be certain.
IMPROVE YOUR TESTING EFFICIENCY AND MAXIMIZE SYSTEM PERFORMANCE WITH MTS TRAINING. THESE EXPERTLY LED COURSES PROVIDE HANDS-ON LEARNING TO MAKE SURE YOU ARE THOROUGHLY FAMILIAR WITH YOUR TEST SYSTEMS AND KNOW HOW TO OPERATE THEM EFFECTIVELY. IN ADDITION TO A BROAD SELECTION OF STANDARD COURSES, MTS CAN CUSTOMIZE COURSES TO MEET YOUR SPECIFIC LAB NEEDS AND DELIVER THE TRAINING AT OUR TRAINING CENTER OR YOUR WORKPLACE.
Course Selection

Overview

As your partner in successful testing, MTS provides in-depth, focused training on the operation of the products you have purchased. We offer classroom training in three Regional Training Centers, located in the USA, Korea, and Germany.

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<thead>
<tr>
<th>Test System Operation &amp; Application Theory Courses</th>
<th>AMERICAS TRAINING CENTER</th>
<th>ASIA TRAINING CENTER</th>
<th>EUROPE TRAINING CENTER</th>
<th>GROUND VEHICLES</th>
<th>BIOMEDICAL</th>
<th>GEO &amp; CIVIL ENGINEERING</th>
<th>MATERIALS</th>
<th>AEROSPACE (STRUCTURAL &amp; COMPONENT)</th>
<th>PAGE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTS Hardware &amp; Analog Controllers*</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Damper Test System Operation</td>
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<td>Durability Testing Technology</td>
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<tr>
<td>Elastomer Testing on Controllers with MTS Series 793 Software</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<td>Measurement Uncertainty *</td>
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<td>Test Rig Design</td>
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<td>Materials Test Lab Management</td>
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<table>
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<tr>
<th>Software Operation Courses</th>
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<tbody>
<tr>
<td>MTS Hardware Concepts &amp; Series 793 Software</td>
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<td>MTS Series 793 Advanced Software Operation</td>
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<td>MTS Series 793 Software with MultiPurpose TestWare® (MPT™) Test Design</td>
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<td>MTS MultiPurpose TestWare (MPT) Software*</td>
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<tr>
<td>MTS Series 793 Software with MTS TestSuite™ (mpe) Test Design</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>MTS TestSuite Multipurpose Elite (mpe) Software</td>
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<td>MTS TestSuite TW Elite (TWE) Software</td>
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<td>MTS TestWorks™ 4 Software</td>
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<td>AeroPro™ Operator*</td>
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<td>AeroPro Administrator*</td>
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<td>Fatigue &amp; Fracture with MTS TestSuite (mpe) Software</td>
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<td>Component RPC Pro Software Operation</td>
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<td>RPC Pro Software Operation</td>
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<tr>
<td>RPC Pro Advanced Software Operation</td>
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<tr>
<td>Combined RPC Pro Operator &amp; Basic RPC Pro Fatigue</td>
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<td>✓</td>
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Training/Consulting Package

MTS TestSuite TWE Training/Consulting Package

(2 days software training plus 2 days consulting, on custom test methods) 19

RPC Pro Software Training Course Comparison

Comparison Charts 28-29

* Not regularly scheduled, but available on request.
To register for an MTS training course, call the appropriate Regional Training Center.

- Americas Training Center 1-952-937-4000
- Asia Training Center +82-31-714-7151
- Europe Training Center +49-30-81002-222

Training course schedules are available online at www.mts.com.

Confirmation
MTS will send you written confirmation of your course registration. Prices for standard courses include tuition, text materials, class supplies, classroom refreshments, and lunch. All other expenses are the responsibility of the student.

Cancellation policy
MTS reserves the right to cancel a class if there is not sufficient registration four weeks prior to the start date of the class. MTS will not reimburse any prearranged travel-related expenses if a class is cancelled.

If you cannot attend the course after you have registered, you must cancel your registration at least one week prior to the start of the course. Persons who do not attend a course and who do not cancel their reservations will be assessed a non-notification of cancellation fee.

Customized training
If you have specialized needs requiring custom training, MTS can help. MTS has a large staff of engineer trainers with a wide range of experience. In many cases, customized training may be combined with a solution to an issue you may be experiencing.

Please contact MTS for a quote for your custom training requirements.

Training at your facility can be more cost effective
If you have a large group needing training, consider the cost effectiveness of having MTS provide training at your facility.

MTS will deliver any course at your facility. Please see price list for base rates that include tuition, text materials, and all other classroom supplies for the students.

You are responsible for providing all hands-on training equipment, classroom facilities, and training aids such as projectors.

