



SoftTouch AM™ Toolings for Ferrous and Non-ferrous Material Friction Extrusion Additive Manufacturing

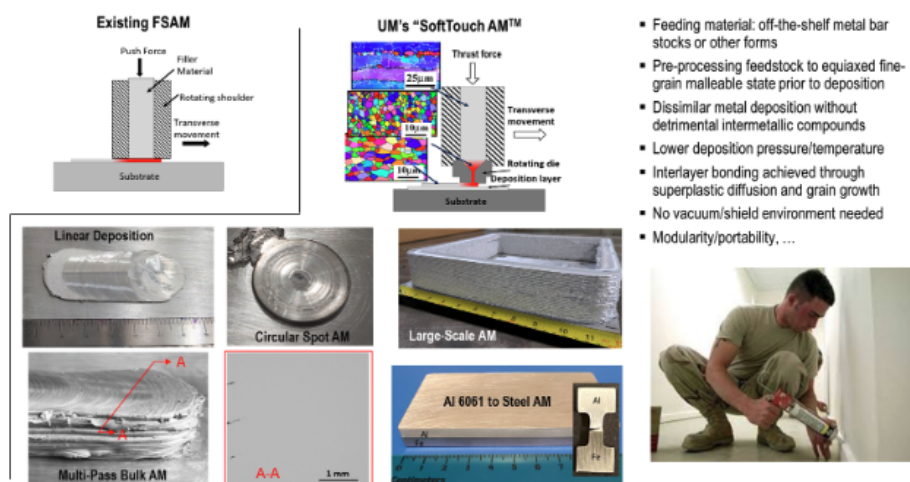
TECHNOLOGY NUMBER: 2023-355

Accelerate Blue Foundry - 2025 (Physical Sciences)

OVERVIEW

SoftTouch AM™ is a new metal additive manufacturing process that uses a friction-based, solid-state method to deposit a wide range of metals (both hard and soft) layer by layer, delivering high-quality, energy-efficient, and versatile metal parts for industries that demand customized or large-scale production.

U-M's SoftTouch AM™ versus Existing FSAM



DESCRIPTION

The SoftTouch process works by pushing an off-the-shelf metal rod or bar (the feedstock) through a specially designed assembly where a rotating die at the end creates intense friction. This friction heats and softens only the metal at the rod and rotating die interface—without causing any melting—allowing the material to be extruded and deposited in layers onto a surface to build up a finished part. The tooling is tailored for different metals: a simple, single-part design for soft non-ferrous metals (like aluminum or copper) and a more robust, multi-part design (using a ceramic insert and hard alloys) for high-temperature, hard ferrous metals (like steel). Unlike traditional 3D printing or friction-stir additive methods, the former require full melting or extensive post-processing and the latter requires a direct friction engagement with substrate or previous deposited layer. SoftTouch achieves strong, fine-grin

Technology ID

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Category

Manufacturing Process

Engineering & Physical Sciences

Accelerate Blue Foundry -

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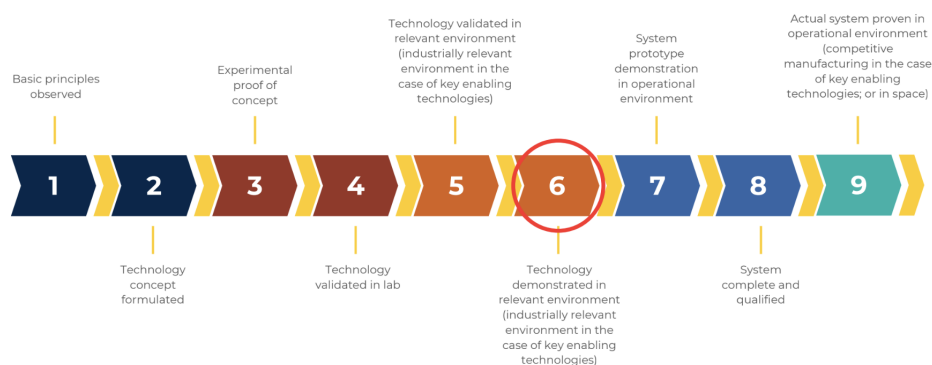
metal deposition and defect-minimized bonding at lower energy cost, and is adaptable for various shapes of feedstock and custom die profiles.

VALUE PROPOSITION

- **Energy-Efficient & High-Quality:** Delivers strong, fine-grain metal parts at temperature well below melting, eliminating solidification-induced defects and reducing energy consumption.
- **Material Flexibility & Customization:** Handles a broad range of metals and alloys (both soft and hard), with adjustable die designs for different shapes and applications, enabling rapid prototyping or small-batch custom manufacturing.
- **Robust for Industrial Demands:** Multi-part, high-performance dies with ceramic inserts allow reliable processing of hard, high-temperature metals, tapping into demanding sectors like aerospace and automotive.

TECHNOLOGY READINESS LEVEL

Technology Readiness Levels



INTELLECTUAL PROPERTY STATUS

Patent Applications are pending.

MARKET OPPORTUNITY

There is a growing demand for advanced, energy-efficient, and customizable metal additive manufacturing in industries such as aerospace, defense, automotive, and heavy machinery—especially for producing complex, high-strength parts or repairing large components that traditional methods cannot handle easily. SoftTouch’s ability to process both common and high-performance metals, with minimal energy waste and high bond quality, addresses key pain points in both prototyping and repair applications, as well as in manufacturing of critical spares on-demand. Projections show the global metal additive manufacturing market exceeding \$10 billion by the end of this decade, driven by trends toward lightweighting, sustainability, and rapid product customization.

- This project has participated in Customer Discovery

REFERENCES

- "[3D printing of fine-grained aluminum alloys through extrusion-based additive manufacturing: Microstructure and property characterization](#)."
- "[Large area friction stir additive manufacturing of intermetallic-free aluminum-steel bimetallic components through interfacial amorphization](#)."