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Monoline Fracturing Fluid Delivery Technology Reduces Connections by 75%

New design promotes system integrity and safety while reducing operating time and wellsite footprint

CHALLENGE

Provide a safer, faster, cleaner alternative to conventional frac iron for hydraulic fracturing.

SOLUTION

Pilot the Monoline* flanged-connection fracturing fluid delivery technology in the Eagle Ford Shale, USA, and British Columbia, Canada.

RESULTS

- Reduced rig-up and rig-down time by 70%.
- Reduced the number of connectors by 75% and 50%, respectively.
- Simplified hookup.
- Minimized potential leak paths.
- Eliminated temporary pipework and mismatched equipment.
- Increased the structural integrity of the entire wellhead by using a single, dedicated line for fracturing fluid delivery.
- Reduced the wellsite footprint.

The Monoline technology, consisting of high-pressure pipe segments joined with 90° elbows and swivel flanges, eliminated multiple connectors.

Conventional frac iron is time-consuming and hazardous

Oil and gas operators use frac manifolds to quickly redirect fluid and isolate wells during multiwell fracturing operations. The resulting near-continuous hydraulic fracturing improves crew efficiency, equipment utilization, and well economics.

The link between the outlet of the frac manifold and the inlet of the frac tree is made awkward by the inherent misalignment between the manifold and the tree in the vertical and horizontal planes. These misalignments are conventionally addressed by "frac iron," which comprises several 3-in or 4-in pipe segments and a goat head joined by hammer union swivel joints.

In addition to being costly and time-consuming to install, frac iron creates a cluttered, hazardous work environment and increases risk of impact damage to the connectors and pipe.

Monoline flanged-connection fracturing fluid delivery technology streamlines operations

To help operators save time and reduce HSE risks, Cameron developed the Monoline technology, which uses a series of high-pressure pipe segments joined together with 90° elbows and swivel flanges. This configuration enables the full three degrees of freedom needed to accommodate the misalignment between the frac tree and frac manifold.

Cameron technicians assemble the Monoline technology at the wellsite.

A four-person crew installed the preassembled system in 2.5–3 hours per well.

The system has many advantages compared with conventional frac iron, including up to 75% fewer connectors, simplified hookup, and a smaller footprint. It uses industry-standard flanges with conventional tools and known recommended torque values—no sledgehammers are involved, minimizing the potential for impact damage. The larger diameter enables increased flow rate while mitigating erosive fluid velocities. The system arrives preassembled at the wellsite, reducing rig-up and rig-down times.

Field trials demonstrate improvement in operational efficiency and safety

In the Eagle Ford Shale, Cameron installed and operated 5⅛-in, 10,000-psi Monoline technology on a two-well pad. A four-person crew installed the preassembled system and subsequently removed it in 9 hours, a total saving of 84 man-hours compared with conventional frac iron. The system used 75% fewer connectors, reduced potential leak paths, eliminated mismatched connections and temporary pipework, and resisted erosion while directing a 4-lbm/galUS maximum slurry density at a maximum flow rate of 80 bbl/min for 23 fracturing stages/well.

In Canada, the Monoline technology was used on two wells of an eight-well pad and standard frac iron was used on the other wells. A four-person crew and one crane again installed the preassembled system and subsequently removed it in 9 hours. The maximum flow rate was approximately 11.5 m^3/min for the 14 fracturing stages/well. The system performed to expectations with no recorded issues or NPT.

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