

The Challenge

A Gulfstream GIII aircraft was modified via Supplemental Type Certificate to add a cargo door on the forward right hand side of the aircraft. As part of the modification effort, a Finite Element Model (FEM) was constructed to establish internal loads and load redistributions in the aircraft structure due to the large fuselage cutout and subsequent reinforcement structure added. Having worked with PVI three previous times, Avenger Aerospace again asked PVI Systems to develop a testing system to collect data to validate the FEM.



The Solution

Collaborating with Sensing Systems Corp., PVI installed all required strain gauges and set up the testing system. The system installed for validation testing was comprised of three (3) axial strain gauges and two (2) bi-axial (tee rosette) strain gauges. A 10 channel Data Acquisition System (DAS) was used to acquire the strain data which was recorded via external laptop using Chameleon software.

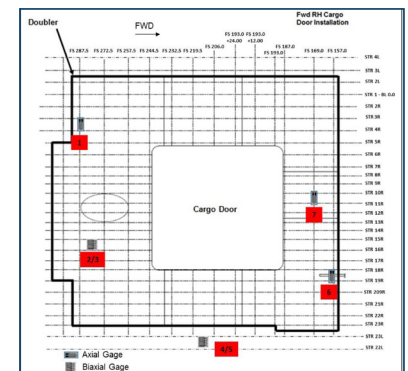


To accurately test strain in a simulated "in-air" experience, the aircraft needed to be pressurized.

1. Data was recorded at skin and fuselage station locations to which the gauges were mounted within 1" accuracy.
2. All strain gauges were calibrated to zero while in the Zero G configuration (aircraft jacked/shored).
3. After the aircraft was removed from the Zero G configuration, all strain gauge readings were recorded as baseline 1G ground strains.

System Features

- Three (3) single uniaxial strain gauges
- Two (2) biaxial, 90 degree "T" strain gauges
- Chameleon for NI CompactDAQ
- NI-9236 8 channel, 350 ohm Quarter Bridge Strain Gauge module
- NI-Ethernet cDAQ chassis with 300 ft distance from central computer



The FEM matched real world data validating the model through test. The flexibility of the designed system and robust Chameleon DAQ software allowed the customer to use it for multiple tests.



Contact us for more information about the Chameleon System or custom-engineered Data Acquisition, Automated Test & Measurement, Machine Vision, and Process & Motion Control systems.