SACS Enables L&T-Valdel to Deliver Optimized FPSO Design and Meet Accelerated Project Schedule

Bentley Software Helps Reduce OSX-3 FPSO Topside Steel Weight by 10 Percent

SACS and STAAD Software Optimizes Topside Modules

Located in the Santos Basin off the coast of Brazil, the OSX-3 is a floating production, storage and offloading (FPSO) vessel designed to produce and treat 100,000 barrels per day (bpd) of crude oil. L&T-Valdel Engineering was commissioned by MODEC International to provide modularization design for the FPSO topside. The challenge was to complete the design of 15 modules and 10 pipe racks within 10 months. The company used SACS for modeling, analysis, and optimization of the FPSO topside structure and STAAD.Pro to design its tertiary steel. Bentley software was used to analyze the module for all static and dynamic loads observed during pre-service and in-service conditions. SACS improved design accuracy and visual clarity, which saved on-site construction time and reduced steel consumption by 10 percent.

“An EPC project always demands a very tight schedule and optimization – two things that are basically contradictory,” explained Sharad Jain, lead structural engineer, L&T-Valdel. “The biggest challenge on this project was to complete the project on time and optimize the design.”

—Sharad Jain, lead structural engineer, L&T-Valdel

Fast Facts

- The scope of work involved six disciplines, more than 120 people, and 2,000 deliverables.
- More than 1,000 special pipe supports were designed in just 15 days.
- First cutting of steel occurred within three-and-a-half months of project start.
- Within six months of project start, 80 percent of the overall material take off was issued.

ROI

- SACS achieved a 10 percent overall reduction in steel weight per module/pipe rack compared to conventional design.
- SACS provided clear visualization of lifting arrangements and detected structural clashes, helping to avoid major rework and saving time finalizing the safe and practical lifting arrangement.
- STAAD.Pro’s speed and accuracy helped the team complete the project on time.

Designing for Deep Water

MODEC turned to L&T-Valdel for its expertise in topsides design. Headquartered in Bangalore, India, as a wholly owned subsidiary of Larsen & Toubro Ltd, India, L&T-Valdel specializes in the engineering challenges confronting offshore projects such as wellhead and process platforms, FPSO topsides, pipelines, and offshore drilling rigs.

The OSX-3 oil production ship was to be turret-moored in a maximum water depth of 110 meters and have a 100,000 bpd capacity. Modularization of the OSX-3 topsides involved design of 15 modules and 10 pipe racks weighing 6,000 metric tons. The design had to be both economical and workable, and also completed on time.
“In the present industry dynamics, effective cost management is the only mantra for competitiveness and sustainability. Engineering software has emerged as the principle tool to reduce the engineering cycle time and achieved desired results. For offshore structural design, that software is SACS.”

– Sharad Jain, lead structural engineer, L&T-Valdel

SACS not only provided improved design accuracy but also provided visual clarity, which reduced onsite construction time and material. Optimizing the layout of pipe racks spanning 30 meters each and reducing their height helped to achieve an enormous reduction in the total weight. SACS also identified local failures in sections and plates. By modeling modifications rather than replacing entire sections, SACS reduced the total steel weight per module/pipe rack by 10 percent. The software’s model viewer module provided a clear visualization of lifting arrangements and detected structural clashes, helping to avoid major rework. This saved an enormous amount of time in finalizing the safe and practical lifting arrangement.

With the right combination of specialized expertise and fast, accurate analysis and modeling software, L&T-Valdel fulfilled the requirements of the FPSO topside subcontract and enabled MODEC to deliver an on-time, optimized solution for OSX-3 Leasing B.V.’s FPSO.