

Long duration internship proposal on Code_Aster applicability in automotive design

by Pierre Juillard, Research Engineer, pierre.juillard[at]arcelormittal.com

Purpose of the mission

In order to propose ever lighter steel solutions on automotive structures, advanced design methodologies making intensive use of numerical simulations and optimization approaches are considered to help designers proposing solutions reaching such targets while respecting tight timelines.

A long duration training is proposed to work on such approaches and most notably:

- to evaluate Code_Aster applicability to assess general technical requirements usually considered during such studies in order to allow parallel computations at large scale on which is based the optimisation process
- to link it with internal optimisation tools and apply it on automotive test cases in order to validate this system
- to tackle shape optimization topic for thin steel sheet application

The mission: accountabilities and activities

During the internship, the trainee will first focus on chassis part design and be in charge of:

- getting familiar with corresponding technical requirements and numerical simulations allowing to evaluate them (stamping simulations, static loading, modal analysis, and fatigue analysis) in order to:
 - o convert when possible existing simulations into Code_Aster simulations
 - o formulate adequate objective functions
 - o automate such analysis, and most notably pre and post processing steps
- propose adequate approach to drive simple shape modifications (shape and topological modifications) on such parts
- setup the optimization study considering thickness, material and shape optimization

With the results expected from these tasks, design studies highlighting advantages of ArcelorMittal steels are expected to be carried out faster with more detailed results.

In a 2nd step, capitalizing on the acquired knowledge, the scope of Code_Aster applicability will be assessed on full automotive body, as well as optimization possibilities.

The environment

The training will be carried out in the ArcelorMittal Automotive Application Research Centre where studies are lead to show potential of ArcelorMittal High Strength Steels and support ArcelorMittal customers within the frame of automotive design. During the training period, the student will be immersed with teams carrying out such studies and will be able to take advantage of such an environment to learn more about this domain.

Start date 2010/08/02

Duration ~11months