Magma m-pipe® and IDP system global analysis

Magma has developed a 3in 15ksi m-pipe® IDP (Integrated Deployment Package) system for hydraulic well stimulation, designed for deeper waters that require higher intervention fluid flow rates and pumping pressures.

m-pipe® and the IDP system is a single rental unit, providing efficient pumping for light well intervention from the back deck of a vessel of opportunity , combatting the flow rate, pressure and fatigue issues of coiled tube units.

Growth in hydraulic well stimulation demand

Until recently, coiled tubing has been seen as the solution of choice for light well intervention, driven by a need for fast, mobile delivery. However, subsea well depth and flow rate demands have increased substantially, taking coiled tubing to the limits of its safe capabilities. Coiled tubing is prone to fatigue damage and corrosive fluid attack and it has flow rate and pressure limits, making it far less suitable in depths below 1,500m.

With demand for hydraulic well stimulation growing at 43% a year and now using over 25% of vessel days (Infield), a more effective solution is required.

Magma IDP back-deck system

Despite the obvious cost benefits from the ability to use lower cost vessels, until now the oil industry has had no genuine alternative to small diameter coiled tube units.

The Magma IDP enables hydraulic pumping for deep water wells, providing a reliable high pressure m-pipe® riser pipe with a fully integrated deployment system.

RiserTec validation of the Magma IDP system

- Review and verification of existing Magma global analysis models
- Specific review of deployment in 2,000m (6,500ft) in the Gulf of Mexico
- Design optimisation for catenary and steep-wave riser configurations
- Operational envelope definition and establishing key performance drivers
- Review moonpool clashing, bellmouth sizing, buoyancy sizing & load limits
- Comparison with a representative 2 3/8 in coiled tube system deployment

m-pipe®

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RISERTEC

RiserTec IDP review

RiserTec is an independent design and analysis consultancy, located in Aberdeen (UK) and Houston (TX), and specialising in riser system analysis of all types.

RiserTec completed an extensive independent review and validation of Magma's m-pipe® composite riser and back-deck Integrated Deployment Package, designed for hydraulic offshore well intervention in deep water.

The analysis scope included riser configuration optimisation for a generic 6,500-ft water depth hydraulic pumping application in the Gulf of Mexico, as well as development of a robust and efficient procedure for optimising the riser configuration for future Magma client vessel applications.

Following the riser system validation, RiserTec provided further Magma IDP system recommendations that included control of riser curvature for drift-off and drive-off events, and weak link considerations for emergency disconnect.

RiserTec report results

RiserTec conducted extensive research over a three month period, with analysis of over 40,000 vessel moonpool deployment options for the Magma IDP system, seeking the m-pipe® riser configuration with optimal performance.

m-pipe® catenary and steep-wave configurations were considered by RiserTec and both found to perform well in operation. It was assessed that either configuration could be successfully adopted, depending on project specific considerations. Analysis of 25,000 steep-wave configurations showed a steep-wave arrangement was preferred to a catenary, due to both a more straightforward vertical connection to the intervention skid and emergency disconnection from the skid.

22,000 load cases were assessed for a steep-wave configuration, combining ranges of sea state, current velocity, vessel offset, bow heading, fluid content density and operating pressure. Recommendations were made re control of curvature for drift-off and drive-off events, and system requirements for emergency disconnect.

The report also considered five different multi-service vessels. The optimised configuration was found to provide for uptime operability in excess of 95% for vessel moon pool deployment. It was also revealed that deployment and recovery operations could be performed in over 75% of the environmental conditions reviewed.

RiserTec's operational conclusions on the IDP and m-pipe® were that the system demonstrated suitability for nominal Gulf of Mexico weather and loop current conditions, and better overall performance than 2 3/8 in coiled tube units.

From a commercial perspective, the Magma IDP system has compelling appeal as a hydraulic well pumping system:

- Magma's m-pipe® is light, flexible, fatigue and intervention fluid resistant, and has the high performance and flow rate required to ensure safe, rapid and lower cost intervention in demanding offshore environments.
- The Magma 'integrated package' approach to intervention riser and deployment provides the ability to intervene subsea completions efficiently from a vessel of opportunity, to maximise their ongoing productivity.
- The m-pipe® and IDP system allows for flexible HPHT and high flow rate applications in deep water of 3,000m (10,000ft) and local offshore environments, maximising vessel utilisation and reducing intervention Capex.
- The m-pipe® and IDP system can be rented as a complete intervention package from Magma, on a short-term campaign or annual contract basis, reducing Capex and avoiding multiple intervention campaign contracts.

For more information on rental options for the Magma IDP and m-pipe® system email sales@magmaglobal.com

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