



Automotive manufacturer retrofits robots with LioN-Power

Belden's connectivity solution with multiprotocol I/O modules supporting PROFINET / EtherNet/IP enables customer to gain flexibility with a standardized concept.

-  Multiprotocol technology inside LioN-Power active I/O modules supports the three largest Ethernet protocols in a single device by achieving fieldbus independent robot automation.
-  M12 Power (L-coding) connection options helped customer upgrade to new technology without changing robot design. As a result, all cost-saving targets were achieved.

Project Overview

An automotive manufacturer in Japan collaborated with another automotive company to strengthen their alliance on the shop floor level body shop. They made a plan to retrofit robots with a single, unified concept, using a Belden solution to replace controller cabinets with IP67 I/O modules and cabling cordsets. The two companies will deploy the solution across their factories in Asia and Europe.

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**Be certain.
Belden.**

The Challenge

The project was initiated to standardize the design for the robot control system by upgrading from PROFIBUS to PROFINET, while also working with different Ethernet protocols. The goal was to implement the solutions in proprietary factories and alliance partner sites as well to reduce the costs significantly.

Part of the new concept was to deploy an IP67 communication solution and replace cabinets. The partners also wanted to simplify cabling design of robots to gain savings from standardization. The existing cabling solutions were housed in cabinets and totally different in the factories of both companies.

System Requirements

- One I/O module covering different communication protocols – the robots in Europe have PROFINET, while in Asia and South America, EtherNet/IP is needed
- Support of M12 Power L-coded PROFINET standard
- Simplify handling and installation with compact, lightweight and smallest design of I/O modules in the market
- Metal housing to meet resistance against welding sparks, vibration (15 g) and shock (50 g)
- IO-Link support for future applications
- Netload Class III
- Customized diagnostic

Why Belden?

Belden delivered cost effective LioN-P I/O modules and a cabling solution designed for the needs of different robotic applications for both automotive companies.

- Strong long-term customer relationship and proven product installations during more than 20 years with one of the partnering manufacturers
- First in the market with an I/O module to support both PROFINET and EtherNet/IP in the same device to meet customers' demands across multiple regions and protocols
- Technical collaboration for the improvement and adaptation of the products according customer needs

The Belden Solution

The new concept includes up to three Lumberg Automation I/O modules per robot, with at least one I/O module for the "patch bay" at the feed of robot and one I/O module to connect to the new IP67 robot controller station.

The selected products fulfilled the requirement to reduce part-stocking and gain flexibility through standardization on a single I/O module. The support of PROFINET and EtherNet/IP enabled the System Integrator to retrofit robots in an identical way, but with different programmable logic controllers (PLCs). The LioN-P module helped simplify the robot cabling and further reduced costs by standardizing the cabling of all the robots to Ethernet or M12 power cables.

With the changeover to PROFINET, the customer applied the latest PROFINET specification, whereby the M12 Power has already been defined. The customer gained a significant advantage for the use of M12 power from 2 x 16A compared to 2 x 9A at 7/8" by higher conductor cross sections. A length expansion of a maximum of 17 m at full power compared to a maximum of 10 m can be achieved.

Therefore, robot cells can be built with greater flexibility. For further cost efficiency, the selected M12 L-coded connector can be used for both EtherNet/IP and PROFINET, where before two products (4-pole 7/8" power for EtherNet/IP and 5-pole 7/8" power for PROFINET) were required.

Simplicity of installation was an added benefit of the smaller, lighter Belden solution. In addition the smaller cable diameter further reduced the weight.

The LioN-P module – with PROFINET Conformance class-C V2.3 as well as Netload Class III and metal housing – enables robots to achieve higher availability by securing for the highest network load and providing resistance against harsh environmental conditions. Thanks to 2A output current compared to the 1,6A output current usually found in the market, the customer also benefited from greater valve control on the robot. Finally, customized diagnostics increased for process data, uniform diagnostic messages and structure between different protocols, and user friendliness reduced training for maintenance staff.



