

SEISMIC SIMULATION



MTS SEISMIC TESTING SOLUTIONS



be certain.


LEVERAGE SUPERIOR
MTS TECHNOLOGY AND
DECADES OF SEISMIC
TESTING EXPERTISE TO
PERFORM ACCURATE AND
RELIABLE EARTHQUAKE
QUALIFICATION AND
SIMULATION




MTS SEISMIC SIMULATORS

Across the globe, civil engineering researchers rely on MTS simulation technology and expertise to accurately replicate earthquake ground motions in laboratory settings. They deploy MTS seismic simulators to evaluate the behavior of everything from small structural components to full-scale structures under true earthquake conditions. These robust uni- and multi-axial systems help governments and research organizations ensure the safety, durability and reliability of buildings, bridges and a wide array of other civil structures.



Conceptual drawing  of six degree of freedom seismic simulator facility.

Structural integrity  test, simulating supported loads and earthquake ground motions.

FULL SIX DEGREE-OF-FREEDOM SEISMIC SIMULATORS

MTS' premier seismic simulators provide a full six degrees of freedom that recreate the true conditions of a real earthquake. Featuring a compact design, these systems minimize your laboratory size requirements. These shaking table systems are specially designed to meet your specimen size and dynamic motion requirements.

SPECIAL-PURPOSE SEISMIC SIMULATOR SYSTEMS

MTS Special-purpose Seismic Simulators are designed to evaluate specimens that are either too large for other simulators or specimens that can be evaluated with fewer degrees of freedom. A special-purpose simulator can be more economical than a full six degree of freedom system.

» BIAXIAL BRIDGE TESTING

For one customer, MTS developed a two-degree-of-freedom, multiple-simulator system for testing multi-span bridge structures.

» UNIAXIAL WALL TESTING

MTS met the unique requirements of one customer by designing a one-of-a-kind uniaxial solution for testing full-scale wood wall structures. This system simulates gravity and inertial loading under the influence of a seismic event.



« Economical uniaxial seismic simulator for basic research and component qualification testing.

Uniaxial seismic damper test system for evaluating full-scale bridge isolators. »



» SEISMIC DAMPER TESTING

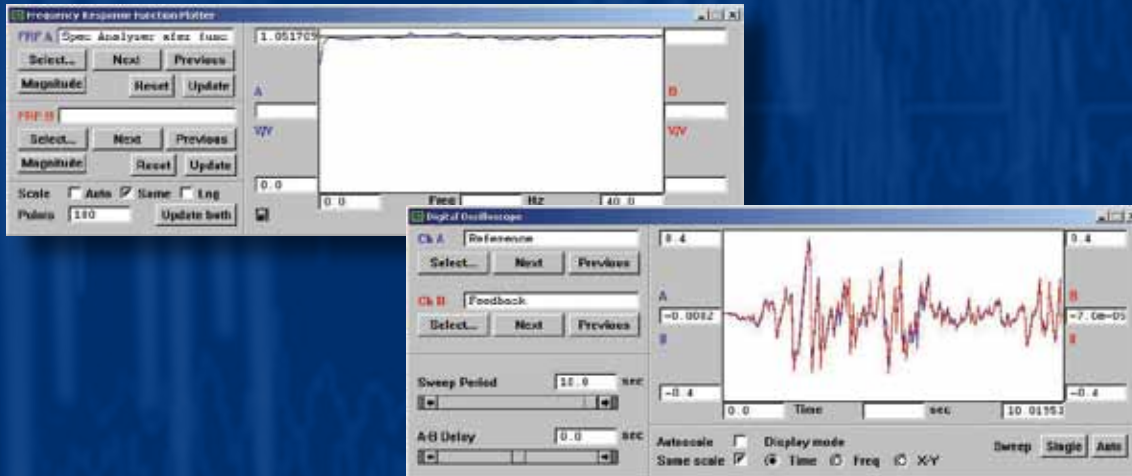
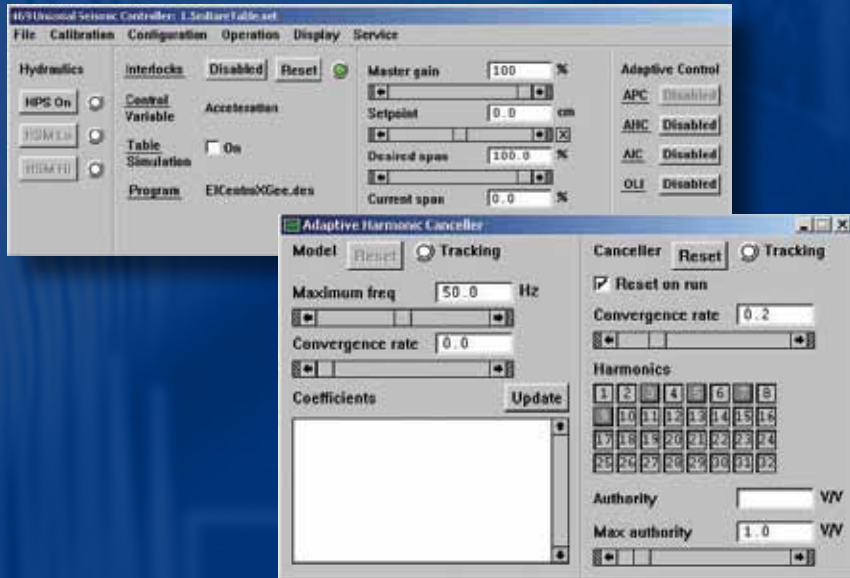
MTS developed a seismic damper test system to evaluate full-scale bridge isolators used to support bridges and protect them from the destructive forces of earthquakes. This system tests large elastomeric pads and friction pendulum surfaces.

