SUCCESS STORY 5521.001

Foundational and advanced AM training to equip the warfighter and support elements with new advanced manufacturing skills

Over 1,000 DoD personnel received training through DRIVE AM program

Coursework overview for the General Additive Manufacturing track, including AM Workflow, Material Extrusion, and Laser Powder Bed Fusion processes

PROBLEM

To assure the viability and recognition of additive manufacturing (AM) in the defense industry, soldiers, technicians, engineers, and Department of Defense (DoD) leadership roles must be exposed to state-of-the-art educational programs that incorporate fundamentals through the authority-level curriculum. It is important to build on the accomplishments of the Driving Research, Innovation, and Value through Education in Additive Manufacturing (DRIVE AM) project via the W.M. Keck Center at the University of Texas at El Paso (UTEP).

OBJECTIVE

The overall objective of this project was to drive research, innovation, and value through education in AM. The purpose was to insert the DRIVE AM foundation program throughout the DoD and expand its virtual content; 2) complete the DRIVE AM specialty program, enroll participants, and provide offerings; 3) develop awareness throughout the DoD on UTEP's unique approach in using a specific laser powder bed fusion (LPBF) qualification test artifact for deepening the understanding of the LPBF workflow to benefit DoD ; 4) advance the DRIVE 3D STEM K-PhD pipeline and economic development initiatives; and 5) leverage the DRIVE AM program to expand into the high priority needs for understanding and training in AM of alloys relevant to future high-velocity applications.

AMERICA MAKES TECHNOLOGY DEVELOPMENT ROADMAP

This project aligns to:

VALUE CHAIN

ASTM PROCESS CATEGORY
Material Extrusion, Powder Bed Fusion

EQUIPMENT
All-In-One-Multi^{3D}, Pinnacle PXS-225/70 X-ray CT

MATERIAL
Molybdenum and Niobium refractory alloys

TECHNICAL APPROACH

The project team of America Makes and UTEP expanded, developed, and delivered offerings while using the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) lifecycle model. This began with an analysis (largely informed by customer discovery) of the need for DRIVE AM training and the participant's experience level, critical knowledge gaps, scheduling, and other constraints. To increase engagement and impact, the Knowledge and Best Practices Teams embarked on a multi-location roadshow performing marketing lectures at DoD locations. UTEP continued the K-PhD and outreach efforts initiated during the DRIVE AM program. The project team researched literature to understand activities promoting STEM recruitment and incorporated those findings into their courses. At least three courses were developed, one each for elementary, middle, and high school-aged students.

ACCOMPLISHMENTS

DRIVE AM successfully developed and implemented a wide range of educational resources across different modalities, reaching thousands of trainees. This initiative was completed through DRIVE AM training courses developed via literature reviews and compilation of materials, then presented to DoD personnel over multiple-day training courses.

In addition to the training courses, the DRIVE AM program implemented a Train-the-Trainer program to offer staff and students the opportunity to improve their oral skills and support the expansion of the program.

The UTEP Keck Center was also successful in the acquisition of equipment for research facilities and projects, including installation in the campus Keck facility and the Cotton Street extension, aimed to bolster student capabilities in conducting experiments for various projects, including DRIVE AM training for DoD personnel. This initiative extended to the expansion of the DRIVE AM Program at Advanced Manufacturing Integration and Innovation Center (AMIIC) in Huntsville, AL, providing an additional location for AM training and ensuring access to state-of-the-art machinery for effective research.

The invaluable hands-on experience provided by DRIVE AM training readied over a thousand individuals to operate, and critically think about the application of AM. The DRIVE AM team successfully expanded offerings and was able to use Customer Discovery efforts and assessment to identify where efforts should be focused to better impact DoD adoption and implementation of AM technologies. While additional value can be garnered from more training, the required activation energy for new course offerings increased as there are fewer available parties to offer higher-level training. The conclusion was that the Knowledge Base, which will be developed in DRIVE AM Phase 3, will focus efforts on inserting DRIVE AM further into the government by creating asynchronous education that will provide beneficial knowledge to military personnel.

PROJECT END DATE

December 2023

EXPECTED DELIVERABLES

- Training impact repot
- Regional intervention report
- Long-term DRIVE AM Strategy/Operations Concept
- K-PhD outreach courses
- Final report

FUNDING

$10,605,052 total project budget

PROJECT PARTICIPANTS

Project Principal:
University of Texas El Paso (UTEP) Keck Center

Other Project Participants:
NCDMM/America Makes
El Paso Chamber of Commerce
ReLogic
Schmitt Consulting Group
Youngstown Business Incubator

Public Participants:
U.S. Department of Defense