

Shanghai Universal Logistics Technology Co., Ltd

Simulation Acceleration in the Design Iteration Process of Non-Standard Products

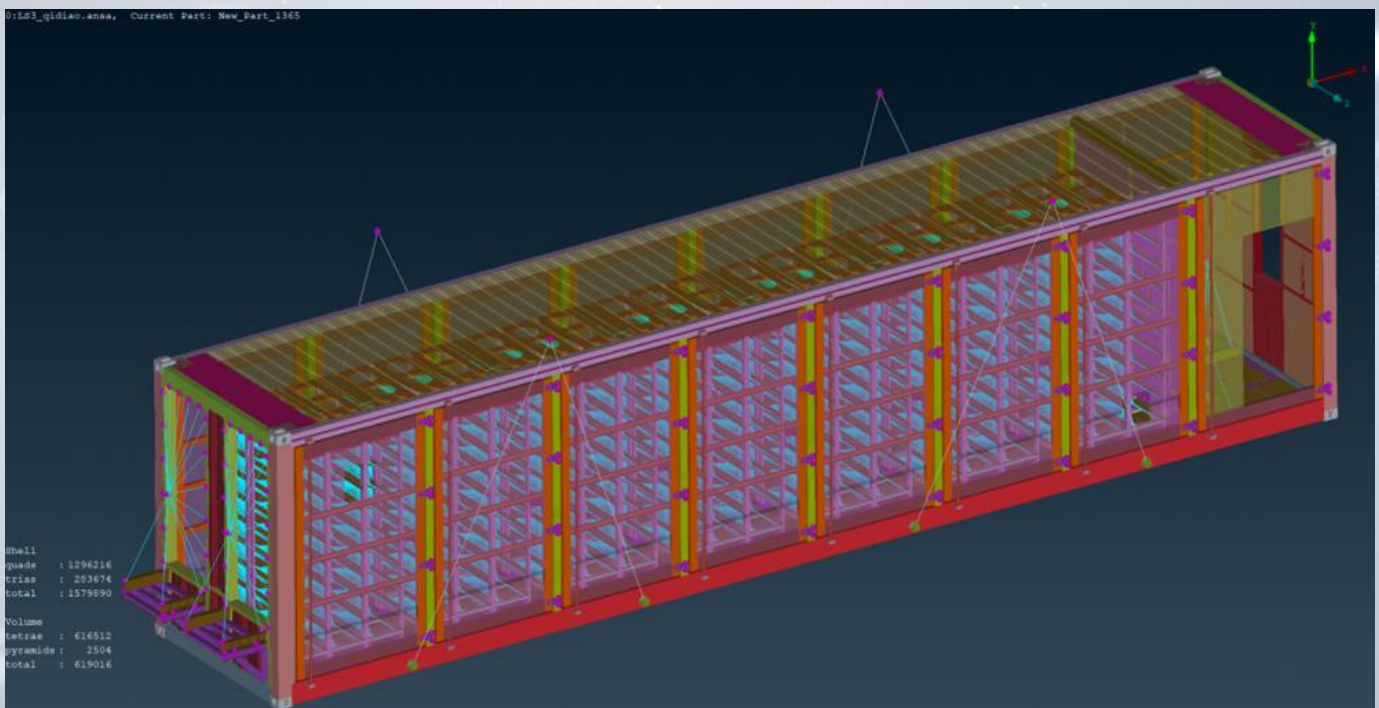
Shanghai Universal Logistics Technology Co., Ltd. specializes in the design of customized, non-standard containers that rely heavily on simulation technology. The iterative nature of the design process presents a major challenge for CAE engineers, who must explore optimal solutions within tight time constraints. Traditional approaches require rebuilding analysis models for each iteration, significantly slowing down the workflow.

By leveraging BETA CAE's ANSA pre- and post-processing system, engineers can efficiently identify design changes, seamlessly update models, and automate connection handling, leading to a 70% reduction in simulation preparation time. This streamlined approach empowers engineers to focus more on design exploration, ultimately accelerating innovation in specialized container development.

"ANSA's advanced data architecture, flexible workflow organization, and agile toolset bring exceptional efficiency to CAE engineers, enabling rapid simulation during the product design iteration process and providing them with more time for exploration of design solutions.."

Jet Shen

Chief Structural Expert



Challenge

The container is mainly a welded structure, the seamlines between different parts are treated as geometric collinear intersections in the analysis model, which are common nodes after meshing. This approach brings better simulation accuracy but also increases design time. If the analysis model needs to be rebuilt for each design iteration, it will not be able to meet the requirements of the design cycle.

CAE engineers desire a "surgical" approach to building analysis models, in which only the modified parts of the previous version of the model are updated, and the unchanged parts are retained. This allows for the maximum reuse of the previous version of the analysis model, facilitating fast simulation during design iteration and precise comparison of performance differences between different design versions.

The handling of bolt and rivet connections in large assembly models requires a lot of manual processing. CAE engineers expect a tool for automatic connection.

Approach

Identify and Separate Design Changes. Using the Compare tool in ANSA, quickly find out the differences between two design versions and automatically separate the differing parts for further processing.

Pretreatment part of Design Changes and Merge with the previous analysis Model. Perform geometry handling such as removing small features and mid-face generation on the changed parts, save as separate ANSA files, and merge them with the previous analysis model. Use ANSA's Transform tool for fast and convenient positioning.

"Connect" the part of Design Changes with the previous analysis Model. With ANSA's extensive TOPO toolset, geometric collinear connections between design changes and the previous analysis Model can be quickly achieved. Only a couple of functions in the TOPO toolset are needed to efficiently complete geometric connections of any complexity.



Automatic Update of SETs. ANSA provides a unique SET definition tool that allows setting components of loads/constraints/contacts as uniquely named sets. Corresponding modeling operations could be performed by invoking these sets. If these sets are created based on geometric entities such as macros, the elements, and nodes on these entities would inherit the settings of load, constraint, and contact after meshing. Unlike traditional techniques that manage objects by ID numbers, changes to the geometric entity within the sets (such as splitting, cutting, or even removing it) will not affect the update of the sets. This means that the settings of the analysis model in terms of loads and boundary conditions can also be efficiently reused, further enhancing pre-processing efficiency.

A script was developed based on ANSA API to automatically generate connection elements based on the geometric model, which can adapt to connected bolts and rivets of different layers.

Results

With ANSA's advanced model reuse capabilities, Shanghai Universal Logistics Technology Co., Ltd. has drastically improved its simulation efficiency. By automating design change identification, seamless model updates, and connection handling, engineers have reduced simulation preparation time by 70%.

This has allowed for faster iterations without compromising accuracy, ensuring that design modifications are quickly validated. The streamlined workflow minimizes manual effort and maximizes consistency in the analysis process, enabling engineers to dedicate more time to refining and optimizing container designs.

For more about BETA CAE Systems, visit www.beta-cae.com