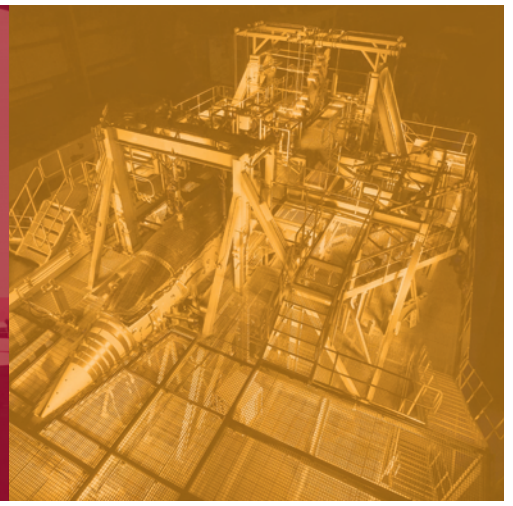




# AEROSPACE TEST SOFTWARE FOR STATIC, DYNAMIC AND SYSTEM TESTS

SET UP AND RUN TESTS FASTER  
WHILE PROTECTING THE TEST SPECIMEN



# AEROSPACE TEST SOFTWARE THAT MAKES THE DIFFERENCE

Wherever test and development engineers are pushing the limits of product design, system set-up and tests must be conducted faster than ever.

Moog continually develops aerospace test software applications to provide customers with the best tools to set up tests faster, and run them efficiently, while protecting test specimen.

Listening to our customers and studying their requirements for aerospace led us to develop Moog Test Software that supports both simple and complex tests, and leverages the world-class performance of Moog Actuators, Servovalves and Test Controllers.

Unsurpassed innovation and technological expertise combined with close customer collaboration make Moog a leader in the design and development of force and motion control systems.

Our total focus on meeting your unique test requirements means you can rest assured you're using the most flexible, highest performing aerospace test software available anywhere.

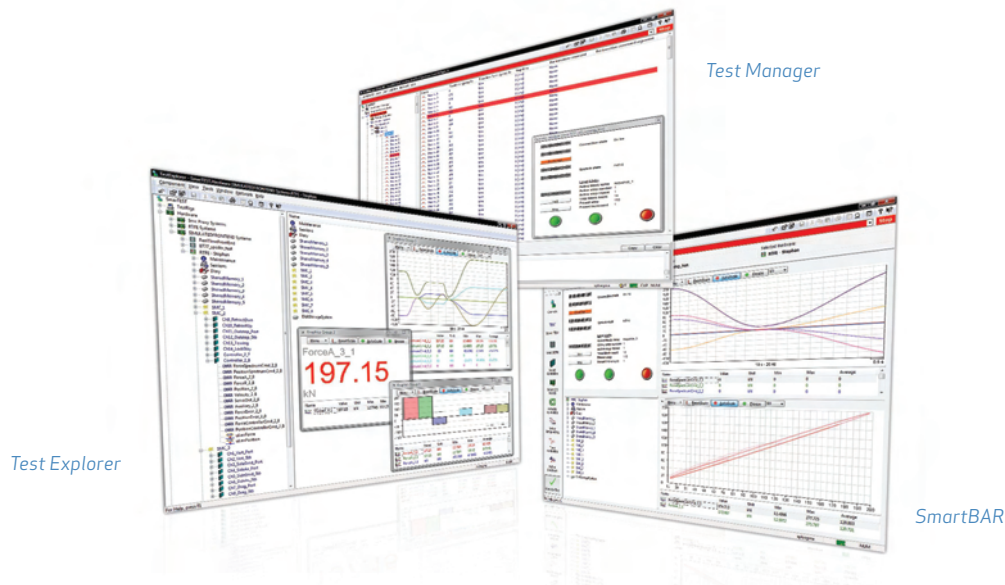
# MOOG AEROSPACE TEST SOFTWARE: YOUR KEY TO BETTER, FASTER SYSTEM SET-UP AND TEST RESULTS

Moog Aerospace Test Software runs on a PC that controls and monitors a Moog Test Controller or dedicated real-time controllers. The software is highly versatile for use in many different structural and system testing applications.

