



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

Technical Interchange Meeting- GVSC Tires, Track & Suspension  
Team

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# TIRES, TRACK & SUSPENSION BRANCH OVERVIEW



- The branch is comprised of engineers possessing combined knowledge across tires, track and suspension areas.
- The branch has two primary focus areas:
  - Research & Development: Technology development to push state-of-the-art advancements in tires, track, and suspension technologies.
  - Fielded System Support: Support “cradle-to-grave” operations of combat vehicle tires, track and suspension systems, and seek opportunities to enhance platform capabilities while providing expertise to trade studies, analysis of alternatives, and integration.





# GVSC TIRES, TRACK & SUSPENSION THRUSTS

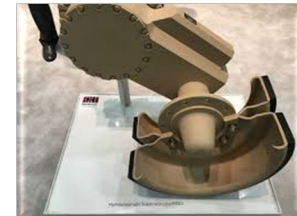
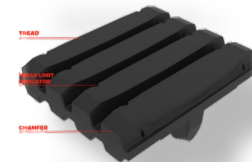


The GVSC Tires, Track and Suspension Team provides technology development and technical engineering support for both wheeled and tracked Army vehicles.

- **Tires**
  - Arctic / Northern Operations specialized designs
- **Track**
  - Lightweight, metallic & composite segmented tracks
    - 60T capable
    - Segmentation incorporated into composite design
    - Reduced rolling resistance
- **Suspension**
  - External suspension with adaptive capabilities
    - 60T capable
    - Ride height adjustment & semi-active damping

