Military vehicle seating: Keeping American soldiers safe

June 7 2013

Anthropometry of Motor Vehicle Occupants (AMVO) shells. Credit: Matthew Reed

(Phys.org) —Transportation crashes have accounted for two-thirds of U.S. noncombat military deaths since 2000—a trend University of Michigan researchers are hoping to help reverse.

Research professor Matthew Reed and colleagues at the U-M Transportation Research Institute and U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) aim to

make seating in military vehicles safer, more effective and more comfortable for soldiers.

Previous studies of seated anthropometry—measurement of height, weight and proportions of the human body—have not included the impact of protective gear worn by soldiers on their posture and body shape.

"Current and future military vehicle programs face major challenges in providing adequate accommodation for soldiers while ensuring performance and safety," said Reed, who is also a research professor of industrial and operations engineering. "Current design guidance is based on outdated anthropometry."

Reed says that military vehicle programs lack detailed information on soldier posture and body shape, including the effects of personal protective equipment for seat and vehicle interior layout.

Reed and colleagues collected data from more than 300 soldiers—men and women of all shapes and sizes—at three U.S. Army bases in 2012. Using laser scanning and three-dimensional measurements, they analyzed the vehicle seating positions of soldiers—both drivers and crew, with and without their protective equipment and other gear—relative to the steering wheel, pedals, foot position and seat height and angles.

"The Seated Soldier Study: New Data and Tools for Soldier-Centered Design of Vehicles" is the first large-scale study of soldier posture and body shape in seated environments. Results are being integrated into both commercial tools and into TARDEC's internal design and assessment software, and will be integrated into more Army program tools and procedures.

The research was funded by TARDEC through the Automotive Research

Center, a U-M-based U.S. Army Center of Excellence for modeling and simulation of ground vehicles at the College of Engineering. Reed and TARDEC colleagues gave the first public presentation of the research this week at the Automotive Research Center's annual program review at U-M.

The research also will be highlighted at the Second International Digital Human Modeling Symposium June 11-13 at the Michigan Union on the U-M campus. Hosted by the U-M Transportation Research Institute and the OPEN Design Lab at Penn State University, the conference will feature more than 80 research presentations from scholars and industry experts from around the world. For more information, see www.dhm2013.org.

Provided by University of Michigan