

Topic: N181-071

Precision Combustion, Inc.

Eliminating Adverse Impact of Copper Contamination in Jet Propellant 5 (JP-5) Fuel

There is a need for a device to identify and remove copper that is leaching into jet fuel stores. Currently, no solutions are available to mitigate the effect of copper-nickel contamination and replacement of fuel piping is prohibitively expensive. PCI is developing a replaceable filter module that integrates a sorbent that is chemically tuned to selectively attract and retain dissolved copper without affecting fuel additives or the fuel itself. It has a short contact time, low-pressure drop and a high mass transfer rate substrate that has demonstrated high copper removal rates. This offers a viable path to removing copper and improving the fuel thermal oxidation stability of jet fuel.

Technology Category Alignment:

Ground and Sea Platforms

Air Platforms

Energy & Power Technologies

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SYSCOM: NAVSEA

Contract: N68335-20-C-0182



Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-20-C-0182



Tech Talk: https://www.youtube.com/watch?v=Qp0TiKv90_E

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2020-0497

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High-Efficiency Filter System for Removal of Copper Contamination from Jet Fuels
Precision Combustion, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: SBIR

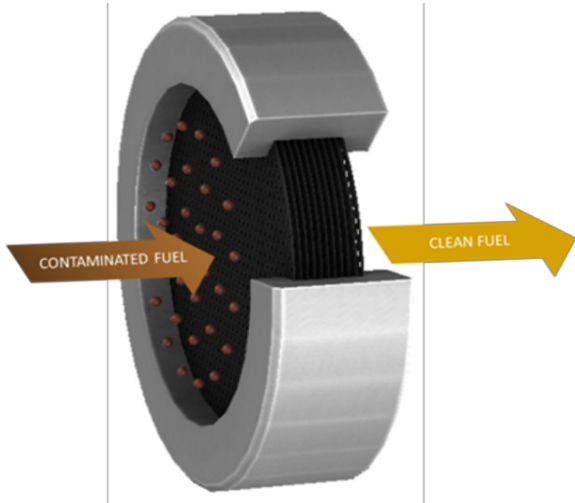
Transition Target: NAVSEA

TPOC:

(215)897-7948

Other transition opportunities:
NAVAIR

Notes: Outside of the Navy, there are additional transition DoD paths through each of the other services. Although the filter is being designed to further enable Jets on Aircraft carriers, metallic contamination can be found in fuel stored anywhere with copper or brass piping and fittings. Removal of this contaminant can have a positive impact on nearly any engine using jet fuel.



WHAT

Operational Need and Improvement: There is a need for a device to identify and remove copper that is leaching into jet fuel stores. Currently, no solutions are available to mitigate the effect of copper contamination, and the replacement of fuel piping is prohibitively expensive. Removing copper contamination from jet fuel will enable aircraft to maximize fuel use to perform their missions.

Specifications Required: The solution must fit within the fueling/filtration areas onboard existing aircraft carriers, be accessible for maintenance and filter changes, and integrate with the existing fueling system without degrading performance (pressure, flow, etc.).

Technology Developed: PCI is developing a replaceable filter module that integrates a sorbent that is chemically tuned to selectively attract and retain dissolved copper without affecting fuel additives or the fuel itself. It has a short contact time, low-pressure drop with a high mass transfer rate substrate that enables high copper removal rates. This offers a viable path to removing copper and improving the fuel thermal oxidation stability of jet fuel.

Warfighter Value: The integration of our filter will aid the Navy in meeting and exceeding the mission performance requirements for its current and future aircraft. Removing copper contamination will let our jets fly faster, longer and with less maintenance, saving money, enhancing overmatch and saving the lives of US Warfighters. Integration into existing fueling systems will reduce costs and extend the useful lifetimes of aircraft and support systems

WHEN

Contract Number: N68335-20-C-0182 **Ending on:** October 25, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Design filter to meet operational requirements	N/A	Design modeled to meet requirements	2	December 2019
Breadboard filter performance verified	N/A	Performance meets requirements	4	March 2020
Pilot size prototype design and assembly	Low	Scaled prototype assembled	5	July 2021
Filter demonstration to Navy	N/A	Pilot solution demonstrates efficacy	6	September 2021

HOW

Projected Business Model: Deliver TRL 5/6-ready prototypes to enable military evaluation of the operational capability of the technology, followed by an EMD program to advance the system to procurement availability.

Focus on Primary DoD Customer until success is met, with ongoing activities to expand the market and customer bases on both the DoD and commercial endeavors.

Develop key relationships to license the technology or partner with appropriate manufacturing and implementation companies to offer cost effective, high quality products to serve customer needs.

Company Objectives: PCI will further develop this technology for integrations with other DoD forces, with the potential to expand into the commercial marketplace to provide contamination removal for commercial jet fuels to reduce maintenance costs and extend lifetimes of aircraft. The filter has further application into stationary / ground mobile turbine engines to enhance lifetime and performance while reducing maintenance and operating costs.

Potential Commercial Applications: The focus of this effort is on copper removal from Jet fuels with the described filtration system. There is the potential to extend this solution into the commercial market for metal ion removal from fuels (copper or other metals) if the filter performance can be replicated into the removal of other metal ions in fuels. Although performance requirements for non-military craft are less rigorous, contaminated fuel still impacts engine performance, lifetime and maintenance costs. The metal deactivator market exists to address metallic fuel contaminants; the use of a removal filter will enhance and in some cases, replace the use of metal deactivators.

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