

A new Approach to Annulus Pressure Monitoring: Improving Data Reliability and Well Integrity, while Reducing Lifecycle Costs

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Abstract

Well Integrity Management is now recognised as a critical activity by all oil and gas OPCO's. The key data used to identify well integrity problems is annulus pressure. Consequently, it is vital that reliable annulus pressure data is available on every well. This white paper discusses the downsides with the traditional approach, and describes a new field proven technology, which addresses them. When CAPEX and lifecycle OPEX are taken into consideration, the new system can also deliver cost savings.

Downsides to the Traditional Approach



Typically, to monitor annulus pressure, a pressure gauge is installed on an instrument flange, with either 1 or 2 gate valves between it and the wellhead side outlet / annulus.

This configuration is sub-optimal for a number of reasons:

- The grease that is used to maintain the gate valves, often creates a blockage between the gate valve the gauge, rendering the gauge data very unreliable.
- There are CAPEX and OPEX costs for gate valves purchase and maintenance.
- The non API 6A gauge, is a flimsy, 'weak-link' in an otherwise robust well barrier envelope, it is very susceptible to accidental damage and only offers a single barrier to a pressurized annulus.
- Since the gauge used is not API 6A rated, to limit the time it is part of the barrier envelope, OPEX is incurred opening and closing the gate valves.
- The gauge often has to be manually read. This incurs OPEX and also introduces the risk of human error.



N.B. Even in today's 'i-field' projects, the first 4 of these points are not addressed.

Benefits of the 'VR Sense' Solution



A new solution (PTC's VR Sense) is now being widely used, which addresses all of the challenges listed above.

It takes advantage of the threaded profile (known as the VR profile), which is machined into the side outlets on every wellhead. The VR profile is where a VR plug would be set, to facilitate safe removal or testing of the gate valve.

The VR Sense solution, employs a 'Smart' VR plug (API 6A equivalent specification) incorporating a pressure / temperature sensor. It delivers the following benefits:

- The need for the gate valves is eliminated
 - Eliminating the possibility that gate valve grease will make the data unreliable.
 - Saving CAPEX / OPEX.
- When the VR Sense plug is installed it becomes a robust part of the well barrier envelope. The associated 'API 6A' flanged enclosure provides an independently verifiable secondary barrier in the unlikely event the plug were to leak.
- The data is communicated electronically (wired or wireless). In addition to saving OPEX, this facilitates true continuous monitoring / trending (simultaneous temperature data also adds value here) and reducing the likelihood of error.

