



Aerospace Testing Solutions

be certain.

TO STAY COMPETITIVE IN A RAPIDLY EVOLVING INDUSTRY, AEROSPACE PROFESSIONALS NEED HIGH-QUALITY TESTING SOLUTIONS THAT DELIVER RELIABLE, ACCURATE, REPEATABLE RESULTS. BUILDING UPON DECADES OF CUSTOMER SUCCESSES, MTS IS THE PREFERRED CHOICE FOR AEROSPACE TEST LABS WORLDWIDE. **LET MTS HELP YOU REDUCE DEVELOPMENT COSTS AND BRING NEW PRODUCTS TO MARKET WITH SPEED AND CONFIDENCE.**



Keeping pace in an accelerating world



Driven by demands for more fuel-efficient aircraft, global compliance, and competition for regional routes, aerospace products are evolving at a rapid pace. Test professionals, working with advanced materials and technology, are challenged to quickly validate new designs while managing costs and protecting valuable test articles.

MTS can help you achieve these objectives with speed and precision. We offer a knowledgeable, dedicated team of aerospace and materials testing experts, along with a comprehensive array of proven products for testing materials, subassemblies and full-scale structures for commercial and military aircraft, helicopters and space vehicles. MTS experts are ready to work with you on any stage of your program; from lab design and equipment procurement through systems integration and test consulting.

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Expertise

With more than four decades of experience working with leading aerospace engineers, MTS has built a legacy of successful collaboration that touches every aspect of the aerospace industry. Your test program will benefit from extensive applications expertise, including proven skills in systems integration, test management and an ability to keep tests running at peak reliability and efficiency.

Support

Our unmatched service and support starts with dedicated aerospace engineering resources. MTS expertise extends to every stage of test program development — from project and facilities planning to system design and delivery, to lifecycle support and global service. We not only provide the right technology — we can seamlessly integrate subsystems to meet your specific testing needs. This approach protects your investment, maximizes test efficiency and increases uptime.

Breadth

MTS offers the industry's broadest array of high-performance test solutions for aerospace, incorporating best-in-class AeroPro™ software and digital controls, actuators, hydromechanical systems and accessories. MTS test systems deliver the features and performance you need to simulate real-world operating conditions and meet your testing goals. In addition to our comprehensive standard product offerings, MTS has unrivaled capabilities to create custom solutions.



Accelerate tests and generate accurate results



Testing full-scale aerospace structures is expensive, time consuming and complex. Success requires multidisciplinary expertise in mechanical and electrical design, hydraulics, measurement and control, test operation and program management. It also requires test professionals to run highly realistic tests as safely as possible, while minimizing test time and total cost.



MTS is uniquely equipped to help your team automate, simplify and accelerate structural testing. From static to fatigue testing and flight-by-flight spectrums to damage tolerance design verification, MTS is the only partner you'll need to accelerate your structural evaluations with confidence.

We help reduce test costs with systems that maximize ease of use, uptime and reliability. MTS also brings the necessary skills to integrate hundreds of control channels with thousands of data acquisition (DAC) channels, hydraulic systems, safety systems and cabin pressurization systems — so they all work together seamlessly in real-time. We have extensive experience developing and implementing control algorithms, filters, stable electronics and control software. As a result, we can help you cycle tests as quickly as possible while maintaining load accuracies. Our aerospace customers often exceed expectations for test cycle speed, saving considerable time and money. This efficiency not only reduces test costs, but helps discover fatigue issues sooner and often saves enough time to expedite certifications.



ENSURE TEST ARTICLE SAFETY

Nothing is more catastrophic to a test program than accidentally damaging the test article. Some potential causes include power failures, cut cables, failed load cells and transducers, and accidental overloads. To ensure the safest test possible, MTS controls incorporate multiple levels of error detectors, limit detectors and failure monitors.

We also offer passive and active technologies that safely remove energy from the test system in the event of a failure. Economical passive load abort manifolds release stored energy from each actuator independently. The Active Load Abort system provides the redundant controls and hydraulic logic required to unload energy from the test system and test article in a more controlled, synchronized manner.

