



**Volume Two / Issue 7**    **CASE STUDY - Marine Terminal Building**  
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*In This Issue...*

**PRODUCT**  
*Axis™ Underfloor Air Distribution System*

**Carrier Axis™ Underfloor Air Distribution System Solves Unique Building Renovation Challenges**

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The Marine Terminal building, 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.



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

## CASE STUDY

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.

[Learn more](#) about Axis™ underfloor air terminals or [download](#) the complete case study.



Installation of Carrier 45X Fan Powered Terminal

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Peter Balistrieri  
Job Captain  
HGA