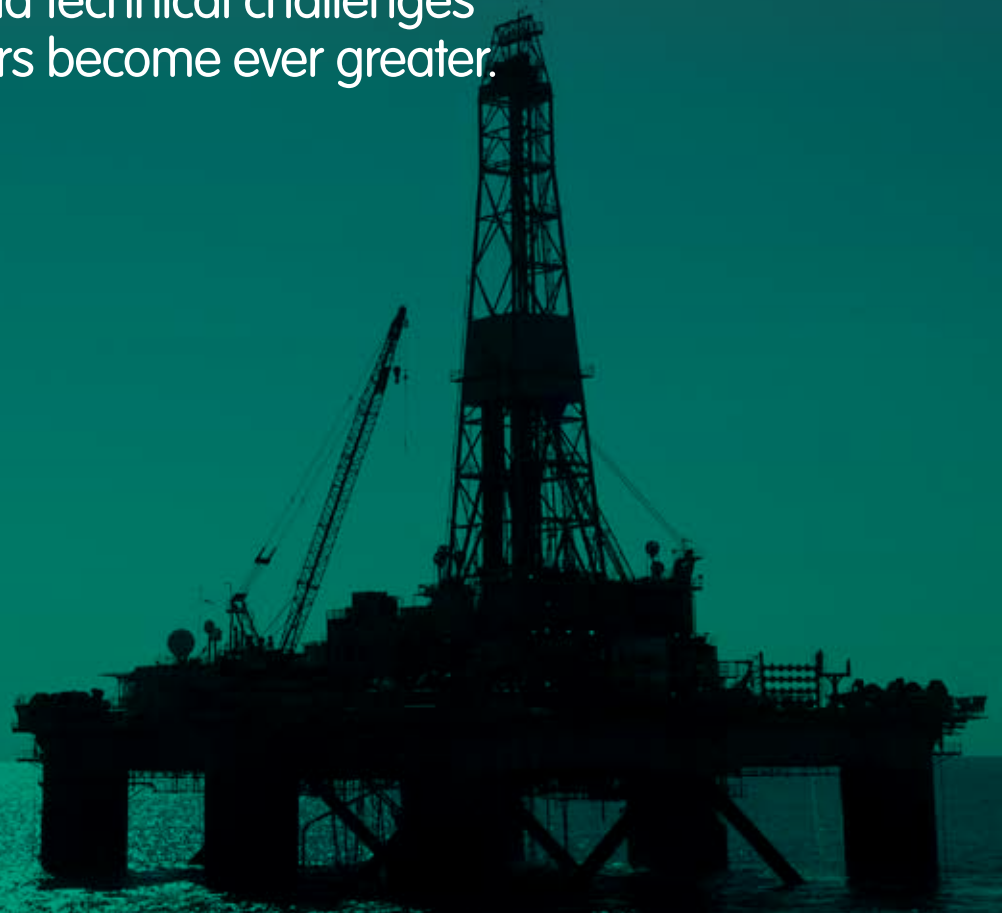


DRILLASSURE™

Drilling riser monitoring system
Enhanced safety. Improved efficiency.

As the search for oil and gas extends into deeper and more difficult environments, the safety, ecological and technical challenges associated with risers become ever greater.



Pulse's combination of hardware, software and installation is helping companies complete these critical subsea operations with absolute confidence.

The **DRILLASSURE™** drilling riser monitoring system provides critical information to support day-to-day drilling operations and longer-term integrity management, through a combination of hardware, software, analytical tools and installation services.

The benefits of **DRILLASSURE™** for you

- **Improved safety** through lowering risk of parting from BOP, reduction in unplanned incidents and maximizing time available in the event of an emergency disconnect situation
- **Greater productivity** by optimising the vessel position, increasing operating windows, enabling longer drilling operations and confidence to drill during high currents with less risk of VIV
- **Longer lifetime** through reduced stress and wear on critical riser components and better understanding of stress and fatigue using accurate modelling based on real-time measurements
- **Increased efficiency** thanks to improved decision making on the drill floor and automated software replacing manual calculations during operations
- **Lower costs** through optimisation of riser inspection programs

How does it work?

The **DRILLASSURE™** system utilises real-time software in conjunction with inputs from sensors on the topside vessel, lower marine riser package (LMRP) and along the length of the riser to provide a fully integrated solution to optimise drilling operations and improve safety.

DRILLASSURE™ provides continuously updated operational envelopes to optimise the drilling vessel position through all stages of the operations (riser installation, operation, etc.) and in a wide range of operating and metocean environments.

At the base of the riser tension (INTEGRICollar™) and lower flex joint angle (INTEGRIPod™) measurements provide critical information to prevent excessive wear, tension or compression on the lower riser joint, LMRP or BOP stack. On request BOP internal pressure, temperature and vibration sensors can also be provided.

On the topside **Pulse** provide measurements from 6 degree of freedom motion sensors, DGPS vessel position, top tension, tensioner stroke combined with flexjoint angle.

On the riser itself a combination of current speed sensors (ADCP), vibration and inclination measurements (INTEGRIPod™) provide information on the shape, movement and tension along the riser to prevent excess bending and fatigue caused by vortex or drilling induced vibration or vessel induced motion (VIV, DIV & DIM).

DRILLASSURE™ can be interfaced with the drilling vessels dynamic positioning or mooring system or as a standalone advisory system. If real time data is required this can be provided to the topside data acquisition system via an acoustic receiver or an existing electrical umbilical system.



