Topic: N173-142

Sphere Brake Defense, LLC

Advanced Tactical Vehicle Braking

Numerous Marine Corps. heavy tactical vehicles are having technical issues related to mobility, fuel economy and safety; specifically, they're experiencing brake system problems due to corrosion and drum weight that's compounded by vehicle up-armoring in the field. Our bolt-on sphere brake, which requires no tools to change pads compresses hemispherical brake pads on a sphere brake surface, generating more power in a smaller package. Engineered to bolt on to existing drum and disc configurations, prototypes have been tested on a Class 8 Heavy Duty truck (Mack) and we're engaged with the Army (Stryker and FMTV vehicles). Sphere Brake Defense specializes in developing advanced wheel-end technologies and seeks to integrate this technology into government and prime tactical ground vehicles to increase safety while reducing lifecycle costs across programs of record.

Technology Category Alignment:

Ground and Sea Platforms
Materials & Manufacturing Processes
Energy & Power Technologies

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SYSCOM: MARCOR
Contract: M67854-19-C-6515

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=M67854-19-C-6515

Tech Talk: https://youtu.be/MbTr8Nl8LFs

Department of the Navy SBIR/STTR Transition Program

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MCSC-PRR-3594

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Advanced Tactical Sphere Brake
Sphere Brake Defense, LLC

WHO

SYSCOM: MARCOR

Sponsoring Program: Program Executive Officer Land Systems

Transition Target: Amphibious Combat Vehicle

TPOC:
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Other transition opportunities: System has applications for all heavy tactical vehicles (and trailers) to include Medium Tactical Vehicle Replacement (MTVR), Logistic Vehicle System Replacement (LVSR), Stryker (Army),and Family of Medium Tactical Vehicles (FMTV) among others.



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Notes: The Bolt-on Sphere Brake Kit for Pneumatic and Air-Over-Hydraulic (AoH) Tactical Vehicles (pictured) meets or exceeds current performance specifications relating to mobility, fuel economy, and safety, but with a smaller physical footprint (size/weight), and revolutionary advantages in maintenance and logistics support that will have a dramatic effect across the Marine Air-Ground Task Force (MAGTF) -- this braking kit has already been tested by one of the preeminent American truck manufacturing companies. The US Army has recently awarded SBD with a Sequential Phase II SBIR project to scale the Sphere Brake Kit for the Stryker and FMTV platforms.

WHAT

Operational Need and Improvement: Several Marine Corp vehicles are experiencing brake system problems across the fleet; specifically, there is significant corrosion of the drum and brake actuation mechanism from water and debris accumulating in the inner brake drum surface. This problem impacts safety, performance, operational availability, maintenance time, logistics delay time and money. Furthermore, drum brakes are heavy. They are made of mild to medium strength grey iron and the entire assembly (drum, pads, hardware, chambers) can weigh on order of 400 pounds each. Under brake application, the brake pads expand out from the axle towards the drum surface longitudinally, inducing mechanical fade under severe heat. Their actuators as well as the entire assembly make drum brakes susceptible in tactical vehicle applications.

Specifications Required: New brake technology on the current horizon appears promising where innovative designs will enable very high torque and are significantly lighter, smaller, and reliable while producing more brake force; these have significant performance advantages towards safety as well. New brake technology offers tactical advantages in that they can be inspected and maintained in the field, possibly without wheel removal and replacement. Specifications include: must be able to service and replace brake pads without removing wheels; must weigh 30% less than existing brake systems; must bolt-on to existing wheel-ends, axles, and wheel hubs; and must be cost competitive with existing brake systems in the market.

Technology Developed: The pneumatic and AOH sphere brake kit bolts on to existing wheel-ends without any modifications to the axle, wheel, or hub. The brake weighs >50 pounds less per wheel-end than existing brakes and it's the only brake in any market that doesn't require wheel removal to change brake pads.

Warfighter Value: The sphere brake kits provide unprecedented reliability, maintainability, and safety to the Warfighter that existing brakes cannot match. The collective return of investment yields thousands of dollars of savings per mile equating to millions of dollars in savings over the life of a vehicle program.

WHEN

Contract Number: M67854-19-C-6515 **Ending on:** July 11, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
FMVSS 121 Section 6 Certification	Low	PASS	6	4th QTR FY20
Sequential Phase II US Army	Med	Contract Award	7	4th QTR FY20
FMVSS 121 Stopping Distance Track Certification	Med	PASS	7	3rd QTR FY21
TOP 2-2-608 Mountain Brake Descent Certification	High	PASS	7	3rd QTR FY21
Program Transition	High	LRIP	7	1st QTR FY22

HOW

Projected Business Model: SBD is colocated in a 100,000 sq. ft. manufacturing facility operating a lean, agile supply chain to provide premium technology without the premium price. The technology will be developed, manufactured, and commercialized on ground tactical vehicles across agencies within the Department of Defense (DOD). Numerous Marine Corps and US Army programs have already expressed interest to transition the technology to several Programs of Record as a Prime. SBD has established relationships with several vehicle Prime Contractors who have also expressed interest in transitioning the technology to new vehicle platforms as a Tier 1 supplier. After successful certification and fielding within the DOD, SBD will transition the brake technology to same class commercial vehicles. SBD could license the technology to existing brake manufacturers.

Company Objectives: Over the next 5 years the company will usher in disruptive wheel-end and drive train technology for multiple industries on a global scale providing unprecedented safety, efficiency, and cost savings for all customers. The near term goal is to replace existing foundation braking across multiple ground tactical vehicles. The long term goal includes expanding wheel-end product offerings to provide holistic solutions to vehicle integrators within and external to the DOD through companion technologies and advanced material composites.

Potential Commercial Applications: Where there are brakes, there can be sphere brakes. Numerous vehicle platforms across different industries face similar challenges relating to reliability, fuel efficiency, and maintainability. The company will continue developing sphere brake kits for the commercial vehicle industry, racing, rail, and e-mobility industries. Numerous iterations of the sphere brake are already in development within each industry through existing original equipment (OE), government, and academic partnerships. SBD has partnered with Casey Rail to develop a new Sphere Brake Rail Kit for freight rail cars. A new Hydraulic Sphere Brake has been developed and is currently going through field testing on Cleveland CycleWerks' new Falcon Black electric motorcycle for 2021 commercial production. In both heavy and lighter applications, the sphere brake delivers the same value to commercial vehicle fleets that it delivers to programs within the DOD.

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