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Case Study – Orlando World Marriott

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



Variable Speed Drives and New Cooling Towers Maximize Efficiency at Orlando Marriott

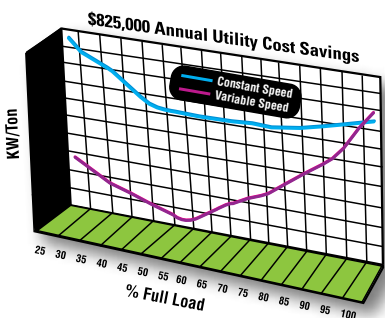
Project Objectives

The Orlando World Center, the largest facility in the Marriott chain, is a 200-acre campus that includes 2,000 guest rooms and more than 400,000 square feet of meeting space, making the hotel a destination for both vacationers and business travelers. The hotel's three 22-year old centrifugal chillers were in good condition but required refurbishment for energy efficiency and environmental soundness, while the chiller plant's three cooling towers were undersized and deteriorating. Additionally, existing chiller controls did not take advantage of recent advances in graphics and web-accessibility.

Solution

Carrier was selected to renovate the chillers, install energy-saving variable speed drives (VSD) and replace the existing refrigerant with environmentally sound HFC-134a. Carrier also engineered and installed three new induced draft cooling towers using fans with variable speed drives, increasing the plant's cooling tonnage by 300 nominal tons. Finally, Carrier installed Carrier Comfort Network® (CCN) controls and the i-Vu® web-based integrated control system to provide Marriott staff with the ability to control every aspect of the chiller plant from any web-enabled device in the world.

By installing variable speed drives (VSD) on two refurbished centrifugal chillers and also on cooling tower fans at Orlando World Center Marriott, Carrier increased the efficiency of the chiller plant. The renovations saved the Marriott \$825,000 in annual energy costs.





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“The chiller plant renovation saved the Marriott \$825,000 in annual energy costs. At current rates, the project will pay for itself in just over two years.”

Jeffrey Plutz
Director of Engineering,
Orlando World Center Marriott

Project Synopsis

The Orlando World Center, the largest hotel in the Marriott chain, has a 200-acre campus that includes 2,000 guest rooms, a spa and fitness center, several restaurants and bars, and more than 400,000 square feet of award-winning meeting space, making the hotel a destination for some 800,000 vacationers and business travelers a year. The hotel’s three 22-year old centrifugal chillers were in good condition but lacked the variable speed drive (VSD) technology that can make chillers energy efficient under both part- and full-load conditions. Furthermore, the hotel’s three existing cooling towers, which were undersized for the warm, humid conditions of the Orlando area, were deteriorating. Finally, the existing chiller plant controls did not incorporate the latest web-enabled digital control technologies, so facilities staff did not have the benefit of advanced graphical and diagnostic capabilities, nor the ability to access the chiller plant from the web.

Carrier was selected for the \$1.9 million contract to renovate the Marriott chiller plant. Alan Korb, P.E., Systems Engineer at Carrier Commercial Service in Jacksonville, Florida, said, “We’d been servicing the chillers at Orlando World Center Marriott for years. When it came time to renovate the plant, we knew exactly how to optimize the chiller plant’s cooling capacity without sacrificing the existing chillers, which were still in good condition.”

Carrier refurbished the centrifugal chillers by installing energy-saving variable speed drives (VSD) and replacing the existing refrigerant with environmentally sound HFC-134a. Variable speed drive technology allows chillers to operate efficiently under part- or full-load conditions by enabling the unit to run at a lower speed under low-demand conditions, thereby using less energy to meet the cooling needs of the facility. Carrier also replaced the existing forced draft cooling towers with nine new induced draft cooling towers. The fan motors of the new towers use significantly less horsepower.

Finally, Carrier installed Carrier Comfort Network® (CCN) controls and the i-Vū® web-based integrated control system to provide Marriott facilities staff with access to control every aspect of the chiller plant from any web-enabled device in the world. The new controls and i-Vū system control interface also enable Carrier technicians to perform remote troubleshooting on the Marriott chiller plant as needed.

Jeffrey Plutz, Director of Engineering for the Orlando World Center Marriott, said, “Based on the average energy consumption over the past four years, the chiller overhaul and cooling tower replacement reduced annual energy consumption by 8.25 million kilowatt hours. The chiller plant renovation saved the Marriott \$825,000 in annual energy costs. At current rates, the project will pay for itself in just over two years.”

Project Summary

Location: Orlando, FL

Project Type: Renovation

Building Age: 22 years

Building Size: 28-story tower; 2,000 guest rooms and 400,000+ sq. ft. meeting space.

Building Usage: Resort and conference center.

Main Objective: Renovate the chilled water plant for energy savings.

Major Design Drivers: Existing chillers were to be renovated rather than replaced; existing cooling towers required replacement; existing controls needed to be upgraded.

Design Considerations: Cooling towers were replaced at separate times to provide continuous comfort to Marriott guests.

Unique Features: Variable speed drives were added not only to chillers but also to cooling tower fans, enabling maximum energy efficiency.

Total Cooling: 3,600 tons

HVAC Equipment: Existing centrifugal chillers; new variable speed drives; new cooling towers.

Controls: Carrier Comfort Network®, i-Vū® web-based integrated control system.

Project Date: 2007-2008

Project Cost: \$1.9 million