

Five Pillars for Successful Network Deployment at the Edge

New networking environments require new ways of thinking. But when you supplement forward thinking with a series of tried-and-true fundamentals from the traditional information technology (IT) world, you'll have your edge network set up for success in no time. Use the guide below to learn how.

Go Where New Technology Takes Your Network

The rise of the Internet of Things (IoT), Artificial Intelligence (AI), 5G wireless and Industry 4.0 require network connections to be stretched beyond the boundaries where electronics are normally deployed. Whether in a public or private space, a record number of devices are collecting real-time data at the edge*. That means more compute in medical and academic campuses, sports stadiums and harsh and/or non-traditional environments.

These edge locations can either be in environmentally controlled colocation facilities, or in non-controlled environments that can include varying conditions such as heat, snow, humidity, rain, corrosive agents and dust. As a result, deploying compute and automation control equipment in such environments requires innovative methods of storage, support and maintenance.



By the Numbers

*The Telecommunications Industry Association® (TIA) projects an astounding 29 billion connected devices on the global network by 2022. 18 billion of those devices will be related to the Internet of Things.

Taking IT to the Streets

Because they exist in remote and extreme environments, edge networks and equipment are not administered or overseen daily. Like the proverbial chain that is only as strong as its weakest link, any limitations on network design, infrastructure or performance might result in unacceptable downtime.

That's why environmentally rated enclosures with cooling accessories, and cable and power management options play a key role in enabling network operations at the edge.

Workers in Lawrence, Massachusetts, a suburb of Boston, install one of 110 street surveillance cameras that relay live images to local authorities.

[Click here](#) to download the full case study and learn more about the unique CPI enclosures they used to complete the job.





“The interesting thing about the edge is that it encompasses all the elements of a data center deployment. You must deal with thermal management, remote monitoring and control, security, and know the environmental conditions within the enclosure. More importantly, you must address the environment where the enclosure will be located. Edge enclosures are the first line of defense for your sensitive and expensive equipment.”

Sam Rodriguez, Chatsworth Products (CPI)
Sr. Product Manager of Industrial Enclosures

The following sections of this interactive presentation present five important considerations—pillars if you will—for information technology (IT) and operational technology (OT) teams to include in the planning of a robust and reliable network at the edge. Be sure to browse the interactive resources and products in each to get a deeper understanding for each area of focus.



Pillar 1
Plan For
Environmental
Conditions



Pillar 2
Protect Against
Security
Vulnerabilities



Pillar 3
Mitigate Risk with
Adaptable
Equipment & Cabling



Pillar 4
Extend Equipment
Life with Thermal
Control &
Management



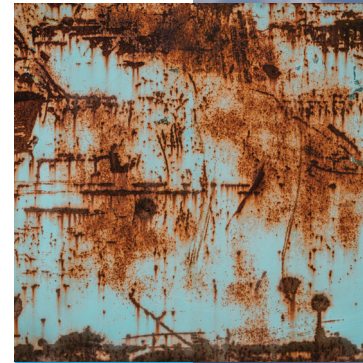
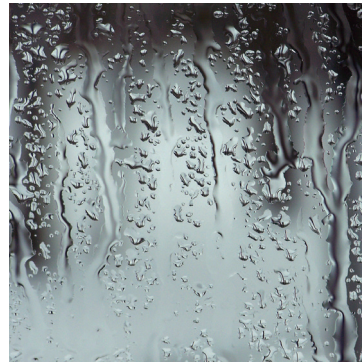
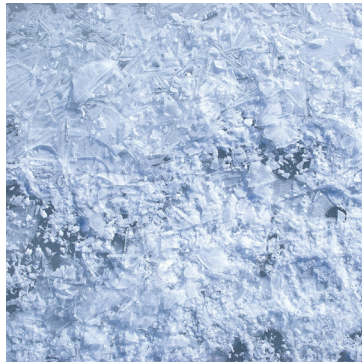
Pillar 5
Safely Manage IT/OT
Assets with
Remote Monitoring
& Switching

Pillar 1

Plan For Environmental Conditions



Harsh weather conditions such as heat, snow, humidity, precipitation and corrosive environments require equipment to have higher levels of protection. In nontraditional spaces, the enclosure provides the primary protection for equipment.





The main difference between industrial enclosures and standard IT enclosures is that industrial enclosures are completely sealed when closed.

Openings in industrial enclosures include seals to prevent ingress of dust and liquid. Note the seal around the perimeter of the door, the channel around the door opening and the multi-point latch, which help prevent dust and liquid penetration into the enclosure. For the best protection, look for a seal that is created using formed-in-place foam gasket technology. A robotic process applies this type of seal, and it is much more durable and reliable than adhesive-backed foam tape.

What's the Difference?

The difference between NEMA Type and UL Type is that manufacturers can self-certify NEMA Type enclosures, but UL Type enclosure performance is verified by UL through a series of design review and performance testing.

NEMA vs. UL.

In the United States, the National Electrical Manufacturers Association (NEMA) identifies 16 types of enclosures for nonhazardous locations, each providing a different level of protection against dust and liquid penetration, in its "NEMA Standard 250 Enclosures for Electrical Equipment (1,000 V Maximum)."