Benefits of Onsite Training
- More economical for groups of four or more.
- Often provides answers to the specific questions facing your company.
- By using your equipment for the hands-on training, the students learn exactly how to use their testing system configuration.
- Scheduling flexibility can resolve shift work and other group logistics issues often associated with larger groups.
This training course is designed to introduce and familiarize the students with the correct operational techniques for efficient setup and operation of MTS material, simulation, and component test systems. The instructor discusses major system components and presents the principles of closed-loop servocontrol. The instructor and you perform hands-on operation of MTS controller-based systems and their related electronic, hydraulic, and mechanical components.

**Who should attend**

This course is designed for students new to using servohydraulics and who will be operating an analog controller.

**Prerequisites**

Students should have some supervised experience with their system prior to attending. All prerequisites are the responsibilities of the student.

**Learning outcome**

The students will have a functional understanding of the HPU, HSM, servovalve, fluid care, closed-loop control, actuators and load frames, limit functions, and tuning. They will understand set point, span, adjusting limits, under-peak detection and error detectors. They will be able to set up and run tests using the analog controller.

**Equipment**

The class covers MTS hydraulic and mechanical components and analog electronics. The instructor concentrates on MTS analog controllers.
Damper Test System Operation
3 day course

This course provides you with the fundamentals of damper testing and the use of the MTS Damper Software running on MTS Series 793 software to execute tests in your laboratory. Damper test setup, execution, and analysis are covered through classroom lectures and laboratory exercises. Both Performance and Durability testing are covered.

Who should attend
This course is targeted at damper system operators, test engineers, and laboratory managers. For more advanced topics that address your specific testing needs, contact MTS about consulting services.

Prerequisites
Students must have a thorough understanding of Series 793 software including PID tuning, signal offsets, and limit settings. For those who are new to the MTS controllers with Series 793 software, MTS strongly recommends attending either the MTS Hardware Concepts and Series 793 Software course or the MTS Series 793 Software with MultiPurpose TestWare (MPT) Test Design course prior to taking the Damper class.

COURSE OUTLINE
I. Introduction
II. Damper testing principles & issues
   A. The damper test market
   B. Damper test techniques
   C. Current trends in damper testing
   D. Damper test solutions
III. Mechanical aspects of a damper test frame
   A. Frame & actuator design
   B. Performance test requirements vs. durability test requirements
   C. Accumulator sizing
IV. Damper test software introduction
   A. Damper software installation
   B. PC requirements & controller platform requirements
V. Laboratory damper testing
VI. Damper test system software
   A. Damper channel & signal configuration
   B. Concepts of performance testing
   C. Concepts of durability testing
   D. Concepts of temperature sweep testing
   E. Concepts of sine sweep testing
   F. Gas & seal friction testing
   G. Concepts of NVH testing
VII. Damper test analysis
   A. Creating a test workbook
   B. Opening a test workbook
   C. Data plotting & reporting
VIII. Example tests
   A. Create & run a performance test
   B. Create & run a durability test
   C. Create & run a temperature sweep test
   D. Create & run a sine sweep test
   E. Create & run a NVH test
### COURSE OUTLINE

<table>
<thead>
<tr>
<th>I. Introduction</th>
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<tbody>
<tr>
<td>A. Durability testing objectives</td>
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<tr>
<td>B. Durability testing in the vehicle development process</td>
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<tr>
<td>II. Assessment of service conditions</td>
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<tr>
<td>A. In-service &amp; proving ground loading</td>
<td></td>
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<tr>
<td>B. Road-load data acquisition</td>
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<tr>
<td>C. Transducer selection &amp; vehicle</td>
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<tr>
<td>instrumentation</td>
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<tr>
<td>D. Recording systems</td>
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<tr>
<td>E. Digitization of data</td>
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<tr>
<td>F. Time &amp; frequency domain analysis</td>
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<tr>
<td>III. Laboratory reproduction of service</td>
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<td>conditions</td>
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<tr>
<td>A. Fixturing</td>
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<tr>
<td>B. Servohydraulic test systems &amp; components</td>
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<tr>
<td>IV. Programming of test systems</td>
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<tr>
<td>A. Test excitation</td>
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<tr>
<td>B. Servocontrollers</td>
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<tr>
<td>C. Servoloop tuning &amp; stabilization techniques</td>
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<tr>
<td>D. Command compensation methods</td>
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<tr>
<td>V. Test evaluation metrics</td>
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<tr>
<td>A. Test correlation</td>
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<tr>
<td>B. Fatigue analysis methods</td>
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<td>(load-, stress-, &amp; strain-life)</td>
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<tr>
<td>C. Cycle counting</td>
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<tr>
<td>D. Damage accumulation</td>
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</table>

In this course, your instructor presents the principles for fatigue-correlated durability testing of ground vehicles and their components using servohydraulic laboratory test equipment. You examine the choices required when designing a durability test, from vehicle instrumentation and data collection through test rig design and test excitation. The course includes an introduction to fatigue analysis methodologies applicable to durability test data editing, test correlation, and evaluation. Numerous test examples and problem-solution scenarios are included. Particular emphasis is given to the design of fatigue tests for ground vehicle structures and components subjected to variable amplitude loading. Test rig design is introduced in this course. A more rigorous, detailed approach to design is provided in another MTS course called Test Rig Design.

