THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Knowledge that will change your world

# *UAB School of Engineering Research & Development Capabilities Summary*

December 2014

# UAB School of Engineering

## *Education*

- 5 Engineering disciplines
- 12 Traditional and Online degree programs
- Undergraduate and graduate programs
- Experiential
- Impactful K-12 and community outreach

## *Research*

- Biomedical/Health Technology
- Manufacturing
- Sustainability
- Modeling and Simulation
- Energy Dissipation-impact mitigation

# *R&D Capabilities Summary*

## Materials Processing and Applications Center

- Composites and metals casting: up to **TRL level 6-7**
- Technologies for metals and lightweight composites (thermoplastics, fiberglass, carbon-fiber composites)
- Industrial scale facilities
- Concept to prototype & manufacturing process
- Extrusion-compression, pultrusion, compression molding, thermoforming, vacuum Infusion
- Commercialization outlet – R&D to commercial transition

- **Selected applications**
  - Electronic mounting components
  - Components for aviation & missile defense
  - Weapon systems components, launch rail, tailcone
  - Hydrodynamic ram resistant materials
  - Composite tubes and curved objects
  - Low temperature use trays for space applications

# R&D Capabilities Summary

## Systems Integrations and Applied Technologies

- System Design (ISO 9000/ AS 9100 Certified)
  - Structural, Mechanical, Electrical / Electronics, Software Development
  - System Analysis
  - Fabrication and Assembly, Test and Checkout
  - Complete System documentation, refurbishment and reverse engineering
  - Space hardware development
  - Enabling Technology Laboratory

- Staffing: 32 engineers and technicians capable of developing “hardened”, high reliability precision instruments, and systems

# R&D Capabilities Summary

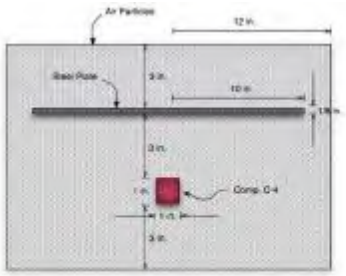
## Computational Structural Mechanics Laboratory

*widely recognized as a prolific third-party developer of DoD weapons analysis codes*

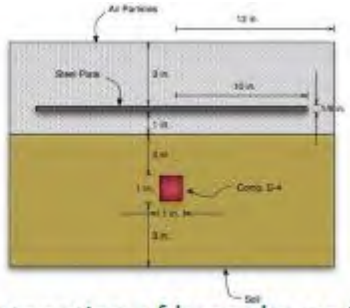
- Integration of concrete models into legacy weapons analysis codes
- Verification and Validation studies
- Code coupling
- Material and reactive flow model development
- Material model calibration and validation
- Improvements to algorithms in legacy weapons analysis codes
- Computational framework for optimal weapons design

## Other Computational Mechanics/Fluid Mechanics

- Rigid Body Dynamics
- Fluid Structure Interactions



Detonation of bare charge in air



Detonation of bare charge in soil

# R&D Capabilities Summary

## UAB Engineering: Enabling Technology Laboratory

- Research development and applications of Immersive Systems (IS) technologies to communication, visualization, and training
  - Virtual Reality
  - Mixed Reality
  - Augmented Reality
  - Remote presence
- Developed for VIR systems, tablets, smartphones, wearables, embedded systems, the web, and embedded systems.
  - 4-wall immersive systems
  - Immersive head-mounted displays (oculus rift, google glass etc.,)
  - Wearable sensors
  - Advanced scanning and tracking hardware

**Applications/Experience**

- Air force Para-rescue: augmented reality medical combat training
- Virtualized operational training (security/emergency )
- Situational awareness and response
- Medical training applications

# *R&D Capabilities Summary*

## Impact Mitigation and Energy Absorbing Structures

- Advancing innovation in impact related safety issues
- Developing impact mitigation systems for relevant high profile problems that will significantly reduce risk in sports and transportation
- World class crash mitigation systems designer
- State of the art dynamic impact testing facilities
- Proven track record of successfully licensed safety products (NASCAR SAFER crash barrier, etc.,)

## Vehicle and Robotics Engineering Laboratory

- Power Flow Optimization and Control in Mechatronic Driveline Systems
- Interactive Dynamics of Driveline and Steering Systems
- Hybrid-electric power transmission

# Contact Info School of Engineering

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