NEW – UNIAXIAL SEISMIC SIMULATORS

MTS 1.5 and 3.0 meter Uniaxial Seismic Simulators evaluate the performance of structures during earthquake conditions with superior quality and reliability, at a lower price than comparable systems. MTS Uniaxial Seismic Simulators offer compact, safe, and integrated solutions for your lab's growing seismic testing needs. These systems are ideally suited for:

- » Performing basic research and component qualification tests.
- » Quick installation and integration into existing systems.
- » Testing that does not require the unique performance of custom-designed systems.





SEISMIC APPLICATION SOFTWARE

MTS Seismic Control Software provides a user-friendly interface for system tuning, test set-up and operation, and data acquisition. MTS Seismic Control Software is the only package available that offers high-fidelity, high-bandwidth adaptive control for earthquake waveform reproduction.

MTS Seismic Control Software offers the following important advantages:

- » High-level fixed control techniques to ensure high-fidelity waveform reproduction across the wide bandwidth and complex motion of an earthquake.
- » Patented MTS adaptive control techniques to further improve simulation fidelity by compensating for the changing dynamics of the specimen and the system.
- » Command function generation including cyclic, random, sweep, earthquake files and external control (digital/analog).
- » Advanced data handling, including a digital oscilloscope, real-time spectrum analyzer, and data acquisition of all internal and external signals.

MTS SEISMIC CONTROLLERS

Dependable, state-of-the-art MTS Seismic Controller technology is incorporated into all MTS Seismic Simulators. These controllers are optimized for seismic simulation, enabling advanced control and data filtering operations.

For full six degree-of-freedom simulators and special-purpose simulators, MTS Seismic Controllers are designed to reliably operate multiple actuators simultaneously. Tremendous processing power and coordination is used to reproduce the exact conditions of an earthquake in all the required directions.

Several improved features of MTS Seismic Controllers are now available:

- » An expanded effective frequency range for adaptive control techniques to 100 Hz.
- » Enhanced force balance control to improve the vertical load and over-turning moment capacity on multiple degree-of-freedom systems.
- » Improved compensation for hydraulic power storage and delivery.



Affordable uniaxial controllers employ the same technology as the larger systems, but are efficiently packaged to control only a single actuator. Uniaxial controllers can be located near the seismic simulator and easily relocated with changing test setups.



« Custom uniaxial system for testing full-scale wood wall structures.

Six degree of freedom hybrid bridge simulator combines mechanical test with real-time computer simulation. »

