

Structural optimization of new high speed train

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The aim of activity is the design of the carbody structure of the new HS railways vehicle with the specific target of optimization in terms of weight and dynamic behavior, respecting the static structural and fatigue requirements of the project.

Starting from the CAD model of current configuration, the FE parametric model will be developed and integrated into the optimization platform modeFRONTIER to achieve the requested goals.

The optimization loop involved more than 50 variables input and several structural constraints to be satisfied, two steps optimization strategy has been developed.

The first phase involved the most important output, weight of carbody and first frequency bending mode, which are the objectives of the problem.

The second phase started from an optimal points of design space defined during the previous one and it has two new objectives, weight and max transversal displacement under pressure loads, and several constraints on outputs of structural analysis (static, linear buckling and fatigue analysis).

The first frequency bending mode has been defined like a new constraint for this step of optimization.

The Pareto frontier has been worked out and using decisional criteria tools the optimal point has been extracted from it.

Key words: structural, optimization, weight reduction, parametric, high speed train