

Nevada Automotive Test Center

Vehicle Technology Rodeo – Feb. 6, 2019



## Future Technologies: Ultralight through Heavy Transport Systems

### Background:

For more than 35 years, up until 2013, NATC conducted a Rodeo at our proving grounds in Nevada. The event started with 20 engineers and operators getting together after the ADPA conference to discuss common interests about ground vehicles, particularly in the areas of mobility and performance as defined by current and future operational needs. The Tactical Wheeled Vehicles (TWV) conference was one of the few events on the West Coast and it helped to ensure involvement of the commercial truck manufacturers, including Freightliner and PACCAR, which were under development in the West. The TWV conference allowed an interaction between commercial, traditional military truck manufacturers, associated tier one suppliers, and Government personnel, often creating new, lower cost and more rapidly implementable solutions.

As technology moved forward, the Rodeo events began to include more vehicles and a broader range of events supported by several hundred hardware provider personnel over two days. Demonstrations ranged from ultralight concepts developed through the Fort Lewis skunk works to HET transporters, live fire to loss of control events resulting in vehicle rollovers.

### Rodeo event:

NATC is fortunate to be able to host our recurring Vehicle Technology Rodeo (Rodeo), which will occur after the NDIA Tactical Wheeled Vehicle (TWV) Conference, on Feb. 6, 2019. The Rodeo is an operational vehicle demonstration that allows participants to observe a variety of wheeled vehicle systems in a mission profile environment. The demonstrations identify current strengths and potential challenges facing the tactical and combat wheeled vehicle community.

Up to 12 demonstrations will be presented from approximately 0800 through 1700. Based on guidance from Marine Corps and Army organizations, NATC invites participation from organizations with key vehicle systems and technologies that are relevant to solving both near term and future challenges. This year, the vehicle systems will range from ultralights to heavy transports and are scheduled to have technologies including UAV interoperability, integrated threat targeting, live fire, and semi-autonomous/ autonomous system operation suitable to Eastern European and Southeast Asia 2025 mission profile events.

Generally all of the demonstrations are finalized by late October/early November taking into consideration interests that may develop as a result of the Modern Day Marine and AUSA

events. Many of the event topics have already been identified as technology, along with operational challenges, continues to advance rapidly.

NATC hosts the Rodeo at no cost to either the participants or the organizations that provide the vehicles and technologies for the evaluations. To cultivate the best environment for open discussion and maximize information exchange, only Government personnel are invited. Further, NATC requests that all attendees wear civilian attire to recognize that all questions, whether from operators or senior personnel, are worthy of clear and concise responses.

The participants are separated into groups of approximately 12 to 15 and are transported sequentially to every demonstration. Vans depart for the demonstrations at approximately 0800, return for lunch and then continue through the afternoon until 1700. Approximately 35 minutes is allotted for each station event. During that time a short discussion of the technologies represented by the vehicle system(s) is provided and the attendees ride over specific mission profile events. Each of the demonstrators is asked to provide technical information in advance to NATC; typical "show" materials are discouraged. This information is combined with DVD documentation of the demonstration and then the complete technical package is provided to each of the attendees.

As noted below, the various technologies and vehicle systems have been operated, tested or otherwise vetted to help ensure not only the success of the Rodeo but also to provide validation of the claims or positions taken by the demonstrating organization. Over the years, it has been found that the most successful communication of the technologies includes an appropriate reference system and, therefore, demonstrations that have direct A to B comparison events are encouraged. For example, if a suspension or powertrain upgrade is made to a HMMWV, the demonstration will include a baseline vehicle so that participants can quickly identify the differences as they may apply to their operational requirements.

Up-armored production commercial vehicles:

Traditionally, the addition of significant survivability and protection systems within an accurately "skinned" commercial pickup or SUV has resulted in substantial degradation in on- and off-road performance and associated reliability. Recent technology applications have substantially improved these vehicles as operational systems while helping to ensure that the suspension and powertrain performance is sufficient for successful mission completion. This challenge has been compounded by all of the electronic controls, from engine and transmission to interior controls. Technology has been developed which allows replacement of these proprietary systems while retaining required system performance, durability and repairability through advanced chassis systems.

