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Aeroelasticity Support for Perlan 2 Glider

Image Credit: Jamie Darcy | Airbus

Case Study

OVERVIEW

The Perlan Project's engineless sailplane aircraft, the Perlan 2, is designed to glide on air currents to 90,000 feet, at the edge of space, to study Earth's climate. Due to the flexibility of the light composite aircraft, flutter in these conditions can pose significant risk, which makes ground vibration testing to characterize the flexibility critically important. In preparation for the upcoming Perlan 2 flight test program, ATA Engineering, Inc., (ATA) provided aeroelasticity support to help evaluate the stability of the aircraft and ensure the safety and success of the flight test. This Perlan 2 project is an example of how ATA uses a combination of test and analysis to support our customers.

TASKS PERFORMED & KEY OUTCOMES

- Developed dynamic finite element model (FEM) from customer's CAD models using Femap and NX Nastran. Measured all significant aircraft masses during assembly to verify FEM.
- Planned test using pretest analysis to identify sensor locations and test configurations, and provided the test facility and aircraft suspension system.
- Conducted the ground vibration test (GVT) to determine aircraft global modes and control surface modes, supplying all necessary data acquisition hardware.
- Updated FEM using GVT results and ATA's Attune correlation software, resulting in a test-verified FEM including stiffness perturbation analysis
- Developed aerodynamic panel model from customer's CAD models.
- Performed aeroelastic stability (flutter) analysis with aerodynamic model and test-verified FEM to evaluate aircraft stability.


Perlan 2 GVT at ATA headquarters


FEM dynamic analysis