### Who should attend

The course is excellent training for test or design engineers and technicians who require an understanding of modern simulation testing methods.

- It should be especially useful for engineers who are planning new test facilities, or who must regularly request testing services from other departments.
- It will be helpful for experienced test engineers and technicians who are looking to fill gaps in their understanding, and for lab managers and technicians who desire a broader understanding of test design.

### Prerequisites

A technical degree or equivalent background in test applications is preferred.
This is a basic course that covers the use of MTS Elastomer Test Systems using digital controllers with Series 793 Software. Training includes an overview of viscoelastic theory, test system setup, and operation with practical test examples and data analysis as it pertains to tests available with the MTS Model 793.31 Dynamic Characterization and Model 793.33 Static Deflection software. Test setup, execution, and analysis are covered through classroom lectures and laboratory exercises.

*Note: This course does not include the ElastomerExpress™ Application.*

### Who should attend
This course is targeted for engineers new to elastomer testing using MTS controllers with Series 793 software, whether they are new to the test lab or they are just setting up a test system. For more advanced topics that address your specific testing needs, contact MTS about consulting services.

### Prerequisites
Students must have a thorough understanding of Series 793 software including PID tuning, signal offsets, and limit settings. For those who are new to the MTS controllers with Series 793 software, MTS strongly recommends attending either the MTS Hardware Concepts and Series 793 Software course or the MTS Series 793 Software with MultiPurpose TestWare (MPT) Test Design course prior to taking the Elastomer Applications class. All prerequisites are the responsibilities of the student.
The MTS Measurement Uncertainty Course introduces techniques for determining the measurement uncertainty for Materials and/or Simulation testing applications. The instructor will provide both “practical” and “testing specific” measurement uncertainty examples. Additionally, the instructor will provide all the information and forms necessary for you to perform a Measurement Uncertainty analysis for your system.

This course is taught at your location. Contact the Training Administrator for rates and availability.

Who should attend

The course is designed for Materials and/or Simulation systems operators, test engineers, laboratory supervisors, and quality control personnel.
This course is available as a companion to the 3-day training course on Durability Testing Technology, or as a stand-alone course. The course focuses on the principles of test rig fixture design for testing vehicle components.

Important mechanical design issues are addressed, including:
- Restraint
- Fixture kinematics
- Safety
- Performance
- Component sizing
- Common test configurations

Who should attend
This course was developed for engineers and technicians who are new to the technology, whether they are new employees of existing facilities or employees involved in setting up a new testing rig or laboratory. It will also be valuable for engineers and technicians who have experience with certain aspects of test technology and who desire expanded knowledge of test rigs and fixtures.

Prerequisites
A technical degree or equivalent background in test applications is preferred.
The student learns fundamental knowledge required to ensure their laboratory determines material property data accurately and reliably. We review the various standardization agencies and their interrelationships, focusing primarily on ASTM (American Society for Testing and Materials) standards and requirements. We examine testing system hardware and software from a lab manager’s viewpoint: how does it work, how must it be maintained, and what are some of the common problems and solutions. This course also covers ASTM requirements and practices concerning calibration and measurement uncertainty analysis. Sessions consist of a combination of classroom and laboratory exercises: students will set up and run ASTM monotonic and cyclic tests and produce reports documenting test results.

Who should attend
This 2-day course is designed for students who need to ensure their lab meets relevant rules and regulations governing materials testing labs. It is also for students who would like to gain a familiarity with the ASTM standards governing some common monotonic and cyclic tests, and learn about common lab maintenance and calibration practices.

Learning Outcome
The student will be familiar with the structure and layout of a typical ASTM testing standard. Students will be understand ASTM requirements concerning calibration and measurement uncertainty. Students will also learn about common problems and solutions concerning maintenance and operation of system hardware and software. Students will run ASTM standard tests and generate reports. These tests include standard monotonic, fatigue and fracture tests as specified by ASTM.
The MTS Hardware Concepts and Series 793 Software* class will introduce and familiarize the students with the correct set-up and operation of MTS material, simulation, and component test systems. The course content is designed for individuals new to servohydraulic testing. The instructor will discuss major system components and present the principles of closed-loop servo control. The course also introduces the students to basic operating principles of a digitally controlled servohydraulic test system. Students are provided with a hands-on approach to learn the operation of the controller and its related system electronic, hydraulic, and mechanical components. The five-day course will cover opening and running a test in both MultiPurpose TestWare (MPT) and MTS TestSuite (mpe) Software. The course does not cover designing tests in these applications. Sessions consist of a combination of classroom and laboratory exercises using the Series 793 software.

