Aerospace Europe Conference 2023
Joint 10th EUCASS – 9th CEAS Conference

Abstract #XXX *(to be filled by the organizers)*
Preferred Topics: AEROFLIPHY / STRMAT / SYSINT *(3 maximum from the list of topics)*
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Type: Oral
Status of corresponding author: Regular
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Title
Gravel Deflector Aircraft Integration.

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Abstract
In this report it is described the challenges faced during the development of the gravel deflector loads model, under the C295FW project for Canada.

The C295 is an aircraft certified[1] by Airbus that is able to operate on unpaved runways. When the aircraft is operating on unpaved runways, the landing gear wheels can lift stones that can damage the aircraft external surfaces. In order to avoid this, the gravel deflector was developed and installed, in order to protect the aircraft from stones hits.

The Gravel Deflector consists on a shielding element, supported by links and attached to the NLG leg by means of a supporting frame, that folds with the support of the folding bracket.

- The shielding element is the effective part that interposes in the trajectory of the debris, absorbing the excess of its energy or preventing it to reach any impact in sensible element installed on the lower part of the aircraft fuselage that might otherwise be damaged as result of the impact.
- The links serve as support for the shielding element up to the upper and lower frames.
- The supporting frames support both the shielding element and the links in place, attached to the nose landing gear.
- The folding bracket is attached to the bay, and forces the folding of the shielding assembly into the bay during the nose landing gear retraction.

Due to the constraints of the aircraft design, it is not possible for a Gravel Deflector to provide full aircraft protection capabilities. So the design of the Gravel Deflector shall maximize the area of protection and minimize the negative effects on the non-protected areas.

For sizing the gravel deflector, it was necessary to build a model able to compute the interface loads with the bay and the landing gear. The model shall be representative for the phases in which the gravel deflector is outside of the bay: landing approach, landing run, ground handling and take off run. This model takes into account the aerodynamics, the structural flexibility, the hydraulic system functionality and the kinematics in order to obtain realistic loads.

The model[2] has been developed in MSC Adams software, and it has been validated against laboratory tests in order to check that the loads used for design are correct. A description of the methodology followed is described in this report.

References

[1] Federal Aviation Regulation: TRANSPORT CATEGORY AIRPLANES (FAR part 25).
[2] Dan Negrut, Andrew Dyer “ADAMS/Solver Primer” Ann Arbor August, 2004