Likewise, Underwriters Laboratories (UL®) has a similar system in "UL 50 Enclosures for Electrical Equipment, Non-Environmental Considerations; UL 50 Enclosures for Electrical Equipment, Environmental Considerations; and UL508A Standard for Industrial Control Panels."



NEMA Type Ratings for Indoor & Outdoor Nonhazardous Applications

NEMA Type ratings for enclosures used in indoor nonhazardous application

Specific Applications, Indoor Nonhazardous Locations	Type of Enclosure					
	1	2	5	11	12	13
Provides a degree of protection against:						
Incidental contact with enclosed equipment	X	X	X	X	X	X
Falling dust	X	X	X	X	X	X
Airborne dust, particles			X		X	X
Dripping noncorrosive liquid, light splash		X		X	X	X
Oil/coolant seepage					X	X
Oil/coolant spray/splash						X
Corrosive agents				X		

Note: With NEMA Types, each number has a specific range of protection, and a larger number does not always mean more protection. However, as you can see from these tables, some NEMA Types include the protections of other NEMA Types. For example, any of the enclosure types listed in the table above will protect against falling dust, but only Type 12 and 13 will protect against oil/coolant

NEMA Type ratings for enclosures used in outdoor nonhazardous application

Specific Applications, Outdoor Nonhazardous Locations	Type of Enclosure									
	3	3X	3R*	3RX*	3S	3SX	4	4x	6	6P
Provides a degree of protection against:										
Incidental contact with enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet**	X	X	X	X	X	X	X	X	X	X
Sleet***					X	X				
Windblown dust, lint, fiber, and flying	X	X			X	X	X	X	X	X
Hose down							X	X	X	X
Corrosive agents		X		X		X		X		X
Occasional temporary immersion									X	X
Occasional prolonged immersion										X

Notes: *3R enclosures may be ventilated. **External mechanisms are not required to be operable when the enclosure is ice covered. ***For 3S enclosures, external mechanisms are required to be operable when the enclosure is ice covered.

What to Look for in Industrial Enclosures

When specifying an industrial enclosure, select vendors that can provide the following capabilities:



Third-party Certification*

UL Type Protection rating



Robust Construction

Fully welded, steel construction



Precision

Robotically applied, continuous foam gaskets



Configurability

Multiple styles and sizes covering a wide range of applications



Customization

On-demand modifications (size, openings, color, accessories and more)



Personalization

Modified to blend or match surroundings

*Third-party testing verifies a manufacturer's claims are valid and keeps them honest.

RMR® Industrial Enclosures

With nearly 30 years of enclosure design and manufacturing experience, CPI offers a full line of enclosures designed to protect equipment in these environments and offer the capabilities listed on the previous slides. This line, RMR® Industrial Enclosures, forms the foundation for your digital transformation.

RMR Industrial Enclosures include specialized seals for cable openings in order to maintain a variety of NEMA Type ratings, including 12 (IP55), 4 and 4X (IP66) protection ratings and options for disconnect switches and circuit breakers.



RMR Industrial Enclosures come in a variety of sizes, configurations and form factors to help solve virtually any kind of edge application in nearly all indoor and outdoor environments.



RMR Modular Enclosure

A flexible solution with bolt-on panels that allows for multiple configurations to accommodate larger automation panels or racks for IT equipment.



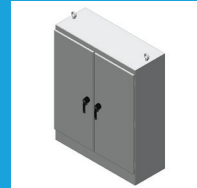
RMR Swing Wall-Mount Enclosure

Ideal for wall-mounting IT equipment; enables quick access to the front and rear of equipment through a three-part, swing-out design.



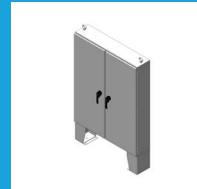
RMR Fixed Wall-Mount Enclosure

A single access enclosure that supports a mix of IT, electrical and electronic equipment.



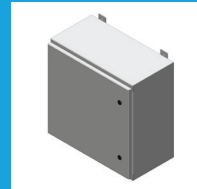
RMR Free-Standing Enclosure

A cost-effective enclosure for large IT, telecom or automation panel applications that supports front and rear access to deeper electrical equipment.



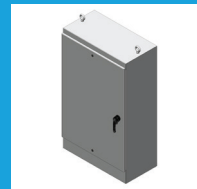
RMR Floor-Mount Enclosure

A cost-effective enclosure for large automation panel applications that includes floor stands for easier bottom cable entry.



