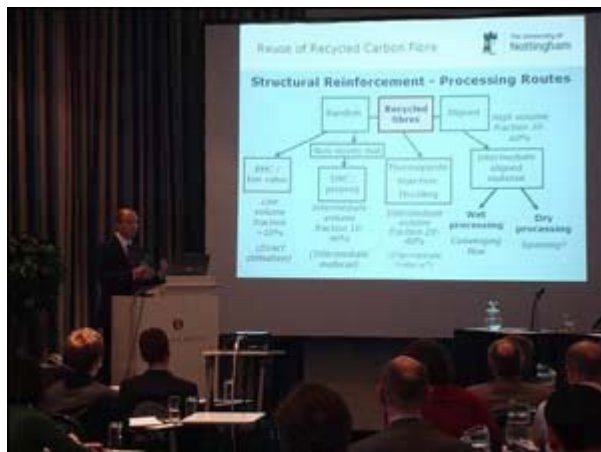


# Review of IntertechPira Carbon Fibre Recycling & Reuse Conference

November 21, 2009 (Germany)



The world's first conference dedicated to carbon fibre recycling, held in Hamburg, Germany on 3 – 4 November 2009, offered a broad analysis of the current recycling technologies, commercial applications, the latest research results and future opportunities in this field.

## Programme highlights

Dr Steve Pickering opened the conference with a comprehensive overview of the current recycling technologies on offer, illustrating the differences in the processes,

the type of output material generated by each of the respective pyrolysis, fluidised bed and thermal fluid bed technologies. This was a detailed and comprehensive introduction to the event and Steve set the scene well in outlining progress to date with CF recycling, but also highlighting the challenges facing this fledgling industry.

Steve Line, CEO of the first fully commercialised recycling plant, Recycled Carbon Fibre Ltd., based in the UK, gave a lively presentation, posing questions from the business perspective, and outlining the difficulties in establishing a baseline price for a recycled product that could (whether rightly or wrongly) be considered inferior to virgin material.

A brighter outlook from Boeing's Bill Carberry followed the coffee break, giving the aerospace sector's view on progress to date with recycling aircraft, and passed round a test component chair arm produced from recycled carbon fibre. Bill is also Deputy Director of AFRA, the Aircraft Fleet Recycling Association, who have helped develop best practice methodology for many other material and component streams in end of life aircraft. He did make clear however, that while the latest state of the art planes from all mainstream producers were using a high percentage of carbon fibre, aircraft manufacturers would always use the best material for purpose and in the future there was no guarantee that this would be carbon fibre.

Day 1 closed with two complimentary papers from Imperial College London, from Soraia Pimenta and Dr Silvestre Pinho. Soraia presented the results of extensive mechanical testing of composites made using recycling fibres, and analysis of the failure mechanisms involved under different stress conditions. Soraia's study was particularly

interesting in investigating the impact of 'bundles' or grouped, aligned fibres (artefacts from the source material) in the non-uniform nature of the recycled fibre composites, and how we might take advantage of some non-intuitive results.

Feedback for the manufacturers was that while performance was comparable with virgin materials, management of retaining 'bundles' in the matrix and preserving fibre length would be key in pushing performance yet further.



Silvestre's presentation followed up on this primary research, illustrating how we can use this detailed analysis to build models and predict the performance of composites made from recycled fibres. By better understanding the failure mechanisms, and behaviour of certain types of composite matrix, we can create a positive feedback loop in the design of the reclamation and recycling system and optimise the recycling output to give materials that are best suited for creating recycled

composites.

Day two opened with one of the world's most experienced proponents of carbon fibre recycling. Pete George from Boeing has chaired many conference sessions and run workshops on recycling fibre over the last decade, and was an ideal candidate to open the second day of the event. The theme for the morning was to look at key end uses for recycled materials and perspectives from these end user sectors.

Pete talked in detail about Boeing's current operations in managing their materials flows and gave details of manufacturing demonstrations and proof of concept trials run with partners at recyclers MIT and Recycled Carbon Fibre Ltd. The key point of the presentation was that the recycling process needs to be product oriented – by designing the system to produce materials that can be integrated into existing markets; the barrier to acceptance is reduced significantly. For the foreseeable future, carbon fibre will not be recycled back into aerospace structure components, but that with proper traceability, repeatability, qualification and documentation a view towards recycling uncured manufacturing excess back into non-structural aerospace applications may be possible.

A World F3rst, at the world's first carbon fibre recycling conference followed as Dr James Meredith from Warwick University outlined the drivers behind, and the technical challenges of designing and building a sustainable Formula 3 racing car. Although there was resistance to the project, the team have successfully created a competitive car, using a wide variety of natural materials and low carbon alternatives.

Everything apart from the cashew nut brake pads made it to the final test vehicle! James concluded that there was potential for recycled carbon fibre in motorsport applications, but probably in lower Formulas, and there was further work needed in terms of standardization of material properties and sustainability of supply.