



ROYAL INSTITUTE  
OF TECHNOLOGY

# Processing, microstructure characterization and mechanical testing of SS441

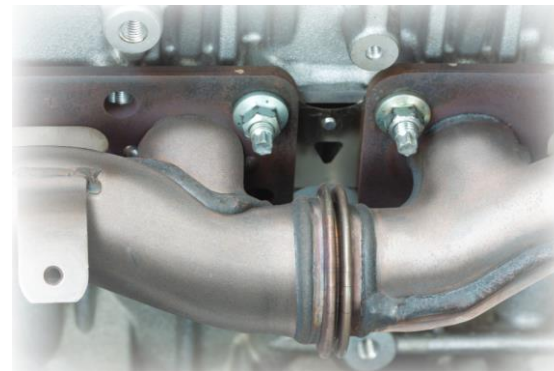
Technical group project 2019 – AM Database

*September 27, 2019*



# SS441

- Composition (wt.%):  
Fe-18.9Cr-0.034C-0.79Nb-0.28Ti-0.1N
- Conventionally produced:  
Good oxidation, corrosion and creep resistance  
Used in, e.g., heat exchangers



# Background

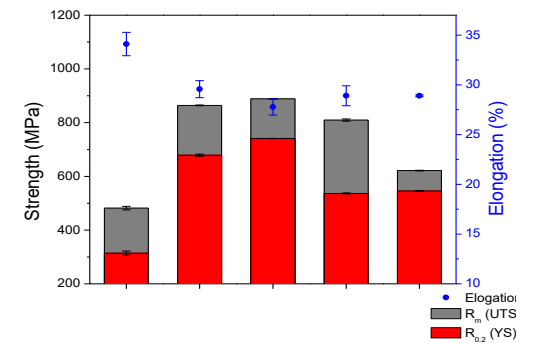
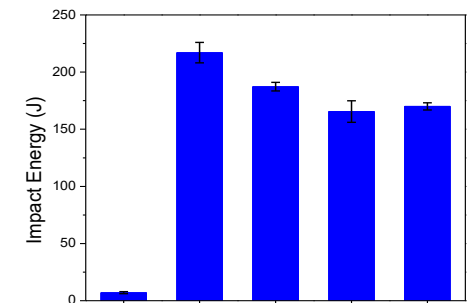
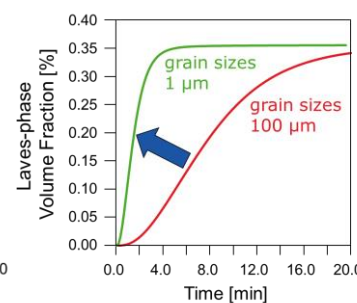
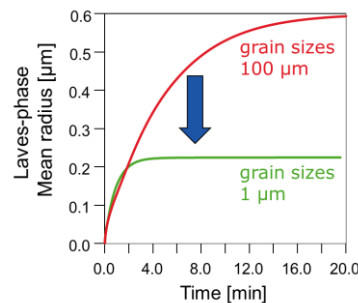
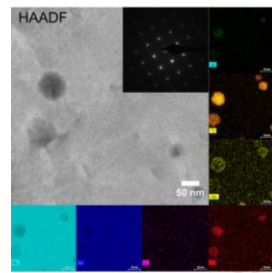
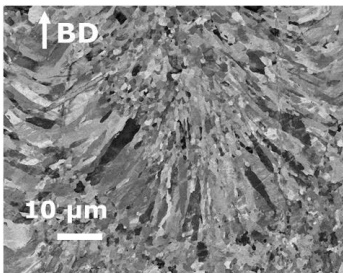
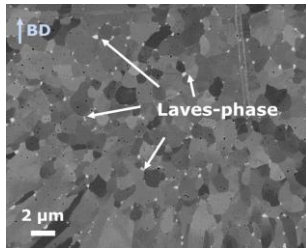
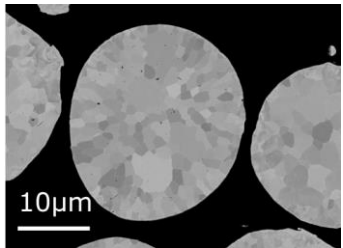
- Powder provided by Kanthal (gas atomized by Sandvik Osprey)
- Part of project at UU
  - Printed parts, studied varying VEDs
- Part of a Hero-m 2i project at KTH
  - Microstructure characterization + modeling
- Partly part of the DEMA project at KTH/Chalmers
  - Printed parts to identify process window

# Produced results

Microstructure characterization of powder, as-built and post-heat treated samples heat treated parts: LOM, SEM, TEM, EBSD, EDS

Mechanical testing of post-heat treated parts: Impact toughness tests (Charpy V) and tensile tests at room temperature

Calculations: Micro-segregation profiles and solidification paths, precipitation kinetics



→ Data (results) to be curated

# Associated data/metadata

## **Feedstock**

Production method,  
composition, powder  
properties, handling etc.

## **Printing details**

Machine brand/version,  
printing parameters (VED,  
scanning strategy, build plate T),  
powder batch etc.

## **Post-heat treatment**

Furnace, furnace atmosphere,  
heating and cooling rate etc.

## **Testing/characterization**

Sample preparation, sample  
dimensions etc.

...?

# Your data?

- What kind of results is your research producing?  
What should be captured/curated/stored?
- What is the associated data/metadata to be stored with your results to make it useful in the future?
- How should your data be structured?
- ...