Dayton Regional Ecosystem for Additive Manufacturing: DREAM

SKYWARD

EWI

SHEPRA Inc.

OPEN ADDITIVE

PAC Powder Alloy Corporation

NSL ANALYTICAL

LASER FUSION SOLUTIONS

BasTech MAKING THE FUTURE

BEEHIVE INDUSTRIES

KANEY

UNITED PERFORMANCE METALS AN ONI COMPANY

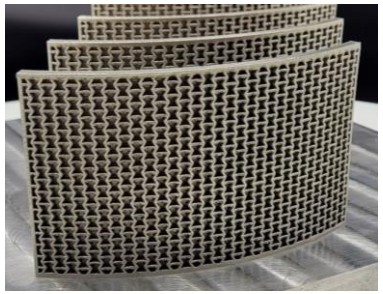
OHIO UNIVERSITY 1804

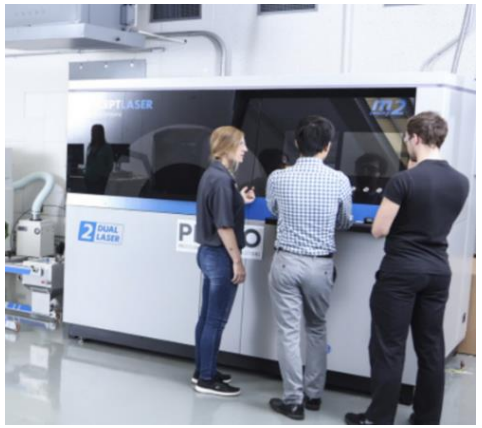
OHIO STATE

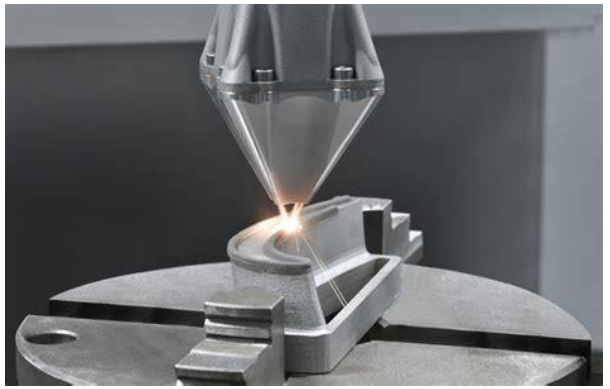
DAYTON

THE UNIVERSITY OF TOLEDO

TANGIBLE SOLUTIONS







TechConnect DEFENSE INNOVATION AWARD 2020

DREAM Overview

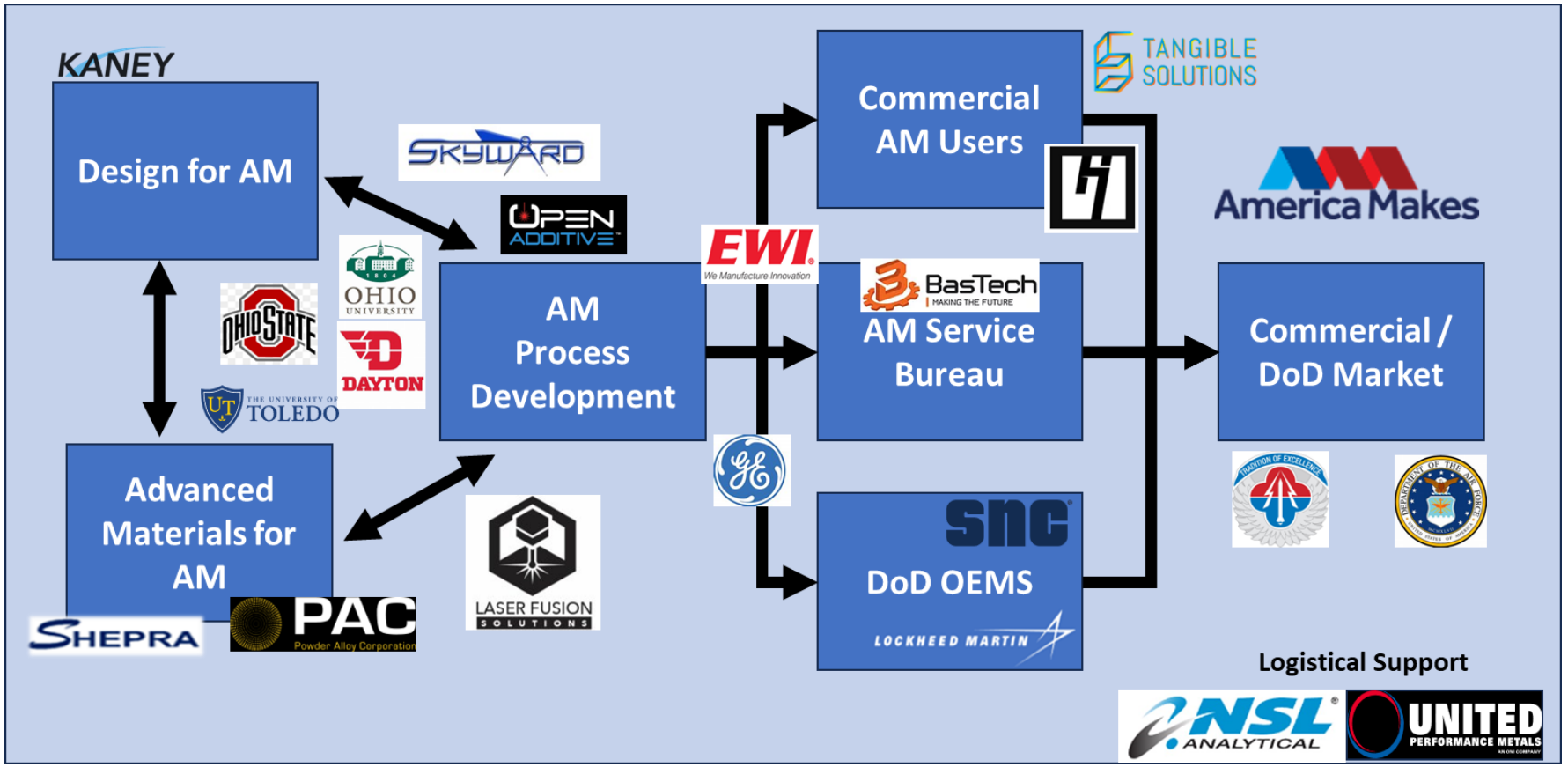
Objective: Spur economic growth by developing keep capabilities and technologies that support the utilization of Additive Manufacturing

Opportunity: The greater Dayton region and the state of Ohio have established a nascent ecosystem that supports the emerging technology of Additive Manufacturing.

- This ecosystem includes:
  - *Raw materials production and advanced material development,*
  - *Fabrication of additive manufacturing systems,*
  - *Sensor and software development for AM quality assurance*
  - *Contract Additive Manufacturing and logistical Support*
  - *Fabrication of Aerospace and Biomedical components and devices*

Approach: Execution of individual projects that collectively develop the workforce and enable new technologies that expand the Additive Manufacturing capabilities of the ecosystem and transition to DoD and Commercial OEMs and spur economic development.

DREAM Value Stream



DoD Science & Technology Priorities

