AeroPro™ Control and Data Acquisition Software

LEADING AIRCRAFT MANUFACTURERS WORLDWIDE USE **AEROPRO™ SOFTWARE**
TO STREAMLINE TEST SETUPS, SIMPLIFY THE ACQUISITION OF HIGH-QUALITY
TEST DATA, AND DRAMATICALLY ACCELERATE STRUCTURAL TESTS. THIS
SOPHISTICATED AND EASY-TO-USE SOFTWARE CAN PROVIDE THE SAME BENEFITS
FOR YOUR TEST PROGRAM.

The World's Most Advanced Aerospace Structural Testing Software

AeroPro Control and Data Acquisition Software from MTS opens exciting new possibilities for aerospace full-scale structural testing.

Based on the real-world needs of aerospace test professionals and incorporating unrivaled MTS expertise in precision force and motion control, AeroPro software accelerates your ability to define and run even the most complex tests. When using this software in your test lab, you will be employing the most advanced set of tools ever developed to reduce your testing time and get products to market faster.

Test programs that choose AeroPro software get more than just a static tool. They gain a dynamic, growing resource that keeps them on the cutting edge of technology for decades. As structural testing continues to evolve, let AeroPro software be your bridge to the future.

AeroPro software is designed to evolve along with your needs, continually setting new standards for aerospace structural testing speed and functionality.

Photo courtesy of NRC Canada

Integrated control and data acquisition

AeroPro software is the only structural testing software that supports up to 360 control channels and 10,000 data acquisition (DAC) channels from within a single, seamless user experience.

Test-accelerating control loop optimization

Gain unprecedented power and control over your tests with state-of-the-art software tools for optimizing control-loop functionality.

Streamlined test setup

A drag-and-drop interface, intuitive navigation and a variety of wizards speed test creation and configuration.

Real-time data display and sharing

AeroPro software makes it extremely easy to isolate, extract and securely distribute meaningful information from an "avalanche" of test data.

Broad hardware compatibility

AeroPro software is supported by both current and past MTS controller families, including high-channel-count FlexTest® models and the Aero ST™ and Aero-90™ control systems. To facilitate the access and usability of data, AeroPro software also supports leading data acquisition hardware.

Unrivaled service and support

When you choose AeroPro software to drive your aerospace structural testing, you will be tapping into the largest and most experienced service, support and consulting staff of any aerospace testing solution provider.

AeroPro software provides you with a sophisticated and productive means of creating and configuring even the most complex structural tests. Improve throughput and cost-efficiency by spending less time creating tests and more time running them, with software functionality that includes:

» A highly intuitive user environment

» An extensive collection of wizards and add-ins

» A database of constants

» The ability to import all test parameters
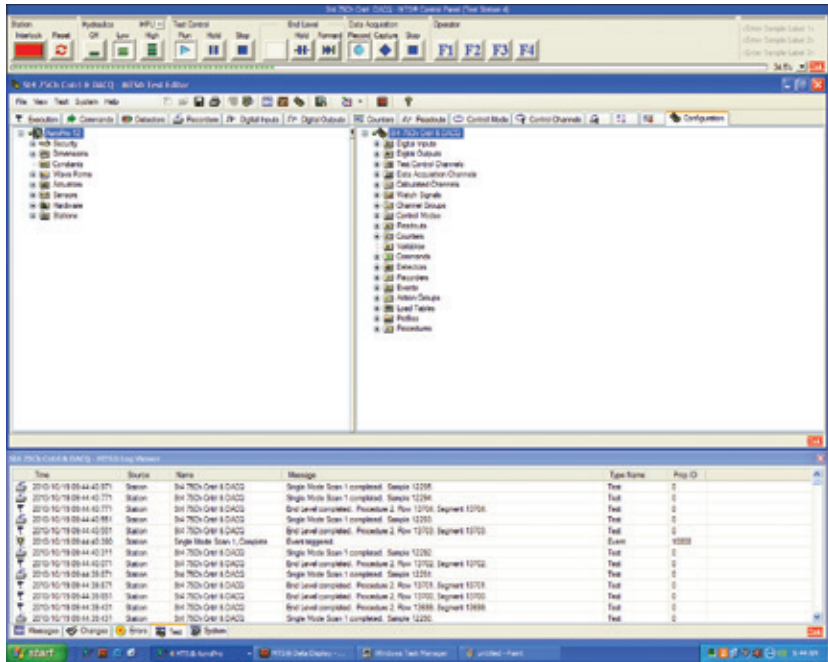
Intuitive drag-and-drop interface

