Unmanned Aerial Vehicles | Integrated Analysis and Test for Efficient Aeroelastic Analysis of Predator

CASE STUDY

CUSTOMER:
General Atomics Aeronautical Systems, Inc.

INDUSTRY:
Aerospace

PROJECT NAME:
Modeling, Testing and Analysis of Predator Aircraft

CUSTOMER LOCATION:
San Diego, California

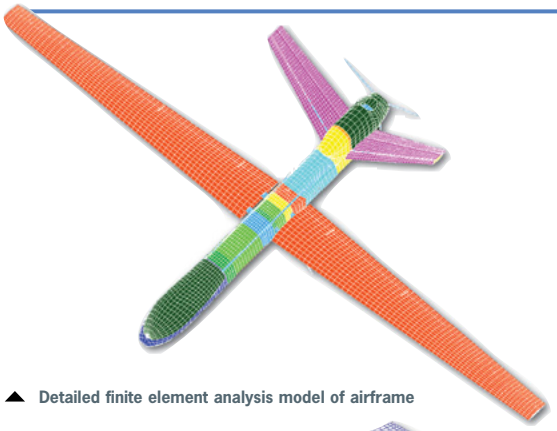
OVERVIEW

General Atomics Aeronautical Systems, Inc., (GA-ASI) develops and manufactures the Predator line of aircraft, a highly successful, long endurance, unmanned aerial vehicle (UAV) used primarily for surveillance and reconnaissance missions. The original version of the Predator is a propeller-driven aircraft that has seen significant use in recent conflicts around the globe. Variants of the Predator, including the Predator B and Altair, offer a significant expansion in mission performance and capability.

ATA Engineering, Inc., (ATA) has supported GA-ASI by modeling, testing, and analyzing both the Predator and the Predator B and testing the Altair. ATA's suite of sophisticated test and analysis tools allowed them to work very efficiently in a highly integrated design, analysis, and test environment. This allowed ATA to meet all of the schedule and technical needs and provide critical flight qualification information for the aircraft.

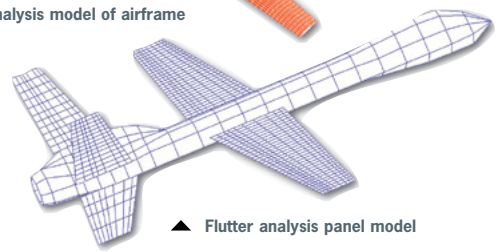
ATA SUPPORT INCLUDED:

- Developed detailed finite element models (FEMs) of both the Predator and Predator B from a combination of drawings and CAD models.
- Selected optimal sensor locations for modal tests of all aircraft.
- Performed modal tests (GVTs) on aircraft to measure modes of vibration with various fuel configurations.
- Modified detailed FEMs to better correlate with modal test data for both Predator and Predator B.
- Used correlated models to calculate flutter margins for various phases of flight.
- Performed a preliminary "whirl flutter" analysis for the Predator B.
- Calculated internal loads due to aerodynamic forces.
- Performed in-flight acceleration and control-surface torque measurements on Predator.



▲ Detailed finite element analysis model of airframe

▲ Ground vibration test



▲ Flutter analysis panel model

"The ability to use multiple tools in a tightly integrated fashion lets the engineers focus their efforts on the design issues, resulting in faster, better solutions."

David Alexander
VP Engineering
General Atomics Aeronautical Systems, Inc.

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