



CUSTOMER CASE STUDY

SBM Offshore: Data flow from engineering to operations

SBM Offshore - www.sbmoffshore.com

Industry - Oil and gas

Goals

- Build a foundation for process monitoring, condition-based maintenance, and advanced analytics
- Create a single source of truth for engineering and operations data
- Ensure users have access to quality data anytime and anywhere

Challenges

- Engineering data wasn't digitalized and was scattered across locations
- No standard structure for operations data
- Data collection takes place in remote, offshore locations

Results

- Improved design quality and reduced design time
- Reduced the cost of non-quality
- Optimized FPSO production, reduced costs, and increased uptime
- Connected engineering data to operations
- Centralized emissions management

Solutions

- AVEVA™ E3D Design
- AVEVA™ Engineering
- AVEVA™ Diagrams
- AVEVA™ PI System™
- AVEVA™ PI Vision™
- AVEVA™ Asset Information Management

In the world's deepest, most remote oceans, FPSOs, or floating production storage and offloading vessels, are continually producing, processing, and storing hydrocarbons as well as storing oil. Given the remote nature of operations, these vessels must not only be built precisely, but they must also operate smoothly to ensure both efficient production and crew safety.

SBM Offshore designs, supplies, installs, operates, and maintains FPSOs that run at a 99% production uptime. In an effort to optimize the design process and operations as well as continue moving toward the company's zero-emissions plan, the company embarked on a digitalization journey – from design and operations – to combine knowledge and cement best practices.

“At SBM, we like to say that we are not in the energy business, but in the energy transition business.”

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Cyrille Tenet

Global Engineering Director, SBM Offshore

Designing with data

Designing an FPSO is a complex endeavor, but the process is far more efficient and accurate when teams can access and leverage existing engineering data. Unfortunately, SBM Offshore's engineering data was neither digitized nor centralized, and the lack of both structure and automation made it difficult and inefficient for stakeholders to use. The company needed to create a trusted set of engineering data that would act as a single source of truth and establish a baseline for design processes.

In 2018, SBM Offshore began the process of building an integrated 1D, 2D, and 3D collaborative platform using AVEVA solutions. Named the Collaborative Engineering Environment, the solution would deliver quality and controlled engineering data to all internal and external stakeholders, improving productivity and collaboration while reducing the cost of non-quality. There was just one problem: The team first needed to digitalize the FPSO information, which included over 150,000 tags, upwards of 10 million data points, and more than 50 million data entries from one FPSO alone.

Starting small nets big results

Using a combination of AVEVA Engineering for 1D data, AVEVA Diagrams for 2D, and AVEVA E3D design for 3D data, the team started small to build the right data foundation. The team found the same generic patterns in all FPSO components, so they started by digitalizing P&IDs and associated components.

From there, they slowly built a digital model of the entire FPSO. This generic approach ensured that the principal solution would apply to any product or project and ultimately preserve data quality.

By using an integrated suite of AVEVA solutions, users only had to create and manage tags and populate attributes one time to enable 1D, 2D, and 3D models. The team took a phased approach.

First, they back-drafted P&ID data from the old system into the new AVEVA tools and then used a mixed model. Finally, after four long years, the company produced all P&ID data in the new environment. Once all data was produced in the new environment, SBM Offshore took a user-based approach, adding new functionalities to motivate adoption and enable users to view their achievements.

For example, piping scope is critical and drives the success of an EPS project, but SBM Offshore needed to better control the quality of the isometric drawings. Using the Collaborative Engineering Environment, designers started by drafting the P&IDs in AVEVA Diagrams before drafting the pipeline spools in AVEVA E3D Design.

From there, data and tags were transferred back to AVEVA Engineering where users ran the ISO check tool, which performs 1D, 2D, and 3D comparisons against data from other sources. Once users were confident in the data check, they could publish consistent, accurate isometric drawings. Not only did this process save 15 minutes per isometric – it also improved quality and ensured standardization across FPSO design projects.

By digitalizing its engineering data, SBM Offshore increased overall engineering quality, accelerated schedules, reduced man hours, improved compliance with client requirements, and even laid the foundation for digital twins.

Bringing its engineering data online was a massive endeavor, but engineering is only one facet of SBM Offshore's business model. The data foundation needed to flow through from engineering to operations so operators can ensure vessels are operating at optimal levels.

“We put the operations users in the driver’s seat so they can define how to leverage the collaborative environment for their benefit.”

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Cyrille Tenets
Global Engineering Director, SBM Offshore

Building the foundation for real-time FPSO monitoring

SBM Offshore's multiple FPSOs operate in several remote ocean locations, and the company lacked standard procedures for monitoring FPSO performance. This meant that users were missing valuable opportunities to reduce costs, increase asset uptime, and optimize production.

