Department of the Navy SBIR/STTR Transition Program

Pending SYSCOM Review

Topic # N162-100

Integrated Hybrid Structural Health Monitoring (SHM) System

Acellent Technologies, Inc.

WHO

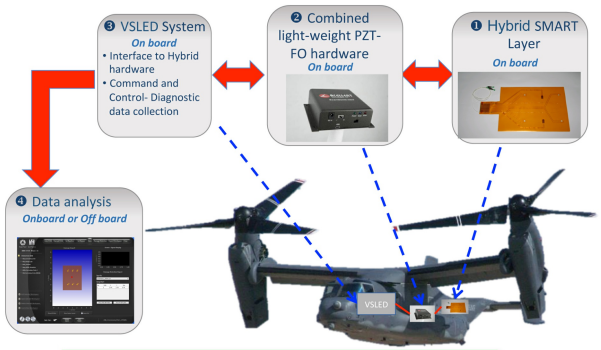
SYSCOM: NAVAIR

Sponsoring Program: V-22 PMA

Transition Target: V-22, CH-53K

TPOC:
(301)757-2031

Other transition opportunities: Both military and non-military platforms for aircraft/rotorcraft. Also for bridges, buildings, heavy machinery, etc.



Hybrid PZT-FO "Genielight" System Benefits:

- Provides on-demand information on damage data and structural response
- Ease of installation and use
- The system offers the best actuator/sensor decoupling (minimum interference) through the use of different mechanisms for signal transmission
- Ability to be used for a multitude of measurements- damage detection, temperature, strain/load sensing, acoustic emission.

WHAT

Operational Need and Improvement: • Navy aircraft and commercial aircraft will benefit from development of a hybrid SHM system that accurately tracks damage data for structural components throughout the aircraft component's life.
• More precise fatigue/damage tracking can lead to reduced maintenance downtime and cost due to targeted, less frequent inspections and part replacement.

Specifications Required: HYBRID SYSTEM COMPONENTS : 1) hybrid PZT-FO sensor network, 2) connectors, and 3) data acquisition hardware/software
CAPABILITIES • damage detection • damage quantification • static/dynamic loads monitoring in real world loading environments • hardware and software for data acquisition and processing are packaged as a single unit, are as small and lightweight as possible and interfaced with the current V-22 Vibration/Structural Life and Engine Diagnostics (VSLED) system.

Technology Developed: KEY TECHNOLOGY DEVELOPED INCLUDES:
• Integrated hybrid SHM system consisting of a hybrid PZT – FO sensor network, monolithic connector for both sensor types, and data acquisition hardware/software integrated into a single unit.
• Hybrid sensors designed and manufactured in a single sensor layer for ease of integration with the structure
• Ability for damage detection, quantification, and loads monitoring capabilities in real world operating environments.
• Miniaturized lightweight hardware and software for data acquisition and processing interfaced with the current V-22 VSLED system.

Warfighter Value: • Increase in operational efficiency • Prevent structural downtime • Minimize operation/maintenance cost • Prolong life span of valuable assets

WHEN

Contract Number: N68335-18-C-0187 **Ending on:** February 10, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hybrid sensor layer and connector	Low	Design and manufacturing of layer	5	April 2018
Integration of PZT and FO hardware	High	Integration flows smoothly	5	November 2019
Software development	Low	Hybrid software functions well	5	September 2019
Interface to VSLED system	Med	Interface functions well	5	November 2019
Combined system testing	Low	Acceptance criteria is met	5	January 2020

HOW

Projected Business Model: • The system developed with subcontractor IFOS is positioned to sell directly or through prime contractors for existing and new Navy aircraft platforms as a complete system.
• Acellent and IFOS will be the primary supplier for the system and will also provide support and provide services including system updates, training, installation, data analysis and data management.

Company Objectives: • Acellent is committed to commercializing the hybrid SHM system.
• The overall goal is to develop and commercialize the Integrated Hybrid PZT-FO system.
• Preliminary testing will be conducted with Bell Helicopters and NAVAIR
• Additional partners for testing and trials using the system are sought.

Potential Commercial Applications: The hybrid SHM system can provide a complete solution for a wide range of structural analysis, evaluation, and maintenance requirements and enable a number of high value economic benefits to markets such as
• Military Aircraft/Rotorcraft
• Commercial Aircraft/Rotorcraft
• Pipelines/Refineries
• Other markets (heavy machinery)

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