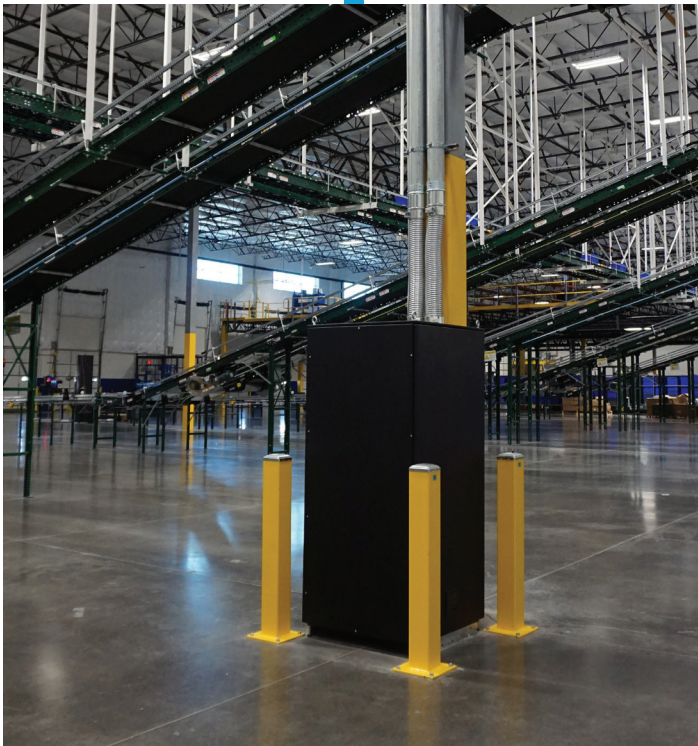
RMR Standard Wall-Mount Enclosure

A cost-effective individual enclosure for small IT, telecom or automation panel applications.



RMR Stainless Steel Enclosures

Protects against dirt, rain, sleet, snow, splashing and hose-directed water, along with an increased level of corrosion protection.



“One of the big things about the RMR cabinets that we really liked is that they are for the most part waterproof, which is a big benefit to us. We worked with the team to essentially mock up a cabinet so that when it comes off the truck, you simply roll it into place, and plug up your power. The power is in it, fans are in it and cable managers are in the positions that we need.”

Joe Hoskins, Director of Data Center Management, Amerisource Bergen

Pillar 2

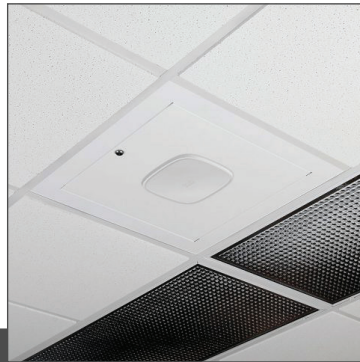
Protect Against Security Vulnerabilities



Equipment placed in remote edge locations is likely to be more vulnerable to rogue attacks and vandalism because these locations have minimal or zero personnel. It is important to invest in a comprehensive physical security solution that can be easily integrated into your edge enclosure.

When planning for physical security, be sure to:

- Plan for multiple layers of security
- Ensure data produced at the edge remains private and secured
- Ensure only authorized people have access to equipment, and deploy an access control system with alarm notifications
- Maintain an automated logging method of who and when the equipment was accessed
- Protect non-authorized users from being electrocuted
- Consider ability to remotely unlock doors through software interfaces



Take a deeper dive:

Get a detailed overview of the factors influencing mission-critical security coverage for your network as it extends out to the edge. Download the [CPI Security Solutions brochure](#) here.



Get Peace of Mind with Partners You Can Trust

Properly planning and deploying such infrastructure can be a monumental task. For a successful edge investment, partner with suppliers who can provide customizable, scalable and environmentally rated solutions that can support and protect new generation equipment.

Did you know?

19% of respondents indicate **Stolen Credentials** as a security incident/attack type encountered in the past year.

- 2019 Cisco Cybersecurity Report

14.6 billion - the estimated number of IoT M2M (machine-to-machine) devices in use by 2020, which will account for **51%** of all network devices.

- 2020 Cisco Global Networking Trends Report

Of the nearly **30,000** claims of metals theft in the U.S. between 2014 and 2018, nearly **98%** pertained to the theft of **copper**, which is still heavily used in today's digital infrastructure industries.

- 2019 National Insurance Crime Bureau Forecast (SM) Report

End-to-End Security Solutions

As edge applications grow, the network may extend into areas that aren't controlled by IT. It's likely a user starts by considering an industrial latch that provides durability and maintains environmental protection that can be securely padlocked. Additionally, smaller enclosures can be pole mounted to make them more difficult to access.

Beyond that, the data in your network needs to be protected. Preventing physical tampering with access points is an important component of network security, and access point mounting solutions and enclosures from Oberon (a division of CPI), ensure that only authorized technicians can handle access points. This is especially useful in industries such as finance and health care, where organizations must comply with security requirements dictated by PCI, HIPPA, FISMA and more.



RFID Electronic Lock Kit

Can be preinstalled in CPI enclosures and features swinghandles with integrated dual-frequency card reader technology. Audit trail capability allows for enhanced regulatory compliances such as HIPAA, SOX, PCI DSS 3.2 and SSAE 16.

Electronic lock kits can be integrated either into CPI eConnect PDUs, a standalone networked controller or an already deployed Weigand-based building security system. Custom configurations provided by CPI include multi-factor authentication solutions for higher levels of security.



CUBE-it® Wall-Mount Cabinet

Provides a secure, easy-to-install, swing-out storage solution for ICT equipment. Attractive design and security features like a single lock and key on the front door provides access to the entire cabinet.



Oberon 1047-Series

Provides a lockable, economical and suspended ceiling Wi-Tile™ enclosure mount to secure Wi-Fi and small cell APs flush to the ceiling. This steel enclosure replaces a standard ceiling tile, and its larger back-box is suitable for larger APs and antennas. The 1047 Series offers a variety of AP-specific trims as well as clear and opaque domes.



eConnect® Power Distribution Units (PDUs)

Integrate electronic locks powered and managed through the same PDU interface, minimizing cabling infrastructure and putting control of cabinet-level security in the hands of IT, while ensuring authentication and secure communication with LDAP and RADIUS compatibility most commonly used by IT groups, with support for SNMPv1, v2 and v3 that allows encryption of data communicated between the PDU and other applications.



