

The Additive Manufacturing Consortium: Current Projects and Plans for 2019

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The Additive Manufacturing Consortium (AMC) is a group of likeminded companies and research organizations that come together to conduct pre-competitive research to advance the use of additive manufacturing (AM) within industry. With a focus on metal additive manufacturing, the AMC selects projects each year that are funded through membership fees. Throughout the year, via regular conference calls and in-person quarterly events, members are updated on research progress and can provide input and advice to the research teams. The research focus is applied R&D in which results can be directly implemented into industry within the next 2-5 years. In addition to current project reviews, quarterly AMC meetings offer a program of presentations on new technologies or relevant external research. Tours of various additive manufacturing organizations and networking opportunities are also part of these events.



Additive Manufacturing
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Current AMC Projects

Phase 4: Continuing Further Testing on IN 625 and IN 718 And Relating Microstructure to AM Properties

AMC has been working on high temperature Ni alloys for several years and continues to build to the knowledge base. This project focuses on evaluating the effect of sourcing the same specification of material from different powder vendors. The goal is to quantify the physical as well as chemical differences in these powders and study their effect on microstructure and mechanical properties of components.

Development of Stainless Steel 316 L on Multiple AM Processes

The aim of this project is to study the behavior and differences of stainless steel 316L on both laser powder bed fusion and laser directed energy deposition (DED) systems. This project looks at development of build process parameters, heat treatment parameters, and

compares the corrosion resistance and tensile properties of the parts build on the two systems.

Phase II: In-process Monitoring & Defect Rectification

In-process monitoring is expected to be a key requirement in the future for production parts. This project examines defects introduced into a build, then uses in-process monitoring techniques to first detect the defect and then vary the build parameters for subsequent layers to improve or eliminate the defect.

Use of Laser DED Multi-Material Builds & Repair

This project utilizes EWI's RPM (a laser DED system) to evaluate the feasibility of AM for multi-material repair applications. In this project, ICME techniques are used to help direct the experimental Design of Experiment (DoE) on machine and minimize the parameter window. The final goal is to demonstrate a repair application in which different materials can be added onto an existing part. The model for this project is transitioning Inconel 625 build to stainless steel 316L.

Evaluation of Post Process Techniques for AM

Surface finishing of AM parts is a major challenge for the industry today. Additive manufacturing provides the benefit of creating complex geometry, but achieving post-finish requirements — whether it be increase of fatigue strength by removing microcracks, smoothing surfaces for fluid flow, improving finish to avoid manual sanding, and/or cosmetic appearance — can be difficult. This project is focused on reviewing the various automated post-processing techniques and evaluating their effectiveness for a complex AM part features.

Comparison of Commercially Available AM Simulation Tool

Currently every manufacturing software provider is releasing a new software tool for AM process simulation. The goal of this project is to weed through the noise of new product releases and evaluate the capabilities of some of the commercially available AM process simulation software tools.

Projects for 2019

As the AMC research groups wrap up 2018 projects, consortium members are preparing to select projects for the coming year. Potential projects fall into these categories:

- **Material characterization** – projects in developing parameters for various materials
- **AM machines and testing** – reviewing new machine technology and or characterizing the specific technology
- **Technology advancement** – new methods or applications of metal printing
- **Part acceptance** – evaluate how to characterize and or measure parts
- **Post process and finishing** – determining the best way to improve part finish and or complete secondary operations
- **AM software** – evaluating the software tools that exist to help analysis of additive parts.

The AMC exemplifies the “it’s better together” philosophy for pre-competitive, industrial R&D. Cooperatively, a cross-section of stakeholders is able to propel the technology forward and move companies closer to the adoption of metal AM in production for manufacturing. If you are interested in joining or learning more about the AMC, contact Mark Barfoot, Director of AM Programs, AMC and ASTM Center of Excellence (CoE) at mbarfoot@ewi.org.



Mark Barfoot, Director of AM Programs, AMC and ASTM CoE, oversees the overall success of EWI’s AMC along with EWI’s involvement in the ASTM CoE including consortia management, execution, and growth. Mark has a diverse AM and manufacturing background. He brings experience as former president of AMUG, has a solid understanding of industry applications for AM from his time working for a Stratasys reseller as well as spearheading the use of AM at Christie Digital Systems, and he has experience in metal AM research at the University of Waterloo.

The Additive Manufacturing Consortium (AMC) was founded by EWI in 2010 with a mission of accelerating and advancing the manufacturing readiness of metal additive manufacturing (AM) technology. The consortium brings together a diverse group of end users, suppliers, researchers, and stakeholders across academia, government, and industry to positively impact the AM landscape through organized and focused activities. Specific goals are to foster technical interchange by presenting timely cases studies and current research efforts at quarterly meetings; execute group sponsored, pre-competitive research projects within the AMC; collaborate on government funding opportunities; and provide a forum for discussing and shaping industrial and government roadmaps that define future funding. For more information about the AMC, visit <https://ewi.org/additive-manufacturing-consortium/>