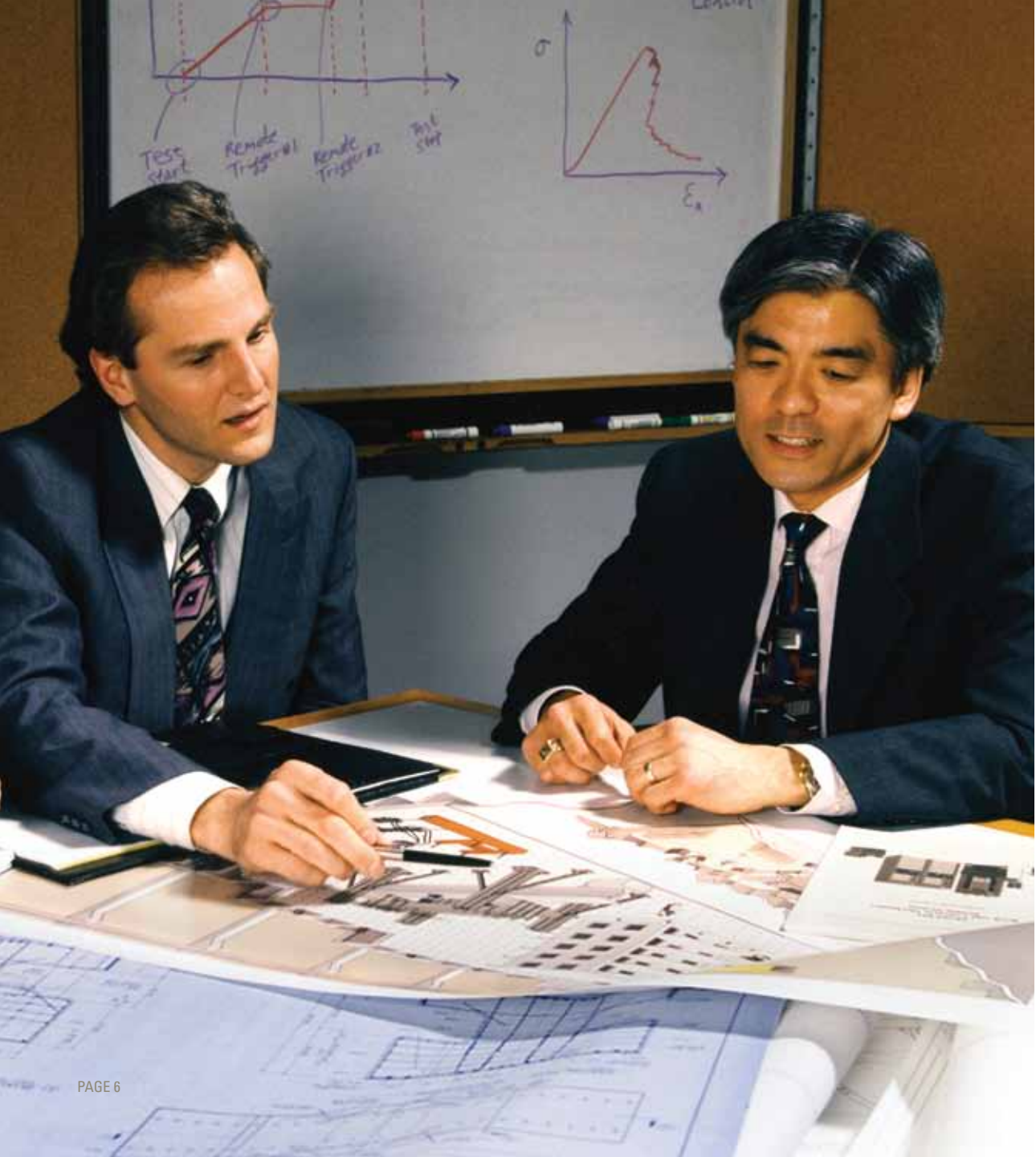


NEW – MTS HYBRID SIMULATION

MTS Hybrid Simulation combines test-based seismic simulation experiments of substructures with real-time computer simulations of the remainder of the structure. Each portion of MTS Hybrid Simulation occurs simultaneously, and information is shared real-time via reflective memory technology. This provides a more complete picture of how earthquakes can affect large structures such as buildings and bridges without physically testing the entire structure.

MTS SEISMIC TEST EXECUTION SYSTEM (STEX)

Frequency response analysis of test specimens is accomplished with MTS Seismic Test Execution System (STEX). This is an optional software component, specifically designed for analysis of civil structures subjected to earthquake conditions. STEX also provides an additional adaptive control technique to further ensure simulation fidelity.



CONSULTING, SERVICE AND SUPPORT

MTS fields the largest, most experienced consulting, service and support staff of any test and simulation solutions provider. Deployed worldwide, they work to maximize your test lab's effectiveness, efficiency and productivity.

» CONSULTING

In close collaboration with our expert consultants you'll design a high-performance, cost-effective lab that maximizes your test equipment investment. The comprehensive array of MTS consulting services cover full lab planning, foundation and design, reaction mass specifications, hydraulic power delivery and master control rooms.

» SERVICE AND SUPPORT

MTS continues to serve its customers long after system delivery and installation. We provide a broad range of services to ensure optimum seismic simulation system reliability and longevity. Worldwide MTS field service experts deliver rapid on-site service and telephone support. Using comprehensive training programs, MTS gives you the technical knowledge and skills you need to get maximum benefit from our equipment. To maximize the life of your MTS test equipment, we offer extended warranties, software support, and upgrade programs.

