Quad 204 – Wellhead Integrity Solution

Provision of wellhead integrity systems and development of related installation and rig handling methodology to increase the fatigue life of subsea wellheads. Developed and delivered by Neptune – 100% in-house design and optimisation. Structural and fatigue analysis of wellhead integrity system. In-house engineering, project management, manufacture and testing of a total of 8 systems. Successful deployment of all 8 systems.


Location: Schiehallion Field, Quad 204, West of Shetland, UKCS

As part of their Quad 204 drilling campaign, BP were employing a Generation-6 rig for drilling operations. A need was identified for an Extra Support Sleeve (ESS) to be engineered and manufactured, to improve fatigue life of the existing subsea wellhead under the predicted loading conditions. A further need was identified to engineer and build a Torque and Alignment Structure (TAAS) to transfer loads from connected equipment into the ESS and the wellhead.

Neptune was contracted to provide the ESS solution to support the wellhead. The ESS consists of a fabricated pipe which is welded onto a forged and machined ESS body. The ESS supports the wellhead from the outside and provides additional stiffness to the wellhead. The ESS is attached to the Torque and Alignment Structure (TAAS) which is also engineered and manufactured by Neptune. The TAAS also accommodates cementing equipment.

Our scope of supply included:
- All elements of engineering and project management
- All elements of engineering analysis and fatigue modelling
- Qualification and validation testing for centraliser system
- Factory acceptance testing and finite element model validation
- Technical risk assurance process
- Manufacture of every element of the ESS and TAAS wellhead integrity systems
- Design and manufacture of wellhead lifting clamps
- Management of third-party design verification and assurance process
- Interfacing with client, OEM’s, technical authorities, assurance bodies and rig personnel
- Offshore engineering and technical support with system installation and subsea deployment onboard Deepsea Aberdeen semi-submersible
Figure 1: Cross section of ESS installed into TAAS.

Figure 2: FEA model of ESS & wellhead under loads.
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Figure 3: ESS upper centraliser bank qualification testing (with strain gauges) to demonstrate fitness for purpose and validate simulation models.
Figure 4: ESS being brought onto the drill floor of Deepsea Aberdeen.

Figure 5: ESS & TAAS System being deployed on-board Deepsea Aberdeen.