Pillar 3

Mitigate Risk with Adaptable Equipment & Cabling



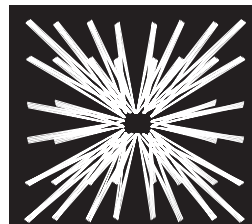


While traditional OT applications have relied on back plates and DIN rail-mounted equipment and plastic wire ducts for electrical wiring, switches and servers require EIA 19" rails, copper and fiber, 48-port patch panels and more. The equipment could have different airflow requirements, and depending on either copper or fiber cable, it could require different styles of cable management.

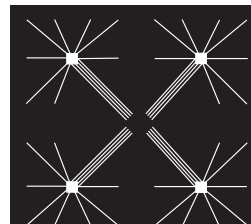
As a result, there are two universal concerns and solutions regarding cable management in manufacturing environments:

Limited floorspace. Manufacturing floorspace is firstly reserved for equipment and secondly for material logistics. This means overhead may be the best option for network cabling, offering the least obstructed path and being high enough to avoid incidental damage from material handling.

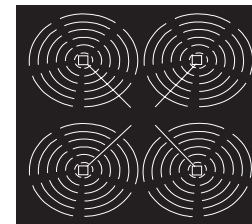
Need for flexibility. As manufacturing becomes more automated, the need to deliver network connections fast enough to keep equipment connected and synchronized correctly increases. Zone cabling allows easier moves, adds and changes and typically limits cabling and networking changes within the affected zone. Wireless options further extend this flexibility.



Traditional Cabling



Zone Cabling



Wireless

Take a deeper read.

Download a recent CPI whitepaper on [IT/IOT Collaboration: Protecting Networking Equipment in Diverse Manufacturing Environments.](#)



Did you know?

Zone cabling divides the manufacturing floor into zones, with a central enclosure in each zone to aggregate nearby network connections.

The advantage is that cabling changes are typically just between the enclosure and manufacturing equipment as opposed to all the way back to telecommunications equipment rooms.

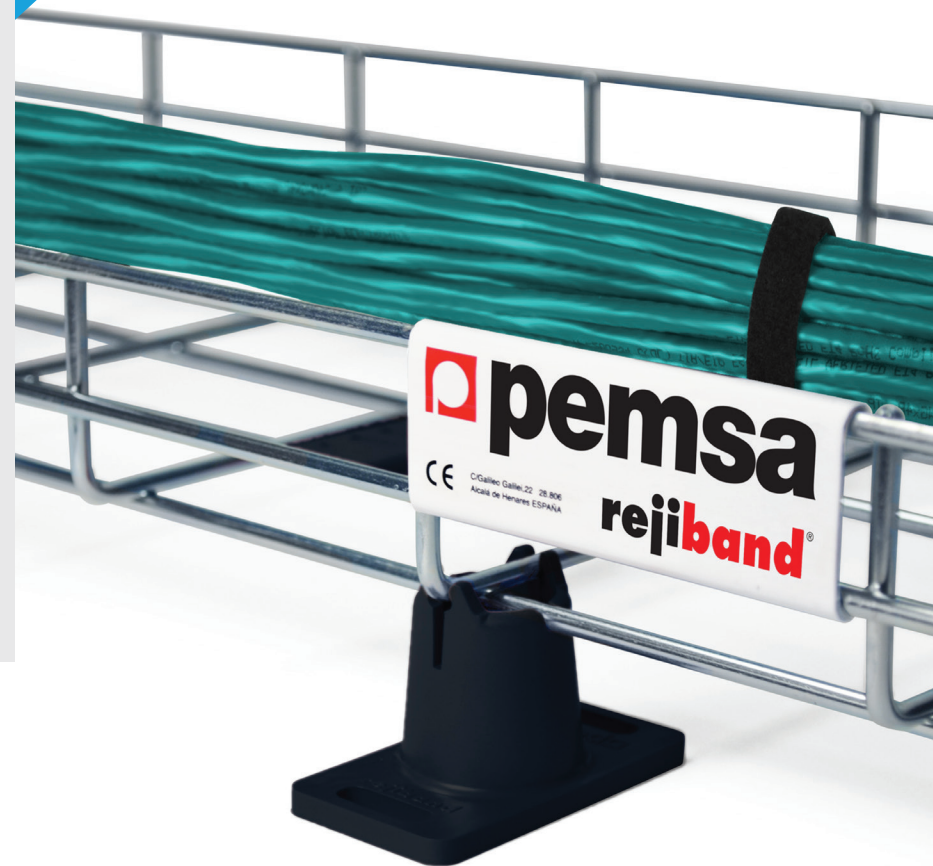
Would a zone cabling approach work for your site?

Cabling Solutions Cut a Path to Success

Pemsa® Rejiband®

Wire Mesh Cable Tray

The award-winning Pemsa Rejiband Wire Mesh Cable Tray is exclusively offered by CPI in the United States and Canada. The tray is available in an award-winning, proprietary BLACK C8® finish that provides high corrosion resistance almost equivalent to that of stainless steel, making it a cost-effective finish to support edge applications.

