

Handling complex parameterization using ANSA for structural performance optimization

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ABSTRACT

Utilization of various morphing and parameterization techniques for design optimization is a common practice in product development. Often these parameters deal with changing height, width, shape, and size of various structural components. However, the drive towards zero prototypes and accelerating technological advances make it necessary for the CAE analysts to be able to rapidly set up complex parameters to carry out structural performance optimization for ever-evolving designs. These complex parameters are beyond simplistic changes and need sophisticated integration of software capabilities and automation to carry them out. In order to effectively address these issues, this paper presents a framework for creating rapid parametric optimization setup using ANSA and Python scripting automation. The concept and the automated parametrization process are illustrated using a benchmark study carried out by General Motors.

The benchmark study is carried out using an open-source Chevy Silverado truck model. The objective of the study is to minimize weight of the vehicle while maintaining the baseline performance criteria for the stiffness and modal performance using NVH load cases. The parameterization for design shape changes is setup using ANSA morphing and automation capabilities. ANSA Optimization Tool is used for organizing and running the optimization study using directly created Response Surface Models (RSM). The results of the study as well as the complex parameterization and responses extraction techniques using ANSA and META will be illustrated in detail.