

Topic: N131-073

Transparent Armor Solutions

Lightweight Gemini™ Transparent Armor for Land Vehicle Applications

Transparent Armor Solutions (TAS) product, Gemini™ provides a lighter and more durable product than conventional transparent armor laminates. Our product provides enhanced performance against ATPD 2352P [4] threats while remaining affordable to many transparent ballistic window users. Transparent Armor Solutions focus is to design, develop and create advanced armor technologies for both the warfighter and commercial user's protection. The new Gemini™ armor system reduces weight and improves delamination resistance while improving the utility and application of the product. Existing transparent armor systems used are: Mine Resistant Ambush Protected (MRAP), M-ATV, HMMWV and the future JLTV. For JLTV, Gemini™ can be customized to be used in the A kit along, and/or with B kit add-on for potential reduction in cost and weight. As a result of these savings TAS has already received inquiries from OEMs to integrate Gemini™ into their current and future platforms.

Technology Category Alignment:

Modularity

Survivability

Structures and Protection

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SYSCOM: ONR

Contract: N00014-15-C-0053

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00014-15-C-0053

Department of the Navy SBIR/STTR Transition Program

STATEMENT A. Approved for public release; distribution is unlimited.

ONR Approval # 43-2203-16

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WHO

SYSCOM: ONR

Sponsoring Program: Code 30

Transition Target: JLTV, MRAP, JLTV GPK (Picatinny), MATV

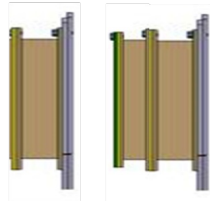
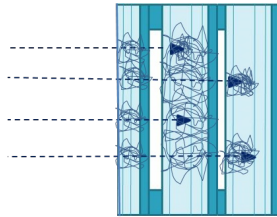
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Other transition opportunities:

Marine Army Ground Tactical Vehicles, MTVR, LVSR, HET Urban Survivability Program (HUSK)



A kit: A+B system

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WHAT

Operational Need and Improvement: As tactical vehicle's need within combat are increasing, so are the armor requirements. Tactical vehicles need lightweight armor in order to keep their mobility. This SBIR's Gemini™ armor significantly reduces vehicle weight while adding a modular feature to the armor system.

Specifications Required: In order to be applied to a future land vehicle application (such as JLTV), the technology needs to be under 44 psf and reduce cost by 10-20%. In order to be on the JLTV GPK system, the technology needs to be lighter than 40 psf (T) or 36 psf (O) at a similar cost to the current solution.

Technology Developed: This SBIR is developing a solution that will be less than 36 psf using:

- Fused Quartz Glass & Borosilicate Glass
- Advanced Interlayers
- Advanced Polymers
- Multiple Laminates (Air Gaps)

Warfighter Value: This program will develop two major products.

Product 1: Accurate Ballistic Model

The program has completed an accurate ballistic model that has been used to optimize transparent armor technologies. This will be useful to future armor development programs.

Product 2: Lightweight Modular Transparent Armor that is:

- Lighter than currently fielded systems
- Lower cost than armor systems of similar weight
- Longer service life than currently fielded systems
- Able to easily modify/upgrade to other threat requirements

WHEN

Contract Number: N00014-15-C-0053 **Ending on:** July 31, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Class 3a (ALLTEMP) solution under 36 psf	Low	Currently at 36 psf in development	4	February 2017
Class 2a (ALLTEMP) solution under 28 psf	Low	Weight requirement	4	February 2017
Modular Prototype Solution developed	Low	Hardware fabricated	6	November 2017
ATPD 2352 Qualification Testing Completed	Low	Qualification completed	7	August 2018

HOW

Projected Business Model: Upon successful completion of this program, TAS would look to complete manufacturing of the final system. Manufacturing would occur at the manufacturing facility in Santa Ana, CA. Transparent Armor Solutions (TAS) has manufacturing capability that focuses on US military requirements for transparent armor. This includes a near complete vertical integration for armor fabrication. TAS has large scale production capability with CNCs, waterjet, automated layup system/lamination line, clean room and state of the art autoclave. Production capacity is currently rated at 50-100 vehicle sets a day. Expansion could easily occur to meet a higher demand.

Company Objectives: Transparent Armor Solutions already communicates with the major defense OEMs. This includes BAE, General Dynamics, Oshkosh Defense, Navistar, AM General and Textron. In addition, TAS has already submitted pricing for JLTV vehicles to Oshkosh Defense. While discussing this program with the vehicle OEMs, they have asked for updates in status as the program progresses, and will aid in an advisory role in discussions of weight and performance tradeoffs. Thus, initial marketing of this program has been initiated with interest and anticipation from the major OEMs.

Potential Commercial Applications: By development of an lightweight affordable solution, sales will be based on platforms that can adopt the system. The two main candidates for this system are also the largest volume systems in the military. The military currently has over 50,000 up-armored HMMWVs. If this was applied to only 20% of the armored HMMWVs in service, this would be at least a \$300M sales opportunity. JLTV is the prime candidate system for this technology. The weight requirements of JLTV demand advanced solutions and the weight/cost/modularity benefits of this system makes it quite attractive. With an estimated 50,000 vehicles, JLTV would be an estimated \$500-700M transparent armor opportunity.

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