An easy-to-use interface features a file-tree structure and drag-and-drop functionality with the familiar look and feel of Windows® Explorer. Most test setup and configuration tasks are accessible from the main window with a single mouse click.

The interface is highly customizable, including a software control panel that you can adjust to fit your needs. An extensive collection of powerful software wizards will assist you with most of the software's primary functionality, and you can create custom wizards to speed specific tasks. Users can take advantage of several prepackaged add-ins, or design their own with Visual Basic.net or C#.net.

AeroPro software also provides multi-level security and the ability to access test data remotely through a network or other secure connection.

Custom command scripts

Custom command scripts allow you to execute available system and control panel commands with the click of a mouse, or have them triggered by an event that occurs during testing. Use this capability to display custom messages, add messages to the test status, or send a message to your smart phone. You can even choose to control your hydraulic power unit directly from the AeroPro software control panel.

An easy-to-use, drag-and-drop interface adds unprecedented speed and simplicity to structural test creation and configuration.

Custom command functionality includes these powerful time-saving features:

» Performs shunt verification and calibration operations on all channels automatically

» Delivers results in an easy-to-understand sortable table format

» Efficiently groups channels and performs tuning operations in tables, eliminating the time-consuming task of tuning one channel at a time.

Signal-based command option

Signal-Based Command functionality offers significant time savings during both setup and testing by requiring fewer calculations. It automatically adjusts test loads to simulate the physical influences from external aircraft systems, such as wing flap, that operate independently from the control system during a structural test. This automated functionality adds realism to the test and ensures that loads are synchronized with the operational state of the aircraft.

Without the Signal-Based Command option, engineers are forced to account for the physical influences of external systems by manually adding calculations into the control loop. This manual process requires complex and time-consuming setup. In contrast, Signal-Based Command simplifies the entire process with a user-friendly setup wizard that efficiently walks you through the steps for creating a table and importing the values for the external system.

Signal-Based Command functionality is ideal for running MTS-controlled structural tests concurrently with:

» Iron bird tests

» Flight control gear validation

» Landing gear extraction/ retraction tests

» Autopilot validation

Custom waveform generation

Custom waveform generation capabilities allow you to easily refine tests and control end-level transitions with a waveform suited to a particular application. You can create up to two custom waveforms to be used as transitions between profile segments or as inputs for the function generator.

Test parameter import

AeroPro software makes tests easier to set up, relocate and repeat than ever before, thanks to greatly enhanced import and export functions that can handle every object or parameter in your test. A variety of wizards that make it easy for test engineers to import and export:

» Existing test profiles

» Load conditions

» Calculated channel configurations

» Historical calibration information

» System resource information and results data

Extensive event/action functionality

AeroPro software provides a wide selection of system events to initiate specific system actions. Digital inputs, treated as system events and defined as part of the system hardware resource, make it possible to quickly and easily assign event/action relationships.

Database of constants

Greatly simplify the development, input and editing of advanced equations with the AeroPro database of constants. This time-saving feature allows you to create and modify your own constants. Once the constants have been saved in the database, they can be added to tests as variables at any time.

This capability allows test engineers to repurpose complex equations by changing values in a few key variables. For example, when conducting a series of stress tests on several materials, you can choose to save your material properties as constants in your database. Each time you switch to a new material from that point forward, there's no need to rewrite equations. You can reuse the same test calculations simply by changing the material constant.

Do More, See More — All In Real Time

The advanced functionality of AeroPro software is not limited to test setup alone. It helps you reduce your actual testing time in a number of ways.

