White paper

# Simulation enabling technologies

Modular Run Management

Modular Run Management is a new methodology for the preparation and management of complex structures, key results, and reports. It combines established practices with state-of-the-art methodologies for model composition, loadcase set-up and model integrity checking, and facilitates storage and data sharing via inbuilt data management functionality.

In today's CAE simulations, complex structures that consist of several sub-assemblies are handled with the aid of "include files". This technology, supported by all major FEA solvers, enables the subdivision of a complete simulation model in smaller units (each being an individual solver keyword file) and the reassembly of the complete model by the solver during the simulation. The big advantage of this working method is found in the simulation model improvement process (looping phase), where individual analysts can focus on different areas of interest and only update the keyword files concerned, while the integrity of the complete model is maintained.

Limitations of current practices

Conventional management of big models with include files works very efficiently for experienced users who, usually assisted by custom scripts, generate new run iterations, submit them to the solver, and get processed key-results in minimum user time. The current practices however, come up with a couple of key deficiencies:
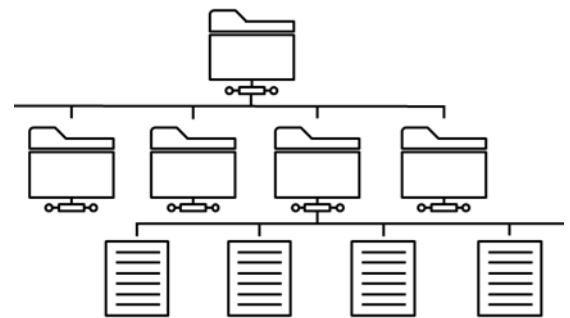
- Heavy reliance on the individual: Users need to make sure that they follow rules consistently. If these rules are not followed, traceability, model integrity and results assessment, are all at stake. Moreover, learning to follow these rules requires extensive training.

- Heavy reliance on scripts: The lack of an actual "system" to deal with the multiple challenges of simulations management leads to the inevitable development of custom scripts to carry out important steps of the process. However, scripts also need maintenance, and this always tends to be problematic.

These difficulties are intensified for organizations that employ remote teams. To work efficiently, users end up creating local copies of big data-sets, putting data security at stake, and sacrificing data traceability.

physics on screen

Our Modular Run Management Solutions

Modular Run Management (MRM) is the methodology proposed by BETA for the efficient preparation and management of CAE simulations of complex structures and the related key-results and reports. In its core, MRM makes use of well-established practices such as, the organization of the main deck in include files or the results overlay for the comparison of simulation results. It combines these practices with state-of-the-art methodologies for model composition, loadcase set-up and model integrity checking and it facilitates storage and data sharing with the use of inbuilt data management functionality.

The BETA Suite offers an integrated environment for Modular Run Management that comes with inbuilt knowledge of the primary workflow and requirements for setting up a simulation and offers numerous possibilities for the extension and customization of the default functionality.
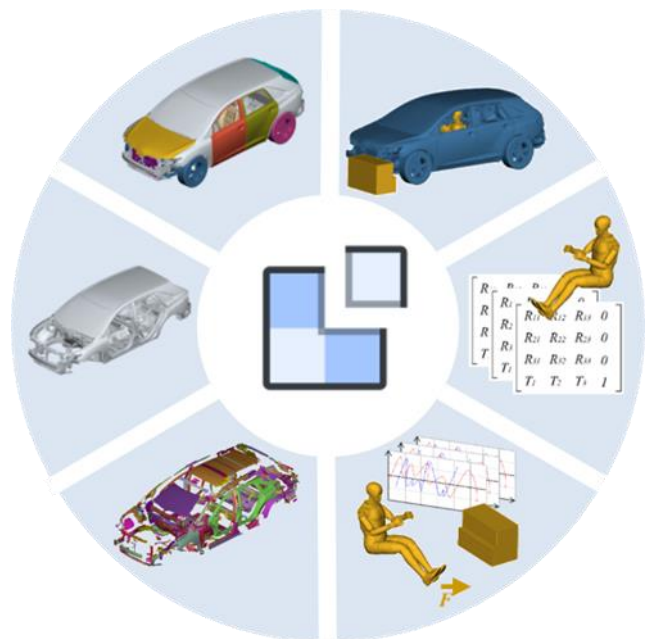
With the use of the Modular Run Management Environment:

- The users work primarily with ANSA files whose rich content enables efficient model editing. Solver files are created "just in time" to facilitate the composition of the simulation deck file.
- No data are shared with the team if they don't meet the minimum set of requirements set by the system administrator.
- Library files are used as read-only data and are shared among different projects, eliminating data duplication.
- Important settings and customization options are defined once by the system administrator and are then shared with the team. Any deviations from the initial settings and the data produced can be easily tracked.

- Data pedigree and relations can be traced fast and easy. Who created this new version of the simulation and when? Which were the changes comparing to the previous simulation version? Which process was followed to modify the model? Which other simulations have used the same model? Answers to all these questions and more are accessible with just a few clicks.

The Modular Run Management Environment comes with unique tools for:

- Variants Management. On Subsystem, Model and Loadcase level.
- Inter-modular assembly, supporting all major assembly strategies used by the CAE community.
- Data sharing and collaboration, covering the needs of both small, local teams and large, geographically dispersed teams.
- Process standardization. The methodologies used at each stage of the simulation preparation are controlled centrally but are also available within the data produced.
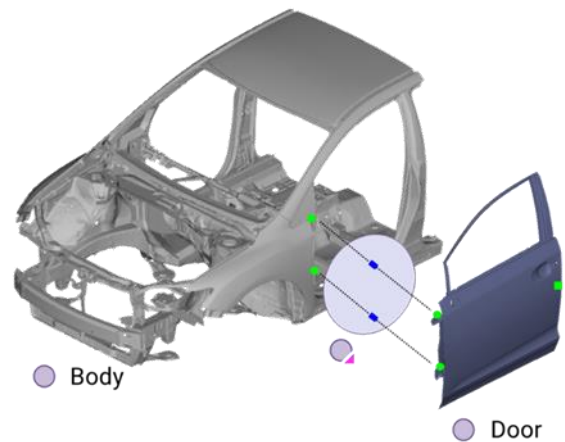
About BETA CAE Systems International AG

BETA is a simulation solutions provider, dedicated to the development of state-of-the-art software systems for CAE. For almost 30 years, we have been developing tools and delivering services for the front-runners in numerous sectors by listening to their needs and taking up even the most demanding challenges. For more information on BETA CAE systems, our products, and our services, visit www.beta-cae.com

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