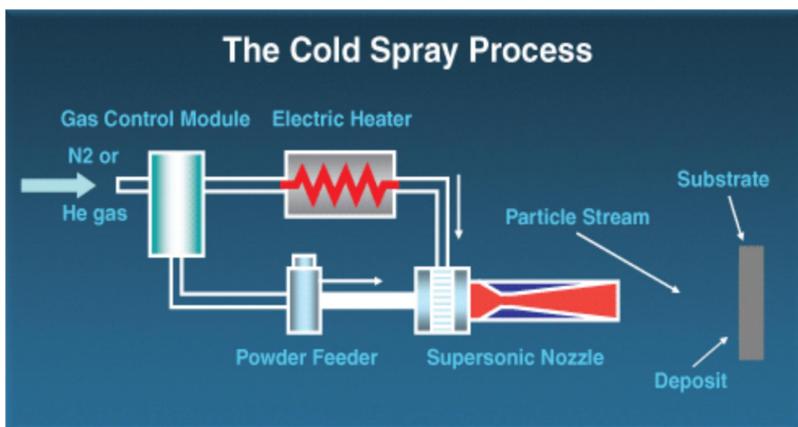


**S&T Campaign: Materials Research  
Manufacturing Science  
Advanced & Additive Manufacture**

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## Research Objective

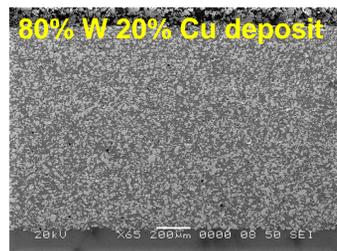
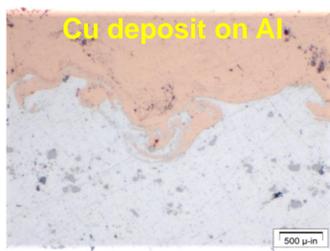
To model, design, and develop cold spray as a qualified process for depositing coatings, low cost dimensional repair, and production of near-net shape parts in order to alleviate logistical burdens on high cost restoration, lack of viable repair processes, and long lead times for replacement of metal components



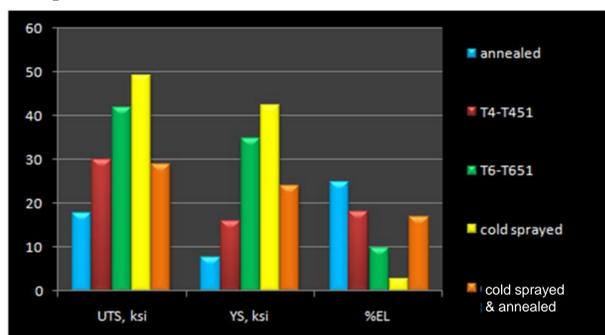
Cold spray is a unique solid-state materials consolidation process which utilizes high velocity particles impinging upon a substrate to build up coatings and/or near-net shaped parts without the use of combustion fuels

## Challenges

- Address limitations in materials capabilities for additive manufacturing using the advantages of cold spray as a low temperature, powder-based process
  - Corrosion/thermally sensitive substrates and feedstocks are key cold spray applications
  - Multi-component deposits, functional grading



- Develop powder feedstock production processes and specifications tuned for cold spray process to further the mechanical capabilities of deposits
- Provide extensive materials characterization data to support qualification of repaired and near-net shape components



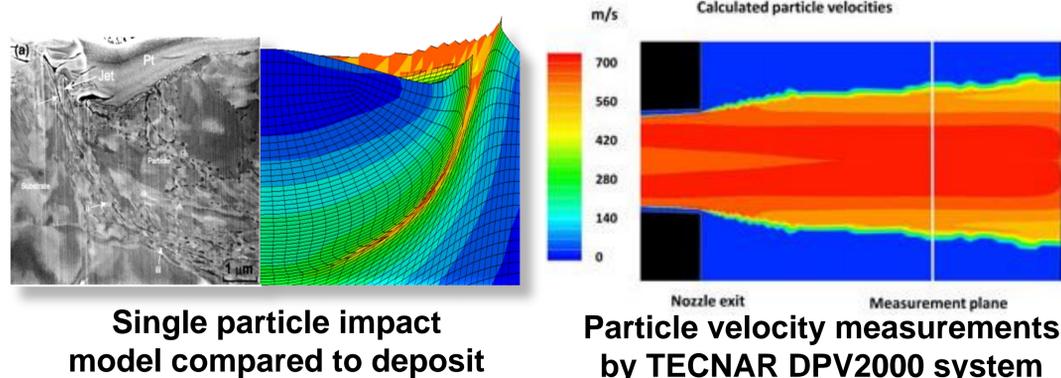
Mechanical properties of cold sprayed deposits

## ARL Facilities and Capabilities Available to Support Collaborative Research

- Full suite of cold and thermal spray capabilities
  - Large-scale industrial spray systems for development of cutting edge research and applications
  - Portable spray systems to design and test repair in the field



- Extensive resources and tools for spray/impact modeling, process development, materials characterization, and mechanical testing
- Over 30 years of experience modifying cold spray systems and techniques to maximize the performance of additive manufactured parts



## Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- Powder synthesis, processing, and characterization experimentation and expertise
- Modeling of multi-particle impact phenomena to predict and design material properties in deposits
- Sophisticated automation for cold spray processing



Cold Spray Repair of Magnesium Components: Main, Intermediate and Tail Gearboxes for UH-60