Who should attend
This five-day course is geared toward users who are new to servohydraulics or have limited experience using them. They need to learn the basics of the hardware and be able to operate the digital controller software. The pace of the class is designed to ensure all students have the opportunity and time to engage all topics and concepts presented.

Prerequisites
Students should have some operator experience with their system prior to attending. For assistance in determining which class would appropriate for you, please contact the MTS Training department. All prerequisites are the students' responsibility.

Learning outcome
The students will have a functional understanding of the hydraulic power unit (HPU), hydraulic service manifold (HSM), servovalve, fluid care, closed loop control, actuators and load frames, limit functions, tuning. They will have an understanding of the relationship of software adjustments to the hardware.

The students will be able to launch the application, open the proper configuration/parameter set, properly control the hydraulics, manually command the control channel, install specimens safely in their fixturing, manually tune control modes, set limits, offset inputs. The students will be able to open and run a test in MultiPurpose TestWare (MPT) and MTS TestSuite Multipurpose (mpe) software.

* Series 793 Software operates the FlexTest and TestStar controllers.
MTS Series 793 Advanced Software Operation

3 day course

COURSE OUTLINE

I. Introduction
II. User-defined actions
III. Advanced control modes
   A. Channel-limited-channel
   B. Dual Mode compensation
   C. Cascade Control
IV. Advanced adaptive compensation
   A. ALC
V. Calculations
   A. Calculated inputs and outputs
   B. Calculated channels
   C. MPT variables
VI. Advanced tools
   A. HWI Editor
   B. Systems Options Editor
   C. Project Manager
VII. Calibration (on request)

The Series 793 Software operates the FlexTest SE, FlexTest 40, FlexTest 60, FlexTest 100 and FlexTest 200 controllers. The MTS Series 793 Software Advanced Operation class addresses options and tools of the Series 793 software that require in-depth knowledge of the system, such as advanced control modes, calculations and hardware configurations.

Who should attend

This course is designed for students who have a good working knowledge of their testing system and its operation. They desire instruction on the advanced system capabilities.

Prerequisites

Students should be familiar with Series 793 Software. Several of the subjects in the Series 793 Advanced Software Operation class require software options that may not be installed on all systems. All prerequisites are the responsibility of the student.
The MTS Series 793 Software* with MultiPurpose TestWare (MPT) Test Design class introduces you to basic operating principles of a digitally controlled servohydraulic test system. Students are provided with a hands-on approach to learn the operation of the controller and its related system electronic, hydraulic, and mechanical components. Sessions consist of a combination of classroom and laboratory exercises. Students will set up and run monotonic and cyclic tests using the concepts they have learned.

Who should attend
This 4-day course is designed for students who have a practical working knowledge of a closed loop servohydraulic testing system and have experience operating their own test system. They desire instruction on adjusting the servohydraulic system and designing tests. The class pace assumes the students have a fundamental understanding of their MTS servohydraulic testing system.

Learning outcome
The students will be able to open the proper configuration/parameter set and manually command the control channel. They will have an understanding of the interaction of specimen installation, offset inputs, and limit actions. The students will create inputs and control modes. They will be able to monitor test inputs and control in real time and understand effects of tuning and specimen characteristics. The students will create both monotonic and cyclic test procedures using MultiPurpose TestWare (MPT) procedures that will feature both advanced test flow concepts and data collection.

Prerequisites
Students should have operator experience with their system prior to attending the course. Students must have a full understanding of basic closed loop control concepts and fundamental testing knowledge. Students should also have a working knowledge of the operating system and its graphical user interface. For students new to servohydraulic test systems, we strongly recommend attending the MTS Hardware Concepts and Series 793 Software course. For assistance in determining which class would appropriate for you, please contact the MTS Training department. All prerequisites are the students’ responsibility.

* Series 793 Software operates the FlexTest and TestStar controllers.
The MTS MultiPurpose TestWare Software class explores the more advanced features of the application including File Playback with focus on processes beyond command and data acquisition. Students are provided with instruction consisting of a combination of classroom and laboratory exercises. Students will create their own procedures covering a variety of different testing scenarios utilizing the concepts they have learned.

Who should attend
This course is designed for experienced users of Series 793 Software who would like further instruction on developing tests.

Learning outcome
The students will be able to create and configure optional software adjustments. They will set up, monitor, and incorporate analog/digital inputs, outputs, control modes, and detectors. This would also include data acquisition techniques such as type, file sampling, file size, and output format. The students will associate Project Folders, Configurations, and MPT Procedures and Specimen Files appropriately for their testing needs.

