Post-Doctoral Position
ENS Cachan, Paris, France

Location: Ecole Normale Supérieure de Cachan, LMT Cachan, South of Paris, France
Duration: 18 month
Starting date: Between March 2011 and September 2011
Scholarship: €2000/month

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Scientific domain: Experimental & Numerical Mechanics, vibrations, model validation
Industrial context: The postdoctoral work is within the framework of a FUI10 project; the industrial partners are Renault SA, Arcelor Mittal and L&L Products.
Expected initial skills: background in the fields of mechanical engineering & numerical methods
Complementary skills: Nastran, design, …
How to apply: detailed CV by email.

Domain:
The standards concerning the emission of pollutions of automotive vehicles are more and more tight. Different types of solutions are investigated in order to reduce those emissions: change the motor type (switch to hybrid or electric) or optimize the performances, by obtaining a great reduction of mass, for example. In that case, problems due to the strength of the structure might appear.
Alternative solutions exist to solve this problem and have to be studied if one wants them to become mature enough for being used in the industry. It is indeed very important for the manufacturer to be able to include such solutions at the early stage of the design of the vehicle. This is the framework of this post-doctoral work.

Activity 1: Methodology for defining the locations of stiffeners
Construction of a simplified finite element model of a car structure in order to be able to locate the risky zones of lightened structures. Definition of specifications for the reinforcement of such a structure using structural inserts as stiffeners.

Activity 2: Numerical & experimental study of the stiffening solutions

Activity 2.1: First, and based on the study of representative coupons, we want to evaluate the variability of the static behavior of the connection between the insert and the structure (that includes foam) depending on the initial gaps. Experimental tests will be conducted under static loadings only.

Activity 2.2: Then, models of the connection between the insert and the structure are to be developed. They must take into account the variability of the gaps between the parts. This variability will be identified using the previous experimental tests. Such connection models will be included in the computations of the complete structure and must lead to a reduction of the safety margins that are currently used.

Activity 2.3: Last, dynamic experiments on coupons must be performed in order to validate the numerical models that are currently used, to propose some lighter ones and to introduce some damping models adapted to the connection between the insert and the structure and to the insert himself.