

# Department of the Navy SBIR/STTR Transition Program

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Topic # N151-008

Innovative, Low Cost, Highly Durable Fuel Bladder for Naval Applications

Texas High Energy Materials, LLC

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-276

**Transition Target:** H1 Helicopter

**TPOC:**

(732) 616-0684

**Other transition opportunities:**

Examples of military platforms that would benefit from an improved and/or secondary source of fuel bladders include F/A-18 (PMA-265); Multi-Mission Helicopters (PMA-299); CH-47 Chinook Helicopter; and V-22 Osprey (PMA-275).

**Notes:** State of the art in fuel bladder manufacturing is a handmade artisan dependent process that can take up to 60 days to complete. This process is subject to human error, often requiring significant rework of the finished product, which results in expensive end products and long build times. This rework can include, but is not limited to, repairs such as patches, buffing, and fitting replacement.

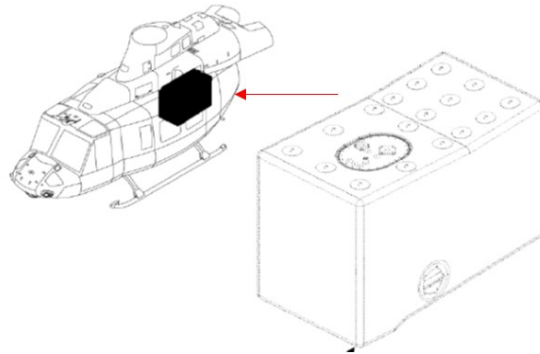


Image courtesy of Bell Helicopter

## WHAT

**Operational Need and Improvement:** Quality fuel bladders are imperative for the safety of our warfighters. Any fuel leaks during operational flight lead to a risk of fire, which could result in the loss of aircraft and crew. On many platforms, the Navy's demand for fuel bladders is higher than the rate that the current fuel bladder manufacturer is able to supply. The US Navy seeks a self-sealing, crashworthy, low cost, lightweight, flexible fuel bladder for combat aircraft applications. To meet unmet Navy supply and demand, new bladders must be produced through a much faster and more repeatable manufacturing process.

**Specifications Required:** Proposed designs must be compatible with any fuel used by the Navy, including JP-5, commercial Jet A (with military additives) and a 50/50 blend of current jet fuel and bio-derived fuel. Proposed designs must also have self-sealing capability. A production representative fuel bladder must be constructed from the proposed materials. A more consistent material and process will yield higher quality fuel bladders, which will help reduce the downtime of aircraft, thus improving the capability of the warfighter. MIL specifications that must be met include MIL-DTL-5578, 6396, and 27422F.

**Technology Developed:** A modern combat aircraft fuel bladder that meets MIL-DTL-27422F performance requirements. This new "from the ground up" development does not use any legacy materials or manufacturing processes of the World War II era fuel bladders still in use today. Gone are the seams, artisan "by hand" production methods, inconsistent natural rubber, months long production times, and short supply of legacy bladders. The DoD now has access to consistent, 100% synthetic, high-performance, high-quality fuel bladders that can be produced in hours, not months, for uninterrupted supply.

**Warfighter Value:** The ballistic tolerance of our fuel bladder technology prevents rupture, leaking and catastrophic release of fuel when struck by 50-caliber and 20mm Vulcan projectiles. Our physical self-sealing mechanism is instant and complete, even after tumbled 50-caliber bullets core-out and remove bladder material. Legacy bladders continue to use inconsistent natural rubber for self-sealing, which is highly susceptible to premature activation that renders the mechanism useless.

## WHEN

**Contract Number:** N68335-17-C-0163 **Ending on:** September 13, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Fit Test H1 left aft fuel bladder	Low	NAVAIR approval of proper fit and installation	6	February 2022
Pass all requirements of MIL-DTL-27422F	Low	Self-sealing and Crashworthy performance tests	6	August 2022
Full Automation Manufacturing Process	Med	Completion of an automated production line	7	June 2023

## HOW

**Projected Business Model:** As a preferred U.S. Military partner, Texas High Energy Materials specializes in materials designed to endure the most extreme conditions while staying environmentally friendly. Our self-sealing fuel cells are versatile and easily adaptable to any geometry and platform. 80% of our build process is automatable and seamless minimizing variability and the need for rework. Our process is fast, efficient, and unparalleled; our fuel cell can be created in hours versus the months it takes for legacy cells. Texas High Energy Materials, LLC can partner with current DoD fuel bladder and fuel system suppliers to produce and integrate alternative bladders into aircraft systems. The company can also pursue organic growth of an affiliated company to produce and supply fuel bladders to primes and subcontracted component manufacturers.

**Company Objectives:** Texas High Energy Materials, LLC develops innovative materials in a practical, collaborative approach for government and private industry applications. We transition our technological breakthroughs into commercial, state-of-the-art products and champion their integration into government procurement and non-DoD industrial use. Texas High Energy Materials, LLC seeks meetings with those interested in our fuel bladder technology that enables mission-critical assets, damaged in battle to remain in service without compromising safety or performance of the aircraft.

**Potential Commercial Applications:** Fuel bladders are utilized on a majority of Navy, Marine, Army, and Air Force aviation platforms, as well as throughout the commercial industry. This topic has the potential for interoperability, since the same material lay-up and manufacturing process can be utilized for fuel bladders across many military and commercial platforms. Other applications include Formula One (F1) racing; NASCAR; H1 Unlimited Hydroplane boat racing, and NHRA drag racing.

**Contact:** Al Perez, CEO; President  
Alperez4@yahoo.com 512-670-6182