Advanced Materials & Manufacturing
Artificial Intelligence & Autonomy
Space Technology
Hypersonics

Jobs Ohio Priorities

Advanced Manufacturing
Aviation & Aerospace
Military & Federal
Automotive

The DREAM value stream spans the entire innovation pipeline to turn concepts and capabilities into market realities

DREAM Team: Dayton

Dayton has a very strong and broad ecosystem related to Additive Manufacturing capabilities including:

National Policy & Technology Leadership: US Air Force
Materials Development: SHEPRA, University of Dayton
Design for Additive Manufacturing: Kaney
AM Sensor & Software Development: Skyward, Laser Fusion Solutions, Open Additive, Wright State
AM Production Systems Mfg: Open Additive
AM Fabrication Services: BasTech, Tangible Solutions, Laser Fusion Solutions:

Applications:

Maintenance & Sustainment: Sierra Nevada (MRO), SHEPRA (logistics)
Propulsion: Hyphen Innovations
Hypersonic: SHEPRA, GoHypersonic, New Frontier Aerospace

DREAM Team: Southwest – Central Ohio

National Policy & Technology Leadership: US Air Force
Materials Development: SHEPRA, Univ of Dayton, Powder Alloy Corp, Ohio State, Ohio Univ.
Design for Additive Manufacturing: Kaney
AM Sensor & Software Development: Skyward, Laser Fusion Solutions, Open Additive, Wright State, EWI
AM Production Systems Mfg: Open Additive, AddUp
AM Fabrication Services: BasTech, Tangible Solutions, Laser Fusion Solutions, Beehive
AM Logistical Support: United Performance Materials (AM consumables)

Applications:

