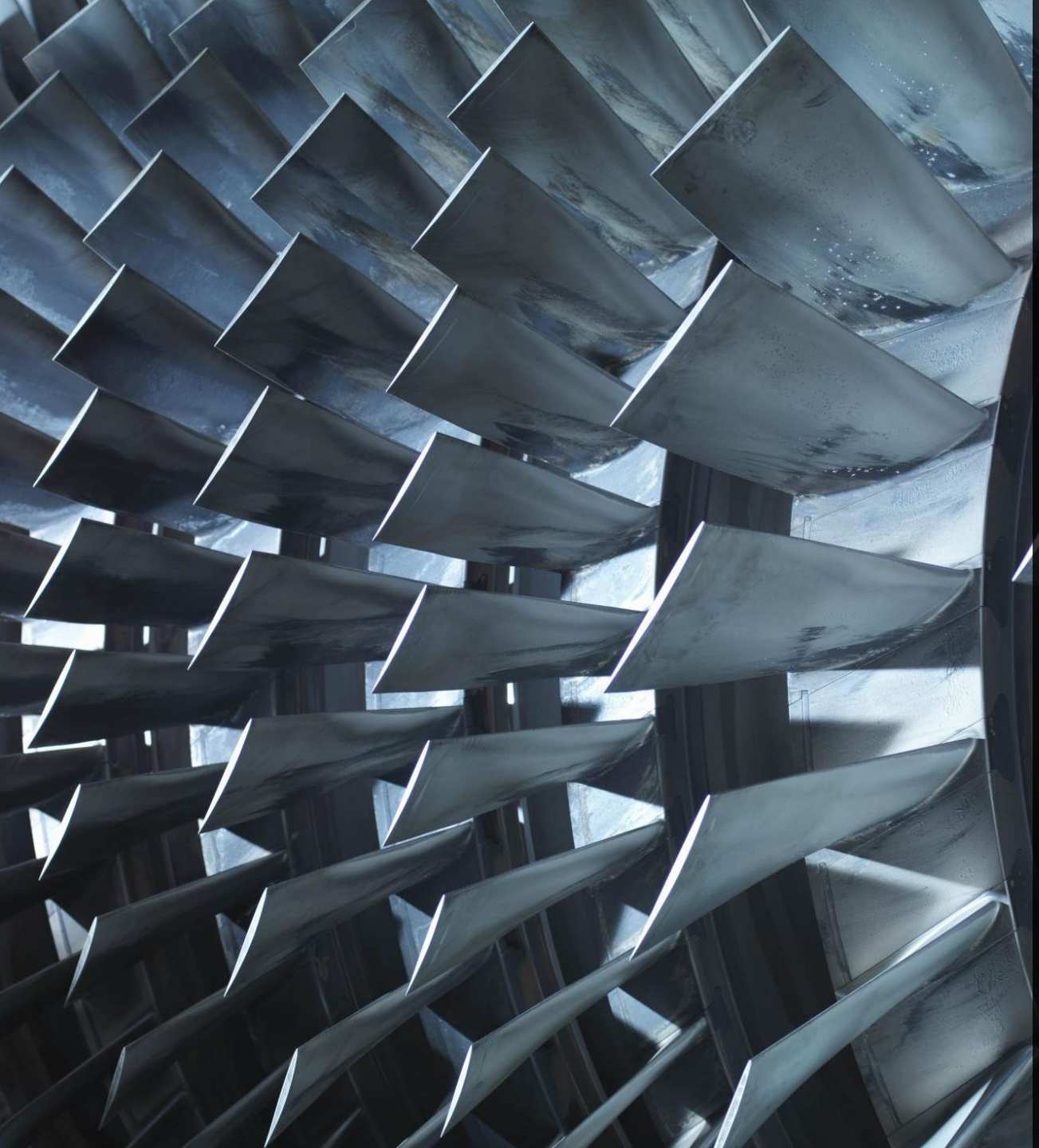

FormAlloy Technologies, Inc.

Impossible to AMpossible ™

Metal Deposition for Sustainment and Repair

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http://www.formalloy.com/

METAL DEPOSITION FOR SUSTAINMENT AND REPAIR

- About us
- Technology
- USAF Use Case
- Summary/Q&A

FORMALLOY

Form, Enhance, and Repair metallic parts that go beyond the bounds of manufacturing

Award-winning systems and services are used by Defense and Aerospace, Automotive, Energy, and Consumer Goods companies

