

“A Finite Element Model of the Hybrid II 50th for aircraft seat certification”

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AC 20-146 “Methodology for Dynamic Seat Certification by Analysis for Use in Parts 23, 25, 27 and 29 Airplanes and Rotorcraft” describes how numerical models (CAE) can be used in the seat design and certification process. However, until recently the evaluation of the performance of the seat structure and restraint systems has largely been done by means of physical testing, mostly sled based. Technical innovations (e.g. inflatable restraints) and customer wishes (luxurious first class cabins) have made physical tests more expensive and complex. To counter that, the FAA and industry are approving and stimulating the use of virtual design. The SEAT Modeling Working Group, a sub-committee of the SAE Aircraft SEAT Committee, with members of industry, government and software suppliers, has over the past three years been developing best practices for finite element modeling. As part of this committee, FTSS has developed a LS-DYNA model of the Hybrid II 50th crash test dummy. The paper will discuss the modeling methods used, validation on material, component and full system level and the objective rating of the test versus model responses. The paper will also present several application examples of the Hybrid II and Hybrid III dummy models including validating the models for NASA’s Constellation Program, where frontal, lateral, vertical and rear impact conditions of the Orion vehicle were simulated and compared with actual test results obtained from sled tests executed at Wright Patterson Air Force Base.