CASE STUDY

FAST-TRACKING SUSTAINABLE MOBILITY

ALTAIR SIMSOLID® ENHANCES ACCURACY IN BATTERY DEVELOPMENT AND PLASTIC PARTS DESIGN

About the Customer

Boasting approximately 6,000 employees at over 40 locations in 17 countries, Röchling Automotive – a division of the Röchling Group – designs, develops, and produces customized high-performance plastics parts to provide global customers with a variety of innovative plastics products and services. In line with their motto "We Drive Sustainable Mobility," the division uses bioplastics and recyclates to meet their customers' sustainability goals. To achieve excellence in all product areas including aerodynamics, propulsion, structural lightweighting, and battery solutions, Röchling Automotive's CAE department deploys advanced technologies to perform system simulations including structural, fluid-dynamics, acoustics, process, and thermal analysis.

Their Challenge

To stay ahead of the competition in an automotive industry that's shifting to electric mobility, it's pivotal to deploy best-in-class battery technology in the development process.

Adapting production to the needs of electric vehicles (EVs) requires not only new manufacturing processes and systems, but also the provision of advanced tools to optimize the development of batteries, the heart of EVs. The thermal management of EV batteries requires precise control of the heat flow, which is usually addressed through cooling circuits that regulate temperature. In a recent project, Röchling Automotive developed new flow channel and cell holder system plastic parts for a battery cooling system that consisted of a battery heat exchanger and a flow channel for the coolant. To ensure the performance and structural integrity of a new battery coolant system, the Röchling Automotive team had to perform a structural analysis of the newly designed plastic parts.

REDUCED DEVELOPMENT TIME

NO CAD SIMPLIFICATION/ CLEANUP

NO MESH QUALITY ISSUES

ALL IN A SINGLE ENVIRONMENT

CALCULATION TIME REDUCED BY

60% ▼

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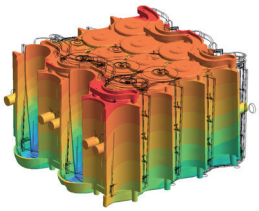
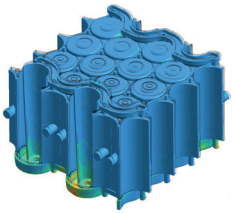
Until recently, structural analysis at Röchling Automotive has followed the classic three-step finite element analysis (FEA) approach: pre-processing, solving the numerical solution, and evaluating the results during post-processing. Since the traditional FEA approach generally requires a fully prepared CAD model, the team first had to simplify the geometry and then create an accurate mesh – two of the most time-consuming and error-prone tasks in traditional simulation. Röchling Automotive faced several challenges in the standard structural analysis of the newly developed snake-shaped flow channel and cell holder system plastic parts. These challenges included high geometrical complexity, material characteristics and contact non-linearity, and the large number of elements needed to accurately capture the stress gradients in small regions, making mesh creation cumbersome.

To address these challenges and to accelerate their development process, Röchling Automotive's vision was to find an analysis solution that would combine the standard three steps in one tool – allowing them to find the best designs in a much quicker, much easier way.





TOP: The high complexity of Röchling Automotive's newly developed flow channel and cell holder system plastic parts posed several challenges to the development team. **MIDDLE:** Altair SimSolid enabled Röchling Automotive to perform a structural analysis of the newly designed plastic parts, ensuring the performance of the new system. **BOTTOM:** Thanks to SimSolid's meshless approach, the Röchling Automotive team analyzed more CAD models in a given time, allowing them to achieve optimal designs faster.

Our Solution

When Röchling Automotive learned about Altair SimSolid®, Altair's multidisciplinary structural and thermal analysis tool, they quickly realized it would empower them to accelerate their development process and study many different design variants in a given period of time. Previously, using the traditional approach, the team had to use different tools and spend a lot of time preparing CAD models and creating accurate meshes for FEA analysis. However, Altair SimSolid enabled them to condense these steps within a single software tool. With Altair SimSolid, the Röchling Automotive team could import a CAD model, automatically retain all the boundary conditions, and save the configuration settings within the same workbench – all through a single interface.

Altair SimSolid's structural analysis capabilities include the system's normal modes of behavior, the frequency response, and the g-load amplifications along the three main axes. And since Altair SimSolid enables the analysis of both single components and system-level products, the team's simulation approach was much closer to parts' real behavior. The automatic generation of the connections between components helped manage the system's complexity. In all, there was no need to simplify the geometry because Altair SimSolid works well on fully featured CAD geometry while also being accurate and lightning fast.

Results

Altair SimSolid enabled Röchling Automotive to slash development time while still achieving high-quality results. The team greatly benefited from Altair SimSolid's meshless approach, which eliminated the need for notoriously tedious mesh creation and geometry simplification. As a result, their team could analyze more CAD models in a given time, allowing them to achieve optimal designs sooner and with greater confidence. Moreover, thanks to Altair SimSolid's preliminary evaluation of new designs – which focuses on products' overall performance – Röchling Automotive can now submit better quotations to customers earlier.

"Altair SimSolid's biggest advantage for us is its lightning-fast speed. Providing us with quick and accurate results, it enabled us to address designs in front of the many initial crossroads of product development," said Alessandro Morosini, CAE manager, Röchling Automotive S.r.l. "We reduced our calculation time by 60%, which allowed us to triple the number of designs analyzed while respecting the set design time. While we could have achieved similar results with other tools, only Altair SimSolid allows us to achieve this level of performance and accuracy within the constraints of our tight timeframes."

To learn more, please visit altair.com/simsolid