Future-Proofed
Fulfilling and exceeding requirements for real-time communication based on standard Ethernet for today and tomorrow

Reliability & Availability
Wired/wireless Ethernet systems designed to deliver total reliability under harsh conditions

Cost Efficient
Belden offers one device with integrated multi functions to provide cost-effective and high-performance solutions
Automotive Manufacturing

Make your manufacturing smarter. Belden can help.

Belden is delivering complete end-to-end communication solutions for shop floor automation. Belden is a strategic partner for both automotive manufacturers and tier1-2 suppliers. We are driven by innovations and take a customer-focused view that combines anticipating customer needs with a thorough understanding of key requirements.

Belden can deliver global innovative solutions on a customized scale, wherever and whenever they are needed. Belden engages with several Industrie 4.0 initiatives such as SmartFactory from DFKI, to be close to trends which impact you, helping evolve ideas into mature products.

Future-Proofed

Grow your bandwidth to meet rising demands for Gigabit speeds throughout your entire factory. Let us help you transform your OT network to Industrial IoT standards using new technologies like Time Sensitive Networking (TSN). TSN is a novel technology that offers an entirely new level of determinism in the field.

Plus, you can protect your enterprise with our complete portfolio of networking and security monitoring solutions to confront the threat landscape evolving day-by-day. You’ll find exactly what you need to ensure your industrial control network stays operational.
Don’t make your journey to the smart automotive factory alone. Partner with experts who not only know the way but are paving the path forward. Be certain with Belden.

Reliability & Availability

Increase your uptime and efficiency with proven communication infrastructure ranging from industrial wireless, switching, routing and connectivity to security and network management software.

With Belden, you have a single source of high performance products PLUS expertise and service to ensure maximum production uptime.

Cost Efficient

Reduce both inventory and maintenance with integrated, multi-purpose designs. You’ll find switches and routers with built-in security features and PoE. Or how about I/O modules that deliver integrated PLC and switching functions, too?

In addition, you can improve your CO₂ footprint with green devices that decrease energy consumption and give you the lowest total cost of ownership.
Protect Your Investment with Better Production Cell Communication

Production cell communication on the shop floor brings all data and signals from the sensor and actuator level of the machines to the PLCs. Signals travel via distributed switches on the machines to a central switch for the production cell. Let’s take a look at the sub applications that characterize production cell communication.

Application Requirements

Network Access of Production Cell

Network access provides a handover point that connects each production cell to the field-level communication of several machines. Belden offers an extensive communication infrastructure portfolio dedicated to this application. Even future requirements such as Industrie 4.0 and the virtualization of application controllers have been taken into consideration.

Key Requirements

• Meet rising bandwidth needs using Gigabit technology
• Protect and flexibly segment the production cell network
• Be ready for PLCs in the local Cloud by providing real-time communication from the field into the backbone

Key Features to Meet Challenges

• Switches with a variety of speeds – from 1 Gb/s up to 10 Gb/s
• Defense-in-Depth concepts based on firewalls with Deep Packet Inspection or wire speed ACLs for real-time communication
• Real-time communication using Time Sensitive Networks (TSN) based on standard Ethernet technology

Cordless Nutrunner

In the automotive industry, the accepted standard solution is to connect nutrunners via cabling to the controller. However, this cord requires frequent maintenance or replacement. That’s why more operations are moving to cordless nutrunners that can maintain uninterrupted performance.

Key Requirements

• High availability of nutrunners
• Increasing flexibility of workstations
• Improvement of quality control

Key Features to Meet Challenges

• Immediate shift to back-up channel when using channels with required radar detection
• Integrating WLAN into the tooling controller allows working stations to advance production flow
• WLAN enables tooling to measure and communicate torque profile
Field-Level Communication

The field-level network between and inside machines is used to provide end-device connectivity within the production cell. Field-level communication is expected to experience significant change as Industrial Internet of Things (IIoT) standards are put in place. The new evolution of mission-critical networks is designed for real-time communication based on standard Ethernet between field devices and virtualized controllers. Belden has developed the first solution in the industry to help customers manage the change.

