

DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

“Development and Fabrication of Thermal Protection Systems for NASA: Enabling the Exploration of our Solar System”

Steven M. Violette, Ph.D.
Spirit AeroSystems, Biddeford, Maine

Abstract:

Spirit AeroSystems, formerly Fiber Materials Inc., has been developing and fabricating light weight thermal protection systems (TPS) for NASA missions since the mid-1990's. Starting with the Stardust mission heatshield, FMI has produced three generations of PICA (Phenolic Infused Carbon Ablator) materials to support these missions. Since 2016, Dr. Violette's team has developed 3rd generation PICA, or PICA-D, which will support the New Frontiers 4 Dragonfly mission to Titan and the Mars Sample Return - Sample Return Lander (MSR-SRL) mission to Mars to retrieve the samples collected by the Perseverance rover. Since 2014, Dr. Violette has been developing 3D Medium Density Carbon Phenolic (3MDCP) material, a woven TPS material manufactured at Spirit's Maine and Rhode Island sites. Currently, Spirit is fabricating single piece 3MDCP heatshields to supply the Mars Sample Return - Earth Entry Vehicle (MSR-EEV) forebody thermal protection system. The flight heatshield will enable planetary re-entry for the sample return capsule carrying the first samples ever returned from Mars to Earth. Dr. Violette presents the legacy of flight heatshield fabrication at Spirit for seven NASA missions, and the development of the materials and manufacturing capabilities.

Speaker Bio:



Dr. Violette is a Senior Application Engineer and Technical Fellow at Spirit AeroSystems in Biddeford, Maine. His focus is the development of advanced composite materials and their manufacturing processes. In seventeen years of high temperature composites experience, he has been the principal investigator and program manager for NASA, Air Force, Army, Navy, Boeing, Lockheed Martin, and other space and missile programs. In these programs, Steven has been responsible for the development of thermal protection and propulsion products, including Carbon-Carbon, Carbon-Silicon Carbide, Phenolic Impregnated Carbon Ablator, Polymer Matrix Composites, insulators, and other thermo-structural composites.

Dr. Violette joined FMI in 2006, bringing fifteen years of experience in chemical engineering, polymer science, and composites manufacturing. His manufacturing background encompasses densification process engineering, chemical reactor engineering, fluid/separation process engineering, and engineering management. His R&D experience includes composite design and development, program planning and execution, polymer densification processes, carbon densification processes, chemical kinetics, reactor design, and composites characterization. Dr. Violette holds a B.S. and Ph.D. in Chemical Engineering from the University of Maine.

Date: Friday, April 28, 2023
Place: Whitehall Classroom Building 110

Time: 3:00 PM EST
Contact: Dr. Jesse Hoagg

Attendance open to all interested persons