



YASKAWA

Yaskawa VFD Up To The Challenge of Large Critical Project

The new World Headquarters for Sprint, one of the world's fastest-growing communications companies, gives ample evidence of the company's position at the forefront of the Information Superhighway.

The company has integrated long distance, local and wireless communications services with its fiber optic network to establish itself as a leader in advanced data communication services, and is one of the largest carriers of Internet traffic with its EarthLink Network.

By the mid-1990s, Sprint's rapid growth had produced a situation where the company's 14,500 employees -- carrying out duties as diverse as product engineering and development, finance, sales and marketing -- were scattered through more than 60 offices in the Kansas City metro area.

In 1997, recognizing the need to consolidate its operations in a central location, Sprint commenced design and construction of a new World Headquarters complex. When completed in 2002, the 240-acre Sprint campus will include 18 low-rise office and four special services buildings.

The first occupants moved in during the winter of 1999 and have been followed by additional divisions in a gradual transition from multiple locations throughout the area.

From the beginning, the World Headquarters plan incorporated the most advanced HVAC technology available, including a comprehensive, networked LonMark building automation system.

The J.E. Dunn Construction company was selected to provide construction site management and oversight. That function included research and specification of air handling units and motor speed controllers for buildings campus-wide.

Governair Corporation, Oklahoma City, was selected to provide the roof-top air handling units. These units were specified with AC variable frequency drives on the supply and return air fans to optimize efficiency through temperature and pressure control.

Custom Air & Power Systems, Governair's Kansas City representative, also wanted to insure that the AC drive company selected would be up to the challenges of such a large and critical project.

Yaskawa Electric, New Berlin, Wis., a long-time supplier to Governair, was a natural fit for the drives portion of the job.

During pre-construction meetings at the newly-excavated construction site in the summer of 1997, J.E. Dunn engineers solicited ideas for optimizing maintenance practices for the air handling units, fan motors and drives.



Specifically, J.E. Dunn was intent on providing a drive system that could be monitored and maintained proactively. Down time would not be an option at the new World Headquarters.

Ideally, information relative to AC drive and motor operating characteristics would be constantly monitored and available to help anticipate problems like premature motor bearing or winding failures, along with power quality issues impacting system performance. The answer was quickly found to lie in the state-of-the-art LonMark building automation system.

Availability and access to LonMark's[®] open-architecture Echelon protocol made Yaskawa's network-compatible variable frequency drives the obvious choice. These versatile and advanced HVAC drives feature a Yaskawa-designed and built interface card, which can be installed on the drive chassis inside of the enclosure.

Direct serial communication interfacing meant that the numerous drives in Headquarters Campus facilities are linked directly to the building automation system.

Using LonMark communication protocol, the drives are able to send a wide variety of information directly to a central system monitor. Sprint's maintenance staff can observe, chart and record several critical system performance characteristics in real time, simply by calling up various parameters on a central PC.

Monitored characteristics can include motor operating current, voltage, KW, frequency and run time. Additionally, the drive's fault log, DC bus voltage, internal program parameters and input and output terminal status can be reviewed, charted and recorded.

LonWorks, developed by Echelon Corporation, is a simple, low-cost networking solution to connect HVAC devices, including VFDs, temperature control devices, lighting controls, fire alarm and security systems, into one central control network. Immediate benefits to Sprint included:

- A simplified control system,
- Reduced installation costs,
- Reduced commissioning times,
- Increased system flexibility,
- Improved diagnostics,
- Expanded system capabilities.

Early in the project, Sprint and J.E. Dunn Construction initiated a "bulk-buy" approach, purchasing common components and materials in quantity. This helped to reduce costs on everything from brick, doors and lighting fixtures to air handling units.

Nearly a dozen HVAC manufacturers were invited to review architectural renderings and submit bids for air handling equipment.

Plans were to condition the general office space with large air handlers. Smaller units that could be operated when needed would be added to buildings with food courts and other special facilities.

Initial bids narrowed the field to four HVAC manufacturers who were asked to make "value engineering" recommendations to reduce equipment costs.



Based on input from their consulting engineers, Governair suggested using prop exhaust fans instead of centrifugal fans on the return exhaust, reconfiguring the electric heat to preheat only a minimum of outside air and shortening and repositioning sound attenuators. This significantly reduced both the width and length of the unit, decreasing cabinet costs.

Shipping charges were also proportionately lower, reducing the total cost of the job by 30 percent and securing the bid for Governair.

All chillers, including several 1,000 and 2,000 ton units, are installed at the Headquarters' Central Plant. Cooling water is piped underground from the Central Plant to Air Handling Units (AHUs) at individual campus buildings.

The large air handlers range in size from 50,000 CFM to 125,000 CFM and use Yaskawa GPD 506/P5 drives to control high-efficiency motors and fans on both intake and exhaust sides. All drives incorporate an input circuit breaker mounted and wired in an oversized enclosure, allowing power to be interrupted at the drive for maintenance and inspection.

Each unit has chilled water cooling and fin-tube electric heat sized to preheat the outside air. Additionally, because quiet operation is critical to Sprint, large banks of sound attenuators were installed between the cooling coil and the supply fans.

Each large unit includes a conditioned service vestibule housing the controls and variable frequency drives, with treadplate flooring for the safety of maintenance personnel.

The units are continuously monitored from the chiller plant via the LonMark network. From a single computer screen, operators determine outside and entering air temperatures, motor speeds, how many fans are operating and when filters need to be changed.

Although the unit serving the corporate offices normally operates as a chilled-water air handler, a compressor section was also designed in to this unit as a backup. If the chilled water pumps fail, compressors and DX cooling can be switched on manually for total redundancy.