

Subsea Riser Monitoring Using Optical Sensing

Subsea applications such as riser monitoring have long used engineering techniques and practices taken from the space flight and aerospace engineering domains. Both disciplines deal with high-value, mission critical components and systems where failure is not an option. For this reason, risk management dominates all other factors when designing components and operating systems. As the aerospace community has known for years, effective risk management is made possible by collecting more of the right data .



Sensuron's fiber optic sensing system, which has been deployed in space flight and aerospace applications, is also ideally suited for Subsea Riser Monitoring because it enables the advanced collection of real-time tension, torsion, and shape information. Subsea risers are designed to withstand some of the most complex loads and harsh environments that engineers have ever faced. The dynamic nature of the riser, its components, and its environment subjects it to structural stresses, fatigue stresses, material wear, mechanical degradation, impacts, and environmentally induced loads. Due to these and other factors, the ability of sensors and instrumentation to measure the riser's structural response to loads is critical.

Based on distributed strain sensing, Sensuron's fiber optic sensing system provides real-time information on riser loads, shape, and performance, which are all factors that periodic inspections can miss. Real-time monitoring also supports forensic engineering by storing data on actual events as they occur. This capability assists in

determining the 'how and why' of an incident to prevent recurrence – a key element of risk management. So, what can Sensuron's fiber optic sensing systems do for riser monitoring?

Structural Risers: Monitor tension, torsion, and deviations from vertical along the length, as well as reaction forces at the bottom landing and top attachment points.

Top Tension Risers: Monitor riser tension and deviation from vertical and measure loading on heave compensators.

Catenary Risers: Monitor tension along the length and seafloor-to-surface shape of the riser.

Flexible Risers: Monitor tension, torsion, and shape of the riser, whether it is vertical, horizontal, or in a complex shape.

Sensuron's fiber optic sensing system can provide engineers with accurate, real-time data on the riser's strain levels, its shape, and additional residual strains resulting from overloading. Our optical sensing technology provides shape sensing using thousands of distributed sensors to ensure maximum coverage from a single lightweight optical fiber that is somewhat thicker than a strand of human hair. Immune to EMF, RFI, or other electromagnetic influences,



Sensuron's Summit 4-channel system