Hexcel Case Study:
NaCa Systems Hybrid Automotive Seat Back

Hybrid carbon and wood fiber composite automotive seat back.

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Hexcel and NaCa Systems develop hybrid carbon fiber prepreg and wood fiber composite sports car seat back using a rapid press molding process.

Natural materials and carbon fiber working together

NaCa Systems, a future-focused Tier 1 supplier of natural fiber composite automotive interior parts are based in the historical textile industry city of Liberec in the Czech Republic. NaCa Systems - a combination of Natural and Carbon materials, has developed a portfolio of novel press molding technologies for thermoset and thermoplastic components based on wood and other natural fibers.

In late 2018, NaCa Systems was searching for a development partner to help productionize a new lightweight sports car seat back using a hybrid carbon fiber and wood fiber composite. Hexcel's unrivaled expertise with fast curing epoxy prepreg systems and dedicated research and technical support teams provided a winning combination.

NaCa Systems' technology is based around wood fiber thermoset mats with an 80% fiber content using materials derived from waste streams in timber, furniture and packaging industries. High-temperature press molding of the wood fiber mats produces highly detailed components for applications such as automotive interiors. Parts can be finished with a surface lamination using foils, leather and wood veneers or, for components such as the seat back, as a composite with a carbon fiber prepreg and protective clear coat.

Tailored rapid cure epoxy prepreg solution

For the seat back project, Hexcel provided its HexPly® M77CS epoxy prepreg material. HexPly® M77CS is a fast curing hotmelt, thermosetting epoxy matrix, specifically designed for prepreg applications at which short-cure cycles and clear surfaces with perfect aesthetics are required.

Several different HexPly® woven fabric and UD prepregs were considered and evaluated, with some trial parts also produced using Hexcel's HexMC®-i 2000 carbon fiber epoxy molding compound, before a woven 3K carbon fiber twill material was selected - offering the optimum balance of structural performance and visual appearance.

Following quickly after the initial testing, Hexcel developed a special version of the M77CS prepreg with an increased resin content to optimize the CFRP to wood fiber composite bond strength despite the slightly higher resin uptake seen with the natural material component. Hexcel's carbon fiber prepreg was cured at around 145°C for four to five minutes and could be fully integrated into NaCa Systems' existing production lines and metallic tooling.

Weight savings and improved safety in a more sustainable composite

As well as validating a short cycle time production process for CFRP and wood fiber composite parts, this Hexcel and NaCa Systems innovation offers a host of benefits to automotive manufacturers. The lightweight seat back produced demonstrates a 40% weight savings when compared to a typical injection molded plastic component, while also featuring a significantly improved CO2 footprint versus a full carbon fiber part. Unlike plastic molded parts, the prepreg and wood fiber structure doesn't produce sharp-edged pieces when damaged, significantly increasing passenger safety in a crash scenario. In addition, wood fiber composites also increase sound absorption, contributing to improved noise, vibration, and harshness (NVH) damping within the vehicle interior.

Both parties are now looking forward to bringing this novel hybrid technology into high volume production, providing attractive, sustainable and lightweight parts for a broad range of interior trim and vehicle cabin applications.

"**Hexcel has been a fantastic technology partner for our latest natural fiber and carbon composite hybrid parts,**" said Aleš Kopal - CEO, NaCa Systems. "**For us, it is important to work with a prepreg supplier who can tailor the materials to work with our processes and who can deliver consistent quality as we grow rapidly in response to the continued drive from OEMs for more sustainable composite solutions.**"

Hexcel Product Family

HexTow® Carbon Fiber

HexFlow® Resins

HexMC® Molding Composite

HexForce® Reinforcements

Polyspeed® Laminates and Pultruded Profiles

HexWeb® Honeycomb Core

HiTape® Advanced Reinforcements

Modipur® Polyurethane

HexWeb® Engineered Core

HexPly® Prepregs

HexBond™ Adhesives

HexTool® Tooling Material

HiMax™ Multiaxial Reinforcements

For more information

Hexcel is a leading worldwide supplier of composite materials to aerospace and industrial markets. Our comprehensive range includes:

- HexTow® carbon fibers
- HexForce® reinforcements
- HiMax™ multiaxial reinforcements
- HexPly® prepregs
- HexMC® molding compounds
- HexFlow® RTM resins
- HexBond™ adhesives
- HexTool® tooling materials
- HexWeb® honeycombs
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products
- Polyspeed® laminates

For quotes, orders and product information call our sales office in Austria +43 7229 772-0. For other worldwide sales office telephone numbers and a full address list, please go to:

http://www.hexcel.com/contact/salesoffice

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