



# U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND GROUND VEHICLE SYSTEMS CENTER

**Ground Systems Engineering Support (GSES)**

*Chris Mocnik, Deputy Executive Director*

**24 APRIL 2024**

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# GROUND SYSTEMS ENGINEERING SUPPORT (GSES) ORGANIZATION & CAPABILITIES



## Sustainment Engineering (SE): Associate Director- Mr. Tony McKheen

- Serves as one of the Engineering Support Activities (ESAs) to DLA and Team Detroit Arsenal (to include Arsenals and Depots) for ground systems in sustainment.

## Technical Data Management (TDM): Associate Director- Ms. Celeste Kozinski

- Provides Secondary Item Data Management (SIDM) support, technical data configuration management, and CAD development and validation.

## Force Projection Technologies (FPT): Associate Director- Dr. Jose Mabesa

- Performs research, development, engineering and sustainment support for the Army's force projection assets.

## Ground Vehicle Materials Engineering (GVME): Associate Director- Mr. Brandon Pender

- Provides technical expertise in materials engineering and manufacturing through the weapon system lifecycle from research to acquisition to sustainment.

**GSES**

- Approximately 220 Government Civilians
- Funding: S&T, SSTS, AWCF, DWCF, Customer Reimbursable



# SUSTAINMENT ENGINEERING

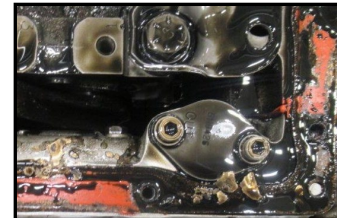


**Mission:** Provide engineering expertise to support readiness of fielded military ground systems

**Vision:** Be the recognized sustainment engineering organization that eliminates engineering barriers to military system readiness

## Functions:

- Engineering support to systems in sustainment - safety issue resolution, field support, ECP development/review, depot support, TDP revisions
- Spare part procurement technical support - review TDPs, identify alternative sources, engineering support to the buying community (DLA, ACC), engineering certification for sole source J&As, source approval requests
- Obsolescence management and industrial base support - predictive, proactive and reactive obsolescence management and mitigation, reverse engineering, counterfeit investigation



# TECHNICAL DATA MANAGEMENT (TDM)



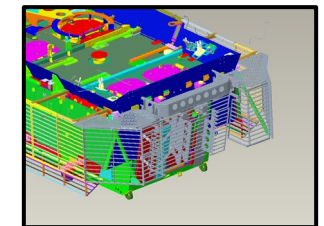
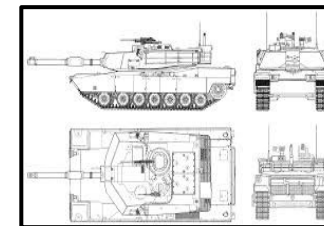
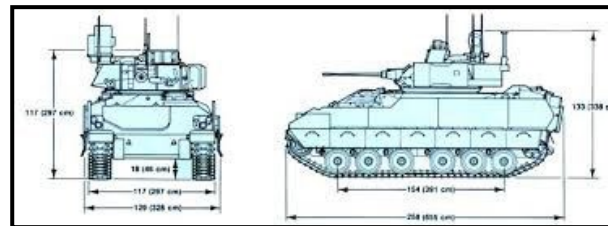
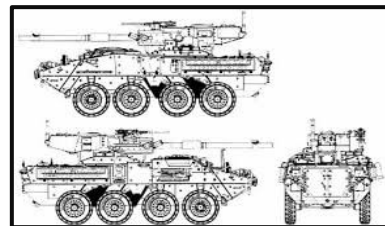
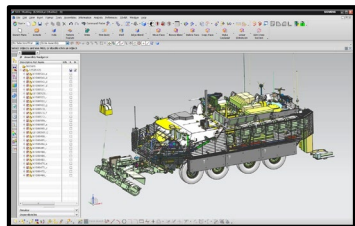
**Mission:** Provide superior customer service through technical expertise for development and management of technical data for designated systems to enhance military readiness across the DoD.

