

Effective Aircraft Seat Development for Row to Row HIC test

Dynamic testing is required as a part of aircraft seat certification (Title 14, Code of Federal Regulations (14 CFR) 25.562). This test represents the actual impact by a passenger against the front row seat at emergency landing condition. The obtained Head Injury Criteria (HIC) value in the test must be below 1000 (Title 14, Code of Federal Regulations (14 CFR) 25.562(c)(5)). HIC values are calculated with acceleration pulse being generated when the Anthropomorphic Test Device (ATD) head strikes the seatback during dynamic testing. However, the outcome varies depending on mass, rigidity, and stroke of the tested seat. Understanding these factors is critical for safe and quality of aircraft seat designs.

As of today, Computer Aided Engineering (CAE) has been widely utilized for product developments. 1D simulation is used for better understanding and evaluations of features by simplifying various complicated physical phenomena. The component properties that consist of seat structures are determined using these 1D simulations. Meanwhile, 3D simulations are useful for comprehensive evaluations as seat assemblies. The 3D simulations enable to predict and reproduce ATD and seat responses during dynamic testing.

Toyota Boshoku Corporation has been doing various research on safe, quality, and optimized seat designs, utilizing both of 1D and 3D simulations. In this presentation, we discuss updates on the current research.