HIGH-PERFORMANCE MTS HYDRAULIC POWER UNITS

MTS offers hydraulic power units designed to meet the high power requirements of seismic simulation. MTS will work within your local circumstances to determine the best solution for hydraulic power. Examples of solutions include:

- » Powerful hydraulic pumps and large accumulator systems
- » High pressure blow-down accumulator systems for high performance
- » Diesel pumps when electric power is expensive or unreliable

For smaller seismic simulators, MTS SilentFlo™ units are amazingly quiet, highly efficient, and easy to operate.



« Six degree of freedom underwater table system for offshore earthquake simulation.

Large outdoor uniaxial simulator, upgradeable to six degrees of freedom. »



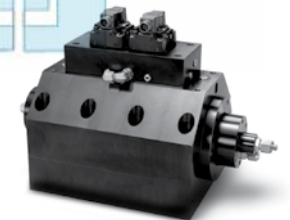
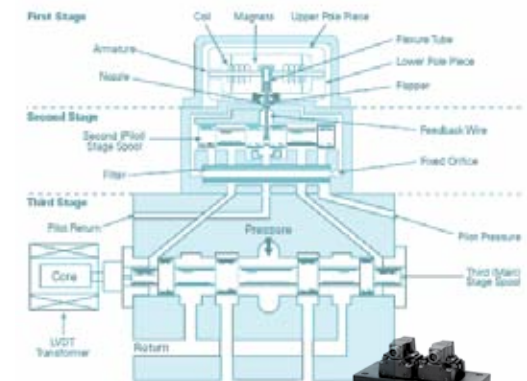
MTS ACTUATORS

MTS actuators, designed for high performance and compactness, are recognized worldwide for their performance and quality. MTS ensures high-fidelity seismic simulation by incorporating polymeric or hydrostatic bearings, stiff piston rods, and patented swivels throughout its actuator designs. Hydraulic cushions protect each actuator from an unlikely, but damaging, overload condition.



MTS SERVOVALVES

MTS proprietary servovalves are designed to provide high-frequency and high-flow seismic simulation capabilities, while providing good low-level response. The 256 series 3-stage valve features unmatched capacity and controllability.





REGIONAL BUSINESS CENTERS

THE AMERICAS

MTS Systems Corporation
14000 Technology Drive
Eden Prairie, MN 55344-2290

USA

Toll Free 1-800-328-2255
Fax: 1-952-937-4515
E-mail: info@mts.com
Internet: www.mts.com

MTS Systems Corporation
14000 Technology Drive
Eden Prairie, MN 55344-2290 USA

ISO 9001 CERTIFIED

MTS is a registered trademark and SilentFlo is a trademark of MTS Systems Corporation. RTM No. 211177.

©2006 MTS SYSTEM CORPORATION
100-164-239 SeismicSolutions PRINTED IN U.S.A 4/06

EUROPE

MTS Systems France
BAT EXA 16
16/18 rue Eugène Dupuis
94046 Créteil Cedex
France
Telephone: 33-1-58 43 90 00
Fax: 33-1-58 43 90 01
E-mail: contact.france@mts.com

MTS Systems GmbH

Hohentwielsteig 3
14163 Berlin
Germany
Telephone: +49-30-81002-0
Fax: +49-30-81002-100
E-mail: euroinfo@mts.com

MTS Systems S.R.L. socio unico

Corso Cincinnato, 228/b - 10151
Torino
Italy
Telephone: 011 45175.11 sel. pass.
Fax: 011 45175.00-01
E-mail: mtstorino@mtsitaly.com

MTS Systems Norden AB

Södra Långebergsgatan 16
SE-421 32 Västra Frölunda
Sweden
Telephone: 46-31-68-6999
Fax: 46-31-68-6980
E-mail: norden@mts.com

MTS Systems Ltd. UK

Brook House
Sommerford Court
Sommerford Road
Cirencester GL7 1TW
Glos. -United Kingdom
Telephone: +44-1285-648800
Fax: +44-1285-658052
E-mail: mtsuksales@mts.com

ASIA/PACIFIC

MTS Japan LTD
ArcaCentral Bldg. 8F
1-2-3 Kinshi, Sumida-ku
Tokyo 130-0013
Japan
Telephone: 81-3-6658-0901
Fax: 81-3-6658-0904
E-mail: mts-jinfo@mts.com

MTS Korea Inc.

5th Floor, Core Building
8-1 Sunae-Dong, Bundang-Gu
Seongnam City,
Gyeonggi-Do 463-825,
Korea
Telephone: 82-31-714-7151
Fax: 82-31-714-7198
E-mail: mtsk-info@mts.com

MTS Systems (China) Co., Ltd.

Building 23, No.481,
Guiping Road
Shanghai 200233,
P.R.China
Telephone: 86-21-5427 1122
Fax: 86-21-6495 6330
E-mail: info@mtschina.com