Master's Thesis - "Modeling crack propagation from an internal defect in additively manufactured material" (30 credits/20 weeks – 1 or 2 students)

About us

GKN Aerospace is the world's leading multi-technology tier 1 aerospace supplier. With 55 manufacturing locations in 15 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.

Linköping university has a strong research focus on performance and durability of advanced materials for demanding applications. This includes fatigue behaviour of additivly manufactured materials.

Project Background

The advent of additively manufactured material has led to renewed focus on defects and their effect on fatigue life. A thorough understanding of this effect is necessary to realize the potential of additively manufactured components in the aerospace industry, where safety is of paramount importance. Fracture mechanics if often utilized to study the effect of defects on fatigue life. However, majority of such studies focus on defects that lie on the surface.

For this thesis, it is proposed that fracture mechanics approach is utilized to investigate the effect of embedded defects on the fatigue life of additively manufactured fatigue specimens. The thesis will be carried out at GKN Aerospace Sweden and will be jointly supervised by Professor Johan Moverare at Linköping Univeristy, and Sushovan Roychowdhury and John Lindgren at GKN Aerospace.

Assignment Description

The work in this thesis will focus on embedded defects and their effect on fatigue life. Following tasks are foreseen:

- Literature study on fracture mechanics approach as applied to embedded defects.
- Based on above knowledge develop codes to calculate stress intensity factors and fatigue life of test specimens.
- Make use of alternate tools (e.g Ansys, NASGRO, FRANC3D, other scripts) for validation of selected cases.
- Perform sensitivity studies.
- Compare predictions with available experimental results.
- Write report and present results to disseminate knowledge.

Qualifications

Student(s) in the final year of their M.Sc. studies in the field of Mechanical or Aerospace Engineering with an interest in Solid Mechanics and Fatigue. Previous experience of FE analysis (e.g. in Ansys) and knowledge of Fracture Mechanics is an advantage.

Apply by

Send your resume and cover letter to
Professor Johan Moverare, johan.moverare@liu.se
Sushovan Roychowdhury, sushovan.roychowdhury@gknaerospace.com

Last date for application: 2024-12-31. Interviews will be held continuously and the position could be filled prior to the last application date.