**Vision:** Be the gateway to developing, managing, and validating technical data for DoD designated systems throughout the lifecycle to enhance military readiness.

## Functions:

- Secondary Item Data Management is the customer interface and process manager to provide technical data in support of spare part procurements for TACOM LCMC, Army Contracting Command, and Defense Logistics Agency (DLA).
- Configuration Management manages assigned DoD system's/product's technical data throughout its lifecycle including system requirements, functional attributes, and physical properties.
- The Computer Aided Design (CAD) Projects and Validation teams design, develop, and update Technical Data Packages for assigned DoD systems using multiple CAD and model-based engineering (MBE) tools in support of CAD technical data for the procurement of ground systems, spare part components, and future modifications necessary to sustain our Warfighter.

**TDM ensures the integrity, quality, and maintenance of Technical Data Packages (TDPs) for designated DoD systems in support of Army readiness.**



# FORCE PROJECTION TECHNOLOGY (FPT)

## “TO GET YOU *THERE*, TO KEEP YOU *MOVING*, TO BRING YOU *HOME*”

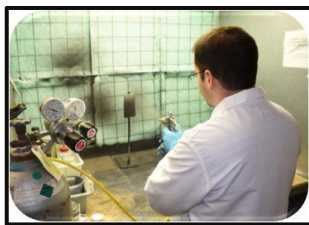
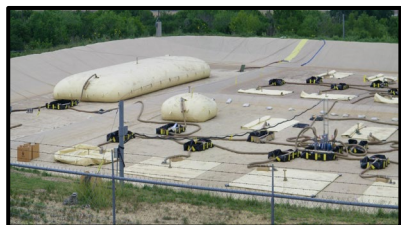


**Mission:** To provide equipment lifecycle engineering, research, and support for the missions of gap crossing, petroleum & water systems, combat engineering, and fluid quality surveillance, and Contested Logistics

**Vision:** To be the recognized authority in lifecycle engineering and research for critical Army Force Projection Technologies. These technologies include the treatment, handling, and testing of Fuels, Lubricants, and Water; and force enhancing capabilities such as: Bridging, Construction and Material Handling Equipment and Sustainment Transformation for the Army of 2030 and 2040.

### Functions:

- Provides full life-cycle engineering and technical support for a wide range of logistics, sustainment and maneuver support systems.
- Systems under FPT’s purview include: Petroleum Storage, Distribution and Quality Surveillance; Water Generation, Treatment, Handling and Quality Monitoring; Military Assault and Tactical Bridging; Combat Engineer (Construction) and Material Handling Equipment; and development and testing of ground system fluids; including petroleum, oil, & lubricant (POL), coolants, and solvents.
- FPT operates five laboratories which include: the Bridge Technology Lab, Water Treatment Test Facility (with a separate component test lab), Fuels & Lubricants Lab and the Army Petroleum Lab (APL).
- FPT serves as the DoD responsible agent for all ground fuels and lubricants specifications (AR 70-12, DoD 4140.25, DoD 4180.01), is the National Depository Authority for the U.S. Army on Military Load Classification per STANAG 2021, STANREC 4865 (formerly the NATO Trilateral Design and Test Code), and is the DoD lead lab for ground water supply and wastewater treatment (AR 700-136).
- FPT serves as the executive agent for Contested Logistics across the GVSC Enterprise.



# GROUND VEHICLE MATERIALS ENGINEERING (GVME)

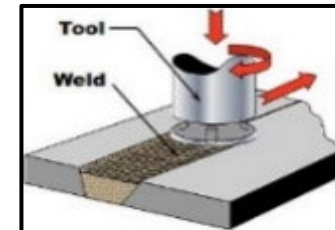
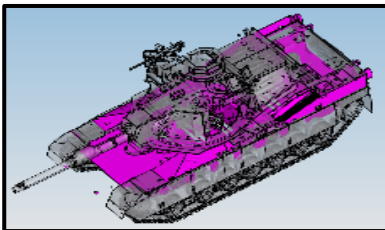


**Mission:** Provide materials technologies and engineering support to ground systems throughout the life cycle to enhance warfighter readiness.

