The Right Part
The Right Place
The Right Time
By-Design

ARL AM Vision

The Right Part
Material
The Right Place
Process
The Right Time
On-Demand By-Design
Model
ARL AM Vision-Execution

**Near Term**
- Optimized Materials
- Process Modeling

**Mid Term**
- Novel Feedstock
- Optimized Processing Technologies
- In-Situ Characterization

**Far Term**
- Indigenous Mat'ls
- Responsive Mat'ls
- Process Control Feedback Loop
- Intrinsically Certified & Qualified Parts
- Predictive Property Modeling

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**Near Term**
- CONUS Based
- Depots/Arsenals

**Mid Term**
- Agile, Expeditionary Manufacturing Facilities
- Transition to Traditional Manufacturing Facilities

**Far Term**
- CONUS & OCONUS
- Battlefield Capable to Reduce Logistics Burden

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**Near Term**
- Digital Repository for Need Base Parts

**Mid Term**
- Repairable Design
- Informatics based need
- Warfighter Training
- Manufacturing On-Demand, On-Site, and As-Needed

**Far Term**
- Autonomous, Agonistic Manufacturing Systems
- Predictive failure modeling

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**Near Term**
- Topology Optimization
- Design Optimization for Material, Size, Weight and Properties

**Mid Term**
- Hybrid / Graded Materials and Process
- Structural & Fracture Critical Components
- Business Case / Cost Modeling/ Optimization

**Far Term**
- Manufacturing Parts Organic to the Soldier or Platform
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Near Term - Cold Spray Research

PRODUCTION SCALE-UP
UH-60 Sump Repair
MEO T7631

Flexible Robot Environment

Reactive Materials Shaped Charge Liners

Powder 10,000lbs/month

CONSOLIDATION

> UTS than Wrought

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Industry
AF RIF
DMS&T & Army Mantech
AMRDEC
NAVAIR
AFRL
TIPS
DLA
TMR
SBIR
ARL CII
ONR

TRL 9
TRL 8
TRL 7
TRL 6
TRL 5
TRL 4
TRL 3
TRL 2
TRL 1

POWDER SYNTHESIS

MODELING & SIMULATION

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Identification of available resources

- Quartermaster List/Prepositioned stocks
- Indigenous Sources
- Solar
- Battle Damage Scrapyards
- Waste Streams

Expeditious Counter Measures

- Programmable electronics
- Smart Sensors
- Scalable Lethality
- Adaptive Protection
- Power
- Fuel
- Water
- Replacement & Repair

Use Manufacturing S&T to further ARL’s Mission – Discover, Innovate, and Transition

• Combination of chemical, biological, and mechanical processing
• Energy and materials scavenged from environment/processes
Piloting a New Laboratory Business Model

Transformation Principles
Flow, Agility, Quality, Efficiency & Effectiveness

Create flexibility and agility to make workforce changes to keep pace with rapidly evolving technologies and national security requirements

Onsite collaboration with academia and industry through layered security process; ARL as anchor within community

Enable greater sharing of specialized facilities between agencies, private sector partners, and experiment with new models for modernizing labs

Implement strategies and policies that support exploitation of science and transition to small business and entrepreneurs

ATTRACTION AND RETAIN BEST & BRIGHTEST
OPEN CAMPUSES
SHARED MODERN FACILITIES
INNOVATION PRACTICES

Open Campus is to augment ARL’s resources through open collaboration.

Research Centers will be stood up in areas of particular interest.

Responding to the National Security Challenges of the 21st Century
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Center for Agile Materials Manufacturing Science

OVERVIEW
The Center for Agile Materials Manufacturing Science (CAMMS) will lead research focused on discovery, innovation, and maturation of materials and manufacturing science to permit agile, adaptive, and mobile processing for a highly flexible and expeditionary manufacturing capability to quickly produce tailored parts and components.

PARTICIPANTS
Open to national and defense labs, universities, and industry

CONCEPT OF OPERATION
The CAMMS is ARL’s Open Campus focal point for government, industry, and academia to innovate processing for manufacturing science.

COLLABORATIVE FOCUS
• Manufacturing and processing science
• Manufacturing process-to-microstructure modeling
• Development of novel expeditionary manufacturing techniques, processes, and technologies
• Process characterization-based performance estimator using a probabilistic approach
• Rapid, in situ certification of additively manufactured parts

BENEFITS
• Access to ARL’s strong capability in physical and mechanical metallurgy, physical ceramics, materials processing, polymeric materials, materials modeling, and manufacturing science
• New materials and feedstocks for high performance parts
• Specifications and standards published for materials and processes developed by the Center
• Access to pilot scale manufacturing facilities to prove out processes for niche and military applications

UNIQUE FACILITIES
• Additive Manufacturing Laboratory Suite
  – Selective laser sintering
  – Hybrid additive manufacturing system
  – Cold spray systems
• Characterization and Computational Tools and Nondestructive Evaluation (NDE) Capabilities
  – X-ray Computed Tomography suite
  – Scanning and transmission electron microscopy
• Specification and Standards Office

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MIL Specifications and Standards

CT with In-situ Mechanical Testing

Additive Manufacturing Laboratory Suite

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