

# Thermoplastic Composite Material for Flexible Body Armor Applications

School of Engineering, University of Alabama at Birmingham

Sponsor – Department of Defense, Army Research Laboratory (ARL)

University of Alabama  
at Birmingham (UAB) –  
Engineering Applications  
Research Complex (EARC)

Thermoplastic Composite Materials &  
Product Forms for Army Applications

Army Research  
Laboratory,  
Aberdeen, Maryland



Army  
Applications



## *The Program:*

The U.S. military constantly faces the competing challenges of ever-changing threats, needs to control costs, needs for lighter weight / more durable / improved performance equipment, and needs to increase the protection of our troops. The School of Engineering (SOE)/University of Alabama at Birmingham (UAB) is conducting research and development efforts on developing base materials, processing technologies and military relevant parts prototyping using advanced thermoplastic composites to reduce weight, improve mobility, provide flexibility and increase performance of troops against various threats.

## *Accomplishments:*

The thermoplastic material and processing technologies that UAB is developing is providing weight and cost reduction, improved mobility and performance to increase the effectiveness and protection of our combat soldiers. These applications use advanced thermoplastics for military helmets, rucksack frames, extremity protection such as elbow and knee with lower weight and improved fit. A synergistic computational modeling and simulation approach along with extensive experimental studies, performance evaluation under static and dynamic loading, design, analysis and prototyping skills has been established.

## *Future Directions:*

The program will accelerate the development of leading edge technologies in thermoplastic composite materials with low cost, lightweight, high performance benefits, in an applied research and education environment for the army. The demonstrated technologies will have the potential to rapidly transition into applications for the protection and effectiveness of U.S. combat soldiers. The program provides unique opportunities for graduate and undergraduate students, who actively contribute to the program. Alabama and US industry will be integrated into the application development effort for mass produce ability and cost-effective manufacturing strategies.