Key Requirements
- Deterministic real-time communication in highly redundant networks
- Protection against unauthorized access
- Resistance to vibration, shock, welding sparks, chemicals or temperature

Key Features to Meet Challenges
- Real-time communication using Time Sensitive Networks (TSN) based on standard Ethernet technology
- Network Access Control (NAC) based on IEEE802.1X combined with Access Control Lists (ACLs)
- Switching portfolio with high IP rating up to IP65/67

Wiring of the Machine

In order to drive productivity improvements, IP20 peripheral devices are moving closer to actuators and sensors. Belden helps you make this transition with robust connectivity solutions that ensure the operational reliability of your equipment in the most challenging environments, such as aggressive atmospheres, weld slags and vibration.

Key Requirements
- Resistant to temperature, vibration, shock, welding sparks or chemicals
- Fast start-up times for tool changing
- Reduce maintenance efforts

Key Features to Meet Challenges
- Industrial M12/M8 connector technology with self locking screw coupling
- Tool changes supported by prioritized start-up in less than 500 ms
- 50% reduction in installation time with M12 Hybrid
Today’s automotive production must adapt to continuous changes in technology, while at the same time building cars with fewer interruptions, greater speed and absolute precision. To keep production cells active, an increasingly sophisticated array of services is required. This includes security concepts at different levels to protect against cyberattacks and data breaches with integrated security controls. The goal is to achieve, maintain and prove security compliance with your industry policies.

Another service is to monitor your network with Network Management Software that enables secure and easy configuration as well as the monitoring of industrial network components in real time. Belden’s portfolio enables you to overcome the challenges in the production cells of today – and tomorrow – with the following solutions.

### Industrial Connectivity

1. **Modular Industrial Patch Panel (MIPP)**
   - Modular Industrial Patch Panel MIPP from Belden is a termination panel that offers significant space and cost savings. The panel easily manages both copper and fiber cables.
   - High port density for maximum up to 24 ports
   - Available as both single and double modules for fiber, copper
   - Up to 6 modules can be combined in one line

2. **M8/M12 Circular Connectors & Cordsets**
   - The assembly-friendly circular connectors of the E-series M12 from Lumberg Automation are perfectly suited for applications involving all types of sensors and actuators.
   - Self-locking screw coupling
   - “Piggyback circuit” ensures correct functioning, even if the LED display is damaged
   - Protection class IP67; up to IP68/69K

3. **LioN-Power I/O Modules**
   - Multiprotocol technology inside LioN-Power active I/O modules supports the three largest Ethernet protocols in a single device plus M12 power technology.
   - One device for EtherNet/IP, PROFINET, EtherCAT
   - Scalable, digital Input/Output (DIO) universal module option
   - Complementary M12 power technology with unscaled 2x16 amps current rating

4. **LioN-Power Field Level PLC (μDCU)**
   - LioN-Power μDCU (μ = micro) is the first device that combines the benefits of a field I/O and a programmable logic controller (PLC).
   - Control on-board I/Os independently from higher level PLC
   - Communicate simultaneously with a connected PLC
   - React to diagnostic events (short circuit, under voltage)

### DataTuff® IE Cables and Connectivity

5. **Optical Fiber Cable – GMTT**
   - The Belden Fiber optical cable 9/125µ with up to 24 fibers is designed to isolate the fiber from external forces by using the technology of tight buffer for low bend radius.
   - PUR jacket, halogen-free and flame-retardant, a helically stranded cable core for flexibility and outstanding mechanical protection for the fibers
   - Supports Gigabit bandwidth to be future-proof
   - Extremely strong, rugged, survivable tight-buffered cables for severe environments in the production cell

6. **Optical Fiber Cable – GMSN**
   - The Belden Fiber optical cable with up to 24 fibers is designed to isolate the fiber from external forces by using the technology of central loose tube for high protection purposes.
   - TPU jacket and flame-retardant
   - Simple all dielectric cable construction (and consequently more cost-effective up to 24 fibers than multi-tube cables)
   - Easy to install in trenches due to high flexibility and cable warranty of 30 years
### Industrial Communication Infrastructure

#### EAGLE20/30 Multiport Industrial Firewall System
Advanced Security Features and built-in HiSecOS software eliminate the need for multiple routers and protect your production cell.
- Comes with up to 8 ports, including 2 x Gigabit, 4 x Fast Ethernet and more
- Defense in Depth at Layer 3 by combining Filtering and Deep Packet Inspection
- NAT (Network Address Translation)

