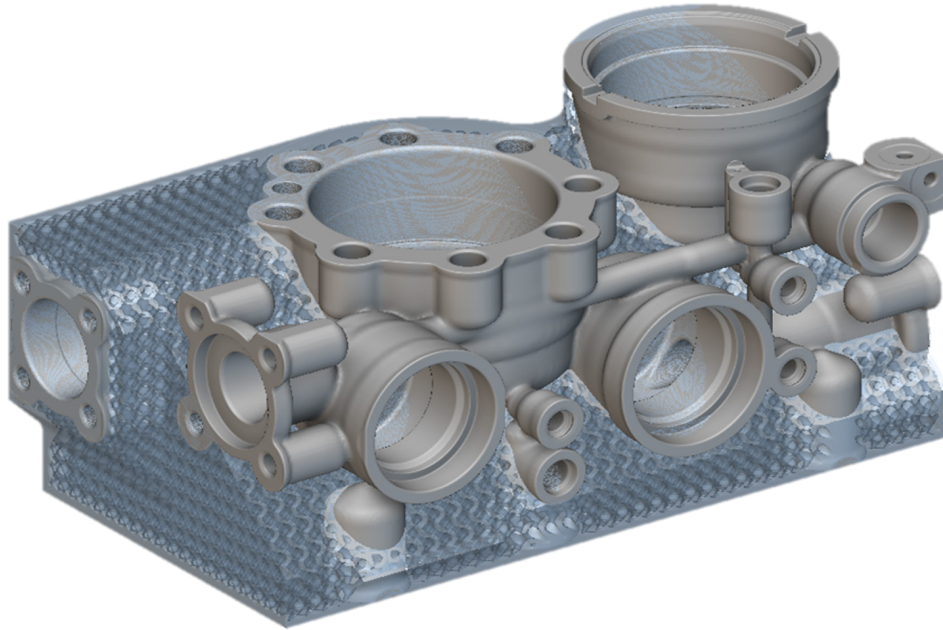


AM Phase 4, Application Development



A 3D model of the design for the AM-optimized manifold.

PROBLEM

Phase 3 of this project previously focused on the design of an additive manufactured (AM)-optimized, air-reducing manifold, the development of the build strategies, and the generation of the AM-centered First Article Test Procedures that are used in Phase 4. However, there are still some improvements that could be made to the design. Additionally, the manifolds have not yet been manufactured and thoroughly tested according to the First Article Test Procedures previously mentioned. As a directed project from the Navy, they are focused on the "bigger picture" problem of technical risk reduction of metal powder bed fusion AM for naval components. Currently, qualification of anything other than a wrought manifold body is not permitted by existing standards.

OBJECTIVE

The objective of this effort is to follow up on the work done in Phase 3 designing an AM-optimized, air-reducing manifold. More specifically, the scope of this project includes updating and improving upon the AM manifold design as well as manufacturing the finalized AM manifolds and assembly components. The scope also includes generating the First Article Test Procedures for performance testing and tests per those procedures.



**AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP**

This project aligns to:



DESIGN

**ASTM PROCESS
CATEGORY**
Powder Bed Fusion

EQUIPMENT
Laser Powder Bed
Fusion machines

MATERIAL
Inconel 625

TECHNICAL APPROACH

Marotta Controls will investigate whether AM is a viable alternative with performance benefits and propose tests necessary to certify the performance of AM manifolds. First, Marotta Controls will create and release the drawings for a fully functional manifold designed in accordance with MIL-V-24272B requirements with the AM body produced by laser powder bed fusion (LPBF) in Inconel 625. A minimum of three manifold bodies shall be fully manufactured, which includes: printing, post-processing, and finish machining. One of the three-manifold bodies shall be used for part verification based on a procedure written in accordance with NAVSEA S9074-A2-GIB-010/AM-PBF. The subassembly components for the end-use product will then be procured and used to assemble the other two manifold bodies into a fully operational product. Lastly, the assembled manifolds will be tested according to requirements of MIL-V-24272B which includes but is not limited to operational tests, leakage tests, shock tests, vibration tests, and noise tests.

PROJECT START DATE

October 2023

EXPECTED END DATE

September 2024

EXPECTED DELIVERABLES

- Project data report
- Test reports
- TRX briefing to America Makes members
- Final report

FUNDING

\$1,450,000 total project budget

PROJECT PARTICIPANTS

Project Principal:

Marotta Controls

Other Project Participants:

NCDMM/America Makes

Siemens Energy

Nu Labs

Public Participants:

U.S. Department of Defense