About Panduit World Headquarters

Panduit is a world-class developer and provider of leading-edge solutions that help customers optimize the physical infrastructure through simplification, increased agility and operational efficiency. Panduit’s Unified Physical Infrastructure™ (UPI) based solutions give enterprises the capabilities to connect, manage and automate communications, computing, power, control and security systems for a smarter, unified business foundation.

The new Panduit LEED Gold certified five-story building comprises 280,000 square feet of office, conferencing, training, and data center space, and was built using the company’s UPI approach to optimize operational efficiency, enable advanced technology and create a healthy, productive, and sustainable work environment.
Panduit World Headquarters

Business Challenges

Since its founding in 1955 Panduit has been providing customers with innovative networking and electrical infrastructure solutions, backed by world-class quality and service. By engaging with customers, partnering with technology leaders, and investing in research and development at rates of two to three times the industry average, Panduit enables customers to take full advantage of leading-edge technologies to stay ahead of evolving business trends.

This business approach was put to the test in 2007 which, after several productive decades in their original single-story corporate headquarters, Panduit decided the time was right to invest in a new space for the company. The challenge facing Panduit’s leadership team was whether to upgrade its existing global headquarters facility – anchored by the original 10,000 square foot brick building constructed nearly 50 years ago to house office, manufacturing, and warehousing – or to construct a new facility.

Their decision was to build a fresh new multi-story facility, allowing the design team to employ new intelligent infrastructure design strategies that would reduce operational expenses and provide a flexible migration path for future growth. The new building would be engineered to help teams collaborate more productively, and would reflect the global technology solutions and global brand the company had worked hard to achieve.

Design Principles

During initial planning meetings Panduit quickly realized the need for a set of design principles that would guide building development at each phase and created an overall framework for the development of the World Headquarters (WHQ) building. These principles reflect the values and goals of Panduit, and were integrated into every phase of building design and execution to guide the creation of the new physical space in which our employees, customers, and partners would work and grow together.

**GLOBAL VISION** – World-class facilities for every Panduit employee.

**INNOVATION** – Utilize technology and design to cultivate new solutions.

**COLLABORATION** – Create an environment which encourages communication, personal growth and teamwork.

**SUSTAINABILITY** – Design Panduit facilities to minimize their environmental impact.
Project Approach

Panduit project leaders decided early to invest in a building based on the Unified Physical Infrastructure\textsuperscript{SM} (UPI) approach. UPI-based solutions integrate core systems and facility functions that are typically siloed – communications, computing, control, power and security systems – into seamlessly connected, managed and automated architectures within an optimized physical infrastructure foundation.

Some of the advantages that this approach to infrastructure architecture offers to owners, employees, visitors, and guests include:

- Connected building solution, which improves building system management, providing greater visibility and control of critical systems that identify, monitor, and resolve problems before they affect workers, and enhancing overall security and safety
- Converged enterprise networks that enable enhanced commissioning and help meet energy performance requirements
- Multi-technology architecture that extends the reach of cabling infrastructures to all endpoint devices, creating seamless integration of building systems including IP telephony, wireless connectivity, secure building access, digital media and unified communications
- Converged enterprise infrastructure design to reduce deployed capital and maintenance costs throughout the lifecycle of the building
- Sustainable building system design, which automatically manages energy resources more efficiently via smart lighting systems, electrical sub-metering, daylight harvesting, and modern underfloor Heating, Ventilating, and Air Conditioning (HVAC)

Panduit chose its architect partner, Gensler, to help develop a flexible, intelligent, and connected environment that would engage customers and partners, while using unique design features to enable employee collaboration such as open office concepts and collaborative work spaces. Technology choices in the WHQ all support increasing system convergence and partner integration, and were made easier through input from Technology Partners.

The result is a LEED Gold certified facility that leverages intelligent design features to achieve state-of-the-art visibility and control over all critical building systems as well as energy and operational cost savings strategies…all aligned under a single unified infrastructure.

“\textit{We believe physical change helps drive cultural change. Our new World Headquarters building brings Panduit’s UPI philosophy to life and enables others to experience the benefits for people, for business financials and for the environment.}”

– Tom Donovan, President, Panduit
For the WHQ project, Panduit invested in a UPI-based Connected Building Solution to enable convergence of facility systems onto a single network for improved control, communication, and management. Using new measurement tools and newly-developed policies, Panduit can now consistently manage its global real estate portfolio, as well as provide assessments for our customers on how Connected Building technologies can help them achieve operational and sustainability goals.