#### Tofino Xenon Security Appliance
The Xenon Industrial Security Appliance is a Layer 2 Industrial Firewall purpose-built to protect ICS/SCADA against cyber threats. The device now offers two deep packet inspection Loadable Security Modules (LSM) for DNP3 and IEC 104 (IEC-60870-5-104). Other LSMS include industrial protocols such as EtherNet/IP, Modbus TCP and OPC.
- Permits read-only and read/write access for Modbus TCP data
- Blocks any traffic that does not conform to the protocol specification
- Permits device restarts only from the shift operations manager’s terminal

#### Tripwire – Configuration Assessment Engine
Tripwire enables continuous compliance with industrial cyber security best practice frameworks, such as ISA99/IEC 62443 by assessing every configuration change against the frameworks’ benchmark controls to ensure that configuration does not take a device out of security compliance.
- Complies with fundamental best practices for securing industrial control networks
- Ensures that devices are configured correctly
- Reduces the potential attack surface for cyber security intrusions or events

#### BAT Wireless Platform
A unique Hirschmann Wireless platform concept that permits tailor-made solutions with an optimum price-performance ratio.
- PRP functionality and Clear Space guarantee stable wireless connections
- Support of multiple channels and prioritized channel scan
- ESD protection, robust hardware and M12 connection technology

#### MSP30/40 Din Rail Layer 2 and 3 Switches
Industrially compatible, flexible, economical and future-proof – these are only a few features that this intelligent MSP system offers your communication network.
- Variety of port types, with up to 28 Gigabit ports
- Enables simple configuration and diagnosis using HiDiscovery, Industrial HiVision or web interface
- Comprehensive security functions such as port security, DHCP Snooping, Dynamic ARP Inspection and many more

### BAT867-R Industrial Wireless Access Points
The Hirschmann BAT867-R WLAN device provides an easy-to-install but feature-rich access point/client. The device operates at up to 867 Mbps.
- 2 x 2 MIMO support
- Support of 802.11ac standard
- Version with IP40/RJ45 and IP65/M12 connectivity

#### OCTOPUS IP67/IP54 Switch
IP67/54 switches from the OCTOPUS family allow fail-safe networks to be installed in demanding cabinet-free environments.
- Compact IP67/65/54 metal housing with high port density
- Vibration-proof M12 connection technology
- Standardized redundancy mechanisms like RSTP, MRP or DLR as well as HiFusion for redundant interconnection of networks

#### SPIDER III Unmanaged Industrial Ethernet Switches
Unmanaged switches are a cost-effective solution for the field level in industrial networks inside machines. The portfolio also features devices with a robust IP67/IP54 housing (OCTOPUS) for use in the most demanding environments.
- Full, future-proof Gigabit switches
- Different port counts, media types (copper and fiber)
- Diagnosis through LEDs which indicate status of the power supply and port status

#### RSP35 Switches with TSN
The RSP35 takes standardized IEEE 802 Ethernet to the next level by having Time Sensitive Networking (TSN) protocol implemented, which offers unprecedented low end-to-end latency for real-time applications.
- Calculable, guaranteed end-to-end latencies
- Highly limited latency fluctuations (jitter)
- Extremely low packet loss
Build an Infrastructure that Supports Control Room Communication End-to-End

Belden delivers a complete, innovative Ethernet communication infrastructure from the core to distribution and down to access level, ranging from DIN-Rail switches and modular patch panels to 19-inch intelligent patching solutions and industrial workgroup and backbone switches and security firewalls.

Application Requirements

Infrastructure Cabling

The long distances on the factory floor and the need for increasing data rates have an impact on what type of cable should be selected. Most customers prefer to use fiber cable to connect network devices from the core to local control level. Copper cable, on the other hand, is widely used from access level to machine level or for links between switches in the same area.

Key Requirements

- Covering current and future-proof applications as 2.5 and 10 Gbit/s
- Designed and built for meeting such standards as Construction Products Regulation
- End-to-end solution offering complete suitability and availability of networks

Key Features to Meet Challenges – Fiber

- Bend-insensitive multi-mode (OM3, OM4) or single-mode (OS2) fiber
- LS-NH/FR jackets meeting standards for toxicity, flame propagation and droplets
- PUR jacket for outstanding resistance to abrasion, high flex and high tolerance to solvents
- Tight-buffer for low bend radius or Central Loose tube for high protection purposes

Key Features to Meet Challenges – Copper

- LS-NH/FR jackets meeting standards for toxicity, flame propagation and droplets
- PUR jacket for outstanding resistance to abrasion, high flex and high tolerance to solvents
- CAT 6A/CAT 7 pre-terminated or field-mount solution with RJ45 shielded connectivity

Technical Information

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Tight-Buffer (GIXT)</th>
<th>CLT (GUSN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bend radius</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Construction products regulation</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Crush resistance</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Connection</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

* with Belden Brilliance Universal connectors AX1052xx
Production Backbone Communication

Due to the large size of a communication network and the sheer scale of automation devices in an automotive plant, the overlying network has the task to enable seamless and highly available communication from OT to IT Enterprise infrastructure. To deal with this complexity, a state-of-the-art network divides the whole into logical segments, each oriented towards specific production processes, with a manageable number of participants.

