Master Thesis - "Design and Validation of Distortion and Swirl Screens for Prescribed Inlet Flow Fields"

About us

GKN Aerospace is the world's leading multi-technology tier 1 aerospace supplier. With 33 manufacturing locations in 12 countries, we serve over 90% of the world's aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world's advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

Project Background

Inlet distortion and swirl screens are used to generate prescribed flow conditions for aerodynamic testing. A Python-based design tool has been developed to convert desired pressure-loss distributions, represented by momentum sources in CFD, into manufacturable distortion screen geometries. The methodology now needs to be evaluated by resolving the generated screen geometry in CFD and assessing how accurately the target flow field is reproduced. A further challenge is to account for the development of the flow between the screen location and the downstream Aerodynamic Interface Plane (AIP), where the target flow conditions are specified.

Assignment Description

The thesis will focus on the design and validation of distortion and swirl screens for prescribed inlet flow conditions. An existing Python-based tool converts CFD momentum-source models into geometrical distortion screens. The method will be validated using CFD of the resolved screen geometry. The work will also investigate how the screen design can be adapted to reproduce a specified target flow field at a downstream Aerodynamic Interface Plane (AIP).

The work may include:

- Design and generation of distortion and swirl screen geometries.
- CFD analysis of momentum-source models and resolved screen geometries.
- Validation of the developed Python-based design methodology.
- Comparison between target and achieved pressure, distortion and swirl distributions.
- Investigation of the downstream development of distortion and swirl between the screen and AIP.
- Development of methods to modify the screen design to improve agreement with the target flow field.
- Evaluation of relevant design parameters and practical aspects such as manufacturability.

Qualifications

- Master's student in Aerospace, Mechanical Engineering or similar.
- Knowledge of fluid mechanics and aerodynamics.
- Experience or interest in CFD, Python and data analysis.

Apply by: Send your resume and cover letter to magnus.strid@gknaerospace.com