BETA
SIMULATION SOLUTIONS

Jiangling Motors

Vehicle collision simulation process management using SPDRM

A comprehensive suite of solutions for standardizing, and automating vehicle collision simulation process.

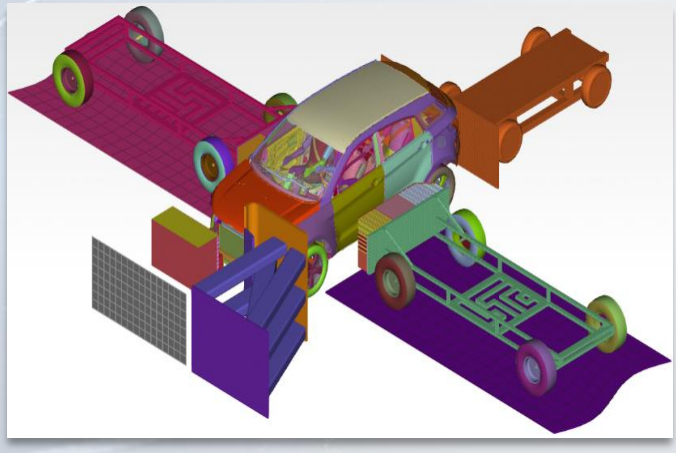
Vehicle collision simulation is characterized by systemic complexity, a multi-branch nature, and time-intensive requirements. It requires rapid design iterations, involving numerous stakeholders, adhering to various collision protocols/regulations, and encompassing different load cases with unique settings.

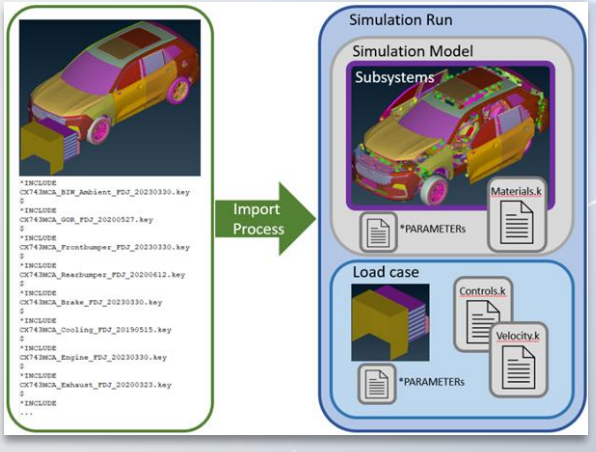
Important considerations also involve the reinforcing requirements for simulation expertise, the need to enhance further work efficiency, to maximize the utility of historical data, and manage access rights to simulation data ensuring data security.

BETA CAE Systems China, in close collaboration with Jiangling Motors Corporation (JMC), has developed a collision simulation platform that seamlessly integrates JMC's existing collision simulation data with workflows of BETA CAE Systems' SPDRM.

"The introduction of this platform marks a significant milestone in our journey towards advancing our vehicle collision simulation technology. BETA CAE Systems' solution not only furnishes a comprehensive array of cutting-edge modular model management solutions, but also facilitates the maximization of existing model data conversion and utilization, thereby mitigating the challenges associated with starting from scratch when introducing new technologies and involving minimum switching costs."

Liu Hao
Crash Safety Engineer
JMC





Challenge

Developing and implementing a simulation process management platform is an intricate system engineering process which had to take under consideration the management of data, the allocation of resources, and the management of the processes. Each aspect can be further refined and subdivided, requiring the deployment plan to be customized to suit diverse user needs. It is also important in such an endeavor to ensure minimal disruption to current workflows while facilitating a smooth transition to new technologies.

