

SAFE OPERATIONS, ASSET INTEGRITY AND PROCESS SAFETY

Efficient asset management is a key element for business success



Safe operations require safe tools and a safe working technique. The role of asset integrity management has never been more crucial to the Oil & Gas industry. Since the industry is moving towards exploration into ultra-deep water, involving even more challenging operations, companies will be exposed to complexities in even more hazardous and extreme conditions.



Asset integrity refers to the prevention and control of events with low frequency and high/severe consequences on people, the environment, assets or project performance.

In 2017, in line with Asset Integrity Best Practices released by the IOGP, a **new Asset Integrity Management System** was developed for Saipem in order to control risks that could escalate to Major Accident Events (MAE). The model follows a typical Deming cycle and is based on four phases: Planning, Operation, Performance monitoring and Continual improvement. The heart of this model is the HSE Case (a process which identifies risks relevant to the activities carried out onboard and maps all key elements to ensure their control), traditionally developed for the offshore production and drilling units and in the last few years extended by Saipem to the Offshore construction fleet.

A guideline to an **'upgraded' version of the Vessel HSE Case** was developed in 2017 and launched for the Khankendi subsea construction vessel and then extended to further vessels (Saipem 7000 and Castorone).

The main output of the HSE Case is the mapping of Safety Critical Elements (SCE - Safety Critical Equipment, Tasks and Competencies) constituting barriers to the escalation of identified MAE scenarios. Each SCE is supposed to work according to specific requirements, called Performance Standards. International Marine standards, set by organisations such as the IMO and IMCA, allowed Saipem to set most of the Performance Standards related to 'classical' marine equipment. Specific Offshore Construction Operations and equipment are not covered well by these standards (e.g. pipe-lay equipment/operators). Saipem's standards and

criteria relevant to specific Offshore Assets & Operations have therefore been updated to reflect the principles of Saipem's Asset Integrity Model. A **specific safety critical competence library** has been developed and matched with the official Saipem competence library and training matrix.

In addition to classical Marine critical equipment, Non-marine safety critical equipment has also been flagged as a top category in the Saipem Computerised Maintenance Management System.

In 2017, new activities also concerning the Performance monitoring and Continual improvement phases were carried out.

A set of common **Asset Integrity KPIs** were selected and grouped into six families: Major Accident Events, Safety Case Development, Safety Critical Equipment, Safety Critical Competences, Safety Critical Procedure, Emergency Control.

This set will be tested in 2018 against the availability of information, the capability to provide a reliable picture and their sensitivity to changes.

Furthermore, in order to provide an adequate detail of information at various levels of the organisation (site, division or group level), a multi-layer dashboard was created in which KPIs are graphically represented, weighted and aggregated to provide an overall score. A comprehensive and strategic asset integrity management programme is recognised as an important tool for capturing the financial upside while meeting or exceeding corporate responsibilities to health, safety and environment, but sensible results can only be

FOCUS ON THE COMPETENCE ASSURANCE & ASSESSMENT PROGRAMME

As an output of the WWZ programme, competence resulted as one of the main points of concern. Therefore several initiatives were developed with one example being the Competence Assessment & Assurance (CA&A) programme. The programme leads to a series of benefits including a specific training and coaching strategy aimed at improving any identified weaknesses, an enhanced personnel development path, as well as local content development objectives.

CA&A: drilling update

In 2016, the CA&A programme was launched at the Saudi Arabian Saipem (SAS) Ltd drilling projects. In the last 4 years, the number of onshore rigs operating in Saudi Arabia almost doubled. This meant mobilising an important number of new local and international resources, brand new to Saipem and 'fresh' to the drilling industry. This led to preparing the implementation of the CA&A system, rolled out through a pilot project at SAS operations. There is a plan to extend the programme to offshore drilling vessels in 2018.

**Onshore rigs involved
in the campaign since its launch
in November 2016**

21

**Personnel assessed
since the campaign launch**

+550

CA&A: offshore update

In 2017, Saipem continued to train the VMT and to perform scheduled assessments. A new standard procedure was issued in alignment with the improvements collected by the vessels and the actors involved in the process. In the new document the internal certification process of the assessors was structured and officialised; the list of roles was updated on the basis of the new professional role system of Saipem and skills were further detailed. The project was implemented onboard the 7 vessels already involved in 2016 and launched onboard FDS, Khankendi and Castoro 10 (at the beginning of 2018).

**Vessels involved
in the campaign since its launch**

10

Assessors trained

105

Assessments completed

227

achieved in the long run through a cultural change, with the energy and the commitment of many stakeholders.

2018 OBJECTIVES AND FUTURE PLAN

Within the next year an awareness tool will be developed for Khankendi, S7000 and Castorone to allow the vessel management team to cascade information about barriers and relevant performance standard requirements to the crew.

Audit and inspection tools will be developed through a checklist to verify the compliance of Safety Critical Equipment, Competences and Procedures with their respective Performance Standards.

An Asset Integrity audit programme shall also be launched to provide top management with a first picture of the implementation of the AI Model key elements across the Company, enhance awareness and test the right settings of the Performance Standard.

FOCUS ON DIGITALISATION IN ASSET MANAGEMENT

New approaches based on virtual and augmented reality have been launched in collaboration with an O&G major for Maintenance & Asset Management and the development of a smart wearable device platform has been also investigated to improve safety conditions onboard. Some of the proofs of concepts have already been directly checked on site with interesting results: i.e., the track & trace of asset and materials for construction digitalisation, the potential for using flying drones and rovers at Saipem yards and the application of vision technology for specific activities on the Company's offshore fleet.

Moreover, Saipem and NTT DATA signed a cooperation agreement with a view to prototyping and

implementing new solutions in Saipem yards and on vessels. The cooperation concerns the application of technologies such as smart wearable devices, Internet of Things, cyber security, virtual and augmented reality. NTT DATA and the Saipem Innovation Factory jointly worked on the 'Digital Site' project at Saipem's Arbatax yard (Italy) where the use of innovative devices for the health and safety of workers, among which the NTT DATA's Hitoe smart shirt, was experimented. As a result, two co-development projects are being developed in the field of augmented and virtual reality solutions for onshore pipelines and on the application of algorithms for cognitive computing for the analysis of documents.

For further information on Saipem's commitment to innovation please refer to page 28.