MTS TestSuite™ Multipurpose Software

Powerful, adaptable, productivity-enhancing software

be certain.

INCREASE YOUR TESTING POWER AND PRODUCTIVITY WITH **MTS TESTSUITE™ MULTIPURPOSE SOFTWARE.** YOU CAN DESIGN TESTS JUST AS YOU IMAGINE THEM, AND SEE AND MODIFY CALCULATIONS TO MATCH YOUR SPECIFIC REQUIREMENTS. ENJOY THE UTMOST FLEXIBILITY TO CREATE THE RIGHT TEST TO MEET YOUR OBJECTIVES AND MAKE THE BEST USE OF YOUR RESOURCES.

Productivity You Can Build On

MTS TestSuite™ Multipurpose Software puts all the power of testing into your capable hands. This flexible new software is the result of insight gained through years of experience with testing applications in numerous industries across the globe.

Designed to give you the utmost freedom to create tests and the tools to make test operation easier, MTS TestSuite Multipurpose Software will enhance productivity, adapt to your needs and grow with your organization.

Enhance Productivity

Due to the modular design, MTS TestSuite Software allows you to provide the right tool to the right person at the right time. You can give individuals access to specific modules based on their job tasks and responsibilities.

If you have separate individuals designing tests and running the test equipment, you can offer each person the appropriate tool. If someone would like to take the test data and complete the analysis and report generation in another location, that is possible too. Everyone can finish their tasks and share information through a common platform and user interface.