Upon completion of the course, the students will be able to create, edit, and modify MultiPurpose TestWare Procedures.

Prerequisites
Students should have significant and detailed operator experience with their system prior to attending the course. Students should also have a working knowledge of the operating system and its graphical user interface. For students with limited experience, it is strongly recommended that they attend the MTS Hardware Concepts & Series 793 Software course prior to attending this class. All prerequisites are the responsibility of the student.
The MTS Series 793 Software* with MTS TestSuite Test Design class introduces the basic operating principles of a digitally controlled servohydraulic test system. Students are provided with a hands-on approach to learn the operation of the controller and its related system electronic, hydraulic, and mechanical components. Sessions consist of a combination of classroom and laboratory exercises. Students will set up and run monotonic and cyclic tests using concepts learned.

Who should attend

This 4-day course is designed for students who have a practical working knowledge of a closed loop servohydraulic testing system and have experience operating their own test system. They desire instruction on adjusting the servohydraulic system and designing tests. The class’ pace assumes students have a fundamental understanding of their MTS servohydraulic testing system.

Learning Outcome

The students will be able to open the proper configuration/parameter set and manually command the control channel. They will have an understanding of the interaction of specimen installation, offset inputs, and limit actions. The students will create inputs and control modes. They will be able to monitor test inputs and control in real time and understand effects of tuning and specimen characteristics. The students will create both monotonic and cyclic test procedures using TestSuite Multipurpose (mpe) software. Test procedures will feature both advanced test flow concepts and data collection.

Prerequisites

Students should have operator experience with their system prior to attending the course. Students must have a full understanding of basic closed loop control concepts and fundamental testing knowledge. Students should also have a working knowledge of the operating system and its graphical user interface. For students new to servohydraulic test systems, we strongly recommend attending the MTS Hardware Concepts and Series 793 Software course. For assistance in determining which class would appropriate for you, please contact the MTS Training department. All prerequisites are the students’ responsibility.

* Series 793 Software operates the FlexTest and TestStar controllers.
MTS TestSuite Multipurpose Elite (mpe) Software

2 day course

The MTS TestSuite Multipurpose Elite Software class explores the more complex features of the application including File Playback with focus on activities beyond command and data acquisition. Students are provided with instruction consisting of a combination of classroom and laboratory exercises. Students will create their own procedures covering a variety of different testing scenarios utilizing the concepts they have learned.

Who Should Attend
This course is designed for experienced users of Series 793 software who would like further instruction on developing tests.

Learning outcome
The students will be able to create and configure optional software adjustments. They will set up, monitor, and incorporate analog/digital inputs, outputs, control modes, and detectors. This would also include data acquisition techniques such as type, file sampling, file size, and output format. The students will associate Project Folders, Configurations, Procedures, MP Test Runs and Specimen Files appropriately for their testing needs. Upon completion of the course the user will be able to create, edit, and modify Multipurpose tests.

Prerequisites
Students should have significant and detailed operator experience with their test system prior to attending the course. Students should also have a working knowledge of the operating system and its graphical user interface. For students with limited experience, it is strongly recommended that they attend the MTS Hardware Concepts & Series 793 Software course prior to attending this class. All prerequisites are the responsibility of the student.
This is a basic course on MTS TestSuite TW Elite (twe) software. The course starts with test terminology, frame operation and test-run fundamentals, and then covers other subjects such as modifying tests and customizing the test workflow. Classroom and lab exercises are performed on Electro-Mechanical (EM) software simulators and EM frames.

Note: For more advanced training that addresses your specific testing needs, MTS recommends the MTS TestSuite TWE Training/Consulting Package that combines two days of TWE training with two days of consulting. See the course description for the TWE Training/Consulting Package on page 19 for details.

Who should attend
This course is designed for those who use MTS TestSuite TWE software to run tests, create/edit report templates, and modify work flow in existing tests.

Learning Outcome
The students will become familiar with using TestSuite TWE software to select and run a test, tag and recalculate data, add and configure meters, and run test reports. The students will also learn how to modify a test procedure, edit test parameters, create variables and calculated variables, define user roles, create report templates, and manage hardware resources.

Prerequisites
Students must have some hands-on experience with their system, and have a good working knowledge of computers prior to attending. All prerequisites are the responsibility of the student.

Note: For customers that are running TWE software on servo-hydraulic frames, MTS recommends attending either the MTS Hardware Concepts and Series 793 Software course or the MTS Series 793 Software with MultiPurpose TestWare (MPT) Test Design course. These courses cover using Series 793 software to set up basic PID tuning, signal offsets, and limit settings.
MTS TestSuite TWE Training/Consulting Package

4 day course

For customers who are converting from TestWorks 4 to TestSuite TWE or customers who are new to the MTS TestSuite TWE software, MTS offers a package that combines product training and test consulting. This is an excellent option to quickly bring your staff up to speed on the new software and to develop your test methods so you can continue testing with minimal interruption.