The software architecture helps you expand the test rig as more control channels are required, while safeguarding the test specimen which saves you time and money.

Moog Aerospace Test Software is the result of close and ongoing cooperation with leading aerospace OEMs and independent test laboratories, as well as research and development centers.

This software remains the best-in-class option to successfully run both simple and complex solutions for aerospace static and dynamic tests.



## KEY FEATURES BRINGING YOUR REAL BENEFITS

Key features	User benefits
Native windows application with easy workflow supporting 'drag and drop'	User friendly
Dual safety; hardware and software Extensive set of configurable safeguard settings	Safety of the specimen
Perform complex control algorithms using both internal and external data	Online dynamic calculations
Unique force control loop	Decreases test set-up time by 50%, increase testing speed by approximately 30%
Automatic hardware recognition, pre-set calibration algorithms and auto-tuning	Test rig set up is twice as fast
State-of-the-art configurable controller settings	Optimize control for complex test rigs
User-definable operator panels and configurable graphic views	Operation and monitoring made easy
Speed of use (quick data upload and download, simple system calibration and set-up)	Data reliability
Software can handle up to 500 channels	Allows expansion of test rig as required
Data Acquisition Systems (DAQ) synchronization	Use your existing DAQ system for synchronized integration
On-board data acquisition	Simple test set-ups become fast track
Real-time data import and export	All data available as control parameter



# FASTER TEST SYSTEM SET-UP AND RUN

Moog's Aerospace Test Software has the capacity to support a wide variety of test set-ups both in a very simple manner for fast track users or in a more advanced manner for experienced users. Standard and specialist test modes include static, dynamic and system test.

Test applications include: aircraft/airframe structural tests; iron bird tests; landing gear tests; helicopter airframe, rotor head and blade tests; fuselage and cockpit pressurization; engine casing tests; fin actuation landing tests; hydraulic system tests; load calibration tests.

## ACCELERATE SETUP WITH INTUITIVE USER INTERFACE

### Intuitive user interface

Setting up your test is easily done through an intuitive user interface. A test overview database allows you to store and organize your current and old test programs. Test stations can be easily created by selecting available hardware and then 'drag and drop' this into your test program.

### Run tests faster

The new real-time Ethernet interface uses specific and dedicated protocol software for data transfer. This plays a key role in providing users with reduced latency while running tests. For example, Quad Core IPC processor technology combined with the new Ethernet interface allows the reliable control of the 256 control channels with a command resolution of 200 Hz or more and a latency of 5 ms or less for large iron bird test systems with up to 1280 look-up tables and calculation channels.

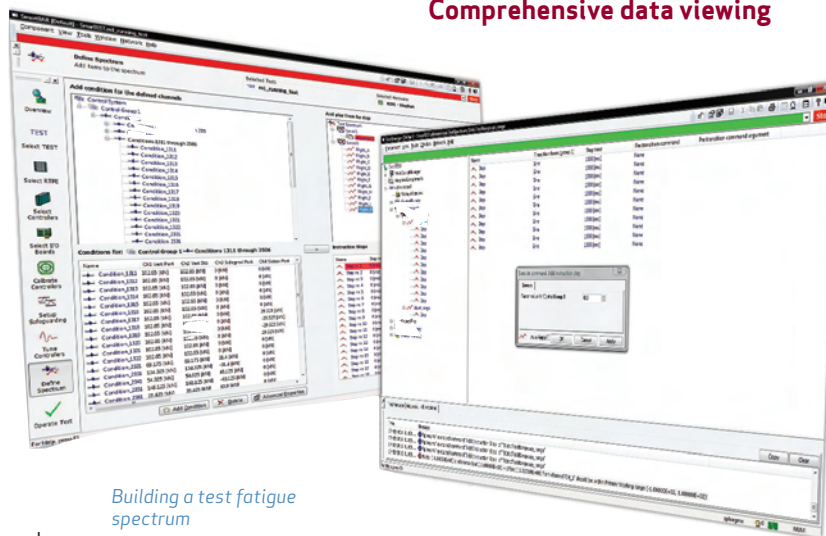
## MAKE THE SYSTEM WORK YOUR WAY

### Operator dashboard

Test operation is done via a user-configurable operator dashboard. You can create action buttons or display information that you want to see. The operator dashboard supports Adobe Flash® technology for dynamic visualization, as well as multiple languages for localization.

