Virtual Corrosion Assessment on Oil & Gas FPSO

Oil and Gas Industry

Deployment:

- Data contextualization

- 3D platform deployment

- Field inspection with 360º camera and drone

- AI Image Analytics

- Virtual Survey

- Dashboards

- Automatic Integrity and Maintenance plans

Technologies:

- Twin Navigator

- Field Scan

- AI Image Analytics

Challenges

One of the **major problems** encountered in the operation of FPSOs is the **corrosion of structures and equipment**. The usual approache to inspect these anomalies currently create several barriers to efficient data gathering and complete understanding of the integrity of the platform.

To perform the corrosion monitoring, workers need to walk around the entire industry and identify where the anomaly points are. However, due to the lack of digitalization of this process, this analysis is performed in a very analogical way and is susceptible to errors, mainly due to the huge number of existing components in the FPSO and with many of them in places of difficult access. In addition, important data to perform this process is usually found in a diffused way in the various information management systems used by the company, besides the large number of activities still performed on paper. As a consequence of all this, for example, the inspection and maintenance planning process of the FPSO topside regularly took **more than 170 days**, in which more than half represent days when a worker needs to be on board the platform to perform the necessary field assessments, subjecting them to risks and accidents.

In other words, this process **leads to low assertiveness in corrosion management of the FPSO**, generating high need of people on board, high rates of rework, unplanned shutdowns and significant increase in operating expenses.

Solution

The proposed solution to the challenges faced at the FPSO involves **virtualizing the corrosion assessment and data analysis process** for optimized maintenance planning and reduced people on field.

For this, the set up of Vidya's platform was done in 30 days, and the first step of the implementation was to **process the 3D model of the assets involved in the project on the Vidya platform**.

At this stage, our team of engineers and asset management specialists was also responsible for processing and contextualizing all the already existing information and data from the industrial plant, such iness rules.
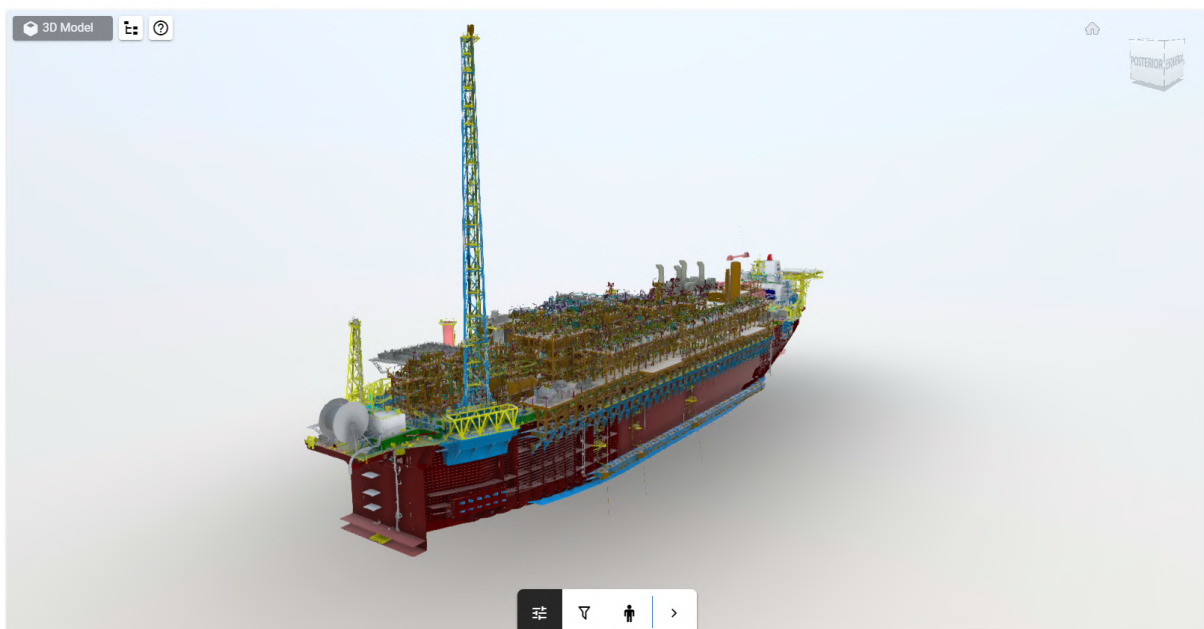
In addition, **important structures and information** about the fabric maintenance process of this industry **were also inserted into the platform**, such as the creation of customized inspection checklists according to standard corrosion classification procedures, in this case ASTM D610, and segmentation of components that should be prioritized in case of maintenance needs by criticality criteria.

Then, one of our qualified inspectors went to the FPSO to collect images of the entire platform with **360° cameras and drones**, which were uploaded into the platform and synchronized with the respective components of the 3D model. With all the collected images, it was possible to process them with our Artificial Intelligence trained to detect corrosion points automatically.

Thus, the platform allowed operators to navigate through the 3D model synchronized with field photos and the AI corrosion markings to remotely and quickly assess the integrity of the FPSO. To do this, the inspector can fill in checklists with the client's inspection procedures, the degree of degradation and severity of corrosion in each component, and mark on the 3D model the corroded areas that need to be painted.

Based on the information inserted into the platform and the corrosion evaluation performed by the inspector, automatic coating plans are generated, including the necessary budget for maintenance and the prioritization of components based on the criticality criteria established.

Finally, to facilitate the operators' analysis and prioritization of activities, **customized dashboards were developed** with the previously mentioned data and the main inspection and maintenance parameters, and even classification of the most critical components for maintenance prioritization, along with the possibility of exporting this information in csv spreadsheets for other uses.

Results

With all this set, we had the delivery of a **fast, hybrid and assertive corrosion assessment process through Vidya's Platform**. The AI Image Analytics and the virtual inspection by operators of the corrosion spots on the FPSO allowed the creation of complete and optimized coating plans to the industry,

This has enabled an approximately **70% reduction in the time spent in the inspection and corrosion maintenance planning process on the FPSO**, from 172 day to only 49, and a 94% reduction in the POB required, helping operators to evaluate necessary interventions without exposing themselves to risks and accidents.

The presentation in customized dashboards of the data generated enabled the analysis of integrity information and the assertive prioritization for coating of the most urgent elements and the best timing to perform their maintenance, also relating cost data of this operation.

Having more assertiveness in this process, approximately **965 thousand dollars per year were saved only with the man/hour reduction in the corrosion maintenance planning, POB reduction, and rework mitigation, demonstrating considerable OPEX savings.**

In other words, since the implementation of Vidya's Digital Twin, the main results achieved are:

- **Ability to inspec**t the entire FPSO in a virtual way and create maintenance plans for the corroded areas, prioritizing them according to the urgency of each case;
- Increase safety by **reducing in 94% the POB;**
- **US$ 295,000 savings** per year from M/H reduction in maintenance planning;
- **US$ 400,000 savings** per year from rework mitigation;;
- **US$ 270,000 savings** per year from POB reduction.