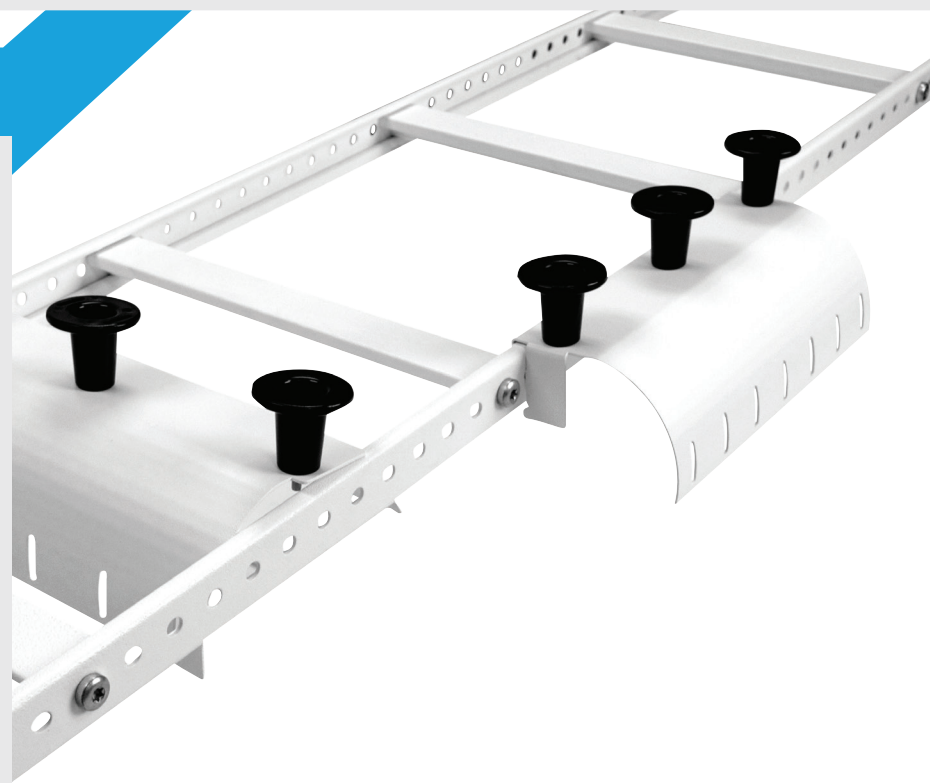


Cabling Solutions

Cut a Path to Success

Adjustable Cable Runway

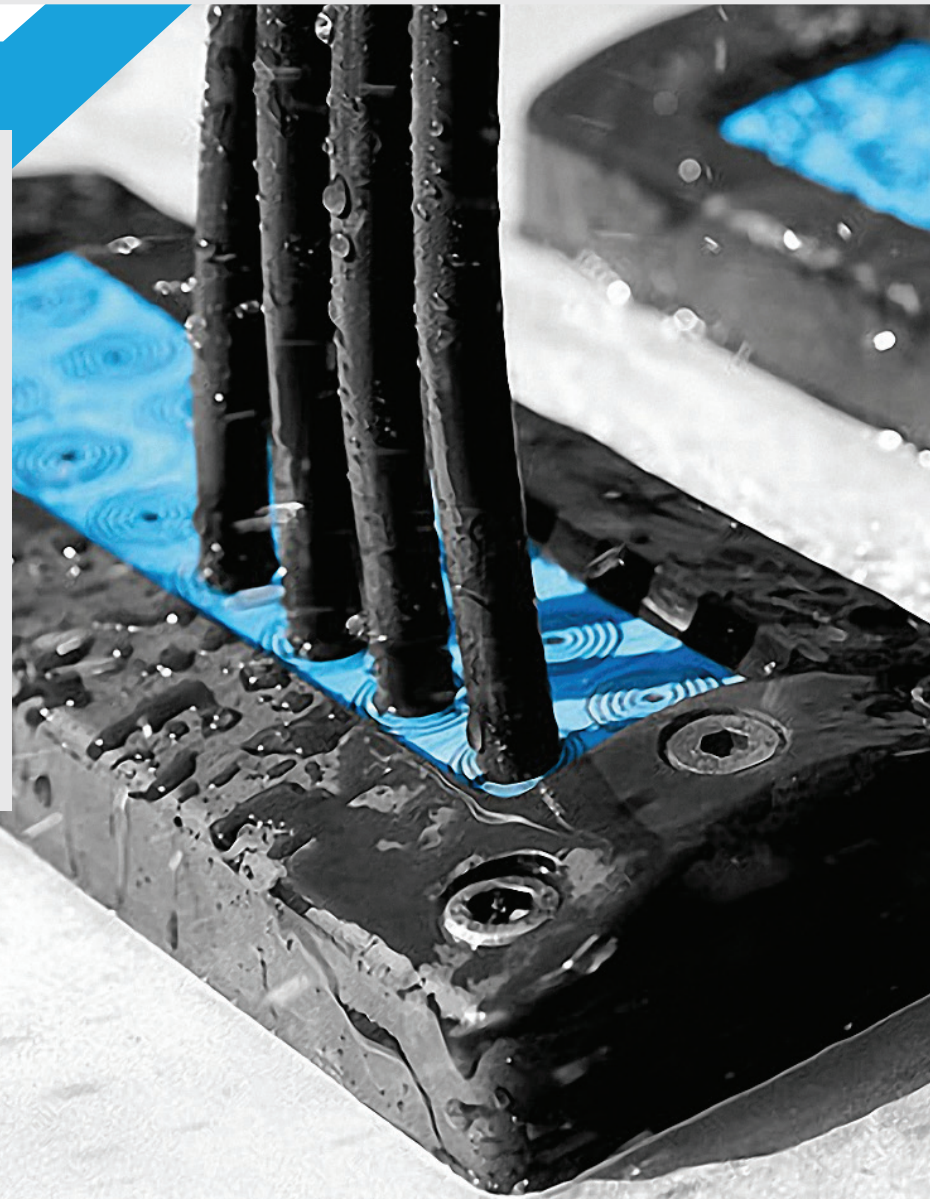
CPI's Adjustable Cable Runway is designed to provide a flexible point-to-point solution anywhere cables enter or exit the cable pathway and features movable Cross Members for ultimate cable pathway customization, support for cable and fiber from floors, ceilings, walls and the tops of cabinets and racks, and works with a number of tool-less accessories for quick and easy deployment.



