

America Makes Rapid Innovation Call Feb. 09, 2021

February 18, 2021

Jason Thomas

*America Makes, NCDMM
Portfolio Coordinator
jason.thomas@ncdmm.org*

Brandon Ribic

*America Makes, NCDMM
Technical Director
brandon.ribic@ncdmm.org*

Rapid Innovation Call – Feb 9, 2021

- 1 step response – Full Proposal
- Shortened proposal response format
- All team members must be America Makes members

|America Makes RFP

Rapid Innovation Call



Prepared by

**The National Center for Defense
Manufacturing and Machining (NCDMM)**

Jason Thomas, Portfolio Manager
236 W. Boardman Street
Youngstown, OH 44503
Phone: 330-610-0415
ric@americamakes.us

9 February 2021

NCDMM reserves all rights in connection with this document and in the subject matter represented therein. This material is based on Air Force Research Laboratory agreement number FA8650-20-2-5700. The U.S. Government is authorized to reproduce and distribute reprints for Governmental purposes notwithstanding any copyright notation thereon. The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of Air Force Research Laboratory or the U.S. Government.

Schedule

Event	Date
Project Call Announcement and Posting	02/09/2021
Project Call Kickoff Webinar	02/18/2021
Questions from Proposers about Scope or Approach Due	02/16/2021
Responses to Proposers about Scope or Approach Due	02/19/2021
Deadline for all team members to be an America Makes Member	02/19/2021
Fully Executed NDA with NCDMM (only if proposal contains proprietary information)	02/19/2021
Full Project Proposal Submission Due Date (Note: No Concept Paper Submission)	03/01/2021
Anticipated Decision and Notification to Project Proposal Teams	03/15/2021
Anticipated Date to have ALL Projects on Contract	04/31/2021
All project finalized reports and deliverables received no later than	08/31/2021

Topic 1: Characterization of Metal AM Process Surface Features

▪ Background

- Many variables can affect product surface quality or promote undesirable microstructures when building layer by layer
 - Feedstock form, geometry, and delivery mechanics
 - Feedstock characteristics such as size distribution, mean particle size, wire diameter, mass flux, etc.
- During printing a range of physical processes such as energy absorption, melting, solidification, and heat transfer may promote variations in surface roughness, surface waviness, or distortion

▪ Considerations

- A method to monitor the evolution of process surface features may offer a means to assess important process structure- property relationships which may impact:
 - Product quality
 - Yield
 - Cost
- AM process surface features to consider:
 - Product surface roughness
 - Product surface waviness
 - Feature or component distortion
 - Feedstock geometry
 - Unconsolidated powder layer geometry/ height
 - Consolidated component later geometry/ height
 - Solid/ liquid material surfaces

Topic 1: Characterization of Metal AM Process Surface Features

- Proposers are encouraged to describe an approach that includes:
 - Development, demonstration, and documentation of methods for direct or indirect in-situ measurement of metal AM surface features
 - Continuous or layer-wise monitoring with one or more techniques
- The method proposed should document:
 - Build design
 - Sensing method setup
 - Procedures
 - Analysis
 - Materials
 - Hardware/ software
- Technical approaches which are readily scalable to current commercially available systems are preferred

Topic 2: AM Part Families for Product Q&C (Qualification and Certification)

■ Background:

- Qualification and certification of AM components in regulated industries is cited as one of the key challenges towards broader adoption of AM
 - The initial few metal am components in aviation applications have been certified using a “point design” approach
 - All engineering data (testing, Analysis, etc.) is generated for a single part number
 - This work needs repeated for a different part number even if it is produced using the same alloy and AM process
 - “Point design” process is expensive and time consuming
- A new approach is needed to improve Q&C process efficiency, and to reduce the barrier to entry for a range of AM companies
- Approaches should address the needs of one or more industries and documentation should be delivered serving as a technical reference aiming to catalyze development of a public standard or best practice

Topic 2: AM Part Families for Product Q&C (Qualification and Certification)

▪ Considerations:

- Proposers are encouraged to consider an approach which details some or all of the following:
 - Key technical considerations for the use of part families
 - Criteria for establishing a part family
 - Common vs unique attributes within a part family
 - Effect of the part family type on the required level of material testing
 - Effect of the part family-based approach on the required levels of machine / process / material qualification
 - Potential synergy between the feature- based and part family- based Q&C approaches
 - Leveraging prior America Makes project data
 - Leveraging member engagement (one-on-one or workshops) or chartered groups
 - Use of part family concept in development of material allowables and design values
 - Enabling role of Computational Materials in establishing and leveraging the concept of part family in the above categories

Topic 3: Development of Test Artifacts for the Characterization of AM In-situ Process Monitoring Systems

■ Background

- Characterization of AM machine performance is critical to ensure quality, consistency, and repeatability of fabricated parts.
- While artifacts exist to benchmark AM equipment capability, there exists opportunity for similar approaches to systematically assess in-situ process monitoring methods

■ Considerations:

- A successful artifact design and test protocol may enable a best practice or standard method for:
 - Monitoring system comparison
 - Monitoring system capability, sensitivity, and repeatability

Topic 3: Development of Test Artifacts for the Characterization of AM In-situ Process Monitoring Systems

- Proposers are encouraged to describe an approach that develops and documents a test artifact or set of geometric features specifically designed to characterize the performance of AM in-situ process monitoring systems.
- Metals- based, commercially available AM systems
 - LPBF, EB-PBF, or DED
- Subset of considerations for technical approach:
 - Artifact CAD model, step file
 - Variation in feature geometry to induce variation in observable indications
 - Manufacturing process parameters
 - Monitoring methods
 - Use of one or multiple in-situ process monitoring sensors

Funding Description		Amount
Total Award Funds Available		\$185,000
Max federal funds per award	Topic 1	\$50,000
	Topic 2	\$75,000
	Topic 3	\$60,000
Cost Share	Topic 1	No cost share
	Topic 2	25%
	Topic 3	25%
Maximum Allowed Period of Performance (PoP) – shorter periods are acceptable* *PoP may be longer if contracting can be expedited, but no proposed PoP's longer than 4 months will be considered for funding. Non-funded (no guarantee) follow on efforts may be included – counts towards page count		4 Months (3 months technical and 1 month reporting) – no extensions will be considered

Minimum Deliverables

Minimum Deliverables	Timeline
Written Final Report (minimum one round of revision completed with PM/NCDMM prior to final submission)	Due on or prior to 8/31/2021 (non-negotiable deadline, no extensions will be considered)
Financial and man-hour reports	Monthly
TRX, MMX, webinar, or other America Makes hosted forum to brief membership	Minimum of one for closeout, two at most (including closeout)
Lead organization shall participate on at least one working group, advisory group, steering committee, etc. relevant to the subject matter of the project.	Hours shall be tracked and reported
Data management plan, key performance parameters (KPP's), planned project deliverables list with corresponding (existing/ new) Technology/EWD roadmap requirements	Draft at time of proposal Final 1 month after award

Reporting

1. At minimum, one (at most two) project briefing at America Makes Members Meeting and Exchange (MMX), Technical Review and Exchange (TRX), an America Makes hosted forum and/or an online webinar primarily for purpose of closeout
2. Data Management Plan, Key performance parameters (KPP's), planned project deliverables list with corresponding (existing/new) Technology Roadmap requirements finalized and documented within one month of project start date
3. Review of Data Management Plan and Execution 60 days prior to end of PoP
4. Virtual monthly team meetings that include the NCDMM PM and Government Technical advisors that are assigned post award as necessary or as agreed upon by lead organization/NCDMM/government technical advisors
5. Reports, presentations, or teleconferences upon request by NCDMM or AFRL
6. Working group, advisory group, or steering committee participation shall include presentation of milestone achievements or lessons learned relevant to the fulfillment or creation of roadmap requirements, requesting subject matter expertise support, and consultation for project steering group purposes or as necessary
7. Finalized, written report (minimum one round of revisions with NCDMM required before final submission) submitted to NCDMM by no later than end of proposed period of performance

Proposal Evaluation Criteria

Technical Approach (0-30 percent)

Delivery and Management (0-70 percent)

When America Makes America Works

