DESIGN GUIDELINES FOR 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. Side-facing seat impact sled tests are conducted using SID ATDs with a three-point restraint system and a body-centered configuration on a rigid divan type couch facing a production bulkhead in order to compare with a rigid barrier for injury criteria. Tests are conducted for single and multiple seated occupants with Hybrid II as second occupant. Validated analytical models are developed supporting the sled test results. Sets of parametric studies were conducted using EuroSID ATD for evaluating compression-based criteria by introducing different belt configurations. 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. This study showed that TTI and pelvic acceleration increase linearly with the increase in the distance between the occupant the rigid barrier. SID is more sensitive to rigid barrier impact. Through the conclusion, most suitable injury criteria are identified. 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.