Project #51:
Ultrasonic Additive Manufacturing for Automotive Structures

Purpose:
Enable lightweight vehicle structures via UAM

Research Objectives:
• Understand the cause for the knockoff in x-tensile (in-plane) strength resulting from the UAM process
• Develop weld parameters that can reduce or eliminate the knockoff

DIC Testing and Modeling:
• Digital image correlation (DIC) used to measure 2D and 3D strain fields
• Permits local and global measurements

Methodology:
• Investigate process-property relationships through Design of Experiments study
• Prior pilot study focused on feasibility of welds
• DOE study focused on x-tensile testing
• FEA models developed to guide the experiments and assists with data analysis

Ultrasonic Additive Manufacturing:
• 3D printing technology based on ultrasonic metal welding
• Low-temperature process
• Dissimilar metal parts and integrated structures

Periodic machining shapes part and maintains uniform welding surface

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