PARAMETRIC STUDY OF ROW-TO-ROW HEAD AND NECK INJURIES IN TRANSPORT AIRCRAFT

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ABSTRACT

The Federal Aviation Administration has amended certain regulations for certification of aircraft interiors that requires engineers to demonstrate that a head contact with any cabin furnishing complies with the head and neck injury criteria requirements specified in 14 CFR 25.562.Based on these regulations, the occupant safety devices such as the seat, restraint system, the vehicle interiors, and the other parts in aircraft are designed and certified to reduce the injuries during crash. Therefore head and neck injury compliance is a significant problem for manufacturers of aircrafts and business jets due to the high cost involved in the certification. Difficulties have been encountered during the certification of both front-row bulkhead and row-to-row seat installations for transport (Part 25) class aircraft. This thesis presents a study into the problem associated with the compliance of Head Injury Criteria (HIC) and Neck Injury Criteria (FNIC) encountered in transport category aircrafts row-to-row problem. Dynamic analyses are performed to investigate the variation of HIC and neck loads with dummy type and for a range of seat row pitch. Another variable is the break-over resistance of the forward seat back. The predicted values of HIC are known to be higher for lower seat setback distances. Finally, for many of the cases that have been modeled, neck moments and forces have been predicted to exceed the recommended tolerance levels, even when the HIC is significantly below the survivable threshold of 1000.