

Topic: N122-107

## Composite Technology Development, Inc.

### Benzoxazine Matrix Composite Bearing Materials for Arresting Gear Components

Composite Technology Development (CTD) has developed new composite bearing materials (slippers) for use in aircraft carrier arrestment systems. These materials allow for low friction sliding and relative movements of components in the system to absorb the energy of stopping fixed-wing aircraft on aircraft carrier flight decks. This technology addresses two leading causes of system downtime – slipper wear and slipper swelling;. Swelling and wear factors have been reduced by an order of magnitude relative to the current material. Prototyping of required slipper shapes has also been conducted. CTD is seeking support from the Navy in terms of providing a material and performance specification tied to our material development. We also are seeking support to transition from the lab to LRIP to full production over the next 2 to 5 years.

### Technology Category Alignment:

None

None

None

### Contact:

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**SYSCOM:** NAVAIR

**Contract:** N68335-15-C-0027

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-15-C-0027](https://navystp.com/vtm/open_file?type=brochure&id=N68335-15-C-0027)

# Department of the Navy SBIR/STTR Transition Program

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Benzoxazine Matrix Composite Bearing Materials for Arresting Gear Components  
Composite Technology Development, Inc.

## WHO

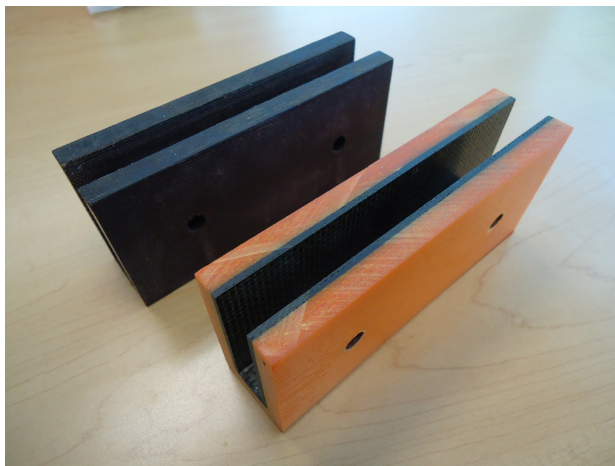
**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA 251

**Transition Target:** Aircraft Carrier Arrestment Gear

**TPOC:**  
(732) 323-4416

**Other transition opportunities:**



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## WHAT

### Operational Need and Improvement:

Arresting gear use composite bearings (or slippers) to provide low friction sliding support between system components to absorb the energy required to arrest aircraft  
Slipper wear is one of the leading causes of system down time and unscheduled maintenance due to hydraulic seal failure  
Slipper swelling is another cause leading to arresting gear mechanical jamming, and significant downtime

**Specifications Required:** Slippers must withstand static loads from 10 psi to 460 psi, and multiple arrestments at peak velocities up to 550 in/s.  
Slippers are subject to hydraulic fluid contamination, humid air, and various greases and must maintain dimensional stability up to 200 degrees F and low wear rates  
Improvement over the existing slipper material and a 20,000 cycle arrestment goal with no shelf life limitation is the goal

**Technology Developed:** Newly developed composite bearing materials comprised of carbon reinforcing fibers, nanoparticle fillers, and a benzoxazine resin are the solution.  
Swelling and wear factors are reduced by an order of magnitude relative to the current material.  
CTD has prototyped several required shapes and is developing a wear testing system that accurately represents the operating environment and validation.

### Warfighter Value:

Extending mean time between replacements to 20,000 arrestments and eliminating swelling will greatly reduce operational and maintenance costs. Avoiding unscheduled down time will improve sortie generation

## WHEN

**Contract Number:** N68335-15-C-0027 **Ending on:** October 31, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Final Resin Selection	Low	Low wear factor in composite, low swelling in hot ethylene glycol	4	December 2015
Test System Fabrication & Demonstration	Med		5	March 2016
Manufacturing of Slippers for Low/Med Risk Areas	Med	Generation of parts with required tolerances	6	March 2016
Delivery of 2 Shipsets	Low	Delivery to Navy sponsor	6	October 2016

## HOW

**Projected Business Model:** Commercialize this new material, and the slipper designs, to Navy specifications. CTD has a successful history of manufacturing composite components and licensing technology.

CTD will manufacture materials and the slipper components directly, and may license the design and material to a third party.

**Company Objectives:** Fully qualify the material and slipper designs and expand the materials system's usage to broader industrial applications

CTD validates the slipper manufacturing process at competitive costs

Materials, processes and manufacturing methods will support future product development

**Potential Commercial Applications:** Bearing materials are currently are used in multiple challenging wear environments

Materials can be manufactured for numerous applications, including bushings, bearings, wearstrips, vibrating conveyor supports, gears, slip rings, grommets, bobbins, thrust washers, and wear plates, supporting a variety of applications in military and industry applications

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