Cabling Solutions Cut a Path to Success

Sealing System Accessories

RMR Industrial Enclosures require specialized seals for cable openings in order to maintain NEMA Type 12 (IP55) and NEMA Type 4 (IP66) protection ratings. CPI offers three unique solutions that ensure operational reliability: Roxtec®ComSeal™ Grommet, Roxtec RG6 Gland Seal and the EPDM Snap-In Liquid Tight Grommet.



Cabling Solutions Cut a Path to Success

Netpoint™ 3030 Wireless Bollard

Oberon's Netpoint™ 3030 Wireless Bollard is ideal for extending wireless and Wi-Fi coverage into open public spaces such as parks, outdoor malls, and bus stops. The wireless bollard can be used to mount the Wi-Fi AP in locations where Wi-Fi coverage is most needed and avoiding the need to mount on buildings or light poles. This rugged fiberglass bollard is weatherproof and tamper resistant and is designed to protect wireless equipment in open public areas.



Pillar 4

Extend Equipment Life with Thermal Control & Management



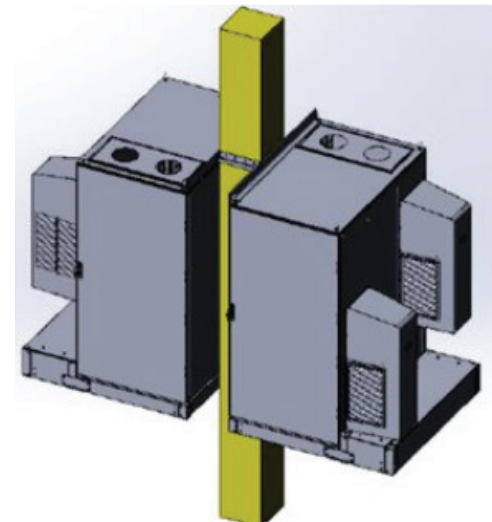
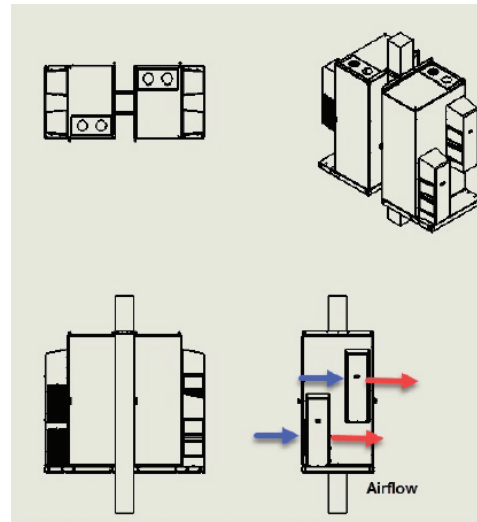
Award-Winning Case Study: From Sketch to Reality

Read how CPI helped a popular online food service company meet unique edge deployment needs, keep equipment cool and save valuable floorspace in the process.



The sealed design of industrial enclosures does not allow for needed ventilation, so a filter fan or cooling unit is an important requirement to exhaust or reject heat from the enclosure in order to maintain the equipment manufacturer's recommended temperature operating range.

Like the enclosures, the filter fan or cooling unit need to be IP- or NEMA-rated to match (or exceed) the enclosure rating.



Thermal Management Products

To address efficiency, industrial cooling units typically have a fixed set point and circulate air continuously. The compressor cycles off if the temperature within the enclosure is under the threshold, but the fans run continuously at a constant rate. It is important to size cooling units for a specific heat load to match the sum of the heat produced by the equipment in the enclosure. If the enclosure supports mission critical equipment, a redundant cooling unit should be added. The redundant units should be linked together so they can be cycled at partial load or run concurrently if peak load exceeds a single unit's capacity.

Recommended airflow through an industrial enclosure. Place the intake near the base and exhaust near the top. Place the filter fan on the intake to pressurize the enclosure and reduce dust penetration.

Photo provided by Pfannenberg USA (pfannenbergusa.com).