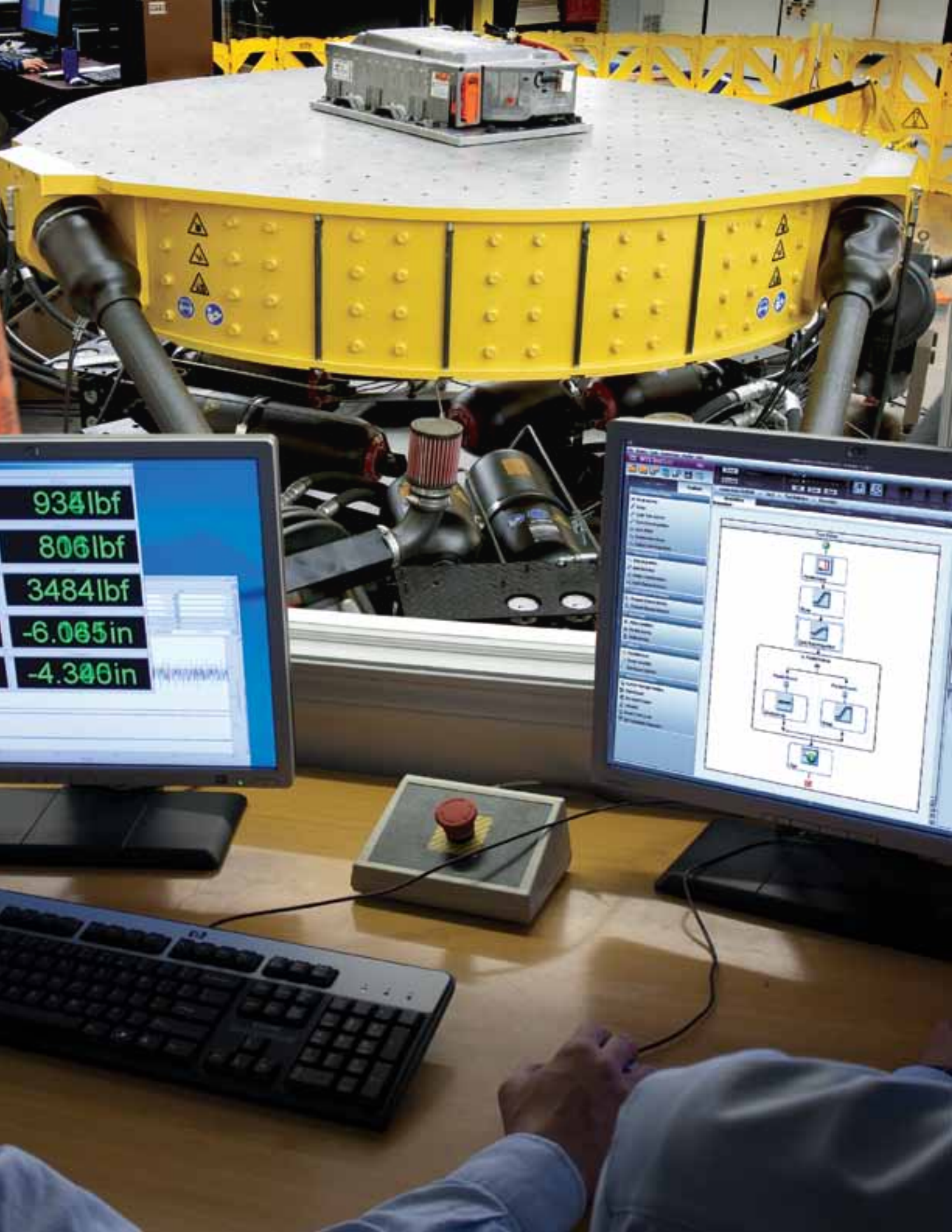
Enjoy More Power and Control

As a test designer, you have more capability than ever before. Because of the open environment, you can see calculations, and modify them if you wish. We have built in the open source Iron Python programming language to give you the capability to program complex calculations.

You are able to create test procedures using a visually-intuitive flow chart depiction of test activities. Whether it is a simple test, or something more complex with parallel paths, you will have an easy-to-modify visual representation of the test.

Also you can add customizable templates to test to specific industry standards. You'll be able to use a standard template designed by MTS, or adapt it to suit your requirements. You or MTS can create new templates to meet your testing needs.

Whether you are testing materials, components or structures, you have the power to modify your tests and create the configuration that meets the needs of your organization. And you will have access to new features, such as Virtual Specimen, that save you time and expand your testing options.


934lbf
806lbf
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MTS TestSuite Multipurpose Family

The MTS TestSuite Multipurpose Software family is a set of applications, modules and options that you can configure to meet the unique needs of your test program. The offerings include:

- Multipurpose Elite (MPE)
- Multipurpose Express (MPX)
- Analysis & Reporting Tools
- Fatigue, Fracture & Tensile Testing Modules
- Series 793 Options

Each of these elements can be used for a specific purpose within your organization. Buy only what you need, and allow your software to adapt with your test program.

TESTING MODULES

- Low-Cycle Fatigue
- High-Cycle Fatigue
- Advanced Low-Cycle Fatigue
- Thermomechanical Fatigue
- Fatigue Crack Growth
  - Clip Gage
  - Crack Gage
  - Direct Current Potential Drop
- Fracture Toughness
  - K1C
  - CTOD
  - J1C-CTOD
- Tensile Tests

Multipurpose Elite

This application is the engine that drives all the MTS TestSuite Multipurpose offerings. With this powerful tool, you can create and edit and run tests with more flexibility than ever before. You can then tailor these test setups to make them even easier for your test operators to run.

If you have only a few individuals creating tests, and several more people operating tests, you can purchase a few Multipurpose Elite software licenses, and several more Multipurpose Express software licenses.

Multipurpose Express

This application is designed for the test operator. It is used for running tests that were created with MTS TestSuite Multipurpose Elite Software or MTS-supplied modules. When using Multipurpose Express software, even the most complex tests are easy to operate, and there is no danger of things being changed from the original test design.

This application allows the operator to run tests and see the acquired data or calculated values in a user-configurable runtime view, so the operator can choose which aspects of the tests to monitor during the test. They may also interact with the test based on user-defined prompts that were created by the test designer.

Analysis & Reporting Tools

For more in-depth analysis of fatigue and fracture test data, we offer a Fatigue Analyzer and a Fracture Analyzer. For easy report creation, there is a Reporter Add-In for use with Microsoft Excel® that allows you to organize your raw data and create impressive reports with little time investment or manual intervention.

Fatigue, Fracture & Tensile Modules

These modules contain the test and report templates and calculations you'll need to test to current industry standards. They can be used with results obtained from either Multipurpose Elite or Multipurpose Express Software.