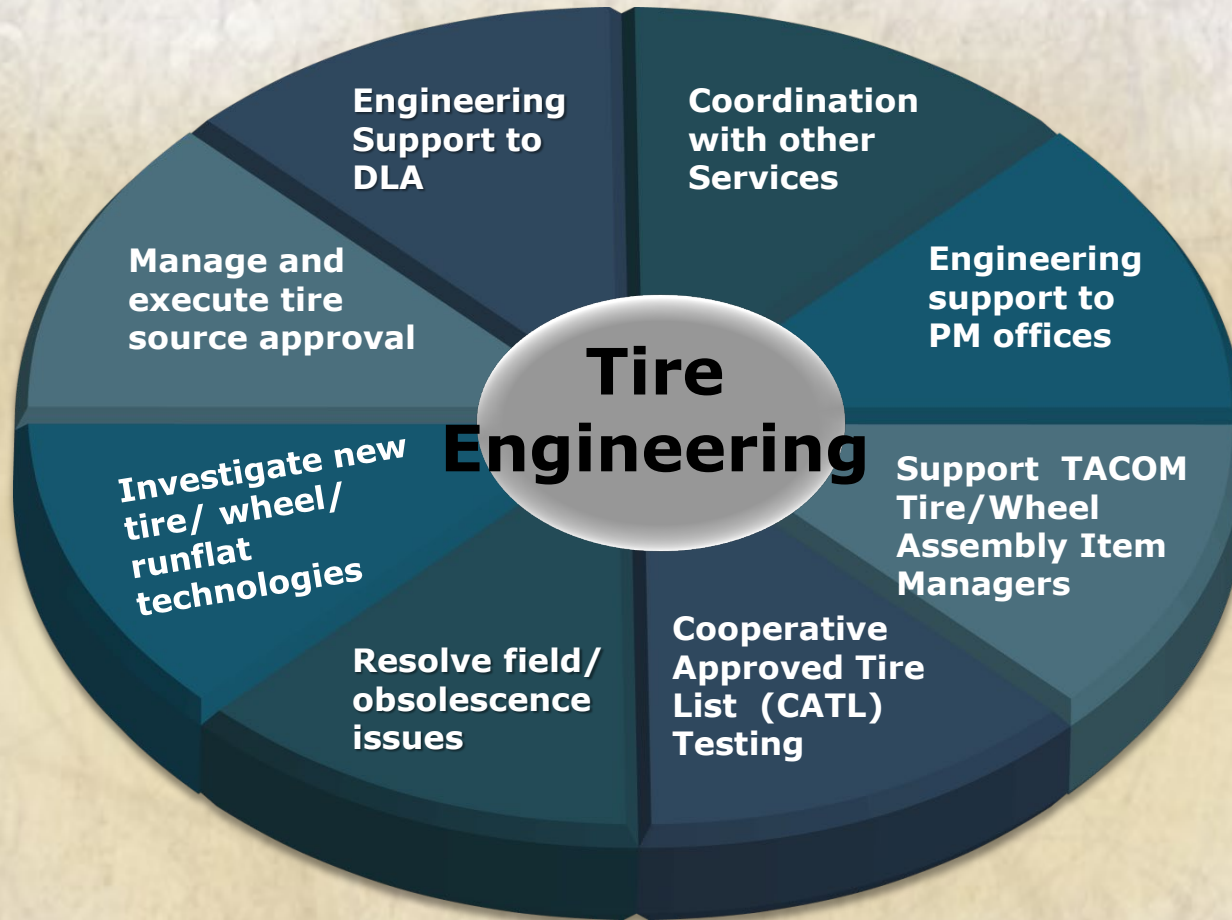


COMPOSITE RUBBER CONSTRUCTION ENGINEERED TO DELIVER HIGH PERFORMANCE, REDUCE VEHICLE WEIGHT AND MINIMIZE ROLLING RESISTANCE.





# TIRE ENGINEERING





# LINES OF EFFORT-TIRE ENGINEERING



- **Engineering Support to Defense Logistics Agency (DLA) (tires, wheels, runflats, tubes, valves, beadlocks, flaps, chains)**
- **Engineering Support to Vehicle System Program Offices**
- **New Technologies**
- **Technical Support to TACOM ILSC Tire/Wheel Assembly Item Managers**





# GVSC TIRE NEEDS/PRIORITIES



- **Support for GVSC Vehicle Modeling**
  - Tire Models (Pacejka, FTire, Swift)
  - Tire Characterization (Dimensional, Deflection, Force & Moment Data)
- **Winter Tires for the Military**
  - Additional Sizes for Artic Mobility
- **GVSC Research and Development Efforts**
  - Airless Tire Technology
  - Auxiliary Support for Tire Storage Barrier Coating Project



## TIRE ENGINEERING SUPPORT TO DLA

**GVSC Tire Engineering provides support for issues related to the DLA Tire Mission, serving as technical focal point for Department of Defense (DOD) ground tires and tire related components (run flats, bead locks, wheels, tire valves, flaps, chains, and tubes)**

- Technical support for customers in the field, DLA Land & Maritime Contracting, and Global Tires Program (GTP) contractor
- Review alternate offers and resolve obsolescence issues
- Maintain and manage Cooperative Approved Tire List (CATL)
- Coordinate with the Services (Army, Navy, Air Force, Marine Corps) on tire issues providing a central focal point for DLA.
- Technical support for DLA in Govt. Meetings
- Government representative at Industry Association committee meetings including SAE Truck & Bus Military Industry Tire Task Force, ASTM, and Tire & Rim Association



# GROUND VEHICLE TIRE QUALIFICATION



- GVSC Tire Engineering manages the qualification process for DoD ground vehicle tires
- Classifications
  - SAE J2014 / Manufacturer's Approved Part No.
  - Cooperative Approved Tire List (CATL)
  - Product Description (ZZ-T-391, ZZ-T-410, ZZ-T-1619)
- Qualification Process Dependent upon NSN Classification
- Vehicle qualification testing inherently qualifies OEM tire for that vehicle system
- Replacement tires qualified via testing requirements per classification





# SAE J2014



## **SAE J2014 Pneumatic Tire/Wheel/Runflat Assembly Qualifications for Military Tactical Wheeled Vehicles**

- Applies to all combinations of pneumatic tires, wheels, or runflat devices for military tactical wheeled vehicles**
- Society of Automotive Engineers' specification**
- Developed by SAE Truck and Bus Military Industry Tire Task Force (collaboration with Government (GVSC) and Industry)**
- Describes test and test methodology which contains the information needed to evaluate and measure tire/wheel/runflat systems and changes in vehicle performance**
- Tests required based on vehicle system and mission profile**
  - Used as basis for procurement of a tire, wheel and/or runflat device for military wheeled vehicles**
- TACOM Administrator's Manual (AM) for use with SAE J2014, Pneumatic Tire/Wheel/Runflat Assembly Qualifications for Military Tactical Wheeled Vehicles is a separate document which specifies the pass/fail criteria and managed by GVSC Tire Engineering**



# SAE J2014 TESTS



- ***Tire Traction 4.4.2***
- ***Vehicle Evasive Maneuver 4.4.3***
- ***Bead Unseating 4.4.4***
- ***Rolling Resistance 4.4.5***
- ***Dimensional Criteria 4.4.6***
- ***Mechanical Reliability (Off-road Durability) 4.4.7***
- ***Tire Treadlife Durability 4.4.8***
- ***Comparative Stopping Distance 4.4.9***
- ***Tire Single Wheel Skid Resistance 4.4.10***
- ***Rim Slip 4.4.11 ASTM F2803***
- ***Load Deflection 4.4.12 SAE J2704***
- ***Mission Profile Runflat 4.4.13***
- ***Paved Runflat 4.4.14***
- ***Curb Impact 4.4.15***
- ***Half Round 4.4.16***
- ***Absorbed Power Ride Quality 4.4.17***
- ***Mission Profile Speed Evaluation 4.4.18***
- ***High Speed Evaluation 4.4.19***
- ***Steady State Dynamic Stability 4.4.20***
- ***Tire Underbody Impingement 4.4.21***
- ***Convoy Escort 4.4.22***