Building Intelligence
• Tridium Niagara Framework™ Middleware Platform
• Oracle Software Platform

Collaboration, Voice and Video
• Cisco Unified Communications Manager
• Cisco Unified IP Phones
• Cisco TelePresence®

Digital Media Suite
• Cisco Digital Media Player 4400G
• Cisco Digital Media Manager
• Digital Signage Module

Zone Cabling Architecture
• Panduit PanZone® Work Area Raised Floor Consolidation Point Enclosure
• Panduit QuickNet™ OM3 Fiber Optic Trunk Cable
• Panduit QuickNet™ Category 6A Copper Cabling Assemblies
• Panduit Cool Boot™ Raised Floor Air Sealing Grommet
• Panduit J-Mod™ Cable Support System
• Panduit GridRunner™ Underfloor Cable Routing System
• Panduit Tak-Ty® Hook and Loop Cable Ties

Connected Building Solution

Intelligence
Intelligent middleware transforms building operational data into valuable business information and provides deeper visibility into building systems. Middleware can take one of several forms – a hardware appliance, a software application, or a combination of both. In this way, middleware plays a foundational role in a UPI-based Connected Building solution, as the fundamental tool to enable integration, interoperability, and convergence of building systems.

Panduit deployed Tridium’s Niagara Framework™ Middleware Platform in its WHQ, enabling the establishment of custom policies and rules to leverage and share information among disparate systems such as HVAC, lighting, and security. Panduit integrated the Niagara platform with Oracle solutions to apply policy-based, integrated energy management practices to achieve energy efficiency throughout the WHQ and support sustainability goals.

Zone Cabling Architecture
One of the key enabling technologies of the WHQ’s converged physical infrastructures is the use of a zone cabling architecture. Under this approach, all system networks (copper, optical fiber, coaxial and fieldbus cabling) are converged within common pathways from the telecommunications rooms to consolidation points. The final termination is within zone enclosures distributed throughout each floor of the building, allowing all cables to be managed and patched in a single enclosure.

Under this zone architecture, enterprise network and BAS cabling throughout the WHQ becomes easier to locate, manage and maintain as each additional building system is routed within the same pathways and enclosures. This localizes changes at the zone enclosure and at user/device endpoints, generating future operational cost savings by reducing the time and effort required for moves and changes.

IP to Everything
IP-based communication is making a revolutionary impact on the process of building design, construction, and operation. IP-enabled components can include a wide variety of endpoint devices (lighting, access, security cameras, digital signage) as well as required enterprise network infrastructure (cabling, switches, servers, and related protocols). This progressive change in building systems make-up, provides an opportunity to take an open systems approach to extending an intelligent infrastructure across the entire enterprise.

Panduit uses the Cisco Connected Real Estate framework to integrate all 9000 WHQ building systems and sensors onto the Cisco IP network. Every piece of information we can extract from the building is available, including air temperature, air quality, humidity, energy consumption, and lighting output; delivering energy costs per square foot that are $0.63 lower than the average non-connected building and saving more than $176,000 annually.
Enterprise Networks

Unified Operations Center

Panduit is realizing the benefits of building system integration and automation in its Unified Operations Center (UOC). This single facility combines security, network, and building operations functions, enabling Panduit to manage the security of its global facilities from a central location.

This co-location of traditionally separate operations functions made sense to Panduit, as there are many situations — emergency and non-emergency — that warrant close coordination and information sharing. By integrating management of the enterprise network and physical security systems over a UPI-based physical infrastructure, Panduit’s UOC allows data to be shared across a full spectrum of network, building system, and security applications for improved operational awareness and response. Moving to converged and IP-based systems also speeds time-critical evaluation and response for improved workplace safety and network service level agreements.

Security solutions including access control points, video surveillance, and network surveillance, monitor and immediately respond to alerts, while simultaneously communicating to security/operations personnel to respond depending on the event.

Smart Data Center

At the core of the WHQ is Panduit’s smart data center, which supports all global office and manufacturing operations. The data center showcases an intelligent infrastructure that features High-Speed Data Transport (HSDT) cabling systems, energy efficient heating and cooling, and data center virtualization.

Our strategic partnerships with Cisco, IBM, EMC, Emerson Network Power – Liebert and others enabled the deployment of an end-to-end solution into our data center operations.

