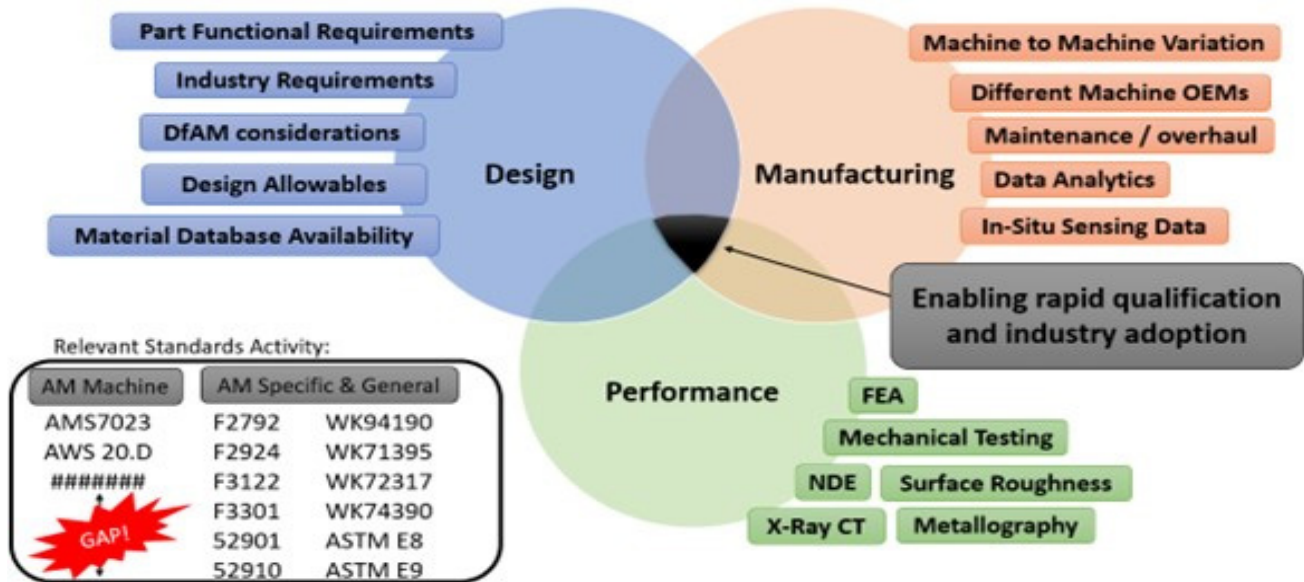


Rapid Qualification Pathway for Metal Additive Manufacturing Using Laser Powder Bed Fusion (PBF-L) for Critical Applications



Project framework for enabling rapid qualification and industry adoption.

PROBLEM

Additive manufacturing (AM) machines and materials qualification are major barriers to broad AM adoption. Generating the requisite data and models requires significant resources to produce statistically significant data. This qualification process requires generating test coupons under a controlled process and testing and analysis of the resulting data. These processes are then “frozen” with no changes to key process variables allowed. Standard-based guidance does not exist for requirements when a process change is needed. This greatly inhibits the agility of AM processes to respond to changes in the technology or supply base, allowing only one path to implement change to a qualified process — a total requalification, which may cost more than \$3M per machine/material combination and take several years.

OBJECTIVE

Develop a rapid qualification framework for metal AM laser powder bed fusion (PBF-L) processes that can be achieved with a data-driven solution to minimize the reliance on costly and time-consuming post-build testing.



AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP

This project aligns to:



PROCESS

ASTM PROCESS
CATEGORY
Powder Bed Fusion

EQUIPMENT
EOS M290

MATERIAL
Ti-6Al-4V

TECHNICAL APPROACH

This project will be executed using a data-driven framework, integration of key stakeholders, and the utilization of advanced technologies. The project will be organized into seven tasks that cover various aspects of the qualification process for metal additive structures: data collection, advanced sensing and data fusion, qualification framework, manufacturing and testing, demonstration component and process verification, workforce development and mobilization of rapid qualification, and data management. Each task will have specific deliverables and milestones, ensuring a systematic and well-coordinated approach to achieve the project objectives.

PROJECT START DATE

October 2023

EXPECTED END DATE

July 2025

EXPECTED DELIVERABLES

- Conventional test matrix and test plan
- Cite standards and material/process specifications used on project
- Powder reuse strategy
- Statistically based mechanical property curve (B-basis)
- Final report

FUNDING

\$1,050,000 total project budget

(\$700,000 public funding/\$350,000 private funding)

PROJECT PARTICIPANTS

Project Principal:

EOS North America

Other Project Participants:

3Degrees

Addiguru

NSL Analytical

The Ohio State University Center for Design and
Manufacturing Excellence (CDME)

Tinker Air Force Base

Public Participants:

U.S. Department of Defense