### Comprehensive data viewing

A number of graph types can be created: time-trace, bar chart, XY and table view. You can switch online between data signals to be displayed in engineering units, % transducer range, % spectrum range, or % reference.



Building a test fatigue spectrum

Building a Static Test

## FOLLOW THE WORKFLOW FOR EASIER OPERATION

### 1. Station set up

Select a real time controller or station and make the connection. Define which controller channels to use and establish data-acquisition interface.

### 2. Rig commissioning

Calibrate the sensors to ensure feedback signals and control precisely force and position. Select safeguarding parameters to protect your test article. Tuning of the control loop with the dedicated graphical user interfaces.

### 3. Spectrum execution

Define or import spectrum and operate test using the operator dashboard.



Operate a Test

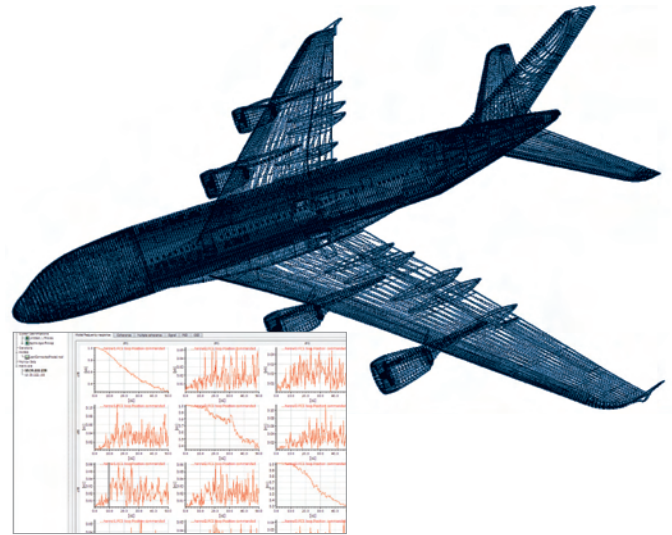
## TEST SPECIMEN SAFETY

### A safe test specimen, to meet programs schedule

Commercial and military aircraft manufactures place great emphasis on the accuracy and repeatability of the test loads applied to their structures with test specimen safety being absolutely paramount to meet program requirements within time and budget.

Performing static and fatigue test on high value aero structures and components requires specialist skills and experience in a wide range of engineering disciplines.

Using the Moog Aerospace Test Software you can undertake a growing range of test tasks more easily, reducing set up time and optimizing test running rates, while placing accuracy, and test specimen safety at the heart of the system architecture.



### Dual safety

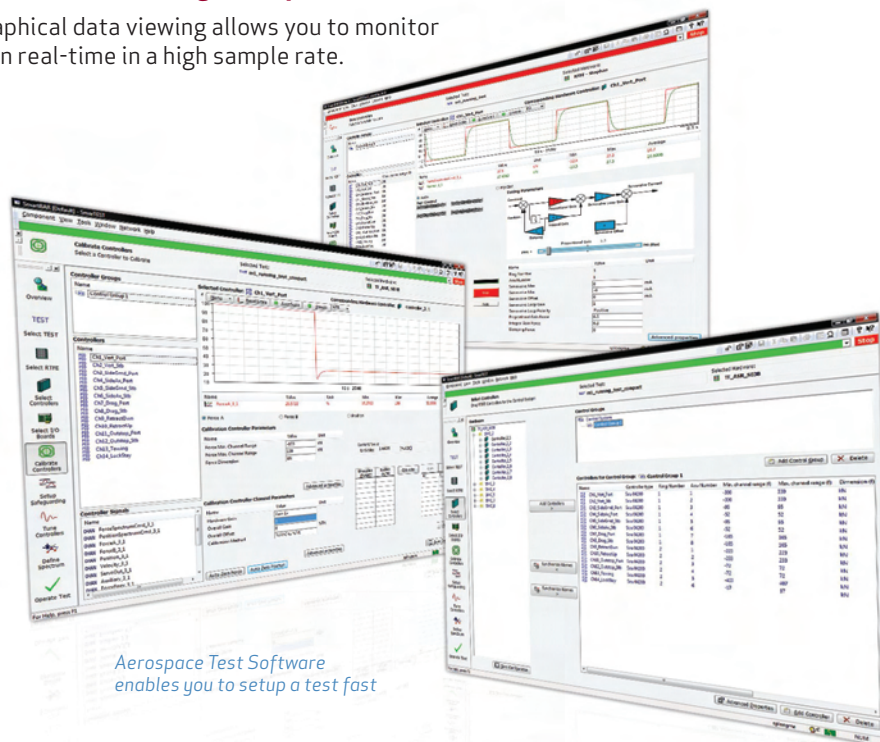
The safety is based on the two main causes of damage: accidental loads and unforeseen test shutdown. Therefore the Moog safety concept is equally based on software thresholds and hardware integrity.

