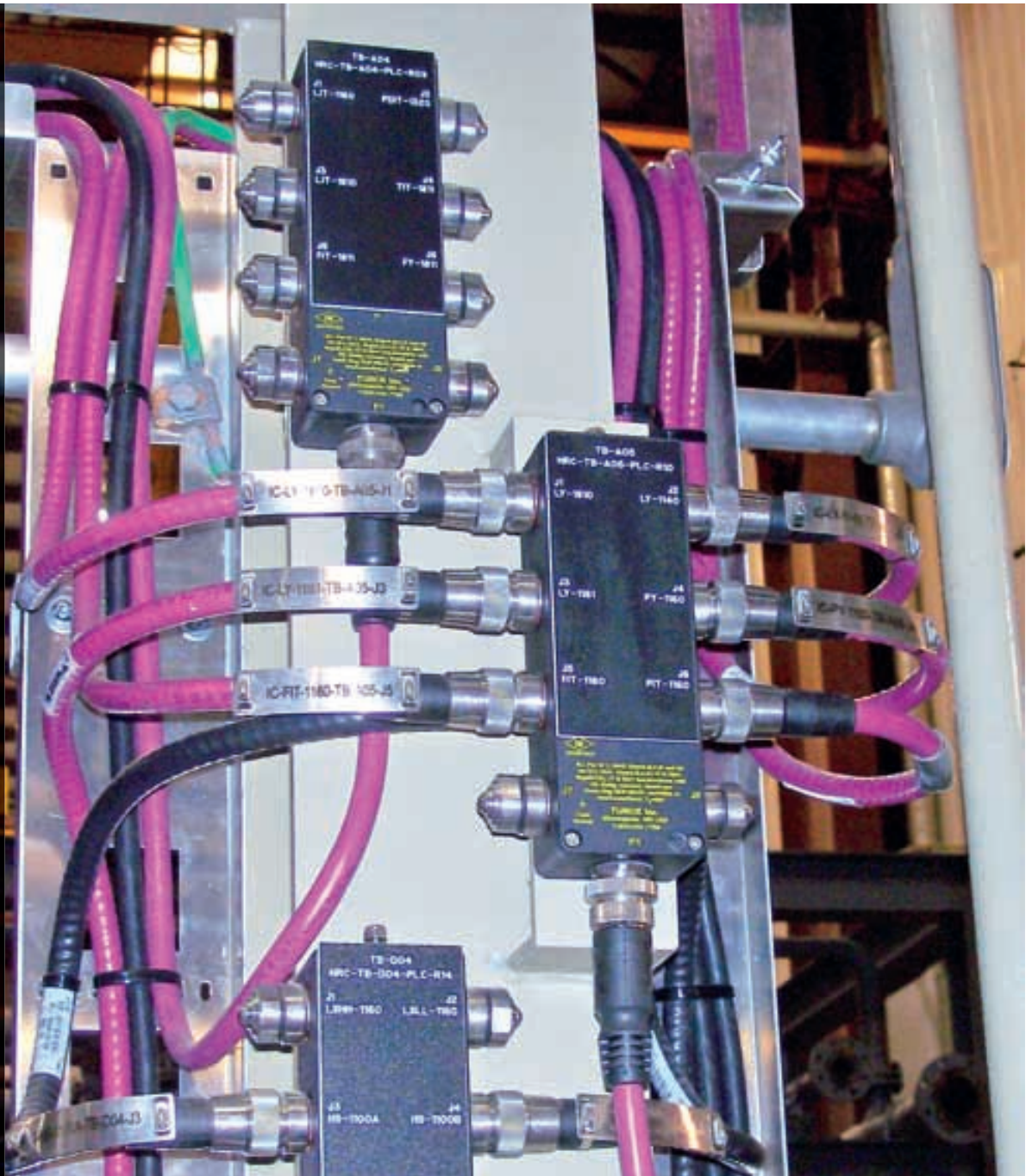


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Enerflex chose
Turck's armored
8 port process
junction blocks
with 7/8"
connectors

User www.enerflex.com

Plug & Work

Turck's hazardous area quick disconnect wiring system and the BL20 remote I/O system support the modular concept of Enerflex's production facilities for oil and gas

The Canadian oil and gas company Enerflex, based in Calgary, Alberta, has divisions for both services and products. While the service side lists instrumentation and controls, as well as mechanical services for compression in its offerings, the products side includes oil and gas production processing, compression and environmental services. Enerflex Production and Processing (P&P) is responsible for the

design and construction of complete, ready to commission modular production facilities for the oil, natural gas and chemical industries. Products, such as line heaters, liquid separators and even full amine sweetening and dehydration plants are offered.

