SAND2017-12793

Exceptional service in the national interest

Sandia National Laboratories

Assessing Armor Performance Using High Fidelity Blast, Ballistics and Blunt Impact Simulations

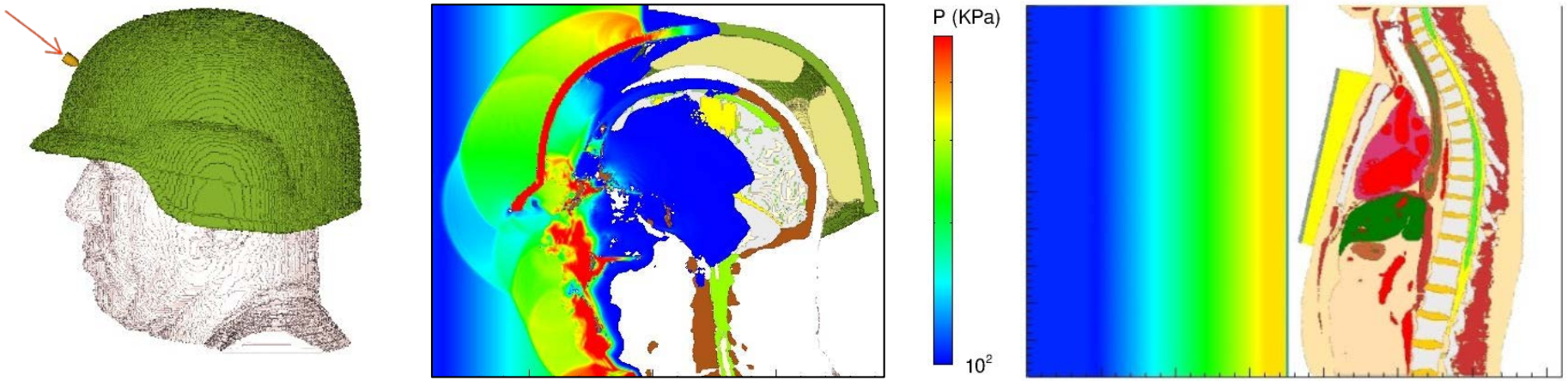
Douglas A. Dederman, Program Manager
Strike Systems -Terminal Effects
Integrated Military Systems
dadeder@sandia.gov

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Background

- Closed-Head Blast Injuries are leading cause of traumatic brain injury (TBI) in military personnel returning from combat [1,2]
  - As of 2010, 160,000 US warfighters sustained TBI
  - 69% as a result of IED blast exposure in Iraq & Afghanistan
- We investigate injury mechanisms of blast and blunt trauma
  - We seek to decrease injury through improved armor design



[1] Defense and Veterans Brain Injury Center TBI numbers: DoD numbers for traumatic brain injury 2010.
[2] Fischer, H., 2007, United States Military Casualty Statistics: Operation Iraqi Freedom and Operation Enduring Freedom, Congressional Research Service Report RS22452.

SAND2017-12793

FY18 – CT Scan of PPE Vest on “Bob”

- Configuration 1: Crye Air frame Helmet and SpecOps Vest on Head-Neck-Torso
- Utilized new Sandia CT facility capability to scan as shown
- Goal – Computed Tomography to CTH with vest for relative merit assessment

SAND2017-12793

FY18 – CT Scan of PPE Vest on “Bob”

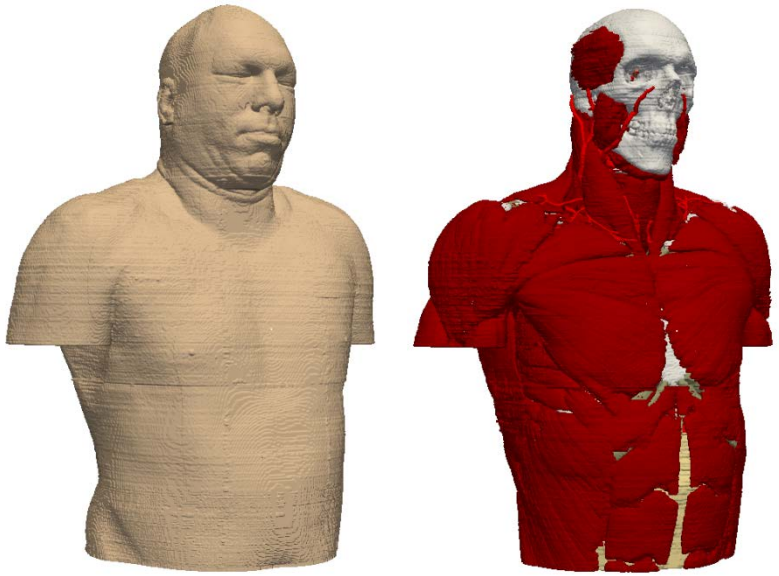
- Configuration 2: Army Combat Helmet and Crye Vest on Head-Neck-Torso
- Utilized new Sandia CT facility capability to scan as shown
- Goal – CT to CTH (Shock Physics Code) with vest for relative merit assessment

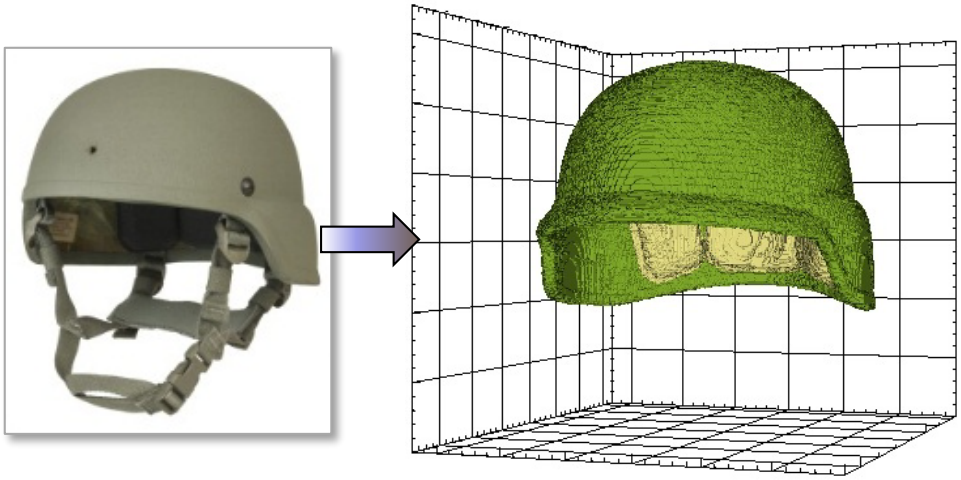
SAND2017-12793

Summary

POC: Douglas A. Dederman, dadeder@sandia.gov, 505-844-7458

- Further Model Development Opportunities with new PPE Scans
- **GOAL:** Develop tools to assist in better protecting the warfighter
- Constructed anatomically accurate digital models of the head/neck/torso region
- Digitized models of conceptual and prototype armor
- Our Team: Dr. Paul Taylor, Dr. Chad Hovey, Candice Cooper, Shivonne Haniff, Ryan Terpsma and Doug Dederman plus reach back to the Science and Technology community at Sandia





SAND2017-12793