

Master Thesis - “Optimized heat treatment of cast Nickel-based superalloy” (30 credits/20 weeks – 1 to 2 student)

This thesis work is initiated through GKN Aerospace Engine Systems with head quarter in Trollhättan, Sweden. The Trollhättan site employs approximately 2000 persons in research and technology, product development, manufacturing and product support of jet engines and engines for space vehicles. GKN Aerospace is deeply involved in developing and adapting additive manufacturing (AM) technologies for engine parts.

Project Background

GKN has found that a certain pre-welding heat treatment can reduce the amount of cracking that occurs in the heat affected zone after laser welding in one specific cast precipitation hardened superalloy. The tested pre-welding heat treatment works but takes long time to perform. Therefore, the thesis work should look at finding alternative heat treat schedules that possibly give the same reduction of cracking but using a quicker heat treatment.

Target

Description of thesis goals and targets.

- > Review existing data and results available at GKN
- > Review literature, use thermodynamic simulation software (like thermocalc, Jmat pro etc) and use existing GKN experience to propose new alternative candidate cycles.
- > Down-select cycles for practical trials, perform heat treat trials, compare microstructures in material with microstructure in the originally tried material that worked good.
- > Select a few new alternate promising heat treat cycles and perform weld trials in heat treated material and analyze metallographically amount of cracking in the heat affected zone (HAZ).
- > Present the summary and conclusions for an audience at GKN Aerospace. (English)

Qualifications

- > Master, **Materials engineering or Mechanical engineering or Physics, including courses on materials**
- > Interest in Image analysis, metallography and simulation
- > GKN would prefer if the student can perform most of the work on site at the R&T organization in Trollhättan.

Apply by

- > By sending CV and personal letter to Peter Georgsson (peter.georgsson@gknaerospace.com)