

NAVY Transition Assistance Program

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N07-076 - Weidlinger Associates, Inc.

Piezoelectric Single Crystal for Improved Fuel Injector Application

NEED & CUSTOMER REQUIREMENT

Need: Pulse Detonation Engines (PDE) allow for greater engine thrust with greater efficiency, offering the potential for a new generation of super and hyper-sonic vehicles. Current fuel injector technology cannot provide the precise delivery of fuel to the engines in both time and space for maximum effectiveness - the fuel injectors developed for this application will meet those needs.

Value to the Warfighter: Single crystal piezoelectric fuel injectors can significantly enhance the performance of the next generation super and hyper-sonic vehicle engines through improved, operational capabilities, increased fuel efficiency, power, and emissions control.

Operational Gap: Current fuel injector technology cannot deliver the precise variation of the fuel:air mixture against time that the PDEs require. Current solenoid based actuators offer only on/off options.

Customer Specifications: The injector(s) must provide a total of 35g/s of JP-10 fuel (up to 4 injectors), initially up to 4 injectors, cycling at a rate of 80 to 100Hz.

Technology Description: The use of single crystal piezoelectric to operate the fuel injector directly offers a) greater stroke per volt excitation thus creating greater piston movement or smaller actuator size, and b) precise control against time of injector fuel delivery.

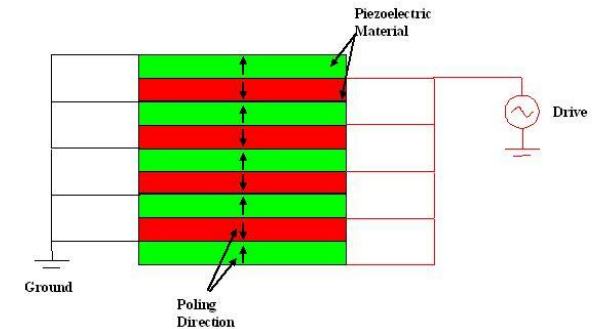
SPONSORSHIP of original SBIR/STTR Topic

SYSCOM: ONR - SBIR

Transition Target: Pulse Detonation Engines, currently in research stage

Original Sponsoring Program: ONR Future Naval Capabilities(FNC)

TPOC Phone Number: (703) 696 4406



TECHNOLOGY DEVELOPMENT MILESTONES (SBIR/STTR)

Milestone	TRL	Risk	Measure of Success	TRL Date
Demonstrate feasibility of single crystal use for injectors	5	Low	40 micron stroke at 200v with 20mm stack	December 07
Simulation Toolkits for injector stacks	9	Low	Toolkits available commercially	December 08
Prototype testing	4	Moderate	testing forthcoming	Oct/Nov 09
Testing in Working Environment	5	Moderate	Equivalent performance under realistic conditions	Mar 10
Development with major commercial manufacturer	6	Moderate	Design accepted for testing by major prime	Nov 10

Open contract: N00014-08-C-0546 ending Dec 09

TECHNOLOGY TRANSITION OPPORTUNITIES (PHASE III)

Other Potential Applications:

This fuel injector technology could be adapted for use in any fuel driven engine - petrol or diesel. This would lend itself to increased fuel efficiency in any Navy or DoD combustion engine, as well as potentially improved emissions or power output. Adaptation for the civilian automotive market is likely the largest market.

Business Model:

WAI aims to collaborate with a major commercial user to complete development to the point of commercial readiness. WAI would be best suited to maintaining R&D for such devices while manufacturing be done under licence or sold to a 3rd party.

Objective:

We would be looking for a prime to either collaborate or team with us on this technology to demonstrate the value of the technology.