

CASE STUDY

# Narrow Body Economy Seat Certification



## Task Objectives

Airframe Designs was engaged to provide expertise and guidance to support the structural certification of a family of economy seats for narrow body aircraft, typically AIRBUS A320 and BOEING 737 types.

The objective was to certify families of seats to meet EASA ETSO C39c and C127b performance requirements for static and dynamic strength.

Additionally, the client required compliance with OEM delivery specifications (Airbus Frame Specs and Boeing D6 Documents) and compliance with appropriate airworthiness specifications (EASA CS 25 / FAR 25).



## Static Testing

Static tests were defined in Test Plans, witnessed, and reported to demonstrate compliance in respect of static strength.

Worst case flight, gust, ground, and emergency landing load conditions plus passenger abuse load cases were executed using whiffle trees and body blocks to introduce the loads in accordance with the relevant specifications.

Pass / Fail criteria were assessed during and after the test to ensure that the necessary compliance was achieved.

## Dynamic Testing

Dynamic tests were defined in Test Plans, witnessed, and reported to demonstrate compliance in respect of the dynamic performance requirements.

16g Forward (inclusive of seat track pitch/roll and seat yaw) and 14g Down tests were executed using a dynamic sled facility in the UK, with dynamic pulses applied as per AC 25.562-1B.

Critical passenger occupancy, represented by Hybrid II Anthropomorphic Test Dummies (ATDs), was considered and the seats were appropriately ballasted to ensure that under-seat baggage, literature stowage, and maximum certified seat weights were represented.

Pass / Fail criteria were assessed during and after the test to ensure that the necessary compliance was achieved.



## Interface Loads Derivation

It was necessary to derive a comprehensive set of interface loads at the attachment of the seat to the aircraft seat tracks.

Rigid Body static analysis, following OEM approved methodology, was carried out for the entire family of seats to ensure that the most critical seat configurations and occupancies were selected for both static and dynamic testing.

Furthermore, it was necessary to ensure that the applied interface loads sat within the allowable load envelopes.

// "AFD provided a team of structural specialists that enabled the efficient and cost effective delivery of our seat certification structural test programmes.

*The professionalism, dedication, and diligence of the team built confidence with EASA and ultimately guided the certification plans towards successful outcomes." //*

**Gary Doy**  
Design Q

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