Extensive capabilities for your test program

MTS offers a broad range of structural test solutions that enable aerospace test professionals to manage a complete spectrum of structural tests efficiently and cost-effectively:

- » Static and fatigue tests
- » Flight-by-flight spectrums
- » Damage tolerance design verification
- » Certification tests
- » Air loads calibration testing
- » Space vehicles & satellite hardware tests

Industry-leading test software

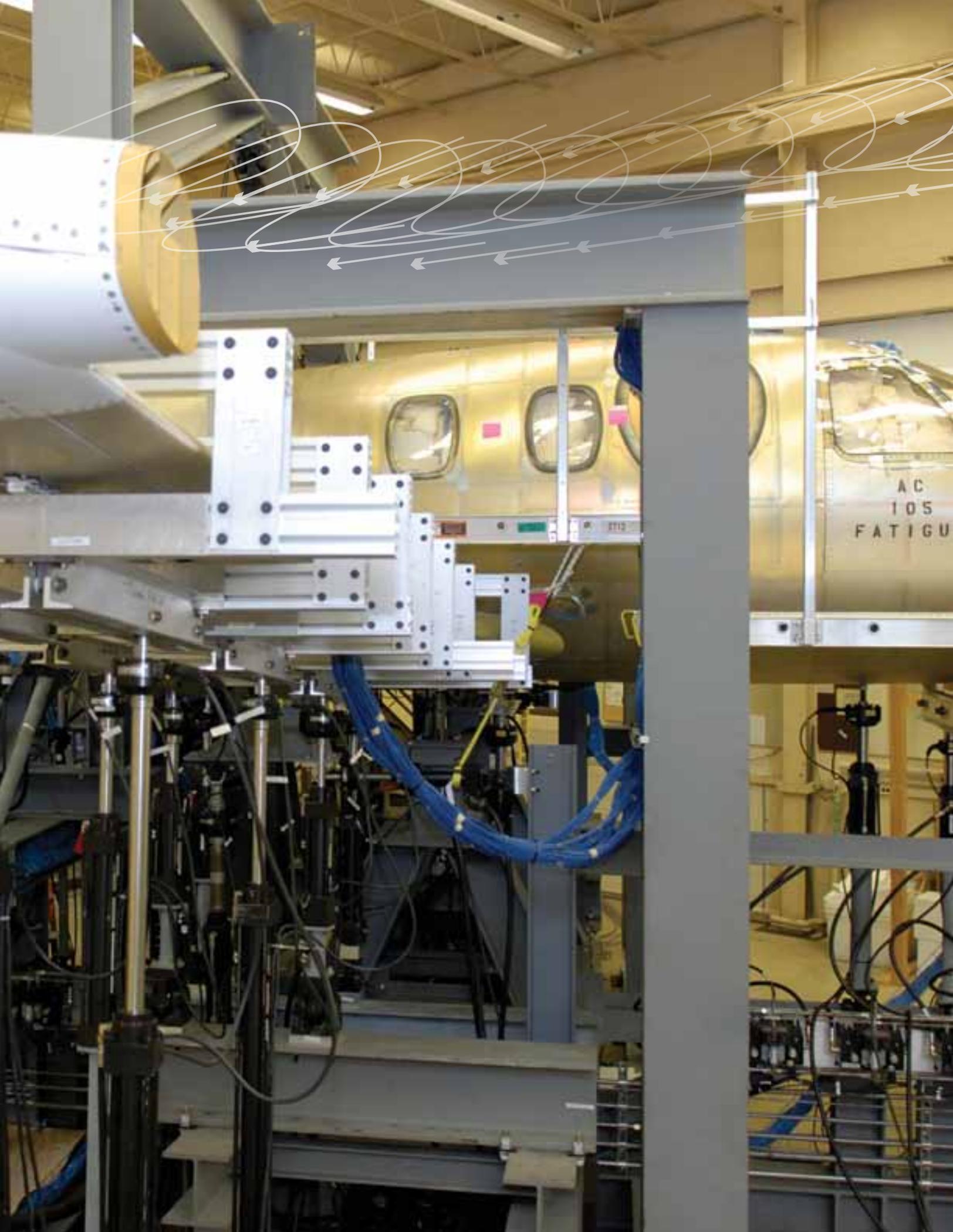
State-of-the-art AeroPro software, our flagship application for structural testing, seamlessly integrates control and data acquisition channels into a single, intuitive user interface, and equips you with the most advanced toolset of test-accelerating capabilities ever developed. Around the world, leading aircraft manufacturers use AeroPro software to streamline test setups, simplify the acquisition of high-quality test data, and dramatically accelerate structural tests while maintaining a high degree of confidence. It delivers all the features and functions that are critical to fast, accurate structural testing:

- » Integrated control and DAC
- » Test-accelerating control loop optimization tools
- » Streamlined test setup
- » Real-time data display and sharing
- » Live data visualization options
- » All data stored in the same file formats

Optimize power and distribution

MTS SilentFlo™ hydraulic power supplies will help you avoid large costs in plant infrastructure simply because they can keep your test environment below industry standards for sound pressure levels. Additionally, we can provide expert facilities planning services to help ensure the efficient performance of all hydromechanical components, and protect your long-term investment. These planning services span a wide range of disciplines, including:

- » Hydraulic power supply and distribution
- » Foundation and strong floor design
- » Floor plan efficiency
- » Hose and cabling schemes
- » Electrical power management
- » Materials and equipment handling strategies



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Evaluate performance quickly and precisely

Developing reliable components and subassemblies requires aerospace test labs to simulate high-force and extreme-temperature operating environments with precision and repeatability. High-quality test data is critical. It enables you to accurately define and run tests of more complex structures — such as airframes and propulsion systems — and accurately characterize performance earlier in the development cycle.

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VALIDATING NEW TECHNIQUES

One of the most promising areas of component testing for aerospace involves a technique for cost-effectively manufacturing composites that offer the same strength as aluminum structures yet weigh much less. Known as vacuum-assisted resin transfer molding (VaRTM), this process stands to redefine the role of composites in aerospace and significantly change fuel efficiency calculations for new aircraft.

MTS test systems help validate the quality and durability of parts fabricated using VaRTM through complex subcomponent fatigue testing, including strain surveys, fatigue spectrum tests and design limit load (DLL) verification. The expertise gained in these tests can be applied to other new and emerging manufacturing techniques, enabling faster development of lighter, stronger aircraft components.



MTS offers an array of proven, integrated component and subassembly test solutions composed of powerful control and data acquisition software, test application software, versatile controllers and reliable hydromechanical systems. Our aerospace customers leverage these offerings to acquire high-integrity test data at every stage of product development, and to characterize the strength, performance and durability of components and subassemblies.

From this extensive portfolio, MTS can configure the right test solution for virtually any need, whether you need to integrate the specimen with the aircraft or test a specimen in a standalone fixture or frame. Either way, MTS has the components and skills to help you deliver optimal results.

Broad range of applications

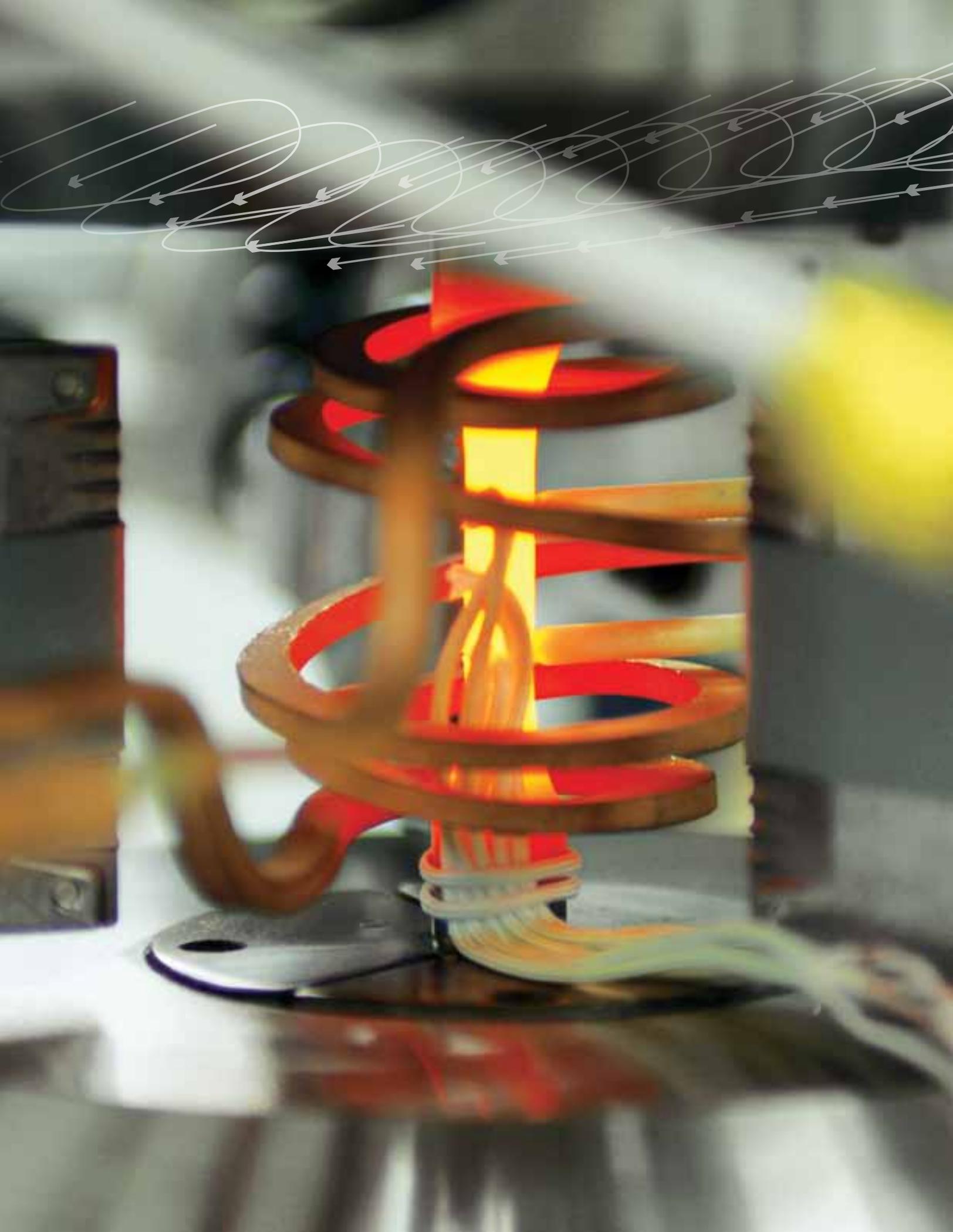
Backed by more than four decades of experience, MTS can help aerospace test professionals design, implement and fine-tune testing solutions for component and subassembly applications with speed and cost-efficiency.