Enerflex P&P, located in Nisku, Alberta, has sold products to China, Pakistan, Oman and the United States, just to name a few. When a plant is built in

Quick read

The Calgary based oil and gas specialist Enerflex initially builds its modular production facilities to test the systems and pre-commission the facility, before it will be broken down into container sized loads for shipping. In order to realize the benefits of this modular concept, the Enerflex engineers rely on Turck's hazardous area quick disconnect wiring system and the BL20 remote I/O system.

western Canada and needs to go to Oman or other locations far and wide, it will need to be modular, so it can be broken down into container sized loads for shipping efficiency. Enerflex has been able to design the mechanics of a plant to break down into container sized parts for years using flanges and brackets, but the instrumentation has always been a trade-off.

The company wires the plant in the factory, which allows them to test the control systems and pre-commission the facility, but all that wiring needs to be disconnected from the instruments and rolled back to the points where the modular sections (skids) are joined. This wiring, unwiring and rewiring at the final construction location is time consuming and very costly, when you need to fly skilled manpower around the world and house them in a foreign country while the plant is completed and commissioned. Additionally, there is always the issue of wiring mistakes occurring throughout the process that can delay the startup further, which can cost thousands of dollars and lost production.

Improving the physical layer

Matthias Reissner, lead engineer of the instrumentation design team for Enerflex P&P, is always striving for continual design improvement. That can come from using a new sensor technology to measure flow, pressure or level, but other design improvements are possible starting with something that has been overlooked for years: the physical layer of the plant. Matthias had been looking for a way to improve upon an old and cumbersome wiring system that had remained unchanged for decades. That system was proven and reliable, but

required many man hours to install and did not lend itself to modular construction where components need to be disassembled for transport.

This is where Turck has been able to help. The Turck quick connector system is innovative in that it allows for the use of a rugged connector system to terminate to process instruments in the field and consolidate those signals at a pre-made junction box. From the junction box, a multi-conductor home run cable is installed across skid joints back to a control cabinet. This connector system could solve the issues involved with pre-wiring a facility for testing while gaining the ability to reconnect the system once the component parts were re-assembled at the final production site.

This type of quick disconnect wiring has been in use in factory automation for years, but only with additional approvals it would be allowed for use in a potentially explosive environment. Turck got both an American and a Canadian approval (FM and CSA) on their connector system. Despite strong competitors for Turck in North America, Matthias says, "The decision to go with Turck was made easy because of the complete line of product, as well as the local technical and sales support available."

The first project started in 2008, when an American oil and gas company wanted Enerflex P&P to build a complete amine gas sweetening facility for processing natural gas. The customer wanted a facility ready to commission within four months. The new amine plant has approximately 300 inputs and outputs including discrete, 4-20mA, RTD's and thermocouples. The facility is laid out into four main groups for hardware and I/O. These units are separated by long distances, which



The connection process takes just minutes and saves days compared to the old method of single point wire termination

Comfortable:
It took less than a day to complete the task of wiring, configuring and pre-commissioning all 70 instruments on the workbench



requires large numbers of signals to be sent over 100 meters back to the PLC. Enerflex convinced them that the Turck system would allow the customer a quicker delivery and less expensive start-up.

Quick disconnect and remote I/O

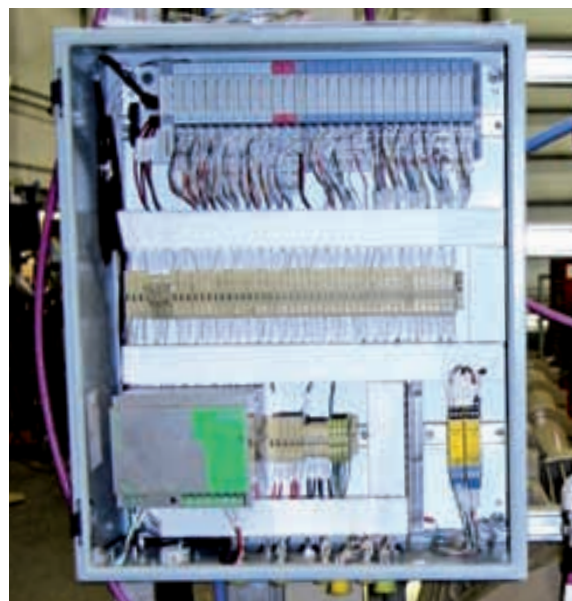
Matthias and his lead process technician Darcy Guderjan decided to use the Turck hazardous area quick disconnect wiring system and the BL20 remote I/O system. BL20 is a cost effective and easy to configure system for process remote I/O solutions in hazardous locations. There are about 150 signals that had to be transferred using a single Ethernet cable back to the PLC from the three remote sections of the plant. They chose BL20 I/O running the EtherNet/IP protocol, which has a worldwide Division 2/Zone 2 approval, to consolidate the

