

New process technologies bring better helmets to the field

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Researchers with the U.S. Army Research Lab (ARL) Weapons and Materials Research Directorate saw the product of their work toward a new generation of significantly improved materials for advanced Soldier head protection reach the milestone of commercial production on March 12 when Ceradyne, a commercial partner, announced it had received its first Enhanced Combat Helmet order.

The new helmets have 35% higher tolerance from fragmenting munitions than previous ballistic helmets.

Other helmets from the ARL-led Army ManTech program are already in the field, used by the Green Berets, the Navy SEALs, and Special Operations Forces. These include the Future Assault Shell Technology (FAST) helmet, as well as the MARITIME helmet. The FAST helmet offers 25% weight reduction, while the MARITIME helmet offers a 35% weight reduction using new grades of a material supported and demonstrated in part by the Program Manager Soldier Protection Individual Equipment.

The state-of-the-art helmet technology was made possible through new manufacturing processes developed at ARL, in collaboration with U.S. Army Natick Soldier Research, Development And Engineering Center and Program Executive Office (PEO) Soldier. Material researchers were able to develop, execute and transition manufacturing processes that addressed technology gaps precluding the use of new thermoplastic-based composites. ARL has initiated process research as part of its mission program, and was supported by the Army Manufacturing Technology (ManTech) Program.

“The ManTech program has allowed us to serve as a catalyst to stimulate industry into unconventional ways of adopting these new materials for ballistic protection,” said Dr. Shawn Walsh, Team Leader, Agile Manufacturing Technology Team, WMRD, ARL. “Ultra high molecular weight polyethylene materials are inherently more expensive, so handling them, reducing the waste associated with the process to form them, and maximizing their benefit in terms of how they are formed into the ultimate part is very critical”

ManTech supports manufacturing technologies that reduce the commercial risk in transitioning military-unique manufacturing processes to production. Prior to ManTech, the technology that the Army used to manufacture helmets was more than 30 years old and was not adaptable for fully exploiting the new materials

The Army helmet fabrication goal was to develop an entirely new methodology for mass producing complex shapes combining layers of different thermoplastic materials. Along the way it pioneered an innovative molding technology, a perform process that reduces touch-labor by as much as 40% and waste by as much as 70%.