

Airbus (Beijing) Engineering Centre

## Aerospace engineering: Collaborative solutions for enhanced efficiency

A complete automation process for the modeling of bump cells and the creation of the global model.

The aerospace industry operates at the intersection of precision, complexity, and innovation. Facing rigorous demands for accuracy, safety, and speed, aerospace engineers constantly seek ways to streamline processes and enhance productivity.

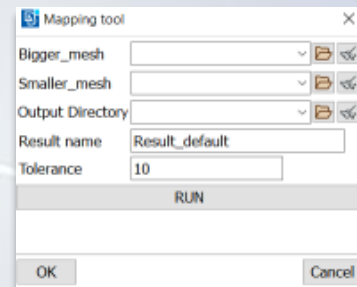
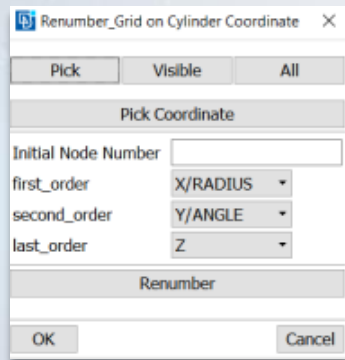
In this relentless pursuit of achieving maximum automation, our team undertook the challenge of enhancing three critical processes in Airbus. The grid ID renumbering based on coordinates, the GFEM to DFEM mapping, and the post-processing of result files.

Each of these tasks presented unique obstacles, from handling varying extraction precision in grid renumbering to managing the complexities of boundary mesh affiliation ensuring computational accuracy in data transformation.

Recognizing these challenges, BETA CAE Systems China and Airbus (Beijing) Engineering Centre joined forces to solve the unique needs of aerospace engineering.

“In our trial period, ANSA demonstrated good management of our FEM model, particularly with complex structures such as the A350 S19 fuselage detailed model.”

Airbus (Beijing) Engineering Centre



## Challenge

The objective was to reach the maximum possible automation level and minimize the manual work for 3 distinct processes.

- Grid ID renumbering based on coordinates
- GFEM to DFEM mapping
- Post-processing script to handle various result files and reformat them

In this effort, rough patches were:

- Renumbering grids need varying extraction precision across different mesh size
- Mapping tool, managing the affiliation of boundary mesh becomes challenging; various algorithms need to be tested
- During the post-processing, raw data undergoes constant computation and transformation. Any inaccuracies could impact the results, leading to non-conservative outcomes

## Approach

Three scripts have been written with the aid of the available ANSA and META APIs.

The first script concerns the grid ID renumbering. Aerospace models are required to handle results based on grid ID, including ID range and ID order control. Through specific directions, renumbering takes place based on pointed coordinates, greatly accelerating model-building iterations.

The second script assists with the GFEM to DFEM results mapping. Working efficiency is boosted due to ANSA's advanced API, which

allows for automated area identification between different models.

The third script, a customized interface guides the user to extract results from a list of files and process them before outputting them again in a new format. This workflow not only accelerates but also simplifies an error-prone process.

## Results

Through our collective efforts, we have collaboratively developed tools, which not only maintain the previous level of computational accuracy, but also save significant time otherwise spent on manual modelling. Leveraging the robust capabilities for secondary development and readily available APIs in BETA CAE Systems' software, the customization process was relatively brief, as many APIs are pre-packaged and ready for immediate use. This presents a more convenient and time-saving solution compared to other software.

For more about BETA CAE Systems, visit [www.beta-cae.com](http://www.beta-cae.com)