Master Thesis - “Compressor blade impact analysis in LS-Dyna” (30 credits/20 weeks – 1 student)

About us

GKN Aerospace is a world leading multi-technology tier 1 aerospace supplier. With 55 manufacturing locations in 15 countries. 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

Containment capability is required for all compressor and turbine blade stages in a gas turbine aero engine to prevent progressive hazardous failure in case of a blade rupture. Hand calculation and energy based sizing methods have up to recently been the only viable method to assess containment requirement for a containment case. Explicit FEA has however made it possible to assess these events in a better way, especially for new designs where previous empirical data is not applicable.

GKN has previously developed material models for analyzing casing containment capability, but see the need to study blade modelling in more detail.

Assignment Description

Assess the applicability of a material model specifically tuned for hexahedral elements and see how it works for tetrahedral elements. If needed, perform a tuning of the material model using tetrahedral elements.

The thesis will also include a literature study regarding meshing and failure modelling.

Main activities are:

- Review literature for how tetrahedral and hexahedral elements perform when modelling failure with explicit FE simulations.
- Material test correlation:
  - Mesh and simulate material test performed at high strain rate.
  - Update a material failure model based on results.
- Blade impact simulation: Mesh a blade geometry used for impact testing and simulate tests. Verify modelling technique and define a conservative approach for containment sizing.

Qualifications:

You are a student in the final year of your M.Sc. studies in the field Mechanical or Aerospace engineering with an interest in solid mechanics and FEA. Experience in LS-DYNA is recommended.

You will need to have a citizenship and background that allow work with export controlled data. Both for civil dual use and military applications. Students at Swedish Universities are therefore prioritized when reviewing applications.

Apply by

Send your resume and cover letter to dennis.rikemanson@gknaerospace.com

Last date for application: 2024-12-06