**Vision:** To be the Army's preferred source for materials and manufacturing technology integration.

## Functions:

- Provide technical expertise in materials engineering for the entire weapon system lifecycle from research to acquisition to sustainment. This includes the evaluation and integration of new materials solutions for future systems, requirements development for current acquisition programs, and materials technical solutions for fielded systems.
- Materials technical competencies include lightweight materials maturation and integration, design optimization/weight reduction, materials selection & characterization (failure analysis), joining (welding, adhesives, mechanical fastening), additive manufacturing, coatings/corrosion, hazardous materials management & environmental compliance.
- Materials has fully capable lab facilities to conduct testing of all material types including characterization at macro and micro level. These labs include the Metallurgy Lab, Elastomers Lab, and capabilities in Friction Stir Welding (FSW) & Additive



# LAB, SIL, or EQUIPMENT / SOFTWARE



## Jointless Hull Subsection Tool

### Capabilities:

- Bulk metal 3D printing
  - Accommodates most metals (aluminums, steels, high temp alloys, etc.)
  - 20+ lbs per hour
- 5-axis milling (lubricant-free)
  - Automated tool-changer (12 tool capacity)
- Working envelope of 3' x 3' x 3', smaller version of the machine at Rock Island Arsenal (RIA) with a working envelope of 30' x 20' x 12'.

### Benefits:

- Alternative source for long lead, expensive, and hard to source castings, forgings, and weldments.
- Resource for engineering development for the larger machine at RIA
- High throughput, deposition rates can exceed 40+ pounds per hour
- Unlike other AM processes, no melting, and therefore no cracking, hot tearing, or porosity
- Joining of dissimilar materials
- Wide variety of processable materials
- Solid Feedstock – ½” square x 24” bar makes it easy to handle and store.

### Point of Contact

**Name: Brandon Kropf**

**Email: brandon.t.kropf.ctr@army.mil**



Jointless Hull Subsection Tool at the AMCC

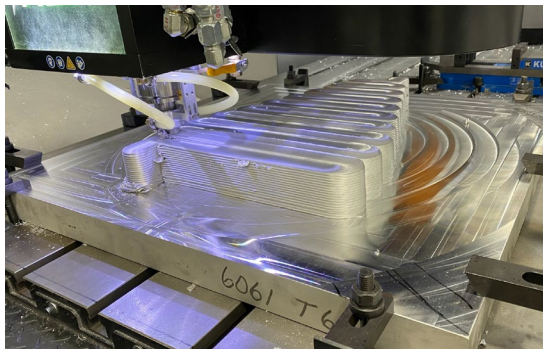
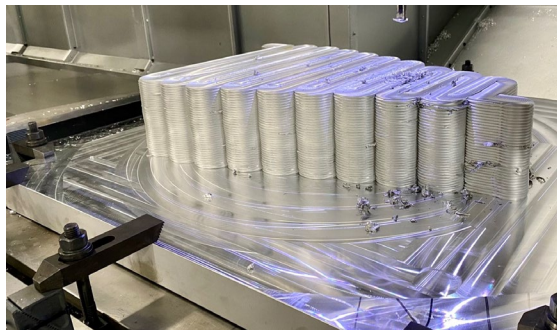


**ADVANCED MANUFACTURING  
COMMERCIALIZATION CENTER**  
*An SAE Government Technologies™ Program*

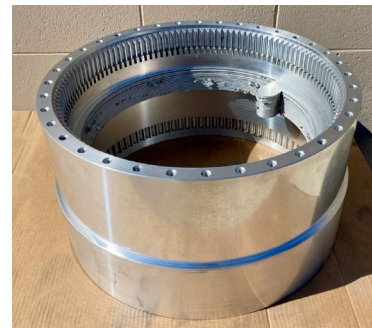
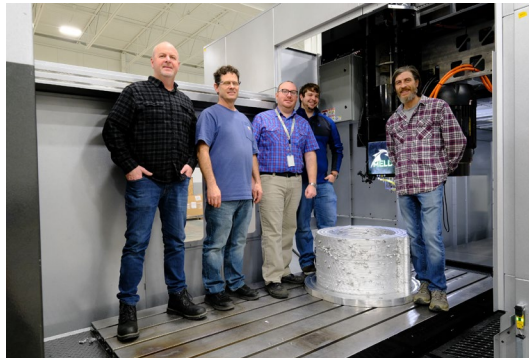
# JOINTLESS HULL – PROTOTYPE PARTS