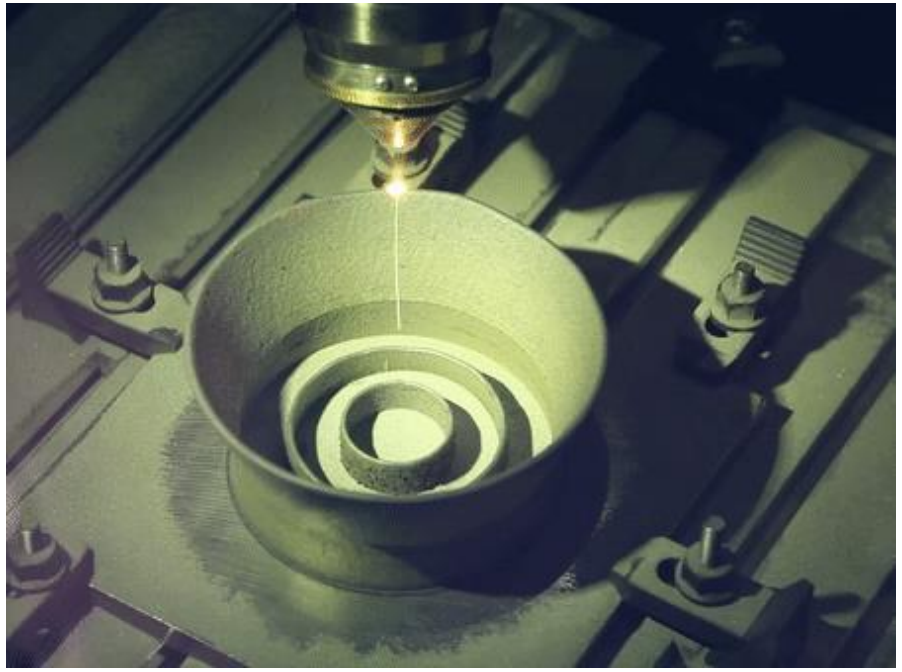
Melanie Lang, Co-Founder & CEO
Aerospace Engineer

Jeff Riemann, Co-Founder & CTO
Mechanical Engineer

About Us

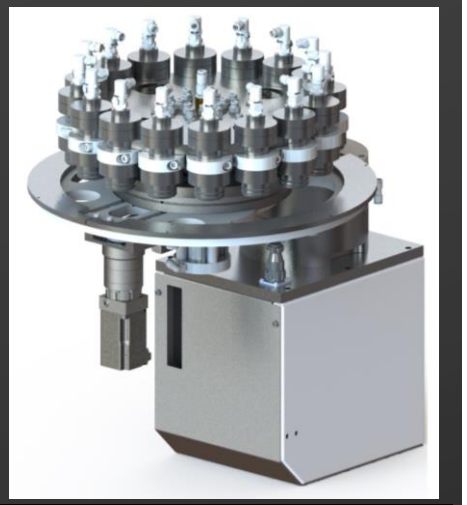
Founded by engineers from the Aerospace and Heavy industry, FormAlloy was founded in 2016 to develop a disruptive technology that delivers the future of additive manufacturing – creating high-value components with superior performance.

DIRECTED ENERGY DEPOSITION (DED) TECHNOLOGY



FormAlloy System in Action

FORMALLOY



Technology

Improve readiness and effectiveness for Critical Components

Unique

Unsurpassed in-situ monitoring and control

Scalable

Innovative

Pre & Post Inspection

Multi-Material Specialty Equipment – Alloy Development Feeder

Proven

Qualifiable Repair Solution

R&D

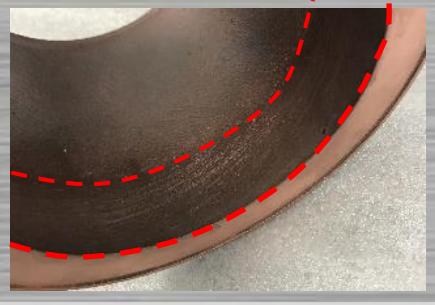
Expert services from concept to production

SBIR PHASE II: USAF HYPERSONICS REPAIR ON-DEMAND

U.S. AIR FORCE

Primary AF Customer: Hypersonic T&E Technologies at Arnold Engineering Development Complex (AEDC)	Phase II Funding: Allocated Other: AEDC Internal Funding for Testing

AFWERX



Problem/Opportunity

High-value copper components utilized by the USAF Hypersonics Team become damaged at unpredictable rates, are sole sourced, and have lengthy lead times.

Solution

Deliver an automated metal deposition system to build and repair copper-based components and other metallic parts, with single or multiple materials.