AIRFRAMES

- » Primary structures
- » Flight control surfaces
- » Substructures
- » Landing gear
- » Satellite and space system components
- » Flight control systems
- » Propulsion system components
- » Helicopter components
- » Aircraft fasteners and fastened substructures

PROPULSION SYSTEMS

- » Engine mounts, shafts, fan blades, disks
- » Fairings, shrouds, nacelles, thrust reversers
- » Helicopter blades and rotors
- » Rocket components



Drive innovation even further

Around the world, aerospace manufacturers face intense pressure to increase the fuel efficiency of gas turbine-powered jet engines. Even relatively small incremental improvements will pay huge dividends in the form of lower operating costs and decreased emissions. Much of the research in this arena is focused on rigorously testing new materials that will perform reliably at high temperatures for extended periods, allowing the next generation of turbines to run hotter.

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MTS supports advanced materials testing applications for aerospace with an extensive array of proven solutions. We understand complex materials tests, which often require precise characterization of material behavior under exacting mechanical loads in high-temperature environments, and incorporate multiple methods of correlated data acquisition. We can also help your team optimize manufacturing processes or conduct quality control checks of finished materials and components.

No other test solutions partner offers a stronger combination of technology and expertise than MTS. Rely on our solutions to simulate and control real-world forces, motions and environmental conditions, perform both static and fatigue testing with exceptional efficiency, and obtain meaningful information about superalloys, ceramic matrix composites, ceramic coatings and other materials with extreme precision and repeatability.

Comprehensive application support

Turn to MTS for the testing systems and applications expertise you need to characterize a wide variety of innovative materials, including:

- » Metals and superalloys
- » Monolithic and composite ceramics
- » Ceramic matrix composites
- » Ceramic thermal barrier coatings
- » Metal matrix, carbon fiber and polymer composites
- » Resins
- » Propellants

High-temperature testing

MTS delivers the technology, service and industry-specific expertise aerospace test professionals need to perform a full spectrum of high-temperature materials tests. These high-temperature testing solutions leverage decades of industry collaboration and field-proven technology, so you can test with more confidence. MTS also brings expertise that comes only from experience, which translates directly into higher efficiency for your test program. We can help you perform complex systems integration, suggest alternative configurations and validate setups, enabling your team to fulfill its role in a highly orchestrated development schedule.

On the path to innovation, high-temperature test engineers must constantly address new challenges. MTS is the right partner for achieving this goal with speed and flexibility. We design our systems to adapt easily to new requirements — so your MTS solution will remain a viable platform as you add tests that require even higher temperatures and forces. Our global team can also work with you to consider the implications of new tests, ensuring accurate, repeatable results for every test you devise.

Your proven partner for aerospace testing and simulation

MTS offers the broadest range of hardware, software and accessories for aerospace testing. Our complete portfolio includes standard and custom products that can be integrated into complete solutions for virtually any application. MTS also provides high-quality components, accessories and software tools so you can develop your own in-house, specialized systems.



SUPERIOR SERVICE AND SUPPORT

When you choose MTS, you gain a testing partner that thrives on collaboration. We listen closely to your requirements before working with you to develop the best solution for your individual needs. We back every solution with a global network of systems engineers, applications engineers and field service engineers who remain available when and where you need them.

