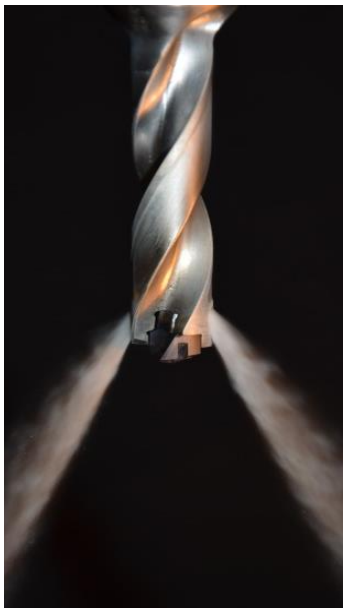
Postdoctoral Research Position in France / 12 months / sept 2019

Title : Modeling and experimentation of TA6V drilling under cryogenic LN_2 assistance

Application to drilling of TA6V / CFRP stacks

Context

The work is part of the project "Drilling of aeronautical stacks TA6V / CFRP under cryogenic assistance" supported by the Carnot Arts Institute. The project consists of two complementary studies corresponding to the TA6V and CFRP materials. In the aeronautical field, the combined use of TA6V and composite parts requires assembly operations. Most of these assemblies are made by mechanical methods (riveting, bolted connections). The establishment of fasteners requires the realization of a very large number of holes of high dimensional quality, geometric, surface condition but also material integrity. In the context of drilling the TA6V, the wear of the drill is important because of the low diffusion of calories, due to the poor thermal properties of TA6V. To improve the cutting process, one of the currently explored routes is cryogenically assisted machining, which minimizes workpiece and tool damage. Among other things, the drill margin continually rub several times on the wall of the hole (function of tool feed), and induce intense thermomechanical loading. The integrity of the hole surface is therefore largely affected by this loading in terms of residual stress value, thickness of metallurgically modified sub-layer. This phenomenon has already been modeled in a recently supported thesis (Y. Merzouki 2018). The purpose of this work will be to appropriate the results and improve the proposed model.



Mission

The postdoctoral researcher, mainly located on the ENSAM campus in Cluny, will take in charge a model that has already been developed and will have to master it. It will implement test campaigns to test a previously designed prototype drill. The effects of the cryogenic environment on cutting mechanisms in the case of TA6V should be highlighted. Surface integrity will be investigated precisely, by cutting the hole and analyzing the surface. The postdoctoral researcher will be in charge of proposing and implementing specific instrumented tests to analyze the various phenomena involved. He will then have to carry out the test campaigns and make a detailed analysis of the results obtained.

Abilities:

The candidate must have a good knowledge of machining techniques and have a strong taste for rigorous implementation of highly instrumented experimental procedures. Also, he is asked for good programming skills to improve the modeling of the drilling operation.

Practical information

The post-doctorate will be 12 months full time and will be based at LaBoMaP ENSAM Cluny (80%) and (20% at the beginning of the period) at LAMPA ENSAM Angers.

Salary : 2000€ after tax deduction / month
Starting date : september 2019 (possibilities to start up to january 2020)
Duration : 12 months
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Laboratory's website: http://labomap.ensam.eu/ , http://lampa.ensam.eu/