Impact

- ✓ Savings for arc heater components
- ✓ Ability to quickly resume testing and avoid costly downtime
- ✓ Enhance and extend component performance

Phase I End	Phase II Start	Planned Phase II End
March 2020	July 2020	January 2022

I"The ability to repair, and potentially enhance arc-heater test components on-demand is a game-changing technology which results not only in cost savings, but more importantly reduces procurement risk and test downtime."
- Donald J. Malloy, Ph.D., P.E., Hypersonic T&E Technologies Lead, U.S. Air Force Test Systems Future Capabilities Branch, TDX

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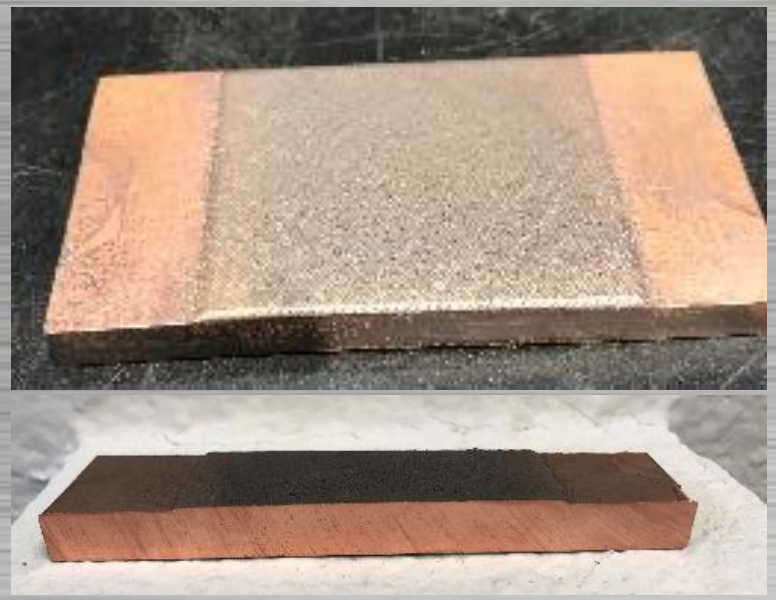
Air Force SBIR/STTR

SBIR PHASE II: USAF HYPERSONICS REPAIR ON-DEMAND



Copper Deposition on Copper Substrates

Automated preheat to add material onto copper substrates

Optimized parameter set for Copper deposition

Cross Sectional Metallographic Evaluation

Fully dense, no delamination between the substrate and the deposition

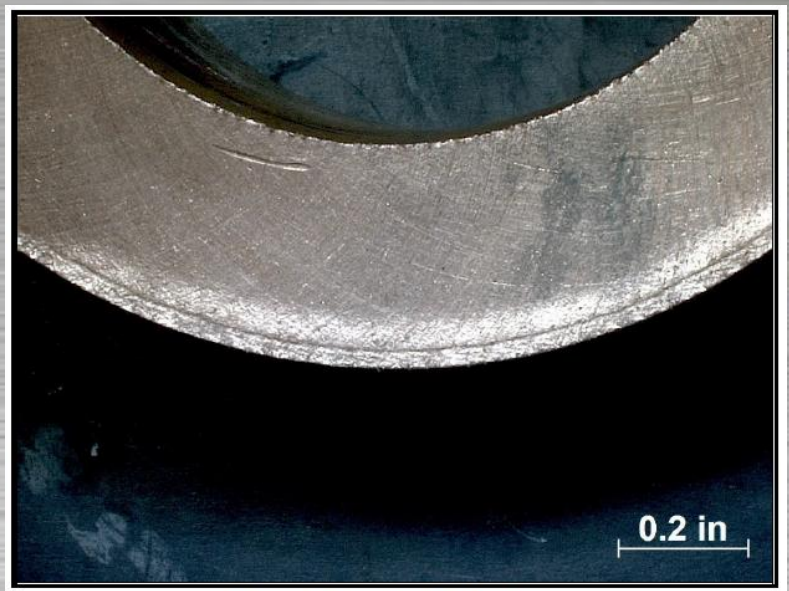


Figure 1: Coating Bend at 5X.

Bend Test per ASTM 571

Sample was bent around a 1-1/4" diameter mandrel and deformed area was examined at 5X magnification, no indications noted.

Sample was then bent repeatedly from 0° to 180° and back until fracture occurred. The fractured surface was examined at 10X magnification, no indications noted.

Customer Impact

> The ability of FormAlloy to repair, and potentially enhance arc-heater test components on-demand is a game-changing technology which results not only in cost savings, but more importantly reduces procurement risk and test downtime.
>
> Dr. Donald J. Malloy, Hypersonic T&E Technologies Lead, U.S. Air Force Test Systems Future Capabilities Branch, TDX

> Redacted
>
> Large Consumer Goods Company, Undisclosed

> NASA is leveraging FormAlloy's technology for development and feasibility studies…for key components such as rocket nozzles.
>
> Paul Gradl, NASA Senior Propulsion Engineer

FormAlloy Technologies, Inc.

Thank You

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