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Integration of Load Introduction Elements into Fabrics

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Abstract : Lightweight design plays an important role in the automotive industry. Especially the combination of metal and CFRP shows great potential for future vehicle concepts. This requires joining technologies that are cost-efficient and appropriate for the materials involved. Previous investigations show that integrating load introduction elements during CFRP part manufacturing offers great advantages in mechanical performance. However, it is not yet clear how to integrate the elements in an automated process without harming the fiber structure. In this paper, a test rig is build up to investigate the effect of different parameters during insert integration experimentally. After a short description of the experimental equipment, preliminary tests are performed to determine a set of important process parameters. Based on that, the planning of design of experiments is given. The interpretation and evaluation of the test results show that with a minimization of the insert diameter and the peak angle less harm on the fiber structure can be achieved. Furthermore, a maximization of the die diameter above the insert shows a positive effect on the fiber structure. At the end of this paper, a theoretical description of alternative peak shaping is given and then the results get validated on the basis of an industrial reference part.

Keywords : CFRP, fabrics, insert, load introduction element, integration
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