Connectivity solution designed for the needs of welding robots.

Product Details

Lumberg Automation LioN-P I/O modules have the latest M12 power technology, as well as standard 7/8" power technology to offer the newest innovations in standard connectivity design with up to IP69K protection degree and a weight of only 500g.

0980 ESL 303-121

- 8 Digital Inputs and 8 Digital Outputs
- M12 L-coded power supply, 5-poles, 60mm housing
- PROFINET I/O Device

0980 ESL 393-121

- 8 Digital Inputs and 8 Digital Outputs
- M12 L-coded power supply, 5-poles, 60 mm housing
- Multiprotocol (PROFINET/ EtherNet/IP)

0980 ESL 308-121

- 8 Digital Inputs and 4 Digital Outputs
- M12 L-coded power supply, 5-poles, 60 mm housing
- IO-Link Master, PROFINET I/O Device

0980 ESL 398-121

- 8 Digital Inputs and 4 Digital Outputs
- M12 L-coded power supply, 5-poles, 60 mm housing
- IO-Link Master, PROFINET / EtherNet/IP / EtherCAT I/O Device



0980 ESL 303-121

M12 Power Cordset in different versions

The M12 Power Connector opens the world of conventional M12 to high power transmission in a compact design.

- M12 female (male) shielded/unshielded connector with threaded joint and molded cable
- 360° shielding connected to knurled nut
- Rated Voltage of 63 V



M12 Power Cordset

Summary

In the first year, 200+ robots have been retrofitted with the Lumberg Automation solution.

Both automotive manufacturers agree that the benefits of this solution have helped them achieve the standardization they wanted at the project's outset.

Because of this change, they have also seen greater cost savings, better inventory management, easier installation and maintenance and improved global flexibility.

With all these benefits, the concept will be extended to use the multiprotocol LioN-Power I/O module for new robots – up to 3,000 robots will be equipped in the next phases, including an expansion to other shop floor areas, like powertrain.



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Belden Competence Center

As the complexity of communication and connectivity solutions has increased, so have the requirements for design, implementation and maintenance of these solutions. For users, acquiring and verifying the latest expert knowledge plays a decisive role in this. As a reliable partner for end-to-end solutions, Belden offers expert consulting, design, technical support, as well as technology and product training courses, from a single source: Belden Competence Center. In addition, we offer you the right qualification for every area of expertise through the world's first certification program for industrial networks. Up-to-date manufacturer's expertise, an international service network and access to external specialists guarantee you the best possible support for products.

Irrespective of the technology you use, you can rely on our full support – from implementation to optimization of every aspect of daily operations.



Always Stay Ahead with Belden

In a highly competitive environment, it is crucial to have reliable partners who add value to your business. When it comes to signal transmissions, Belden is the No. 1 solutions provider. We know your business and want to understand your specific challenges and goals to show how effective signal transmission solutions can push you ahead of the competition. By combining the strengths of our five leading brands, Belden, GarrettCom, Hirschmann, Lumberg Automation and Tofino Security, we are able to offer the integrated solution you need. Today, it may be a single cable, switch or connector, to solve a specific issue; tomorrow, it can be a complex range of integrated applications, systems and solutions. With the rise in smart, connected devices brought on by the Industrial Internet of Things (IIoT), together, we can make sure your infrastructure is ready to handle and make sense of the influx of data. Transform your business now with instant access to information, and make your vision a reality. Visit info.belden.com/iiot to learn more.

About Belden

Belden Inc., a global leader in high quality, end-to-end signal transmission solutions, delivers a comprehensive product portfolio designed to meet the mission-critical network infrastructure needs of industrial, enterprise and broadcast markets. With innovative solutions targeted at reliable and secure transmission of rapidly growing amounts of data, audio and video needed for today's applications, Belden is at the center of the global transformation to a connected world. Founded in 1902, the company is headquartered in St. Louis, USA, and has manufacturing capabilities in North and South America, Europe and Asia.

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