

LSU Yard Tests Verify Third-Party Communication Capability of LPAC

THE PROBLEM

No system existed for controlling low well pressures in MPD/UBD applications with the capacity for third-party software control.

THE SITUATION

M-I SWACO launched an R&D effort to develop a specialized choke control system for MPD/UBD. The system would have third-party control capabilities.

THE SOLUTION

The result of the R&D project was the LOW PRESSURE AUTOCHOKE CONSOLE (LPAC), which was verified in lab tests at Louisiana State University System based on AUTOCHOKE* technology. The LPAC was designed with Modbus TCP third-party communications control.

LPAC Third Party Communication Verification

The Situation

M-I SWACO noticed a need in the industry for a specialized choke control system specifically for Managed Pressure Drilling (MPD) and Underbalanced Drilling (UBD) applications. It was critical that any system developed have the capability to be controlled by third-party MPD software solutions.

The Solution

The subsequent R&D effort resulted in the development of the Low Pressure AUTOCHOKE* Console (LPAC). The LPAC is new technology based on the already existing AUTOCHOKE. The LPAC provides clients a simplified, technologically advanced, and cost-effective method to control the relatively low well pressures of MPD and UBD applications. The LPAC was developed to deliver an economical solution for controlling back pressure on wells lower than 1500 psi within an operating window of +/- 50 psi. The LPAC employs Modbus TCP capabilities to allow communications and/or control with third-party devices. The unit can send or receive Hydraulic Set-Point, Casing and Drill Pipe Pressures, SPM, and Strokes. A critical safety feature of the LPAC is the built-in arbitration scheme that allows the logical transfer of control between the current controller and the device requesting control.

The Results

The effectiveness of the new LPAC technology was verified in multiple yard tests at Louisiana State University's Petroleum Engineering Research and Technology Transfer Laboratory. The tests confirmed the capability of the LPAC to interface with third-party customer software. The LPAC consistently managed casing pressure at the client's desired set points to within +/- 50 psi, while simulating the pump ramp up and ramp down conditions seen regularly on wells during connections.

THE RESULTS

Consistently managed pressure within +/- 50 psi.

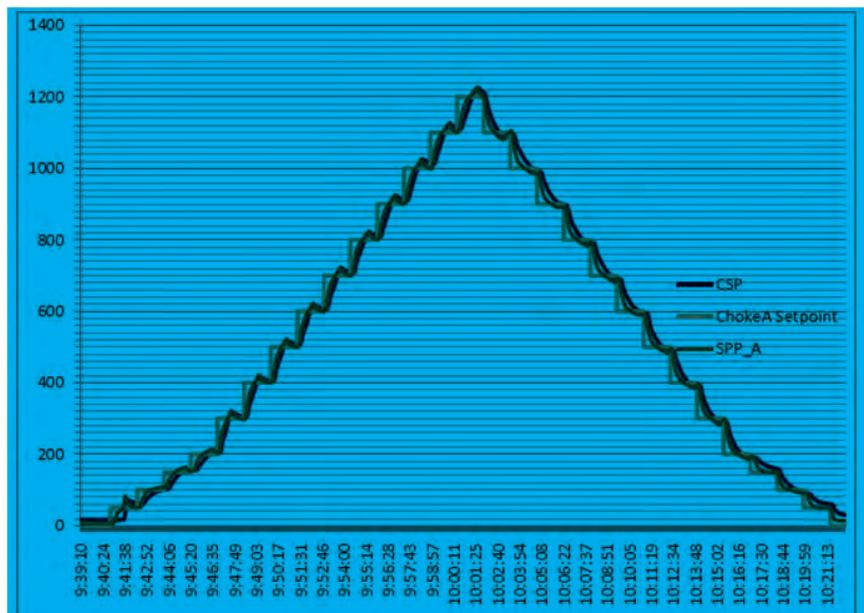
Exhibited 20 psi offset between SPP and CSP.

Confirmed capacity to interface with client software.

Verified as safe low-pressure control mechanism.

The Details

As illustrated in the following graph, a step test using Electronic Control with third party input was performed, sending new set points to the LPAC at a range from 50 to 1200 psi. This test was carried out on the LSU short well of 5280 ft (1609 m) and the pump running at 60 gpm. An offset of approximately 20 psi is noted between the Set Point Pressure (SPP) and the Casing Pressure (CSP). This offset exhibits hysteresis, with CSP lagging the SPP. The CSP consistently is lower than the SPP on ascending pressures changes and higher on descending pressure changes. This behavior is attributed to the mechanics of the AUTOCHOKE, but is superior to the responsiveness of other chokes on the market. SPP had a consistent ramp up and overshoot of around 20 – 30 psi during each increasing step change and then would settle down to approximately the Choke A Setpoint value. The reverse was true on the descending side.



Questions? We'll be glad to answer them.

If you'd like to know more about the new LPAC, please call the M-I SWACO office nearest you.

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