# Department of the Navy SBIR/STTR Transition Program

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Topic # N112-102
Advanced Vacuum Bagging Technologies
METSS Corporation

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:**

**Transition Target:** Composite Part Production

**TPOC:**
(301)342-8402

**Other transition opportunities:** Composite part production utilizes vacuum bagging technology to compact pre-preg laminations to eliminate voids and achieve maximum density during curing. Conventionally, vacuum bagging is performed by skilled labor but requires time and effort to produce a high quality vacuum bag for each part manufactured. This spray applied vacuum bag technology can be used for the production of any type of composite part; however, it is particularly well suited for parts that are made in high volume, or have high relief or complex contours. What separates the METSS-designed advanced vacuum bag is that it's polyurethane-based, thermally stable, non-silicone and can be used multiple times.

METSS Advanced Vacuum Bag Photographs

## WHAT

**Operational Need and Improvement:** The Advanced Vacuum Bagging (AVB) Program improves and accelerates the vacuum bagging process by reducing material usage and labor and reduces losses due to defective parts. Conventional vacuum bagging requires one vacuum bag set-up per part. Following cure, the conventional vacuum bags are removed and discarded. The Advanced Vacuum Bag is produced directly on the part, in the mold, to produce an exact replica of the part that can be used repeatedly to produce multiple parts from the same vacuum bag.

**Specifications Required:** The Advanced Vacuum Bag is spray-applied rubber coating that is non-silicone. Application is simplified by using a conventional two part Meter-Mix spray equipment and disposable static mixers. The AVB cures rapidly and is tack-free within 30-60 minutes. The material tolerates multiple cure cycles to temperatures of 375 F.

**Technology Developed:** A two part polyurethane rubber was developed. The two reactive components mix during application. Spraying delivers an even coat of the reactive liquid that flows and levels prior to cure. The polyurethane permits multiple coats within a 30 minute time window. The polyurethane has been repeatedly cycled to 375 F with good retention of mechanical properties. Conventional Meter-Mix spray equipment has been used with some minor modifications for application. Disposable static mixers with spray tip are used to apply the resin to the part. A highly effective mold release system has been selected and used on carbon fiber molds.

**Warfighter Value:** Advanced Vacuum Bagging is expected to reduce cost for composite part manufacturing by increasing production and reduceing part imperfections. The Advanced Vacuum Bag recycles the vacuum bag and reduces waste from single use vacuum bags.

## WHEN

**Contract Number:** N68335-13-C-0040 **Ending on:** January 22, 2016

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|---|---|---|---|
| Developed Base Formulation | Med | Tolerate 375 deg F | 6 | January 2016 |
| Developed Spray Application | Med | Produce Successful coating | 6 | January 2016 |

## HOW

**Projected Business Model:** Produce and market a two-part polyurethane resin. Resins will be produced at METSS or at a toll manufacturer. METSS will make available the meter-mix-spray equipment and/or provide specifications.

Alternatively, the technology is for sale to a company that would provide the same service.

**Company Objectives:** Partner with a larger company to evaluate the vacuum bag's material-of-construction, gain insight into performance, and assess cost savings. A composite manufacturer with laboratory capabilities is preferred. The goal of this program is to create an Advanced Vacuum Bag that is multi-use, thermally stable, demonstrates superior performance, and reduces costs, especially during large-scale composite manufacturing.

**Potential Commercial Applications:** Companies that manufacture polymeric composites will benefit from Advanced Vacuum Bag technology. This technology adds value by increasing and streamlining output, reducing the cure time process, lowering the environmental impact, and outperforming current silicone-base vacuum bags. Multiple-use vacuum bags will improve production and help to generate high quality composite parts.

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