FORM B - PROPOSAL SUMMARY

PROPOSAL NUMBER: 08-1 **A1.12-9820**

SUBTOPIC TITLE: Mitigation of Aircraft Structural Damage

PROPOSAL TITLE: Integrated Structural Health Management

SMALL BUSINESS CONCERN (Firm Name, Mail Address, City/State/Zip, Phone)
Cornerstone Research Group, Inc.
2750 Indian Ripple Road
Dayton, OH 45440 - 3638
(937) 320-1877

PRINCIPAL INVESTIGATOR/PROJECT MANAGER (Name, E-mail, Mail Address, City/State/Zip, Phone)
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Expected Technology Readiness Level (TRL) upon completion of contract: 3 to 4

TECHNICAL ABSTRACT (Limit 2000 characters, approximately 200 words)
Cornerstone Research Group Inc. (CRG) proposes to advance the state of the art in composite health management through refinement of an existing technology developed by CRG called Reflexive Composites. Reflexive Composites are the current state of the art in health management integrating piezoelectric structural health monitoring, healable polymer matrix composites, and intelligent controls delivering highly aware structures capable of identifying location and magnitude of damage with 1/16" spatial resolution. Reflexive Composites respond to damage with a healing cycle capable of restoring up to 90% of mechanical performance post failure.
CRG proposes to advance the state of the art in health management through the development of a next generation control system capable of analyzing structural health monitoring (SHM) data and determining the appropriate healing cycle, identifying the type of failure in the composite, make predictions to the loss in mechanical performance, generating custom healing cycles based on failure type, healing, and making predictions of restored mechanical strength. The results of this analysis will allow the vehicle user to make any necessary mission adjustment to ensure vehicle survivability with the damaged structures on the vehicle.

POTENTIAL NASA COMMERCIAL APPLICATIONS (Limit 1500 characters, approximately 150 words)
Supporting NASA's IVHM Program, this project's technologies directly address requirements for integrated vehicle health monitoring as well as prediction models for remaining mechanical performance of aircraft systems and sub-systems for all vehicles, primarily air vehicle systems. This project's technologies offer a highly aware structure to identify and repair damage in flight as well as reduced preventative maintenance through scheduled active scanning capabilities.

POTENTIAL NON-NASA COMMERCIAL APPLICATIONS (Limit 1500 characters, approximately 150 words)

This project's technologies developed for NASA systems would directly apply to systems operated by other government and commercial enterprises.

Government systems that would derive the same benefits would include but not be limited both manned and unmanned air vehicles, ground vehicles, and marine vehicles operated by Army, Navy, and Air Force.

This technology's attributes for damage identification and repair should yield a high potential for private sector commercialization for commercial air vehicles and high-end automobiles by companies such as Boeing, Vought, Spirit, and Mercedes Benz.

NASA's technology taxonomy has been developed by the SBIR-STTR program to disseminate awareness of proposed and awarded R/R&D in the agency. It is a listing of over 100 technologies, sorted into broad categories, of interest to NASA.

TECHNOLOGY TAXONOMY MAPPING

Airframe
Composites
Multifunctional/Smart Materials
Sensor Webs/Distributed Sensors

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