

Modelling and experimental validation for low and high energy impacts on composite aircraft structures

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Low energy impacts (up to 100 J) by hail or tool drops may happen on aircraft skin structures, and has to be considered on the design allowables to fulfill Damage Tolerance requirements. The damage caused is often BVID (Barely Visible Impact Damage), as internal delaminations which may drop significantly the material strength.

Large energy impact caused by collision with large birds, or by ice grown on the blades in case of turbopropellers, which suddenly debonds and impact the fuselage, pose a significant threat to the aircraft safety, and either the structure has to be designed to collapse, avoiding damage to the main spar, as it is the case for wing leading edges, or an additional shield have to be built on the basic structure, as used to be the option selected to protect the fuselage sections. Whatever is the approach, refined numerical methods and advanced instrumentation are needed to optimize and validate the design. Details and results on the modelling for wing leading edge impact will be presented, together with experimental tests done on plates of deferent materials, submmitted to high energy impacts.