

Comparison of Automotive and Transport Aircraft Occupant Injury Criteria

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Abstract

From the beginning of transportation safety research in late 1940s, the goal was (and remains) to understand the mechanisms of injury commonly observed, prevent, or reduce fatal injuries and increase the likelihood of survivable crashes. From Colonel John Stapp's pioneering human volunteer research to understand the whole-body injury tolerance, to the development of automotive and aerospace safety regulations, to the present-day the industry has come a long way. While the intention of the regulations between automotive and aerospace have been broadly similar, the advantage of observing tangible results (reduction in fatalities) of automotive safety research and regulations has motivated the industry, regulators, and the end-user – the public, to push for advanced safety research and breakthroughs in systems and technologies like airbags and advanced driver assistance systems (ADAS). In comparison, the aerospace safety regulations first defined in 1945, with subsequent additions to add occupant injury protection requirements in late 1980s has led to a steady, albeit slower, incorporation of new safety systems and technologies. Although safety features like shoulder belts and airbags have been part of transport aircraft seating systems, they have yet to gain popularity and wide passenger and airline acceptance. Within the last decade, FAA has introduced several new injury pass-fail criteria, primarily derived from automotive industry, including N_{ij} , TTI, and the use of more biofidelic ATDs like ES2-re. As the industry prepares to understand and implement measures to meet these different criteria, there is likelihood for introduction of additional and potentially new injury criteria. This presentation will be a comparison of the automotive and transport aircraft's occupant injury criteria and current technical challenges and viable future approach for enhanced occupant safety.