

Small-form-factor Ultrasonic Sensor for BOP Equipment for Real-time Monitoring

Teledyne Impulse

Background

The scope of this technology is the use of an ultrasonic position sensor to measure the position of a piston in a Blowout Preventer (BOP) through a control fluid. This unit utilizes existing Teledyne dry-mate technology to carry position data back to signal processors in the customer's control system for real-time monitoring. The developed sensor assembly is capable of operating with an internal BOP pressure of 5,000 psi, and a maximum survivable pressure of 19,400 psi. The jumper-level solution utilizes a PBOF jumper to a Teledyne Impulse API16D connector.

What were the project challenges?

The largest challenge was developing this solution with a very small footprint for use in new and legacy BOP's. Other challenges included the customer having to develop custom control software. This new software required Teledyne to become competent with the customer's system to assist in troubleshooting issues with the electronics.

What were the innovative technical solutions available for the project team?

Cameron previously employed Teledyne to develop an optical position sensor, which was eventually deemed too costly for their BOPs. Currently, other BOP manufacturers use alternate measurement technologies, such as LVDTs. Optical position measurement technology is being explored for use in other equipment where ultrasound may not operate as desired.

Interconnect

Product:
Dry-Mate Interconnect
with PBOF Hose

Application:
Blowout Preventer (BOP)

Client:
Cameron



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What was the final engineered technical solution:

The final engineered solution utilizes a 6-way dry-mate connector that is integrated with a 4-wire RTD ultrasonic transducer, for automatic temperature calibration. The ultrasonic assembly is integrated with a PBOF jumper and interfaces with customer equipment using a Teledyne Impulse API 16D dry-mate connector. Design iterations between development phases have minimized the housing length to just 3.5 inches.

What were the benefits of selecting this particular approach/solution compared with the others proposed?

Ultrasound provides benefits with its simple concept application with lower initial cost than other options. The interface used with the ultrasonic transducer requires only a single modification to customer equipment, further reducing the system cost structure. Ultrasonic sensors also have applications in other equipment the customer manufactures. Future improvement to the technology can be achieved with software upgrades, which is a cost saving opportunity for the customer. Understanding implications of using ultrasonic transducers coupled with our connectors has enabled us to be knowledgeable and comfortable with utilizing them in other potential new developments.

Highlights:

- Ultrasound provides benefits with lower cost than other options
- Teledyne developed a low-cost ultrasonic transducer assembly with a small footprint to detect sensor position in a Blow Out Preventer

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