

10th Triennial International Fire and Cabin Safety Research Conference
October 17-20, 2022
Atlantic City, New Jersey

Authors:

Ian Hellstrom
FAA Civil Aerospace Medical Institute

Title:

ATD Construction Harmonization and Modernization

Abstract:

The Federal Aviation Administration evaluated several aspects of Anthropomorphic Test Device (ATD) testing with the aim of better understanding some of the factors that affect the quality of the test results. This included the effects of long-term static ATD pelvis loading, effects of cyclic dynamic compression on an ATD pelvis, and changes in ATD movement and loading due to the apparel on the ATD. Phase 1 of the testing simulated two types of static ATD pelvis storage methods of the 50th percentile Hybrid III ATD for the duration of one year. The objective was to measure changes of the ATD pelvis rubber and foam that cover the ATD metallic pelvis. In one method of storage, the ATD pelvis had no contact between a surface and the foam and rubber case. The second storage method had the pelvis loaded with a 125 pound load on the bottom side of the pelvis. This is a similar weight to what an FAA Hybrid III ATD loads the bottom of the pelvis when the ATD is seated in an upright position. Pelvises were removed from storage every three months and cyclically loaded to measure the effects of their respective storage methods. Phase 2 evaluated the effects of repeated dynamic compression loads and the effect on the foam and rubber casing on the Hybrid III pelvis. Data collected from Phase 2 will be used to assist in the development of a vertical calibration procedure for an FAA Hybrid III ATD. The data from phases 1 and 2 may yield insights into the number of loading cycles until a pelvis should be replaced and the identification of characteristics and precursors to warrant taking a pelvis out of service for seat certification. Phase 3 testing evaluated the effects of a variety of ATD clothing and footwear used during horizontal and vertical dynamic sled testing. SAE AS 8049 specifies the use of cotton apparel and a shoe with a heel height of 1.5 inches. Three different clothing materials and four different types of footwear were tested to determine if their coefficient of friction changes ATD movement and loading during dynamic testing. Results for all three phases will be presented during the conference.