

Shell has been involved in AHMS developments right from the start

In an interview with Report, Gbolagade Oguntola, Project Engineer at Shell Nigeria, outlines the importance of long-term structural integrity monitoring of FPSOs to the organisation.



In 2006, the original Monitas Joint Industry Project (JIP) got underway with the aim that it would develop an Advisory Hull Monitoring System (AHMS) for FPSOs. This important JIP is now supported by more than 15 companies and Shell has been involved right from beginning. AHMS advises on the hull integrity of FPSOs and helps the owner to understand the real age of the vessel by monitoring fatigue loading and coupling it back to the design tools.

Q: In-situ monitoring of the long-term structural integrity of Shell's floating structures is a requirement of the company's in-house operate phase performance standards. Is this one of the reasons that

Shell has supported the development of AHMS, and what were Shell's initial expectations of the system?

A: "There is a need to build knowledge around FPSOs' end of life performance, as well as to create a robust database with respect to this subject from which the development of newbuilds can be based. Therefore Shell's immediate expectation is to understand the in-service hull fatigue consumption and thus provide a means of assuring the long-term integrity of hulls. Additionally, looking into the future, we wanted to be involved to gather data for forensic assessments in the event of any failures, as well as for the further development of newbuild floaters."

Q: Nowadays AHMS has been installed onboard newly built floaters such as the USAN FPSO, CLOV FPSO, Ichthys FPSO and Moho Nord FPU. What made Shell decide to implement AHMS on its existing FPSOs?

A: "We do this to understand the in-service hull fatigue consumption and thus provide a means of assuring her hull long-term integrity. Currently, the installation onboard the existing Bonga FPSO is being prepared."

Q: How does Shell overcome the challenges associated with installation onboard a production unit?

A: "Indeed, one of the main challenges when installing AHMS on an existing FPSO is the installation procedures. Synergies

with all teams involved in the installation phase are vital to manage the operational exigencies."

AHMS not only measures the lifetime consumption but also explains why the measured lifetime consumption deviates from design predictions. For this purpose the design tools are integrated into the software and are 'brought onboard' the FPSO as such, which is rather unique in the industry. Using this method all the processing occurs automatically onboard the FPSO. However, another way to do it is by sending the raw data onshore and then carrying out the calculations at the office.

Q: What is Shell's view on these different approaches?

A: "Certainly onboard real-time data processing is preferred. It is nice-to-have the processed data transmitted to the office for forensic analysis in the event of failure and as a basis for future new-build concept evaluations when required."

The Monitas Group project (2013–2016) – the successor of the Monitas JIP – is aiming to further develop the added value of advisory monitoring systems for integrity management by comprehensive analyses of measurements and to exchange experiences. The Monitas Group offers operators and other stakeholders a platform to discuss fatigue loads on FPSOs at length.



Q: What is your experience of these discussions and what does Shell take away from the Monitas Group meetings?

A: "The Monitas Group meetings give insight into some of the common deviations from the design conditions. They also provide useful feedback for improved designs for future newbuild."

Q: The AHMS system provides feedback about the FPSO's fatigue accumulation rates. How will Shell use the onboard feedback in its operational procedures?

A: "Although tank loading and offloading sequencing on the Bonga FPSO already benefits from the application of the Onboard Computer Loading Instrument, further benefits are derivable from the AHMS concerning optimising loading/offloading operations relative to the external environmental loading."

AHMS provides data about the lifetime consumption of the hull of the FPSO and to this end, sensors are installed in the ballast water tanks and on deck. But the Monitas Group is also investigating whether the sensors can be used to support damage identification.

Q: Shell is supporting this research. Could you tell readers why this is of interest to the company?

A: "Inspection of confined spaces such as ballast tanks and cargo tanks pose HSSE risks and are expensive. Real-time health monitoring offers an opportunity to optimise inspection intervals (RBI) based on fatigue damage data."





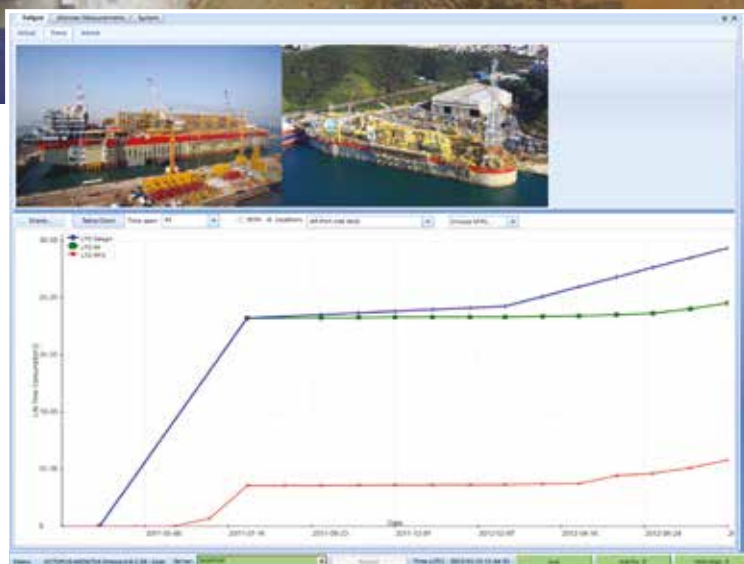
Sensor installation on deck CLOV FPSO

MARIN has developed the advisory system for the hull of FPSOs. But with relatively limited customisation the methodology can be applied to the hulls of other types of floaters (e.g. SEVAN, FLNG, semi) or for moorings and risers.

Q: What is your view on deploying AHMS on other types of floaters, moorings or risers?

A: "Real-time monitoring is the most effective in-service performance approach to evaluating the integrity of deep, offshore floaters and any improvements in application are most welcome. It is hoped that integrity assurance of such Safety Critical Equipment (SCE) like moorings and risers will be better managed by the use of such an advanced monitoring system."

To accommodate the installation of AHMS on FPSOs, which are already producing, an AHMS 'light' version is being considered. This comprises only on deck sensors and no



AHMS: USAN measurements results are compared with the design values, on the spot

or limited sensors in the ballast water tanks. Additional and innovative, real-time post-processing is required to maintain all AHMS functionalities.

Q: And as a final question, is this 'light' AHMS version of interest to Shell?

A: "Especially given the challenges of sensors and cable installation on a live

plant such as the Bonga FPSO, innovations with respect to the use of fewer sensors (especially in the WBTs) for brownfield AHMS deployments would be encouraged. But this as long as it can be guaranteed that the application of fewer sensors will not impact the quality of hull strain measured data (combined vertical & horizontal bending moments) obtained." ▢