When submarines deploy the TB-16/TB-34 towed array sonar system using the Lightweight Tow Cable (LWTC), it has a propensity to buckle rendering the towed array out of commission. METSS is developing a new outer jacket for the LWTC by designing a high density polyethylene (HDPE) resin system that will improve the LWTC axial compression strength, improve cut resistance to longline fishing lines, and improve the cut resistance of the submarine’s torpedo guide wire. METSS is leveraging commercially available HDPE base resins and carbon black masterbatch materials to streamline technology transition process making them compatible with current manufacturing process.

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SYSCOM: NAVSEA
Contract: N00024-16-C-4538

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00024-16-C-4538
**WHO**

**SYSicom**: NAVSEA  
**Sponsoring Program**: PMS-401 Submarine Acoustic Systems Program Office  
**Transition Target**: Submarine fleet  
**TPOC**:  
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**WHAT**

**Operational Need and Improvement:**
Develop an outer jacket to improve the performance and eliminate potential deployment problems associated with submarine TB-16 and TB-34 Fat Line Towed Arrays. A specific enhancement to the exiting TB-16 includes compressional ruggedness without modifying the array’s coaxial core. A successful outcome will significantly maintain a submarine’s operational mission profile.

**Specifications Required:**
- Towed array tow cable shall be capable of withstanding 220 pounds of axially applied energy
- Tow cable may have a 30% weight increase
- Outer jacket should have axial stiffness making the cable more cut-resistant
- Survive 150 reeling cycles on the OK-276 handler with the dynamic seal in place

**Technology Developed:**
- Leveraging commercially available high-density polyethylene (HDPE) base resins and carbon black masterbatch materials to streamline transition process using novel and consistent chemistry.
- Largest risk factor is achieving the flexural modulus (>180 ksi) and compatibility with established manufacturing processes

**Warfighter Value:**
- Eliminate Out of Commissions (OOCs) – eliminate “Fail-to-Sail” scenarios that interfere with submarine operations
- Improve the TB-16/34 outer jacket’s axial compressive strength to eliminate cable buckling and subsequent deployment failure
- Improve the towed array’s cut resistance, i.e., cuts/slices caused by fish hooks, high-test line monofilament fishing longlines, and torpedo guide wires

**WHEN**

**Contract Number**: N00024-16-C-4538  
**Ending on**: September 7, 2018

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Risk Level</th>
<th>Measure of Success</th>
<th>Ending TRL</th>
<th>Date</th>
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<tbody>
<tr>
<td>Validate HDPE resin systems in a laboratory environment</td>
<td>Low</td>
<td>Ensure resin systems are adaptable with South Bay Cables’ extrusion processes</td>
<td>4</td>
<td>August 2017</td>
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<tr>
<td>Execute co-extrusion processes at South Bay Cable</td>
<td>Low</td>
<td>Meet established manufacturing requirements</td>
<td>4</td>
<td>September 2017</td>
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<tr>
<td>Conduct limited testing at L-3 Chesapeake</td>
<td>Low</td>
<td>Cable segments pass compression and push force evaluations</td>
<td>5</td>
<td>January 2018</td>
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<tr>
<td>Conduct reel-to-reel test at NUWC</td>
<td>Low</td>
<td>Meet static tension requirements</td>
<td>5</td>
<td>April 2018</td>
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<tr>
<td>Demonstrate performance at Lake Pend Oreille, Idaho</td>
<td>Low</td>
<td>Meet all Navy requirements</td>
<td>6</td>
<td>September 2018</td>
</tr>
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</table>

**HOW**

**Projected Business Model:**
METSS will utilize the partnership established between South Bay Cable and L-3 Chesapeake Sciences Corporation (CSC) to streamline the technology transition. South Bay Cable currently applies the HDPE jacket material onto the LWTC’s jacket.

**Company Objectives:**
METSS intends to become the materials supplier to South Bay Cable to co-extrude the new jacket material for the modified LWTC (achieve a direct materials replacement). The collaboration between METSS, L-3 CSC, and South Bay Cable under the proposed program offers the shortest path to technology transition, and significantly reduces the risks associated with transitioning the SBIR technology into the fleet.

**Potential Commercial Applications:**
Stronger and more robust cable jacket materials may improve commercial seismic receivers (geophones) used in the gas and oil business, as well as undersea and underground cables in a variety of geographic locations.

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**Notes:**
METSS is developing three candidate high density polyethylene (HDPE) resins as a new protective cover for the current TB-16 Lightweight Tow Cable (LWTC). Under strict performance measures, the primary intent is that the Fat Line Towed Array does not buckle during deployment from the submarine and resists cuts caused by monofilament long fishing lines and hooks.