Training helps ensure that your staff understands the software and is familiar with setting up and editing tests and reports. Once your staff is comfortable with the software, the test consultant works with you to design or convert your test methods to your specific requirements.

The training is done at your location using your conference room facilities and your computers. Each student receives a 30-day license to run TestSuite TWE in simulation mode. This enables them to actively participate during the class and apply their new skills after it. Consulting can take place in the classroom and in your lab with your systems testing your products.

The benefits to this approach are twofold.
1. It can reduce the time required to transition your lab to MTS TestSuite TWE software.
2. As your testing needs change, your staff will have the skills required to modify and develop test templates.

Who Should Attend
This training is designed for test engineers who need to create or modify tests using MTS TestSuite TWE software. No prior experience with MTS TestSuite TWE is required, but a familiarity with material testing and test systems is desirable. Detailed knowledge of the tests that need to be conducted will maximize the benefits of the course.

Training – 2 Days (8 hours each)
Training on the MTS TestSuite TWE product gives you a foundation for creating and maintaining the tests and reports you need now and into the future.
- Training is conducted at the customer site in a conference room environment.
- Class size is limited to four students.
- Hands-on training is provided for each student using the software’s simulation mode.
- Training includes an MTS TestSuite TWE 30-day simulation mode license for each student.
- Customer provides student computers.

Consulting – 2 Days (8 hours each)
Consulting services give you expert assistance with your choice of the following:
- Converting TestWorks 4 methods to TestSuite TW templates
- Creating a new test from a written description
- Optimizing test procedures
- Connecting with external devices
- Communicating with LIMS and other software

Advance Planning Session
A planning session conducted on-line or by phone with the customer, trainer and consultant is included prior to the course in order to make the course time most effective.

Options
To further customize the package you can add:
- An additional day of consulting at the package price.
- Custom test templates, written in advance by MTS so they are sure to be ready when you need them.

COURSE OUTLINE
Training concentrates on essential core concepts and best practices. Some content can be customized, based on your requirements.

I. Workflow basics
   A. Running tests
   B. Setting up projects

II. TW Elite software setup
   A. Configuration menu
   B. User management
   C. Review tab results, statistics, tagging, charts/markers

III. Variables
   A. Creating, editing, and managing
   B. Calculated variables and functions

IV. Modifying tests
   A. Test flow and test activities
   B. Extracting data
   C. Data acquisition

V. Creating report templates with optional Reporter Add-in
   A. Test run and test report templates
   B. Report generation options
This comprehensive course starts with an introduction to TestWorks Software, material testing and general operation of electromechanical and servohydraulic test frames. In this course we will cover Operator, Supervisor, Definer and general Creator level options.

COURSE OUTLINE

I. Material testing definitions and calculations
   A. Stress
   B. Strain
   C. Yield
   D. Modulus
   E. Slack compensation
   F. Gage length adjustment
II. Frame operation, safety features, and user interface
   A. Logging into TestWorks
   B. User interface
   C. Basic frame operation
   D. Help files
   E. Calibrating devices
   F. Right-click menus
   G. Entering variables
   H. Data storage and output
   I. Reviewing data
III. Troubleshooting
   A. Contacting technical support
   B. Locating error messages
IV. Hands-on exercise
   A. Mounting specimen
   B. Running test
   C. Reviewing data
V. Supervisor training
   A. System login names
   B. Device setup and calibration
   C. Practical exercise
VI. Definer Part I
   A. Introduction
   B. Define page organization
   C. Configuring the user interface
   D. Configuring inputs
VII. Definer Part II
   A. Configuring formulas
   B. Configuring data channels
VIII. Creator
   A. Modifying define page steps
   B. Adding and removing steps
   C. Interpretation of a method testflow
   D. Method practice
   E. Break detection
   F. Data acquisition

Who should attend
This course demonstrates how to use TestWorks software to gather meaningful data, manage data, and modify test methods.

Learning outcome
The student will understand basic material testing terms and calculate basic formulas such as stress, strain, and modulus. They will learn frame operation, running a test, printing and exporting data, and basic troubleshooting. They will know how to create user login names, add devices, manage system directories, and method definitions tasks such as configuring the user interface, modifying test segments, modifying data channels, modifying formulas, and using the Method Assistant.

Prerequisites
Students must have some operator experience with their system prior to attending. Students should also have a working knowledge of the operating system and its graphical user interface. For assistance in determining which class would be appropriate for you, please contact the MTS Training department. All prerequisites are the students' responsibility.

