CASE STUDY

Linde Engineering experiences higher accuracy and quality control with bi-directional interface between Forte 3D and Aspect Pipe Stress

Engineers significantly reduce the time spent for creating pipe stress model

Key facts:

Company: Linde Engineering

Website: linde-engineering.com

Industry: Engineering, Construction

Country: Germany

Octave products used: Forte 3D *(Smart 3D),* Facets P&ID *(Intergraph Smart P&ID),* Forte Review *(Intergraph Smart Review),* Facets Instrumentation *(Intergraph Smart Instrumentation),* Aspect Pipe Stress *(CAESAR II),* SmartPlant® Foundation

Linde Engineering, a division of the Linde Group, is a leading technology partner for plant engineering and construction worldwide. The company has extensive process engineering expertise in the planning, project development and construction of turnkey industrial plants worldwide.

Identifying Goals

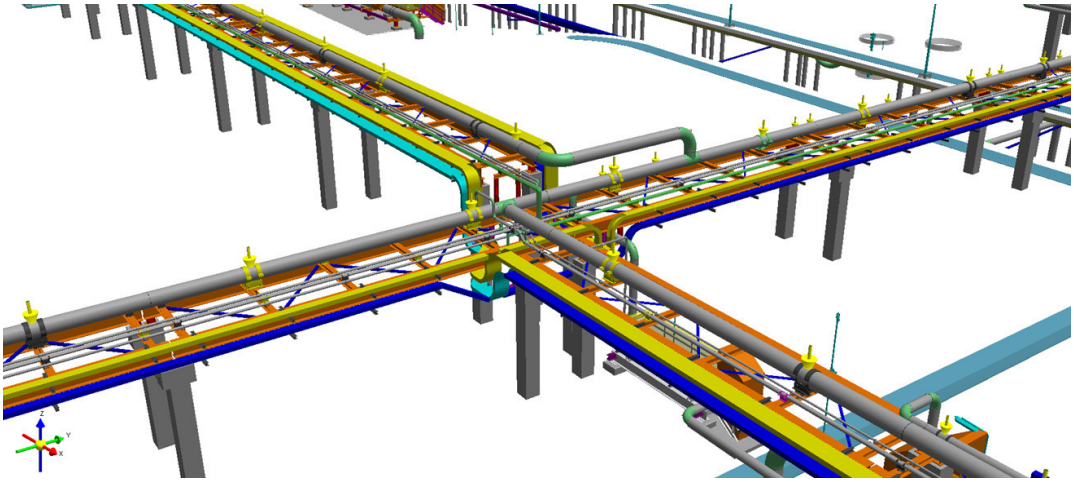
With more than 1,000 process engineering patents and 4,000 completed plant projects, Linde Engineering ranks among the leading international plant contractors.

Engineers used to separately input similar data into their computers. Recently, Linde Engineering has increased its effort to automate data input and data processing with the ultimate goal to increase accuracy, reduce rework and increase workflow efficiency.

Piping design, pipe stress analysis, and structural design have an important influence on the layout and cost of the plants. To create a CAD piping model and perform computer-based pipe stress analysis, a huge amount of data must be processed. Linde Engineering identified this as one of the processes where improvements could have a high beneficial impact, and has since then worked with Octave to create a comprehensive interface enabling bi-directional communication between Forte 3D, Octave's design software and Aspect Pipe Stress, Octave's advanced pipe stress analysis tool.

Key benefits:

- Time spent for creating pipe stress models has been reduced up to 50%
- Optimized accuracy of layout between CAD and stress model
- Less error opportunities
- Piping designer can verify piping routing and support



Overcoming challenges

The company decided to tackle the interface between Forte 3D and Aspect Pipe Stress first. In Linde Engineering's existing workflow, the piping design group and the stress analysis group worked together in creating and approving the piping layout and pipe support concept, and in providing piping loads to the structural group. However, there was no seamless data transfer between the groups.

The pipe stress group needed to re-enter piping data to Aspect Pipe Stress from isometric drawings. On the other side, the piping design and structural groups got the results of pipe stress analysis in paper format and had to incorporate them manually in their applications. This was inefficient, time-consuming and not up-to-date.

The proposed solution was to create a Piping Component File (PCF) interface, which has an ASCII text format and contains piping data of the Forte 3D model, including pipe size, component type, pressure, temperature and thickness, among others. The PCF created within Forte 3D enables piping layout and piping data to be seamlessly inserted into Aspect Pipe Stress. To have optimal interface efficiency, all data must be available in Smart 3D before starting analysis. In addition, Aspect Pipe Stress provides dialog-based PCF import and translation of company- and project-specific data with mapping files, mapping units and materials, support restraints, and branch types, all of it resulting in a Aspect Pipe Stress file with piping data ready for analysis.

Realizing results

The new interface enables seamless data transfer between involved groups, minimizes data re-entry, and increases efficiency. The PCF interface from Forte 3D to Aspect Pipe Stress provides most of the pipe component and process design data, translates company-specific content, creates piping models in Aspect Pipe Stress as an experienced stress engineer and shows significant time savings for creating stress models.

"In the first projects where the tool has been used, engineers have reduced the time spent for creating pipe stress models up to 50%, accuracy of the layout between CAD and the stress model has experienced a vast improvement, and there has been a significant reduction in layout inaccuracies, resulting in significant productivity gains," says Andreas Emrich, Pipe Stress Manager, at Linde Engineering.

Once the interface from Forte 3D to Aspect Pipe Stress was ready, engineers focused on the interface from Aspect Pipe Stress to Forte 3D, which aimed for a seamless transfer of stress analysis results; providing stress report data concurrently to all Forte 3D users; and allowing a clear process of revision. Only a few steps were needed to create an access result database (MDB file) from Aspect Pipe Stress. Functionalities include open data export wizard, set revision number, export piping layout data,

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Pipe Stress Manager,
Linde Engineering



select load cases and restraint summary output, including support loads and support denomination.

Once all pipe stress data is available, it is converted to MDB data for use in Octave Forte Review. This file can be merged with the piping model, resulting in a 3D model . svf file. The visibility of pipe stress results in the 3D model facilitates the work of piping designers and civil engineers when checking, reviewing and validating piping layout. The Forte Review file system makes data available to other applications and disciplines.

The benefits include the concurrent availability of data to all users, a clearer and holistic vision of the process, increased opportunities to maximize data for reporting purposes, simplified stress analysis results and improved performance and accuracy for piping designers and civil/ structural engineers.

Moving forward

In the short term, Linde Engineering's future plans include providing the PCF with more attributes for stress analysis. Furthermore, additional work to expand data transfer is required, as well as labeling and tracking modifications of stress analysis in Forte 3D, providing automatic pipe support, layout check and support load data to the interfaces. The goal is to work more efficiently with increased accuracy to minimize time consumption and maximize flexibility in the cooperation between the involved groups over all Linde Engineering entities to deal successfully with future challenges in the design of process plants.

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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