

# Carbon standstill

Left: Bicycle manufacture may be an ideal sector for the proliferation of recycled carbon fibre.

Despite predictions of an 80% recycling rate in the composites sector, ELG's Frazer Barnes argues that the carbon fibre sector is closer to 6%. He talks to **Khai Trung Le** on the value of composites recycling, and what improvements could be made.

In 2011, a statement from an ACMA Green Composites Council subcommittee, the Composites Institute, the US Department of Energy and the Institute for Advanced Composites Manufacturing Innovation set a tone of optimism with an ambitious composites recycling target of 80% by 2016. However, as the year comes to a close, Frazer Barnes, Managing Director of ELG Carbon Fibre, UK, notes that the target is still far from being reached – 'For carbon fibre, the amount of manufacturing waste actually recycled is around 6%. I'm not an expert on glass fibre, but I think it's worse there. The industry is a long way from an 80% recycling situation.'

Barnes attributes some of the slowdown in reaching the target to the lack of development in the end user market for composites products, slowing down both increasing demand and establishing a cycle of retrieving waste carbon fibre. But within ELG's primary target industry – transportation – there remains a fundamental issue of seeing where recycling composites can be used. 'The traditional carbon fibre composites sector would like to see a recycling solution,' said Barnes. 'They recognise the value in having someone recycle their materials, but one of the difficulties is that not many companies want to use recycled products.'

This is keenly felt in the aerospace sector – identified as one of the biggest contributors of carbon fibre waste by Barnes – where identifying correct applications is still an ongoing process, 'We all have to be realistic – you're never going to make primary structure out of recycled carbon fibre.' In 2014, ELG Business Development Manager, Alex Edge, claimed that recycled carbon fibre could provide savings of as much as 20–30%. However, being made from shredded, shorter fibres, tensile strength is reduced by 10–20%.

Instead, Barnes posited transferring aerospace waste to other transportation sectors that may be more compatible, including pushbike manufacturing, a solution that may fit both sectors. 'In an ideal world, the OEMs want to be paid for their carbon fibre waste, seeing that it still has value.'

## Making recovery

Despite the disparity between 80 and six, Barnes noted that establishing a closed-loop system for composites recycling was not being sat on. 'All of the companies, at least at OEM level, that generate composite waste are looking for recycling solutions, and they're interested in finding applications for recycled fibre.'

Beyond the obvious environmental benefits that are a priority within the automotive and aerospace sectors, the furthered use of recycled carbon fibre can help ease fluctuations between supply and demand of materials and pricing. Barnes continued, 'The carbon fibre industry is still a relatively small one, in terms of global materials usage, and has been characterised by over- and under-supply. So you have a whipsaw effect of the loss of promising developments, because of high prices and lack of material, or stalling in progression of applications brought about by over-capacity price drops that aren't sustainable when demand comes on stream.'

'The use of recycling can smooth that out. It's taking a waste product that exists in the market today and returning it to market, easing supply and demand fluctuations.'

There remain obstacles in devising the most efficient and easily accessible route for composites recycling, but Barnes would like to see greater involvement from academia in recycled material application, citing ELG's work with the Universities of Bath, Nottingham, and Warwick, UK, and California Polytechnic State University, USA. 'We work with them not so much on recycling processes but on looking at the application of recycled materials into high-volume industries. That's our message, as far as the role for academics to contribute.'

While Barnes is clear on the role and development of recycled carbon fibre, the wider composites sector may continue to fall short of the strong expectations of 80%. 'The glass fibre sector is much more difficult. One of the reasons we can recycle carbon fibre is because it's a high-value material. So even with the costs of recovery and processing the fibre, there is still a very large competitive advantage compared with virgin carbon fibre. In glass fibre, because it's a relatively low-cost material, the business case for recycling and the methods we can use is more difficult to justify.'