Key Requirements

- Bandwidth preparation for the future to distribute a large variety of data actions, including work orders for machines and software updates
- Increase network availability assuring that disturbance of individual network components does not cause downtime
- Being ready for PLCs in the Cloud by providing real-time communication from the field into the backbone

Key Features to Meet Challenges

- Consistent Layer 3 capabilities and Gigabit connectivity over switching portfolio
- Short convergence times of supported industrial redundancy protocols to enable rapid reconfiguration after network changes
- Packet filtering via wire speed Access Control Lists (ACLs) and usage Firewalls
# Belden Product Solution

The automotive industry is challenged by the need for IT and OT to grow together in order to benefit the most from a digital factory. Belden provides ruggedized backbone switches with IT features to interconnect with the IT backbone, as well as offering a broad-suited switching portfolio to connect down to the production cell in conjunction with the right choice of cabling and passive products to build up a future-proofed infrastructure to the cell.

<table>
<thead>
<tr>
<th>Industrial Connectivity</th>
<th>Industrial Communication Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Modular Industrial Patch Panel (MIPP)</strong></td>
<td><strong>MACH 4000 Backbone Switch</strong></td>
</tr>
<tr>
<td>Modular Industrial Patch Panel (MIPP) from Belden is a termination panel that offers significant space and cost savings. The panel easily manages both copper and fiber cables.</td>
<td>The MACH 4000 backbone switch provides real versatility, especially for large networks, with several media modules, high port density and the extendable routing functionality.</td>
</tr>
<tr>
<td>- High port density for maximum up to 24 ports</td>
<td>- Supports data rates up to 10 Gbit/s</td>
</tr>
<tr>
<td>- Available as both single and double modules for fiber, copper</td>
<td>- Dynamic Layer 2 and Layer 3 routing</td>
</tr>
<tr>
<td>- Up to 6 modules can be combined in one line</td>
<td>- Fast redundancy methods</td>
</tr>
<tr>
<td><strong>DataTuff® IE Cables and Connectivity</strong></td>
<td><strong>MACH100 Workgroup Switches</strong></td>
</tr>
<tr>
<td>The comprehensive Industrial Ethernet cable range ensures the highest level of reliability, quality and performance.</td>
<td>MACH 100 series workgroup switches are a cost-effective alternative for Layer 2/Layer 3 applications with high data rates.</td>
</tr>
<tr>
<td>- Cat7 and Cat5e with PUR cable jacket with special protections against high temperature, welding sparks, chemicals and PLTC available</td>
<td>- Available in different full Gigabit versions</td>
</tr>
<tr>
<td>- Different types of conductors depending on application: permanent (solid), vibration (stranded), flexion or torsion (high-stranded)</td>
<td>- Various redundancy methods</td>
</tr>
<tr>
<td>- High EMI/RFI protection with foil and braid shield options</td>
<td>- Extensive management methods and diagnostic functions</td>
</tr>
<tr>
<td><strong>Optical Fiber Cable – GUXT with LSNH/FRNC</strong></td>
<td><strong>GREYHOUND Switches</strong></td>
</tr>
<tr>
<td>The GUXT optical fiber cables are designed with a tightly buffered fiber that is surrounded by aramid yarn and a jacket with a fiber diameter of 900 micron (0.9 mm), an industry standard for added mechanical and environmental protection.</td>
<td>Fast/Gigabit Ethernet switch designed for use in harsh industrial environments with a need for cost-effective, entry-level devices.</td>
</tr>
<tr>
<td>- Halogen-free UV-resistant outer jacket</td>
<td>- Offers different configuration options including, full Gigabit combo ports and TX ports</td>
</tr>
<tr>
<td>- Prevents splicing and improves installation cost efficiency</td>
<td>- Provides enhanced features through Hirschmann’s operating system, HiOS</td>
</tr>
<tr>
<td>- Offers a projected lifetime &gt; 30 years</td>
<td>- Allows adjustments – even in the field – through the module port configuration features</td>
</tr>
<tr>
<td><strong>Optical Fiber Cable – GUSN with LSNH/FRNC</strong></td>
<td><strong>Industrial HiVision Network Management Software</strong></td>
</tr>
<tr>
<td>The GUSN optical fiber cables are designed as loose tube cables, where the coated fiber “floats” within a rugged, abrasion-resistant, overized tube filled with optical gel. The technology minimizes stress on the fiber by material expansion or contraction. This cost-effective Belden solution minimizes the amount of labor and material required to install the cable.</td>
<td>Industrial HiVision is a proven solution in the automotive industry. It saves you time, reduces errors and provides a snapshot of network health so you can easily increase availability and enhance security.</td>
</tr>
<tr>
<td>- Simple all dielectric cable construction (and consequently more cost-effective up to 24 fibers than multi-tube cables)</td>
<td>- MultiConfig configures hundreds of devices from any manufacturer simultaneously</td>
</tr>
<tr>
<td>- Reduces the number of breakout kits by 50%, saving time, money and space</td>
<td>- Alerts are generated when unauthorized changes are made, rogue devices are added or MAC/IP address pairs change</td>
</tr>
<tr>
<td>- Offers a projected lifetime &gt; 30 years</td>
<td>- User roles control access to the network by granting different levels of access rights</td>
</tr>
</tbody>
</table>
Industrial Communication Infrastructure

