Coupling ANSA and optimization software for efficient design workflow - Shape and parameter optimization based on the Morphing Tool.

G. Korbetis, I. Makris, and G. Panagos
BETA CAE Systems S.A., Greece

ABSTRACT

CAE technology is used to support the design process that is driven and fed back by finite element based simulation. As the complexity of the design tasks increases the computational volume and required man hours, the optimization procedure can contribute significantly in the design and calculation process. Easy and flexible definition of optimization parameters in pre-processing software is essential for the efficient model handling. ANSA is capable of interfacing with different optimizing programs to cover a wide range of cases, from early design stages to detailed model features handling.

In this case study four variations of a front rail are tested in crash analysis for the determination of the optimal shape for each one of them. ANSA Morphing Tool is used for the preparation of the model so as to define the shape optimization parameters. Entities of the model, such as material properties and sheet metal thickness, are accessed as design variables. ANSA scripting language and μETA-Post session files are used for the definition of input and output files containing these design variables, constraints and objective function. The problem is solved using different optimizers with Optimization and DOE methods.

A final front crash test of a BiW verifies the results attained from the partial tests. This approach also demonstrates the ability to parametrically substitute different versions of a component in an assembly.

keywords: optimization, morphing, design process