

Maximizing Production and Minimizing Risks: Condition Monitoring of Subsea Christmas Tree Equipment



Oil and Gas
Industry



Deployment:

- 3D setup
- Data contextualization
- Field Image capture

Technologies:

- Twin Navigator
- VFiles
- Predictive models

Introduction

Oil and gas facilities routinely need inspections and maintenance that ensure the safety of the process, **avoiding unplanned shutdowns, accidents, and regulatory non-conformities.**

In this context, the subsea Christmas tree is a crucial component in the extraction of oil from subsea wells. Due to its critical role in the extraction process, it is essential that this equipment is **constantly monitored** to ensure its proper functioning and to prevent any potential malfunctions that could result in environmental damage or a loss of production.

Challenges

The X-tree is equipment of **fundamental importance to an offshore process.** The equipment consists of a set of valves, coils, and fittings that control the flow of oil from the well to the production facilities on the surface. It is typically located at the top of the wellhead and is designed to control the pressure and flow of fluids from the well.

The Christmas tree is a critical piece of equipment that plays a vital role in the operation **providing increased safety and efficiency** of an offshore oil and gas production facility.

Given the importance of the equipment, it's **fundamental that its condition is constantly monitored** with the goal of **ensuring the good function** of valves and early identification of leaks or anomalies regarding pressure and fluid temperature.

Its failure can be a starting point for **oil leaks or blowouts** due to the escape of high-pressure fluids.

Thus, it becomes **essential to ensure the reliability of this equipment**.

Solution

The proposed solution involved the **digitization of the X-tree monitoring process** with the centralization of operational systems and instrumentation within Vidya's platform, providing easy access to important documents and procedures with 3D visualization and the setup of alerts triggered by anomalies.

The first step was **collecting information from the Christmas tree**, such as technical drawings, documents, and spreadsheets. Then, **Vidya's engineers contextualized the data** by gathering, analyzing, and linking it with assets, processes, and properties.

This process led to the setup of the **Twin Navigator**, which synchronized 360 photos with the 3D model for remote inspections. Finally, Vidya integrated the client's operational systems (Alerts, Maintenance, Documents, and Material Management) into a **single platform**.

Also, an automatic visual trigger alert was created in the system when an efficiency problem or non-identified anomaly occurs. This is **powered by computational models** that will support decision-making with predictive analysis of failures.



Results

With the implementation of the proposed solutions, it was possible to:

- **Savings in time** when accessing relevant information
- **Centralization** of systems
- **Visual alert** when anomalies manifest
- Accurate condition **monitoring** of the equipment
- Predictive models able to **predictive** future failures

