Value Added IO-Link Solution Partner

Turck has already implemented IO-Link solutions for its customers in many fields of application and for various industries. Here we present two case studies.

Case study gear production

Several magnetic field sensors on the production line of the differential gears detect the position of piston chambers and clamps, while proximity switches detect direct components of the differential themselves. There are also many actuators such as air valves, solenoid valves and other devices, which perform the commands of the controller.

The initial plan to connect the signals of sensors and actuators to the fieldbus gateways in the control cabinet using passive junctions and multicore cables, was quickly discarded. The costs of the cable lengths and the extensive wiring effort involved had a negative effect on the overall cost. Turck could offer a space saving IO-Link solution that simplified the wiring of the production workbenches. The system also allowed the implementation of diagnostics right down to the sensor level.

Turck offered a BL20 Profibus gateway in conjunction with IO-Link master modules. Turck's IO-Link compatible TLB junction boxes are ideal for connecting the sensors and actuators in the field. These IO-boxes use IO-Link to bring up to 16 binary signals to the IO-Link master via a standard sensor cable. The 16-bit process signal of the IO-Link protocol is therefore not used for an analog process value, but for transferring 16 individual switch signals for digital input or output signals. As the TLB I/O hubs offer protection to IP67, they can be mounted directly in the field as close as possible to the sensors and actuators. IO-Link is a digital protocol that allows the use of standard three-wire cables, which eliminates the need for any expansion shielding and lengthy cable commissioning.

This network structure, consisting of IO-Link gateways and TLB I/O hubs, is one of the most cost-effective solutions for the fieldbus in the control cabinet. Even with rapid movements and the resulting centrifugal forces, the sensor reliably supplies the exact position of the positioning element via the 4…20 mA analog signal. The controller can determine from this the exact position of the arm at any time.

For safety reasons, the manufacturer also wanted the possibility to indicate any failure of the positioning element and output this signal on the controller. Here the sensor was able to impress thanks to its ability to be parameterized via IO-Link. The IO-Link interface allows the user from the controller to define the measuring ranges, invert the output signal or simply output special signals like the failure signal. The controller recognizes this special condition and shuts down the ride according to a stored safety routine.

Case study roundabout ride

In order to determine the horizontal position of the arms of a roundabout ride, the manufacturer previously used five sensors on each hydraulic lift cylinder. Although this ensured safe operation, the installation of the sensors and their adjustment was relatively complex. Any misalignment of the sensors could not be determined exactly at any time.

Today, Turck’s Li linear position sensor measures the travel of the hydraulic cylinder up to a total length of 1,000 millimeters. Even with rapid movements and the resulting centrifugal forces, the sensor reliably supplies the exact position of the positioning element via the 4…20 mA analog signal. The controller can determine from this the exact position of the arms at any time.

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## IO-Link – Simple, Seamless, Efficient

**What is IO-Link?**

IO-Link is based on a point-to-point connection between the sensor/actuator and an interface module. Up to now, the linear connection was only designed for transmitting switching information, but IO-Link now allows two systems to be transferred easily and resource-saving, including switching status and data channel. Other information can be exchanged in addition to the process values, such as parameters or diagnostic messages. The enable communication with sensors and actuators down to the ‘fast relay’ to be established for universal communication.

### Standard wiring

IO-Link does not require any special wiring. The sensors and actuators can continue to be connected using the proven, attractively priced and weatherproof industrial three-core cable. The operating modes available for selection are the standard switch mode and the communication mode.

### Your benefits

- **Reduced machine costs**
- **Faster tool change operations**
- **Improved machine availability**
- **Comprehensive status information and diagnostic capabilities**
- **Enhanced information**

### Engineering tool integration

Standardized interfaces (DI/DO/DDD) implement information exchange and seamless integration into engineering tools. Furthermore, integration into standard PLCs as well as management or configuration tools is also made available. Connections into enterprise networks can be achieved using standard Ethernet mechanisms.

### Device identification

Integrated device identification ensures that in the case of component replacements the correct device has been installed. Each device contains detailed information regarding manufacturer, type etc., component replacement can be safely handled automatically.

### Wiring

IO-Link uses the same standard unshielded 3-core cables with standardized plugging as conventional I/O. This eliminates problems with complex devices which have no pre-configuration or programming is no longer necessary.

### System expertise in IO-Link

Turck is going to provide not only one of the most comprehensive IO-Link portfolios worldwide. From a variety of sensors, cables and junction boxes to programmable fieldbuses and Ethernet solutions, but also a distinctive system expertise in IO-Link. Take advantage of Turck’s long-term experience in this technology, the resulting product portfolio and the user-friendly software support.

### Plug&Play device integration

The settings of all Turck over IO-link devices are now integrated in the station-GSDML-files of the TBEN IO-link masters. This simplifies significantly the parameterization or programming is no longer necessary.

### Improved machine availability

- **Comprehensive status information and diagnostic capabilities** in the plant to drastically reduce machine downtimes.
- **Enhanced information** enables cost saving mechanisms such as predictive maintenance or asset management to be easily implemented.
- **Device replacement without manual intervention** to parameterize the new unit alleviates the need for qualified personnel.

#### Ethernet/Fieldbus connection

IO-Link allows connection to all major fieldbuses, as well as Ethernet. Turck offers solutions for the whole range, from master machines for EtherCAT and PROFINET to EtherCAT gateways and PROFINET IO connected IO modules, thanks to the automatic protocol detection function.

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**Display and switch requirements on devices**

- Reduced maintenance costs due to intelligent multi-purpose devices
- Only one IO module and one inexpensive standard cable required
- Reduced IO hardware swapping
- Displays and switches no longer required on devices
- Reduced engineering and assembly costs and automatic documentation of device parameters during the engineering phase

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**Efficient processes**

- Enhance parameterization options for just in time parameter changes to devices
- Efficient processes requiring different parameter sets for switching thresholds, gain sensitivity and so forth due to differing production conditions
- Faster tool change operations

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**Ethernet/Fieldbus connection**

- Allow the integration of standard 24 VDC devices into automation systems via IO-Link with Turck I/O hubs. Variants for inputs and outputs are currently available, a version with universal digital I/O is under development.