RELIABILITY OF OFFSHORE EQUIPMENT

As the offshore industry moves to deeper water, and dealing with more complex reservoirs, it is deploying more sophisticated designs of subsea equipment. These employ elaborate control and data retrieval means to increase the capability of the equipment, and the operational information that it supplies back to the surface. However, as is always the case in engineering systems, the increased capability comes at a price – that of greater risks of the equipment behaving in unexpected ways, of personnel operating it incorrectly, or an increased rate of breakdown.

It is therefore essential that such systems are operated with maintenance procedures to identify and attempt to prevent potential failures. Of course, some component failures will occur at one time or another. It is impossible to completely eliminate all the risks associated with operating a particular system. However, by the implementation of a suitable reliability and risk assessments it is possible to reduce these risks to an acceptable level.

Techniques such as Failure Mode and Effects Analysis (FMEA) and Reliability Centred Maintenance (RCM) may be used to identify potential failure modes of a system. The possible cause and severity of a particular failure mode can then be determined and define what steps need to be taken to reduce if, not eliminate the occurrence of failures. Assessing the effect that the failure of a certain sub-assembly or component has on the overall system is vital to analysis. Determining the severity of the failure will help dictate the course of any subsequent action, whether it be redesign of the system, increased preventative maintenance, etc.

Safety offshore is of paramount importance, therefore all possible efforts must be made to eliminate the occurrence of failure modes of critical, or catastrophic severity, which could result in injury or loss of life. Another factor to be considered is a failure that causes the suspension on-going operations, and the financial losses associated with such a delay.

As well as considering the reliability of a system, it may be equally important to consider the availability of the system. This can be defined as the ability of the system to perform its intended function when called upon. If a system is not in continual or regular use, a component failure may remain hidden from the operating and maintenance crews until the system is eventually required. BPP-TECH has extensive experience in risk and reliability analysis, and provides an efficient. structured approach to assessing interconnected system failures.

Each potential failure mode in the system is analysed to determine its effect, and to classify it according to its severity. The objective is to identify reliability-critical areas in the system. Then modify the design, or maintenance procedures, to eliminate single point failures, and any catastrophic or critical consequences of such failures. Each individual component of the system is considered separately for each of its failure modes.

As automation increases and more complexity employed in the offshore industry, then a more detailed analysis is required to ensure potential failure modes are identified, and given the required attention.

A recent analysis performed by BPP-TECH on a hydraulic system controlled by Programmable Logic Controller (PLC) highlighted areas were extra attention might be required during maintenance procedures. Despite the high degree of redundancy offered by the PLC there were still areas that required special attention during routine maintenance to ensure availability, and reliability, of the system. It is important that regular maintenance checks are not replaced by total reliance on new technologies. Rather they should be used together, supplementing each other, to reduce the risk of system failure and the resulting, sometimes catastrophic, consequences.