

Reduction of Head and Neck Loads and Other Observation in Side Impacts Using Inflatable Restraints

The ability of AmSafe Aviation inflatable Restraint (AAIR) systems to mitigate injuries in current side facing aircraft seat configurations was evaluated using the ES-2 Anthropomorphic Test Dummy (ATD). A series of impact sled tests were conducted at the AmSafe test facility in Phoenix, Arizona using a side facing sofa fixture with cushion construction representative of current business jets. The tests simulated the typical middle seating configuration. Two types of restraints were evaluated: a three-point body centered conventional restraint with inertia reel (core), and a similar restraint incorporating the inflatable shoulder restraint (AAIR). A conceptual, structure mounted bag with potential to mitigate leg injuries was also evaluated. The test conditions were the 16g, 44 f/s, horizontal impact specified in 14 CFR 25.562 and the 21g 42 ft/s horizontal impact specified in 14 CFR 23.562 both without yaw. Injury criteria was evaluated according to existing and potential new regulations. These include head injury criteria (HIC), neck forces and moments, Nij (lateral and fore/aft), upper and lower spine acceleration. Results were analyzed and used to identify evidence of injurious +AIS 2 loading to the head, neck and spine using conventional and inflatable restraint. Assessments of the restraint with respect to lower leg injury are also provided. Comparative evaluations to standard restraints demonstrate a significant improvement in occupant protection for side facing seats using the inflatable restraint technology.

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