Note: Servohydraulic customers must be familiar with the basic operation of Series 793 software.
This course provides introductory training on AeroPro™ Software. It is intended for system operators needing hands-on experience setting up and running structural tests using AeroPro, and for new users of the AeroPro software. The course incorporates extensive hands-on time to allow attendees to practice the skills learned.

**Who should attend**

This course is designed for technologists and engineers who set up and run structural tests using AeroPro Software on a day-to-day basis. It will be useful for operators new to the system.

**Prerequisites**

A technical degree or equivalent test background is required. Specific experience in structural testing is not mandatory; however, familiarity with servohydraulic test systems is required.

**Scheduling policy**

Course dates will be scheduled once sufficient interest for this course has been received.
This course will provide advanced AeroPro training. The class will expand on the AeroPro operator training to include different hardware configurations and their benefits. Troubleshooting skills for AeroPro hardware and AeroPro tests will be a major part of the experience. Advanced test setup, as well as advanced tuning, will be addressed.

*The outline of this course may be adjusted to fit the specific needs of the class*

### COURSE OUTLINE

I. **Hardware**
   - A. Controller hardware
   - B. Data acquisition hardware

II. **AeroPro Control Troubleshooting**
   - A. Hardware troubleshooting
     1. Troubleshooting skills
     2. Board failures
     3. Cable failures
   - B. Test troubleshooting
     1. Test setup
     2. Test configuration

III. **Advanced AeroPro Control Operation**
   - A. Tuning techniques and theories
   - B. Control and data acquisition linking

### Who should attend

- AeroPro Advanced Users
- AeroPro System Administrators

### Scheduling policy

Course dates will be scheduled once sufficient interest for this course has been received.

### Prerequisites

- AeroPro Operator Training
  - Or
  - Minimum of two years AeroPro experience
Fatigue & Fracture with MTS TestSuite (mpe) Software

4 day course

This course provides you with the fundamentals of material testing and the use of MTS TestSuite Multipurpose Software for fatigue and fracture testing applications. Students will learn how to adjust and operate the software to run a material test as well as analyze data. The instructor will review the history and fundamentals of material testing. Class days are divided into classroom training and laboratory training.

Who should attend

This course is targeted at material test system operators, test engineers, and laboratory managers who are using Fatigue and Fracture applications.

Learning Outcome

At the completion of the course the students will have both a theoretical and practical knowledge of a wide range of material tests. Students will use MTS TestSuite software to create custom tests, and also use the templates to run standard ASTM tests. These tests include tension, compression, fatigue, fracture toughness and fatigue crack growth. In addition, students will be able to process test data and generate reports.

Prerequisites

Students should have some experience prior to attending this course in servohydraulic testing and a working knowledge of the current Microsoft operating system. For assistance in determining which class would appropriate for you, please contact the MTS Training department.

COURSE OUTLINE

I. Testing fundamentals
   A. Load, deformation, stress and strain
   B. Stress-strain relations, material properties
   C. Elastic-plastic deformation
   D. Material strength: yield vs. fracture

II. TestSuite fundamentals
   A. Introduction/overview
   B. Windows/menus
   C. Projects, tests and test runs
   D. Specimens
   E. Procedure creation, modification and editing
   F. Command processes
   G. Data acquisition processes and management
   H. Other processes
   I. Runtime displays
   J. Executing tests
   K. Reports

III. Standard tests
   A. Tension
   B. HCF/LCF
   C. KIC fracture toughness
   D. Fatigue crack growth

IV. Fatigue and fracture fundamentals
   A. Stress-life, strain-life, and linear elastic fracture mechanics
   B. Cracks and crack propagation
   C. Plane stress and plane strain
   D. Stress intensity and fracture toughness
   E. Crack length measurement: compliance
   F. Fracture crack growth and damage tolerance design
Component RPC Pro Software Operation

3 day course

This course shares the same lecture materials as the RPC Pro Software Operation course. However, the training covers only essential basic simulation theory and devotes more time on cRPC Pro application training, following step-by-step procedures. PC-based hands-on exercises use simplified examples. The pace of the hands-on exercises is intentionally slower to ensure basic proficiency of all students. This class is not sufficient preparation for the RPC Pro advanced class.

Who should attend

Entry-level engineers or experienced technicians with some related experience. The course will provide the training necessary to allow simulation operators to understand simulation concepts and run cRPC Pro software.

Prerequisites

A technical or engineering degree and proficiency in the latest Windows operating systems.

