

Cabin Safety Interior Simulation

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The development of an aircraft interior can be a new cabin, a new region of the aircraft (ex. galley area), a new monument (ex. wardrobe), or a change to an existing project (ex. new emergency equipment). All these projects have their own challenges. The interior monuments must comply with requirements of strength, durability, aesthetic aspects, airworthiness, and additionally, human interaction. Considering the production of a new configuration for an aircraft, the interior will only be completely assembled very close to the end of the project. This demonstrates the difficulty that an OEM has to assess the user's interaction with the final product (i.e., the cabin). For this reason, EMBRAER developed a project called Digital Human Modeling to evaluate the possibility to simulate human interaction (pax, crew, and pilot) with the aircraft interior. This simulation needs to have bio fidelity so it can support decision making during all the product development phases. In this paper we will present this project, where we use a DELMIA 3DEXPERIENCE in some interior use cases, simulating the human x aircraft interaction in a representative way and with results that lead us to believe that these simulations can support interior tests, test preparations, and even, replace some physical tests. The interior validation of specific population anthropometry and the feasibility of procedures can be greatly accelerated with DELMIA Virtual Interior Simulation. In the cases developed with EMBRAER interiors teams, the Virtual Ergonomic Simulation enabled the user to simulate and validate safety procedures feasibility with a different population, considering gender, nationality, and population percentile. As an example, in the forward service door evaluation use case, where one American 5%ile female and one American 95%ile Male would operate the aircraft service door, both virtual manikins were required to apply around 12Kg on the door lever, to be able to unlock and to open the door. Approximately, 75% of the Female population in the use case would be able to operate the service door, while about 97% of the Male population would be able to perform the same procedure. This simulation was possible due to DASSAULT SYSTEMES 3DEXPERIENCE Platform, where 3D models of both human manikins and aircraft were used in the context of Virtual Interior Simulation and executed in a short period.