When selecting thermal management accessories for industrial enclosures, select vendors that can provide solutions that are efficient and scalable. A comprehensive line of Filter Fans, Cooling Units and more are available to provide superior thermal management to help protect the life of the electronic equipment in environments that require NEMA Type 12 (IP55) and NEMA Type 4 (IP66) protection ratings.

Watch the RMR Industrial Enclosures video to get a closer look at the thermal management accessories and capabilities available to you.



Pillar 5

Safely Manage IT/OT Assets with Remote Monitoring and Switching

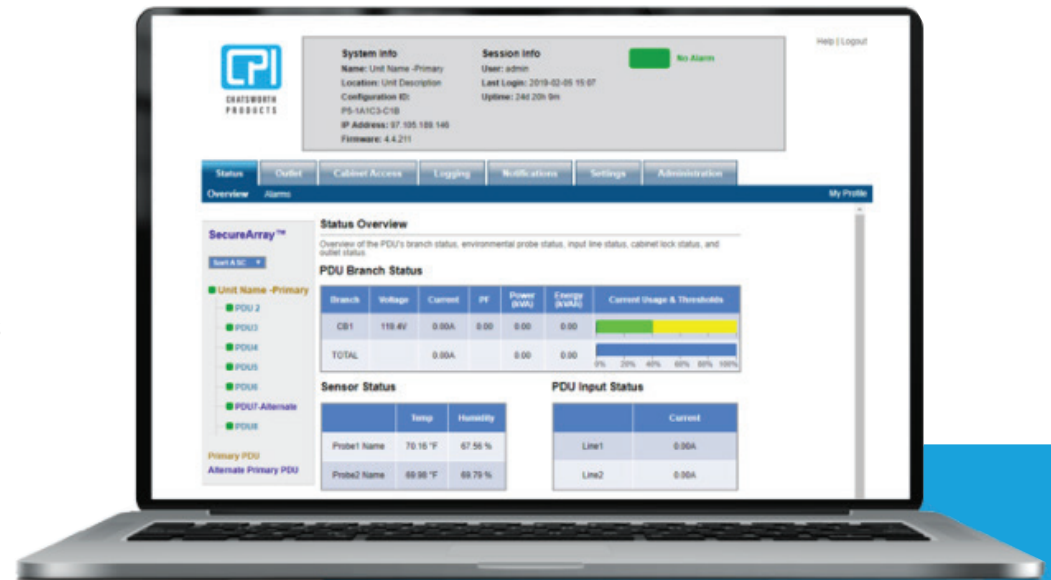


Intelligent power distribution units (PDUs) and environmental sensors can measure temperature, humidity, airflow, power, intrusion and detect entry of water.

This is especially useful for edge locations, where remote monitoring and switching can mean the difference between uptime and discontinued operations.

PDUs distribute power to computers and network switches, provide remote outlet control so you can remotely cycle power to equipment, and monitor power use. These devices automate monitoring, keep logs of measured data and let you set thresholds and receive alarm notifications when conditions approach limits, so you can prevent network outages.

When procuring power and environmental management solutions, look for vendors that can provide features such as high temperature rating (at around 149° F [65° C]) and a wide range of models including monitored and switching capabilities.



Take CPI's eConnect PDU Software for a Test Drive

With a user-friendly interface, now you can try out a live software demo from CPI's Research, Development and Training facility in Georgetown, Texas. Simply use the login information below and click here to get started.

Username: SalesDemo

Password: salescpi123

[Try the online demo. →](#)



Remote Monitoring Products

eConnect® intelligent Power

Distribution Units (PDUs)

CPI eConnect intelligent PDUs provide the ability to remotely monitor power usage and control power to individual outlets for improved uptime and proper equipment provisioning. Integrated electronic locks and temperature/humidity sensors allows a consolidated interface for power, environmental management and access control.



Remote Monitoring Products

CPI RIM-750

The Remote Infrastructure Management (RIM-750) System from CPI provides remote monitoring of environmental sensors for a single server cabinet or enclosure or a small computer or telecommunications equipment room.



Remote Monitoring Products

RIM-750 and Leak Detection Kit Bundle

Get remote monitoring of sensors in your edge enclosure using the RIM-750 paired with CPI's Leak Detection Kit Bundle, which includes a Leak Detection Lead Cable and 200' (60 m) of Leak Detection Sensor Rope.



Take a Closer Look at the Value of Monitoring for Security & Environmental Conditions