Software Processes & Options

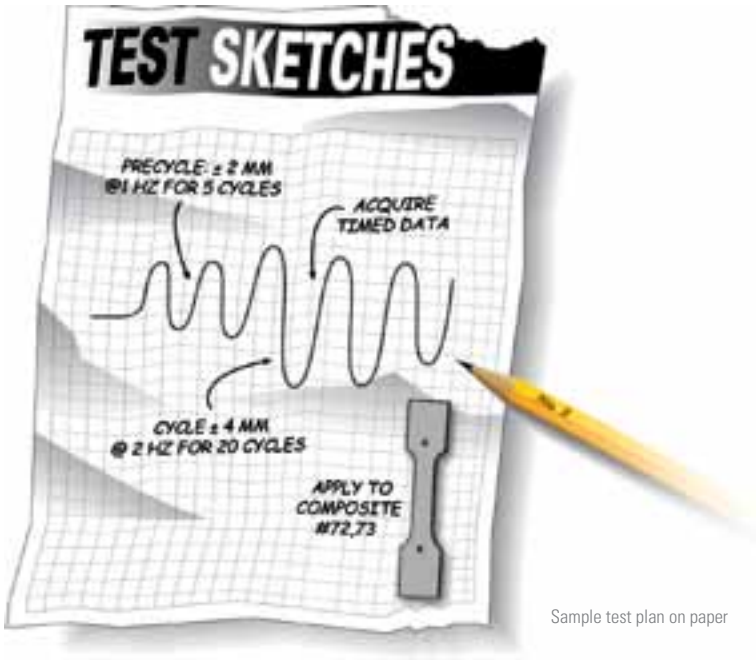
There are several Series 793 Options such as Time History Output and Time History Output with Data Acquisition that are available to provide additional functionality. See subsequent pages for detailed explanations of these options.

Test Definition & Execution

Intuitive Test Creation

Designing a test flow has never been so easy to understand. The intuitive flow-chart interface lets you drag-and-drop test activities into a graphical depiction of the test workflow. MTS TestSuite Multipurpose Elite allows you to create tests that consist of only a single activity, or tests that are more complicated with multiple command processes sequenced with multiple data acquisition processes to build complex test flows.

To convert a sample plan into a test, you drag test activity icons into the Test Editor, and arrange them in the order you want them to execute.