- » Expert consultation and training
- » Responsive field service
- » Comprehensive support

Software

AeroPro Control and Data Acquisition software is a highly effective and intuitive tool for defining and running structural, component and subassembly tests. Its powerful interface efficiently manages both control and data acquisition functions, supporting a large number of channels and offering a broad array of live data visualization options. Designed to give aerospace labs a distinct competitive advantage, AeroPro software helps reduce test operation time and provides a variety of advanced test optimization techniques.

Aerospace test professionals prefer MTS TestSuite™ software for general-purpose component and material testing. This modular software platform is especially well-suited to aerospace testing applications because it provides the utmost flexibility to accommodate both standard and completely customized tests. With optional ready-made modules for low-cycle fatigue, high-cycle fatigue, thermomechanical fatigue, fracture toughness, fatigue crack growth and tension testing, you can easily test to current engineering standards. For non-standard tests, you can see and modify calculations to meet your specific needs. Whether you are conducting tests to validate material performance to a specific standard or are evaluating new hypotheses about material behavior under certain conditions, or both, MTS TestSuite software provides the single, powerful solution for test design and execution.

Controllers

Versatile FlexTest® digital controllers allow you to define and automate virtually any material, component or structural test. These controllers deliver higher speeds and channel densities to keep pace with evolving test demands. They also share common hardware boards and user interface tools, simplifying test standardization and optimization. Their multi-box capability and uniquely field-upgradeable processors let you address changing requirements in the most cost-effective manner. The FlexTest family includes:

- » FlexTest 40 4-channel 1 or 2 stations standalone
- » FlexTest 60 8-channel 6 stations standalone
- » FlexTest 100 16-channel 8 stations multi-box capable
- » FlexTest 200 40-channel 8 stations multi-box capable

FlexTest controllers run the full array of MTS application software, including AeroPro software for structural testing and the MTS TestSuite platform for component and materials testing.

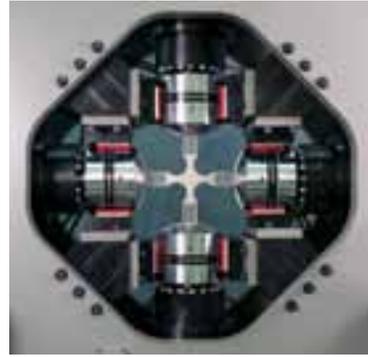


FlexTest Controllers



Load frames

MTS servohydraulic load frames help meet a wide range of aerospace testing needs. Standard MTS Landmark® test systems and high-force Model 311 load frames allow you to perform monotonic and fatigue testing across a wide range of forces. For highly complex multiaxial loading conditions that realistically simulate actual jet engine operating environments, we offer planar biaxial test systems.



COMPLEX INTEGRATION EXPERTISE

Drawing on decades of experience implementing complex test configurations, MTS helps aerospace test professionals reduce risk, increase confidence and optimize efficiency. We understand the critical issues related to system integration, and we make sure all components work in sync and deliver expected performance. Here are two sample configurations of typical testing applications in aerospace:

Full-scale structural

- » FlexTest controls
- » AeroPro software
- » Fatigue-rated actuators
- » Data acquisition systems
- » Safety systems
- » Hydromechanical systems
- » Structural pressure test controller (SPTC)

Materials

- » FlexTest controls
- » MTS TestSuite and MPT software
- » MTS Landmark and Model 311 load frames
- » Grips, chambers, fixtures and extensometers
- » Planar biaxial test system
- » Hydromechanical systems

Accessories

MTS provides a full line of fixtures, grips, extensometers and environmental simulation systems to support complex component and materials testing for aerospace. The range of choices makes it easy to configure the ideal solution for your specific requirements.

Create your own solution

MTS offers a full gamut of high-quality components, accessories and software tools that make it easy and cost-effective to build your own testing systems in-house.

Reliable hydromechanical products

Clean, quiet SilentFlo hydraulic power units (HPUs) can be located right in the lab, which eliminates the cost of special pump rooms and expensive, high-flow hardlines. They are now available with optional networkable monitoring so that you can view the HPU operating condition from the control room or anywhere within your network. MTS hydraulic service manifolds (HSM) control and distribute hydraulic flow to test stations, enabling smooth pressure transitions and providing isolation between test stations. Fatigue-rated servo-actuators designed specifically for servohydraulic testing applications, enable precise control across a wide variety of force ratings and stroke lengths.



SilentFlo™ Hydraulic Power Units and 201 Acuator

Learn more today

Contact us for more information about how MTS can help you improve and accelerate aerospace product development.



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