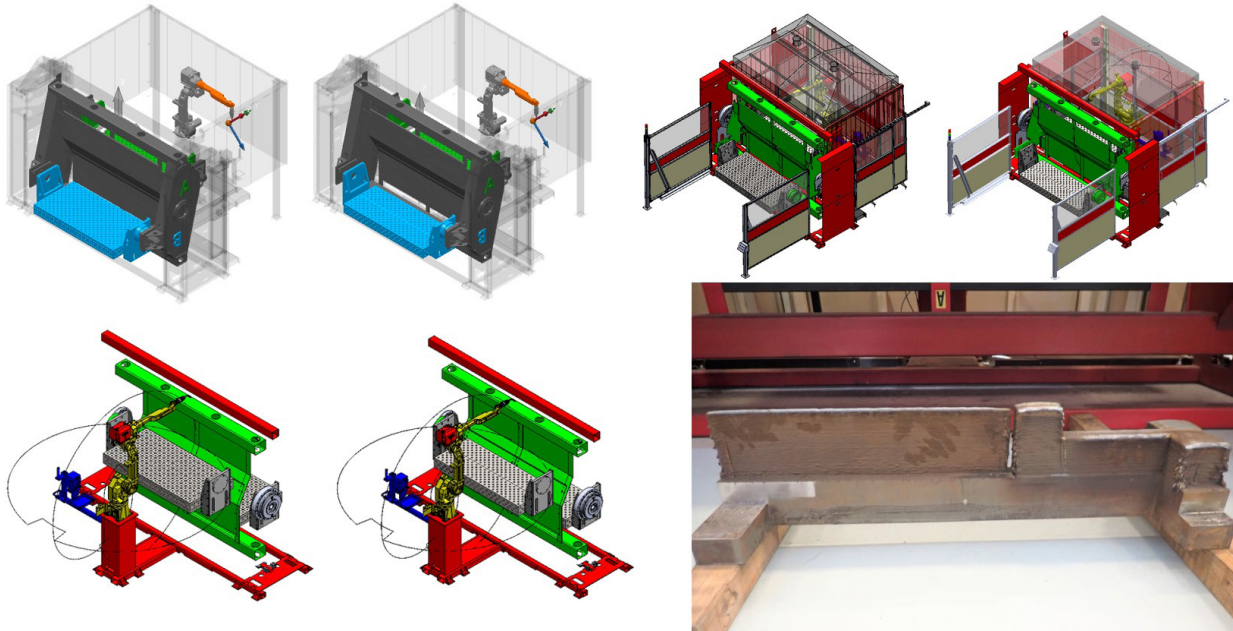


Rock Island Arsenal (RIA) Robotic Arc Directed Energy Deposition (DED) System - Consultative Assistance



Powermill Digital Twin and computer aided design (CAD) renderings with Bluco fixturing tables installed. Bottom left is the Standard Qualified Build completed by RIA technicians.

PROBLEM

Directed Energy Deposition (DED) system software requires developer skills to construct digital twin models, code computer-aided manufacturing (CAM) software post-processors, code build plan solver software, and transition simulation solutions to physical systems for metal additive manufacturing (MAM). Advanced DED software capabilities were needed to enable large-format MAM using arc, laser, or electron beam welding deposition processes, and to enable MAM using affordable pre-engineered robotic welding systems via software integration development.

In America Makes project 5525 RIA Robotic Arc DED System, EWI installed a Genesis Fanuc welding robotic system at the Rock Island Arsenal (RIA) - Joint

Manufacturing and Technology Center (JMTC) and developed a digital twin of the robotic cell. In this follow-on effort, personnel on-site at RIA needed to be trained in the use of the system. Further development was needed to mature large-format robotic DED for Army applications and RIA-JMTC needed the capability to support Army-wide application development and technology maturation. A DED procedure model database was needed for a wide range of structural alloys and build applications, and sensors and control technology were needed for lights-out thermal, dimensional, and quality management.



**AMERICA MAKES
TECHNOLOGY
DEVELOPMENT
ROADMAP**

This project aligns to:



PROCESS



MATERIAL

**ASTM PROCESS
CATEGORY**
Directed Energy
Deposition

EQUIPMENT
Genesis Fanuc
9-axis Welding
Robot System

MATERIAL
MIL-100S-1,
MIL-120S-1

OBJECTIVE

The objective of this project was to train and support the Army Ground Vehicle Support Center (GVSC) and RIA personnel in operating the DED AM System previously developed.

Edison Welding Institute (EWI) assisted in printing a standard qualification block for property testing and establishing DED-applied research test-bed capabilities at the RIA-JMTC.

TECHNICAL APPROACH

EWI trained RIA personnel in operating the Genesis welding system set up on America Makes project 5525. The Genesis welding system fixturing for DED and welding development was improved by installing a Bluco fixturing table. A full-scale, single-sided non-integrated build platform (FS-SS-NIBP) standard qualification build (SQB) was completed by RIA personnel with guidance from EWI. The training was applied to build a demonstration part by RIA personnel while monitored by EWI.

PROJECT START DATE

July 2023

EXPECTED END DATE

May 2024

EXPECTED DELIVERABLES

- Final report to include test results and analysis

FUNDING

\$30,000 total project budget

PROJECT PARTICIPANTS

Project Principal:

Edison Welding Institute (EWI)

Other Project Participants:

NCDMM/America Makes

Public Participants:

U.S. Department of Defense