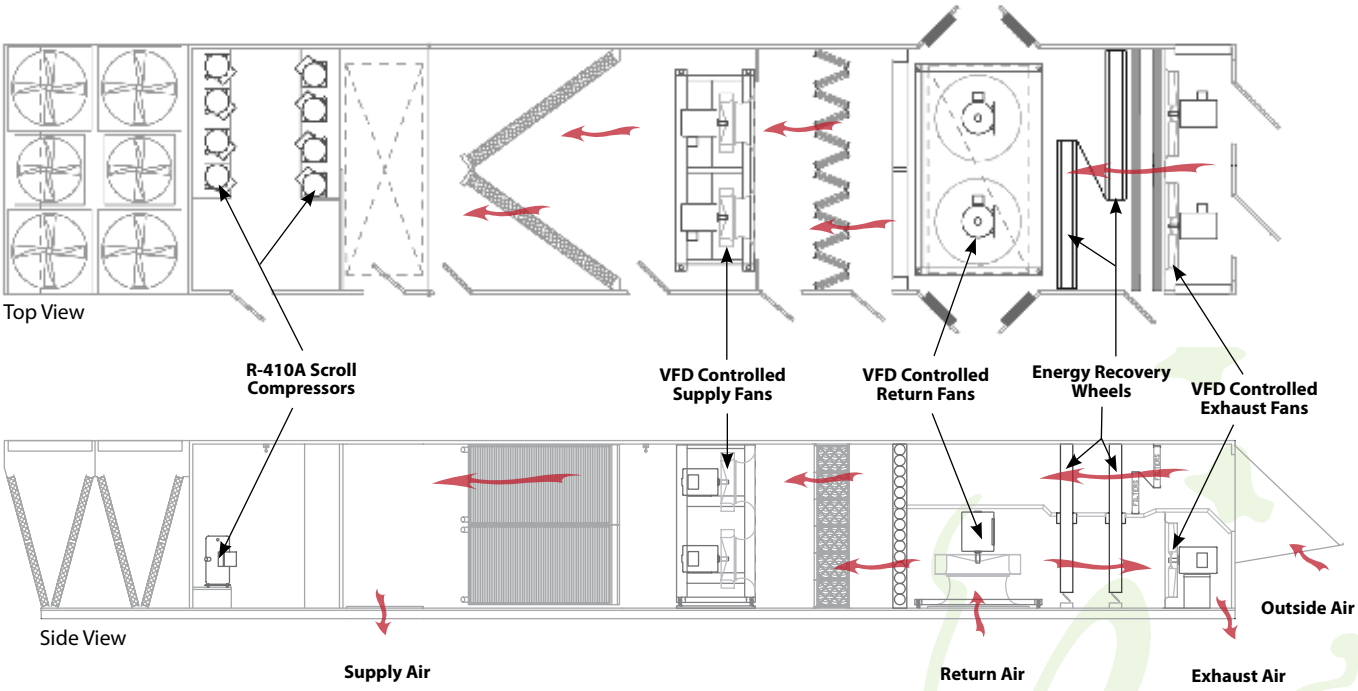
For supply fans the RL Series unit includes four Variable Frequency Drive (VFD) controlled direct drive backward curved blow-through plenum supply fans which provide energy efficient variable air flow without belt energy losses, fan housing energy losses, or draw-through fan motor reheating losses. The supply and return air sections also include sound attenuating insulation liners. The cooling system includes chlorine free R-410A refrigerant scroll compressors, a high efficiency air-cooled condenser, and eight stages of capacity control provide quiet, energy efficient, and environmentally friendly cooling. For air filtration

the RL Series unit uses 4” pleated, 30% efficient, MERV 7 unit filters and 4” pleated, 85% efficient, MERV 13 outside air filters.

The RL Series unit features a one-of-a-kind AAONAIRE® energy recovery wheel option. The option includes two direct drive backward curved plenum return fans, two 81” total energy recovery wheels, and two direct drive axial flow power exhaust fans. The return fans help to overcome the high return static of the large air system, which covers all three floors of the building. The exhaust fans control the amount of air exhausting across the energy recovery wheels. With the addition of VFD controlled return and exhaust fans, energy recovery wheels can be applied in many more applications.

