

# Automotive manufacturer retrofits robots with LioN-Power I/O modules

Application Note



- ››› 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 our customer upgrade their **technology without changing the robot design**. As a result, all cost-saving targets were achieved.

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

## Project overview

Together they devised a plan to retrofit robots with a streamlined concept, using a Belden solution to replace controller cabinets with Lumberg Automation IP67 I/O modules and cabling cordsets, with the goal of deploying the solution across their factories in Asia and Europe.

## The challenge

The goal of the project was to standardize the design for the robot control system by upgrading from PROFIBUS to PROFINET, while also working with different Ethernet protocols. The solutions would then be implemented in proprietary factories and alliance partner sites, resulting in significantly reduced costs.

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 the smallest, lightest I/O modules on the market
- Use metal housing that could resist welding sparks, vibrations (15g) and shock (50)
- IO-Link support for future applications
- Netload Class III
- Customized diagnostic

## Why Belden?

Belden delivered cost-effective LioN-P I/O modules and a complete connection solution with the versatility to meet the needs of different robotic applications for both companies.

- Belden had a strong, 20-year customer relationship and proven product installations with one of the partnering manufacturers
- Belden is an industry leader with an I/O module that supports both PROFINET and EtherNet/IP in the same device to meet customers' needs across multiple protocols and regions
- Technical collaboration for the improvement and adaptation of the products according to customer needs

## Belden's complete connection solution

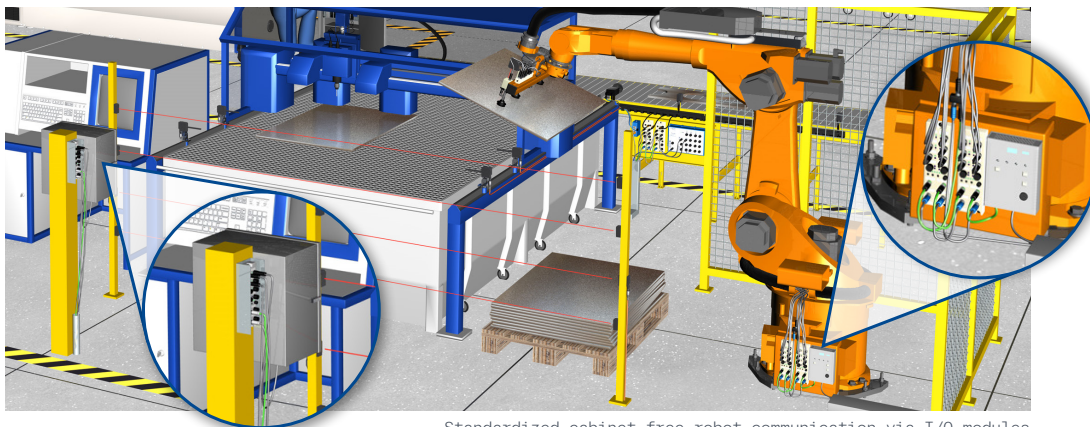
The new concept includes up to three Lumberg Automation I/O modules per robot, with at least one I/O module for the "patch bay" at the chassis of robot and one I/O module to connect to the new IP67 robot controller station.

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 switch to PROFINET, the customer was able to apply 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  $2 \times 16$  A compared to  $2 \times 9$  A 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. Using the smaller, lighter Belden cabling solution further reduced the weight and had the added benefit of easy installation. 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 2 A output current compared to the 1,6 A 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, provided uniform diagnostic messages and settings between different protocols. User-friendly design reduced training for maintenance staff.



Standardized cabinet free robot communication via I/O modules provides significant savings in installation and maintenance

## Product details

### 0980 ESL 303-121

- LioN-P, I/O Standalone, PROFINET, 60 mm
- 8 digital input and 8 digital output channels
- 2 x M12 L-coded power supply

### 0980 ESL 393-121

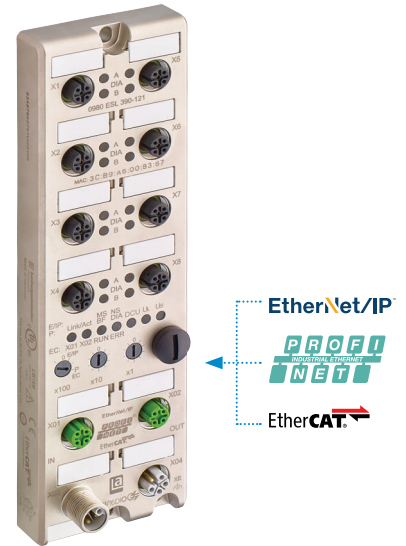
- LioN-P, I/O Standalone, Multiprotocol (PROFINET, Ethernet/IP and EtherCAT), 60 mm
- 8 digital input and 8 digital output channels
- 2 x M12 L-coded power supply

### 0980 ESL 308-121

- LioN-P, IO-Link Master, PROFINET, 60 mm
- 4 digital input and 4 digital output channels and 8 IO-Link Master
- 2 x M12 L-coded power supply

### 0980 ESL 398-121

- LioN-P, IO-Link Master, Multiprotocol (PROFINET and EtherNet/IP), 60 mm
- 4 digital input and 4 digital output channels and 8 IO-Link Master
- 2 x M12 L-coded power supply



LioN-P, I/O Standalone, Multiprotocol

## M12 Power Cordsets in different versions

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

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



M12 Power Cordsets, L-coded



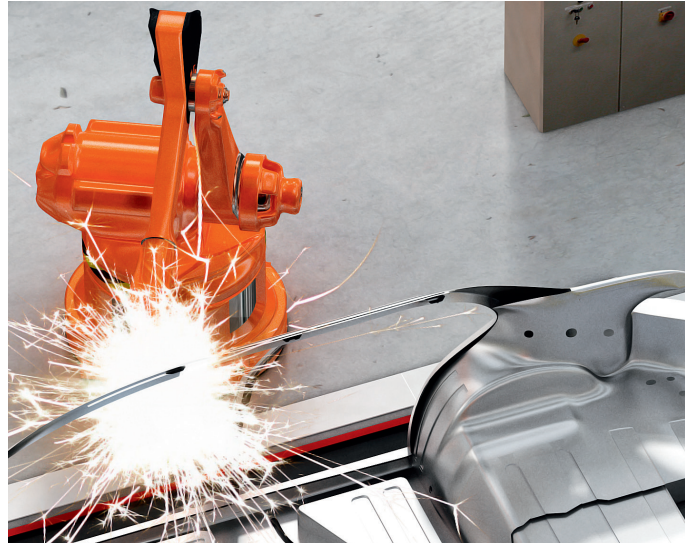
## Summary

More than 200 robots were retrofitted with the Lumberg Automation solution in the first year.

Both manufacturers agree that this complete connection solution has helped them achieve the project's standardization goals.

The change has yielded greater cost savings, better inventory management, easier installation and maintenance, as well as improved 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.



Connectivity solution designed for the needs of welding robots

# About Belden

Belden Inc. delivers complete connection solutions that unlock untold possibilities for our customers, their customers and the world. We advance ideas and technologies that enable a safer, smarter and more prosperous future. Throughout our 120+ year history we have evolved as a company, but our purpose remains – making connections. By connecting people, information and ideas, we make it possible. We are headquartered in St. Louis and have manufacturing capabilities in North America, Europe, Asia and Africa.

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