



Workpiece completed – final helmet shell

ALL-IN-ONE-TECHNOLOGY

Fully automated design and manufacturing of complex geometries with dry fibers

While the automated processing of fiber composites with resin injection processes like RTM is already industry standard, efficient and automated fiber placement processes for complex geometries are still challenging. Until now, narrow radii and angles, strongly convex and concave shapes and undercuts are a challenge for every fiber composite engineer when faced with automation for high volumes.

The start-up company Cevotec rises to this challenge and developed the first fully automated production line for complex geometries based on Fiber Patch Placement (FPP) technology.

Made to order

The robotized system is the first of its kind for scalable serial production of high-quality, complex CFRP components. Three-dimensional geometries are directly produced, making additional forming processes obsolete. The additive manufacturing process of FPP applies fibers only where they are necessary. Thus, variable wall thicknesses in the component and net shape preforming are implemented with ease. This reduces material input compared to

conventional processing methods by up to 30 percent and scrap rate are reduced to about 5 percent.

In addition, Fiber Patch Placement also enables completely new degrees of freedom in the design of load-optimized laminates, as the patches can be placed to perfectly follow load paths in a part. This results in an increase of mechanical properties such as strength and modulus by up to factor 2.5x compared to standard layups.

Artist at work

The intelligent core of the new technology is the software platform Artist Studio developed by Cevotec. It consists of two modules. Module 1, the Patch Artist, automa-



Bird's eye view of FPP production system

tically generates intrinsically optimized patch laminates for the CFRP components, based on CAD files. It optimizes the overlap of the patches in the laminate to ideally distribute the gaps and thus improve the mechanical properties of the laminate.

The layup information is transmitted to module 2, the Motion Artist, which generates the machine data for the robot-assis-

ted production process in the new Fiber Patch Placement production system Samba, which Cevotec developed in partnership with Baumann Automation.

The result: stress-oriented, curvilinear fiber laminates with a logical positioning of each individual patch; efficiently and directionally oriented. All of this is documented in detailed protocols, generated during the production process, which also include data from quality inspections of every single fiber patch. This enables a seamless fiber patch quality documentation for the entire part. With this successful synthesis of both software and hardware Cevotec le-

vels the path for a large-scale volume production of complex components for aerospace, automotive and other industries.

Cevotec releases the Samba production system, together with the Artist Studio software, at JEC World in Paris on 14th March, 2017.

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Additive placement of fiber patches