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*Sam Gibson  
Senior Engineering Manager, Hines  
Union Pacific Center*

**PROJECT AT A GLANCE**

Project Type:  
HVAC Control

Location:  
Omaha, Nebraska

Number of Buildings: 1

Total Square Feet:  
1.3 million sq. ft. (121,000 sq. m<sup>2</sup>)

Equipment:

- 17 – CX9900 Network Controllers
- 955 – Infinet Controllers
- 81 – System Controllers
- 698 – Terminal Controllers
- 170 – VAV Controllers
- 6 – Input Controllers
- 4 – CyberStation Workstations
- 4 – CyberStation Wireless Laptops

Network:  
Ethernet LAN with backup  
fiber optic LAN

Applications:

- HVAC Control
- Lighting Control
- Window Shade Control
- Storm Shutter Control
- Weather Station Monitoring
- After hours HVAC web access

## Mechanical Systems are "All Aboard" at Union Pacific Headquarters

Union Pacific Corporation is one of America's leading transportation companies. Its principal operating company, Union Pacific Railroad, is the largest railroad in North America, covering 23 states from California to Illinois. The company's new \$260 million corporate headquarters building in Omaha, Nebraska, the Union Pacific Center, is a beautiful 20-story, 1.3 million square foot, glass exterior structure. In fact, it's the largest office building in the state! The property, which was designed by Gensler and developed by Hines, was ready for occupancy in the summer of 2004.

With a focus on employee productivity, Union Pacific strives to provide a healthy and comfortable environment for its 4,000+ employees with amenities such as a fitness/wellness center, a state-of-the-art employee training center, and a 660-seat restaurant. Special attention is also given to ensure the workplace offers not only proper interior lighting and climate control, but also peace-of-mind in an area of the country where tornadoes are a concern. Behind the scenes, many building systems in the Union Pacific Center come together to make this happen.

### ONE FACILITY MANAGEMENT SYSTEM TIES IT ALL TOGETHER

In a remarkable display of total building integration, this new corporate headquarters features a single Andover Continuum™ facility management system that not only provides precise indoor climate control, but also centralized monitoring and control of the building's 12 mechanical and electric subsystems.

"We promoted the benefits of a single, integrated system," notes John Hatcher P.E., C.P.P. president of HMA Consulting, the DDC controls consultant who wrote the Division 17 BMCS specification for the Union Pacific Center project. "The Continuum facility management system communicates with the building's numerous subsystems using either a software driver or direct hard-wired connection."



Natural light streams through Union Pacific's 19-story glass atrium. Mechoshade window shades facilitate Union Pacific's "daylighting" strategies

Union Pacific's chillers, CRAC units, PDUs, UPS units, VFDs, fire alarm system, fuel oil levels, electrical system, and generators all communicate with Andover Continuum using a Modbus driver; the Lithuania lighting system uses a BACnet/IP driver; and the storm shutters and window shades are controlled via a direct hard-wired connection.

According to Bob Danielson of Controls Services, Inc. the Omaha-based TAC Partner responsible for the installation, "Continuum's CyberStation™ front-end software package provides Union Pacific the transparent 'look and feel' they wanted — equipment alarms and status graphics from the 12 subsystems display on a single workstation. Additional hardware costs and the need to train operators on multiple proprietary front-ends are greatly reduced," adds Danielson.



Storm shutters provide peace-of-mind for Union Pacific employees

The Andover Continuum system includes 17 network controllers, 955 Infinet field controllers, and four CyberStation front-end workstations operating on an Ethernet LAN network. A redundant Ethernet network was installed for the company's Mission Critical Center and Data Center to insure that these two areas remain up and running 24/7/365. CyberStation wireless laptops, which are used by technicians to troubleshoot equipment throughout the building, round out this powerful control system. In addition, the built-in web server capabilities in the Continuum network controllers allow the building occupants and facilities staff to initiate after-hours HVAC requests using a standard web browser on their home or work PCs.

#### UNDER-FLOOR COOLING SYSTEM

A typical floor at Union Pacific's Headquarters uses an under-floor VAV system for cooling with four air handling units on each floor. Nailor "swirl" diffusers, installed every ten feet in the floor, provide employees the ability to adjust the ventilation manually to meet their individual comfort levels.

Heat and supplemental cooling is supplied by perimeter fan coil units located in the ceiling, which supply air to offset warm/cold window temperatures. Continuum also controls the amount of conditioned outside air introduced into each floor based on carbon dioxide level sensors.

#### SHADE CONTROL FACILITATES "DAYLIGHTING"

The new Union Pacific Center features a 19-story glass atrium that allows every floor to receive maximum natural light. In addition, the building's Mechoshade window shade control system facilitates effective "daylighting", an important concept as Corporate America seeks solutions to increase worker productivity and decrease energy consumption through building design. Glare on CRTs, for example, has been cited as a cause for reducing the percentage of man-hours worked, lowering employee efficiency and response time, and raising worker stress and healthcare costs. In addition,



Sam Gibson monitors Union Pacific's building systems from a central CyberStation workstation

according to the California Institute for Energy Efficiency and the U.S. Department of Energy, 77,000,000MWh of electricity are consumed in the United States each year for lighting buildings' perimeter zones where daylight is already present. Daylighting using a window shade management system can reduce energy consumption and peak demand costs. It can also reduce CRT glare, increasing comfort levels and thus worker productivity.

According to Danielson, Control Services is in the process of automating the window shades through the use of Andover Plain English™ programs that will operate the window shades based on time-of-day or interior ambient light levels.

**STORM SHUTTER CONTROL PROVIDES A "SAFE HAVEN" FOR EMPLOYEES**

Rollac motorized aluminum storm shutters are installed on the northwest corner of the building atrium, and are likewise controlled by the Andover Continuum system. If a tornado is imminent, the CyberStation operator can click a button on the screen to roll down the shutters and block the glass, providing a "safe haven" for the employees on each floor. Data from the wind speed and wind direction sensors installed on the roof of the building is displayed on the CyberStation. If necessary, the workstation will send an alarm to the facilities staff notifying them of a potential threat.

According to Sam Gibson, Senior Engineering Manager with Hines at the Union Pacific Center, "The Andover Continuum control system provides precise control of the building's numerous mechanical systems and interfaced equipment. Precise control equates to a comfortable interior environment and high operating efficiencies. The numerous CyberStations allow our engineering staff to access the control system from throughout the facility. In addition, access via the wireless laptops greatly increases mobility. The control system can be accessed from my desk, the engineering control room, or anywhere within the facility."

**Third-Party Systems Integrated into Continuum**

Subsystem	Manufacturer
Lighting system	Lithonia
Chillers	Carrier
CRAC units	Data Aire
Power distribution units	PDI
UPS units	PowerWare
Variable speed drives	Rockwell Automation
Fire alarm system	Edwards
Fuel oil monitoring system	Earthsafe
Electrical systems	H.K. Scholz
Generators	Cummins
Storm shutter control system	Rollac
Window shade control system	Mechoshade

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