Developing More Accurate and Reliable Vehicle Component Models in Less Time with Software Automation

CHANGAN

Key Highlights

Industry
Automotive

Challenge
Pre-processing vehicle models is time consuming and complex, with many opportunities for error if done manually.

Altair Solution
Build custom software tool to automate most of the pre-processing tasks.

Benefits
- Standardizes model building process
- Enables efficient pre-processing
- Automates repetitive tasks
- 40-50% quicker model building

Introduction

Vehicle requirements, some of which include safety, emissions and lifespan, combined with the high cost of prototypes puts a lot of pressure on the engineers developing them. Designs must be as accurate as possible to save valuable development time and keep the program within budget. Computer-aided engineering (CAE) plays a huge role in the feasibility of satisfying these goals, and building accurate models of vehicles and their components to then analyze and test is directly impacting the overall efficiency of the automobile industry as a whole.

Customer Profile

Changan Automobile has been building and selling passenger vehicles for over 30 years. Its industrial leadership was established more than 150 years ago as China's first western style engineering firm, and today the company is among China's top four automobile groups, maintaining the title of the top selling domestic Chinese automotive brand. Changan, meaning

Keywords: Software Automation, Custom Solution, Automotive, Pre-Processing, OptiStruct, HyperMesh

Changan Automobile Customer Story

"The Changan Chassis Structure Automation Tool that Altair developed for us has transformed the way we design automobile components. Before, our engineering team would dedicate weeks to model pre-processing; today, we can automate almost all of the setup, which has cut that time down to a few days, and allowed our workforce to focus on innovating in other important areas."

Chinghui Chiang
CAE Engineer
Changan Automobile US

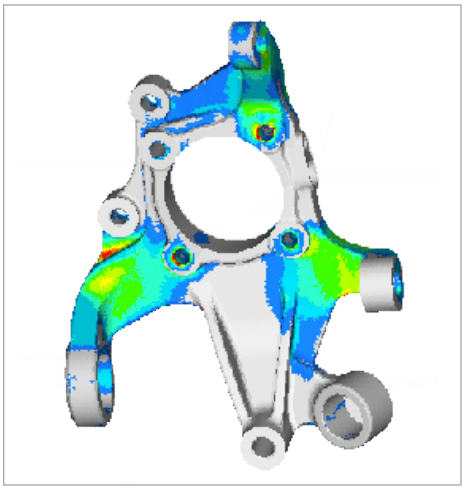
"lasting safety" in Chinese, has always been focused on developing the safest vehicles possible, and today the company employs CAE software to continue to deliver and improve upon this mission.

Challenge: Pre-Processing Vehicle Models Efficiently

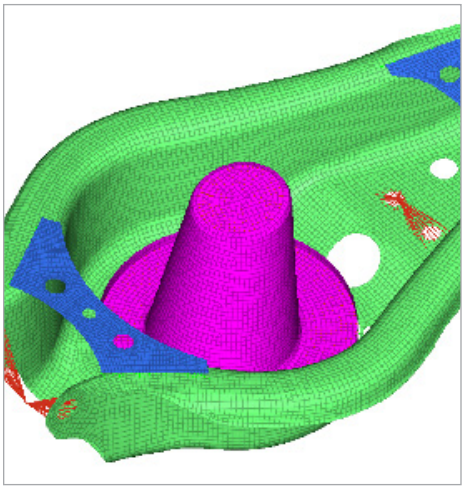
A pain point that Changan was continuously faced with was the pre-processing and setup of their vehicle components, specifically the twist beam. To obtain accurate results from the model, it must be as close to reality as possible, which can be extremely time consuming and subject to errors due to the manual intensive process. This caused a major bottleneck in the development process, making it more and more difficult for them to keep projects within the designated timeline.

Solution: Software Automation for Faster Model Preparation

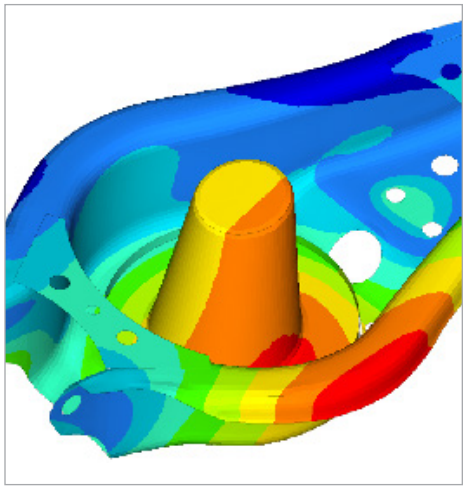
Changan had been using the Altair HyperWorks software suite for some time, and was familiar with Altair's consulting services. This led to a discussion with the Altair Enterprise Solutions Group (ESG) to help them find a way to combat the issues they were experiencing with the model setup phase. Altair's team was able



