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Characterization of Structural Behaviour for High Frequency Phenomena

Results in Brief

Modelling and simulation techniques boost understanding of composite material structural design for European aerospace

The use of composite materials as principal structural elements in aircraft requires a thorough understanding of their mechanical properties. An EU initiative implemented a strategy to determine the mechanical behaviour of composite materials under impact and crashing using experimental characterisation and validated multiscale numerical approaches.



DIGITAL ECONOMY



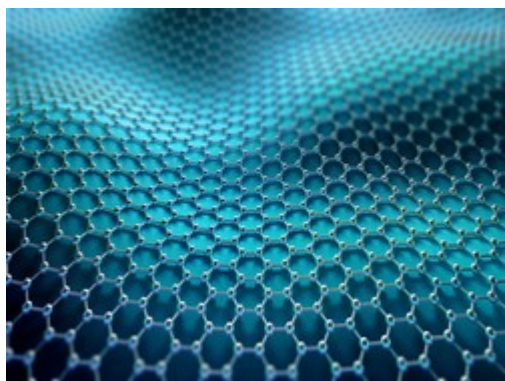
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Thanks to EU funding, the CRASHING (Characterization of structural behaviour for high frequency phenomena) project devised an approach to perform high fidelity simulations of the mechanical performance of composite structures under impact and crash loads.

Specifically, project partners developed and implemented a multi-scale analysis and simulation approach that takes into account the physical mechanisms of damage in composites at various lengths (ply, laminate, component). They successfully validated the approach via industry use cases. The

focus was on composite materials currently used in aircraft innovative designs and new materials with potential future applications.

The CRASHING team defined and manufactured five different composite materials at their three length scales. It demonstrated that the simulation approach for these materials and structures will be suitable for crash landing, ditching, bird strikes and ice impact simulations, and other dynamic loading phenomena.

Researchers developed and applied damage models in commercially available numerical analysis tools typically used by the aeronautical industry for crashworthiness. Specific tests were performed to validate the numerical simulation methodologies. These new simulation tools provide significantly better predictive capabilities and a wider range of validity when compared to previous approaches.

CRASHING provided new insight into the mechanical behaviour of structural composites prone to dynamic loading conditions. This will lead to better designs for components developed by Clean Sky's Green Regional Aircraft programme towards fulfilling European aviation environmental targets for 2020. By opening the door to the industrial implementation of virtual design and virtual testing strategies, the project is expected to have a notable effect on composite structure design and certification in the aerospace industry.

Keywords

[Composite materials](#)

[aircraft](#)

[CRASHING](#)

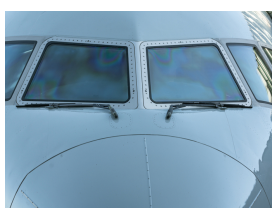
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Project Information

CRASHING

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[Project website](#)

Project closed

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