Optimization of Sensitive Equipment Decon

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ABSTRACT:

Currently the United States Military cannot effectively decontaminate sensitive electronics, optics, and other equipment. Material that has a value over $500.00 is defined as Sensitive equipment and usually includes electronic and optical devices carried by every soldier on the modern battlefield. Given this technological gap in the United States' armed forces' ability, the Joint Program Executive Office for Chemical and Biological defense (JPEO-CB) is evaluating several prototypes which would be able to decontaminate the sensitive equipment used in the Military today. Initial testing was conducted on a range of technologies which employed liquid solvents and gases to decontaminate material. In October 2005 a Discrete Event Simulation was developed to model the throughput of a company of soldiers through a Detailed Troop Decontamination (DTD) line with the integration of the several alternative Sensitive Equipment Decontamination (SED) systems. This simulation found several flaws in the current DTD process and contributed to the amendment of the Operational Requirements Document (ORD). After reviewing the simulation and a number of other considerations, including the desire for a Joint Service solution to the technology requirements, the JPEO-CB decided to fund research on a device which employed modified Vapor Hydrogen Peroxide (mVHP) developed by the Steris company. To ensure that the mVHP alternative is feasible for the Army, a more thorough simulation was developed in ProModel. This simulation allowed the research team to analyze the performance of the prototype developed by Steris when incorporated into the DTD, and found that process time must be reduced to ensure that this SED system can be practically integrated into every service. Minimization of the process time for the mVHP system was required for a Joint solution to be realized. Efficacy research is being executed now at Edgewood Chemical and Biological Center in Edgewood, MD. A team of chemical experts and scientists are studying the ability of the Steris prototype to defeat a range of chemical agents on several different materials. Design of Experiments was used to develop an experimental plan that allowed the scientists to rapidly conduct, analyze, and optimize the performance of the mVHP. Significant challenges are associated with this project. The experiments produce numerous responses, and there is no direct way to minimize time which is one of the primary goals of the research. The tests take hours to complete and require many replicate experiments to ensure accuracy in analyses.

KEYWORDS: sensitive equipment, discrete event simulation, design of experiments, efficacy

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