Case Study:

PTC MSAS™ and PTC VR Sense™ Installed Offshore Denmark

Date: *Feb 2024*
Region: *Denmark*

Key Capabilities

- Dual barriers against uncontrolled annulus inventory release.
- Improved protection against wave impacts and dropped objects.
- Continuous Real Time Monitoring of Annulus Pressure and Temperature.

Challenge

The oil and gas field consisting of multiple platforms in the Danish sector of the North Sea has been a major natural gas provider for nearly 40 years. During years in production there has been a natural subsidence of over 5 meters in the seabed, resulting in the topside facilities sinking correspondingly towards the sea level. To revitalise production from the field, it was decided to replace old platforms with new modern ones, extending this air gap.

However, the Wellhead Deck where wellheads, gate valves and related equipment is located and accessed remains on the same level, closer to the sea. Due to improved wave calculation models available and to comply with the company's two-barrier philosophy, the operator seeked to improve the wellhead barrier situation by reducing the outlet footprint to minimise bending moments caused by potential wave impacts and to provide continuous real-time monitoring of their annuli.

Solution

Interwell's PTC Master Surface Annulus Safety (MSAS™) system was installed on the active (gas injection or bleed-off) side of the wellhead. The PTC MSAS™ valve is installed in the threaded Valve Removal (VR) profile incorporated in the body of the wellhead while the Hydraulic Actuator (HAC) is connected to the PTC MSAS™ valve and secured inside the single block gate valve body. The PTC MSAS™ is a fail-safe closed system, which is operated by applying hydraulic pressure to open the system to initiate injection or bleed-off, and removal of pressure to close. The PTC MSAS™ valve becomes the primary barrier towards uncontrolled annulus inventory release, and the gate valve the secondary barrier.

On the passive side of the wellhead, in addition to reducing the outlet footprint and providing a double barrier, the PTC VR Sense™ was installed, providing continuous real-time monitoring of annulus pressure and temperature. The PTC VR Sense™ system consists of a smart VR Plug with a pressure and temperature sensor in front of the plug, which is installed in the threaded VR Profile in the body of the wellhead as the primary barrier, and a testable flange assembly on the outside becoming the system's secondary barrier.

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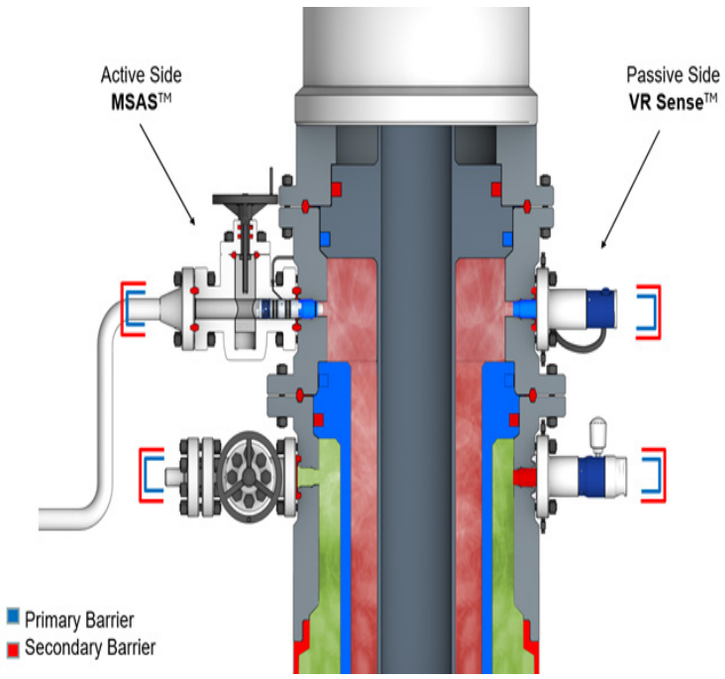
Value Created

Wells equipped with PTC MSAS™ and PTC VR Sense™ on active and passive side outlets of the wellhead provides:

- Effective annulus pressure and temperature management.
- Significant improvements to the surface barrier integrity by moving the barrier envelope from the outlet gate valves on each side to form part of the envelope of the wellhead body.
- Reduced outlet footprint and thereby increased robustness against bending moments caused by wave impacts:
  - On the Active Side of the wellhead; By fitting the PTC MSAS™ inside VR Profile and Single Block Gate Valve.
  - On the Passive Side of the wellhead; By fitting the PTC VR Sense™ inside the VR Profile and Flange Assembly.
- Mitigated risk for uncontrolled annular inventory release by utilising VR Profile equipment by:
  - Reduced likelihood of leaks by reducing footprint (reduced surface area subject to potential impact).
  - Reducing leak time and potential by isolating annular inventory inside annulus if surface impact occurs.
- Reduced servicing and testing of gate valves by reducing or replacing one or multiple valves on each side of the wellhead.
- Mitigated risk of inaccurate pressure readings and leak paths by taking the data from within the wellhead using the PTC VR Sense™ System, rather than passing the pressure through external gate valve flanges, instrument lines and pressure gauges.



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