



FIT ANALYSIS OF LIQUID COOLED VEST PROTOTYPES USING 3D BODY SCANNING TECHNOLOGY

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ABSTRACT

First responders are frequently exposed to hazardous materials and hostile environments that necessitate wearing specially devised personal protective equipment (PPE). Personal cooling garments play an important role in reducing thermal stress associated with wearing insulative and impermeable PPE. As conduction is the primary cooling mechanism for liquid cooled garments (LCGs), there is need for intimate contact between the skin and garment. The fit of two liquid cooled vests was compared and analyzed through use of a 3D body scanner. Visual images from thirteen volunteer subjects, primarily first responders and life safety specialists, were used to evaluate the fit of both cooling vest prototypes. Perceptual data from the subjects provided user feedback on the prototype vests. The results indicated that both prototypes received high scores in the expert fit ratings although prototype II received higher ratings in many body areas. Ratings from the subjects' perceived fit ballot also indicated that prototype II was rated higher although both vests received high marks.

Keywords: 3D body scanning, anthropometric data, cooling garment, LCGs, cooling vest, liquid cooled vest, fit analysis

Introduction

Cooling garments were introduced in the late 1950's to protect the wearer from hostile hot environments, primarily for military and space exploration purposes. Today, the use of cooling garments has broadened to various civilian applications.

This research was conducted as one component of a large three-year, academic/industry collaborative research project to develop a personal cooling system for first responders wearing personal protective equipment (PPE) for level A and B protection. First responders are frequently exposed to hazardous materials and hostile