New Project: Aluminum Recycling Through Wire Additive Manufacturing

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CANFSA
Center for Advanced Non-Ferrous Structural Alloys
An Industry/University Cooperative Research Center

Industrial Relevance


[1]

If new aluminum alloys can be designed closer to the composition of the waste stream, higher scrap utilization would be possible thus improving sustainability

[1] https://www.istockphoto.com/photos/aluminum-scrap

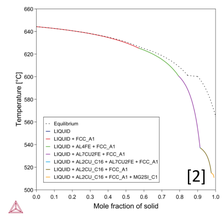
Scope

- Design useful compositions based on the waste stream and produce representative compositions using powder core tubular wire
- Produce additive manufacturing builds and validate alloy design predictions
- Produce wires with actual processed scrap to demonstrate the feasibility of using wire to enable recycling in aluminum alloys

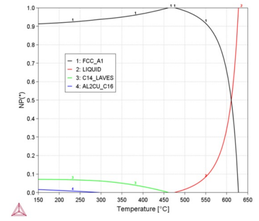
Methodology

Characterize the Composition of the Aluminum Waste Stream

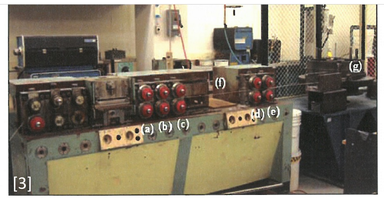
Perform Thermodynamic Simulations and Microstructure Development Modeling to Design Useful Compositions



[2]



Produce Wire Feedstocks for Additive Manufacturing Using Wire Mill



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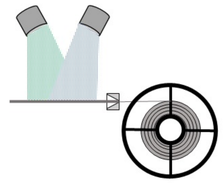
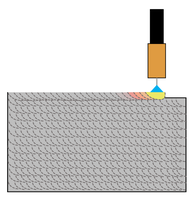


Make Wire Arc Additive Manufacturing Builds to Validate Alloy Design



[2] https://thermocalc.com/content/uploads/Documentation/Databases/Thermodynamic/tcal-examples-collection.pdf
[3] C.K. Hillier, "Powder-Cored Tubular Wire Development for Electron Beam Freeform Fabrication," Masters of Science Thesis, Metallurgical and Materials Engineering, Colorado School of Mines, 2010.

Expected Outcomes

- **New aluminum alloys that are based on the composition of the waste stream demonstrating the potential of incorporating sustainability into the alloy design process**
- **Assessment of using wire consumables to facilitate high scrap utilization in feedstocks for additive manufacturing (and welding)**