



OPTIMIZING FPSO INSPECTION ROI WITH AKSELOS DIGITAL TWINS

Case Study



Challenge

Ensure that risks associated with the FPSO's operational condition and life extension are understood and are effectively controlled without incurring additional costs.

Solution

Akselos Integra™ software is used to automate the framework for analysing inspection data using a holistic, detailed Digital Twin model.

Benefits

Using the Akselos Digital Twin, the supermajor is achieving **5x ROI** for the engineering workflow enabling structural analysis as frequently as new inspection data is available.

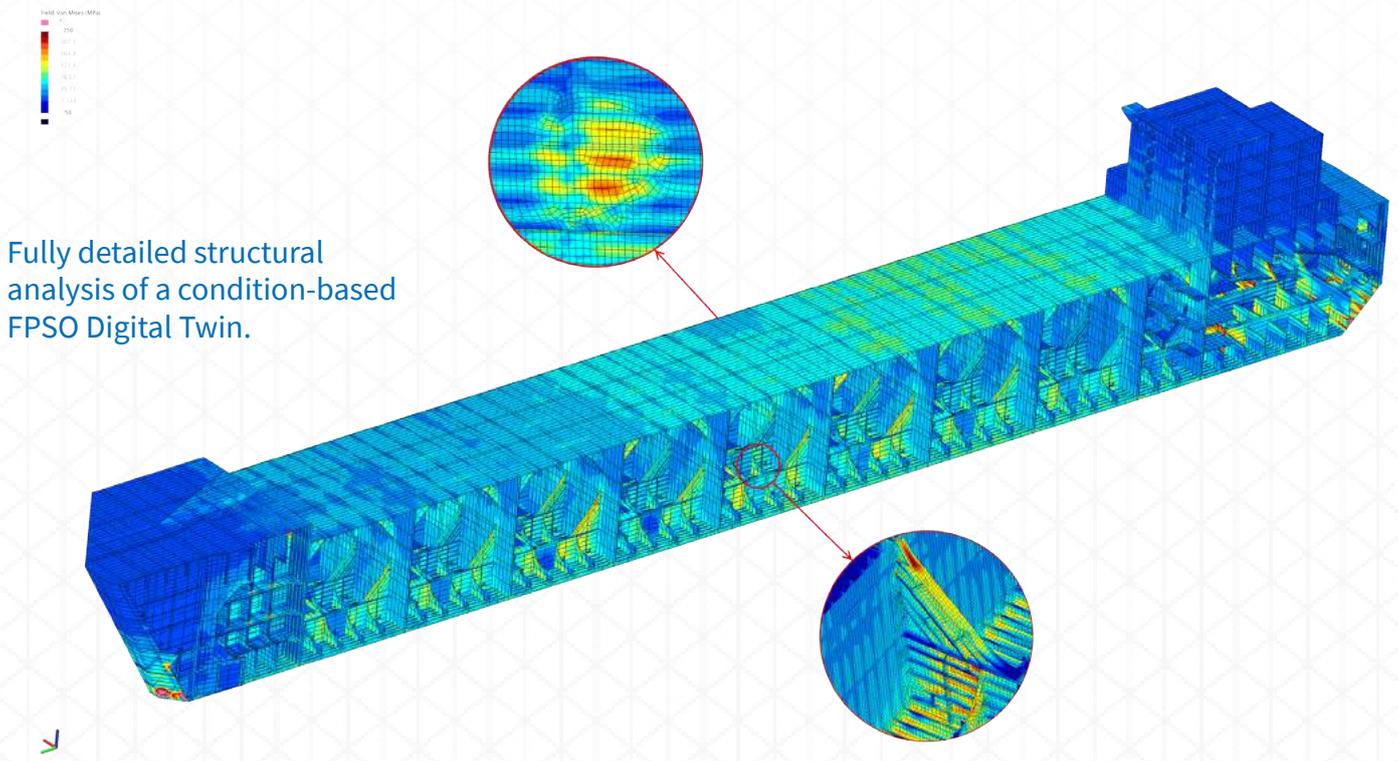
As the operator is suffering from high FPSO maintenance expenses due to complex inspection and maintenance workflows that require a lot of engineering judgment, a more quantitative, data-driven approach to provide actionable maintenance insights can drastically optimize the way the operator uses its engineering and maintenance resources.

Traditionally, engineers use conventional analysis tools, such as Finite Element Analysis (FEA), to assess the structural integrity of the asset. Due to computational limitations, FEA is incapable of supporting global system models at a level of sufficient detail to incorporate detailed inspection results.

According to the operator, a months-long manual process is used today – providing little insight into the true asset condition and requiring expert interpretation after obtaining inspection data.

There's a strong need to decrease the incident to resolution response time using a more automated, data-driven, and physics-based approach that assists the operator in analyzing the large amount of inspection data.

To address this need, **Akselos provides a near real-time structural integrity tool** equipped with holistic, detailed models that help automate inspection analysis workflows from inspection data to same day, full structural integrity reports that give high-level recommendations based on industry standard codes.



