GKN AEROSPACE

Master Thesis - “Topology Optimization for Additive Manufacturing”

(30 credits/20 weeks – 2 students)

About us

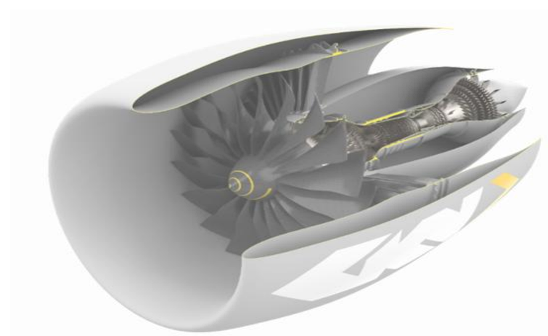
GKN Aerospace is the world’s leading multi-technology tier 1 aerospace supplier. With 33 manufacturing locations in 12 countries, we serve over 90% of the world’s aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used 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 ESA.

Project Background

The hub of the Turbine Exhaust Case (TEC) is a center piece with multiple functions: It acts like a thermal spring to manage the radial thermal stress gradient; it provides general engine carcass stiffness and support for the aft bearing house to the low-pressure shaft as well as providing an attachment for the plug. The hub is challenged by mechanical and thermal stress in a very hot environment and is designed in two different configurations depending on engine application, individually optimized for its manufacturing method whilst fulfilling technical and cost requirements.

With the development of Additive Manufacturing (AM) methods in aerospace applications lies an opportunity to further advance the design of the hub, maintaining the design intent, but improving performance with regards to weight and cost.

Your mission is to optimize the topology of the TEC hub for Laser Powder Bed Fusion (LPBF) in the Haynes 282 alloy with the purpose of reducing cost and weight whilst maintaining – or improving properties, laying the groundwork for future TEC concepts.



Assignment Description

- Focus on topology optimization of the Turbine Exhaust Case (TEC) hub, a critical component in the engine structure, by using additive manufacturing (specifically Laser Powder Bed Fusion using Haynes 282)
    - Design Space Definition: CAD model of the design space and boundary conditions
    - Adapt to material data on Haynes 282 in LPBF
    - Simulation of the new optimized design candidates: Structural and thermal analysis
- Can additive manufacturing enable reducing weight and cost, while maintaining or improving mechanical and thermal performance, and increasing robustness?
    - Manufacturability Assessment: Evaluation of printability, support structures, and post-processing such as surface finish for aero surfaces
    - Cost/Weight Analysis: Comparison with existing TEC hub configurations

The thesis work will be supported by experts in various fields (Solid Mechanics, Manufacturing Methods, Simulation and Materials).

Qualifications

- Final year Master’s student in Mechanical, Metallurgical, Physics, Material Science, Manufacturing Engineering or similar

Apply by

Send your resume and cover letter to Manager of Hot Section Engineering joakim.lundqvist@gknaerospace.com with copy to Chief Engineer marcus.borg@gknaerospace.com.

Last date for application: 2025-11-30 (interviews will be held continuously and the position could be filled prior to the last application date)

Start Date: January 2026 Thesis Duration: 20 Weeks (i.e. finished by June 2026)