ASSET INTEGRITY MANAGEMENT

TAKING A STRUCTURED APPROACH AND FOCUSING ON RISK

Ensuring the structural integrity of offshore facilities and equipment has always been paramount – unfortunately, it does not get any easier. The development of new oil and gas reserves in extreme situations; existing infrastructure that is closer to the end of its design life than the beginning; and an intense focus on health, safety and environmental performance are all putting pressure on operators to do more on the integrity front. But as Peter Falconer, head of 2H Offshore's global integrity management business, points out, it is not simply more effort that is required but action of a more structured kind. "Companies are increasingly recognising the value of taking a risk-based approach to integrity management (IM) because it focuses attention on the parts of the operation where problems are most likely to occur. The benefit arises from being able to identify potential problems before they escalate and cause equipment or system failures that compromise operations."

Integrity loop

Effective IM involves a series of distinct steps, beginning with the gathering of information about the equipment under review. The creation of an efficient database from the available design reports, as-built records and operational logs is fundamental to the IM process. Using this information, plus expert knowledge and experience of the behaviour of the equipment, a risk-based analysis of the threats to the equipment and possible failure modes is carried out. This forms the basis for a strategy covering inspection, monitoring and any relevant failure mitigation measures. It is then a question of implementing the strategy and collecting the new data generated. "The data are used in two ways," says Falconer. " Any data that are outside the boundaries of what was expected will trigger remedial action or changes to the maintenance regime or the way the equipment is operated. Just as importantly, the information is used to update and refine the IM strategy. This feedback mechanism, the creation of an integrity loop, is very powerful, as, in time, it raises your understanding of the critical issues and enables you to adopt a much more proactive stance on the integrity of your key assets."

2H Offshore has been working with BP in the Gulf of Mexico since 2005 to manage the integrity of around 100 deepwater risers and the in-field flowlines associated with the oil company's eight production facilities in the region: seven floating units, including the Thunder Horse semisubmersible (shown here), and the Pompano fixed platform. The scope of the contract was extended in 2007 to include subsea production equipment. Currently, our IM team has 20 people from 2H and another Acteon company, InterAct, working closely with BP's central IM organisation in Houston, USA. The success of the contract has been influential in the recent award of IM contracts in Asia Pacific to carry out risk-based inspection of deepwater risers for a leading international operator, and in the Middle East, where the scope includes more than 400 well conductors in four shallow-water fields.

RISK-BASED ASSESSMENT

At the heart of the IM process lies a risk-based assessment that follows a set course. Expert knowledge and experience of the equipment under review are vital, especially during the first part of the assessment:

1. Identify the main threats to specific items of equipment and the possible modes of failure.
2. Assess the probability of failure occurring.
3. Estimate the consequences of failure and rate their severity according to predefined criteria.
4. Combine the probability and the consequences of failure to obtain a criticality rating.
5. Assess the predictability of the failure based on how well the failure mode is understood and the reliability of the usual inspection, monitoring and mitigation measures. Use this to generate a confidence rating.
6. Combine the criticality assessment with the confidence rating to generate an inspection, monitoring and mitigation strategy, particularly with regard to the minimum inspection interval, for the particular item of equipment.