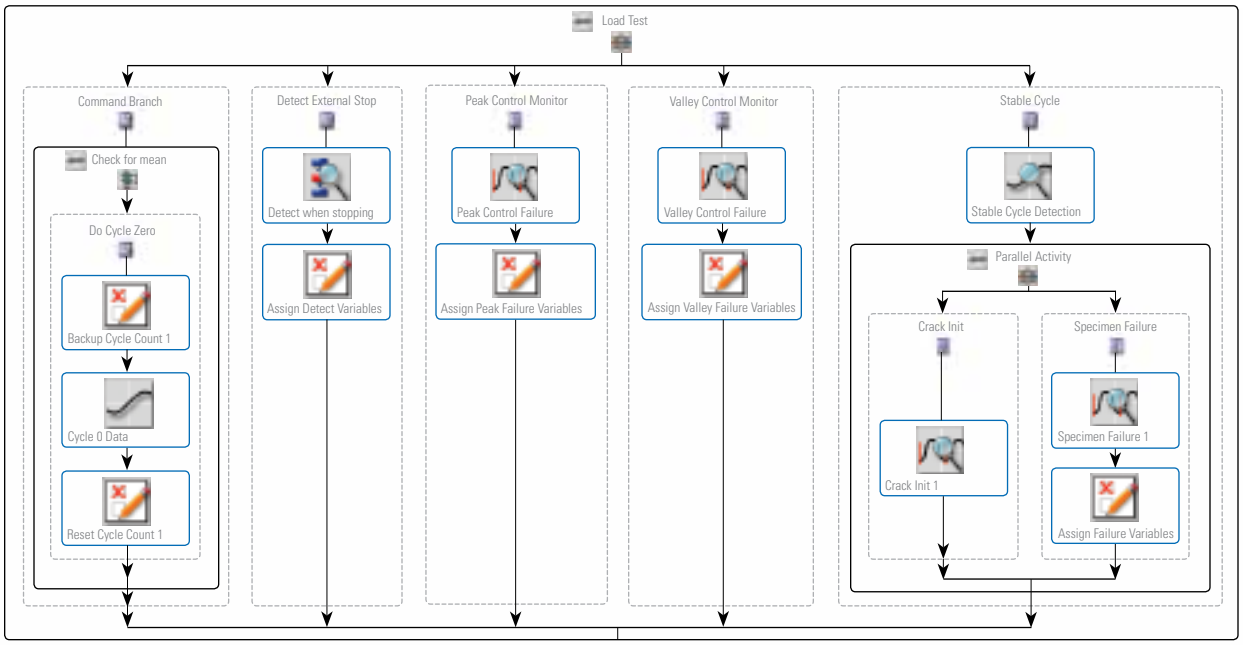
Sample test plan on paper

Standard and Custom Templates

We offer customizable test templates for testing to specific industry standards – use the MTS template or modify it to meet your interpretation of the standard. If you are repeating a specific type of test, you or MTS can create new templates to meet your specific needs.

Control Your Test Flow

Test activities execute from top to bottom as they appear in the Test Editor. To execute activities simultaneously, add Parallel Paths activities to the test flow from left to right. You can also add While Loop, If-Else Condition, and Periodic Time Event activities to control the test flow.



Sample test plan in the MPE Test Editor

VIRTUAL SPECIMEN

Accurately predict test behavior before breaking any test articles. With the Virtual Specimen feature, you choose a standard specimen and define the parameters, such as stiffness, degradation, initial crack length, crack growth rate, yield load and ultimate load. Then you set up the virtual test to receive physically meaningful feedback of realistic specimen behavior without using an actual specimen. You'll be able to validate your setup and approach before you test, saving you time and effort in test design.

Test Activity Property Definition

To define the properties of an activity, select the activity icon on the Test Editor, and then select the Properties panel. You can choose to define parameters as fixed values or variables.

Enhance Operator Ease-of-use

You can add information for your test operator, such as specimen installation instructions or safety information, directly into your test design. This feature allows you to create the information that the operator is exposed to during the test, and control where that information is shown in the test flow. This ability to provide direction during the test allows operators with little training or experience to run complex tests.

Minimize Errors

When you define activity properties, red error icons appear when test entry data is missing or is incorrect. This real-time validation ensures that the appropriate information is included in the test definition.

Defining properties

Error indicators

Analysis & Reporting

Complete Flexibility with Test Data

The MTS TestSuite platform provides flexible analysis tools that allow you to interact numerically and graphically with the test data, and conduct "what if" studies by adding variables, calculations or charts. You can create an analysis definition that includes the charts, tables, views, variables and calculations you prefer to see.

An analysis definition acts as an overlay to the information in the test run to produce an analysis run. This overlay approach means that you can use a single analysis definition to produce analysis runs for multiple, similar tests. Changes you make to an analysis definition are reflected in any analysis run that uses the definition.

The overlay approach also means that you can easily apply different analysis definitions to the data from the same test to produce different analysis runs.

More Powerful Report Generation

MTS TestSuite Multipurpose Elite and Express applications contain standard report generation capability that allows you to create a report during runtime.

For more detailed reporting after runtime, you can use the MTS TestSuite Reporter Add-In for Microsoft Excel. Create test report templates, and generate reports post-test from test run data.

When you create a report, the placeholder values in the report template are replaced with the data and images for a particular test or analysis run. This modular approach means you can use the same template for any number of similar tests. You can also easily create and manage multiple report templates to produce a library of reusable report designs.

With the Reporter Add-In, you receive publication-ready test reports that require no post-processing. These reports can contain text, charts and calculations. The calculations can be performed in the MTS TestSuite Multipurpose application or Excel.

Integration between the MTS TestSuite platform and Microsoft Excel means you get the full range of features in Excel with drag-and-drop simplicity from MTS TestSuite software.