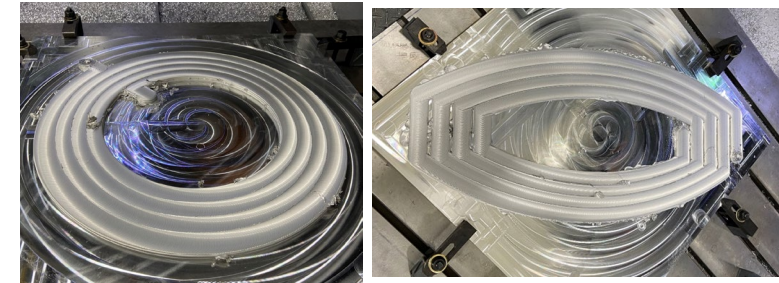
- Military Derivative Wing Terminal
  - Mfg method: Forging
  - Current Lead time: 1,000+ days (52 no bids since 2018)



- Ring Gear for Construction Equipment
  - Mfg. method: Forging
  - Current Lead time: 52 weeks



- Turret Ring for Ground Vehicle
  - Mfg. method: Machining
  - Current Lead Time: 48 weeks





# Materials Testing Laboratory



## Testing Capabilities

### Metallurgy:

- 125 kN Tensile/Compression tester
- 600 kN Tensile/Compression tester
- 250 kN Fatigue testing
- Metallography
- X-Ray Powder Diffraction
- Surface/Residual Stress Analysis via X-Ray
- Scanning Electron Microscopy (EDS, WDS, EBSD)
- Optical Emission Spectroscopy (OES)
- Macro Hardness Testing (Brinell and Rockwell)
- Microhardness (Vickers and Knoop)
- Charpy Impact Testing
- Atomic Force Microscopy
- Electro-Dispersive Machining equipment

### Services: APPROX PRICE \$5,000

- Full material characterization to support: M&S cards, alloy development; reverse engineering; and failure analyses.

### Benefits:

- ISO 17025 accredited laboratory providing comprehensive suite of mechanical and physical testing equipment for Ground Vehicle community's material analysis needs

## Point of Contact

Name: Michael Foley

Email: michael.j.foley7.civ@army.mil

### Elastomers:

- Dynamic Mechanical Analysis (DMA)
- Glass Transition (DSC, TMA, DMA)
- Chemical Composition Analysis (FT-IR)
- High Temperature Testing/Characterization
- Energy Management (Tension/Compression)
- Heat Build-Up
- Wear Resistance/Abrasion
- 1 kN Tensile/Compression tester
- Hardness (Type A & D) testing
- Compression Set
- Chemical Compatibility testing
- Thermal Conductivity (all materials)

## Materials Testing



For what is, what it will be, and when it breaks



# ADDITIVE MANUFACTURING AND MATERIALS CHALLENGES AND OPPORTUNITIES



## AM Challenges:

- IP – Working through legalities of printing parts with IP owned by industry.
- Safety/Qualification – Are printed parts of the same quality as OEM?
- Risk – Aversion to utilizing new tools and processes. Will AM be a problem for me?
- Cost – AM “can” be more expensive than casting and forging for small quantity production runs.

## AM and Materials Opportunities:

- Can you help with any of these challenges? If so, we’d like to hear from you.
- If you have metal additive manufacturing capabilities with military applications (steel, high-grade aluminum, titanium) we’d like to hear from you.
- Do you have a novel metal or glass printing capability? If so, we’d like to hear from you.
- AMCC and Materials Characterization Laboratory are available to you.
- If you have a non-flammable AC refrigerant we’d like to hear what you have.

## QUESTIONS AND ONE-ON-ONES



# Questions?

***Please visit Ground Vehicle Materials  
Engineering for one-on-one conversations at  
Table #3 in room 143***