### More damage assessment during test cycles

The enhanced graphical data viewing allows you to monitor your test article in real-time in a high sample rate.

### Increased use of safety systems

The software supports a comprehensive set of safeguarding parameters that allow for protecting against overloading of your test article. For each type of limit, three error bands can be set up, triggering either an alarm, a user-definable action or a hard shutdown.



Aerospace Test Software enables you to setup a test fast

### Safety features build into the controller

You can prevent any accidental loads with the breakout force feature. It specifies the maximum force that the controller is allowed to apply to maintain the commanded position. If this force is exceeded, the controller will keep the force at a constant level until it is within the limits indicated by the breakout force.

### DAQ and hydraulic systems

Parameters from different sources can be integrated in the control system in order to protect the test specimen from any unexpected shutdown

# TRANSPARENT INTEGRATION OF DATA ACQUISITION SYSTEMS

The load control system can be set up to communicate seamlessly with different external data acquisition systems. The system also delivers faster, more efficient analysis and comparison tests. Because the two systems are connected via Ethernet, the operator can directly

cross-check data from the load control system and data acquisition system through time stamps. This allows all data to be stored and archived on a hard disk for post-test analysis.

## RUN YOUR TEST EFFICIENTLY WHILE PROTECTING THE TEST SPECIMEN

### Multiple DAQs

The Moog Aerospace Test Software offers both basic onboard DAQ functionality and advanced real-time interfacing with external dedicated DAQ systems. You can use new or existing DAQ equipment. Or choose your own DAQ supplier, depending on your needs, preferences and budget.

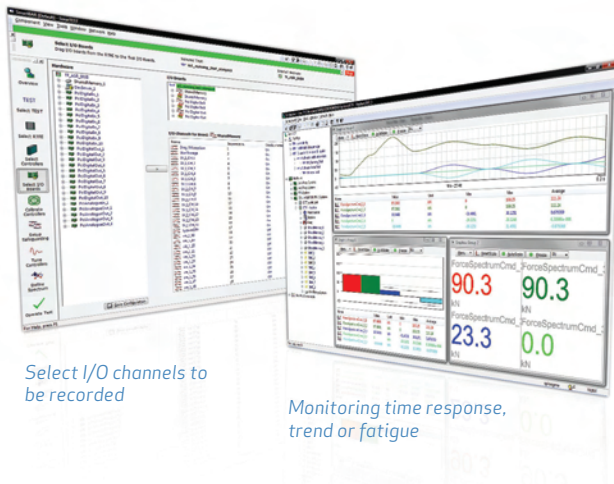
Various methods for transducer input calibrations are supported: end-to-end, multi-point transducer table and shunt calibration are among the options available. Export your calibration settings to Microsoft Excel® for easy backup. Transducer identification via TEDS is supported.

