



OVERVIEW

A Boeing 747SP aircraft has been modified by L-3 Communications Integrated Systems to accommodate a 2.5 meter reflecting telescope as part of the SOFIA program. SOFIA, which will be the largest airborne observatory in the world, is a collaborative effort of NASA and the DLR, German Aerospace Center. This flying observatory is being developed and operated for NASA by a team of industry experts led by the Universities Space Research Association (USRA).

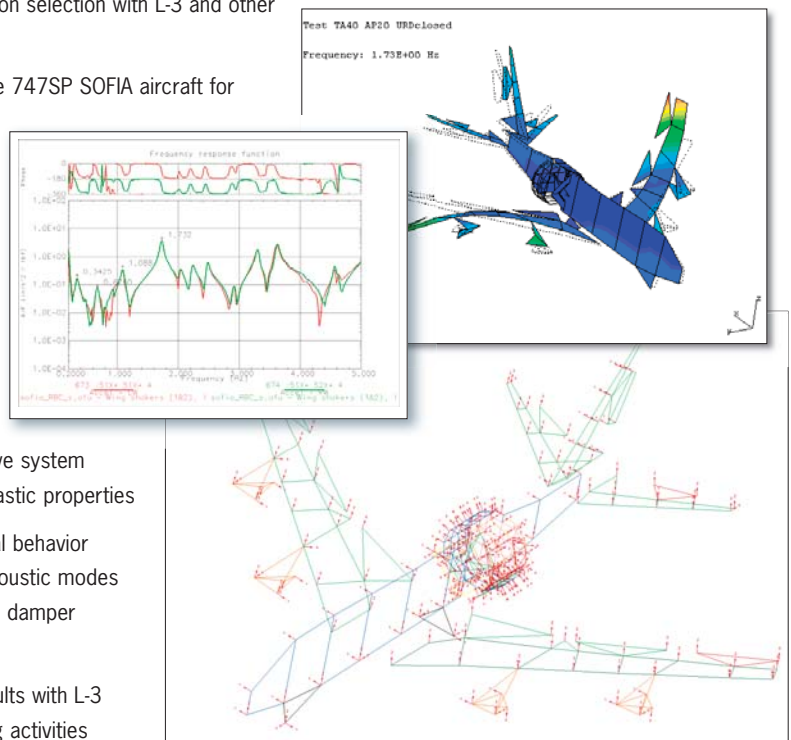
One of the crucial steps in preparing the aircraft for flight was a ground vibration test (GVT) which characterizes the dynamic properties of the aircraft. This is required since major structural modifications to the aircraft were made to accommodate the telescope and all of the supporting equipment. L-3 performed detailed finite element analysis of the modified aircraft to allow dynamic analysis and flutter studies to be performed. ATA was brought in to conduct the GVT of the aircraft in support of the L-3 analysis efforts. ATA provided all of the instrumentation and data collection and analysis systems required to conduct the GVT and worked side-by-side with L-3 analysis engineers in comparing test and analysis results in preparation for final flight certification.

Further testing allowed dynamic interaction between the aircraft and the telescope assembly (TA) to be studied so that the TA vibration isolation system performance could be evaluated. ATA's data system allowed all aircraft and telescope responses to be monitored while the TA control system was actuated. In addition, local components (telescope cavity doors, aperture, bulkheads, etc.) were studied in a number of configurations to observe dynamic interaction with the aircraft.

Overall test results allowed the finite element model to be confirmed in addition to providing comparisons of the modified aircraft with the unmodified aircraft. This was an excellent example of ATA's participation in a large scale modal test program where numerous configurations were required for study and correlation to analysis models were essential.

ATA SUPPORT INCLUDED:

- ▷ Coordination of sensor location selection with L-3 and other team members
- ▷ Conduct complete GVT of the 747SP SOFIA aircraft for eighteen unique configurations
- ▷ Provide detailed test results to L-3 analysis engineers during and at the conclusion of the GVT program
- ▷ Evaluate the TA isolation system characteristics and collect overall aircraft and telescope data during TA drive system excitation to assess servo-elastic properties
- ▷ Study local component modal behavior including telescope cavity acoustic modes and evaluation of tuned-mass damper behavior
- ▷ Coordination of final test results with L-3 engineers for model updating activities



CUSTOMER:
L-3 Communications Integrated Systems

INDUSTRY:
Aerospace

PROJECT NAME:
747SP Aircraft Ground Vibration Test for the Stratospheric Observatory for Infrared Astronomy (SOFIA) Program

CUSTOMER LOCATION:
Waco, Texas

CODES UTILIZED:
B&K I-deas Test Pro IMAT

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