As DAC channel counts have increased, so has test program complexity. In response to this complexity, AeroPro software offers the world's most advanced toolset for speeding and simplifying the testing process.

Tightly integrated control and DAC

AeroPro software is the only aerospace structural testing software capable of integrating the operation and analysis of up to 360 control channels and 10,000 DAC channels into a single, unified user experience.

The software allows you to integrate real-time data on your control system interface, eliminating the need to toggle between interfaces. Significant time savings are achieved by the tool's ability to synthesize data while the test is running. This capability provides deeper insight into tests in progress, making it easier to meet certification standards and validate aircraft designs.

AeroPro software's integrated control and DAC functionality provides an automatic time stamp to facilitate combining data records from the slowest and fastest sources. Data integration is based on the nearest time stamp for minimal skew, and time stamps from each source are maintained in each record to facilitate utmost traceability and data integrity.

## Test-accelerating control loop and test optimization tools

AeroPro software features the industry's most advanced optimization tools designed to help you dramatically accelerate the capabilities and execution of your structural testing.

» Profile Segment Optimization (PSO), a standard AeroPro software feature, optimizes flight (profile) segment times to ensure the fastest possible test execution. This is achieved by monitoring errors between command and feedback during transitions, and adjusting transition times to improve the next playout of the same profile.

PSO will both speed up and slow down tests where needed to stay within pre-set error limits, allowing tests to run unattended for longer periods of time. PSO is an iterative process, so the more often a profile is run, the more streamlined transition times will become. Additionally, PSO can automatically adjust profile times to correspond with any changes in test hardware.
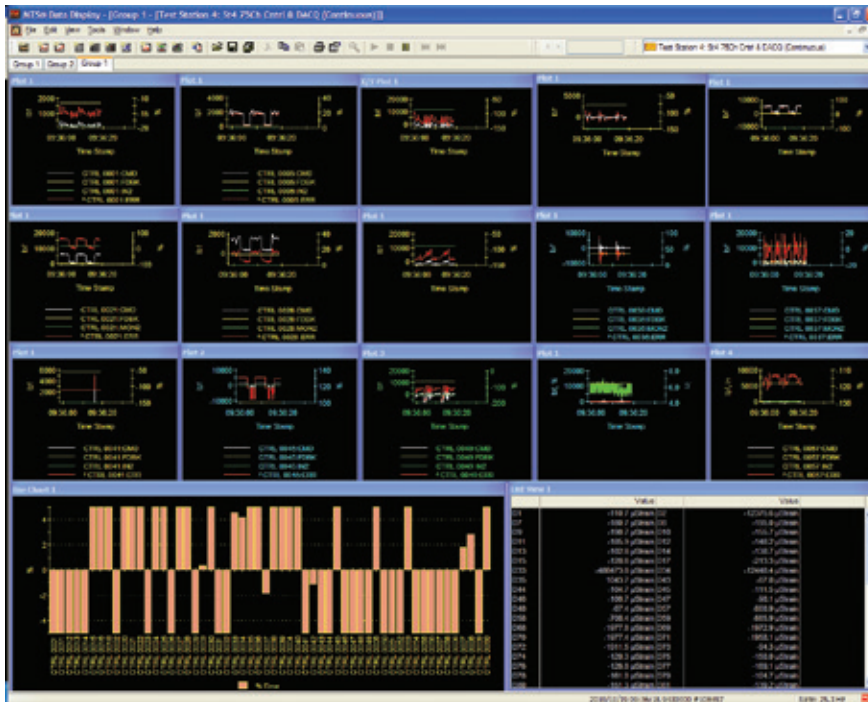