Belden XNM Cabinet Series
Designed for dusty environments, Belden XNM cabinets allow hosting of networking/control equipment on the automotive production floor. Optional air conditioning units allow temperature control for stand-alone applications. Belden has extensive NEMA-style networking enclosure experience and capability to customize product solutions.

- Available as 9, 12 or 20 RU along with choice of solid and plexis front door
- NEMA 12 compliant for hosting servers and switches in industrial environments
- Top and bottom panels allow optional fan mounting

Belden 10GX KeyConnect™/AngleFlex™ Patch Panel
The Belden Patch Panel Series is a new line of patch panels mainly for copper applications. These panels provide better manageability and improved installation flexibility for cabinet installations. Belden 10GX patch panels allow the use of unshielded or shielded Cat 6A/Class EA empty and preloaded with 24, 48 and 72-ports. Angled design supports efficient switch interconnection.

KeyConnect™
- Built-in reliability with ultra-robust design to provide Installable Performance
- Together with Belden 10GX cabling system, margin to spare (guaranteed to 625 MHz)

AngleFlex™
- Patented removable angled inserts provide intuitive left, right or bi-directional patch cord routing and more efficient switch connection
- Angled inserts eliminate the need for horizontal cable management that will result in space, cooling and power savings

FiberExpress (ECX) Patch Panel
Belden’s FiberExpress Enterprise Closet X (ECX) Patch Panel platform is an elegant, intuitive, and flexible solution set that improves upon industry-leading patch panel solutions. The stylish ECX platform has been optimized for LAN environments, and provides an easy-to-deploy, efficient solution for installers.

- Front and Rear removable cassettes (patent pending) on all housings (1U, 2U, 4U). Plus, multiple options for cable strain relief
- Cassette rails molded into housing. No need for extra plastic rail components that can get lost
- Mix and match copper/fiber in the ECX platform using KeyConnect modules, and leverage our broad line of KeyConnect copper connectivity products
Guarantee Top Production Efficiency with the Right Intralogistics Communication Solution

The automotive industry is faced with increasing demand for logistics systems that provide just-in-time delivery of outsourced components for the production process. To meet the challenges of these complex systems, Belden provides state-of-the-art technologies, application expertise and tailored communication infrastructure solutions. Our solutions reduce the complexity in installation, operations and replacement to keep the factory moving.

Application Requirements

Automated Guided Vehicles (AGVs)

To compete in today’s market, automotive manufacturers must offer customers more optional features on the cars they produce. And as vehicle variants increase, the complexity of the production line also accelerates. One of the ways technology can bring greater efficiency to the process is the driverless transport system, also known as Automated Guided Vehicles (AGVs).

AGVs introduce such benefits as cost savings, process optimization and error reduction. The vehicles use wireless technology to connect with a central control system, and this wireless data transmission is critical to guarantee uninterrupted supply flow and production uptime.