Maintenance & Sustainment: Sierra Nevada (MRO), SHEPRA (logistics)
Propulsion: General Electric, Hyphen Innovations, Beehive
Hypersonic: SHEPRA, GoHypersonic, New Frontier Aerospace

DREAM Team: Ohio

National Policy & Technology Leadership: US Air Force, AmericaMakes, NASA

Materials Development: SHEPRA, Univ of Dayton, Powder Alloy Corp, Ohio State, Ohio Univ. Univ of Toledo

Design for Additive Manufacturing: Kaney

AM Sensor & Software Development: Skyward, Laser Fusion Solutions, Open Additive, Wright State

AM Production Systems Mfg: Open Additive, AddUp, Lincoln Electric

AM Fabrication Services: BasTech, Tangible Solutions, Laser Fusion Solutions, Beehive, RP+M

AM Logistical Support: United Performance Materials (AM consumables)

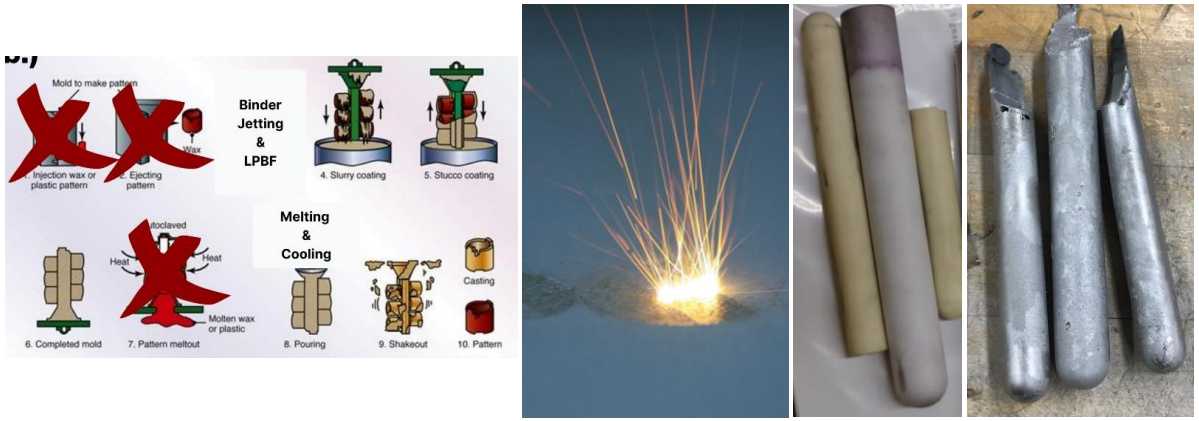
Applications:

Maintenance & Sustainment: Sierra Nevada (MRO), SHEPRA (logistics)

Propulsion: General Electric, Hyphen Innovations, Beehive

Hypersonic: SHEPRA, GoHypersonic, New Frontier Aerospace

DREAM: Foundryless Casting



Description: *demonstrate a significant reduction of steps for investment casting by implementing Additive Manufacturing (AM) processes for pattern making*

Objective: Use LPBF to manufacture Mar M 247 patterns and molten metal reservoirs to reduce investment casting process steps by >50%

Benefits: Reduces the upfront cost of casting, simplifies the casting process to introduce qualified competition, and reduces part lead time and susceptibility to supply chain issues.

Approach: Associated LPBF pattern-making with shelling, melting, and cooling DOE; gather material data with novel, accelerated test methods, leverage artificial intelligence for designing parts, and demonstrate at TRL 6 with a turbine rotor.

Collaborators: Hyphen, OSU, Ohio U., U. of Toledo, LFS, Shepra

Deliverables:

1. *Critical material data comparison to cast Mar M 247 counterpart*
2. *Tuned AI model for predictive support of future components and materials.*
3. *Time and cost analysis of the foundryless casting approach compared to conventional investment casting.*
4. *TRL 6 demonstration of Mar M 247 rotor in a microturbine engine.*

DoD Science & Technology Priority:
Advanced Materials & Manufacturing

JobsOhio Priority:
Advanced Manufacturing

Budget Request

Item / Task	Non-Reoccurring	Reoccurring
Design of Experiments (pattern, shelling, melting, cooling)	$150K	$450K
Material property generation	$100K	$350K
Component design, manufacturing, and testing	$200K	$650K
Total	$450K	$1,450K

FY'25 Congressional Budget Request: $1,900K

Program Element: Manufacturing Technology Program: 060368F
Metals Affordability Initiative: 0603113F