

INFORMATION PAPER

RDNS-WSH-J

21 September 2010

SUBJECT: US Army Research, Development and Engineering Command (RDECOM) - Natick Soldier Research, Development and Engineering Center (NSRDEC) Army Anthropometric Models to Optimize the Human Systems Interface (ANSUR II)

1. Purpose: To provide information on US Army NSRDEC ANSUR II project

2. Background:

- Anthropometric data describing body size distributions of the Army population are maintained at the U.S. Army NSRDEC. The current Army anthropometric database (1988, ANSUR) is used to establish design and sizing requirements, engineering solutions, digital models for vehicular crew stations, portable shelters and workstations, protective clothing and individual life support equipment, and military uniforms. This ANSUR database is now over 20 years old.

3. Problem Statement:

- Many current clothing and individual equipment (CIE) sizing systems no longer cover the full range of body sizes in today's Total Army. Additionally, many tariffs are now incorrect such that the Army has had shortages of select sizes of CIE; this necessitated urgent (and expensive) procurements to meet deployment requirements for OIF1.
- The results of a 2006/2007 pilot study on 2811 Active, Reserve, and Guard Soldiers showed that increases in body weight since 1988 are so significant that subjects in the 1988 ANSUR database cannot represent today's larger, heavier Soldier.

4. Facts:

- ANSUR II will provide anthropometric models for Soldier and aviator clothing and equipment and specifications for digital human figure models for workspace and crewstation design. This will be based on data from the updated anthropometric survey of Active Duty, Reserve, and National Guard Soldiers.
- 6.2 work focuses on: 1) design of a sampling strategy that represents Total Army operational and geographic distributions; 2) completion of multi-staged, stratified random sampling strategy development; 3) completion of the biographical interview methodology, 4) selection of critical sizing and design dimensions relative to standardized measurements and variables required to establish the foundation for 3D scan data extraction and for solid model input, validating landmarks and 3D scanning and measurement protocols, and 5) development and integration of data entry, quality control, and editing software.
- 6.3 efforts include: 1) providing multivariate accommodation boundaries for height/weight, upper/lower body, torso, head/face, hands and feet; 2) providing anthropometric sizing statistics for two piece ensembles, torso based equipment, and head/face equipment – including both dress form specifications and 3D digital models for computer-aided design; and 3) providing anthropometric specifications for male and female families of 3D digital human models representing body size/proportional variation that must be accommodated in Army seated and standing workstations/crewstations.

- During the data collection phase of the ANSUR II project, NSRDEC will measure 13,000 Soldiers comprising Active Duty, Reserve, and National Guard. The survey will include demographic data, 94 standardized direct body measurements and 3D surface scans (whole body, head/face and foot). Minorities will be oversampled to ensure the updated anthropometric database reflects projected shifts in Army demographics. The updated anthropometric database and 3D scan archives will be available early 3rd quarter FY12.
- The ANSUR II project is fully funded and integrated with a parallel USMC effort, titled Marine Corps - Anthropometric Survey (MC-ANSUR). Both efforts are under the same technical and programmatic leadership and the data collection survey portions are being executed under a single contract. The study design for MC-ANSUR is identical in nearly every respect to ANSUR II. Both efforts will use the same measuring team who will collect the same measurements on each population group using the same data collection protocols. The only major differences with regard to study design are in areas related to the numbers of personnel measured, numbers of measurement sites, and the addition of the National Guard component to the Army population to be measured. MC-ANSUR, a five month data collection effort, will be conducted first (May-Sept 2010) followed by the 16 month ANSUR II data collection effort (Oct 2010-Jan 2012). The synchronization of the two efforts will result in exceptional compatibility between the USMC and US Army anthropometric databases.

5. Deliverables:

- Measurer's Handbook (FY10)
- Methods and Summary Statistics report (FY12)
- First ever anthropometric engineering database and 3D scan archive with head/face, foot, and whole body images of survey participants that represents the Total Army population through traditional direct measurements and 3D scan images on the same subjects (FY12)
- Updated procurement tariffs (FY12)
- Accurate anthropometric specifications for Soldier requirements documents and military standards (FY12)
- Statistically optimized family of anthropometric models for sizing/design of equipment, vehicles, and workstations using multivariate statistical methods and leveraging 3D scanning technology (FY13-14)
- Sizing models leading to improved comfort, performance, and conformity of body armor and other personal protection equipment (FY14)

6. Linkages:

ANSUR II is directly linked into several warfighter needs. This effort supports the following FOCs under the Human Dimension Warfighter Outcome (WFO):

- FOC-03-01 Mobility
- FOC-07-01 Protect Personnel
- FOC-09-08 Soldier Support
- FOC-11-01 Human Dimension for the Soldier
- FOC-11-02 Man-Machine Interface

7. Recommendation: None