Key Requirements

- Provide the highest wireless network speed
- Increase performance with reliable wireless roaming
- Protect against interference from shock/vibration

Key Features to Meet Challenges

- Technology in compliance with 802.11n/ac standard to speed up your network
- Wireless client devices that support very low handover time – just milliseconds
- Industrial-grade WLAN devices that provide M12 connectivity
Electrified Monorail System (EMS) Conveyor

Today the heart of the automotive assembly plant is the Electrified Monorail System (EMS) conveyor, which is designed to deliver reliable, safe and efficient transportation of the vehicles or parts between work stations. Using wireless technology increases flexibility and communication availability compared to traditional copper bus bars between each carrier and the controller.

Key Requirements
- Optimize reliability and uptime of the EMS conveyor system
- Increase bandwidth to overcome limitations of grinding lines
- Operate in real-time and avoid switching delays

Key Features to Meet Challenges
- Support of Parallel Redundancy Protocol (PRP) to decrease network latency and transit time differences to zero
- Leaky Cables acting as special antenna to provide a stable and interference-free wireless link with up to 1,000 times higher data throughput compared to traditional bus bars
- 2 x MIMO antenna technology (Multiple Input Multiple Output) supports seamless roaming by the carriers to access points

Floor Conveyer Systems

The floor conveyer system is widely used to transport parts along an automotive assembly line or move materials around a production plant. The conveyer systems are built at the ground level of the production floor, reaching from the belt conveyer and lifting to the skid conveyer. A seamless communication of sensor data to controllers – via a second cloud-based route – enables the plant to optimize material flow by using the data source for service and big data approaches.

Key Requirements
- Low maintenance effort of communication infrastructure
- Cost-effective flow of materials
- Extensive diagnostic options for failures operations

Key Features to Meet Challenges
- High availability with robust IP67 connectivity, supported by materials such as PUR, Metal or PBT
- Easy integration of I/O modules supporting PROFINET, EtherNet/IP, IO-Link, EtherCAT and more
- Easy implementation with modular fieldbus system where IO-Link not only facilitates extensive diagnostic functions but also enables data to flow into a cloud
Belden Product Solution

The adoption of Industrie 4.0 is not limited to only production activities but also to the intralogistics process. With timely supply to automobile production lines, factories achieve greater and greater operational efficiency. Already, we have seen the impact of open standards. Now, as the interconnection of intralogistics equipment with communication devices becomes more common, we will see even greater changes as more systems talk to each other, send data into clouds and create significant data volume.

Belden’s portfolio can help you speed up the interconnection of your equipment with confidence and security. Here are some specific products to consider:

**Industrial Connectivity**

1. **LioN-Power Hybrid I/O Modules**
   - The LioN P IO-Link modules meet PROFINET standards and detect both input and output as well IO-Link data directly on the AGV to connect sensors, the PLC and the wireless client.
   - Multi-protocol support of IO-Link, PROFINET, EtherNet IP
   - M12 hybrid Y-coding technology
   - Small form factor (W x H x D): 30 x 43 x 204 mm and low weight of 413 g

2. **M12 Circular Connectors & Cordsets**
   - Lumberg Automation’s assembly-friendly circular connectors from the E-series M12 are perfectly suitable for applications involving all types of sensors and actuators.
   - Self-locking screw coupling
   - “Piggyback circuit” that ensures the correct functioning even if the LED display is damaged
   - Protection class IP67; up to IP68/69K

3. **Radiating Cable Antennas (Leaky Cable)**
   - Radiating cables are coaxial cables that are equipped with small slots in their shields at regular intervals so they can operate as antennas. This leads to a homogeneous field around the cable.
   - 2.4 GHz leaky cable specially designed to radiate 802.11g and 802.11n
   - Available in 50, 100 m cable lengths
   - Halogen-free and flame-retardant outer sheath

4. **Belden Classic VFD Cable**
   - As the original developer of high quality VFD cable, Belden provides superior electrical performance and reliability, for industrial environments and applications as conveyor systems and driverless transport systems.
   - High-strand tinned copper circuit conductors
   - High Flex variant TPE jacket rated for 10 million cycles
   - Robust ground and shielding system protects equipment from disruption

