

# 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