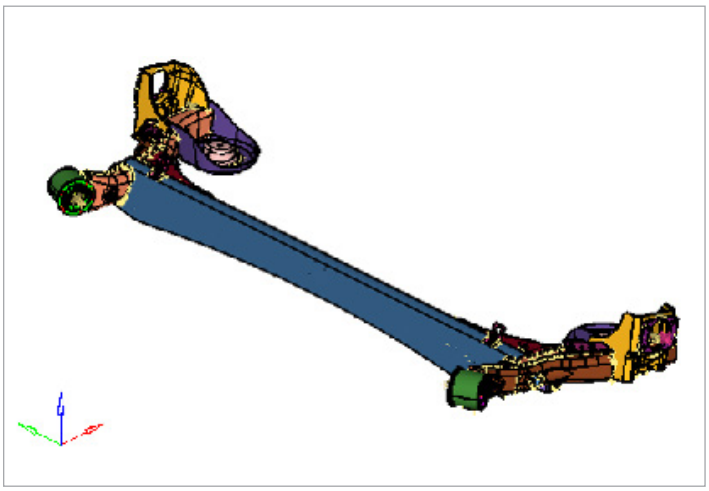
FEA Results of the Knuckle



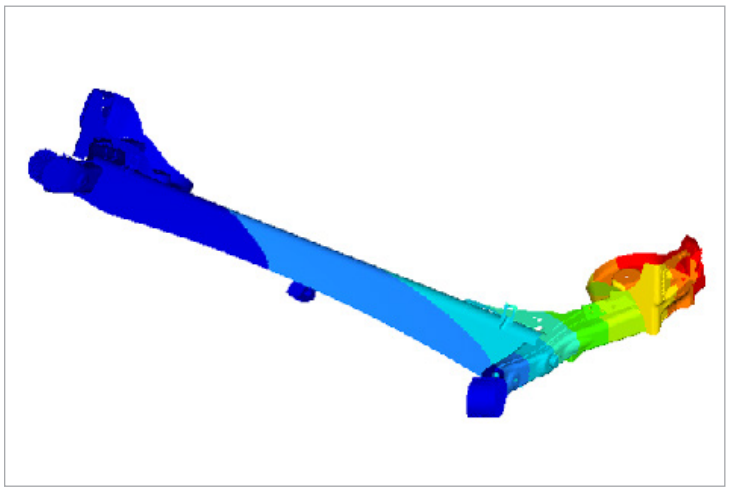
Model of the Lower Control Arm with Mesh



FEA Results of the Lower Control Arm



Twist Beam CAD Model



Twist Beam FE Model with Results Contour

to customize an existing packaged solution to suit Changan's specific needs, called the Changan Chassis Structure Automation Tool. This automation tool guides the user through the necessary process flow of pre-processing the model of the twist beam, automating the repetitive tasks along the way to save time.

Using the Changan Chassis Structure Automation Tool, users are now able to mesh the twist beam to achieve nearly the same level of detail seen in the actual component using HyperMesh, create welds where necessary based on the analysis data, assign the appropriate materials to be applied and identify their contacts. The solution allows for accelerated model organization and rapid mesh generation. The team can now perform all pre-processing related tasks efficiently through standardization.

After the model is completely set up and ready for analysis, it can be imported into OptiStruct or any other solver to then generate the desired results.

Results: Reduced Human Error and 50% Time Savings

The Changan Chassis Structure Automation Tool has allowed them to automate and standardize their model pre-processing which eliminates much of the human error involved, provides more confidence in the accuracy of analysis data, and most importantly, saves valuable development time. Thanks to this automation, Changan has reduced their model pre-processing time by 40-50%.

"The Changan Chassis Structure Automation Tool that Altair developed for us has transformed the way we design automobile components," said Chinghui Chiang, CAE Engineer at Changan Automobile US. "Before, our engineering team would dedicate weeks to model pre-processing; today, we can automate almost all of the setup, which has cut that time down to a few days and allowed our workforce to focus on innovating in other important areas."

As this solution is applicable to all vehicle components, Changan looks forward to applying it to all of the complex components where detailed analysis is necessary. The company has already begun discussion with Altair to further enhance this tool, including adding a fatigue analysis capability.

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