The Majority of tests listed are on-vehicle performance tests. The main performance tests are Vehicle Evasive Maneuver, Comparative Stopping Distance, and Steady State Dynamic Stability. These typically include mixed fitment testing of the candidate and control tire to ensure compatibility. The two main durability tests are the Mechanical Reliability and Tire Treadlife Durability. The tests listed are a menu of tests, and the actual tests to be conducted will depend upon the vehicle system.



# COOPERATIVE APPROVED TIRE LIST (CATL)



- **Qualified Products List (QPL) for commercial tires used for all branches of the Military (Examples: Line Haul Trucks and trailers, Service Vehicles, Construction/Material Handling Equipment)**
- **GVSC Tire Engineering manages and maintains the CATL**
- **Review CATL test plans, monitor testing and analyze results of test data.**
- **Approve/disapprove results and communicate to DLA Land and Maritime findings.**
- **Update for publication CATL list to GTP website.**





# GVSC ENGINEERING SUPPORT TO PM OFFICES



- **Coordinate tire configuration management changes with respective Program Offices**
- **Manage additional tire source qualification testing on vehicle systems to promote competition**
- **Review vehicle purchase descriptions as related to tires/wheels**
- **New Tire/wheel Assembly Configurations on Vehicle Systems**
- **Investigate Field Issues**
- **SME for Common Performance Specification for Tires, Wheels, Runflats, and CTIS requirements.**





# NEW TECHNOLOGIES



**GVSC Tire Engineering RDTE work includes the following projects:**

- **Tire Efficiency – Collaborated with Department of Energy on improving fuel efficiency**
- **Long Term Storage for Tires – Improve storage life of tires through barrier coating**
- **Advanced Silica Filler Technology for Fuel Efficient Military Tire Development – Improve Fuel Efficiency for Military Tires**
- **Non-Pneumatic Tire for On-Highway and Off-Road Mobility-SBIR**
- **Airless Tire Technology– Development of Airless Tire for Light Vehicles**





## TECHNICAL SUPPORT TO TACOM TIRE/WHEEL ASSEMBLY ITEM MANAGERS



- Tires/wheels provided to soldier as an assembly
- GVSC Tire Engineering develops tire/wheel assembly technical data packages (TDPs) for procurement actions at TACOM
- Engineering Review of Tech Data
- Conversion from split ring wheels to single piece wheels
- Resolve issues with Contracting
- Technical support to Maintenance sites for tire/wheel assemblies
- Review PS Magazine articles
- Support Maintenance messages
- Investigate field issues





