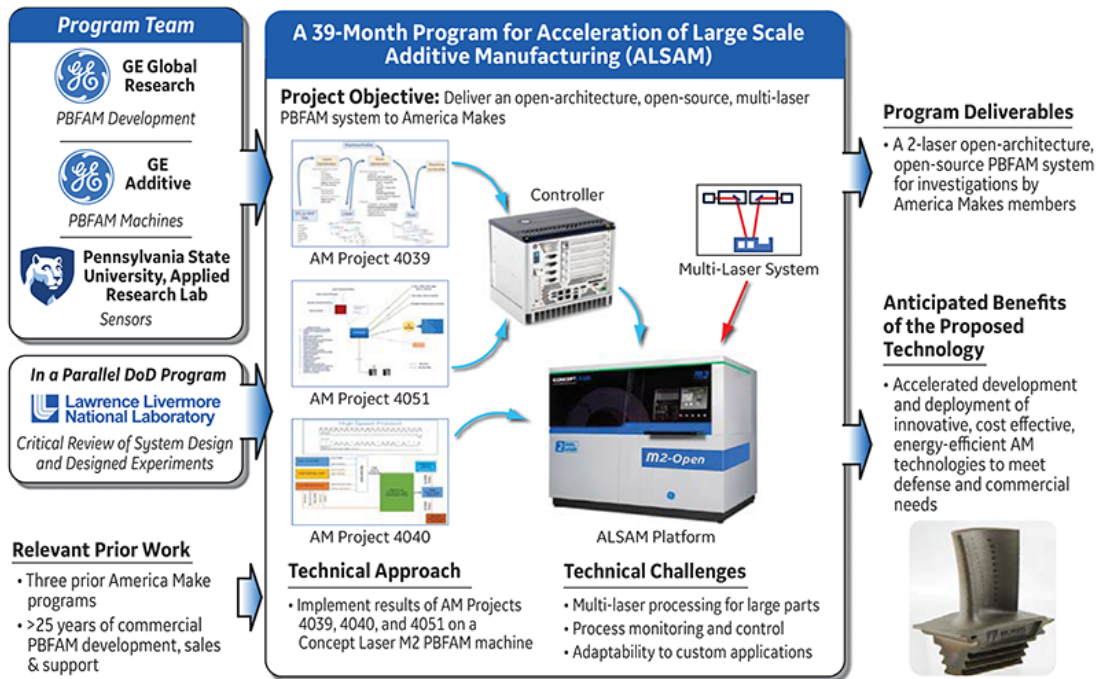


An Open-Architecture Multi-Laser Research Platform for Acceleration of Large-Scale Additive Manufacturing (ALSAM)



Overview of the proposed project approach

PROBLEM

While powder bed fusion additive manufacturing (PBFAM) technology offers major advances in design flexibility, developments are needed to address its limitations such as slow build rates, small build volumes, and steep thermal gradients. Industry demand to address these challenges is outpacing the ability of original equipment manufacturers (OEMs) to provide robust solutions—an issue that has evolved in part because of the closed-architecture approach of existing additive OEMs.

OBJECTIVE

The objective of this project is to develop the use of multiple lasers for PBFAM to enable larger build volumes, improved build rates, and reduced thermal gradients. The project seeks to integrate the results of former America Makes programs into a commercially-available PBFAM system. The system is intended to serve as an open-source, open-architecture resource at America Makes to host future research programs for the acceleration of large-scale additive manufacturing. Key challenges to be addressed include multi-laser processing to accelerate large-scale part production; improving process monitoring and control; and adapting to suit custom applications.



AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP

This project aligns to:



PROCESS

**ASTM
PROCESS CATEGORY:**
Powder Bed Fusion

EQUIPMENT:
GE Concept
Laser M2

MATERIAL:
Alloys of Al,
Ti, Fe, Ni

TECHNICAL APPROACH

The project team includes the Additive Manufacturing Laboratory at GE Global Research (GEGR), the Applied Research Laboratory at the Pennsylvania State University (Penn State), and GE Additive. After a critical design review of the machine and the expected open-architecture modifications, the team plans to modify a GE Concept Laser M2 by replacing the controller and control software with those developed under America Makes Programs 4051 and 4039. In addition, the multi-spectral sensor developed by Penn State under America Makes Program 4040 is being improved for down-beam sensing for installation on each of the lasers of the ALSAM Platform. Modifications to build preparation software and system control software to accommodate multiple lasers are planned and a series of designed experiments tailored to demonstrate the new capability are to be conducted on the machine. After delivery to American Makes, GEGR personnel intend to support the system as required for maintenance, software enhancements, and experimental programs.

PROJECT START DATE

January 2019

PROJECT END DATE

June 2022

EXPECTED DELIVERABLES

- M2 open-architecture PBFAM machine
- Documented calibration method for multiple lasers
- Software uploaded to digital storefront

FUNDING

\$3.42M total project budget

(\$2.5M public funding/\$920K private funding)

PROJECT PARTICIPANTS

Project Principal:

GE Global Research

Other Project Participants:

Pennsylvania State University
Applied Research Laboratory

Public Participants:

U.S. Department of Defense

3024.001 An Open-Architecture Multi-Laser Research Platform for ALSAM

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