To lay the foundation for real-time monitoring, the company deployed AVEVA PI System as its data management platform to improve reliability and quality by giving teams anytime, anywhere access to data. AVEVA PI System ultimately enabled on and offshore teams to monitor FPSO performance and perform condition-based maintenance, and laid the foundation for advanced analytics, artificial intelligence (AI), and machine learning (ML).

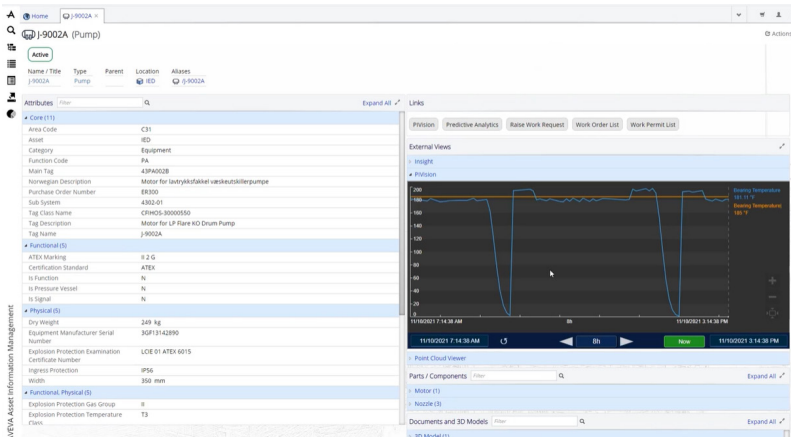
Creating a data pipeline from offshore to onshore

With stakeholders both offshore and onshore, SBM Offshore needed to deploy its AVEVA PI System in a way for users anywhere to consume operations data. The team opted to place a full AVEVA PI System on each vessel, including a data archive, an asset framework, and AVEVA PI Vision, so offshore users had all the data they needed right on the ship.

From there, they used PI Connectors to copy all time-series data, data structures, asset framework templates, and event frames from the offshore AVEVA PI Systems to one onshore AVEVA PI System. Given that the company uses data packages from vendors, they also implemented a data governance program that segregates each client's information within the centralized AVEVA PI System so users could monitor data flow in real time using secure dashboards.

Once AVEVA PI System was up and running, the team built displays to verify that analyses were working correctly and to ensure that systems were 100% online with zero data loss. Using a mix of IT tools and displays in the data archive, they verified the number of offshore and onshore data points, any differences, and event frames for each. The team automatically receives notifications if conditions change.

While deploying AVEVA PI System on its FPSOs was a great start, data quality was paramount. The team prioritized data cleaning up front so users would spend less time cleaning data later. Since vessels are often from different generations and use different equipment, the team built AVEVA PI System using a common asset framework so the same templates could be used for all FPSOs. This laid the foundation for standardized data, ultimately enabling reliable process and asset monitoring across SBM Offshore's fleet of remote ships.



“If we didn’t have the correct standardization, we couldn’t do the AVEVA Asset Information Management integration.”

Hachem Halawana
Systems engineer, SBM Offshore

Engineering data in operations: Users can search for displays in AVEVA PI Vision to view EPC data.

Closing the loop between engineering and operations

With a solid data foundation in place and access to quality data, users can now use AVEVA PI System to monitor vessels on a daily basis. They have access to management dashboards in Microsoft Power BI and can see live AVEVA PI System data right from their phones. From vessel position to technical information, they can easily understand normal behaviors as well as emissions. In fact, AVEVA PI System has become the central system for managing emissions, getting SBM Offshore closer to reaching its net-zero goals. Thanks to a value and cost prevention tool, users can easily understand the impact of their work, which has impacted user adoption.

Beyond real-time monitoring, the team also wanted to give operations users access to its engineering data. Using AVEVA Asset Information Management, which was the chosen technology for one Engineering Procurement Construction and Installation (EPCI) digital twin project, they structured and integrated EPC data to make it available to operations users in AVEVA PI Vision. Now, users can simply search for a monitoring display in AVEVA PI Vision and can open the display to see tags, data, 1D, 2D, and 3D models, documentation, metadata, and live trends for a specific instrument.

A solid data foundation from engineering to operations

While engineering and operations take different approaches to the way they work, SBM Offshore used a mix of AVEVA solutions to combine their knowledge. By focusing on data governance and quality, they laid the foundation for success from the very beginning and are continuing to expand their capabilities.

The Collaborative Engineering Environment is now fully operational, and the team plans to enable the engineering environment to communicate with other systems, such as client systems, third-party portals, ERP solutions, construction yards, CMMs, digital twins, and operations applications. The AVEVA PI System now has more than 500 users and almost 160 million data points per day. SBM Offshore plans to use AVEVA PI System to increase AI and ML usage and enable advanced analytics.

For more information, please watch [SMB's presentation on operational data governance](#) or on its [integrated engineering environment](#)