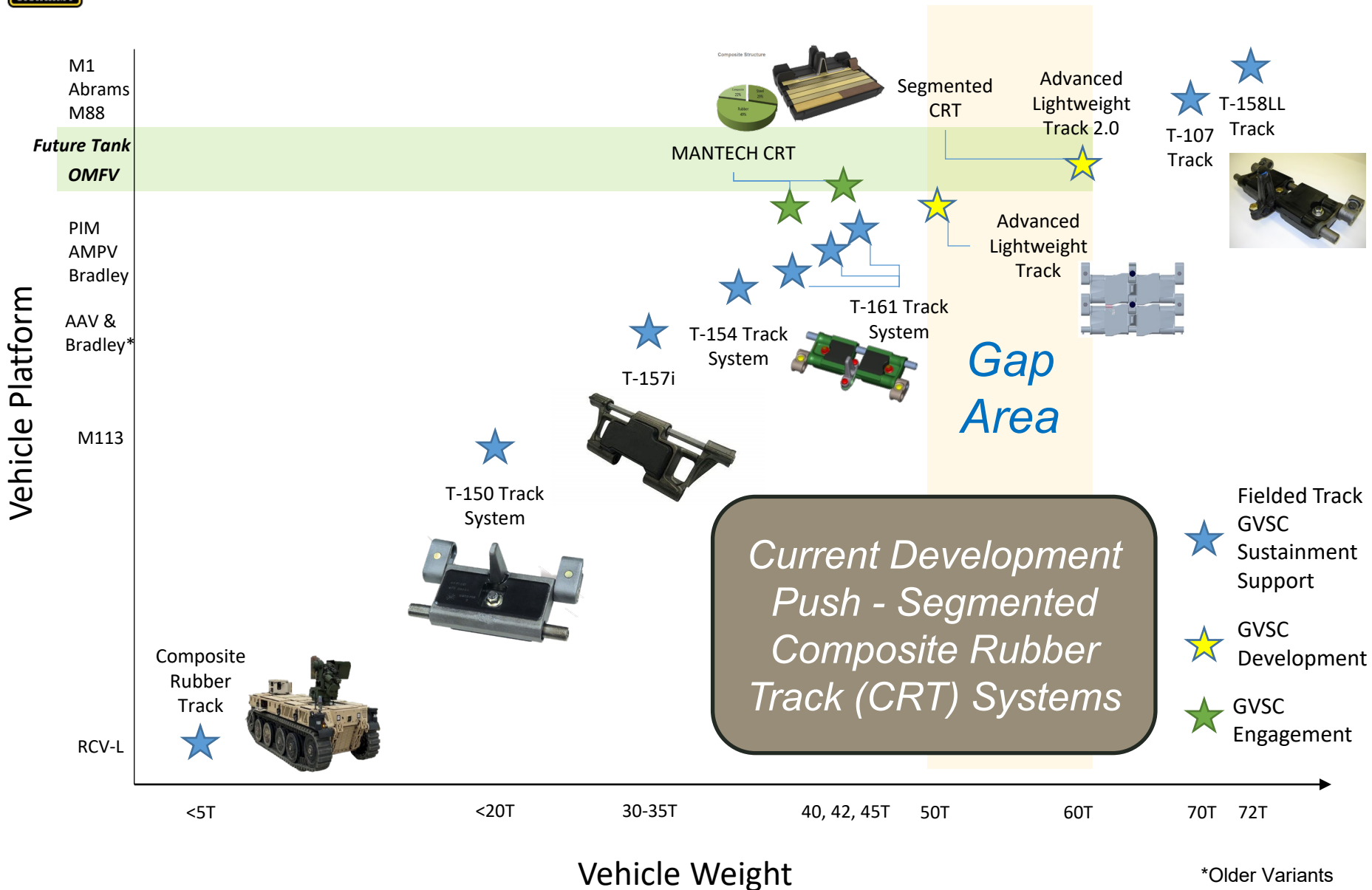
## TIRES SUMMARY:



- **GVSC Tire Engineering provides engineering support to DLA (tires, wheels, runflats, tubes, valves, beadlocks, flaps, chains), Vehicle Program Offices, and TACOM ILSC Tire/Wheel Assembly Item Managers. GVSC Tire Engineering also supports efforts to investigate new technologies (RDTE projects) related to tires and tire products.**



# TRACK SYSTEMS ROADMAP OVERVIEW

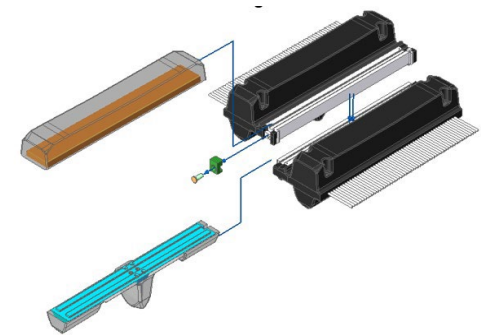




# CURRENT GVSC EFFORTS



- **Advanced Lightweight Track (ALwT) 2.0**
  - Partnered w/Hutchinson Inc, and DST
  - 60T class cast steel track
  - ~23” wide
  - Weight objective: 88 lbs/ft.
  - Flush back design with clip in ground pads
  - Targeting the Platform Electrification and Mobility Platform (PEM) for the capability demonstration
  - TRL 6/7 – FY24/25
  
- **Segmented Composite Rubber Track (S-CRT)**
  - Partnered with Soucy International
  - 60T class segmented “band track”
  - 24” wide
  - Weight objective: 67 lbs/ft.
  - One segment being designed into the track
    - Alleviates installation, repair and maintenance challenges surrounding current Continuous Rubber Track (CRT) technology
  - Targeting the PEM and future main battle tanks
  - TRL 6/7 – FY24/25





# FUTURE TRACK TECHNOLOGIES



- **Track technology will need to evolve for the future.**
- **Future track systems will need to possess unique attributes to work with advanced vehicle platforms:**
  - Reduce track system weight using novel construction methods or materials
    - *Composite Rubber Track (CRT) systems historically challenged above 50T platform weights*
  - Reduce maintenance man hours for service
  - Reduce vibration
  - Lower Infra-Red (IR) and noise signature
- **Track systems in the heavy combat class (70T +) class will need to explore options for reduced maintenance, reduced vibration and signature, all while finding methods and materials to decrease weight.**