

Request for Proposal

Hypersonic Thermal Management II

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August 5, 2022

Program Abstract

LIFT through a Public Private Partnership seeks increased development of hypersonic materials and processes for manufacturing to support the OSD's requirement for Cross Platform System's Development. ALMMII, the Great Lakes Region's premier advanced manufacturing and economic development asset, is rapidly becoming the nation's leader in strengthening the industrial base and accelerating manufacturing process technology. LIFT has invested in and developed a significant ICME hypersonic capability and infrastructure via team projects. LIFT proposes a rapid design of advanced future generation hypersonic materials and manufacturing processes for application in the time frame beyond 2025. Materials focused on those that offer functionally graded optimization which are manufactured through a graded additive process. ICME capabilities will be developed to model and simulate the manufacture of these functionally graded materials systems allowing for agile and fast deployment in various component geometries and uses.

Hypersonic Thermal Management II - Hypersonics

Period of Performance: 24 months

- Task 1** Team Kick-Off
- Task 2** Collaborate with LIFT and LIFT's DoD partners to down-select 1 functionally graded material test article of interest to target for this effort
- Task 3** Advise on test specimen geometry(ies) for the hypersonic-relevant tests
- Task 4** Conduct hypersonic-relevant testing on functionally graded material systems
 - Instrument hypersonic chamber and specimens as needed to support testing
 - Physical hypersonic testing to include high enthalpy reaction facility capable of:
 - Test section flow Mach #s: Full range from 4 to 7
 - Testing run time: Minimum 1 minute of test section reacting run time and 35 minutes of non-reacting flow
 - Specimen size: Minimum 45mm x 45mm
 - Stagnation pressures: Up to 2,000 psi
 - Stagnation temperatures: Exceed minimum critical temperature of 1,200K with preference to test up to 2,000K using Air/O₂ or H₂/O₂ burner with options to evaluate at higher temperatures up to 4,000K for ablation/combustion studies
 - With corresponding low cost of operation compared to National facilities, i.e., AEDC, NASA, AFRL, etc.



- In-situ monitoring of the hypersonic test(s) including high speed camera(s), temperature and pressure sensors, and surface analysis of material structure-property changes during reacting run time and non-reacting flow. Ability to pinpoint time at which material surface modification/degradation begins
- Post-test structure-property evaluations to include microstructural & mechanical evaluation
- Provide data from physical tests to validate hypersonic models
- Inducing micro-mechanical states of stress and strain during hypersonic flow

Task 5 Advise on hypersonic system set-up, testing, and resultant data and recommendations to inform ICME models of material/part



Expectation of a LIFT Project Partner

- Open to all LIFT members
 - All project consortium members must be a LIFT member in good standing for award
 - Non-members may submit proposals but must join membership as appropriate
- Regular communications/summaries to be provided by the partner, including:
 - Weekly review updates
 - Quarterly reports
 - Final Report
- Demonstration of International Traffic in Arms Regulations (ITAR) Compliance. As such, only US persons may work on this program.
- Development research is expected to be accomplished internally, without the use of subcontractors

Deliverables

- Financial Proposal
- Timing Plan
- Resource plan

Note: Responding to this Request for Proposal for services does not require the provider to be able to support the entire request. Should there be aspects that cannot be supported, simply note those on the proposal.

Submission Due Date: August 19, 2022

Submission forum: LIFT submission portal <https://lift.technology/project-calls/>

Contact Information

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