NAVY Transition Assistance Program

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N07-006 - Directed Vapor Technologies International, Inc.

Non-Line-of-Sight (NLOS) Coating Of Turbine Airfoils

NEED & CUSTOMER REQUIREMENT

Need: Innovative manufacturing technologies are needed to produce coatings capable of withstanding the harsh turbine environment with improved ability to control thickness uniformity and distribution on parts regardless of how complex the geometry is. In addition, the process must maintain a microstructure that is strain tolerant for ceramic thermal barrier coatings (TBC) and providing a cost advantage relative to current TBC processing technologies.

Value to the Warfighter: The NLOS coating technology contributes to achieving air superiority over combatant aircraft by improving aircraft speed and range and reducing maintenance requirements. It will allow for the realization of many advanced gas turbine engines while reducing fuel consumption and improving thrust on traditional turbine engines.

Operational Gap: Current TBC deposition approaches are limited to the line-of-sight (LOS) regions of engine components. LOS coating techniques offer limited throwing power to coat hidden and deeply concave surfaces resulting in inconsistent coating thickness on complex parts, reducing the life of the coatings in aggressive, turbine environments.

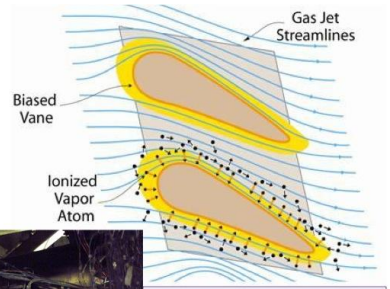
Customer Specifications: Advanced processing approaches are required to enable the application of high quality, TBC systems onto complex components (turbine airfoils) having NLOS region.

Technology Description: A plasma-activated directed vapor deposition (DVD) coating process using novel gas jet compositions enables enhanced NLOS coating onto complex components.

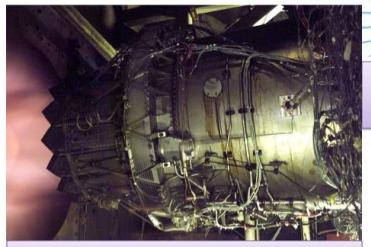
SPONSORSHIP of original SBIR/STTR Topic

SYSCOM: NAVAIR

TPOC Phone Number:
301-342-8010



NLOS Coating of Doublet Vane Assembly Via Plasma Activated DVD



Pratt and Whitney F135 Engine

TECHNOLOGY DEVELOPMENT MILESTONES (SBIR/STTR)

Milestone	TRL	Risk	Measure of Success	TRL Date
High temperature testing of coated coupons	4	Low	Coating withstands conditions of simulated engine environment	October 2009
Application of coating onto turbine engine components	5	Low	Uniform, well-bonded coating	July 2009
Testing of coated turbine engine components under thermal gradient	6	Moderate	Coating withstands operational temperatures and conditions of test engine	March 2010
Build full-scale production coater	7	Moderate	Manufacturing scale coater performs to specification and component feed mechanisms operate smoothly	September 2011
Industry qualification of process and manufacturing line	8	High	OEM certification of manufacturing process and coating quality	July 2012

Open contract: N68335-08-C-0322 ending August 5, 2010

TECHNOLOGY TRANSITION OPPORTUNITIES (PHASE III)

Other Potential Applications:
Any fixed-wing aircraft, rotorcrafts/tilt-rotorcrafts or vehicle requiring TBCs to NLOS areas on platforms such as the USAF C-130 and F-22 and the US Army UH-60 Black Hawk. The technology is also applicable to coating items such as gun barrels, gears, and splined shafts.

Business Model:
DVTI develops advanced coatings and coating application solutions. DVTI has experience commercializing products and processes through its own production capabilities, partnerships, and/or licensing agreements.

Objective:
To identify primes and military groups to assist in the development and qualification of DVTI's advanced coating deposition process and transitioning it to various DoD platforms.

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