System at a glance

- Measures upper flex joint angles and lower stress joint angle
- Displays all relevant parameters on one easy-to-view screen
- Displays real-time operation limits of the measured parameters
- Raises an alarm if measurements exceed limits
- Optimises vessel positioning and joint inspection
- Analyses and interprets fatigue and vortex induced vibration

Topside

- Upper flex joint angle
- 6 DOF motion
- Optimal vessel position (DGPS)
- Tensioner - Pressure/Force
- Tensioner stroke

Drilling riser

- Current speed and direction
- VIV - Vortex Induced Vibration
- DIV - Drilling Induced Vibration
- VIM Vessel Induced Motion



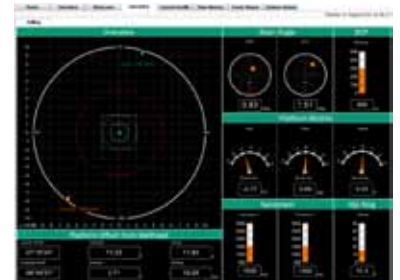
ADCP



INTEGRIpod™

The DRILLASSURE™ system

utilises real-time software in conjunction with inputs from sensors on the topside vessel, lower marine riser package (LMRP) and along the length of the riser to provide a fully integrated solution to optimise drilling operations and improve safety.



Screenshots of the DRILLASSURE™ Software dashboard



LMRP / BOP / Conductor

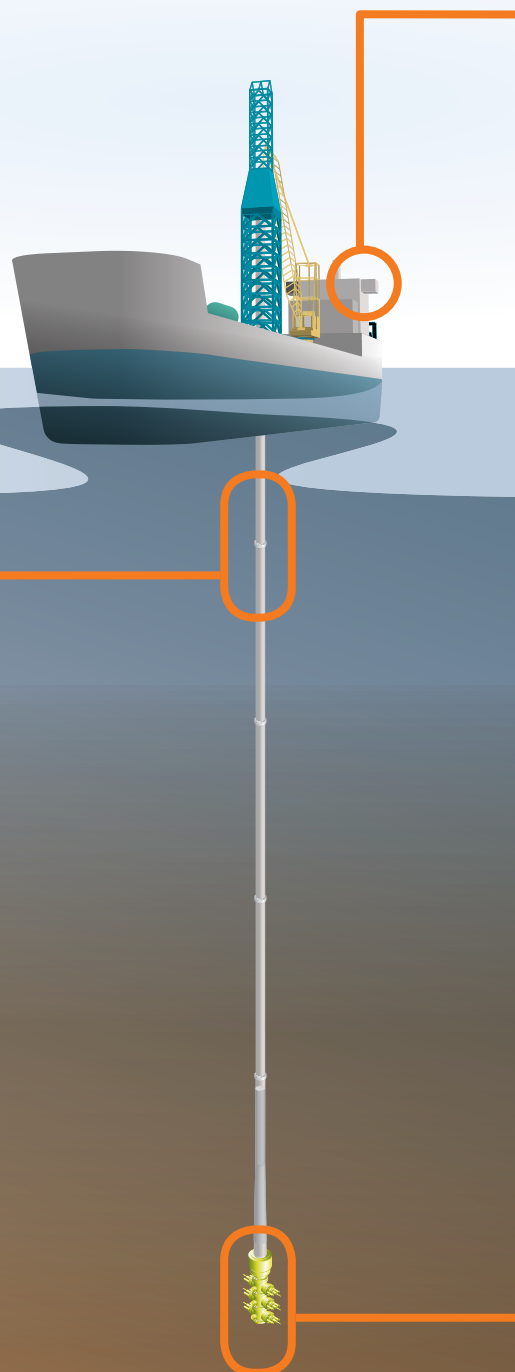
- Effective Tension
- Lower Flex Joint Angle
- BOP internal Pressure
- Vibration
- Inclination



INTEGRICollar™



INTEGRISTICK™

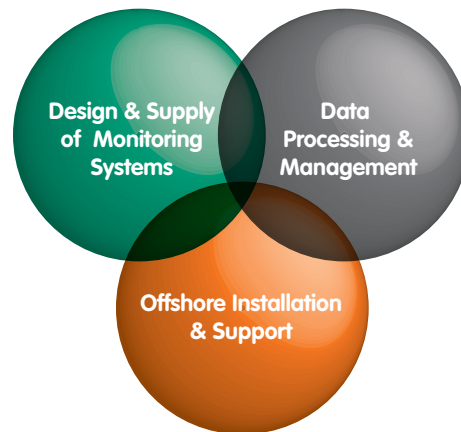




The **Pulse** range of ASSURE™ solutions are engineered to meet your challenges and to help you operate safely and efficiently

The total solution..

At **Pulse**, we believe in total safety and efficiency, so we take responsibility for the full package: hardware, software and installation



Pulse has a global network of operations and support staff to support your operations anywhere in the world 24 hours a day.

Pulse's analytical services and data management and visualisation software ensure that you get the information you need from the data to operate safely and efficiently.

Pulse's industry leading range of INTEGRI™ products and ASSURE™ systems have been providing assurance and security for our customers subsea installations for more than a decade.

Track record and reliability second to none

Pulse is the world's most experienced company in the structural monitoring of drilling applications. We have an outstanding track record of reliability and an advanced engineering toolbox that gives us in-depth understanding of subsea monitoring challenges. Our standards for safety and reliability are second to none:

10 years experience	350 systems supplied	500 subsea deployments	6000 ft deployment depths
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9600-DTS-0403-04 (DRILLAssure)