

# MATERIALS RESEARCH & DESIGN

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## CORE COMPETANCY

MR&D's expertise lies in the areas of composite micromechanics and simulation technologies which involve detailed mathematical models to simulate everything from high-speed impact events lasting only a few micro seconds to full-flight profiles for various aircraft and missile components.

Typical programs at MR&D focus on simultaneous design of material and structure to optimize component cost, weight, and/or thermomechanical performance

## KEY POINTS OF CONTACT

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### Craig Iwano

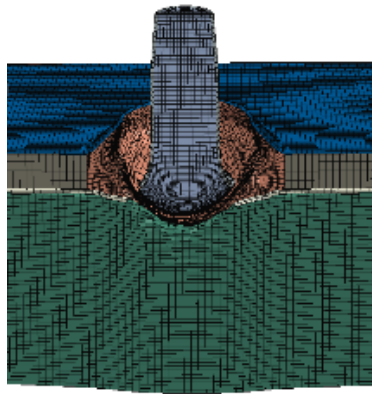
Director, Materials Research & Design  
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## KEY PROJECTS OR PRODUCTS

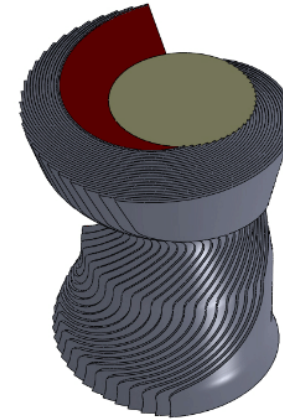
- Design, analysis and successful demonstration of various CMC and high temperature ceramic components:
  - C/SiC ruddervator and flaperon designs for X-37 Orbital Vehicle
  - C/SiC control fin design for X-51 Waverider
  - Ceramic throat for AEDC Hypervelocity Wind Tunnel 9 at Mach 14/18
  - Heat-pipe cooled leading edge for hypersonic applications
  - Load-bearing thermal protection system for hypersonic acreage applications
- Prime contractor on DARPA's Materials Development for Platforms (MDP) Program

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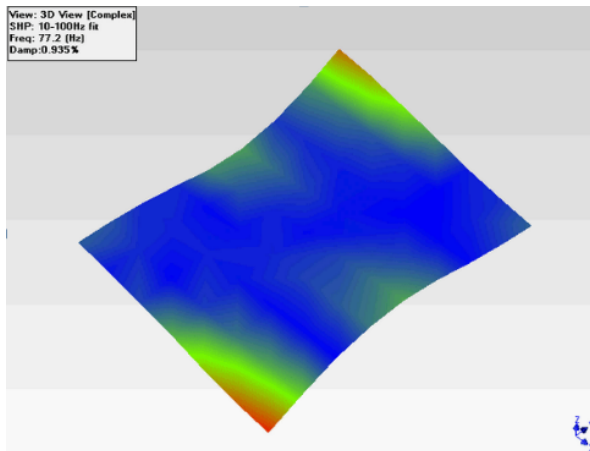
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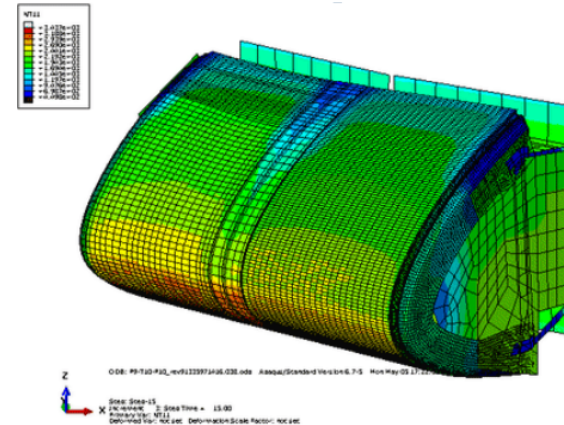
Impact Simulations



CMC Process Models



Structural and Dynamic Analyses



Transient Heat Transfer Analyses