

MODELING RESPONSES OF SID AND EUROSID-1 ANTHROPOMORPHIC TEST DUMMIES ON SIDE-FACING AIRCRAFT SEATS

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ABSTRACT

In the field of business jets, side-facing seats (SFS) are quite popular. The certification of side-facing divans is a challenge currently facing the aerospace industry and is made mandatory under Federal Aviation Regulations requiring equivalent level of safety compared to the conventional forward-or aft-seats. Moreover, passengers seated on side-facing seats experience different dynamic response compared -to those on forward-or aft-facing seats in an aircraft accident. The regulations established by Amendment 25-64 was developed from a database of forward facing seat test results and no specific guidelines for the certification of SFS were given, but recommendation is made to use the injury criteria as well as side-impact ATD's from the automotive industry.

This thesis presents study made on the responses of occupants on a side-facing divan-type aircraft seat. A number of side-facing seat impact sled tests are conducted using SID and EuroSID-1 ATDs with a three-point restraint system on a rigid divan type couch facing a rigid bulkhead in order to maximize the potential for injuries. Studies are conducted for single and multiple seated occupants with Hybrid II as second occupant. Analytical models are developed supporting the sled test results. A set of parametric studies was then conducted using the validated analytical models. Analysis of the data acquired from the tests and analytical models and observations related to significant injury parameters as applied to aircraft situations are presented. Through the conclusion, most suitable injury criteria are identified and the biofidelity of these ATDs as applied to aircraft crash situation are presented. Seating and restraint system configurations that provide maximum protection for occupants on SFS are also identified. Simple guidelines to meet this certification requirement are outlined.