Scaling Up of 3D Printed Castings

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> May 26, 2020 NSRP Ship Design & Material Technologies Virtual Panel Meeting



Project Kick-Off Meeting Agenda

- 1. Kickoff Meeting Goals
- 2. NSRP/ATI Rules for Panel Projects
- 3. Panel Project Timeline to Date
- 4. Project Outline
 - Objectives
 - Technology Briefing
 - Original Schedule
 - Description of Tasks
 - Anticipated Outcomes and Expected Benefits
 - Project Management Structure
 - Project Deliverables/Technical Transfer
- 5. Questions

Kickoff Meeting Goals

- Meet project participants via phone
- Team backgrounds (informally)
- Get participants up to speed and on the same page
- General understanding of requirements and technologies involved in the project
- Project details and management

Panel Project Timeline to Date

- NSRP ECB selected Panel Project for award 11/25/2019
- Project funding delayed due to reorganization of DOD budget 1/22/2020
- Project funding awarded 3/1/2020 and project extended to 3/1/2021
- Purchase Order from NASSCO to MELD delayed due to COVID 19



Don't melt. MELD.

Project Goals and Objectives

The project goals are to:

- To deposit material at a higher rate
- Demonstrate printing capability in aluminum to keep costs down
- Identify potential nozzle head materials that can be procured and tested for longevity in a future project.

The objective is to:

• Assess feasibility and potential for scaling up the technology to increase the scale of printed castings.

Deposit at a Higher Rate







Demonstrate large component capability



Prove scalability: Show what is possible within panel budget

MELD: Print a demonstrator part

TEAM: Select a part, provide CAD file

Demonstrate large component capability





Part Selection Guidance:

Current machine size: 36 in x 18 in x 18 in

Geometry complexity: 3 axis machine



b8 Machine Specifications

Table Size: 42" x 18"
Build Volume: 36" x 12" x 12"
Overall Dimensions: 120" x 132" x 132"



MELD model b8 is an open atmosphere, 3-Axis CNC milling machine style platform with an easily scalable gantry system for larger parts. Localized gas shielding is available for sensitive materials.

Original Schedule

- Part Selection (2/20-5/20)
- Report on deposition rate achieved and scalability assessment 9/20
- Printed naval part 10/20
- Report of evaluation of nozzle head materials 11/20
- Results review and recommendation for next steps 11/20

Description of Tasks

- Project Setup and Kickoff Meeting
 - Determine SOW
 - Develop Schedule
 - Hold Kickoff Meeting
- Determine Part to be Printed
 - Conduct Survey or Submit Candidates to be printed (including dimensions)
- Stirring Tool Modification
 - Larger opening for increased deposition rate
- Stirring Tool Manufacturing
 - Fabricating nozzle head from 'tool steel'
- Stirring Tool Testing
 - Ensure fabricated stirring tool prints under normal operating conditions
- Conduct Test Program
 - Test for increased deposition rate
 - Possibly test metallurgical properties
 - Create final part
- Review and Document Testing
 - Review Deposition Rate
 - Document Nozzle Performance Results
- Prepare Final Project Report
 - Collectively combine all reporting MELD has conducted into final report format
- Quarterly Status Reports

Task Schedule

Task	Q1 - 3/1	Q2 - 6/1	Q3 - 9/1	Q4 - 12/1
Project Setup and Kickoff Meeting				
Printed Part Selection				
Stirring Tool Modification				
Stirring Tool Manufacturing				
Stirring Tool Testing				
Conduct Test Program				
Review and Document Testing				
Prepare Final Project Report				
Quarterly Status Reports				

Anticipated Project Outcome and Expected Benefits

- 1. Increased Deposition Rate
 - An understanding of feedstock size and rate.
- 2. Stirring Tool Modification
 - Stirring tool fabrication accommodating the increased opening.

Project Management Structure



Project Deliverables/Technical Transfer

Deliverables

No.	Name	Due Date
1	Quarterly Report 1	6/25/2020
2	Quarterly Report 2	9/25/2020
3	Quarterly Report 3	12/18/2020
4	Quarterly Report 4	3/1/2021

- Technical Transfer
 - The project technical transfer presentation will take place at an NSRP panel meeting within 3 months of project completion.
 - Presentation location and venue currently unknown

Questions?

