

Afloat, in Position and in Production



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Ask any operator of a floating production system what its top three priorities are and you'll get a consistent answer: ensuring the asset remains afloat, in position and in production. That's because the continued performance and integrity of the asset rely on a combination of critical information, including mooring configuration, motion and positioning.

Around the world, today's floating production systems (FPSOs, semi-submersibles, TLPs and the like) are enabling oil and gas to be extracted from ever deeper waters and ever more remote locations. At any given moment, strong ocean currents and adverse weather conditions pose a risk to the performance, efficiency and safety of these assets, making accurate and continuous monitoring essential.

To perform at a high level, floating production systems rely on precise and timely information derived from diverse sensors and subsystems that collect and relay data about environmental, positional and structural conditions.

Advances in technology are enabling the data from all these sensors and subsystems to be integrated within a management and advisory system and then presented in a single, intuitive interface. The reliable, asset-wide, real-time overview provided by NorthStar™, Fugro's integrated marine management and advisory solution is making a remarkable difference in contingency planning as well as improving facility management and minimising downtime.

Let's consider structural integrity first. Naturally, a primary concern is that the asset remains afloat and on station – to achieve this,

operators use sensors such as accelerometers and GPS to collect and combine critical information about the location, heading, motion, stability and uprightness of assets. Equally important are the data on the position and condition of mooring lines, risers and other infrastructure.

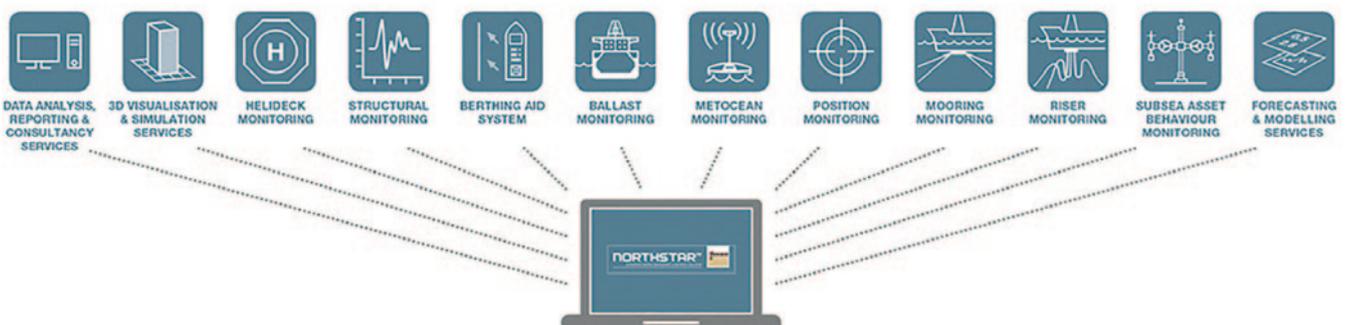
That's a lot of data, potentially coming from many different sources. A decade ago, this volume and breadth of information would have been overwhelming. But multiple data systems can now be monitored by NorthStar, to provide an accurate, comprehensive, real-time overview of the entire asset.

Intelligent data sharing can then open up new opportunities to improve integrity management by:

- *helping field operators extend the service life of their assets as they bid to remain profitable during the recent downturn in the oil and gas market with associated restrictions on capital expenditure*
- *detecting and predicting vulnerabilities, like a deteriorating mooring line, much earlier to allow timely rectifications that help avoid costly operational shut-downs*
- *providing critical field performance data to equipment suppliers and design houses for continual product improvement and reduced design costs*
- *reducing operational costs by moving towards a 'condition based' rather than 'time based' inspection regime for in-place surveys.*

Having an integrated system that can provide early detection and warnings when design limits are exceeded, or if a component has failed, is a massive advantage, because the health and safety,

The reliable, asset-wide, real-time overview provided by Fugro's integrated marine management and advisory solution – NorthStar™ – enables contingency planning, improves facility management and minimises downtime.





Accurate monitoring of data on environmental, positional and structural conditions of floating production systems ensures continued high performance.

environmental and financial consequences of a critical system failure can be astronomical. In 2011, for example, following a severe storm a floating production storage and offloading (FPSO) facility had to shut down operations because it had broken loose from its anchorage. In all, it took four years and an estimated US\$1.8 billion to reinstate the vessel.

Collecting and interpreting data about meteorological and oceanographic influences on the integrity and operating

system that combines and converts all that information into insight, fuelling confident operational planning and the sanctioning of weather-critical activities.

Of course, safe and efficient production also depends on the effective and timely maintenance of surface and subsurface infrastructure. It's now possible to monitor and provide data on structural integrity, drawing comparisons between actual conditions and design criteria and helping to reduce the need

for unplanned (or even planned) surveys.

Fugro's DeepData subsea instrument pods (a subsystem of NorthStar) monitor motions on risers, BOP stacks and other subsea applications such as Christmas trees and decommissioned structures.

Based on this vital knowledge, safe and effective maintenance and intervention programmes can be planned and delivered in an efficient and cost-effective way, to ensure that equipment and infrastructure continue to operate reliably.

In summary, armed with such a wealth of integrated information – historic, current and anticipated – that's converted into

insight, operators of floating production systems and other marine assets are now well placed to make rapid, informed decisions and to resolve potential issues before they become problematic, thereby optimising production and boosting efficiencies.

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Vital data from diverse sensors are integrated within a management and advisory system and presented in a single, intuitive interface.

conditions of a floating production system is vital. That's because data derived from measurement, monitoring and forecasting services reveals invaluable information about ambient environmental conditions (such as wind speed, temperature and humidity, air pressure, cloud height, visibility and weather, wave and air gap, precipitation and currents) as well as historical and future environmental conditions. NorthStar is a fully integrated