COURSE OUTLINE

I. RPC Pro Fundamentals
   A. What is RPC?
   B. The six steps of RPC
   C. Why RPC?
II. Acquire data (step 1)
   A. Road data collection and digitization considerations
   B. Data acquisition equipment and preparation
   C. Getting started in RPC Pro
   D. Data validation
III. Data preparation – edit and analyze (step 2)
   A. Visual inspection
   B. Frequency domain analysis
   C. Graphical editing
   D. Filtering
IV. Channel setup
   A. Networking and configuring hardware
   B. Drive, response, and calculated response
   C. Event-action setup
V. Measuring the system FRF (step 3)
   A. Sequential random excitation
      1. Linearity and coherence
VI. Invert and prepare the FRF (step 4)
   A. Control band selection
VII. Iterate (step 5)
   A. Iteration process
   B. Convergence and divergence
   C. Time, frequency, and amplitude analysis
VIII. Run the test (step 6)
   A. Defining test sequences
   B. Point by Point Monitoring

Optional Materials – The instructor may provide handouts for self-guided study or cover the following during class, as time and class interest permits.

» Peak picking and peak slicing methods for block cycle testing
» Random vibration testing
This course shares the same lecture materials as the cRPC Pro Software Operation course. However, the training includes more in-depth simulation theory and devotes less time to RPC Pro application training. The training focus includes real-life simulation experiences on 4 Post and MAST systems. PC-based hands-on exercises reinforce concepts during each step of a typical simulation process. The pace of the hands-on exercises is intentionally faster to allow more complete coverage of simulation theory. This course is a pre-requisite for the RPC Pro Advanced course.

Who should attend

Entry-level engineers or experienced technicians with some related experience. The course will provide the training necessary to allow simulation operators to understand simulation concepts and run RPC Pro software.

Prerequisites

A technical or engineering degree and proficiency in the latest Windows operating systems.
Software training alone does not ensure successful simulation tests. This course is for the experienced RPC software user who needs to keep abreast of current simulation technology. Instructors take you through advanced techniques for setting up complex RPC tests utilizing the application of the various analytical tools in the RPC Pro Software.

**Learning outcome**

The course combines theory with hands-on exercises to help make the RPC software user more effective in the following areas:

» RPC control and correlation sensor choices
» Fatigue-based editing
» Test correlation analysis
» Engineering and test methods decisions

**Who should attend**

Experienced RPC Pro operators who have simulation experience, but who want to further their RPC knowledge.

**Prerequisites**

» Proficiency in the latest Windows operating systems
» Experience with RPC Pro software
This course covers basic simulator operation and fatigue testing. The course materials contain enough simulation theory and RPC Pro application training to begin working with simulation systems, following step-by-step procedures. In addition, the lecture materials contain enough fatigue theory to perform simple fatigue-based analysis and editing. PC-based hands-on exercises reinforce concepts during each step of a typical simulation process.

Who should attend
Entry-level engineers or experienced technicians with some related experience. The course will provide the training necessary to allow simulation operators to understand simulation concepts and run RPC Pro software.

Prerequisites
- Proficiency in the latest Windows operating system
- Basic understanding of fatigue theory

Course Outline

I. Introduction
   A. What is RPC? – The 6 Steps

II. RPC Pro Fundamentals
   A. Project → workspace → dataset
   B. Introduction to RPC Pro application

III. Setup
   A. Sample rate & frame size
   B. Drive, response, calculated response
   C. Event-action setup

IV. Acquire (optional)
   A. Importing data
   B. Data validation
   C. Visual inspection

V. Analyze
   A. Graphical editing
   B. Statistical editing
   C. Damage-based editing
   D. Data manipulation
   E. Frequency domain analysis
   F. Filtering
   G. User-defined processes
   H. Batch processing

VI. Model
   A. Sequential random excitation
   B. Simultaneous random excitation
   C. H1 & H2 FRF
   D. Linearity & coherence
   E. FRF inversion
   F. ASD prediction
   G. Control channel selection
   H. Control band estimation

VII. Simulate
   A. Iteration process
   B. Convergence & divergence
   C. Time, frequency, & amplitude analysis
   D. Turbo iteration process
   E. Correlation assessment

VIII. Test
   A. Defining test sequences
   B. Monitoring correlation transducers
   C. Resuming aborted tests
   D. Modifying event-action sequences
### RPC Pro Software Training Course Comparison

<table>
<thead>
<tr>
<th>Component</th>
<th>RPC Pro Software Operation</th>
<th>RPC Pro Advanced Software Operation 4-Days</th>
<th>RPC Pro Advanced Software Operation Europe 3-Days</th>
<th>RPC Pro Fatigue</th>
<th>Combined RPC Pro Software Operation &amp; Introduction to RPC Pro Fatigue</th>
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<td>Peak Picking – Peak Slicing</td>
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<td>Equivalent Amplitude</td>
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</table>

- Denotes topic briefly covered in class

\[\text{\textcopyright\textsuperscript{\textregistered}}\] Denotes topic covered in depth