AAON is the only HVAC manufacturer that offers semi-custom packaged rooftop units with capacities up to 230 tons. There are many benefits to using a single semi-custom rooftop unit as a part of a building’s HVAC system. First, a fully custom rooftop unit will have a greater first cost because the unit must be designed specifically for only one order and no economy of scale is gained. Second, using multiple packaged rooftop units can result in a greater first cost because the cost of each additional feature multiplies with each additional unit, and each additional unit requires a power supply, a roof opening, and ductwork. Finally, a single semi-custom rooftop unit option allows greater architectural flexibility in the design of a building.

A 31 ton RN Series packaged rooftop unit provides 100% ventilation outside air to the science labs in the Higher Education Center. The unit varies the amount of outside air supplied to the labs, depending on whether or not the lab hoods are exhausting air and whether or not the lab is occupied. Air is also exhausted from the labs through exhaust air ductwork. Heat pipes are used in the exhaust air and outside air streams to pre-heat and pre-cool the outside air and avoid cross contamination. The unit includes a single VFD controlled direct drive axial flow power return fan to bring the exhaust air up to the unit, which is then exhausted across heat pipes.



210 Ton AAONAIRE RL Series Unit, Energy Recovery Wheel with Power Return and Power Exhaust

For a supply fan the RN Series unit includes a single VFD controlled direct drive backward curved plenum supply fan. The cooling system includes chlorine free R-410A refrigerant scroll compressors, a high efficiency air-cooled condenser, and four stages of capacity control. Along with the direct expansion cooling, the unit includes high efficiency hot water heating. For air filtration, the RN Series unit uses 2” pleated, 30% efficient, MERV 7 pre filters and 4” pleated, 85% efficient, MERV 13 unit filters.

Southern Oregon University and Rogue Community College Higher Education Center's Green Features:

- Total energy use is 30% better than code resulting in an estimated $37,300 annual savings
- R-19 building insulation
- Variable air volume HVAC system
- Energy recovery wheels pre-heat, pre-cool, humidify, and dehumidify the ventilation air
- CO_2 ventilation control sensors
- Occupancy detection for lighting and space temperature setback
- Heat pipes on the science labs' HVAC system recover energy from exhausted air
- Science lab occupancy sensors reduce the air changes per hour when unoccupied
- High efficiency condensing boilers and water heaters
- Window-to-wall ratio design optimizes daylight while minimizing thermal loss
- Building water usage, reduced by 40%
- Low flow urinals and dual flush toilets
- Low flow faucets and shower heads
- Water efficient landscaping, usage reduced by 50%
- Storm water management
- Reduced urban heat island effect building design
- Solar photovoltaic array
- Adjacent to public transit, Rogue Valley Transportation District bus
- Commuter bike rack and shower availability
- Recycled and regionally sourced building materials
- Low volatile organic compound (VOC) building materials

The RL and RN Series units both include double wall foam panel construction which has a minimum R-value of 13. This type of construction prevents loss of energy through the cabinet and because there is no exposed insulation, microbial growth can be prevented, unlike construction with exposed fiberglass insulation.

Thus, both units include the use of an environmentally friendly refrigerant, have superior energy efficiency, and improve the buildings indoor air quality with double wall construction, high efficiency filtration, and the ability to provide ventilation outside air.

Chris Wierman, the Principal Engineer with InSite Group Inc. explained, "The flexibility of the AAON equipment allowed it to meet the heating and cooling requirements of the Higher Education Center's VAV and science lab ventilation systems."

"The high performance features of the Higher Education Center reflect a design process that focused on no or low cost strategic decisions, such as the window-to-wall ratio which optimized daylight while minimizing thermal loss. Using the AAONAIRE unit, we were able to achieve overall energy reduction that is more than 30% better than Oregon's aggressive Energy Code," stated Gregg Sanders, the Project Manger with SERA Architects.

Contact you local AAON representative for more information about building green with AAON equipment.

AAON

SOU • R79060 • 090615

AAON • 2425 South Yukon Avenue • Tulsa, Oklahoma 74107 • (918) 583-2266 • Fax (918) 583-6094 • www.aaon.com