

## Master Thesis - “Creep fatigue and dwell effects on crack growth for additive manufactured aero engine components” (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

Additive manufacturing technology such as laser powder bed (LPB) printing open up for new design solutions but some questions need to be resolved in order to take full advantage of the technology. Recently, a large sensitivity to high temperature dwell effects has been observed for LPB additive manufactured In718 fatigue life. By optimizing the heat treatment of the material the effect of hold times on the fatigue crack growth might be less detrimental, but at high temperatures some sensitivity might still remain. It is therefore important to use simulation tools to asses at which load and temperature levels the dwell effects will be limiting for the life of the components.

### Assignment Description

The work in this thesis will focus on:

- Literature study into modelling of high temperature dwell effects in LPB In718 for crack initiation and crack propagation
- FE simulation and fatigue life prediction of a component using Ansys and in-house codes for crack initiation and propagation
- Sensitivity study of how changes to the material models and parameters used would effect the fatigue life

### Qualifications

Student(s) in the final year of their M.Sc. studies in the field Mechanical or Aerospace engineering with an interest in solid mechanics and fatigue. Previous experience of FE analysis (e.g. in Ansys) and programming (e.g. in python) is recommended.

### Apply by

Send your resume and cover letter to Rebecka Karrin, [rebecka.karrin@gknaerospace.com](mailto:rebecka.karrin@gknaerospace.com)

Last date for application: 2022-12-31. Interviews will be held continuously and the position could be filled prior to the last application date.

