Topic: N04-160

METSS Corporation

Synthetic External Hydraulic (HEX) Fluid (2075-S) for Submarine Applications

The Navy's 2075-TH hydraulic fluid, which is used for external hydraulic (HEX) system motion control, is covered under MIL-PRF-17672. This legacy fluid is significantly challenged by the evolution in submarine force inter-deployment training cycles, higher Fleet operating tempo, and changes in maintenance planning philosophy that require the motion control fluids work longer and harder in the undersea environment. The reduced performance of the 2075-TH HEX fluid has led to many instances of component failures critical to operational submarines. METSS's new synthetic fluid formulation (2075-S) will demonstrate significant improvements in fluid oxidative resistance, additive stability, and tolerance to seawater contamination in extended service life operations. The new synthetic product will improve in-service operability and reliability, while extending product service life and reducing overall maintenance costs.

Technology Category Alignment:

Air Platforms
Ground and Sea Platforms
Materials & Manufacturing Processes

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SYSCOM: NAVSEA
Contract: N00178-17-C-2008

Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00178-17-C-2008

Department of the Navy SBIR/STTR Transition Program

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Synthetic External Hydraulic (HEX) Fluid (2075-S) for Submarine Applications
METSS Corporation

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 450 and SEA 07

Transition Target: All classes of submarines: Los Angeles SSN-688, Seawolf SSN-21, Ohio SSBN/GN 726, Virigina SSN 774, and Columbia SSBN 826.

TPOC:
(202)781-3086

Other transition opportunities:
Possibility exists to provide 2075-S to the surface fleet as well.
Synthetic fluid technology can be adapted to other motion control and fluid power system applications across the Navy surface combatant, undersea vehicle, and auxiliary ship fleet to improve operational readiness and mission reliability.

Image provided by METSS, Copyright 2011

Move the US Navy to 2075-S.
One Navy, One Oil

Notes: In the picture to the right, the submarine's thin-line towed array and its associated handling system (capstan shown) is one of several systems controlled by external hydraulic (HEX) fluids.

WHAT

Operational Need and Improvement:
The US Navy seeks to develop an improved generation of synthetic hydraulic fluid capable of meeting or exceeding the revised MIL-PRF-17672E specifications for 2075 fluids for use aboard Navy submarines in their lubricating, hydraulic, steam turbine and gear applications, both in the propulsion plant and in selected shipboard auxiliary systems

Specifications Required:
Critical for program success is meeting or exceeding MIL-PRF-17672E Qualification Test Requirements:
- Pour Point, °C (°F) max = -29 (-20);
- Flash Point, °C (°F) min = 157 (315);
- Viscosity, centistokes (cSt) @ 40 °C = 28.8 - 35.2;
- Viscosity Index, min = 94;
- Acid Number, mg KOH/g, max = 0.20;
- Corrosion, copper strip @ 100 °C (212 °F), max = 1;

Technology Developed:
METSS is developing a new synthetic hydraulic fluid with the goal of meeting and exceeding the revised performance specification for 2075 under MIL-PRF-17672E.

Warfighter Value:
METSS service synthetic lubricating & hydraulic fluid:
- lowers shipboard maintenance costs,
- improves the operational readiness of various critical ship systems, and
- extends the performance service life of high precision propulsion and motion control devices shipboard

WHEN

Contract Number: N00178-17-C-2008 **Ending on:** July 25, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop Chemical Formula	Low	Chemical additives that enhance the performance of the base stock fluid are identified, and their concentrations in the formulated product are optimized.	5	July 2018
Test and Evaluate Formula	Low	The final 2075-S product formulations will be subjected to the full battery of MIL-PRF-17672E qualification test requirements using a qualified third-party testing facility.	5	September 2018
Develop Detailed Specifications	Low	NAVSEA approval	5	May 2019
Product Scaling	Low	DLA approved facility	6	May 2019
Complete Technology Transition Test Plan	Low	Navy requirements	8	July 2019

HOW

Projected Business Model:
METSS will manufacture and sell 2075-S to the US Navy submarine fleet.

For the surface fleet, METSS also will pursue the development of the other viscosity grades of fluids managed under MIL-PRF-17672E, to create synthetic analogs for 2110-TH and 2135-TH.

Company Objectives:
The primary objective is to fully develop and qualify a cost effective synthetic replacement fluid for the MIL-PRF-17672E petroleum-based hydraulic fluid.

Potential Commercial Applications:
- Any undersea commercial drilling operation (protect drill bit)
- Wind turbines

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