

DEVELOPMENT AND TESTING OF MECHANICAL COUNTERPRESSURE SPACE SUIT GLOVES

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In 2001, the University of Maryland Space Systems Laboratory conducted the second year of a planned three-year research effort into development and testing of mechanical counterpressure gloves. During this year, primary attention has been focused on the hybrid elastic glove concept. In this approach, the elastic fabric layer of a “conventional” mechanical counterpressure glove is adapted for use as an elastic restraint layer. Coupled with a thin elastic latex glove as a pressure bladder, the hybrid glove functions (as far as the pressure suit and wearer are concerned) as a conventional space suit glove. The use of elastic material for the pressure bladder and restraint layers provides much lower actuation forces and increased tactility for the wearer as compared to a conventional pressure suit glove.

In addition to numerous evolutionary modifications and testing of the hybrid glove design, primary efforts this year have gone into extensive operational and human factors testing of the glove, with correlation to current space suit glove capabilities. Two pilot studies were performed to finalize the glove design and check out the experimental protocols, prior to an extensive operational test program. During this testing program, 16 test subjects have performed multiple test sessions on the hybrid elastic glove and a 4000-series shuttle glove in a reduced-pressure glove box. Test results to date indicate that the hybrid elastic glove is approximately midway in performance between the 4000-series glove and nude hand operations. Detailed test results are summarized in this presentation.