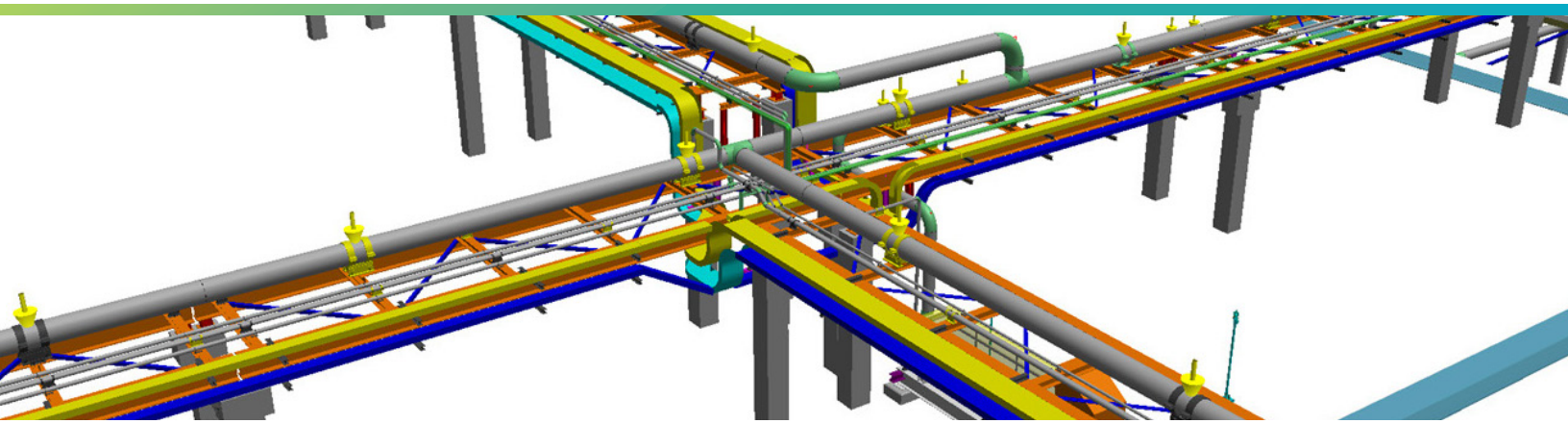
HEXAGON

Case Study



Linde Engineering, Germany

Key Facts

Company: Linde Engineering

Website: www.linde-engineering.com

Industry: Engineering, Construction

Country: Germany

Products Used:

- CAESAR II®
- Intergraph Smart® 3D
- Intergraph Smart P&ID
- Intergraph Smart Review
- Intergraph Smart Instrumentation
- SmartPlant® Foundation

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

Linde Engineering Experiences Higher Accuracy and Quality Control with Bi-Directional Interface between Intergraph Smart® 3D and CAESAR II®

Engineers significantly reduce the time spent for creating pipe stress model

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 Hexagon to create a comprehensive interface enabling bi-directional communication between Intergraph Smart® 3D, Hexagon design software, and CAESAR II®, Hexagon's advanced pipe stress analysis tool.

Overcoming Challenges

The company decided to tackle the interface between Smart 3D and CAESAR II 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 CAESAR II 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 Smart 3D model, including pipe size, component type, pressure, temperature, and thickness, among others. The PCF created within Smart 3D enables piping layout and piping data to be seamlessly inserted into CAESAR II. To have optimal interface efficiency, all data must be available in Smart 3D before starting analysis. In addition, CAESAR II 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 CAESAR II 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 Smart 3D to CAESAR II provides most of the pipe component and process design data, translates company-specific content, creates piping models in CAESAR II 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," explains Andreas Emrich, Pipe Stress Manager, at Linde Engineering.

Once the interface from Smart 3D to CAESAR II was ready, engineers focused on the interface from CAESAR II to Smart 3D, which aimed for a seamless transfer of stress analysis results; providing stress report data concurrently to all Smart 3D users; and allowing a clear process of revision. Only a few steps were needed to create an access result database (MDB file) from CAESAR II. Functionalities include open data export wizard, set revision number, export piping layout data, select load cases, and restraint summary output, including support loads and support denomination. Once all pipe stress data is available, Smart Review Publisher converts MDB data to Smart Review files. 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 Smart 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 Smart 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 Hexagon

Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, 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 3.9bn EUR. Learn more at hexagon.com and follow us @HexagonAB.