

Master Thesis - “Real weld geometry and its effect on fatigue life” (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.

Project Background

High quality welds are an integral part of aerospace components. This is ensured by in-depth knowledge about welds from both the design organization and the manufacturing organization. From design perspective, it is important to understand the stress field around welds and its effect on fatigue life. From previous studies, it is known that one of the key parameters in this regard is the weld misalignment. The design calculations often resort to model simplifications in order to account for the effect of misalignment.

It is proposed that this thesis will continue on the initial work performed in the year 2023, where the focus was on TIG welds on Nickel base alloys. In the proposed second phase of the work, the focus will be on other welding processes and base materials. This will include generating models of real weld geometries, performing stress and life calculations to obtain realistic estimates of fatigue life.

Assignment Description

The work in this thesis will focus on a real weld geometry and its effect on fatigue life. Following tasks are foreseen:

- Collect information from workshop on measurement of weld geometric parameters. This will include both understanding the procedure and gathering data.
- Literature study on ways to model weld misalignment in a finite element analysis and its expected effect on fatigue life. Understand GKN’s previous internal work.
- Build on previous knowledge to propose appropriate models and perform FEA, fatigue and fracture mechanics calculations, including sensitivity studies. Analysis tools: Ansys, NASGRO, FRANC3D, other scripts.
- Write report and present results to disseminate knowledge.

Thus, the proposed activities provide an excellent opportunity to interact with both design and manufacturing organizations to achieve the goals.

Qualifications

Student(s) in the final year of their M.Sc. studies in the field of Mechanical or Aerospace Engineering (or equivalent) with an interest in Solid Mechanics, Fatigue and Statistics. 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

Harald Söderlund – harald.soderlund@gknaerospace.com

Karthickeyan Arasu – karthickeyan.arasu2@gknaerospace.com

Last date for application: 2023-12-31.

Interviews will be held continuously and the position could be filled prior to the last application date.

