

## INTERNSHIP PROPOSAL

# Sensitivity analysis and robust simulation of tire debris impact on composite panels

Cenaero, located in Gosselies (Belgium), is a private non-profit applied research center providing to companies involved in a technology innovation process numerical simulation methods and tools to invent and design more competitive products.

Cenaero's ambition is to be internationally recognized as a technology leader in modeling and numerical simulation, to be a strategic partner of large global industries as well as a real support to regional companies including innovative SME. Mainly active in Aeronautics, Cenaero wishes to increase the transfer and the application of its technology to surface transport, energy, health and sustainable development. Cenaero operates a top supercomputing infrastructure TIER-1 among the world 500 most powerful systems.

Cenaero provides expertise and engineering services in multidisciplinary simulation, design and optimization in the fields of mechanics (fluid, structure, thermal and acoustics), manufacturing of metallic and composite structures as well as in analysis of in-service behavior of complex systems and life prediction. Cenaero also provides software through its massively parallel multi-physics platform Argo and its design space exploration and optimization platform Minamo.

One of the main axes of development robust simulation. In the field of composites, we use open source and in-house tools to setup numerical workflow that will efficiently evaluate the response of a composite assembly. Virtual testing will allow a faster and cheaper validation route to new innovative concepts. Cenaero's expertise and High-Performance Computing infrastructure will contribute to advancements in this field. Furthermore, they can be tested and validated in the frame of collaborative projects such as TIOC-WING. The present proposal deals with the study of the response of tire debris impacts on structural composite panels for new generation aircrafts.

### Objective

This internship aims at exploiting the numerical tools to perform structural analysis of tire debris impacts in a probabilistic workflow. Parameters such as material properties, impact conditions and model description can be studied to build a more robust response of the potential damage occurrence in composite panels. This can reduce the amount of structural testing required that leads to complicated and expensive validations by finding the critical conditions for tests and lead to more interesting design variants.

The student will first familiarize him/herself with examples of composite structural simulation and computational workflows. Parameters of the design space will be analyzed to study the advantages and drawbacks of technological solutions. Finally, results will be exploited in the frame of a research project to validate different tests being carried out in the TIOC-WING project.

The internship offered will require the student: (i) to familiarize him/herself with the FE software Samcef & Abaqus, (ii) to perform simulations through an automated workflow and (iii) analyze and present results to bring forward the sensitivity analysis of different parameters and testing conditions. A detailed report of the internship activities will need to be provided at the end of the internship.

### Profile

- Master's student in Material Science, Simulation or Engineering
- Knowledge of Finite Elements Analysis techniques, experience with a FEA software is a plus
- Knowledge of composite materials fabrication methods a plus
- Motivated by technical challenges, good communicator, and capability of autonomy

- Comfortable in English

### **Duration**

The length of the internship can range between 4 and 6 months. The internship should take place, at least part-time at Cenaero's offices in Gosselies, Belgium.

### **Contact**

Interested candidates should send a cover letter, quoting reference number of the offer, and a resume to [rh@cenaero.be](mailto:rh@cenaero.be)