Department of the Navy SBIR/STTR Transition Program

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NAVAIR SPR Number: 2023-8

Topic # N201-023
Alternate Sled Track Braking Mechanism
American Maglev Technology of Florida, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: Naval Air Warfare Center Aircraft Division (NAWCAD) China Lake

Transition Target: Tomahawk Weapons System Program Office (PMA-280)

TPOC: (760) 939-4367

Other Transition Opportunities: NAWCAD Lakehurst; 846th Test Squadron of the 704th Test Group of the Arnold Engineering Development Complex at Arnold Air Force Base (Holloman High Speed Test Facility); Eglin Air Force Base Test Facility; Hurricane Mesa Test Facility; Sandia National Laboratory

U.S. Navy photo,
https://www.navair.navy.mil/node/20261.

Notes: More than 1 million pounds of thrust is produced in about 0.9 seconds to push a test item down the Supersonic Naval Ordnance Research Track (SNORT) at Naval Air Warfare Center Weapons Division China Lake at Mach 1.0. Test articles are stopped by a water brake, which is fraught with costly maintenance issues. To keep pace with the Navy's rapidly advancing testing requirements, a passive brake with no consumables and minimal maintenance is sought as a replacement.

WHAT

Operational Need and Improvement: The Navy seeks the development of a replacement sled braking mechanism that requires less setup time and does not have the associated regulatory compliance and recurring cost issues as the existing water braking system at SNORT. As ground testing requirements become more sophisticated and approach hypersonic speeds, replacement of the already obsolete water braking system is a high priority for the Navy.

Specifications Required: The braking system should be passive with no outside inputs, such as electricity, water, fuel, or coolant. A maximum of 21,600 feet of braking length is permitted, with equal or lower weight and drag penalties compared to existing probe designs. The brake should fit into or around the existing track foundation and operate in a desert climate without severe performance penalties. Adjustments to the braking profile should be possible without precision equipment and completed by two personnel in less than two hours per mile of braking length.

Technology Developed: American Maglev Technology of Florida (AMT) Inc. has developed a passive eddy current braking system that accomplishes the same results of the current water-braking system and fits in the existing allocated spaces, while offering higher reliability, shorter setup time, lower maintenance and lifecycle costs, and minimal calibration setup. The system requires the integration of permanent magnets on the test sled, which react with steel braking trusses at the end of the track to stop the sled with minimal braking distance. No consumables or outside inputs are required for operation.

Warfighter Value: The eddy current brake eliminates the need for many of the present auxiliary systems, including the diesel-powered pump. Regulatory burdens will be lightened, and the degree of safety will increase with a reduced likelihood of hazardous braking events. Annual operation, maintenance, and calibration costs for the brake will be eliminated.

WHEN

Contract Number: N68936-22-C-0012 **Ending on:** Dec 19, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Low-speed testing to verify centering within braking section	Medium	Ability to center the sled fin upon entry to braking section	5	2nd QTR FY23
Low-speed brake testing	Low	Ability to stop the sled within 40 ft. at 100 ft/s	6	3rd QTR FY23
Objective speed brake testing	Medium	Ability to stop the sled from 650 ft/s	7	1st QTR FY24
Full demonstration test at SNORT	Medium	Ability to accurately predict braking parameters & stopping distance	8	1st QTR FY25

HOW

Projected Business Model: AMT will sell this initial sled braking systems as well as further additions, modifications, and improvements by executive sales directly to US Armed Forces customers. As the need for higher-speed hypersonic missile testing increases, AMT anticipates that the company will be well positioned to provide track improvements and new product offerings that will meet or exceed expectations. Following a successful qualification program, it is further anticipated that each of the government's high-speed test tracks operated by the Navy/Air Force will require this passive system. As this approach becomes the standard across the Armed Forces, AMT expects to also offer next-generation “cold start” acceleration technology that will eventually replace outdated rocket motor technology.

Company Objectives: AMT's objective is to fully develop, demonstrate, and qualify a passive eddy braking system for delivery to the Navy for evaluation to determine its capability in meeting the defined performance goals. Through this process, AMT will demonstrate performance through subscale and full-scale prototype evaluation and testing over numerous deployment cycles to verify models, simulations, and initial test results.

Potential Commercial Applications: Aside from the multiple transition opportunities at the government's test facilities, this passive braking topology has the potential to replace friction braking systems for large-scale systems and devices in transportation, industrial, utility, space and aerospace.

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