

Zeta Safety System

Designed to avoid catastrophic buckling and bending failures of well intervention stacks

The Zeta safety system consists of a real-time monitoring gauge and an advanced job design model for well intervention operations.

The system was designed to avoid catastrophic buckling and bending failures of longer and more complex well intervention stacks that we are now seeing in the industry. These tall stacks are more susceptible to bending excitation forces from crane, production riser and platform movements. The failures are costly and could involve human injury and unplanned release of wellbore pressure to the atmosphere.

At present, a judgment call (based on little or no hard data) is made regarding how much lubricator sway or wellhead movement is acceptable, when to add supports or even when to halt operations due to safety concerns. Motion associated with TLPs and spars only compound this problem. The Zeta safety system eliminates guesswork and provides a tool for optimal rig-up configuration.

The Zeta system utilizes a proprietary 3D finite element analysis (FEA) model in combination with highly accurate measurements from fiber optic strain gauges. This approach enables accurate modeling of changing stress levels across the entire riser/wellhead lubricator intervention stack.

The system can be used for pre-job modeling to optimize and verify the safety margin of your job design.

Zeta Model

- Used during pre-job design to optimize equipment selection and ensure safe stack design
- Models entire wellhead/lubricator stack with its supports and applied loads
- Real-time input from the gauge can be used to determine maximum stresses in the stack
- Warning when pre-set stress levels are exceeded
- Calculates:
 - Displacement (motion) of the stack
 - Von Mises stresses in the stack components
 - Vibration frequency of the stack
 - String weight required to buckle or yield the stack
 - Static or dynamic loading in the guy wires or support structure

Zeta Gauge

- 2' lubricator spool built to API requirements
- Uses fiber-optic strain gauges to measure:
 - Axial force
 - Internal pressure
 - Bending moment (left and right)
 - Bending moment (forward and backward)
- Calculates Von Mises stress in the gauge
- Displays force, pressure, moment and stress values
- Communications with the Model software in real-time
- No electricity to the gauge; no certification issues
- Fiber optic gauges are very stable; remain calibrated



Features and benefits

- Cost-effective equipment selection (gimble tables, load frames, lubricator size/material)
- Adequate safety margin for the specific intervention operation
- Optimized rig-up configuration
- Avoid catastrophic buckling and bending failures of the intervention stack
- Eliminate guesswork and unproductive rig time

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