Recycling of composites – a perspective for the future

Building up a resource efficient materials cycle is recognised as an effective building block for the further development of Carbon Composites. The solution to this problem is being researched and developed in various locations. The time has come for a comprehensive evaluation, which will enable focusing on the outstanding tasks.

What is vital is a consistent processing concept for the usage of recycled carbon fiber (rCF) materials. The elements are listed below:

Development of a logistics chain for waste recovery

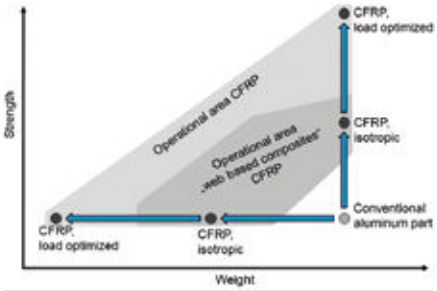
Even when assuming an increased market volume this task can be quickly implemented by efficient partners from the waste logistics sector, based on a meaningful classification of the waste.

Separation Matrix – Fibers

Basically the research into better processes for the separation of fibers from resin-based waste (processing and end-of-life) should be continued. However, it can and must be noted that there is an already existing practice carried out in several industrial installations with pyrolysis, which results in the fact that rCF materials can be further processed.

Establishing of semi finished products

The application of nonwoven processes have led to an industrially capable and, above all, an economically efficient process for the creation of semi finished products.With continuous improvement this should form a good basis for applications in lightweight construction. The sensible adjustment to the product characteristics will lead to a suitable basis for an appropriate design of the



Application of web based composites

Compact line at ITA: carbon fibre waste to semifinished products for hybrid, thermoplastic and thermoset materials

end products. The high degree of variation, which results from process of "web based composites" is a system benefit which will enable further interesting applications. In special cases, yarns and other products like patch-based surfaces, will complement the areas of application.

Step-by-step Downcycling

Obviously it will not be possible to avoid a certain deterioration in the fiber characteristics after recycling. However the choice of the correct process has to orient itself to the challenge of negatively influencing the fiber characteristics, and especially fiber length, as little as possible. From this point of view, the process of chopping waste pieces of several hundred millimeters in length, into ultra short fibers is a destruction of value which is avoidable. Although it must be taken into consideration to find a reasonable solution for the high degree of dust created in the processing of rCF.

Norms and Standards

The well-directed development and trading of products along the value chain of rCF must be based on reproducible and aligned standards and testing devices. Developing these must be a key focus for the near future.

Products and applications

The products determine the appropriate processing technology for rCF. The systematic search for suitable applications must be led by this seemingly obvious but however very important recognition. There are more than enough application examples, which would provide a good and suitable basis for the characteristics of rCF products.

Design processes for rCF

Proper application of rCF materials in composites calls for appropriate layout and calculation models. Especially for nonwovens there is a lack of specific but straightforward models, which can be adapted by designers in medium size and small enterprises, too. Application based semi-finished products like profiles, tapes or organo webs may support this measure.

Pilot applications

Nothing convinces potential users as much as the demonstration of successful applications. This requires a comprehensive approach in combination of process technology and product development, like it is possible with the industrial scale compact line at ITA Augsburg.

Further information:
Univ.-Prof. Dr.-Ing. Stefan Schlichter,
Institut für Textiltechnik Augsburg gGmbH, Augsburg,
phone +49 (0) 821 / 80 90 34 10,
stefan.schlichter@ita-augsburg.de,
www.ita-augsburg.de