- Working with Cisco, Panduit deployed a 10G network infrastructure at the core, distribution, and access layers of our network built upon the Nexus brand of switches at the core of the network
- Our deployment of two IBM Power 570 servers makes use of virtualization technology to run multiple development, single global instances of Oracle, optimizing application performance and delivering long-term scalability and growth while achieving 25% space savings in the data center
- For storage, EMC enabled the consolidation of all our storage into a single array, moving Panduit from 35,000 tapes down to virtually zero while leveraging a second array off-site for disaster recovery
- The 3,000 square foot room uses a 30-inch raised floor and four Emerson Network Power – Liebert cooling units to handle the data center’s thermal requirements, which were calculated using computational fluid dynamics (CFD) techniques

These partner solutions were enabled through the proper deployment of the Panduit UPI design approach to the physical infrastructure. For example, the entire data center infrastructure is built with nothing suspended from the ceiling: Panduit® FiberRunner® Overhead Fiber Cabling and Routing and Net-Access™ Cabinets are an integral part of the solution, providing overhead support for our servers and network hardware and the cabling infrastructure.

The result is an infrastructure design that has reduced data center power consumption by 15% while enabling us to virtualize greater than 60% of our environment.

Physical Security

- Cisco Video Surveillance Manager
- Cisco IP Video Surveillance Cameras
- Cisco Physical Access Control
- Cisco IP Interoperability and Collaboration System (IPICS)
- Cisco PoE Cameras
- Axis 233D Network Dome Pan/Tilt/Zoom (PTZ) Cameras

Data Center

- Cisco UCS™
- Cisco Nexus® 7010 Switch
- IBM System p® Power 570
- EMC Storage Array
- Emerson Network Power – Liebert CRAH units
- Emerson Network Power – Liebert Uninterruptable Power Supply (UPS) Units
- Panduit NetAccess™ Cabinets
- Panduit CabRunner®
- Panduit FiberRunner®
- Panduit Cool Boot™ Raised Floor Air Sealing Grommet
- Panduit StructuredGround™ Grounding System

Network Systems

- Cisco Catalyst® 6509 Switch
- Cisco Aironet® 1231 and 1242 Wireless Access Points
- Cisco Wireless Control System
- Cisco 3845 Integrated Services Router
- Panduit Identification Products

“Combining the workspace for facilities and IT personnel helps reduce our overall operational cost while enhancing workplace safety and security.”

– Jeff Woodward, Senior Manager, Global EH&S

visit www.panduit.com
The five-story WHQ building comprises 280,000 square feet of office, conferencing and training space that is designed to maximize sustainability, innovation, and collaboration. The physical move from the old corporate headquarters to the new building has fostered a deep cultural change and competency growth, enabling collaboration through open office concepts and shared work spaces. The tight integration of the following building elements also is resulting in a 23% reduction in energy use compared to a conventional structure.

Lutron Lighting and Shading System

Furniture
- Haworth Compose®: Workstation and Office
- Haworth Zody®: Task chairs and Guest Seating
- Haworth Planes®: Conference and Cafeteria Tables
- Haworth Very®: Conference and Cafeteria Seating
- Haworth Enclose™: Demountable Wall System
- Haworth TecCrete®: Raised Access Flooring

Open Office Environment/Interior Design

Smart Lighting Systems

One of the key design principles guiding the WHQ construction was to harvest as much natural light as possible, maximizing worker exposure and reducing energy consumption. The WHQ was designed with a floor-to-ceiling height of eleven feet, allowing the exterior glass surface to bring in greater levels of light than conventional, lower ceiling heights would permit.

Panduit worked with lighting partner Lutron to deploy a smart light fixture and shading system throughout the building that collects data on light levels that routes over the building network infrastructure to enable intelligent automated decision making. Dimming controls automatically adjust light levels up to 16 feet into the building space, and automated window shading raises or lowers to mitigate additional heat or glare.

Light shelves also are deployed on the south side of WHQ; these highly reflective polished metal surfaces reflect light off the ceiling for deepest penetration into the building space.

Layout of Office Space

The move from old headquarters to new represented a shift from a high concentration of private offices to nearly 90 percent open office workstations and collaborative spaces. To help manage this challenge, Panduit worked with its partner Haworth to create an extensive full-scale office space mock-up to determine the best seating, worksurface shapes, technology support, and ergonomic tools to maximize employee productivity.

To help ease the transition further, the Haworth team hosted “best practice exchanges” with Panduit leadership, design and construction, and also worked with the move management and employee orientation teams to provide information on workstation features, ergonomic seating adjustment, and office etiquette in an open environment. The final result is a state of the art work environment that tightly integrates the physical infrastructure of the building with a flexible, performance based workspace design that can be replicated at Panduit facilities around the world.

