

# Failure Prediction of Iron Roughneck equipments on upstream Oil and Gas industry



Oil and Gas Industry

## Deployment:

- Data contextualization
- 3D platform deployment
- Historic Data input
- Integration of on-site sensor data
- Failure prediction
- Alerts triggering
- Dashboards
- Predictive maintenance

## Technologies:

- Twin Navigator
- Alerts
- Dashboards
- Predictive models
- Analytics

## Challenges

The upstream **oil and gas industries** require constant monitoring of the production condition of their operation. An essential equipment in this process is the **Iron Roughneck**, a critical component that quicker connects and disconnects segments of pipe in a modern drilling rig, and is also responsible for reducing risks on board.

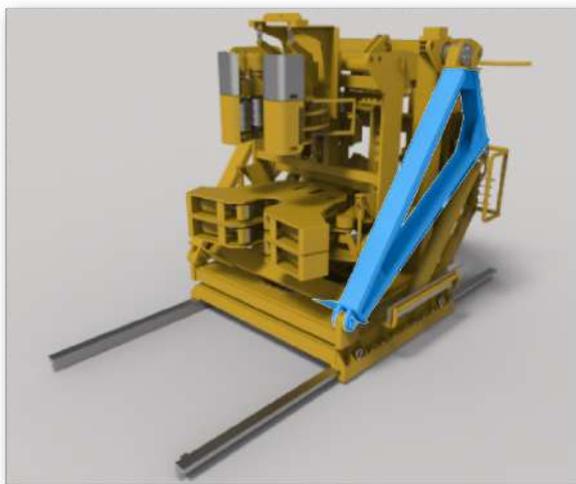
Unplanned downtime of **this equipment makes the entire process less efficient and costly**. Moreover, because of the various diffuse systems for gathering and storing the data generated by the sensors attached, it becomes increasingly difficult to understand its real state of integrity and to make agile decisions to prevent failures.

In this scenario, equipment maintenance ends up occurring mostly in a corrective manner, dealing with problems only when they have already occurred, which **decreases the efficiency of the operation and increases operating costs**.

## Solution

The proposed solution involved **the digitization of processes with the centralization and contextualization of the data generated by the equipment**, aiming to create a data-driven environment in the industry and increase the efficiency of the process from an authentic Digital Twin.

For this, a **3D model of the Iron Roughneck was processed and inserted into Vidya's platform**. In addition, our engineering team was responsible for processing, contextualizing and linking all the already existing data, just as attributes of each structural component, TAGs, workflows, inspection, with its respective component in the 3D model.



To complete the data collection structure, **our team integrated the platform with the client's PIMS (Plant Information Management System)** to process the data already collected by the sensors on board regarding the integrity and efficiency of the Iron Roughneck's operation. This allowed us to supply our AI algorithms with the available historical data to generate equipment failure predictions.

Then, all this data was arranged in customized dashboards, which together with the combination of all the technologies mentioned above made it possible to:

- **Process** the constantly generated data from the equipment by sensors, such as efficiency parameters, allowing the tracking and analysis of its time-series data;
- **Use** the Artificial Intelligence and Machine Learning to generate equipment efficiency forecasts, allowing a much more intelligent and predictive monitoring;
- **Trigger automatic visual alerts in the system** when an efficiency problem occurs in one of the components, or is predicted by the AI algorithm, enabling faster resolution of the problem, reducing unscheduled downtime in the operation.



## Results

With all this set, we had the delivery of a **fully remotely operable platform**. Because of the constant exchange of information of the Digital Twin, the data collected by sensors can now be analyzed remotely and operated in just one place, allowing the reduction of workers in the field and error prediction in the industry.

The solution allowed workers to more assertively understand the operation integrity, based on **historical efficiency data**. From this data, it was also possible to reduce the number of interventions in the equipment, replacing the standard model of corrective maintenance with a predictive one and increasing its useful life.

The reliability of this industry also became clearer, since it was possible to outline the failure rate of every component of the Iron Roughneck, and because of the data contextualization mentioned above, **reduce in 45% the total downtime of the equipment**.

From the application of our Digital Twin in the Oil and Gas sector, the main milestones possible to achieve were:

- **Reduced time spent on maintenance planning**, with the help of Analytics to cross-reference the Iron Roughneck efficiency projections and maintenance costs;
- **Decreased OPEX spent on operation and maintenance**, achieving **30% of savings** in maintenance costs.