Monitor several channels simultaneously during test
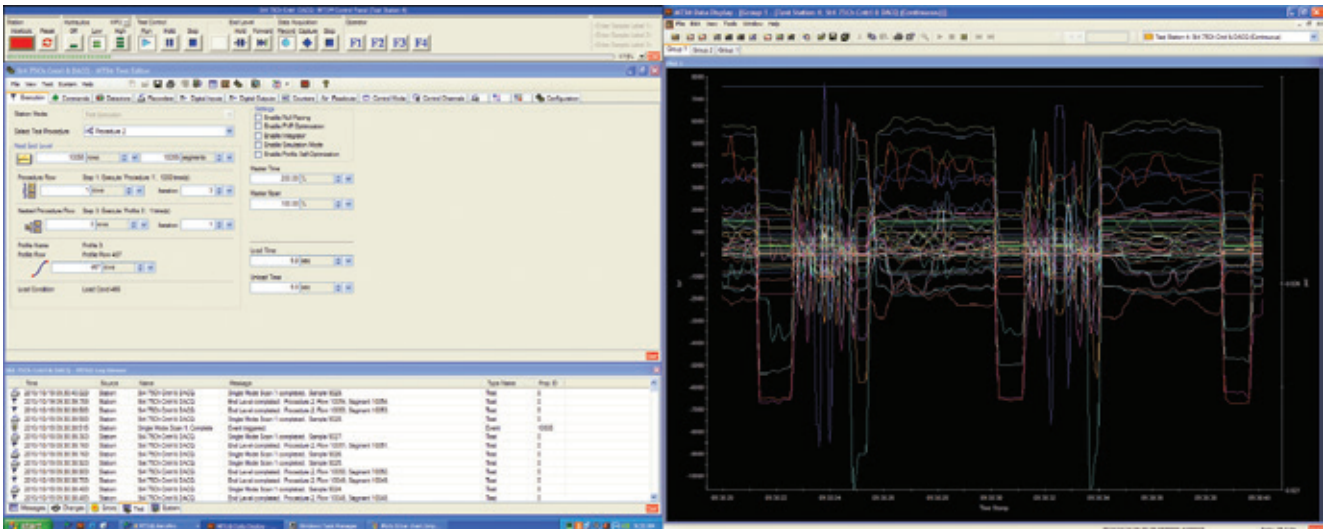
Real-time synchronization of control and DAC data

Optional control loop optimization tools

» Developed through a partnership between MTS and NRC Canada, an optional Cross-Coupling Compensation (C3) Performance utility dramatically accelerates structural tests with highly coupled actuation schemes, helping to identify potential issues earlier. C3 fully compensates for the influences of all actuators present without compromising accuracy or introducing additional strains on test articles, eliminating the need to input cross-coupling information manually and allowing the use of unit load cases to provide automated coefficient generation. The ability to calculate coefficients automatically allows technicians in the most resource-constrained environments to take advantage of this time-saving technology.

» The Forward Loop Optimization (FLO) capability allows you to dramatically improve the system performance of load control tests. FLO reduces test times through proprietary algorithms that improve channel stability and allow more aggressive tuning parameters. You can transition the test article between end levels more quickly without sacrificing accuracy.

