CASE STUDY

FASTER, BETTER SCAFFOLDING DESIGN

ALTAIR® HYPERWORKS® PLATFORM CUTS TIME AND COSTS IN RINGER'S SCAFFOLDING DESIGN CYCLE

About the Customer

Headquartered in Regau, Austria, RINGER is a leading manufacturer of scaffolding and formwork systems with offices throughout Europe. For more than 80 years, RINGER has been supplying high-quality products to its customers worldwide. The company's product range spans facade scaffolding, fall protection systems, transport containers, and formwork systems for modern concrete buildings and frame structures such as multi-story buildings, and more. Committed to quality and reliability, RINGER designs scaffolding that meets stringent material and safety requirements. To fulfill the company's exacting quality standards, RINGER has implemented Altair's leading design and simulation technology in its product development process.

Their Challenge

Used mainly on construction sites, scaffolding systems must be constantly monitored and tested to meet the industry's latest safety standards. RINGER knows ensuring product safety begins in design development; finding the correct dimensioning early plays a crucial role in creating quality designs. Ensuring accurate dimensioning is essential, since unprecise dimensions can cause project delays and increase development and material costs.

In a new project, RINGER engineers needed to design a new component of a facade scaffolding system called a cornice frame. Cornice frames are used when parts of a building extend into the scaffolding area, requiring the scaffolding to bypass these protrusions. Inherent in their design, cornice frames are less vertically load bearing than standard scaffolding frames. The challenge lies in optimizing the maximum vertical load from the scaffolding above while simultaneously allowing sufficient clearance for building protrusions.

INCREASED SCAFFOLDING HEIGHT FROM 2 TO 7 STORIES

REDUCED DEVELOPMENT COSTS

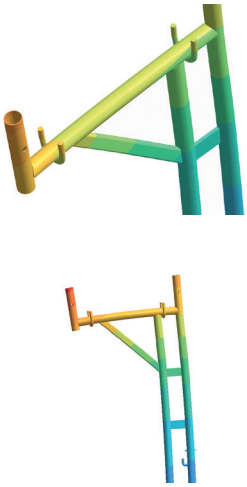
ACCELERATED DESIGN PROCESS

MINIMIZED STRUCTURE'S MASS

IMPROVED EFFICIENCY

RINGER's main goal was to extend the number of scaffolding levels above the cornice frame without increasing the frame's weight. Until recently, RINGER's approach to finding the right dimensioning for new products involved initial design followed by an evaluation by a structural engineering expert. Since this process involved using traditional FEA, this process often meant RINGER needed to wait up to several weeks before receiving the feedback needed to perform revisions. Furthermore, while the FEA-centric approach was usually able to reliably identify and prevent under-dimensioned components, it often missed over-dimensioned components – which led to unnecessary material use, higher costs, and delays.

Since RINGER produces its products in high volumes, reducing these products' mass and costs were vital. To address these challenges and foster an efficient design process, RINGER sought a new simulation tool that would allow them to calculate structural loads early in development. Ideally, the tool would also provide feedback on product behavior as designers adjusted models. Lastly, the tool needed to be easy to use and implement.



TOP: Using the results of the stress analysis, RINGER gained a clear understanding of how to modify the design to meet requirements. **BOTTOM:** The models with more than two floors on top showed a large area with von Mises stresses exceeding the steel's yield strength.

Our Solution

When RINGER learned about the capabilities of Altair's structural analysis software Altair SimSolid® – part of the Altair® HyperWorks® design and simulation platform – their development team started using the tool extensively. Altair SimSolid is easy to use and empowered RINGER to perform structural analyses without having to rely on external experts. One of the first projects was the dimensioning of a steel cornice frame measuring 0.65 x 2 meters, featuring a double balustrade. The project had to comply with two Eurocodes (EN 12810 and EN 12811), which are standardized rules for the structural and geotechnical design for scaffolding throughout Europe.

Using Altair SimSolid, the RINGER designers were able to perform the load analyses in parallel with the design process – and quickly and reliably attain optimal results. To perform a structural (linear) analysis of the design, the project team assumed various load combinations (von Mises criteria) in the model. According to the results of the stress analysis, the models with more than two floors on top showed a large area with von Mises stresses exceeding the steel's yield strength. As a result, the team gained a clear understanding of how to modify the design to meet Eurocode requirements for structures used on upper floors.

Results

By conducting load analyses in parallel with the design process with Altair SimSolid, RINGER's project engineers saved a significant amount of time while slashing the number of physical prototypes needed to achieve production maturity. Furthermore, since Altair SimSolid reliably identified over-dimensioned components, RINGER was able to streamline material usage to achieve substantial mass and cost savings. The tool enabled the project team to achieve their goal of increasing the number of scaffolding levels while not adding weight to the system. Now instead of two stories, seven stories are possible. Altair SimSolid's ease of use empowered the company's engineers to run simulations and achieve reliable results without needing in-depth knowledge of finite element analysis (FEM). This democratization of simulation – which drove substantial savings in time, costs, and material usage – wouldn't have been possible without Altair software.

For RINGER, Altair's simulation-driven design software has become invaluable, enabling all its engineers to quickly achieve optimal results while maintaining the high standards required in their industry. RINGER also aims to leverage other Altair solutions within the Altair HyperWorks platform, such as Altair® Inspire™ for topology optimization, to further meet their organizational goals and satisfy their customers.

Explore the powerful simulation capabilities of Altair SimSolid and see how it can transform your design process. To learn more, visit altair.com/simsolid

> "Thanks to the fast, accurate results provided by Altair SimSolid, we drastically reduced our development time and the number of physical prototypes needed. As a result of this much-accelerated design process, we significantly lowered our development costs while maintaining the high standards RINGER is known for.
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> Hermann Pohn, head of product management and product development, RINGER