

# Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2021-0375

Topic # N151-060

Power Technologies for Navy Conventional Ammunition Fuzes

Omnitek Partners, LLC

## WHO

**SYSCOM:** NAVSEA

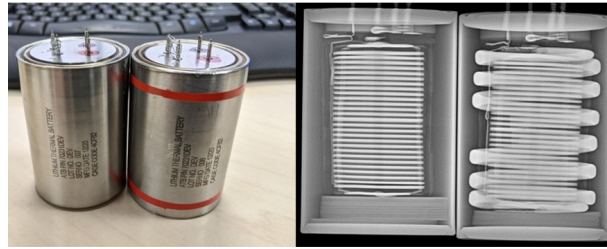
**Sponsoring Program:** PEO IWS 3C  
(Naval Gunnery Systems)

**Transition Target:** Conventional  
Ammunition - Fuzing

**TPOC:**  
(973)724-9475

**Other transition opportunities:**

**Notes:** Thermal battery prototypes and their x-ray image without (left) and with (right) fully integrated heating fuse strips measuring 200-300 percent increase in run-time. The batteries are fabricated using standard fabrication techniques by Advanced Thermal Batteries, Inc., the project subcontractor, making it ready for mass production preparation phase. Thermal reserve batteries are the primary source of power in gun-fired munitions, bombs, rockets and missiles with increasing demand on their run-time with increased onboard electronics and range.



## WHAT

**Operational Need and Improvement:** Thermal reserve batteries are the primary source of power in gun-fired munitions, bombs, rockets, missiles. For relatively small battery sizes used in these applications, current thermal batteries can stay activated for around 40-100 seconds, the run-time requirement for longer range munitions are several minutes, at times in excess of 10 minutes. The Omnitek Partners developed technology increases thermal battery run-time performance more than 200-300 percent depending on the size of the battery – higher percentage increase for smaller batteries - as required for most new and legacy replacement military applications. In all munitions applications, thermal reserve batteries with longer run-time translates to a smaller battery size, thereby more valuable space for system electronics and sensory systems for higher operational precision and higher lethality.

**Specifications Required:** Improve thermal battery runs time 200-300% over current capabilities. Also reduce battery rise time to 5-7 msec."

**Technology Developed:** Omnitek, in collaboration with its subcontractor (Advanced Thermal Batteries, Inc.) has developed a novel thermal reserve battery technology. The battery core is packaged inside a layer of slow burning/heat generating fuse strip to maintain the battery core temperature above the melting point of its electrolyte following activation, significantly increasing the battery run-time, particularly for smaller batteries used in gun-fire munitions, rockets and missiles by 200-300 percent and more. The novel method of fabricating heating fuse strips is ready for mass production. Battery fabrication methods currently used require the simple step of adding the coiled heating fuse strip between insulation layers. The heating fuse strip is ignited with battery activation initiation train. A hybrid version of reserve battery for gun-fired munitions uses a piezoelectric to generate power during the battery rise-time.

**Warfighter Value:** Thermal reserve batteries are the primary source of power in gun-fired munitions, bombs, rockets, missiles, generally designed to satisfy application run-time by increasing their size (heat mass). The Omnitek Partner technology allows the design and fabrication of smaller batteries for a given run-time requirement. As a result, the battery would occupy a smaller valuable munition space. In all munitions applications, thermal reserve batteries with longer run-times would translate to a smaller battery size, thereby more valuable space for system electronics and sensory systems for higher operational precision and higher lethality.

## WHEN

**Contract Number:** N68335-19-C-0158 **Ending on:** January 5, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial prototype fabricated and successfully tested	N/A	Increased battery run-time over 200 percent	5	September 2020
Fully integrated prototype designed, fabricated and tested	N/A	Increased battery run-time over 200 percent	6	February 2021
Fully integrated prototype designed, fabricated and initiated by realistic gun-firing shock-loading	Low	Increased run-time over 150 percent under load	7	August 2021
Fabrication of the replacement thermal battery for Navy application and activation by realistic setback shock loading	Low	Increased run-time 200-300 percent under load	7	January 2022

## HOW

**Projected Business Model:** Currently, heating fuse tubes designed by Omnitek are filled with slow burning pyrotechnic material by Hanley Industries, Inc. in Alton, Illinois (project subcontractor). Coiled and consolidated heating fuse strips with ignition fuse end are then fabricated at Omnitek for each battery diameter and length and shipped to Advanced Thermal Batteries, Inc. (ATB) in Westminster, Maryland (project subcontractor) for battery fabrication. The process of filling the heating fuse tubes and their consolidation and coiling to the battery size requirement are currently performed manually and requires to be automated to achieve lower cost and to satisfy the expected high product demand. Omnitek's current business plan is to have two sized tube filled with slow burning pyrotechnic material to be fabricated by its pyrotechnic vendor(s) - including Hanley Industries, Inc. - and form consolidated heating fuse coils for each battery size order and supply them to battery manufacturers (like ATB) for battery production.

**Company Objectives:** Omnitek's current business plan is to acquire tubes filled with slow burning pyrotechnic material as designed by Omnitek from its pyrotechnic vendors and form consolidated heating fuse coils for each battery size order and supply them to battery manufacturers for battery production. Omnitek has successfully developed many different technologies for the military and for the commercial market that since 2000 has resulted in over 230 U. S. Patents. Omnitek has developed several critical components for gun-fired munitions, rockets, missiles and bombs from concept to full production and is currently the main developer and manufacturer of initiation devices with full safety features for reserve batteries and initiation trains for the military.

**Potential Commercial Applications:** Thermal reserve batteries, particularly those with significantly increased run-time, have potential applications for emergency use, particularly for operating emergency equipment in remote areas and when facing power outages. For example, thermal batteries can provide high current for quickly opening and closing valves along gas and oil pipelines in remote areas when under duress or in emergency conditions. Thermal batteries, with their 20-30 year shelf life are ideal for such emergency operations of safety equipment without line power.

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