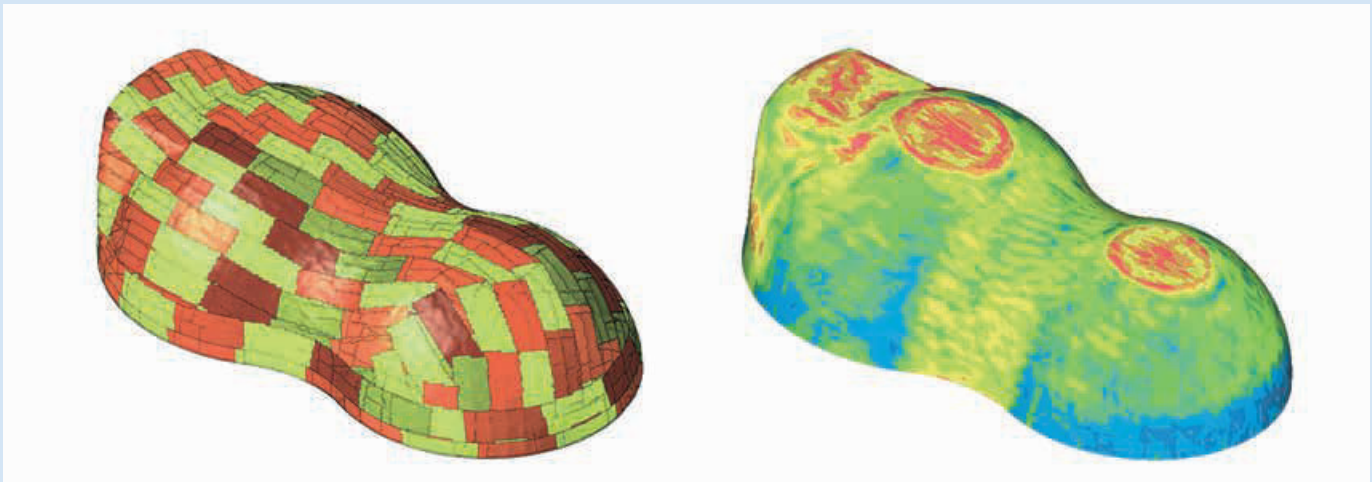


FREEDOM OF AN ARTIST

Automated 3D modeling of patch-based laminates enables an efficient design process

Fiber Patch Placement as an advanced composite technology opens up new potential for extreme lightweight design, but decisive FE features are also required to perform an efficient design process. In addition to the CAD-CAM software ARTIST STUDIO, a new FE-plugin extends the patch-based design process chain.



Exemplary modeled patch laminate (left) and simulation results (right)

Fiber Patch Placement (FPP) with its patch-based manufacturing principle has a high degree of freedom in orienting fibers within the laminate. But the FE-based modeling of laminates with curvilinear fiber orientation can be challenging for structural simulations, as the most commercial modeling software do not explicitly support advanced technology-specific modeling features.

The answer to this barrier is to use the existing software's interfaces which usually are suitable for processing the patch laminate geometry exported from the ARTIST STUDIO module PATCH ARTIST.

Artistic extension

Therefore, in addition to the stand-alone software ARTIST STUDIO, Cevotec has developed a patch-based FE-plugin for the commercial modeling software HyperMesh, one of the leading FEA preprocessors on

the market. This allows users to generate a patch-based laminate within HyperMesh fully automated, based on the geometry, position and orientation of patches as defined in PATCH ARTIST (see Fig.).

Features in practice

The features of the FE-plugin enable the modeling of the precise fiber orientation of each patch and even the thickness distribution due to gaps and overlaps. This is possible on sublayer-level or even on patch-level for a more detailed FE analysis. The FE-plugin supports a variety of automated modeling approaches, including (thick-) shell-based laminates and cohesive zone modeling of the interfaces between patches for a detailed delamination analysis.

The new FE plugin also offers extended modeling capabilities for FPP laminates directly inside HyperMesh. This empowers the user to create local reinforcements and

layers with curvilinear fiber orientation on the fly.

Further FE-plugins in other well-known commercial modeling software like Ansys and Abaqus are on the development roadmap of Cevotec.

Work in progress

A well-designed fiber orientation is the key to achieve superior mechanical performance for fiber reinforced composites. Compared to traditional ply-based technologies, composites engineers can be sure that with Fiber Patch Placement, the fiber orientation after manufacturing is exactly the same as it is modeled.

Further information:

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