

Topic: N07-040

## Creare LLC

### Carbureted Fuel Injection System for Augmentor Stability

Creare's Carbureted Fuel Injection System (CFIS) is a fueling system that enhances the stability and robustness of augmentor combustion. The target application is the F135 engine that is currently used in the F-35. Augmentors must operate reliably over a large flight envelope, and issues such as augmentor screech can limit the flight envelope and thrust of the augmentor. CFIS fuel injectors more-optimally fuel the augmentor, leading to enhanced combustion stability and more robust overall combustion. This benefits all aspects of augmentor performance including stability, thrust, pattern factor, and emissions. The CFIS technology designed allows retrofit on existing engines and was recently demonstrated in a high-fidelity rig test at AFRL-WPAFB. Currently developing a CFIS hardware set and anticipate a demonstration during CY 2018. Creare is an engineering R&D services firm that has developed innovative thermal/fluid technology and helped solve our clients' most challenging problems since 1961. Creare seeks to obtain exposure for this technology within the F-35 program, and also establish relationships with additional programs involving gas turbine augmentors for future systems.

### Technology Category Alignment:

None

None

None

### Contact:

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**SYSCOM:** NAVAIR

**Contract:** N68335-13-C-0392

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-13-C-0392](https://navystp.com/vtm/open_file?type=brochure&id=N68335-13-C-0392)

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR JSF17-821

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## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** Joint Strike Fighter

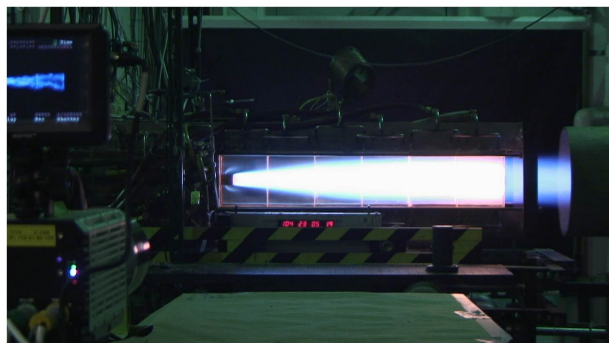
**Transition Target:** F-35 Lightning II

**TPOC:**

(301)995-3995

**Other transition opportunities:** F-22 Raptor  
6th Generation Jet Fighter  
Future Bomber Aircraft  
Cruise Missiles

**Notes:** The image to the right is CFIS Testing in an Augmentor Rig



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## WHAT

**Operational Need and Improvement:** Augmentors Operate Over a Broad Range of Conditions  
Fuel Delivery is Sensitive to Operating Condition  
Suboptimal Fueling leads to Weak or Unstable Combustion

**Specifications Required:** Develop Flameholder Concepts that Enhance Augmentor Stability  
Reduce Blowout for High-Altitude, Low Mach Number Conditions  
Minimize Impact on Augmentor Design

**Technology Developed:** CFIS is a Fueling System that Acts as an Additional Augmentor Fueling Stage  
CFIS Injectors Primarily Fuel the Wake of the Flameholder  
CFIS Injectors are used to More-Optimally Fuel the Augmentor Over the Flight Envelope

**Warfighter Value:** More Robust Combustion and Stability  
Expanded Flight Envelope: Greater Altitude and Speed  
Enhanced Thrust  
Enhanced Reliability and Durability

## WHEN

**Contract Number:** N68335-13-C-0392 **Ending on:** April 30, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Feasibility Demonstration	N/A	Academic Rig Initial Demonstration	TRL 4	July 2008
Detailed Sizing and Rig Demonstration	N/A	Academic Rig Detailed Testing	TRL 5	September 2010
High-Fidelity Rig Test	N/A	Demonstrable Combustion Stability Enhancement	TRL 6	April 2017
Engine Test	Med	Demonstrable Combustion Stability Enhancement	TRL 7	June 2018
Flight Test	Med	Demonstrable Combustion Stability Enhancement	TRL 8	January 2020

## HOW

**Projected Business Model:** The CFIS IP has been Patented  
CFIS IP has been Licensed to Engine OEM  
CFIS will be Manufactured by an Engine OEM Preferred Supplier  
CFIS will be Supplied as Part of a New Engine or as a Retrofit Kit

**Company Objectives:** Creare is an Engineering Research and Development Firm  
Creare's Objective is to Provide Engineering Value to our Clients  
Our Objective for CFIS is to Transition the Technology to DoD Customers  
Our Forum Objective is to Enhance the Visibility of the CFIS Technology

**Potential Commercial Applications:** Augmentors are a Military Technology  
Augmentors are Generally Not Used Commercially  
Commercial Applications Include Commercial Supersonic Aircraft  
Private Spaceflight

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