

Leonberg/Stuttgart, 6th June 2015

The huge potential of lightweight technology combined with the profitability that comes from shorter processes – ThinKing June presents a simpler and lower cost method of laying out and manufacturing carbon or glass fiber components made by Compositence GmbH

In the future it will be possible to avoid a great deal of the scrap and manual work involved in the production of high-performance glass fiber components. The new RoboMAG machine technology produced by the Leonberg-based mechanical engineering company Compositence can produce carbon or glass fiber parts faster while making more efficient use of resources, including with thermoplastic tapes. This reduces weight and costs. This sustainability and efficiency is made possible by new machine technology which uses intelligent software for the layout of components. Compositence GmbH won the 2013 Innovation Prize (1st place) awarded by the State of Baden-Württemberg.

The Development Agency for Lightweighting Baden-Württemberg presents this innovative technology in the June 2015 of ThinKing. Leichtbau BW GmbH uses this label to showcase excellent lightweight technology products or services from Baden-Württemberg.

Previously lightweight fiber composite parts were produced in several stages in processes involving a great deal of manual work. “Our technology now not only shortens the manufacturing process, it also reduces process costs and enables more efficient use to be made of expensive and energy-intensive carbon fiber inputs”, explains company founder Ingo Karb.

The company’s newly developed production process addresses one of the key challenges in the field of fiber composites, namely producing large quantities of high-performance components profitably. Typical applications include load-bearing planar parts made of carbon fiber or glass fiber, for example in vehicles, wind turbines, aerospace, machinery and the sport and leisure industries.

Compositence produces directly from pure rovings without making semifinished products first. This has numerous advantages in many applications. Automated direct production omits intermediate steps, is more cost effective and eliminates practically all cutting scrap.

The components are also lighter thanks to the optimised fiber architecture needed to meet component requirements. The Compositence process applies the carbon fibers according to optimised load-paths with minimum cutting scrap. They are oriented precisely by robot. Time-consuming manual layup is no longer needed.

Software and simulation play an important role in the Compositence process. The LayupPlanner software first virtually assigns fibers to a form. This assignment is then used to generate the machine program for the fiber placement in production. The machine program is tested and optimised in a simulation environment before going into production.

However, the laying up of fibers produced in the LayupPlanner software is not only used for the implementation of the machine program but also for the structural simulation of the component. “This is something radically new for most applications: In this way virtual placement is directly connected with the actual machine program,” explains Karb. This also saves customers time and money in the production development process.

Industrialisation and profitability are both high on the agenda in Leonberg. Current cycle times are around five minutes. The technology is currently being adapted with leading automotive OEMs for significantly shorter cycle times. The greatest financial benefits offered by Compositence’s technology are the direct processing of continuous filaments, minimal cutting scrap and the omission of manual processing steps.

The production of runs of several hundred preforms for planar components is much more economic than manual production.

Modular machine technology also for thermoplastic glass and carbon tapes

As well as the RoboMAG type system, which processes carbon fibers (rovings) directly from manufacturers’ spools, Compositence has also produced machines which place thermoplastic tape (RoboMAG-T). In this case the fibers are already embedded in the plastic and only have to be pressed after placement to make “organic sheeting”.

The big advantage compared with conventional organic sheeting is that production takes place directly in the final contour with a fiber architecture optimised for the component being produced. This enables the amount of material used for various applications to be significantly reduced.

What is more, RoboMAG-T machines can be used to place many different types of material: carbon or glass tapes with various plastics, such as polyamide or polypropylene. Various types of tape can also be used on a machine at the same time to combine their differing properties in a single component.

The Compositence process is not only cost effective, it also produces unique surfaces. One example is the carbon table top Nogi, which Compositence teamed up with process designer Oskar Zieta to develop and produce itself in small series.

As well as machinery and software, Compositence also develops and manufactures prototypes and produces small series.

About Compositence GmbH

In contrast to metals, the material properties of composites are created during the production process itself. One of the key factors determining material properties is the direction in which the fiber reinforcing elements are placed in the part.

The Compositence process applies carbon fibers – without the otherwise usual intermediate steps – according to optimised load-paths with minimum cutting scrap. This reduces both the weight and cost of parts. What is more, the process also produces an attractive surface.

Compositence offers machinery for the preforming of continuous filaments and thermoplastic tapes as well as software products for layout from which appropriate production programmes can be directly generated. Prototypes and small-scale series can be produced or tests performed for the layup of tailor-made materials using two in-house machines.

Further information at: www.compositence.de

Images



Caption: **(Left)** Compositence GmbH's RoboMAG-T machine places load-path optimised thermoplastic tapes on a form with minimum cutting scrap. / **(Right)** The fiber-fair placement process with the RoboMAG system can create very interesting surface appearances. One example is the carbon table top Nogi, which Compositence produces itself with process designer Oskar Zieta. Pictures: Compositence GmbH

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