

PROTECTION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL PROTECTION

Functional Clothing Design For The Tactical All Hazards Ensemble

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For the highest level of chemical/biological protection, many operators rely on Level A protective ensembles which have requirements defined by the National Fire Protection Association (NFPA) 1991 standard. Commercially available ensembles certified to this standard fully encapsulate the wearer and their self-contained breathing apparatus. These ensembles are very bulky and cumbersome, and are generally comprised of thick, noisy, plastic film-based material not best suited for functionality of military tactical missions.

The Tactical All Hazards Ensemble (TachazE) project, funded by JSTO-CBD, DTRA and led by Combat Capabilities Development Command – Soldier Center (DEVCOM-SC), intends to address the capability gap of garment design through the implementation of ergonomic & functional pattern design and application of novel/practical seam design. These are mechanisms that help to control the fit and flexibility of the garment. The weight, hand, and drape of the material custom engineered for this project drives the logical decisions made for construction techniques along with the pattern shapes created. The recent term coined for this level of precision pattern drafting for functional clothing is “Super Articulation”. In starting with a good, functional fit, we’ve elected to keep the features simple yet customizable for the various user groups that need very high levels of protection and mobility in a form fitting, comfortable garment. A minimalist approach was used to develop the base garment design, which we call the “platform”. For instance, vent and fly zippers have been eliminated, but can be included as needed. Another key area we will discuss is designing for a custom fit through unique design details and modularity working to minimize sizes yet provide fit for the 5-95th percentile.

Designing the optimal operational design to integrate with other JSTO-CBD funded S&T developing technologies to deliver a fully integrated system for user demonstration is a key objective.

Whether the Soldier is assuming a natural, resting stature or is engaged in kinetic movement, the requirement to perform the mission without garment restriction is imperative. The design process leverages DEVCOM-SC’S knowledge, skills and experience designing for the unique military segment. In conjunction the US Army Anthropometric Survey (ANSUR) II data and very importantly frequent User input and feedback are accessed. Employing our knowledge of the body’s muscular and skeletal profiles and proportions have been instrumental in optimizing garment fit, comfort, and mobility. The knowledge gained and technology developed from the TachazE program will transition to the Uniform Integrated Protective Ensemble Family of Systems (UIPE FoS) program of record per the existing Technology Transition Agreement (TTA). This presentation will demonstrate how Super Articulation and material characteristics can be manipulated during functional clothing design to achieve conformal fit to the body.