Raised Floor

The floor is one of the hardest working technologies in the WHQ, and was designed in conjunction with our architect partner Gensler to help achieve dramatic operational energy savings. A 15 inch (30 cm) raised floor system (30 inches [60 cm] in the data center) is deployed throughout the entire building to act as both a heating/cooling plenum and as a cavity to efficiently deploy all power and network cabling in a zone architecture. Heating and cooling is supplied at floor level, delivering air directly to building occupants and eliminating the need to heat and cool ceiling-level spaces.

Haworth provided Panduit with the flooring solution, comprised of the raised floor tiles, pedestal system, and diffusers through which air is delivered. The diffusers are manually adjustable, to provide employees greater control over their immediate work environment. Finally, vendor partner Mats Inc. developed a custom terrazzo floor finish for the WHQ lobby and cafeteria spaces that integrates with the raised floor system and resists expansion/contraction.
Sustainability

Panduit has always looked to its people to create sustainable solutions that make a difference, and the WHQ project was no exception. In April 2011 the WHQ earned Leadership in Energy and Environmental Design (LEED) Gold certification by the U.S. Green Building Council. The overall costs associated with meeting the LEED Gold criteria were approximately 2% of the total construction budget, with an estimated payback period of less than 5 years.

Other recent honors include:

- Oracle’s 2009 Enabling the Eco-Enterprise award, for being collaborative leaders in unifying enterprise systems to achieve greater sustainability benefits for people
- Realcomm’s 2010 Digie award in the category Best Use of Automation – Corporate Real Estate, for combining state-of-the-art visibility and control for all critical building systems
- ASHRAE Illinois Chapter’s 2010 Excellence in Engineering award for the incorporation of sustainable design elements and a UPI-based physical infrastructure, reducing energy cost by 23% below ASHRAE 90.1 standards
- Security Technology Executive Magazine’s 2010 Security Innovation award for the deployment of the Unified Operations Center, honoring the most innovative technologies, design strategies, and facility applications in the security industry

Panduit sustainability objectives include reducing consumption of non-renewable resources and creating healthy environments. Several features of Panduit’s WHQ enhance the workplace experience and contribute to overall sustainability goals:

- A 60% virtualized data center environment, with significantly less number of servers within the data center space and significantly reduced estimated power consumption targets
- A green roof which protects the roof membrane from harsh weather and ultraviolet radiation. This system covers 25% of total WHQ roof space, insulating the building and minimizing heat gain
- The first application of light shelves with integrated window shades, to help redistribute the sun’s direct light deep into the building, reducing the need for artificial light
- One of the very few office buildings in the State of Illinois with a fully functional water reclamation system. This system collects rainwater from the roofs for internal non-potable uses to enhance efficiency and environmental responsibility, creating an estimated annual water savings of 30% (nearly one million gallons)
- Bioswales deployed in parking areas contribute to water reclamation efforts, removing silt and pollutants from surface runoff water using natural filtration techniques to treat and then discharge the runoff to area watersheds and storm sewers
- Exterior landscaping featuring native flowers and plants, water features, and a nature trail, designed to be self-sustaining

Did You Know...

- 44% of all materials used for WHQ construction were sourced from within 500 miles of the site
- 27% of all materials used for WHQ construction contained recycled content
- 75% of construction waste was diverted from landfills to either recycling or salvage
- Reclaimed redwood was used for architectural wood accents

“Our infrastructure design enabled us to consolidate servers, storage, and network infrastructure components to reduce our overall data center spend while enabling us to virtualize greater than 60% of our environment. Our power consumption has been reduced by 15% and has allowed for future growth to support Panduit’s evolving business requirements”

- Marc Naese, Director of IT Infrastructure, Panduit
Real-World Solutions to Ensure the Success of Our Customers

With a proven reputation for excellence and technology innovation, a robust ecosystem of global partners, and long-term alliances with top industry leaders, Panduit is a valuable, trusted partner offering strategic vision and real-world solutions to ensure the success of our customers.

Innovative Technology Leadership
Panduit is an industry leader in developing innovative technology solutions that meet the rapidly evolving needs of our customers around the world. Our commitment to continued leadership is supported by significant ongoing investment, dedicated manufacturing facilities, strategic technology alliances, and collaborative R&D with other industry leaders.

Global Business & Commitment
Panduit’s ongoing commitment to customer satisfaction enables our highly skilled and knowledgeable global sales, systems engineering, and technical support teams to engage with critical customer challenges that range from initial problem determination all the way to resolution. Local specialists, trained to global standards and competencies, provide consistent regional support that brings value to local business. Our global value chain, which combines manufacturing, distribution, and service, provides prompt responses to customer-related issues, and streamlines procurement and delivery to any global destination.

