



CASE STUDY

Test Solutions: Linear Actuator End-Of-Line Testing

THE CHALLENGE

Create a universal test system to test various aircraft linear actuators to ensure proper stroke, load, current draw, and other operational parameters are within specification.

THE SOLUTION

A custom 500lb load test system built from off-the-shelf components and based on the National Instruments NI cRIO-9063 platform with LabVIEW applications for control, safety monitoring, data collection, and reporting.



“The automated universal test system is a significant improvement over manual testing in both measurement precision and test time.”

THE SUMMARY

Linear actuators are used throughout aircrafts to perform actions that are both flight (e.g., landing gear deployment) and non-flight (e.g., cargo bay door release) critical. Actuators are typically electrically driven and apply a range of forces to move a piece of the aircraft into a desired position. Components must be tested through their range of expected operation and at safety limits that exceed the norm.

A supplier of aircraft linear actuators approached Tecnova with the need for a new, automated test solution. An older, manually operated test stand design was becoming unreliable and a bottleneck in the flow of production. The new system would be required to test over 20 existing models and be adaptable to test future actuator designs. Actuator specifications differed from model to model making the design of a universal system challenging.

Tecnova engineered a solution using a heavy square beam containing precision milled holes for mounting tooling and mechanical components in rigid locations. The beam, electrical, and mechanical components were placed within an extruded frame. The system does not flex, bend, or introduce translational errors into the testing process or results.

The combination of a pneumatic actuator and load cell precisely supply variable tensile and compressive 0lb to 500lb loads to the unit under test. Extremely repeatable and precise linear transducers provide actuator rod end location feedback to within 0.001in.

A computer running a Windows-based LabVIEW application allows engineers to configure tests, perform manual operations, and calibrate the test stand.

Operators can select from the list of the pre-configured test scripts.

When a test is started, the test script is downloaded to the NI cRIO-9063 for execution. All control, monitoring, and testing is performed within the cRIO.

FPGA-based PID control loops tightly regulate applied loads while fast-acting shutdown routines place the stand in a safe state if a safety condition occurs. A Real-Time application runs the test scripts, checks measurements against limits, and makes status and result information available to the computer. The computer monitors test progression and allows viewing and printing of results.

The design is highly repeatable and performs tests reliably in a fraction of the time over prior manual methods.

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