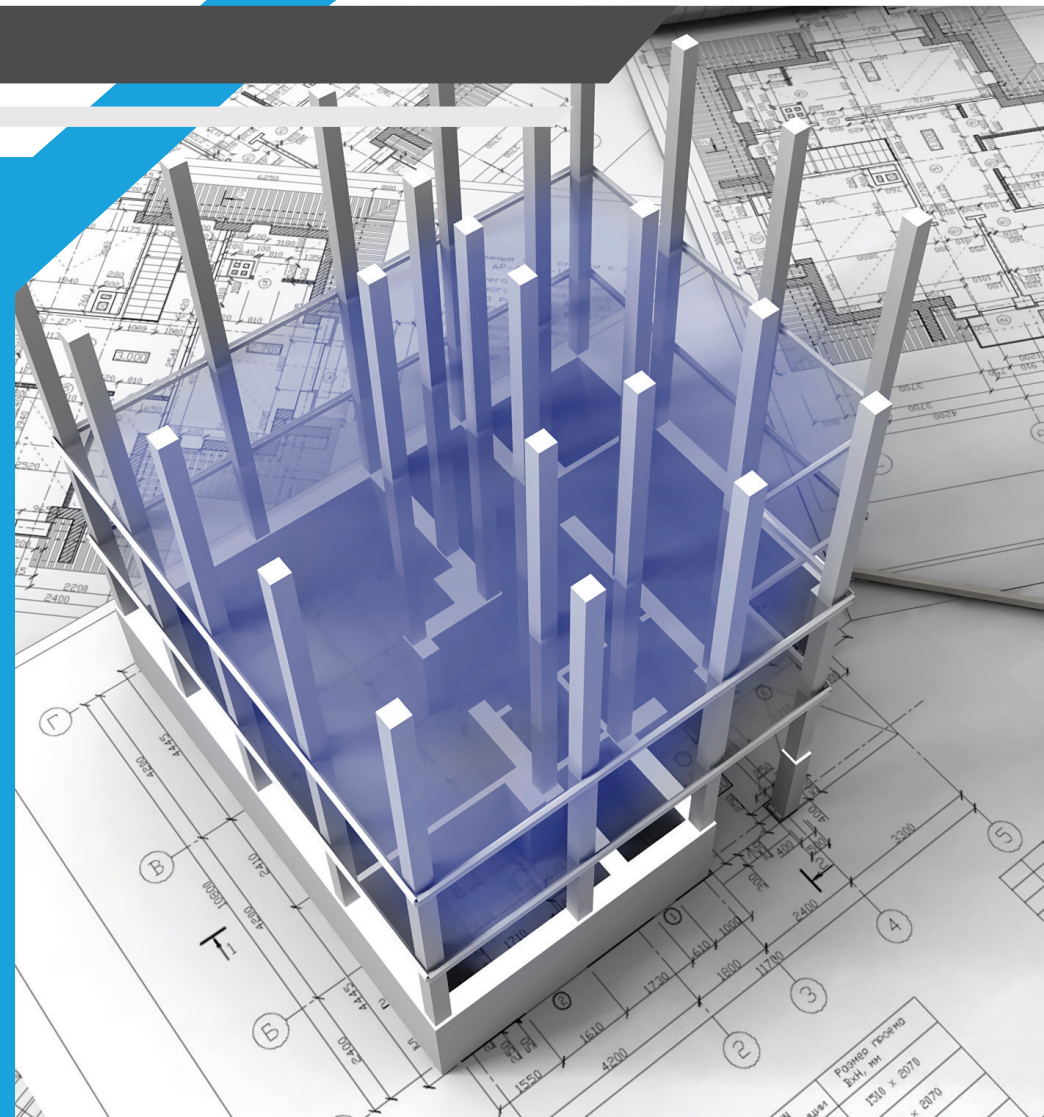
Next Steps

You've glimpsed the future. Now build it. **nd Switching**

Placing your sensitive IT equipment into spaces such as warehouses, manufacturing floors and outdoors demands selecting an industrial enclosure with the appropriate configurations, but especially one that meets your application needs.

Considerations when configuring an industrial enclosure:

- Environmental protection ratings
- Thermal requirements
- Cable entry
- Security via power management
- Remote monitoring and control via power management



CPI Product Designer

CPI has made it easier than ever for users to design, accessorize and customize an industrial enclosure with just a few clicks. The free, intuitive CPI Product Designer provides a simple, online tool that lets you quickly select the style, size, material, protection rating and accessories for a standard enclosure.

Once your design is finished, you'll receive a confirmation email with the product's description, part number, bill of material with pricing and related documents. A second email will notify you when the 3D models are complete, usually within 15 minutes.

[Try the tool here.](#) →



Part Number: **A51-646424-400** Design Accessories Review

(A51) RMR Floor-Mount, Double Door With Feet, Type 4X, SS

Height (in)	64 in (1626 mm)
Width (in)	64 in (1626 mm)
Depth (in)	24 in (610 mm)
Finish	TYPE 304 SS #4 BRUSHED
Latch Style	3PT, CH751
Door Style	Solid
Wall-Mounting	None

3PT, Double Bit 3PT, Square

*304 SS #4 Brushed Finish

Product Details:

- RMR Floor-Mount Enclosure with Floor Stand (A51)
- Type 4X
- Type 304 Stainless Steel
- Height: 64" (1626 mm)
- Width: 64" (1626 mm)
- Depth: 24" (610 mm)
- Solid Double Door with 3PT Latch and CH751 Lock
- Finish: Type 304 SS #4 Brushed

CPI's Vision for Enterprise and Edge Networking Can Be Your Reality



About Chatsworth Products

Chatsworth Products (CPI) is a global manufacturer of products and solutions that protect your ever-growing investment in information and communications technology for IT and industrial automation applications. We act as your business partner and are uniquely prepared to respond to your specific requirements with global availability and rapid product customization, giving you a competitive advantage. With decades of experience engineering thermal, power and cable management solutions for the data center, enterprise networking and industrial enclosure markets, CPI is well positioned to provide you with unequaled application expertise, customer service and technical support, as well as a global network of industry-leading distributors.



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