SOCOM244-007: Thermal Barrier Minimal Deflection Handguard

ADDITIONAL INFORMATION
N/A

TECHNOLOGY AREAS:
Weapons

MODERNIZATION PRIORITIES:
Advanced Materials | FutureG | Human-Machine Interfaces

KEYWORDS:
Sig Rattler; Handguard; Thermal Modeling; Composites; Rail

OBJECTIVE:
The objective of this topic is twofold. First, research thermodynamics involved in an over the suppressor handguard design. Secondly, designing a handguard with a toolless means of mounting. The Sig Sauer Rattler .300BO weapon system and the Sig Sauer SLH Suppressor is the host weapon associated with this SBIR.
IMPORTANT: For SOCOM instructions: please visit: https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/. Go to the bottom of the page and click “DoD SBIR 24.4 Annual”. Once there, go to the SOCOM SBIR24.4

DESCRIPTION:
Research should be focused on thermal conductivity of the handguard to allow rapid fire while maintaining a surface temperature below the level of discomfort given continual interface with an ungloved hand. Heat dissipation shall address standoff, thickness, insulation, materials of the handguard. Composite materials for inlays or surface panels shall be considered. Overall weight and ergonomics of the handguard is a key consideration. Insulating the heat of the suppressor is a key concern. When selecting materials related to rapid firing, it’s crucial to choose those that can withstand high temperatures without decomposing and releasing toxic chemicals. The second aspect of this research is a tool less mounting system for the handguard that will allow removal for maintenance of the piston system. No modifications shall be made to the rifle. While operating, the rail shall remain rigid and returns to within (≤) .5 milliradian’s of mounting center while force is applied and removed by the shooter. Handguard should be between 9 and 11inches in length. Proposers shall provide options for individual components and options for a fully integrated Thermal Barrier Minimal Deflection Handguard.

PHASE I:
Conduct a feasibility study to assess what is in the art of the possible that satisfies the requirements specified in the above paragraphs entitled “Objective” and “Description.”
The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study (“Technology Readiness Level 3”) to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all options that meet or exceed the minimum performance parameters specified below:

- Handguard surface temperature should not exceed 120 deg F when the weapon system is fired with 1 round a sec for 90 rounds with 30secs between magazine changes.
- The handguard should not require tools to install or remove.
- The handguard should remain within .5 miliradian of center once a force of 30lb is applied vertically and horizontally to the end of the handguard.

Currently Arisaka Zero Retention Clamps and a specialty bushing screw is used to stabilize the Sig Handguard. This requires two different torque sizes to remove/install. This is considered armorer level maintenance due to the necessary torque and tightening pattern to ensure the rail will return close to zero. This prevents the end user from removing the piston system to maintain their own rifle and in turn increase the change of malfunctions increasing risk. Rail mounted lasers do not retain zero decreasing accuracy and limiting capability also increasing risk. Firing at a medium rate of fire causes the handguard to get excessively hot preventing holding the rifle without gloves limiting dexterity also increasing risk. Payoffs of this technology is increased rail stiffness across all

the Sig MCX weapon systems to include the SOCOM RAZOR and the Army M7. This technology will also advance heat mitigation technology on handguards that will be necessary for higher velocity projectiles in the future as well. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II:

Develop, install, and demonstrate a prototype system determined to be the most feasible solution during the Phase I feasibility study on a Thermal Barrier Minimal Deflection Handguard.

PHASE III DUAL USE APPLICATIONS:

This system could be used in a broad range of military applications to include the Army M7 rifle and any short barrel rifle configuration. Any small arms weapons where user interface of a handguard and mitigating heat is a concern.

REFERENCES:

1. TOP 3.2.045A Test Operations Procedure for Small Arms https://apps.dtic.mil/sti/citations/ADA481861

TOPIC POINT OF CONTACT (TPOC):

None