



RAILWAY VEHICLE DESIGN: NEW FRONTIERS OPENED BY STRUCTURAL OPTIMIZATION PROCESSES



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Introduction

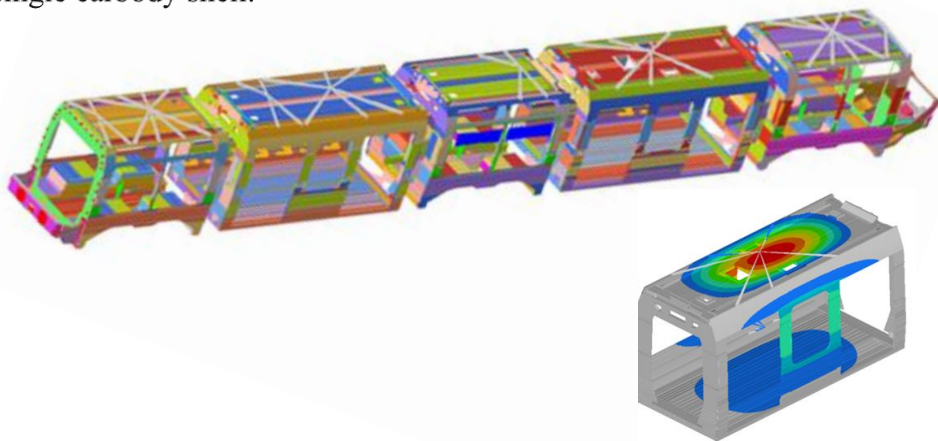
The transition to a globalised electrical power supply pushes main rolling stock manufacturers to find structural solutions for reducing the power required by the vehicles. Structural optimization processes represent an effective method for innovating them.

Research activity

Railway vehicles are high-technological systems that must have great mechanical performance. The development of new optimization procedures opens new frontiers for the sector, particularly from the structural design point of view.

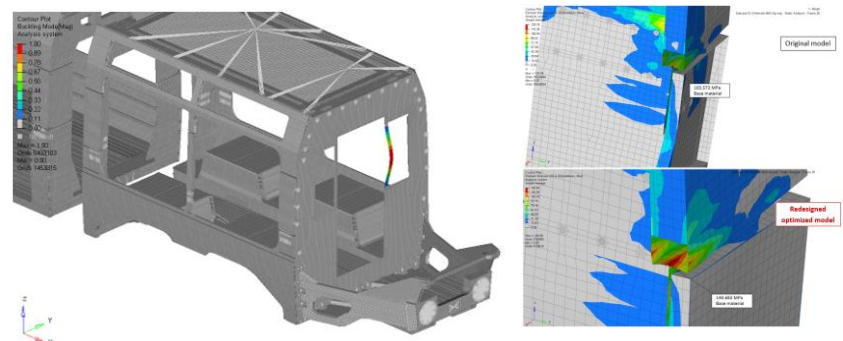
Dynamic size optimization approach to support railway car body lightweight design process

Minimization of the mass ensuring the stiffness performance of the structure, consider constraints on the natural frequencies of the system. The optimization strategy is based on a dynamic size optimization process in conjunction with modal analysis techniques, applied on the single carbody shell.



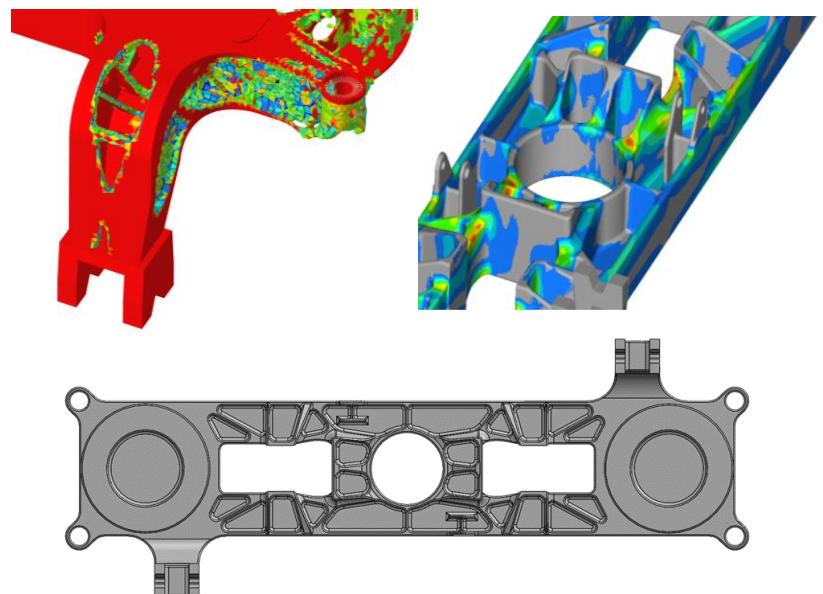
A strategy for lightweight designing of a railway vehicle car body including composite material and dynamic structural optimization

This preliminary numerical work was developed in two main steps: redesign of the carbody structure introducing a honeycomb composite panel and optimization of the innovated system.



Influence of manufacturing constraints on the structural optimization of a railway bolster beam

Definition of an effective and lighter design of the component for producing it with casting techniques, passing from traditional structural steel to cast iron.



Redesign and structural optimization of a motor bogie frame for railway application

Development of a design procedure through optimization techniques for casting manufacturing.