The Solution

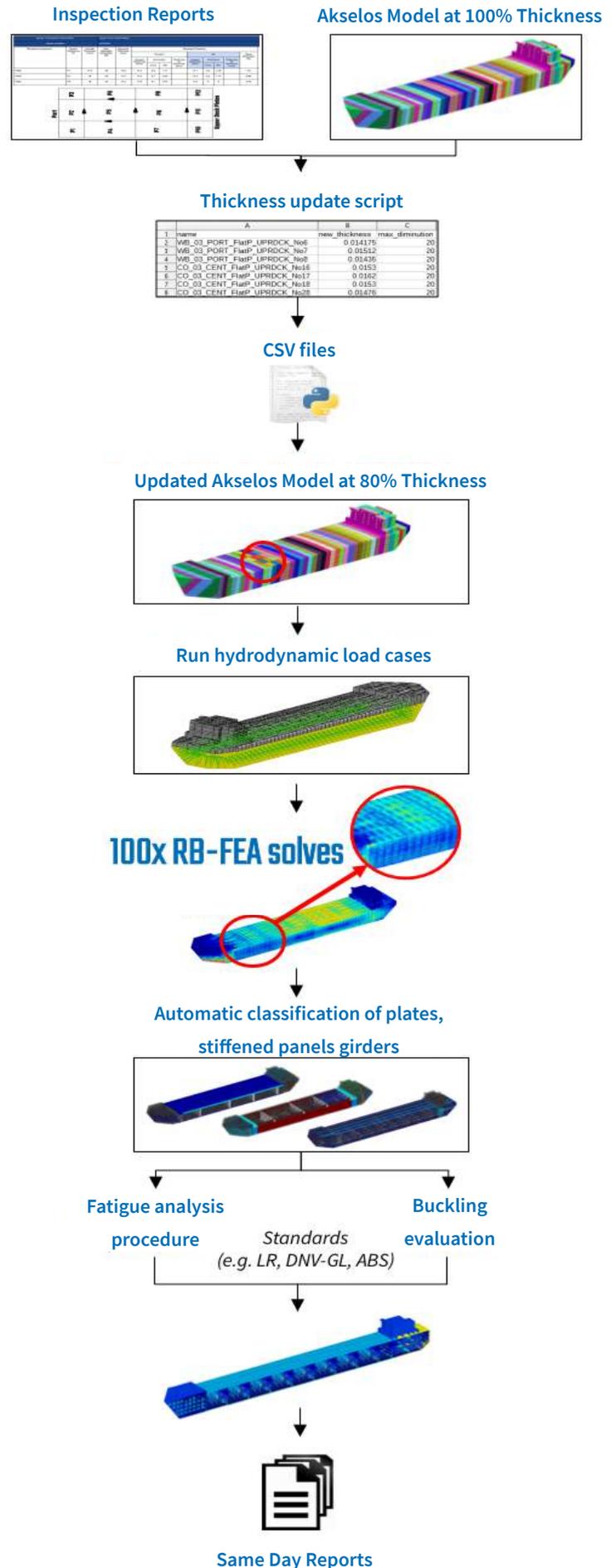
Using Akselos Integra, engineers created a condition-based Akselos Digital Twin incorporating all available design class specifications and leveraging ongoing inspection data. The Akselos Digital Twin was used to identify parts of the hull that are at risk, hence enabling optimized inspection and significant savings in OpEx. The detailed framework is as follows:

1. Akselos Integra software is used to create a detailed Digital Twin of the entire hull based on the original design data, e.g. drawings, Trim & Stability Report, and Weight Report. The large-scale Digital Twin model is built using Akselos's fully parameterized, component-based modeling approach.
2. The Akselos Digital Twin is automatically updated with inspection data to obtain a condition-based model of the FPSO. The update takes a csv file storing thickness data as an input and automatically updates the thickness in a visual way everywhere in the model.
3. The engineers perform a hydrodynamic analysis of the entire hull using an interface to WAMIT. This involves running hundreds of load cases to analyze the response of the hull under different wave periods and headings.
4. Using the class specifications for buckling and fatigue code based checks (e.g. Lloyd's Register, DNV-GL, ABS, etc.), engineers are able to automatically post-process the results of the hydrodynamic analysis and generate reports that identify any parts that do not satisfy the standards.
5. Using Akselos's advanced nonlinear analysis capabilities, engineers can run more detailed failure analyses of required parts identified as a result of the code check studies.

The Impact

By using the Akselos Digital Twin, the operator is able to:

- Achieve 5x ROI on engineering workflow used to analyze inspection data.
- Optimize inspection return on investment and save millions in future repair costs
- Gain a deeper understanding of operational safety margins
- Achieve an optimal mitigation strategy
- Use engineering and maintenance resources in a more targeted and precise manner.



Full, same day workflow for automatic analysis of inspection results using Akselos Digital Twins.

About Akselos

Akselos is a digital technology company headquartered in Switzerland, with operations in Europe, the USA and South East Asia. The company has created the world's most advanced engineering modeling, and fastest simulation technology, to protect the world's critical infrastructure today and tomorrow. The technology has the power to revolutionize how we build and manage our critical infrastructure, and pushes the boundaries of what modern engineering and data analytics can achieve. Developed by some of the world's best minds, the MIT-licensed technology builds something far beyond the capability of a conventional digital twin – a digital guardian that allows operators to not only monitor an asset's condition in real time, but helps them to see the future.



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