

Dr. Hamid Lankarani
Wichita State University

Development of a HIC Compliant Bulkhead

Aircraft certification under 14 CFR 23.562 & 25.562 requires engineers to demonstrate that a head strike into any one of several cabin furnishings complies with occupant Head Injury Criteria (*HIC*). The problem encountered in the certification of 16G airline seats, referred to as the front-row *HIC* problem, occurs for seats located directly behind bulkheads or cabin class dividers. These structures are typically both stiff and strong, and thereby producing a high *HIC* value as a result of head contact. The compliance with *HIC* has proven to be a significant challenge to the aerospace industry. This paper describes a research aimed at the development of a bulkhead that meets the *HIC* requirement as well as industry appearance and aesthetic requirements. In this proof-of-concept study, a rational approach was developed for the design and fabrication of energy-absorbing bulkheads. Several bulkhead structures were designed, fabricated, and then tested on the crash sled at the National Institute for Aviation Research. Typical cabin arrangements of the Part 572 Hybrid II anthropomorphic test dummy (ATD), seat, restraint system, and bulkhead were considered in the tests. Potential solutions for the bulkheads whose performances complied with the *HIC* requirement were arrived at. Design heuristics were also established for the fabrication of such bulkheads, thereby providing the industry with guidelines for the development of a *HIC* compliant bulkhead.