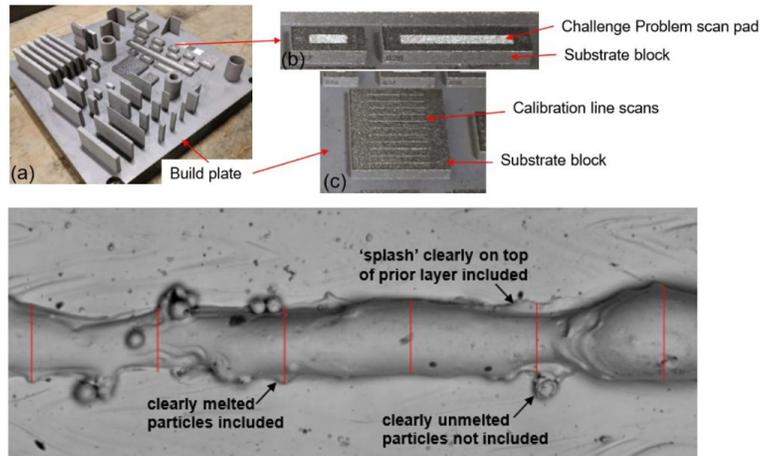


Average of 97 participants attended each of the four challenge workshops

Additive Manufacturing Modeling Challenge Series improves the model predictions for metal AM



Example parts analyzed as part of MIDAS Challenge

PROBLEM

There was a need to predict the internal structure and resultant performance of metallic components produced by additive manufacturing. Four challenges were presented and defined:

1. Macro-scale Process-to-Structure Predictions
2. Micro-scale Process-to-Structure Predictions
3. Macro-scale Structure-to-Properties Predictions
4. Micro-scale Structure-to-Properties Predictions

OBJECTIVE

The purpose of the effort was to challenge the brightest minds from industry and academia by focusing on validating/improving the accuracy of model predictions for metal AM. The goal of the Air Force Research Laboratory (AFRL) AM Modeling Challenge Series was to produce high-pedigree calibration data sets available for modelers to use in the developed models as directly related to predicting the internal structure and resultant performance of AM metallic components.

TECHNICAL APPROACH

The Challenge participants were asked to develop models and algorithms that produced dynamic material property prediction module(s), sensitive to geometry and local processing state. All participant submissions were sent directly to AFRL for grading and a total of \$235K in monetary awards was distributed among the top performers in each of the four challenges. Once completed, a final webinar was held where top performers presented and discussed their results with the AFRL team. For each Challenge, links to the Problem Statement, Dataset, and Answer Template were provided. The Dataset had to be accessed through Globus where individual files from the dataset could be transferred to the location of the participant's choice. AFRL scored all the Challenge submissions and forwarded the tabulated results to America Makes for monetary award distribution. After the top performers were announced, AFRL and America Makes hosted an AM Modeling Challenge Series Workshop the week of September 14, 2020.



AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP

This project aligns to:



DESIGN

ASTM PROCESS
CATEGORY
N/A

EQUIPMENT
N/A

MATERIAL
N/A

ACCOMPLISHMENTS

The project team effectively organized and hosted the Challenge Series. On July 20, 2020, AFRL and America Makes announced the top performers and issued each a \$52K award, while runners-up received a \$27K award. Monetary awards totaled \$235K. AFRL and America Makes hosted an AM Modeling Challenge Series Workshop which offered the top performers an opportunity to present their results to all the Challenge participants and the AFRL team. The workshop lasted four days, with each day dedicated to each Challenge. Several “lessons learned” were tracked to improve future Challenges.

PROJECT END DATE

July 2020

DELIVERABLES

- Recordings of awardees presenting their approaches
- Final report

FUNDING

\$350,000 total project budget

PROJECT PARTICIPANTS

Project Principal:

NCDMM/America Makes

Public Participants:

U.S. Department of Defense