

# Flutter Certification Solutions

## Achieve FAA Flutter Certification with ATA's Turnkey Solutions

The Federal Aviation Administration (FAA) Title 14 code of federal regulations (CFR), Parts 23.629 and 25.629, outlines the requirements for aircraft flutter certification. These regulations call for the natural frequencies of an aircraft to be determined and used to demonstrate that the aircraft design is free from flutter. Ground vibration testing (GVT) of the aircraft determines the natural frequencies of all main structural components and helps satisfy these requirements. After the structural frequencies of the aircraft have been identified, analysis can be used to predict freedom from flutter. Flight tests may then be performed to confirm this prediction. ATA Engineering, Inc., (ATA) has provided complete GVT support for all types of aircraft for over 30 years and supplies all the engineering services for flutter certification of civilian aircraft.

### Overview

Ground vibration testing is used to identify the natural frequencies and mode shapes of an aircraft. ATA begins every modal test with a pretest analysis of the aircraft to determine optimal accelerometer placement. We leverage ATA's commercial software specifically developed for this purpose, in addition to over 30 years of GVT experience, to model the main structures, predict target frequencies, and determine accelerometer placement.

ATA performs each modal test using our own complete set of GVT equipment, which includes everything from accelerometers and data acquisition equipment to computers and software, and which is capable of handling over 700 data channels simultaneously. The shapes and frequencies are monitored in real time so that adjustments can be made during the test to eliminate the need for any retesting. The test data are then used to correlate an analysis model.

Correlation and model-tuning efforts are part of many modal survey projects ATA performs. Model updating is performed using Nastran and ATA's Attune™ software to rapidly identify changes to the finite element model (FEM) needed to yield a test-verified model. Attune can match both modal frequencies and shapes, enabling us to investigate much larger changes to the model and resulting in faster convergence to a correlated FEM.

A test-correlated model can then be used with confidence to predict the aeroelastic stability of an aircraft using Nastran or ZAERO™. ATA has used this approach to demonstrate that flight envelopes are free of flutter instabilities and vehicles are safe for flight testing.

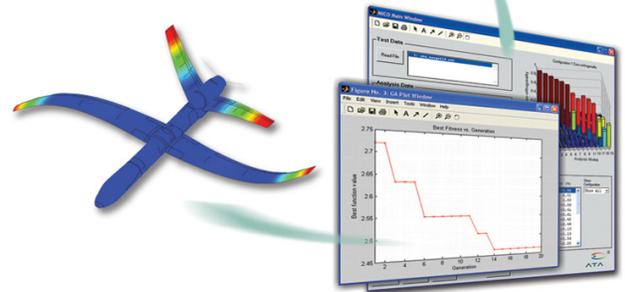
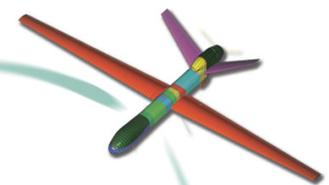
To complete the certification process, ATA provides flight test planning, instrumentation, and data analysis during the flight tests—streaming and reviewing data live during the test. Our ability to process data in real time accelerates the schedule of every test we perform.

### Why use ATA for your certification needs?

- ▶ ATA's turnkey solutions allow FAA flutter certification to be achieved either by ATA collaborating with your designated engineering representative (DER) or in collaboration with one of ATA's DER partners.
- ▶ Our highly efficient test setup, test performance, and real-time data processing accelerate test schedules and reduce aircraft downtime.
- ▶ Our highly experienced staff provide complete test and analysis services and bring extensive troubleshooting experience to the process, reducing risk, cost, and schedule.



- ▶ ATA offers comprehensive and integrated ground vibration testing and model correlation services required as part of FAA certification for very light jets, general aviation, and transport aircraft.



- ▶ ATA's integrated test, analysis, and correlation services allow FAA flutter certification to be achieved within budget and on schedule.