Master Thesis - “Design for Additive Manufacturing: using AI as support ” (30 credits/20 weeks – 1 student)

About us

GKN Aerospace is a world leading multi-technology tier 1 aerospace supplier. With 55 manufacturing locations in 15 countries. 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 aerospace industry is witnessing a significant shift towards the adoption of Additive Manufacturing (AM), particularly in applications where traditional manufacturing methods fall short. This transition is driven by the unique capabilities of AM to produce complex geometries that enhance performance and reduce material waste. Central to this process is Design for Additive Manufacturing (DfAM), a methodology focused on creating and optimizing components specifically for additive techniques.

Incorporating Artificial Intelligence (AI) into DfAM presents an exciting opportunity to further enhance design efficiency. Can AI assist in generating optimized designs, enabling engineers to explore innovative solutions that maximize functionality while minimizing resource consumption? GKN Aerospace seek to understand how DfAM in combination with AI can contribute to the efficiency and sustainability of aerospace manufacturing.

Assignment Description

This thesis aims to explore the role of artificial intelligence (AI) in enhancing the design process for additive manufacturing (AM). The study will encompass a comprehensive literature review, a survey, and interviews to identify current challenges and difficulties in designing for AM. Additionally, it will explore the state of the art and available tools in the market.

Activities:

- Literature Study/survey of the state of the art:
  - Conduct an extensive review of existing literature on the application of AI in design for AM. Focus on metallic components and aerospace applications.
  - Identify key advancements, methodologies, and trends in the integration of AI with AM design processes.
  - Identify and evaluate the current AI tools and software available for AM mechanical design.
  - Compare their functionalities, strengths, and limitations to provide a comprehensive overview of the market landscape.
  - Develop and distribute a survey targeting professionals and researchers in the field of AM.
  - Gather data on the current use of AI in AM design, perceived benefits, and existing challenges.
- Interviews:
  - Conduct interviews with industry experts, researchers, and practitioners to gain deeper insights into the practical challenges and difficulties faced when designing for AM.
  - Analyze the qualitative data to identify common themes and potential areas for improvement.
- Case study:

        - Understand the design process at GKN and understand the capabilities of the AI tools available or that can be made available at GKN
        - Implement a case study to demonstrate the practical application of AI in optimizing the design and manufacturing process of an engine component.
    - Analysis and conclusions
        - Analyze the results of the case study
        - Propose use of AI in GKNs design process.

Objectives:

- Understanding of how AI can be leveraged to support and enhance the design process at GKN, both for conventional manufacturing processes and for additive manufacturing. The findings will offer valuable insights into the current state of AI as a tool in mechanical design, identify key challenges, and suggest potential implementations of AI solutions and future directions for research and development.

Qualifications:

- Masters program in Mechanical Engineering and Product development or related fields.
- Understanding of using CAD (Siemens NX preferable) and analysis tools.
- Deep interest in working with development of aerospace components and products

Apply by

Send your resume and cover letter to jonas.ohrman@gknaerospace.com

Last date for application: