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Mechanical Properties of AM Stainless Steel Parts and Repair Welds

PI: John Carpenter (MST-6)

Funding Agency: C1 (\$14K)

Goals:

- Advance certification of AM materials
- Compare microstructure and its evolution during processing and deformation between AM fabricated and conventional steels

Deliverables Achieved:

- Measured texture data for 17 steel samples on HIPPO, including material planned to be shocked in pRAD in FY16
- Quantified texture and austenite/ferrite phase fractions
- Provide input data for deformation modeling

Proposed Work for Fy'16: (optional)

- In situ annealing studies
- Study influence of synthesis parameters on microstructure (texture, composition)
- Perform imaging/tomography on AM samples

As wrought
 γ only

AM, as
fabricated
 $\alpha \sim 4$ wt. %

$\gamma \sim 96$ wt. %

Texture of as wrought (top) and AM produced 316L steel (bottom). The conventional materials was purely austenite, while the AM material showed ~ 4 wt.% ferrite (upper pole figures).