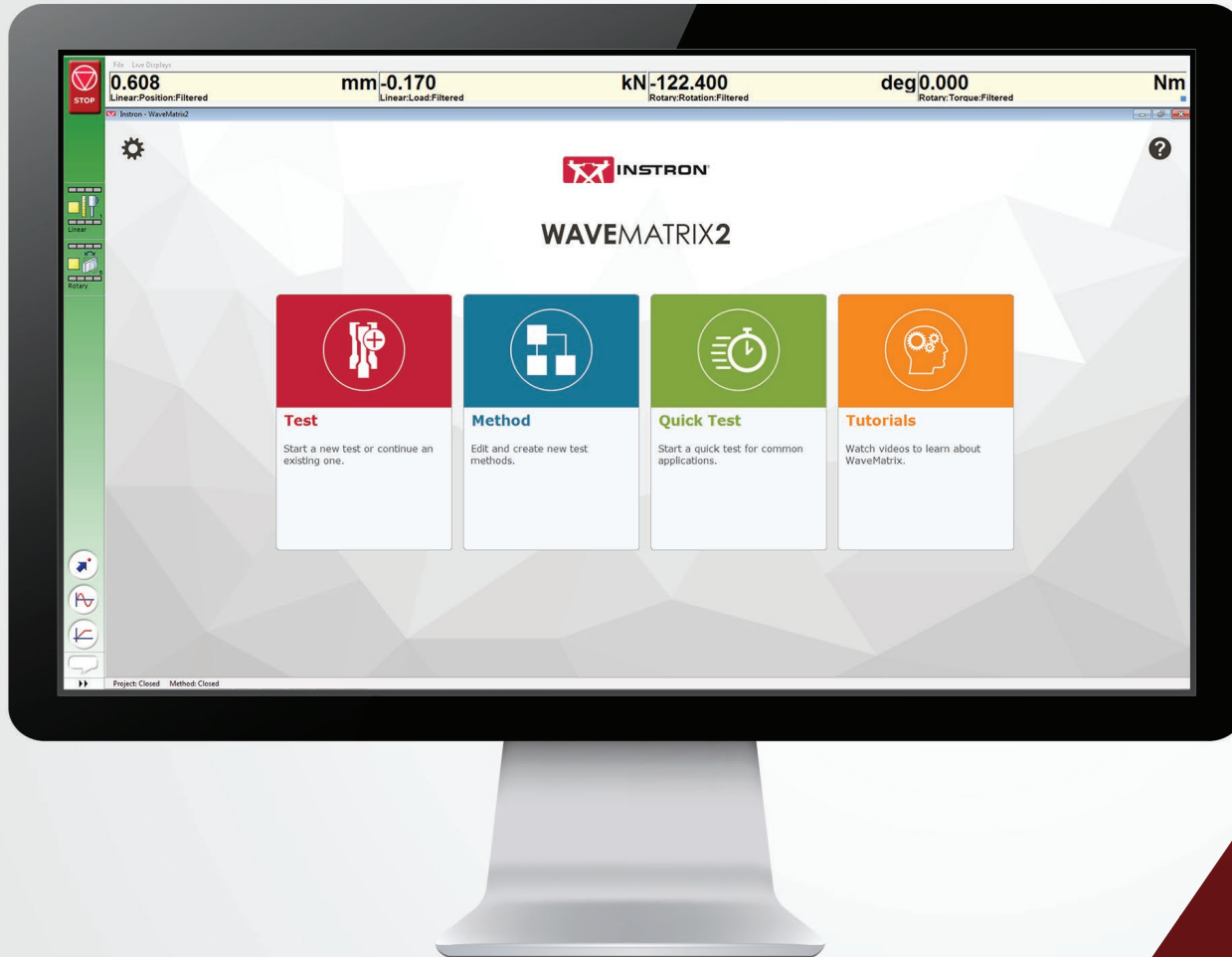


# WaveMatrix 2

The Next Generation of Testing Software



Your testing needs vary greatly depending on the materials and products that you test through to the ways in which you test them. The demands and challenges you face are dependent on the applications that you are interested in and that you use your testing equipment for. Instron recognizes that in order to develop solutions to the wide variety of application challenges you face, we need to have application focused development groups and application-specific solutions. For over 15 years this has been reflected in our “Centers of Excellence” Organizational Structure.

The common challenge faced by all customers across all application areas is to reduce the complexity of setting up and running tests to deliver the data they need. We want our customers to focus on understanding their products and not in learning to use complex testing equipment.



At Instron, we are committed to providing the most intuitive and user-friendly systems available for materials testing. We believe it is usability which allows all technicians to use a test machine with confidence and the results they need first time, every time.

