



LLOYD'S REGISTER ASIA, SRI LANKA

Key Facts

Company: Lloyd's Register Asia

Website: www.lr.org

Industry:

- Chemical & Petrochemical
- Oil & Gas - Offshore
- Oil & Gas - Onshore

Country: Sri Lanka

Products Used:

- CAESAR II®
- PV Elite®
- NozzlePRO™

Key Benefits:

- Accommodated design changes even with a quick turnaround
- Performed multiple opening checks for the large quantity of nozzles on the equipment
- Accurately evaluated the flanges with external piping loads
- Created reports with a single click

LLOYD'S REGISTER MEETS QUICK DEADLINE WITH SUPERIOR ANALYSIS FROM CAESAR II® & PV ELITE®

IDENTIFYING GOALS

Lloyd's Register (LR) frequently performs third-party design appraisal review of complex equipment. It was recently awarded a project to review the piping stress analysis as per ASME B31.3 and B31.4 and equipment as per ASME Sec. VIII Div. 2.

A complete LPG storage and terminal facility was being constructed and needed design review of 13 pieces of static equipment in addition to about 100 critical lines in the piping system. The project included large LPG spheres, propane spheres and other allied static equipment.

OVERCOMING CHALLENGES

The piping system had quite complex construction because it involved piping from the jetty to the tank farm and piping of the tank farm with wind loadings, and both with and without insulation. On top of all that, the client had a strict deadline within which they wanted to have the design review in place for the piping system and equipment. This was a new client and it was a large initial order. The equipment was also complex because it is a spherical tank with braced leg support and with a lot of external loading – external platform loading, railing loading and spray water system loading.

EQUIPMENT ANALYSIS

It was easier to determine the loads for the equipment end connections since pieces were evaluated by PV Elite software. The team could play around with various options for the equipment nozzle load – including the anchor option, WRC option and entering the flexibilities of the geometry by external evaluation – using CAESAR II.

LR was able to highlight some of the major non-compliance issues to the client, which their team greatly appreciated. Non-compliance issues included failure of nozzles in local load criterion and overstress in leg support.



PIPE STRESS ANALYSIS

The team could review the complete equipment as a whole in an integrated approach using PV Elite. LR could model and simulate the complete equipment with leg support and bracing, external platforms and nozzles. The cyclic loadings in the sphere could be easily reviewed. Data integration was simple since PV Elite was used for the equipment and CAESAR II was chosen for the piping.

Many nozzles had pipe loadings which LR could quickly evaluate. Yet for some of the nozzles, WRC was not applicable, so the team needed to perform finite element analysis. With the combined harmony and synchronization of PV Elite and NozzlePRO, it could quickly perform the FEA. The flanges could be analyzed as well under the external loads of piping.

In between the initial request and final delivery, the client had modified some of the inputs of the equipment (including changes in nozzle loads, location and orientation), but with the PV Elite model in place, the team could quickly accommodate the changes.

LR had to perform its own calculations and perform its own calculation report, which is an auditable document, as part of the group's activity. CAESAR II helped them instantly prepare their own calculation reports.

REALIZING RESULTS

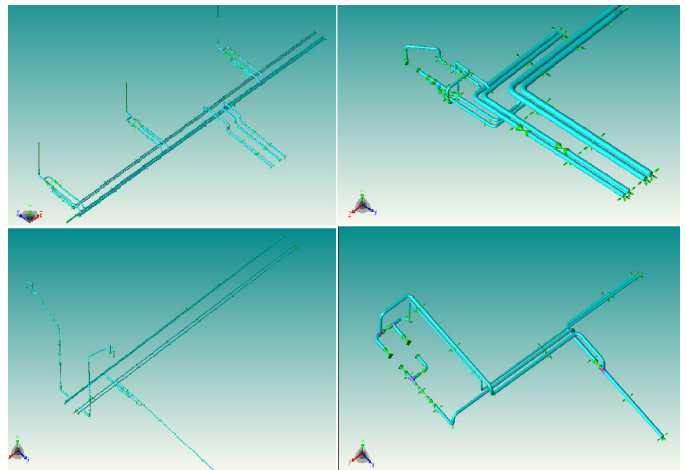
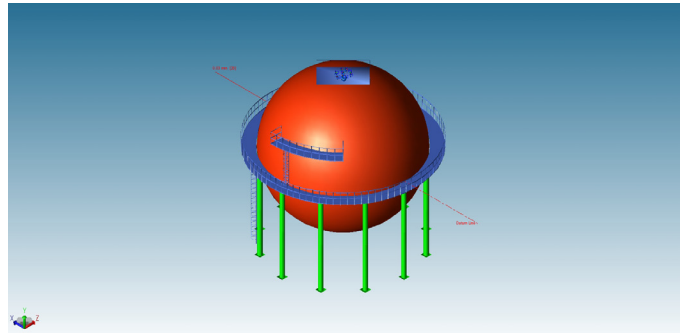
With software from Hexagon PPM, LR could easily deal with design changes even with a quick turnaround. It was simple to perform multiple opening checks on the large quantity of nozzles on the equipment. The team could accurately evaluate the flanges with external piping loads. LR was able to determine the loads for the equipment end connection.

The combined loading calculation and review would have been a major challenge with this equipment, which the team cannot imagine performing in the absence of PV Elite. Its own report preparation would have been haywire without PV Elite, which offered a single-click auditable document.

LR was able to save lot of man hours for the equipment and for the piping, thanks to the use of PV Elite and CAESAR II.

AWARD-WINNING PROJECT

LR received the 2018 CAESAR II Drivers of Success Runner-up Award for its use of the software. The annual Drivers of Success competition recognizes innovative applications of Hexagon PPM products, impressive project results, and significant benefits from collaboration among disciplines and the integration of the products.



ABOUT HEXAGON

Hexagon is a global leader in digital solutions that create Autonomous Connected Ecosystems (ACE). Our industry-specific solutions create smart digital realities that improve productivity and quality across manufacturing, infrastructure, safety and mobility applications.

Hexagon's PPM division empowers its clients to transform unstructured information into a smart digital asset to visualize, build and manage structures and facilities of all complexities, ensuring safe and efficient operation throughout the entire lifecycle.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 20,000 employees in 50 countries and net sales of approximately 3.8bn EUR. Learn more at [hexagon.com](https://www.hexagon.com) and follow us @HexagonAB.