

# Case Study

## 360° sonar integrity monitoring on FPSO

**Products:** RAMS® sonar head  
RAMS® software

**Clients:** BP  
Teekay Petrojarl

**Location:** West of Shetland, UK

### Background

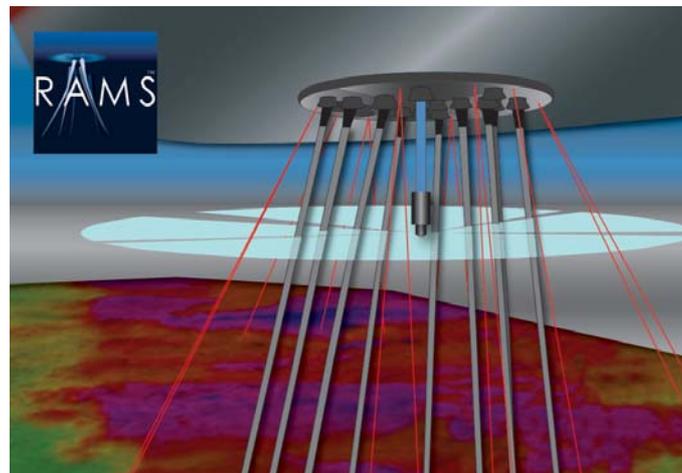
As an owner/operator partnership, Teekay and BP are dedicated to monitoring and maintaining the riser integrity on the Petrojarl Foinaven FPSO, located off the West coast of Shetland. To safeguard the operational integrity of the FPSO, BP recognised a need for an automated monitoring system. The system needed to be capable of monitoring the series of bend stiffeners, umbilicals, risers and mooring lines below the FPSO. BP's specific technical requirements served to highlight the limitations of other monitoring technologies and the need for a new technological solution to meet their requirements.

In terms of dimensions the Foinaven FPSO has an internal turret, 12m in diameter with 14 riser slots of which 10 are currently in use, comprising of 5 x 8" risers, 5 x 10" risers, 2 x umbilicals and 10 x mooring lines which secure the FPSO to the seabed.

### Project

In order to develop a suitable monitoring solution Trittech expanded upon the company's experience with established multibeam sonar technology developing the RAMS® system. RAMS® was designed by Trittech to afford a 360° field of view below the turret and detect multiple targets in close proximity to one another. Furthermore the multibeam sonar solution allowed for the recording of relative movement of the FPSO's anchorage, coupled with an integrated warning system to detect when movement is outside the scope of design specifications.

The RAMS® sonar head, controlled by the RAMS® software, runs on a dedicated Surface Control Unit (SCU). Software displays the known turret configuration as a background to the real-time sonar imagery. Users can define acceptable levels of movement for displayed targets and the result, any non-standard movement, can be rapidly and easily



ascertained. The RAMS® system generates precise, robust real-time measurements to all targets, enabling alarms to be triggered when any target moves outside the delineated scope of movement. The information generated by RAMS® facilitates detection of riser, umbilical or mooring failures as well as permitting integrity trend analysis prior to any potential failure, due to the high level of accuracy obtained from this sonar based monitoring solution.

The RAMS® sonar head was installed via an I-tube on a custom-designed deployment mechanism, to a predetermined depth. Electronic beam steering of the RAMS® sonar in the vertical plane was enabled to ensure optimal return of acoustic reflection from the risers, mooring lines and umbilicals. This ensured a clear line of sight - 22 targets (10 risers, 10 mooring lines and two umbilicals).

### Solution

In 2009, RAMS® was successfully installed by Trittech on this FPSO, where it continues to be in operational use. As a technical solution Trittech's adaptations to the RAMS™ sonar head has been proven to be 100% operationally effective. In terms of the quality, quantity, accuracy and detail of the recorded data RAMS allows BP to conduct trend analysis in order to maintain the integrity of the Teekay Petrojarl Foinavaen FPSO.