Key challenges addressed included:

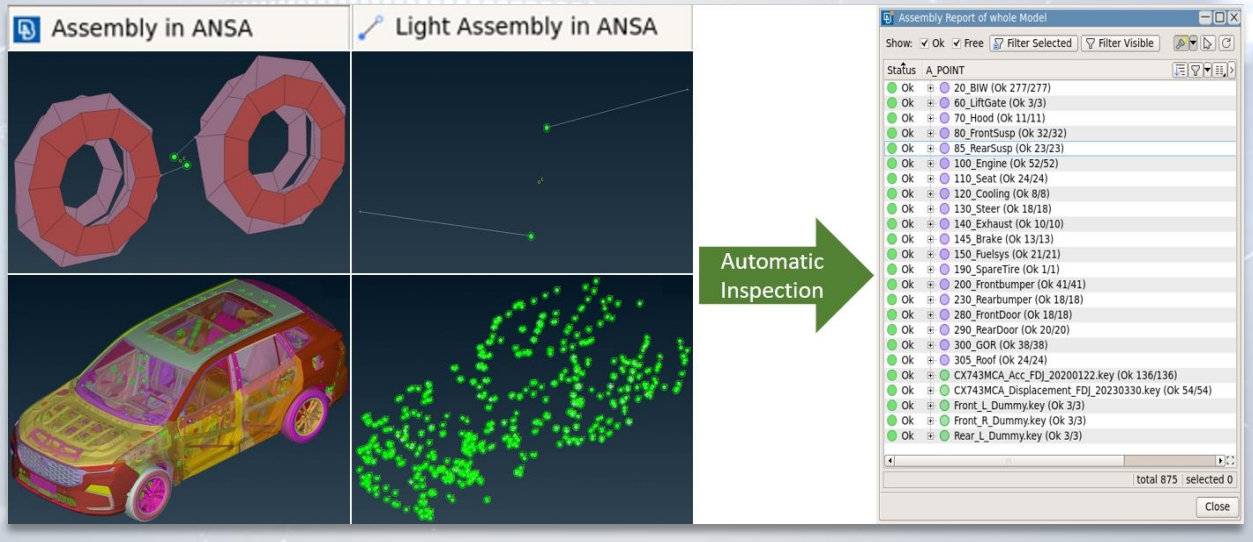
- Classifycation and storing data based on the SPOT principle.
- Recording and tracking the iteration process of multi-version data.
- Synchronizing data changes when multiple users are working concurrently.
- Visualizing differences between multiple versions of data.
- Standardizing the processing of each subsystem through automated naming and renumbering.
- Efficient realization and self-correction of inter- and intra-modular connections.
- Automating the combination and debugging of modular models.
- Streamlining the HPC job submission process and post-processing with a single-click solution.

Approach

In this project, we started from data management, guided by the principle "new data, new method," utilizing, same time, existing data.

Using the "Modular Model and Run Management" (MRM) methodology, we deliberately divided the entire vehicle into various subassemblies according to a structured classification architecture: subsystems, simulation models, library items, load cases, and simulation runs.

Each subsystem corresponds to an exclusive model subassembly available through include files. With BETA's proprietary "smart assembly" methodology, subsystem assembly can be automated. This approach offers significant efficiency and flexibility for connection upgrades or modular model re-combination. Additionally, customized schema for other include files tailored to the customer's needs is also offered. During this case, we categorized control cards and cross sections as library model files, while velocity and MPP cards were designated as load case files, and dummies as library dummies.



At a higher level, the simulation model comprises all subsystems, including connecting subsystems, and library model files. The load case consists of library load case files, library dummies, and library barriers. Ultimately, the simulation run integrates the simulation model and the load case, simplifying the submission process to the solver.

Thanks to MRM's built-in version management and data traceability functionalities, coupled with its rich customization capabilities, we've designed and implemented an effective data management platform. Smooth data circulation within the SPDRM system and upstream and downstream processes is achieved. Furthermore, integration of HPC job submission and post-processing report generation within the SPDRM platform streamlines CAE practices.

Results

The SPDRM platform supports concurrent usage by JMC's safety team, enabling effective management of newly generated data within the SPDRM system while facilitating seamless transfer and reuse of existing data. It provided JMC a comprehensive solution for automatically converting existing data to fit their SPDRM system, minimizing data migration costs. By adopting BETA CAE Systems' new model organization and data management approach, JMC has improved new versioning efficiency and reduced human error to negligible levels. In summary, SPDRM has empowered JMC to excel in data management and normalization, enhancing efficiency in simulation processes.

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