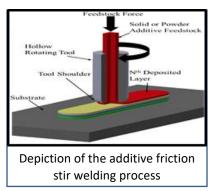## Repair and Retrofit of Railway Systems

Project Summary: The Department of Defense has designated 30,000 miles of track and structure as critical to mobilization and resupply of U.S. forces. Also, OCONUS rail systems in host nations and the theater of operations are also critical for resilient military power projection and to ensure connectivity between air/land/sea. Unfortunately, aging rail infrastructure is susceptible to wear and fatigue damage of the steel track. Conventional approaches to repair are insufficient and

Depiction of the additive friction stir welding process

challenging. New additive manufacturing processes such as additive friction stir welding, using the MELD approach, are capable of conducting high-throughput near-net shape metal deposition for repair applications. Advanced materials such as metal matrix composites can also be manufactured using MELD to improve wear and fatigue resistance.

Benefit: Cost savings from extended rail life and reduction of parts associated with repairs Cumulative Return on Investment Ratio of 228.48%. ROI of the proposed work will increase over time as the technology continues to be integrated into future rail repair and retrofit applications.

Duration of project: FY21 – FY23

Participants: The University of Alabama

Project advocacy (funding or otherwise): US Army Corps of Engineers - Engineer Research and Development Center (USACE-ERDC)