

Abstract

Efficient Testing support for Methodical Product Development of Aircraft Interior components

Dipl.-Ing. Henry Jonas, Dipl.-Ing. Olaf Rasmussen, Dipl.-Ing Thomas Gumpinger,
Prof. Dr.-Ing. Dieter Krause

The process of airworthiness certification is a crucial factor in aerospace engineering. For typical approving, the process includes CAD-modelling, FEM-analysis and mechanical tests. This process shows factors of uncertainty, such as material properties and load induction. In state of the art, there are different calculation methods and mechanical tests, which in practical application often tend to be complex, time consuming and expensive.

Due to the large variety of aircraft interior components, these methods mostly cannot be applied tailored for every variant. So in industrial application, standardised and simplified test- and calculation procedures need to be used, which results in increased safety factors and therefore oversizing. In most cases, a realistic adaption with respect to the real behaviour cannot be guaranteed. In particular those load cases, which may include a multiaxial load situation, typically lead to engineering challenges in test and approving. Many companies can only provide onedimensional test rigs. Furthermore, the dynamic behaviour of components often can only be estimated. Whilst dynamic and multiaxial investigations are standard in structure and flight systems engineering, most interior manufacturers need to use alternatives, which lead to a suboptimal mechanical design.

Issue of this contribution is the presentation of steps towards a realistic interior component testing and simulation including validation methods. By this approach, a methodical product development strategy is derived. Using those enhanced mechanical investigations, safety factors can be reduced and therefore weight be saved.

We compared dynamic FEM and multibody systems simulation in combination with the corresponding dynamic mechanical test in hardware. The test showed different fields of action for improved modelling and testing. Several steps were taken in order to give an optimised simulation process for an improved fit to reality. The simulation steps and methodical interactions in between simulation and testing are presented in example of the cabin interior monument "Doghouse". Presented are also new, enhanced multiaxial test possibilities by a DFG-funded Heaxpod-test rig under construction, which allows combined testing in all six degrees of freedom.

Contact: Dipl.-Ing. Henry Jonas
Hamburg University of Technology
Institute for Product Development and Mechanical Engineering Design
Denickestraße 17
20148 Hamburg
Germany
Phone +49 40 42878 3666
Mail henry.jonas@tu-harburg.de
Web www.tuhh.de/pkt