Plug & Play Industrial Ethernet Connectivity for Oil and Gas

Robust fiber optic cable and connectors such as an advanced DIN rail enclosure enable oil and gas operators to connect communications and control devices.

The recent Santa Barbara, Calif., oil spill is yet another example of the need to monitor and control pipelines to prevent breaches that could endanger life and property for hundreds of miles overland and along coastlines. According to the Los Angeles News Group (June 10, 2015), the spill of more than 100,000 gallons of oil resulted from the failure of monitoring equipment to detect leaks in a corroded pipeline and to automatically shut off valves supplying the oil.

To protect infrastructures against such disasters, promote worker safety and facilitate automated functions ranging from drilling to wellhead operation and transport pipelines, oil & gas operators are increasingly turning to fiber optic cable suppliers for "end-to-end" communications and control solutions. Many such solutions include ruggedized cable and connectors that ensure survival of fiber-based DCS/PLC automation/control architectures for onshore and offshore oil and gas operations, even in the harshest environments.

Integrating the DIN rail enclosure

As fiber optic cable emerges as the medium of choice in many industrial arenas, the DIN rail enclosure plays an increasingly important role. Mounted to a standard DIN rail – the metal rail used to mount various electrical components (e.g., terminal blocks, motor starters, circuit breakers) in a control cabinet - a DIN rail enclosure provides a central location where external and internal wiring can be connected quickly and efficiently.

"This type of enclosure is ideal for production applications, the industrial automation side of businesses," says **Stephen Porach**, PE, RCDD, Sr. Manager of Business Development, Enterprise Solutions at Optical Cable Corporation (OCC), Roanoke, Va. "Today the oil & gas industry is turning from highly proprietary communications systems to the more enterprise-wide prevalent Ethernet communications protocol via fiber optical cable. The appropriate DIN rail enclosure provides an optimal connection for fiber cable that can be terminated in a fixed position."

Mr. Porach explains that the Ethernet protocol allows products from various manufacturers to talk to one another, making the system less proprietary and costly. Also, fiber cable won't cause an electrical spark, another advantage that makes it ideal for many oil and gas applications, particularly in the field.

Porach adds that OCC has developed a new, ruggedized line of DIN rail enclosures to provide highly secure terminations within a wide variety of industrial applications even in the most adverse environmental conditions. Available for both fiber optic and copper applications, this type of enclosure is very easy to install and provides very simple patching for the connection of all those automation components in a patch field for the industrial automation environment.

This enclosure can also be ordered as a complete assembly including connectors and fiber optic cables that are pre-terminated at the factory. These assemblies are built according specifications that will meet the environmental demands of any application – whether noise from electric motors, highly flammable conditions or extreme temperatures – thereby providing a highly reliable, integrated DIN rail solution.

"Companies in the oil & gas industry are placing this enclosure into a cabinet located in the automated 'driller's cabin' on their rigs, where one person monitors drilling controls, automated pipe handling controls, computer hardware and data processing systems in single room on the rig," says **Phillip Hoyle**, OCC Business Development Specialist. "From there they'll connect them to the HMIs and PLCs and other systems. Typically the enclosure would be placed next to the PLC, and then has a 6, 12, or 24-fiber connection there."

Military-grade connectors and adapters may be required for some applications. These products feature non-optical disconnect, black anodized brass or stainless steel configurations that can withstand extreme temperature change, shock, vibration and corrosion.

Hoyle adds that there is high interest in this type of DIN rail enclosure among refineries and petrochemical plants. “They are bringing in pre-terminated MTP® assemblies and connecting a 12-channel MTP into a closet so they can break out their connections to PLCs that continuously monitors the state of input devices,” Mr. Hoyle explains.

End-to-end reliability needed

With or without a DIN rail enclosure termination, fiber optic cable systems for the oil & gas industry must often include ruggedized or even military-grade cable and connectors.

“Typically, in the oil fields our customers select an armor-based cable,” says Mr. Hoyle. “This type of cable is designed specifically for extreme environmental conditions- temperature, humidity, ice, fungus, and fluid immersion. The cable contains MIL [military grade] type of fiber, which is has a bronze braid and is double-jacketed. This top jacket may be a flame-retardant or a low smoke, zero halogen jacket. This type of cable is designed to provide extra protection when you’re out in the oil field in an area where heavy objects may be dropped on cables, or there is danger of the cable becoming sliced or nicked by sharp surfaces.”

For pipeline applications, where sensing and communications capabilities are critical, oil & gas companies are increasingly deploying ruggedized fiber optic cable and DIN rail enclosures to interface with communications devices.

“This enclosure is an ideal way to interface with communications devices that are interfacing with other communications devices,” Mr. Hoyle explains. “You can run a fiber cable and have it break out at a point, a communications pod, for example, then bring the fiber in and have it split off to some communications devices and then go back out with the cable.”

As far as pipeline cable is concerned, it is normally tough enough to withstand temperature extremes and/or heavy moisture. If vermin such as rodents are concerned, fiber cables are available that provide suitable protection; for example, OCC offers ruggedize cables with a layer of fiberglass protection underneath the outer jacket. When a rodent starts chewing on the cable, the fiberglass starts to splinter in its mouths and cause the animals back off.

In addition to having fiber optic cable with appropriate protection, oil & gas producers need to have cable connectors and adapters that can withstand temperature extremes and many types of stresses, enabling systems to run and data to flow regardless of the harshness of the environment.

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“Selecting the right fiber cable and connectors often requires a consultative process between customer and supplier,” explains Mr. Hoyle. “In our case, business development specialists like me will consult with an engineer, project manager or application specialist within the customer’s team. We’ll usually talk through the application and surrounding requirements. The next step is to provide a quote for the application, and review it step by step with the customer. In some cases we may provide the customer with a prototype or sample for testing processes. But whatever the solution, it is vital to ensure that it is end-to-end.”