COMMON AUTOMOTIVE AND AEROSPACE REQUIREMENTS FOR STRUCTURAL OPTIMIZATION COMMERCIAL SOFTWARE. DIALOG WITH VENDORS.

Vladimir Balabanov, Tresha Lacaux, Steve Georgiadis, David Trop

Boeing, Seattle, USA

Markus Schemat, Benjamin Schlaepfer, Moritz Frenzel, Daniel Heiserer

BMW, Munich, Germany

KEYWORDS

structural optimization, industry requirements, visualization, design exploration, integration, collaboration

ABSTRACT

During the past decade there has been a significant growth in industrial structural optimization applications. Capabilities of commercial structural optimization tools increased considerably, now allowing for incorporating analyses results ranging from stiffness and strength, to crashworthiness and durability. Some analyses are performed inside the commercial structural optimization software and some outside. Structural optimization applications are ranging from detailed models of small parts to the models of the whole vehicles. The number of influential adjustable parameters handled by software increased from tens to thousands in the last decade. At the same time there is still a need to account for ever increasing number of requirements to produce realistic industrial designs.

From an enterprise perspective it is often advantageous to utilize the structural optimization tools as opposed to process integration and design optimization (PIDO) tools. This allows for fewer scripts and processes to be maintained, makes the processes simpler, and makes the learning curve more gradual. However, even when a specific optimization implementation is effective due to individual analyst's efforts, structural optimization is often not suitable for general application from an enterprise standpoint.

To widen the scope of structural optimization applications at the enterprise level in the automotive and aerospace industries, and to increase the community of engineers using structural optimization effectively, the commercial structural optimization tools must:

- be easier to use;

- accommodate and interact with existing third-party and legacy tools;
- adapt on-the-fly modifications to the design parameters and optimization strategies;
- act as intelligent guides via dialog with the analysts in solving optimization problems: during setup of the problem, execution of the optimization procedure, and when reviewing the results. The tool intelligence should be derived from the intermediate results and from efficient incorporation within the tool the knowledge and expertise of existing in-house tools, processes, best practices, and design criteria.

The presentation will provide an enterprise view of the bottlenecks using real world design problems in automotive and aerospace industries. Current methods of addressing these bottlenecks will be presented, along with the proposed approaches to overcome them. The most important of the proposed approaches – the continuous dialog of industrial engineers with software developers at all stages of software development process.