



Master Thesis and Traineeship Proposal

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Subject Advanced Manufacturing Processes

Title Numerical analysis of the cure induced distortion for carbon-based FML

Typology Experimental/numerical

Abstract The aim of this thesis concerns the analysis of deformations induced by cure process for carbon-based FML. Geometrical and dimensional distortions are generally caused by residual stress and consequent deformations due to different phenomena that arise during cure process and to the characteristics of the materials, such as the different thermomechanical behaviour of the CFRP and the aluminium. The effects of these distortions manifest themselves in the assembly phase of components. In fact, shimming is required if corresponding surfaces do not match, giving rise to the growth of production costs, delivering time and product weight. The aim of the present work is the evaluation of the influence of some geometric and structural parameters, such as stacking sequence, fibre orientation, thickness and corner radius of the mould, on the spring-in of L-shaped FML. For this study, lots of experimental tests would be required, since a full factorial experimental plan is necessary to delineate the spring-in trend as a function of the abovementioned parameters. In order to avoid wasting time, energy and materials for experimental tests, a previously developed FEM model for cure process simulation and spring-in determination will be used to calculate the deformation of L-shaped parts.

Expected starting date and duration Thesis work will start in February 2020, with a duration of at least 5 months.

Traineeship The traineeship will be conducted in the Laboratory of Technology and Manufacturing Systems, with a duration of 3 months. The traineeship will be aimed at evaluating the distortion of carbon-based FML specimens, whose results will be used to validate the numerical model.