Best-In-Class Partner Ecosystem
Panduit employs a consultative approach to identify customer needs and engage appropriate partners in a collaborative fashion to serve our customers. Panduit’s robust ecosystem of architects, consultants, engineers, designers, systems integrators, contractors, and distributors offer a full portfolio of lifecycle services. Our partners are trained on relevant services to Plan & Design, Build & Deploy, and Maintain & Operate to deliver predictable and measurable results.

Worldwide Alliances
Panduit has established long-term strategic alliances with top global industry leaders such as Cisco Systems, EMC, IBM, and Rockwell Automation to develop and integrate innovative, holistic solutions for our customers. We continually invest in relationships and resources for solving our customers’ greatest business challenges.

Eco-Sustainability & Global Citizenship
With a long-standing commitment to environmental excellence, Panduit continually develops and implements solutions designed to protect, replenish, and restore the world in which we live and operate. This commitment is demonstrated by Panduit’s LEED Gold certified new world headquarters and future sustainable building plans using its own revolutionary Unified Physical Infrastructure\textsuperscript{TM} approach to enable convergence of critical systems for driving energy efficiency.
Objectives

Position the company for long-term future growth
Increase employee collaboration
Serve an expanding global employee and customer base
Create an environmentally sustainable and healthy place to work
Act as a model that could be replicated in other Panduit facilities around the world

Awards

LEED Gold Certified – April 2011
Oracle – Enable the Eco-Enterprise Award
Realcomm Digie – Best Use of Automation: Corporate Real Estate
Security Technology Executive Innovation Award – Silver Medalist
American Institute of Architects, Chicago – Award for Design Excellence
Regional ASHRAE – Excellence in Engineering
Illuminating Engineering Society (IES) of North America – Award of Merit
Panduit World Headquarters Quantified Benefits

Panduit has always looked to its people to create sustainable solutions that make a difference, and the WHQ project was no exception. The overall costs associated with meeting LEED Gold criteria were approximately 2% of the total construction budget, with an estimated payback period of less than 5 years.

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<thead>
<tr>
<th>Organizational Opportunities</th>
<th>Quantified Benefits</th>
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<tbody>
<tr>
<td>Enhanced Functionality and Cost Effectiveness</td>
<td>LEED Gold design standard based construction with payback &lt; five years</td>
</tr>
<tr>
<td>• UPI-based design and system implementation</td>
<td>• $.63/square foot/year operational savings</td>
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<tr>
<td>• Enhanced reliability, building system efficiency, convergence</td>
<td>• Reduce cabling cost by up to 10%</td>
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<tr>
<td>• Reduced materials cost</td>
<td>• Converge networks at design phase to reduce number of networks, cables, and associated contractors</td>
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<tr>
<td>• Eliminate multiple levels of (sub)contractor markup</td>
<td>• Reduce operational expenses</td>
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<tr>
<td>• Increased pricing leverage/simplified contract management</td>
<td>• Reduce outlet requirements by up to 25%</td>
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<tr>
<td>• Use PoE to reduce need for higher voltage power installation and deploy less conduit</td>
<td>• Optimize connected building real estate, reduce required space by up to 67%</td>
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<tr>
<td>• Use zone enclosures to reduce control systems footprint</td>
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<th>Energy Efficiency</th>
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<td>• Smart data center with an intelligent infrastructure (60% virtualized)</td>
<td>• 15% reduction on data center power costs, 38% reduction in cooling costs, 10% space savings</td>
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<tr>
<td>• Light/shading controls</td>
<td>• $70,000/year savings in energy</td>
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<tr>
<td>• Underfloor heating/cooling</td>
<td>• More efficient to heat/cool inhabited space rather than upper ten plus feet</td>
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<tr>
<td>• Water reclamation system</td>
<td>• Reduce annual water usage by 30%</td>
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<tr>
<th>Productivity</th>
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<tr>
<td>• Centralized/remote management enables efficient oversight</td>
<td>• Increase staff productivity up to 25% – 30%</td>
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<tr>
<td>• Collaborative workspace environment</td>
<td>• 300% increase in collaboration zones</td>
</tr>
<tr>
<td>• Open workspace to promote creative thinking and teamwork</td>
<td>• Migrated from 70% private office/30% open plan to 10% private office/90% open plan</td>
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<th>Maintenance</th>
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<td>• Real-time information sharing and intelligent fault detection</td>
<td>• Achieve utility savings up to 10%, reduce downtime</td>
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<tr>
<td>• Enable future reconfigurations</td>
<td>• New applications utilize converged network backbone, reduce reconfiguration costs up to 20%</td>
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