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Case Study – Marine Terminal Building

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Carrier Axis™ Underfloor Distribution System Solves Unique Building Renovation Challenges



Project Objectives

When Hammel, Green & Abrahamson, Inc. (HGA), an Architecture and Engineering firm, decided to renovate an 88-year-old warehouse on the Milwaukee River into their new office space and four floors of condominiums, they had two key project goals: retain the building's unique architectural elements and use the space to promote the firm's philosophy of sustainable, green design. One of the most challenging aspects of the job was the adding of a raised floor over the original sloping one, while incorporating a new air distribution system into the newly created underfloor space.

Solution

An Axis™ underfloor air distribution system comprised of Carrier 45X fan-powered mixing units, 35EC VAV/diffuser plenum boxes, 50Z packaged rooftop unit and Carrier Comfort Network® controls was designed to meet the underfloor requirements while providing a controllable, comfortable environment.

No mixing of clean and dirty air in the occupied space.



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45X Fan-Powered Zone Mixing Unit

"Every workstation has its own diffuser and control, so after a little bit of fine tuning, air delivery has been steady and comfortable for everyone."

Peter Balistrieri
Job Captain
HGA

Project Synopsis

The early 20th century concrete warehouse situated in Milwaukee's historic 3rd Ward waterfront area afforded the Hammel, Green & Abrahamson (HGA) Architect and Engineering firm many possibilities and challenges as a new office space.

The firm wanted to retain as many architectural elements as possible, such as support columns and the ceiling, during the renovation. With these thoughts in mind, HGA decided not to install the new air distribution systems in the ceiling but instead use an underfloor system. This was particularly attractive because the existing floor had a significant slope that was used to aid the movement of cargo in the warehouse years ago.

"Obviously, we couldn't work on the sloped floor so it made perfect sense to incorporate an underfloor distribution system beneath a new raised access floor," said Peter Balistrieri, job captain at HGA.

"Unfortunately, there was not a lot of clearance for the duct work in some areas."

Project Contractor Grunau Co. specified Carrier's Axis™ underfloor system and worked with HGA to design and install the project. The design called for dividing the 30,000-square-foot space into several zones, utilizing multiple mixing boxes with diffusers for every 100-square feet of floor space. This strategy ensured that air temperature could be adjusted by the occupants to meet individual comfort needs.

Of particular concern were the floor-to-ceiling windows facing southwest. The design called for dedicated VAV boxes along with baseboard heating to successfully keep that area of the building comfortable and, with the Carrier system, the tight underfloor height restrictions turned out not to be a problem.

"Even with the Carrier rooftop unit located some distance away from the HGA space on the rooftop, we really didn't need anything special to make the Axis system work," said Doug Mikolainis, design engineer at Grunau.

A key consideration for HGA was silver LEED (Leadership in Energy and Environmental Design) certification for the office space, thus the underfloor air distribution system was an important component to HGA's application. The LEED points are based primarily on cleaner distribution of air. The return air path is high, so clean air is forced from the floor to the return path. Conventional distribution flows top to bottom where it forces "dirty" air stratified at the ceiling back into the space.

"Our firm's philosophy for sustainable architecture is embodied in the design of our space. We use recycled or 'green' products wherever possible, so having the office attain LEED certification was important to us," said Balistrieri. As a result of HGA's efficient and environmentally friendly design, the office build-out has been awarded LEED Silver certification.

The project has been a success for HGA and its staff. "Every workstation has its own diffuser and control, so after a little bit of fine tuning, air delivery has been steady and comfortable for everyone," said Balistrieri.

Project Summary

Location: Milwaukee, WI

Project Type: Renovation

Building Age: 1918

Project Cost Range: \$1.2 million

Project Contact:
Peter Balistrieri, HGA

Building Type/Size: Renovated warehouse/30,000-square-foot office space

Building Usage: Professional office and condominiums

Objective: Add an underfloor air distribution system to renovated office space

Major Design Drivers: LEED certification, architectural elements

Installation Date: April 2005

Design Considerations: IAQ, energy efficiency

HVAC Equipment: 50ZNB090 rooftop unit, 35EC VAV single duct units, 45X fan-powered mixing units

Unique Features: Raised access floor

Total Cooling (tons): 90