

Carbon Composite Recycling

What's the context?

Since Leo Baekeland first patented Bakelite in 1907, society has become reliant on plastic. So much so that **380 million tonnes are produced each year**. While plastics have proved to be endlessly useful, they are just as harmful to the environment. Recycling programmes have improved in recent years but fail to address highly durable thermoset plastics used in industrial settings such as the manufacture of aircraft which represent over **10% of all plastics produced**.

What did we do?

The Expleo Eco-Design Centre is pioneering an all-new process to make previously un-recyclable materials sustainable, reducing plastic waste. The PhD research project with Université Toulouse III – Paul Sabatier is targeting Carbon Fibre Reinforced Polymers (CFRP) used in aircraft. The experimental process has two key parts: **a new recycling process and the application of greener bio-based resins** to be used in the manufacture of composites.

What's the impact?

The new carbon composite recycling processes will make it possible to recycle CFRPs with **90% of the mechanical properties of virgin carbon fibres maintained**. This will eliminate a large amount of plastic waste and allow these fibres to be reused for a range of applications. Reducing the environmental impact of industry requires a holistic outlook across the entire supply chain, focusing on materials and processes as well as fuel emissions. For instance, a Boeing 787 Dreamliner is 50% CFRP by weight which currently would be destroyed at the end of its 15-20 year lifecycle. This process will allow much of that material to be **reused either in the manufacture of new aircraft or other products**.

What's next?

While developed and tested on CFRPs used in the manufacture of aircraft, the process applies to a wider range of products, with **CFRPs used in everything from cars to sports fields to solar panels**. Proven in a lab setting, refinements are being made to the time and energy it requires with plans to industrialise the process at the end of the PhD programme in 2023.