» Calculations in the Loop functionality provides advanced users with unprecedented control by introducing mathematical equations and proprietary control functions into the control loop. This optional feature provides real-time flexibility to calculate inputs and outputs and manipulate signals based on current signals in the controller, allowing test engineers to consider physical realities that could not be addressed in the past.
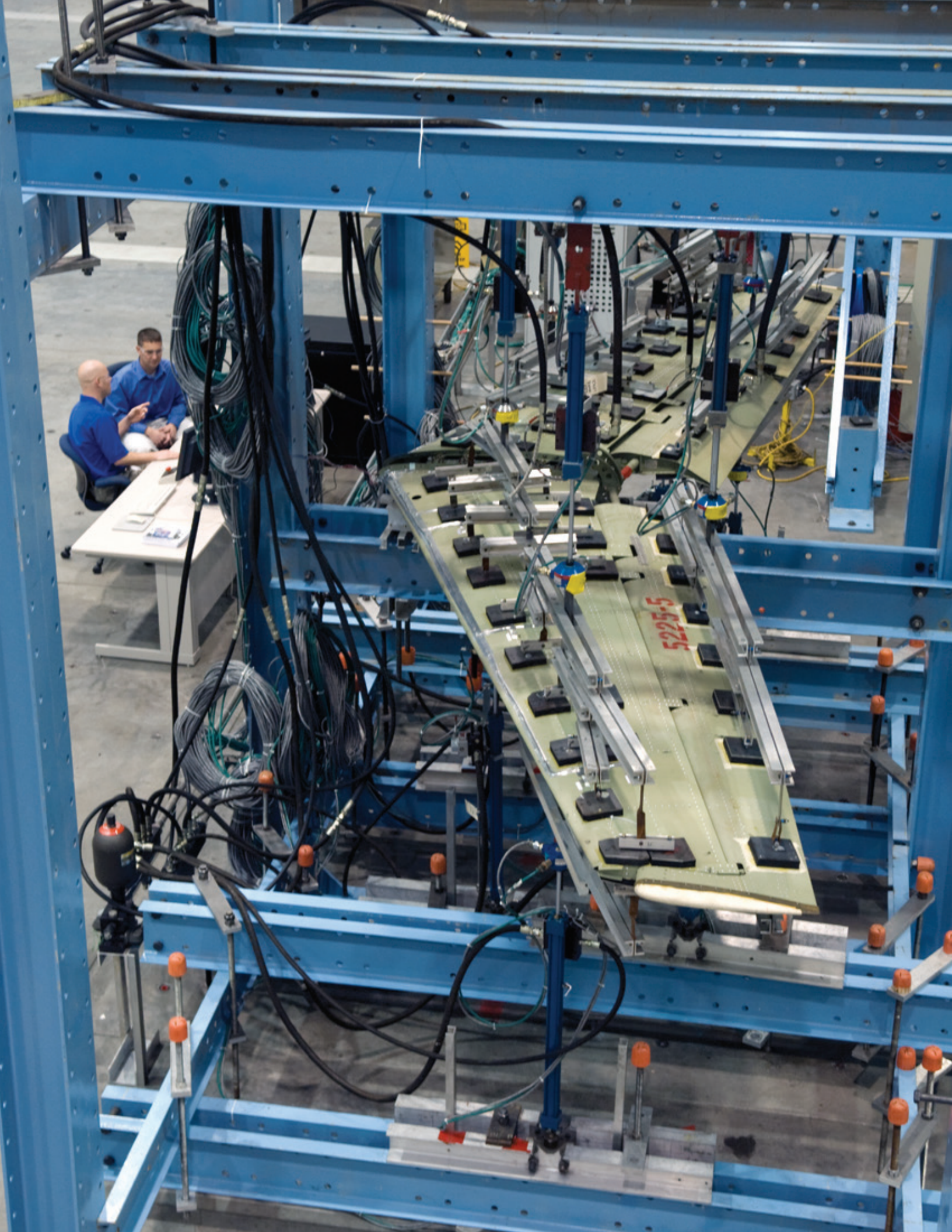
Easily display, interpret and share test data

As today's aerospace testing evolves to replicate service-based usage instead of simply validating design assumptions, the data demands placed on testing hardware and software have grown exponentially. This fact, combined with the luxury of high-density storage technology, presents the user with the challenge of managing an avalanche of available data.

With its high channel counts and enormous data analysis capabilities, AeroPro software can help you transform these challenges into opportunities. You can quickly run targeted queries across huge amounts of data to isolate the information that matters most to you, and make it accessible from any number of licensed workstations across your test lab, across town or even across the world via a secure network connection.

AeroPro software empowers you to view test status, scan data or continuous run-time data with multiple data types in a single display. Easily choose from hundreds or thousands of channels to display, while quickly organizing your information into time plots, bar charts, X-Y plots, tabular displays and more.

Streamlined exporting

Test results gleaned with AeroPro software can be easily exported into spreadsheets, such as Microsoft Excel®, tab-delimited files or Extensible Markup Language (XML). AeroPro software supports the popular server-client approach, which allows you to store test results on a central server for secure access by multiple users within a network. Many MTS clients leverage the client-server approach to display data across their network in real time.

Data reprocessing

An optional data reprocessor allows you to add dataset reprocessing capabilities to the AeroPro software data display application. Once you open a post-test workspace and select a dataset, you can use the data reprocessor window to conveniently create a derived data set, change the test tree and edit the data samples.

