

DESIGN AND FABRICATION OF A HIC COMPLIANT BULKHEAD

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ABSTRACT

Occupant injuries often caused by the impact of the occupant head with any cabin interiors such as a cabin class divider is of serious concern. Currently the certification of aircraft requires engineers to demonstrate that a head contact with any cabin furnishing complies with the Head Injury Criteria (HIC) requirements specified in 14 CFR 23.562 and 14 CFR 25.562. Therefore HIC compliance is a significant problem for manufacturers of aircrafts and business jets due to the high cost involved in the certification. This thesis presents a study into the problem associated with the compliance of HIC for the front-row bulkhead seats in transport aircrafts. In the first part it presents a study of different padding materials and MADYMO biodynamic simulations supported by simple quasi-static tests in the design of energy absorbing bulkheads that effectively attenuated HIC values below injury levels. The MADYMO model is used to conduct parametric studies to assess the affects of bulkhead stiffness and strength on HIC levels. It also presents a set of guidelines in the assessment of energy absorbing bulkheads. The second part deals with the manufacture of an energy-absorbing bulkhead following the design guidelines presented in the earlier section. The new bulkhead being manufactured following the design guidelines is assessed for HIC compliance by conducting various sled tests.