Master's Thesis - "Dwell time crack growth in aerospace alloys – a comparative evaluation of tools" (30 credits/20 weeks – 2 students)

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 the European Space Agency.

Project Background

Fatigue crack growth modelling is a primary activity in the aerospace industry. Such simulations are used in all phases of product life cycle – product development, product support, and repair. Accurate modelling of fatigue crack propagation contributes to both enhanced safety and environmental sustainability.

Traditional fatigue crack growth calculation methods rely on the cyclic part of the loading spectrum. However, in some aerospace materials, a static hold period at peak load can significantly enhance the crack growth rate. Accounting for this so-called dwell-time crack growth is essential in computing fatigue life of an aerospace component. At GKN Aerospace, this has so far been performed through an in-house code.

An alternate option has emerged recently. NASGRO® is a tool often used to carry out fatigue crack growth analysis in the aerospace industry, including at GKN Aerospace. In the newest release (Sept 2026), NASGRO® provides the user the option to include the crack growth contribution from dwell time.

For this thesis, it is proposed that crack propagation simulations are carried out through both these approaches (NASGRO® and in-house code) for a comparative study. The comparison is intended for various crack configurations under multiple types of loading configurations. It is envisaged that the comparison study would lead to recommendations on better usage of these tools with a focus on improved accuracy. The thesis will be carried out at GKN Aerospace Sweden and will be supervised by Sushovan Roychowdhury and Francesco Collini. Johan Olsson is the manager of the department.

Assignment Description

Following tasks are foreseen:

- Literature study on dwell-time crack growth modelling
- Make use of alternate tools (e.g. NASGRO, in-house code) for simulation
- Perform comparison studies
- Recommend best practices for dwell-time crack growth simulations
- 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 a strong interest in Solid Mechanics and Fatigue. Knowledge of Fracture Mechanics fundamentals is an advantage

Apply by

Send your resume and cover letter to Sushovan Roychowdhury,
sushovan.roychowdhury@gknaerospace.com

Last date for application: 2026-12-31.
Interviews will be held continuously, and the position could be filled prior to the last application date.