Cyclic Fatigue
LCF Strain-Control Test Report

Name of the Project	Sample LCF Strain Project
Name of the Test	LCF Strain Test
Name of the Test Run	Virt_3-02_CF_LCF
User Name	John Doe
Specimen Name	Virt_3-02_CF_LCF

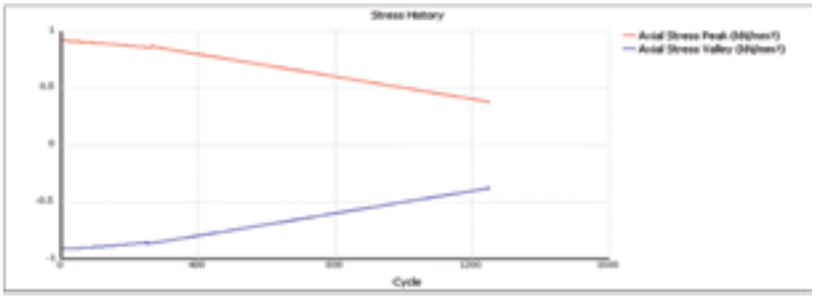
Specimen Description

Geometry Type	Round
Diameter (D)	6.3500 mm
Area	31.6692 mm²
Extensometer Gage Length (L)	25.4000 mm
Elastic Modulus (E)	210.0000 kN/mm²
Yield Strength	0.3500 kN/mm²
Valid at Temperature	23.0000 °C

Test Control Parameters

Frequency	5.000 Hz
End Level 1	0.005 mm/mm
End Level 2	-0.005 mm/mm
Number of Cycles	1250 cycles

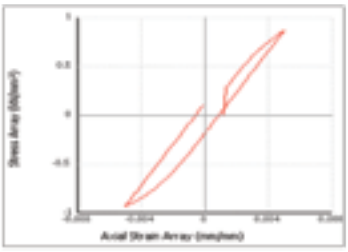
Test History Chart



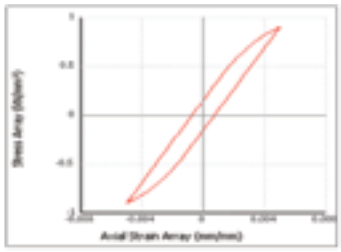
Cycle Loop Data

Cycles Completed: 1250

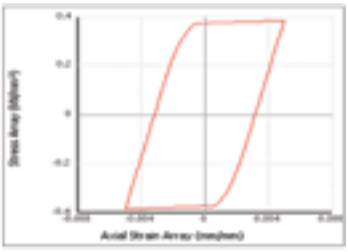
Initial Cycle: 1



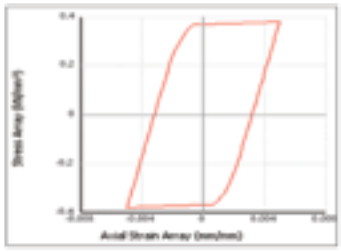
Stable Cycle (100): 100



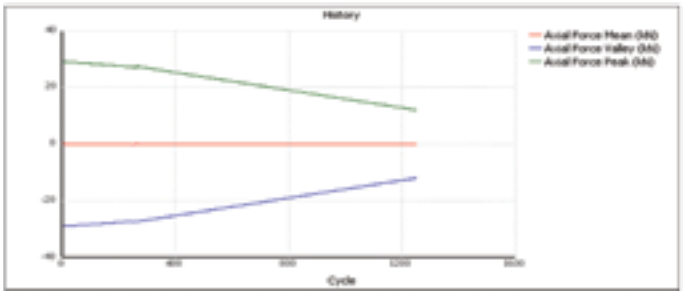
Failure Cycle: 1240



Final Cycle: 1250



Cycle	Axial Stress Peak	Axial Stress Valley	Axial Strain Peak	Axial Strain Valley
1	0.862 kN/mm²	-0.829 kN/mm²	0.00500 mm/mm	-0.00500 mm/mm
100	0.897 kN/mm²	-0.896 kN/mm²	0.00500 mm/mm	-0.00500 mm/mm
1240	0.385 kN/mm²	-0.385 kN/mm²	0.00500 mm/mm	-0.00500 mm/mm
1250	0.380 kN/mm²	-0.380 kN/mm²	0.00500 mm/mm	-0.00500 mm/mm



