Towards a New Generation of Glass Fiber Products Based on Regenerated Fiber Thermally Recycled from End-Of-Life GRP and GRP Manufacturing Waste

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The recovery and reuse of glass fiber from waste glass fiber and end-of-life GRP in an environmentally friendly, cost-effective manner is one of the most important challenges facing the composites industry. The annual global consumption of reinforcement grade E-glass fiber (GF) now exceeds 5 million tons. Associated with this global GF consumption was the production of 0.5-1 million tons of GF manufacturing waste most of which is landfilled. Furthermore, approximately 70% of reinforcement GF is used to manufacture thermoset based composites (GRP) which also produces approximately 15% manufacturing waste. Consequently it can be shown that there is actually sufficient GF available in current manufacturing waste and end-of-life GRP to meet approximately 50% of the global demand for GF reinforcements.

Although a number of processes for recycling GRP are available or under development, the most likely methods to be cost-effective are based on thermal recycling where temperatures in the range 450-600 °C are used to remove the polymer matrix and allow extraction of the glass fiber reinforcement. One of the key barriers to reuse of such thermally recycled glass fibers (RGF) in second-life composite materials is their drastically reduced strength. A breakthrough in the regeneration of RGF performance has the potential to totally transform the economics of recycling GRP waste and end-of-life composites.

In this presentation we will review the outputs from two EPSRC funded research projects focussed on the cost effective recycling of end-of-life glass fiber composites from automotive (TARF-LCV: *Towards Affordable, Closed-Loop Recyclable Future Low Carbon Vehicle Structures*) and wind energy applications (ReCoVeR: *Regenerated Composite Value Reinforcement*). The mission of the ReCoVeR team is to research and grow the knowledge to enable the development of cost-effective, drop-in, glass fiber and composite products based on recycled glass fibers with regenerated mechanical performance. The Research Goals for the project are threefold -

- Generate fundamental understanding of the changes in glass fibers caused by thermo-mechanical conditioning
- Develop cost effective treatments to regenerate the performance of thermo-mechanically recycled glass fibers
- Produce examples of glass fiber and composite products using regenerated glass fibers

The presentation will provide an overview of the research results from all three areas of the project.