temperature, 4-20mA and discrete signals and send them at 100 Mbps to the PLC.

Another major hurdle to cross was the design of the instrumentation wiring on the four parts of the plant. The design needed to accommodate a large number of signals and still reduce the wiring footprint while maintaining the 20 percent customer specified spare capacity. Turck and the Enerflex design team decided to separate the analog signals from the discrete signals for future identification purposes and to conform with what is standard practice in Canada. Enerflex chose Turck's armored 8-port process junction blocks (P-8 RKFV 40-CSV19) with 7/8-inch connectors. They also chose a tray-rated 8 twisted shielded pair cables for signals from the junction blocks to the PLC cabinet and armored single twisted pair cables to connect from the junction block to the instruments.



The instruments are connected to the junction block with armored single twisted pair cables



With Turck's BL20 I/O system about 150 signals are transferred via EtherNet/IP to the PLC

The bottom two ports on each junction block remains open to serve as a 25 percent spare capacity for future use. If needed, the two spare ports could be wired back to the PLC cabinet and could be accessed very quickly, as the wiring is already pre-terminated onto the PLC. This use of pre-made junction blocks reduced the wiring footprint and the amount of cable tray required. There is no longer the need to run all the cables back to the PLC individually, but instead what used to be 8 wires has been combined into one single cable. Because of the small size of the home run cable receptacles, the size of the PLC cabinet, where all the signals eventually terminate, was also reduced, resulting in an additional cost saving.

Wire up on a workbench

For the connector in the instruments, Enerflex chose Turck's CSA and FM approved explosion-proof feed-through receptacles. The advantage of having a connector at the instrument was that Enerflex was able to pre-wire and configure all 70 transmitters before they ever went onto the piping. It was much easier and safer to wire and test an instrument on a warm workbench than out in the cold Canadian winter at -40 °C while 5 meters up a ladder. The efficiency of this process was evident in that it took less than a day to complete the task of wiring, configuring and pre-commissioning all the instruments.

The new system meant that cables had to be measured and ordered based on calculations done with the aid of a new engineering software tool used for drafting layout drawings. Enerflex could not wait for the electricians to measure the finished skid and have the Turck factory in the United States build the desired cables. This process of using the new software design tool was successful with a less than 1 percent error rate. The new cable measurement system worked and the cables were installed with limited difficulty and on time.

The installation of the wiring on the skid went quickly and is easy to trace and troubleshoot. The BL20 remote I/O was configured using Turck I/O Assistant software before it was installed in the remote I/O panels. Once installed in the panels, the instruments were terminated and tested with I/O Assistant before they were connected to the PLC for commissioning. BL20 reduced the cable count and cost significantly compared to conventional point to point wiring.

The PLC cabinet with the Turck home run receptacles was built in a different city and shipped to the Enerflex site to install onto the main skid. When the home run cables from the Turck junction blocks were connected to the PLC cabinet, the commissioning could begin. This connection process took minutes and saved days compared to the old method of single point wire termination as signals were run from transmitters.

Once the wiring, PLC programming and plant commissioning was completed at the Enerflex factory, the entire skid was broken down into smaller sections for shipping. This meant that the home run cables from the junction blocks were disconnected and rolled back to the skid break point and capped off for transport. Once onsite and reassembled by local workers, the process of testing all the signals was very short because of the keyed nature of the connectors. These keyed connectors meant that the job was done with no mistakes, further increasing efficiency and reducing onsite expenses.

Satisfied customer

After the initial two plants were installed in 2008, there have been three other virtually identical plants ordered, all with the Turck hazardous area quick disconnect system specified by the customer. Enerflex was able to increase the productivity of their factory floor by doing multiple parts of the construction process in parallel, as well as provide their customer with a superior product for commissioning and ongoing maintenance. ■



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Matthias Reissner,
Enerflex



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