Activities

Multipurpose software provides test activities, such as command and data acquisition, and are represented by icons on the toolbox. You create a test procedure by adding and linking activity icons together on the Test Editor surface according to your test requirements. Multipurpose software is equipped with the following types of activities:

- Commands send various types of command instructions to a servovalve or servomotor.
- Data Acquisition stores sensor data to disk.
- Event Detection monitors test signals to detect test conditions that you specify, or which generate a user event.
- Control Settings set specific signals such as digital Inputs and Outputs and Span and Setpoint.
- Test Flow Control allows the user to define logic elements such as If-Else conditions and parallel paths of test execution.
- Operator Entry defines information the user will read and enter during the test execution.
- Program Actions allow for the export of data, execution of external applications and creation of reports.

Activity Toolbox
When you purchase additional capability for MP software, new activities appear in the toolbox. You can combine optional activities with standard activities to meet your specific testing needs.

Commands

CUSTOM WAVEFORM

This activity allows the user to specify a sequence of ramps and holds in any control mode and of arbitrary duration. The user can choose the number of repetitions for the waveform and set the behavior for when the activity is interrupted. There is also an activity to simultaneously acquire data with the generated waveform.

CYCLE

This activity creates a waveform by assembling two single segments and repeating them continuously or for a specified number of cycles. You can specify either absolute or relative end-level values. There is also an activity to simultaneously acquire data with the cycles.

DWELL

This activity maintains a static level for a time you specify in a selected control mode. When a dwell command begins, it reads the current level of the selected control mode and maintains that level for the specified duration.

EXTERNAL COMMAND

This activity uses a signal from an external device to control a servovalve or servomotor. When the external command activity begins, it ramps to the set point of the activity. Then it uses a soft start feature to ramp the span from 0% to 100% full scale (or a percentage of it).

PROFILE

This activity applies a profile, which is a waveform consisting of a series of cyclic, dwell, and ramp commands read from a profile file. You create profiles using a spreadsheet or text editor application.

RAMP

This activity generates a command that starts at one level and ends at a different level. You can specify either absolute or relative values.

SWEEP

This activity generates a cyclic command that sweeps through a range of frequencies. This activity can be used to detect resonances in specimen.

Data Acquisition

DATA ACQUISITION

This activity records data when the master channel signal detects a certain trigger event. Triggers can be time, peak or valley, delta level exceedance or a minimum or maximum exceedance.

MAX/MIN DATA ACQUISITION

This activity records data for the highest peak and lowest valley during a test. Each time a peak or valley is detected, it is compared to the peak or valley currently stored. If the new value exceeds the stored value, it replaces the stored value. If not, it is ignored.

HIGH-SPEED DATA ACQUISITION

This activity allows users to acquire data at very high speeds (up to 49 KHz for 1-2 channels for Series 493 controllers and up to 61 KHz for 1-2 channels for Series 494 controllers) for short bursts. This activity extends the timed data acquisition beyond the system rate.

Event Detection

BREAK DETECTION

This activity lets you monitor signals for failure events. The activity looks for specified failure events, determines whether the failure events have occurred and stops the test branch. In a monotonic test, this process can be used to look for an abrupt drop in load, and to shut the test down when the load drop is detected.

CYCLE CHANGE DETECTION

The activity triggers when a signal or calculated variable changes by more than the specified difference from a references value. This allows for various decisions to be based on changes in monitored values.

DIGITAL INPUT

This activity monitors digital inputs from external sources, and can be used to start or end other activities. It can detect the high or low status of any channel (including any type of signal transition). Logic signals or switch contact signals up to +24 volts can be detected.

LIMIT DETECTION

This activity waits for a specific event to occur, then issues a trigger when it occurs. This activity typically sequences in parallel with a command activity to trigger when the activity should end and another should start. A trigger limit can be a number of segments, a length of time, or a sensor signal value. It can be specified as a relative value or an absolute value. Relative values are based on when the limit detection activity was started. Absolute values are based on a zero-point reference, such as the beginning point of the test.