### Onboard DAQ functionality

- Online calculations—real-time calculations on test, control and external data available in shared memory to enable complex algorithms
- Control signal storage on the onboard hard disk (e.g., command data, load cell feedback, position feedback, following error, shared memory signals, etc.), exportable in ASCII format
- Time retrieve storage—storage of user and system actions for post-event analysis
- Real-time data export

### Interface to 3rd party DAQ

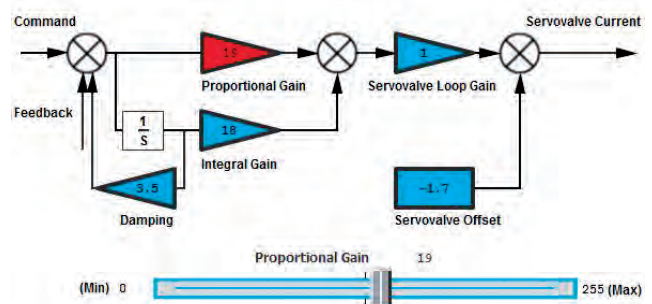
- Transfer of control and test signals to DAQ system (e.g., command data, load cell feedback, position feedback, following error, shared memory signals)
- Real-time synchronization—universal time stamp is used so that test and measurement data are exactly matched
- Activate DAQ commands such as data snap shots or continuous measurement
- Watch dog—continuously monitors DAQ communication and status (safety feature)
- Perform zero balancing of strain gauges
- Transfer of DAQ data to the Aerospace Test Software to be used in control loops (e.g., actual bending moment)
- Transfer of DAQ data to the Aerospace Test Software to be used for safe guarding, etc. (e.g., actual strain level)



## CONTROL LOOP ALGORITHMS

The unique Moog control loop can be configured through the aerospace test software, offering an extensive set of tuning parameters that can be adjusted to get the best performance possible out of your test rig set-up. The auto-tuning functionality saves your time to get your test rig operational.

With the unique force control loop, Moog has demonstrated comparisons at various OEM's a decrease in test set up time of approximately 50% due to a stable control loop and an increase of approximately 30% in testing speed.



Tuning control window



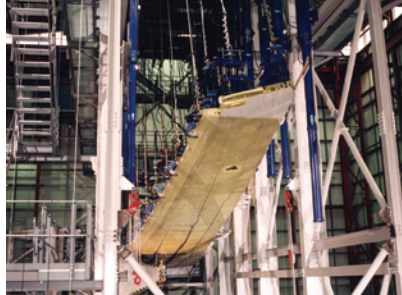
# ONE MOOG SOFTWARE, MANY APPLICATIONS

Test labs must adapt quickly to changing requirements when running different tests. Moog Aerospace Test Software allows you to develop successful tests that match your changing priorities, while protecting your investment in the test specimen.

The software adapts to the size of your test rig. Simple tests can be set up and expanded up to 500 control channels, allowing a wider range of applications while reducing set up time.



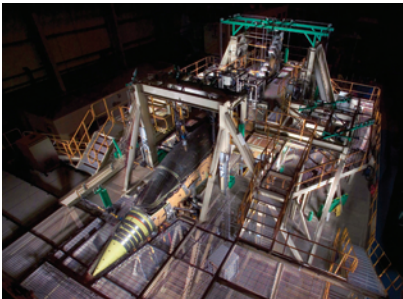
Static Wing Testing



Static Wing Testing



Landing Gear Testing



Full Scale Fatigue Testing



Full Scale Fatigue Testing



Fuselage Fatigue Testing

## MOOG TEST CONTROLLERS

### Advanced control in every application

Moog delivers the flexibility, innovation and trusted solutions you need for a smart approach to aerospace testing. The heart of all our solutions is the control hardware and software that sets the pace for the industry. Our feature-rich Aerospace Test Controllers are all based on user input and incorporate the innovations we have learned from working closely on demanding, high performance testing and simulation applications in labs and aerospace manufacturing facilities around the world.

### Advanced control in every application

**Advanced control technology**—Unique force loop model for exacting control and faster testing

**User-friendly operation**—For maximum flexibility in your test lab and minimum set up time

**Reliability/Traceability**—Easily configurable failsafe safety features to protect your valuable test articles and keep those testing going at all costs

**Networking**—You have the high-performance interconnect you need for current and future networking needs

**Value**—From new equipment to upgrades, you can add just the features you need. New equipment all backward compatible.

### Portable Test Controller

The Moog Portable Test Controller includes up to four servo control channels. The engineer can operate from a LCD front panel or external PC screen. It includes the Moog unique control-loop technology for force, displacement and acceleration control with bumpless transition.



# TAKE A CLOSER LOOK.

Aerospace test solutions from Moog are available around the world. For more information, visit our Web site or contact one of the locations below.

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