Vehicle system electrification:

Significant technology improvements have been forthcoming in the area of vehicle system electrification. From on-board power to drive train optimization, the implementation of electric drive technology has indicated significant improvements to fuel economy and performance. These systems must be tuned for the superior mobility and terrain condition severity found typical of Marine Corps and Army mission profiles. Demonstrations of these

technologies and their potential to substantially reduce fuel resupply requirements while ensuring mission performance and reliability will be included.

Integrated battlespace mobility and weapons effectiveness:

The ability to integrate predictive Blue Force vehicle mobility capability with rapid target identification based on multiple situational awareness inputs will be demonstrated. The demonstration will involve multiple vehicles with inter-vehicle shared SA and UAV equipped. The vehicles will have with sufficient on-board capability to sense, locate, target, and "slew to cue" along with the ability to identify optimum travel path to reach a firing point. Depending upon hardware availability, threat force vehicles or equivalent surrogate vehicles will be included in the event.

Ultralight vehicles:

Expectations for this vehicle class continue to increase with evolving potential missions ranging from drone defeat, to personnel transport, to tracked configurations for "over the snow," to full autonomous weapons capable of operating as a "swarm" under consideration. Valuable lessons have been learned relative to the capabilities and risks associated with these platforms, not only with respect to ultralight vehicles but also to convoy operations within the future fleet. This demonstration will include a number of platforms in various configurations to highlight strengths and weaknesses as well as the potential for implementation of advanced technology (full - semi autonomy / electric - hybrid electric).

8x8 wheeled combat vehicle:

Recent advances in 8x8 wheeled combat vehicle technologies will be demonstrated in representative mission profile conditions. This is planned to include inherent vehicle capabilities such as maneuverability, mobility and speed over terrain as well as the integration of current and emerging lethality, SA, C4I, and vehicle network technologies.

Mobility:

For all wheeled vehicles, tire, run-flat and wheel technology is critical. It is through the tire/ground contact patch that all motion is controlled and vehicle mobility enabled. For some years, in the case of military weight class off-road vehicles, there has been limited investment toward advancing these essential systems other than in the area of weight reduction. Recently these critical technical areas have been revitalized and looked at more holistically beyond the individual physical components. Demonstrations and technical discussions will be provided by an organization recognized as a leader in worldwide mobility and tire-system technology.

Live fire event:

Considering the ongoing threats, a lightweight, traditionally tactical wheeled system equipped with 30mm or larger capability is being explored. Numerous challenges exist to such implementation. Currently several different weapons systems are under consideration and will be demonstrated based on system availability.

Light/medium tactical vehicles:

Demonstrations of cost-effective upgrades to M1151 to M1165 and their impact on overall system reliability and mobility, JLTV, FMTV and MTRV are planned. The detail of these demonstrations will be determined after the conclusion of AUSA. Performance demonstrations of Eastern European and Southeast Asia conditions will include the strengths and weaknesses of current and potential future systems.

Heavy transport:

With the increase in weight of most tactical and combat systems, the ability to transport these systems has been shown to be limited. The increase in weight has resulted in rapid trailer failures, repetitive tire failures in less than 20 miles, and the substantial loss in overall system mobility. Recently, advances have been made in both military and commercial systems to support successful marginal terrain transport of payloads of 50 tons and above. Demonstrations of these systems compared with existing fielded systems are planned.

The final demonstrations will be developed by the end of October but the descriptions provided above identify the topics of the demonstrations that will be included in the 2019 Rodeo. A Government only invitation will be provided separately.

Contact:

2019 NATC Vehicle Technology Rodeo will be held at our Nevada proving ground on Feb. 6, 2019, after the NDIA Tactical Wheeled Vehicle Conference.

Should you have any questions or need any additional information regarding the Rodeo, please do not hesitate to contact Jill Murwin: [jmurwin@natc-ht.com](mailto:jmurwin@natc-ht.com) / (775) 629-2000.