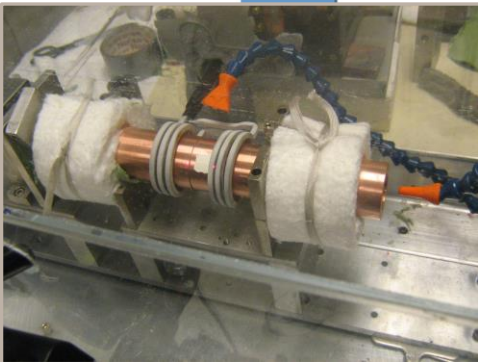


# Materials Engineering

## OVERVIEW

Materials science is at the heart of every manufacturing challenge - from solving complex joining problems to turning great ideas into bold new products. That's why EWI's Materials Engineering Team is at the center of every service we offer, impacting every industrial sector we support.

With more than 120 combined years of cross-industry, cross-technology experience our materials group offers expertise that's both broad and deep. Our areas of specialty include ferrous and non-ferrous metallurgy, polymers, adhesives, dissimilar materials joining, weldability testing, and a deep understanding of the interaction between welding processes and materials to control the resultant material properties. Our clients can access this diverse set of skills to address challenges at all stages of their manufacturing processes.



## CAPABILITIES

EWI's materials engineers have creatively applied their diverse skill sets to push the envelope in materials science and help our clients succeed. Whether your goal is to ensure safe fabrication, optimize designs, or develop new materials, EWI can help. Our materials engineers can assist in:

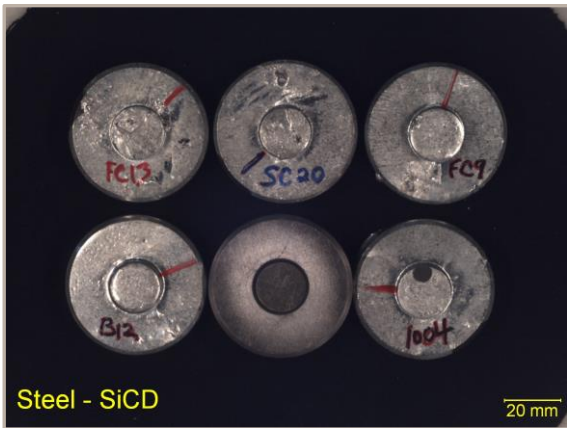
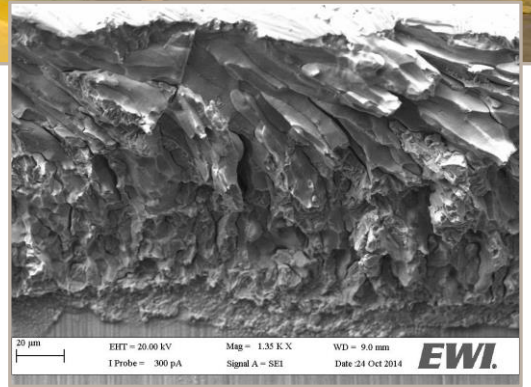
- Materials selection and characterization
- Materials development
- Weldability assessment evaluation
- Welding process selection
- Failure analysis
- Dissimilar metals joining
- Metal-to-nonmetal joining
- Adhesive bonding
- Filler-metal design and selection
- Brazing and soldering

## PROJECT EXAMPLES

Our high-impact projects have included:

- Performing induction brazing of copper pipes which form a continuous hermetic channel hundreds of meters in length in an experimental fusion reactor.
- Modeling and producing thermal protective system (TPS) test structures for the aerospace industry, demonstrating the effectiveness of modeling via thermal testing and verification of predicted performance.
- Identifying the root cause of cracking in titanium pressure vessels intended for satellite installation, providing guidelines to correct fabrication practices and prevent future failures.
- Studying the effect of shielding-gas composition and non-consumable electrode type on microstructure, mechanical properties, and corrosion resistance of stainless-steel weld joints.

- Supporting United States Air Force (USAF) composites-intensive programs by developing methods to bond advanced composites to titanium.
- Supporting United States Navy (USN) composites bonding to steel, earning EWI the Department of Defense Mantech Achievement Award.
- Investigating the effects of inclusions and microstructure in welded high-strength-low-alloy (HSLA) steel on fracture toughness in the coarse-grained-heat-affected-zone (CGHAZ).
- Vacuum furnace brazing tantalum to stainless-steel flange assemblies for an application in a corrosive environment. Proper filler metal and procedure selection prevented oxidation of the stainless steel and resulted in high-quality joints that passed stringent helium leak test requirements.
- Using ultrasonic soldering as a low-temperature bonding process for joining a silicon carbide-diamond composite to steel for a bearing application, achieving a shear strength nearly 50% higher than required.



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## LEARN MORE

To learn more about EWI's materials engineering resources and how they can be used to help your business, visit [ewi.org](http://ewi.org) or contact Alber Sadek at [asadek@ewi.org](mailto:asadek@ewi.org) or 614.688.5125.



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