

CASE STUDY

Maximising Uptime in Deepwater Operations with ReliaSoft RAM Suite

A leading oil and gas service company is one of the world's largest providers of products and services to the energy industry. With a mission to collaborate and engineer solutions that maximise asset value for its customers, the company operates at the forefront of exploration and production technology. A prime example of this is its involvement in major deepwater development projects, providing advanced drilling and completion services in extreme offshore environments where operational excellence and asset availability are critical to success and profitability.

Challenge

In large-scale deepwater projects, our customer must maintain exceptional asset availability. Unplanned downtime can cost millions of dollars per day and presents significant operational and environmental risks.

Solution

Our customer implemented a data-driven maintenance strategy using HBK's ReliaSoft RAM suite (RCM++, Weibull++, BlockSim) to analyse failure data, model system availability, and optimise maintenance tasks for critical deepwater assets.

Result

This proactive approach shifts maintenance from reactive to predictive, maximising uptime, reducing operational risk, optimising spare parts inventory, and ensuring they deliver on their high-stakes contractual performance commitments.



Balancing Risk, Access, and Uptime in Deepwater Operations

Deepwater operations represent one of the most challenging engineering environments on Earth. For this customer, the primary challenge is not just performing the work, but ensuring the constant readiness and reliability of the highly sophisticated assets required to do so.

1. **Catastrophic Cost of Downtime:** Unplanned downtime on a deepwater rig is not a minor inconvenience; it can halt operations entirely, costing millions of dollars per day. Meeting the stringent performance targets in contracts with partners like Petrobras is impossible without exceptional asset uptime.
2. **Extreme and Inaccessible Environments:** Assets operate under immense pressure and high temperatures (HPHT), thousands of feet below the surface. They are inaccessible for routine inspection or simple repairs, meaning any maintenance action is a major, time-consuming logistical operation.
3. **Complex, Interconnected Systems:** A deepwater drilling assembly is a complex system of interconnected components—from drill bits and sensors to pumps and control modules. A failure in one minor part can cascade and bring the entire system offline.
4. **The Risk of Over-Maintenance:** In an attempt to avoid failure, it is easy to fall into a cycle of excessive preventative maintenance. This is not only extremely expensive but also introduces risk, as every intervention is a complex and potentially hazardous procedure.

A Data-Driven Approach to Optimising Asset Reliability

To navigate this high-stakes environment, our customer's asset management and reliability teams deployed a data-driven strategy using the ReliaSoft RAM (Reliability, Availability, Maintainability) suite to optimise their maintenance programs.

1. **Defining the Optimal Maintenance Strategy with RCM++:** The foundation of the program is Reliability-Centered Maintenance (RCM). Using RCM++, teams conduct a rigorous, systematic analysis of critical assets. The software guides them through a logic-driven process to identify failure modes and their consequences. This determines the most appropriate maintenance strategy for each component - moving beyond simple time-based overhauls to condition-based monitoring, predictive tasks, or even allowing certain non-critical parts to run to failure.
2. **Understanding Asset Life with Weibull++:** Historical failure data and operational logs are invaluable. This data is fed into Weibull++ to perform life data analysis. By modeling the failure patterns of components, engineers can accurately predict the reliable life of a part, determine optimal inspection intervals, and make data-driven decisions on when to replace a component before it fails.
3. **Simulating Total Availability with BlockSim:** A deepwater operation's success depends on the uptime of the entire system, not just one part. BlockSim is used to create a dynamic simulation of the whole operation. By inputting the reliability data (from Weibull++) and maintenance strategies (from RCM++) for each component, engineers can:
 - Simulate the overall system availability and identify production bottlenecks.
 - Perform "what-if" analyses to evaluate how improving one component's reliability impacts the entire system.
 - Optimise spare parts inventory by understanding which parts are most critical to have on hand to minimise downtime.

From Insight to Impact: Delivering Measurable Reliability Gains

The implementation of a RAM program powered by ReliaSoft provides transformative benefits for our customer's deepwater operations.

- **Shift from Reactive to Predictive Maintenance:** The program moves our customer away from costly, reactive repairs and into a predictive state, where maintenance is performed precisely when needed, maximising asset life while minimising failure risk.
- **Maximising Contractual Performance and Profitability:** By significantly boosting asset uptime, our customer can consistently meet or exceed the performance targets laid out in demanding contracts, avoiding penalties and maximising revenue.
- **Optimised Logistics and Reduced Costs:** The insights from BlockSim allow for smarter inventory management, ensuring the right spare parts are on the rig without carrying excessive, costly stock. RCM++ eliminates unnecessary maintenance tasks, saving millions in man-hours and logistical support.
- **Enhanced Safety and Environmental Stewardship:** Predictable and stable operations are inherently safer operations. By preventing unexpected equipment failures, this data-driven approach directly contributes to mitigating operational and environmental risks.

Conclusion

In the extreme environment of deepwater energy production, asset reliability is the bedrock of operational success, safety, and profitability. For a leading oil and gas service company, a "fix-it-when-it-breaks" approach is untenable. By embracing a scientific, data-driven RAM program using the analytical power of the ReliaSoft suite, they can master the complexity of their operations, optimise maintenance activities, reduce risk, and maximise asset value in some of the world's most demanding operating environments.



Reliability engineers use predictive analytics and system modelling to optimise maintenance, prevent failures, and maximise asset uptime.