Compatible with Multiple MTS Controller Platforms

AeroPro software features compatibility across three generations of MTS digital controller platforms: FlexTest, Aero-90 and Aero ST.

The FlexTest family is based on a modular architecture that features uniquely field-upgradeable processors. To meet your growing control and data acquisition demands, these controllers deliver higher speeds, higher channel densities and multi-box capabilities (select models). They share common sets of hardware boards and user interface tools, simplifying test standardization and optimization. You can quickly reconfigure for new test setups without having to change controller hardware.

Extensive data acquisition functionality

AeroPro software offers the industry's most extensive data acquisition functionality to accommodate a wide variety of test applications and program budgets. The software supports data acquisition hardware from leading manufacturers, including HBM and VXI Technology, to meet your structural testing needs. You'll experience the same user interface for your controller and DAC which streamlines user training and allows you to collect data in the same format.

» **AeroPro-EX1629 Platform.**
Developed to leverage the full power of AeroPro software, this extremely capable DAC platform is well suited for up to 10,000 channels, and its modular, 48-channel design offers a versatile solution for scalable applications. It facilitates a high degree of software configurability, allowing you to create settings on a channel-by-channel basis. This platform is also easily rack-mountable and includes high data resolution, built-in bridge completion, built-in 16-bit digital I/O, advanced calculations within the hardware, and support for Transducer Electronic Data Sheets (TEDS). AeroPro software also enables the deployment of VXI E1529B and EX1629 hardware in the same test.

» **AeroPro-MGCplus Platform.**
This highly configurable DAC platform provides the flexibility and scalability to easily support low to high channel counts from within a proven, high-performance hardware platform. It is particularly adaptable, using eight-channel plug-in cards to easily address specific channel counts or sensor types. Functionality includes automatic lead wire resistance compensation for improved data integrity, along with TEDS support and flexibility to address all bridge completion resistance connections.

In addition, AeroPro software offers a Digital Data Interface (DDI) for integrating digital input from vehicle bus or onboard monitoring sources directly into the data acquisition stream.

Advanced active load abort technology

AeroPro software provides key control functionality to the MTS Active Load Abort (ALA) System. Active unloading is a helpful safeguard for test articles in the event of a power outage or mechanical malfunction (see page 5 for more information).

Unrivaled Global Service and Support

Leveraging decades of industry experience, MTS offers the most accessible and knowledgeable support, service, and consulting network in the global aerospace industry. We ensure fast, local, efficient service and support through locally managed offices around the world.

Composed of highly experienced test engineers and field service technicians, this network offers a complete range of services, including test assessment and diagnostics, routine maintenance, system lifecycle management and process optimization, all designed to increase your testing productivity and time-to-market performance.

Expert consultation and training

MTS consultants understand aerospace test requirements, and possess in-depth experience in designing both standard and custom testing solutions. Let MTS add value to your aerospace programs by helping you employ the most effective hardware, software and testing approaches based on your specific needs.

MTS aerospace consultants have the expert skills to help you achieve your goals for a wide range of test applications, including fixed-wing aircraft, rotary-wing aircraft, flight controls, and full-scale static and fatigue tests. We also offer comprehensive training – either at your facilities or at MTS – to help you take full advantage of your MTS technology.

Responsive field service

MTS service offers a proven means of maximizing your uptime and keeping you running as productively as possible. Extensively trained MTS field service engineers are strategically located around the world to provide prompt, technically competent responses to your needs, no matter where or when you need them.

Comprehensive customer support

Choose from a variety of support options to meet your needs. Whether providing assistance with test setup, answering questions about software, or just helping get the job done, our experienced support engineers can help you keep your lab running smoothly.

Convenient Software Support Plan (SSP)

As the needs of your industry continue to change, you can count on MTS to keep your AeroPro software on the cutting edge. The easiest and most cost-efficient means of keeping your software current is an MTS SSP agreement. Over time, this agreement costs less than purchasing upgrades and updates separately, and it makes your budget easier to manage with a low fixed cost.

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