Virtual Human-in-the-Loop Solutions

Santos® ETOWL

Virtual Dismounted Warfighter Equipment Configuration Management

Santos® ETOWL (**Enhanced Technologies for the Optimization of Warfighter Load**) is a highly specialized digital human modeling (DHM) environment designed specifically to help US Department of Defense (DoD) acquisition professionals conduct virtual, objective trade-off analysis of new dismounted warfighter equipment designs prior to deployment in expensive and time-consuming field trials.

In addition to a powerful set of Santos® predictive capabilities and analysis tools developed specifically for dismounted warfighter equipment configuration management, **ETOWL** includes an intuitive and focused graphical user interface that can be used with minimal training.

The Santos® capabilities available within **ETOWL** include a physics-based, 1st principles, predictive model that provides substantial biomechanical feedback including the position, angle, velocity, acceleration, and torque for each joint in the body as well as the reaction forces involved in the simulated activity. This feedback allows virtual trade-off analysis to be conducted for any new equipment design and/or loading configuration.

ETOWL capabilities include:

- A Simplified Workflow for Military Analysis
- Predictive Models that create Simulations of Warfighter-Specific Tasks
- A Neural Network that takes advantage of previously computed simulations
- Warfighter-Specific Avatars and Equipment
- An Updated USARIEM Model for Heat Strain that eliminates the input of unrealistic conditions
- A Predictive Model for Extended Load Carriage to assess Warfighter performance

In addition, **ETOWL** provides seven male and seven female digital warfighters that represent general body-type boundary cases based on the recent ANSUR II anthropometric survey conducted by the US Army Natick Soldier Research, Development and Engineering Center (NSRDEC).

ETOWL consists of four interconnected modes designed to provide the Director of the US Marine Expeditionary Rifle Squad with solutions for Warfighter Equipment Configuration Management analysis:

Warrior Configuration Mode
Obtain volume, weight, distribution, cost, and other requirements and metrics for both individual and teams of Warfighters deployed with varying billets.

Extended Load Carriage Mode
Simulate warfighter conditions through variable environments during prolonged walking and provide the baseline assessment of Warfighter ingress and egress into operational areas. Also, predict energy consumption for Warfighter and Squad conditions based on specific objectives. Environmental factors that can be changed include temperature, humidity, cloud cover, terrain, and elevation.

Equipment Import Tool Mode
Import 3D CAD geometry of new or existing equipment models for use with other **ETOWL** simulation modules.

Simulation Builder Mode
Perform trade-off analysis to evaluate change in performance versus loading conditions through Santos® predictive models for specific warfighter tasks. Predicted Warfighter Task Simulations selected from the Marine Corps Load Effects Assessment Program (MCLEAP) course include:

- Stair Ascent and Descent for steep and regular stairs
- Vertical jump for fixed height and maximum height
- Ladder Ascent and Descent

	All Santos® Technologies Developed Since 2003 including a Comprehensive Suite of Literature and Physics-based Analysis Capabilities	**Santos® Technologies Developed Specifically for Warfighter Equipment Configuration Management**	A Basic Santos® Predictive Model that can assess the % of a population capable of performing a task at an easily affordable price	Provides Application Developers with a key Santos® Predictive Model for Human Simulation	Augments WorldViz Vizard with a key Santos® Predictive Model for Human Simulation
Santos® Pro	✓				
Santos® ETOWL		✓			
Santos® Lite			✓		
Santos® PMP SDK				✓	
Santo® PMV					✓

SHI's success is tied directly to our clients' success and **ETOWL** represents yet another way in which we strive to match our state of the art, human-centric, virtual product design and analysis methods, technologies, and resources with client requirements.