PEAK/VALLEY CHANGE DETECTION

This activity monitors signals for changes in the peaks and valleys. The process begins by detecting a peak and valley, which become the reference levels for the tolerance range. When a peak or valley exceeds a tolerance range, the activity triggers. If it is set for continuous triggers, it detects new reference levels for the tolerance setting and continues the monitoring.

STABLE CYCLE DETECTION

This activity detects a cycle for which a characteristic value has not changed by a specified percentage from previous cycles.

STATE CHANGE DETECTION

This activity checks for a specific program state in order to control the execution of a test.

WAIT FOR EVENT

Used when the test flow should wait for a condition to be true. The Wait for Event is a blocking activity that ends when the condition is met, allowing activities after it to execute.

Control Settings

AUTO OFFSET

This activity allows the input signals that are not being used for the active control mode to be set to zero.

RESET CYCLE COUNT

This activity resets the cycle counter for the selected channel to zero while the test is in process.

SET CONTROL EVENT

This activity triggers an action in the controller and optionally logs a message based on test conditions or on user input.

DIGITAL OUTPUT

This activity sends voltage signals to one or more external devices. Each output can be set independently. For example, this activity can be used to trigger a remote device used with the test system.

SET CALCULATION PARAMETER

This activity changes the value of a controller calculation parameter. This activity provides support for calculated signal and output processing.

SET SPAN AND SETPOINT

This activity sets new values to the span (multiplier to the command) and set point (offset to the command). It can act once or continuously.

Test Flow Control

IF-ELSE CONDITION

This activity creates two possible paths for a test procedure based on a conditional expression.

PARALLEL PATHS

The Parallel Path activity enables the execution of multiple activities simultaneously; and they are arranged in parallel.

PERIODIC TIME EVENT

This activity allows you to schedule arbitrary and repetitive times at which the activity will produce a trigger or a series of triggers. This activity is used to start other activities at specified times or intervals.

WHILE LOOP

The While Loop activity repeatedly runs the activities defined within it as long as a defined condition evaluates to True.

Operator Entry

CUSTOM MESSAGE WINDOW

The Custom Message Window activity shows messages to the operator and records the operator's response. The user messages can be formatted via html.

INPUT PARAMETERS

Use the Input Parameters activity to assign values to one or more variables. When the activity runs, a list of selected variables and their current values is shown. You can edit the variable values as required.

Program Actions

ASSIGN VARIABLES

This activity explicitly calculates and assign values to one or more variables in the test.

CALCULATE VARIABLES

This activity performs predefined calculations of any defined variable.

EXPORT DATA

This activity exports any acquired data to ASCII files.

LOG MESSAGE

This activity writes an entry to the message log when a test performs the activity. The entry can contain text and the value of one or more variables.

RUN EXTERNAL APPLICATION

This activity launches an external application as part of the test. This can trigger external calculations or external devices.

RUN REPORT

This activity creates a report based on a pre-defined report template as part of the test.

SEND E-MAIL

This activity allows you to send e-mail with a predefined message. The message can contain log entries and values of any text or numeric variables to automatically inform others about the test's progress.

WAIT

This activity suspends the workflow for a specified amount of time.

Series 793 Options Add Capability

You can purchase additional options that enhance the standard processes included with MTS TestSuite Multipurpose Software.

793.03 CALCULATIONS WITH OUTPUT

Enables the user to define calculations that are executed in the controller. Calculations can be based on any input signal and can create output signals.

793.04 PC PER STATION

Allows user to dedicate an individual PC to each controller station.

793.05 AMPLITUDE PHASE CONTROL

Corrects the command signal for amplitude and phase errors.

793.06 ADAPTIVE INVERSE CONTROL

Uses an inverse model of the test system to improve command response accuracy.

793.07 ARBITRARY END LEVEL CONTROL

Arbitrary end level control is an adaptive compensation technique that improves tracking accuracy. It compensates for peak and valley errors by building (and continually updating) a matrix of amplitude compensation factors. This compensation can be applied to Cyclic and Profile activities.

793.08 PEAK VALLEY PHASE CONTROL

Corrects for peak valley and phase errors by adjusting the command.

793.15 DEGREE OF FREEDOM CONTROL

Provides a coordinate system in which actuators act in groups to produce movement in six degrees of freedom.

