9th Triennial International Aircraft Fire and Cabin Safety Research Conference
October 28 – October 31, 2019
Atlantic City, NJ

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Topic: Human Injury Criteria

Title: Comparison of Dynamic Responses of 50th percentile Hybrid-II and the FAA Hybrid-III Anthropometric Test Devices (ATD) during aircraft seat tests.

Abstract

Aircraft seat dynamic qualification tests require use of a Hybrid-II ATD or equivalent. Auto crash tests now use the Hybrid-III ATD, which is a more advanced and biofidelic test dummy. A version of the Hybrid-III was developed that has been approved by the FAA as equivalent to the Hybrid-II. Although this ATD (called the FAA Hybrid-III) has been available since 2000 it has not been widely used by the aviation industry. This lack of acceptance is apparently due in part to continued availability of the Hybrid-II ATD, although how long it will continue to be available is not certain since civil aviation is now the only user. Another factor is Industry's concerns that the ATD could interact with the seat/surroundings differently than with the Hybrid-II, and produce significantly different results. The Hybrid-III's more flexible neck is one source of this concern since the neck response can affect interaction with surfaces during a head strike and the resulting accelerations.

The purpose of this project was to review available FAA and Industry data to evaluate the actual differences between Hybrid-II and FAA Hybrid-III ATD response during dynamic seat tests. Kinematic, lumbar load and head acceleration data were compared for cases where both ATD's were subjected to similar test conditions. These parameters were also compared for repeated tests with the same ATD. Response differences will be presented as well as recommendations for further investigation.