**Industrial Communication Infrastructure**

5. **BAT-WLC Controller**
   - The Hirschmann BAT-Controller WLC provides centralized management of a large number of WLAN clients and access points.
   - Management from 25 to 1000 access points and clients
   - Integrated IP router with firewall and VPN support
   - Fast roaming possible across a number of subnetworks

6. **BAT867-R**
   - The Hirschmann BAT867-R WLAN device provides an easy to install but feature-rich access point/client. The device operates with the HICOS software.
   - 2 x 2 MIMO support
   - Support of 802.11ac standard
   - Version with IP40/RJ45 and IP65/M12 connectivity

7. **OpenBAT Wireless Platform**
   - A unique Hirschmann Wireless platform concept that permits tailor-made solutions with an optimum price-performance ratio.
   - PRP functionality
   - Support of multiple channels and prioritized channel scan
   - NAT and “Keep client connection alive” function

8. **Lite Managed Industrial Switch**
   - The industrial Ethernet switch guarantees reliable data communication, enhanced redundancy and diagnostic features. It also offers easy-to-implement management functionality at an outstanding price-performance ratio.
   - SNMP and HiDiscovery/Industrial HiVision, plus a web interface, ensure fast and convenient administration
   - A range of diagnostic functions ensures fast identification of errors, resulting in smooth production processes
   - Space-saving installation from a compact design
The Belden Brand Promise

The world is growing more and more connected with an explosion of links from human to human, human to machine, and machine to machine. And, as more connections are created, the networks they form become increasingly vital to our daily lives and our long-term goals.

But, with more connectivity comes more complexity. As the machines, processors and systems that power our world become more sophisticated, the people who design, build and maintain them need a partner with perspective that spans technology platforms, geographies, and industries.

That’s why Belden is on a path to assemble a portfolio of best-in-class communication technology brands. As a part of Belden, our brands benefit from over a century of excellence in manufacturing to the highest standards, and they’re able to share innovations and thought leadership across the organization to stay ahead of the competition. Our customers across all our brands can rely on what we build to outperform and outlast in the most demanding conditions, and they know that we’ll support them with uncompromising and responsive service.

We are greater than the sum of our parts. We prove it by adding expertise and resourcefulness that goes above and beyond product performance. We prove it through our focus on the applications and markets that are most in-demand from industrial IT to industrial connectivity to enterprise connectivity and broadcast. We prove it through continually optimizing our portfolio of technologies, capabilities and brands to create the strongest connections possible.
GLOBAL LOCATIONS

For more information, please visit us at: www.belden.com

UNITED STATES
Division Headquarters – Americas
2280 U.S. Highway 27 South
Richmond, IN 47374
Phone: 765-983-5200
Inside Sales: 800-235-3361
Fax: 765-983-5294
info@belden.com
www.belden.com

Belden
2200 U.S. Highway 27 South
Richmond, IN 47374
Inside Sales:
1-800-BELDEN-1
(1-800-235-3361)
Phone: 765-983-5200
Fax: 765-983-5294
info@belden.com
www.belden.com

Industrial Networking
Hirschmann/GarrettCom/
Tofino Security,
255 Fourier Ave.
Fremont, CA 94539, USA
Phone: 510-438-9071
Fax: 510-952-3456
www.belden.com
gstein@belden.com

EDISONstraat 9
5928 PG Venlo, 5900 AA,
The Netherlands
Phone: +31-773-878-555
Fax: +31-773-878-448
venlo.salesinfo@belden.com
www.beldensolutions.com

Regional Offices
Manchester
International Office
Centre, Suite 13
Styal Road
Manchester M22 5WB
United Kingdom
Phone: +44-61-4983749
Fax: +44-161-4983762
manchester.salesinfo@belden.com

Location Neckartenzlingen –
Stuttgarter Straße 46-51
72654 Neckartenzlingen
Germany
Phone: +49-(0)-712714-0
Fax: +49-(0)-7127/14-1313
inet.sales@belden.com

EMEA +49 (0) 7127 /14-1809 | beldensolutions.com
US 1-855-400-9071 | belden.com
©Copyright 2017, Belden Inc. AUTOMOTIVE-MANUFACTURING_VB_INDS_BDC_0717_ENG

Belden, Belden Sending All The Right Signals, GarrettCom, Hirschmann, Lumberg Automation, Tofino Security, Tripwire and the Belden logo are trademarks or registered trademarks of Belden Inc. or its affiliated companies in the United States and other jurisdictions. Belden and other parties may also have trademark rights in other terms used herein.