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HiPeR – Oriented recycled carbon fibre structures from aviation production waste for reuse in aircraft

Objective

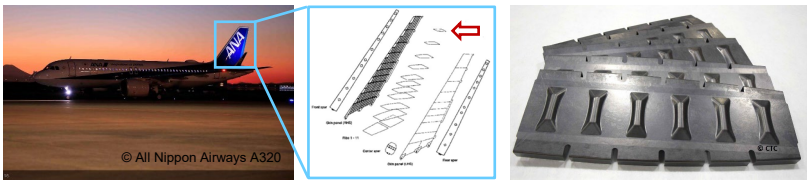
Due to the relatively low performance of recycled length-reduced compared to continuous virgin carbon fibres, the achievable component performance of these materials has so far been in a range that remains unattractive for high-performance applications such as aircraft. To change this, the price-performance ratio of recycled carbon fibre semi-finished products must be reproducibly increased.

Therefore, two basic approaches were pursued in the project: Within the investigations, in addition to pyroly-sed CFRP, alternatively processed recovered carbon fibres were to be examined for their suitability or their price-performance ratio. The main focus laid on improving the mechanical properties of the semi-finished products through a high degree of alignment of the recycled carbon fibres in the textile semi-finished product. Finally, the material development was to be validated in an aeronautical environment for the production of load-bearing parts of the secondary fuselage structure.

Approach and results

Recovered and recycled carbon fibre types were examined and evaluated with regard to their process stability and suitability. Subsequently, only fibre types equipped with sizing were processed into highly oriented semi-finished textile products using carding technology and subsequent flat stretching in order to minimise mass losses. To monitor and evaluate the fibre orientation, an in-line measuring method for quality assurance was developed and implemented in the manufacturing process. The highly oriented textile semi-finished products were further processed and tested in combination with thermoset matrix systems in Germany for aerospace applications. In addition, the Japanese partners mainly pursued the development of thermoplastic composites for automotive applications.

When pressing to CFRP test specimens, fibre volume contents of 30 % were realised to optimise the charac-teristic values. The result of the bending test was an MD bending strength of 658 MPa for the re-covered fibre material and 583 MPa for the recycled fibre material. In the tensile test, a MD tensile strength of 728 MPa was determined for the recovered fibre material and 504 MPa for the recycled fibre material.



Airbus A320: load carrying rib of the vertical stabiliser (VTP) box

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The final report on this project is available on request.

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