Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2021-004

Topic # AF093-203

FY-19

Engineering and Software System Solutions, Inc. (ES3)

WHO

SYSCOM: NAVAIR

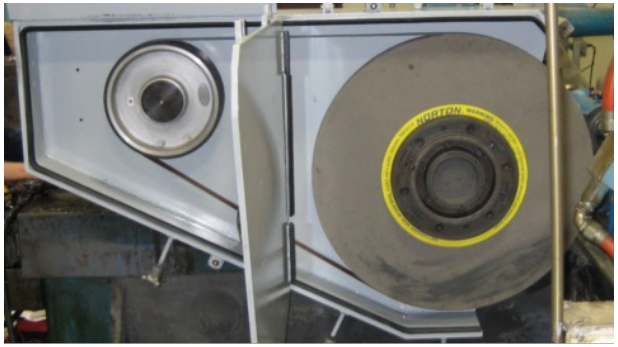
Sponsoring Program: Fleet Readiness Center Southeast (FRCSE)

Transition Target: The initial platform will be USN F/A-18 aircraft landing gear; however, many other similar applications are anticipated

TPOC:
(904)790-6424

Other transition opportunities: Although initially focused on landing gear overhaul work, this system would be useful anywhere engineering chrome or nickel is used and being replaced by novel wear resistant coatings, e.g. engine shafts and drive shafts, potentially at any Navy or Air Force Depot.

Notes: ES3 already provides services to support military and commercial fixed-wing and rotary wing aircraft. Our sustainment services include modifications, upgrades, and enhancements, including structural and electrical modifications to aircraft as well as avionics upgrades.



WHAT

Operational Need and Improvement: During routine overhaul of aircraft components, multiple substrate types and surface finishes are ground on the same grinder. This requires the use of both diamond- and aluminum oxide-type wheels. In addition, both wheel types introduce the risk of grinding burns to steel substrates during rework. Finally, the use of traditional grinding wheels requires significant downtime to replace worn wheels or change to different abrasive types.

Specifications Required: The goal is to achieve the same specifications attained while belt grinding Chrome- and High-Velocity Oxygen Fuel (HVOF) WC-Co/WC-Co-Cr-coated High Strength Steel substrates during Phase I and Phase II; namely, 60% reduction in processing time with no grinding burns, and a 97% reduction in abrasive changeover time (from ~6 hrs with a wheel to <12 mins with belt grinding attachment).

Technology Developed: This belt grinding attachment, a combined USN/USAF effort, converts manual and computer numerical control (CNC) grinders into a two-pulley abrasive belt system. Attachments currently used within the DoD are processing chrome coatings as part of the chrome elimination effort and finishing HVOF thermal spray coatings.

Warfighter Value: Used on F/A-18 landing gear with AISI 4340 alloy steel/300M alloy substrates and already in place at Air Force Depots, this belt grinding technology will dramatically reduce grinding process time, minimize risk of burning HSS substrates, decrease the quantity of condemned and reworked components, reduce the quantity of spares required, and increase part availability to the user. Ultimately, this will allow the warfighter to receive assets with superior finished quality, at a much faster rate, with lower incurred costs.

WHEN

Contract Number: N68335-20-C-0191

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Belt grinding attachment design	Low	Design approval by TPOCs following Critical Design Review	7	December 2020
Belt grinding attachment fabrication and installation	Med	Successful completion of functionality testing at DoD facilities	7	April 2021
Develop grinding parameters for new material and coatings	Low	Achieve government-specified processing requirements, meet specification goals	7	February 2021
Demonstrate and validate system on candidate aircraft components	Med	Achieve government-specified part quality requirements, meet specification goals	8	May 2021
Verify part function and integrity following processing using belt grinding attachment	High	Successful completion of part performance tracking plan	8	November 2022

HOW

Projected Business Model: ES3 is a high-end engineering firm specializing in engineering and design of aircraft components, Systems, and Subsystems; advanced material coatings for aerospace applications; specialized metallurgical, hydraulic, and mechanical custom testing; computational methods for structural dynamic analysis; maintenance repair and overhaul; and development of environmentally preferred material processes. We provide an array of services and products to commercial and government entities. ES3 engineers provide advanced coatings for a variety of specialized applications which encompass goals such as improved component performance, reduced environmental impact, improved repairability, and improved life cycle costs for the warfighters.

ES3 will transition and implement the technology to build organic capability within the DoD. As part of the implementation, ES3 will provide engineering services to develop processing parameters for new substrates and coatings as well as updating all process specifications required for implementation.

Company Objectives: Initially, the target market for this technology will be the USAF and USN depots that are responsible for manufacturing and overhauling diametrical surfaces on any aircraft platform and/or ground support equipment which require grinding operations. ES3 is interested in any customer that has a serious interest in implementing belt grinding into their process.

Potential Commercial Applications: In additional to the Department of Defense, this technology would have applications in the Commercial Aircraft, Ship, Automotive, Petroleum, Natural Gas, and Electric Power Generation industries to manufacture or overhaul shafts and pistons used in engines, turbines, pumps & other power-generation components.

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