

Additive Manufacturing Qualified Low Volume Production (QLVP) for Expeditionary and Small Manufacturer Applications



Prototype expeditionary wire-arc additive manufacturing system shown with an Army MWMSS used for forward operating bases.

PROBLEM

The U.S. Army faces ongoing operational readiness challenges due to part obsolescence and the inability to rapidly obtain service parts for legacy systems. This is especially true in theater. DoD-quality legacy replacement parts are expensive and difficult to source due to low volume demand and up-front costs for qualification and set-up. The timely and cost-effective provision of replacement parts also places a high burden on supply lines affecting every part of the Army's supply chain.

OBJECTIVE

The objective of this project is to improve the operational readiness of the Army's Ground Vehicle Systems by enabling faster and lower-cost access to replacement parts. The program seeks to design systems for two critical points of need: at forward operating bases in theater (to permit the fabrication of provisional parts with minimal demand on logistics supply); and at small-to-medium manufacturing businesses (to enable cost-effective, on-demand supply of qualified replacement parts in low lot sizes).



**AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP**

This project aligns to:



PROCESS

**ASTM
PROCESS CATEGORY**

Material Extrusion
Directed Energy
Deposition

EQUIPMENT

Custom WAAM
Material Extrusion
Binder Jetting
Printers

MATERIALS

Thermoplastics
Casting Sand
Metallic Powders
Steel Alloys
Aluminum Alloys

TECHNICAL APPROACH

Geofabrica is adapting both proprietary and third-party additive manufacturing technology and methods to meet the application objectives of this project. For the provisional forward operating base need, wire-arc additive manufacturing (WAAM) technology is being developed and prototyped to permit fabrication of metal parts in an unsheltered expeditionary environment. A prototype printer is being provided to Army Product Manager Sets, Kits, Outfits, and Tools for consideration for inclusion in the Army's Metal Working and Machining Shop Set (MWMSS).

For the Qualified Low Volume Production (QLVP) system, material extrusion and binder jetting are being employed for intermediate steps in the casting process. Purpose-built printers are being used to generate patterns for the production of sand molds. A separate purpose-built multi-material printer is being used to fabricate sand molds directly. These molds and patterns can then be provided to small manufacturers for use in the next steps of the casting process. Post processing, inspection, and other qualification activities are being performed on the final parts prior to delivery to Army.

PROJECT START DATE

November 18, 2020

EXPECTED END DATE

March 31, 2023

EXPECTED DELIVERABLES

- Robust prototype of Expeditionary 3D Printer
- Small manufacturing qualified low-volume production system
- Final report

FUNDING

\$3,369,960 total project budget
(\$3,369,960 public funding)

PROJECT PARTICIPANTS

Project Principal:

Geofabrica Inc.

Other Project Participants:

U.S. ARMY DEVCOM Ground
Vehicle Systems Center (GVSC)
U.S. ARMY PdM SKOT, PEO CS&CSS

Public Participants:

U.S. Department of Defense