793.16 THREE VARIABLE CONTROL

Provides simultaneous control of displacement, velocity and acceleration variables.

793.18 ADAPTIVE HARMONIC CANCELLATION

Removes harmonic distortions from sinusoidal feedback signals, even on non-linear systems.

793.21 CASCADE CONTROL

Enables better tuning and response when specimen stiffness varies significantly as a function of temperature or wear.

793.25 CANBUS

Provides access to CANBUS hardware resources.

793.71 TIME HISTORY AND SEQUENCE OUTPUT

Allows users to drive control channels in a test system with an RPC time history or sequence file. A sequence file consists of a list of time history files that play out during durability testing.

793.72 TIME HISTORY INPUT/OUTPUT

In addition to time history and sequence output, this activity also acquires and digitizes analog test response data in the RPC® file format. It can also simultaneously (or separately) digitize the resulting analog test response data in the RPC file format. With RPC, this digitized file can be used to calculate the system's transfer function.

Modules and Applications

The MTS TestSuite Multipurpose Software supports several optional modules and applications for conducting tests that meet industry standards.

Fatigue Testing Solutions

LOW-CYCLE FATIGUE MODULE

This module contains the test and report templates and analysis definitions needed for low-cycle fatigue testing up to 12 Hz, in full compliance with current engineering standards.

HIGH-CYCLE FATIGUE MODULE

Get the test and report templates and analysis definitions required to run high-cycle force-controlled fatigue tests up to 70 Hz. These tests will comply with current engineering standards.

ADVANCED LOW-CYCLE FATIGUE MODULE

This solution includes the test and report templates and analysis definitions needed to run constant amplitude strain-controlled fatigue testing up to 12 Hz, in compliance with current engineering standards.

It also calculates and corrects for thermal expansion during non-ambient testing. In addition, a custom waveform activity allows you to efficiently define arbitrary waveforms, including user-defined hold times.

THERMOMECHANICAL FATIGUE MODULE

This module contains all of the test and report templates and analysis definitions needed to conduct complex thermomechanical fatigue tests in compliance with current engineering standards.

FATIGUE ANALYZER

This powerful, stand-alone package lets you achieve new levels of insight by conducting custom, in-depth analyses of test data to create informative results. Over time, you'll build an extensive analysis library that allows you to meet your specific testing requirements with speed and accuracy. A powerful interface allows users to post-process test data for graphical and tabular display.

Fracture Testing Solutions

FATIGUE CRACK GROWTH MODULES

These convenient solutions package the test and report templates and analysis definitions needed for fatigue crack growth assessment in full compliance with current engineering standards.

- Clip Gage Module
- Crack Gage Module
- Direct Current Potential Drop Module

FRACTURE TOUGHNESS MODULES

Get the test and report templates and analysis definitions required to run fracture toughness tests that comply with current engineering standards.

- K1c Module
- Crack-tip Opening Displacement (CTOD) Module
- J1c-CTOD Module

FRACTURE ANALYZER

The Fracture Analyzer allows you to post-process test data for performing in-depth analysis in a graphical and tabular manner, and is required to obtain reports for fracture tests.

Tensile Testing Solutions

TENSILE TESTING MODULE

This package includes the report and test templates, activities and calculations you will need to test to ASTM E 08.

Unified Look & Feel

With a common platform and user interface, all the pieces look and operate similarly, so you need less training and can share information more easily. You can pull in data from previous tests or take tests from one system to another and easily adjust for different hardware definitions with a new resource mapping tool. The entire lab can be standardized on one platform whether you are conducting materials, systems or structural testing. And people in various locations across your organization can share the same data and interact with it in the same way.

Design Freedom

This software offers you the utmost flexibility in test design. You are able to determine the calculations and parameters and you can see how everything was created. This transparency allows you to modify procedures to meet your specific requirements and design tests exactly the way you want them.

Easy Maintenance

Our Software Maintenance Enhancement and Support (ME&S) agreements make it easy to stay current with rapidly changing software technology and engineering standards. Within your contract period, you will automatically receive updates to all software covered in your contract.

Regional Business Centers

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