ROYAL INSTITUTE OF TECHNOLOGY

Processing, microstructure characterization and mechanical testing of SS441

Technical group project 2019 – AM Database

October 24, 2019

THE SWEDISH ARENA FOR AM OF METALS

SS441

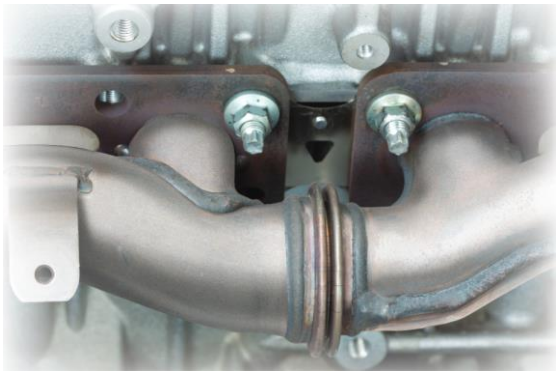
- Composition (wt.%):

  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



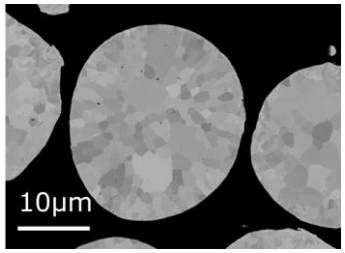
Background

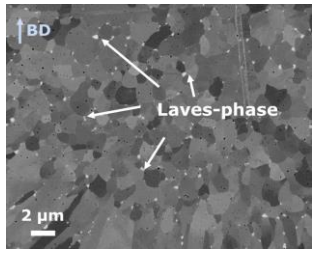
- Powder provided by Kanthal (gas atomized by Sandvik Osprey)
- Part of project at UU
  - Printed parts, studied varying VEDs
- Part of a Hero-m 2i project at KTH
  - Microstructure characterization + modeling
- Partly part of the DEMA project at KTH/Chalmers
  - Printed parts to identify process window

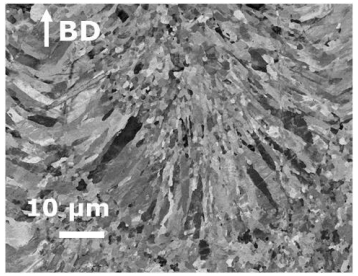
Produced results

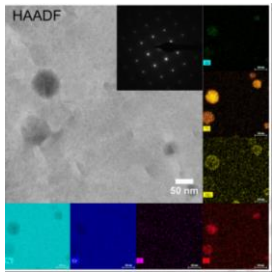
Microstructure characterization of powder, as-built and post-heat treated samples heat treated parts: LOM, SEM, TEM, EBSD, EDS

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

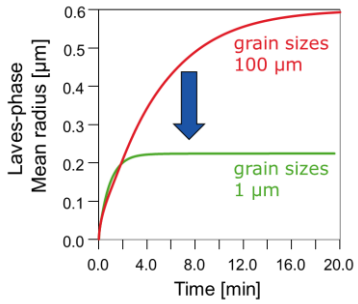


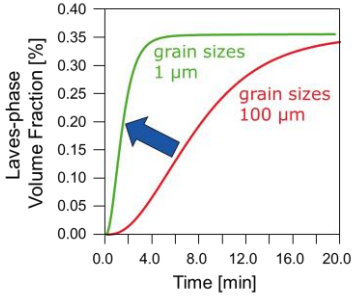


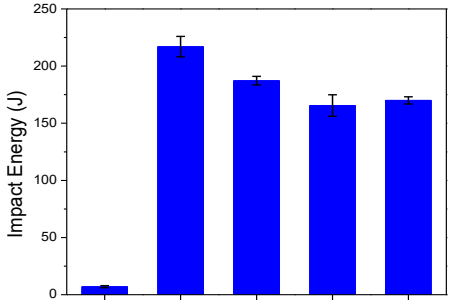


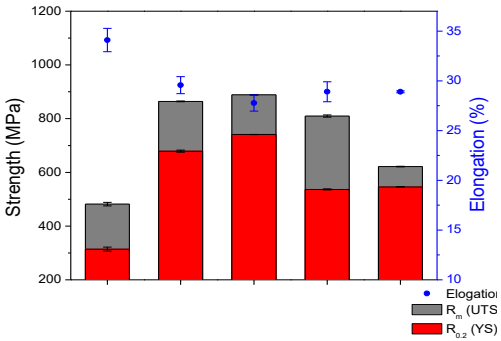


Calculations: Micro-segregation profiles and solidification paths, precipitation kinetics









→ Data (results) to be curated

Associated data/metadata

Feedstock
Production method, composition, powder properties, handeling 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 dimentions 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?
- …