



1 year post-doc position

Title: Study of an adhesive bonding Aluminum / polymer. *Supervisors:* D. Leguillon (CNRS/P. and M. Curie University), R. Xu (Vanderbilt University, Nashville, Tenn., USA).

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Subject: The aircraft industry uses more and more composite materials in the construction of civilian carriers, nearly 50% in the most recent aircrafts. These composite parts complete the metal structure, usually aluminum. The assembly is traditionally done by rivets, an invasive process that manufacturers wish to replace by adhesive bonding. We propose to develop a method to characterize the resistance of an adhesive bonding Aluminum / Polymer (two types of polymers will be used: PMMA and Polycarbonate). The originality of the approach is based on the geometry of the specimens: combining the two materials, they contain a V-notch, the adhesive interface starting from its root. The choice of a transparent polymer allows in-situ photo-elasticity observations. All experimental work will be carried out at Vanderbilt University (Nashville, USA). An international collaboration program already initiated between two laboratories with a first exchange in 2008. The simulation part will be conducted in IJLRA in Paris, France, and it is the subject of this call for applications. It resumes on a mixed criterion (energy/stress) developed in 2002, whose validity has been confirmed many times. Based on the results of the tests, an inverse approach should be able to provide the interface failure parameters (toughness, tensile and shear strength). The scattering of results will be the subject of a careful analysis.

Candidate: This post-doctoral position is aimed at a numerical engineer, with a PhD and expert in computational structures. Knowledge of fracture mechanics would also be welcome. After a period of familiarization with the tests and numerical tools, the candidate will simulate the various tests in order to extract parameters such as generalized stress intensity factors and then establish the procedure for determining the properties of the bonded interface. An assessment of the scattering through Monte Carlo simulations will probably be necessary.

The candidate will mainly work in Paris but he or she will have the opportunity to visit US for short-term research collaboration.

