



## FACTS AT A GLANCE

**Company:** L&T Chiyoda Limited

**Website:** [www.Intchiyoda.com](http://www.Intchiyoda.com)

**Description:** L&T Chiyoda Limited (LTC) is an engineering and consulting firm formed by Larsen & Toubro Limited, India's premier technology, engineering, manufacturing, and construction company, and Chiyoda Corporation, Japan, a world-renowned engineering company serving the hydrocarbon and related fields. LTC serves national and international clients involved in petroleum refining, petrochemicals, chemicals, fertilizers, and oil and gas.

**Industry:** Petrochemical

**Country:** India

## PRODUCTS USED

- CAESAR II®
- PV Elite®

## KEY BENEFITS

- Met stringent requirements.
- Prevented wasted time and project delays.
- Reduced time for analysis and modeling.

## L&T CHIYODA SUCCEEDS USING CAESAR II® FOR ENGINEERING ANALYSIS

**EPC performs complex stress analysis for paraxylene and benzene facility in Mangalore**

### IDENTIFYING GOALS

ONGC Mangalore Petrochemicals Limited (OMPL) assigned Larsen & Toubro the engineering, construction, and procurement for its Aromatics Complex in Karnataka, India, with LTC providing the engineering analysis and UOP serving as the process licensor. The facility would produce 905,200 tons per annum (TPA) of paraxylene and 273,200 TPA of benzene and was to be completed in 33 months.

The project required static, wind, and seismic analyses of piping systems plus two-phase and flange leakage analyses. Pipe diameters ranged from 2 to 64 inches operating at a temperature of up to 578°C and 78 kg/cm<sup>2</sup> pressure.

Stringent routing requirements of the licensor dictated inter-equipment distances, which meant LTC had to analyze and qualify piping systems without changing any pipe routing. This included routing for:

- Absorbent chambers (8 m X 17.2 m).
- Chamber circulation pumps (16" inlet – 24" outlet nozzle).
- Co-planar manifold indexer.

### OVERCOMING CHALLENGES

To best meet client specifications, LTC chose to use CAESAR II for all static, wind, and dynamic analyses. The EPC used CAESAR II to model the static equipment and pipe trunnion and spring supports considering the realistic thermal displacement at equipment nozzles and the effect of pipe supports on stress analysis.

"CAESAR II simulated the different operating condition in the same file," explained Manoj Devani, pipe stress engineer at LTC.

The project called for eight thermos-syphon vertical reboilers supported by column/tower. The CAESAR II analysis indicated that the reboilers' massive weight would require an increase in the column's shell thickness. So, for maximum design efficiencies, it was decided that the reboilers would be supported on an independent structure.

"With CAESAR II, we were able to perform a realistic stress analysis as a single system under different operating conditions," Devani said.

Without CAESAR II, LTC would have spent much more time and expense on the project and might have not been able to meet the tight schedule. The software's analysis tools and calculation modules eliminated errors that may have otherwise occurred. This gave LTC much more confidence in the accuracy of the design and the deliverables it provided the client.

## REALIZING RESULTS

All stress reports were submitted to the client at their complete satisfaction level within the committed project timeframe. This further developed a satisfied client base, which ultimately leveraged growth for the company.

LTC also used CAESAR II's modal analysis to ensure lines qualified, and all in the first submission. The various other analysis modules saved LTC more time and helped further reduce project costs.

"CAESAR II's user-friendly graphic interface, simple modeling techniques, and excellent simulation capabilities helped us confidently develop our project deliverables in a very tight schedule with minimum efforts. We were able to meet client requirements while saving time and reducing costs, completing the work on schedule," Devani added.

## AWARD-WINNING PROJECT

LTC received the 2015 CAESAR II Drivers of Success Runner-Up Award for its use of the software. The annual Drivers of Success competition recognizes innovative applications of Intergraph products, impressive project results, and significant benefits from collaboration among disciplines and the integration of the products.

## ABOUT INTERGRAPH

Soon to be known as Hexagon Process, Power & Marine, Intergraph Process, Power & Marine is the leading global provider of engineering software for the design, construction and operation of plants, ships, and offshore facilities.

Hexagon Process, Power & Marine is part of Hexagon (Nasdaq Stockholm: HEXA B; hexagon.com), a leading global provider of information technologies that drive quality and productivity improvements across geospatial and industrial enterprise applications.

