Characterization & Failure Analysis

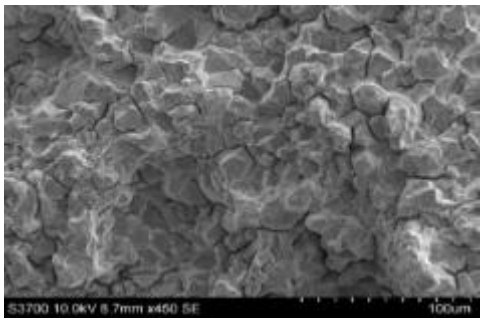
MISSION

Utilize Material Characterization, Failure Analysis and Testing Methods to provide innovative solutions, increasing the performance of warfighter equipment.

OVERVIEW

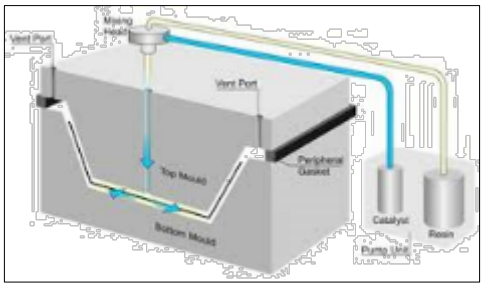
- Expertise in metals, composites, adhesives, elastomers and plastics
- Examples from the approximately 300 projects per year:
    - Armor performance enhancements
    - Track life improvement
    - Turret assembly pin repair analyses
    - High strain rate performance of adhesives
    - Spur gear failure examination
    - Alloy composition certification
    - Thermal performance of elastomers, adhesives, and composites
    - Shear pin material verification
    - Composites design and optimization
- The Characterization & Failure Analysis (C&FA) team provides experimental data to Ground Vehicle Systems Center material R&D efforts, corroborating theories and production methods with anticipated properties
- The C&FA team also serves TACOM program managers as subject matter experts through:
    - Quantitative testing to inform refinements to military standards
    - Testing techniques that satisfy unique DoD requirements
- Additionally:
    - Provide materials reverse-engineering support
    - Polymer-based composites testing and failure analysis
    - Validating parts made via additive manufacturing

"The Subject Matter Expert from the Metallurgical Laboratory was top notch. It is a pleasure to work with your team!"
– Rock Island Arsenal Commander



Electron microscope image of an intergranular fracture surface

Track and running gear components that the Elastomers Lab analyzes and re-engineers to improve the component durability and system readiness.



Resin transfer molding process of composites manufacturing

Individual steel cable braids (electron microscope)

Characterization & Failure Analysis

Material characterization and testing are the focus of the labs, which facilitate material selection, design, verification, improvement and failure analysis. The two laboratories are versatile in their approaches to problem solving and will employ technical experience to engage in innovative solutions to customer requests.

METALLURGY LABORATORY

- Metallography
- X-Ray Powder Diffraction
- Surface Stress Analysis (X-Ray)
- Scanning Electron Microscopy (EDS, WDS, EBSD)
- Compositional Analysis - Optical Emission Spectroscopy (OES)
- Hardness Testing (Vickers and Rockwell Scales)
- Charpy Impact Testing
- Tensile Testing
- Failure and Fatigue Analysis

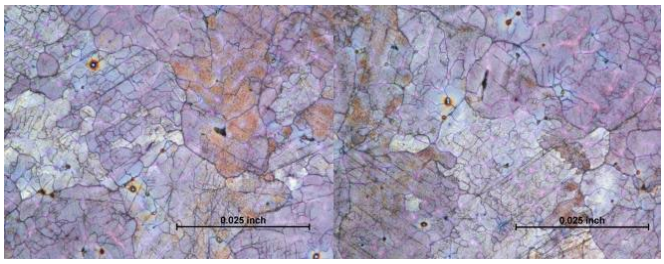
ELASTOMERS LABORATORY

- Dynamic Mechanical Analysis (DMA)
- Crack Fatigue Analysis (FCG)
- Glass Transition (DSC)
- Chemical Composition Analysis (FTIR)
- High Temperature Testing/Characterization
- Energy Management (Tension/Compression)
- Wear Resistance (Din Abrader- RT/150F)
- Compression Set
- Heat Aging Study
- R&D Compounding- Fibers/Nanoparticles

COMPOSITES AND ADHESIVES RESEARCH

- Research and development of adhesives and 3D composites for insertion into Army systems
- Additive manufacturing of composites
- Developing additive manufacturing tooling
- Thermal performance under environmental conditions
    - Adhesive development for high strength and high strain rate conditions
    - High strain application methodology development
    - Analysis of opportunities for weight reduction, optimization, and performance increases

MICROSTRUCTIONAL ANALYSIS



MICROSTRUCTIONAL ANALYSIS

FOR FURTHER INFORMATION:

U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND — GROUND VEHICLE SYSTEMS CENTER:
http://www.usarmygvsc.com/

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