## Introducing WaveMatrix2

Save time, build confidence and get more out of your systems

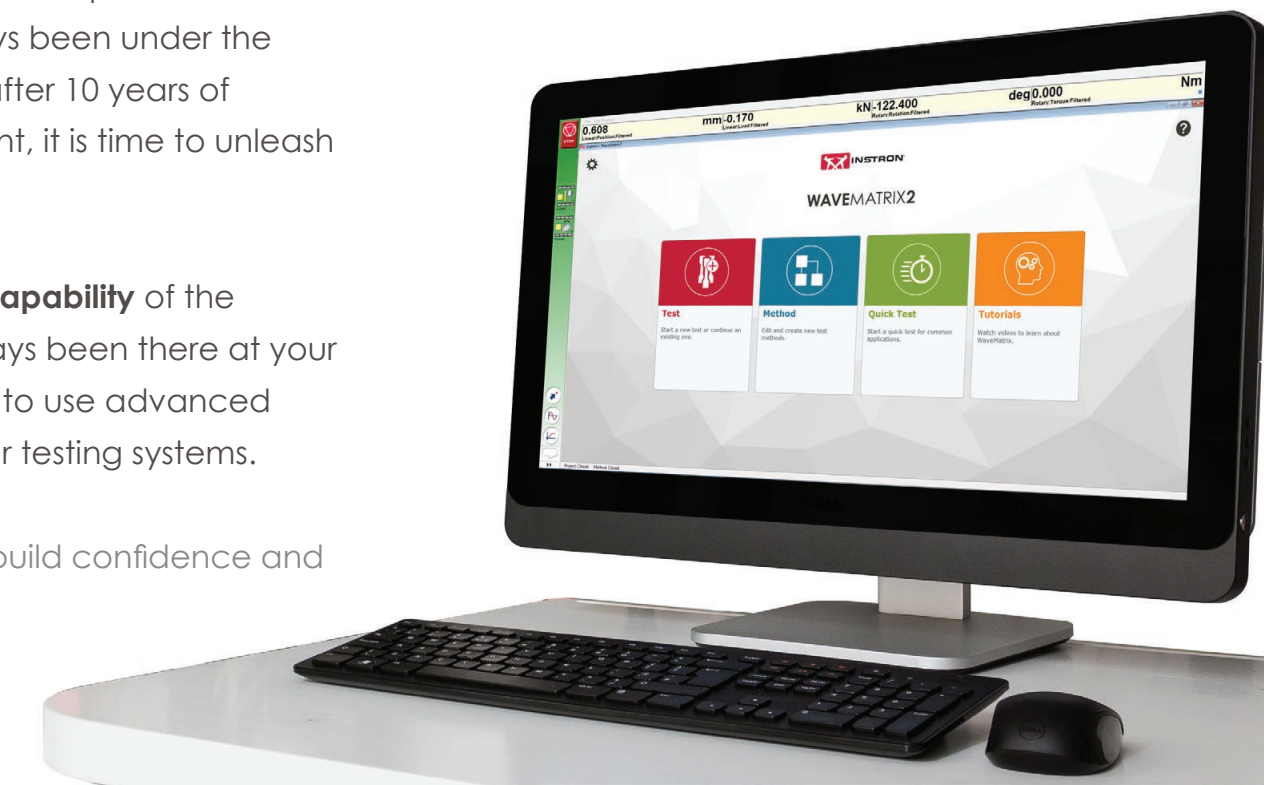
In 2007 WaveMatrix redefined dynamic materials testing software and reflected a demand from our customers for simplicity and ease of use. It represented a step change from the status quo in fatigue and cyclic testing.

Whilst WaveMatrix has long been recognized as an intuitive and user-friendly tool, **WaveMatrix2** raises the bar once again on ease of use with new **Quick Test** method builder and built-in **Video Tutorials**.

At times WaveMatrix's unrivaled ease of use has been mistaken for limited capability. While the power and flexibility of WaveMatrix have always been under the hood, there when it was needed, after 10 years of evolution and product development, it is time to unleash the power.

WaveMatrix2 puts the **power** and **capability** of the WaveMatrix engine which has always been there at your disposal. Boosting your confidence to use advanced features and deliver more from your testing systems.

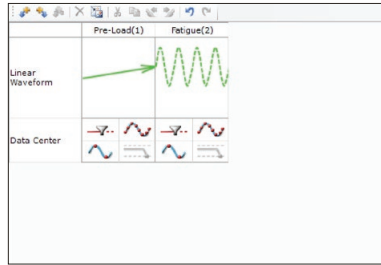
Choose WaveMatrix2 - Save time, build confidence and get more out of your systems.



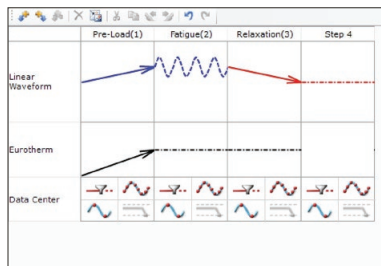
# WORKFLOW

Setting up your Test

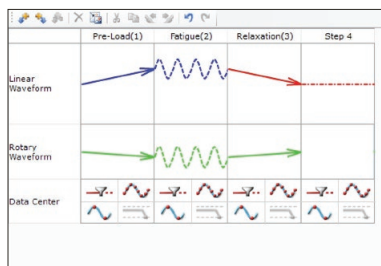
## Visual Method Builder



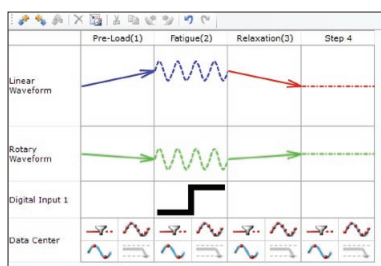
**Sequence view:** A single place to view all activity during a test. The graphics show the direction of a ramp or the type of waveform and the number of cycles. Give each step a meaningful name, displayed live during testing to monitor test status.



Add additional devices for control and interfacing, including 3<sup>rd</sup> party like Eurotherm or National Instruments.



If you have a biaxial system, the rotary actuator is simply added to the sequence view.



Use digital input and outputs for triggering and interfacing 3<sup>rd</sup> party equipment.

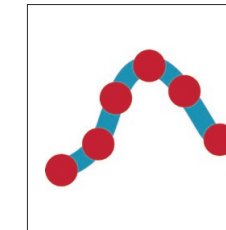


## Getting the Right Data



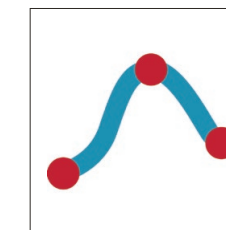
### Data reduction

Specify the criteria that will be used to reduce the volume of data acquired from devices on the selected step or loop during a test.



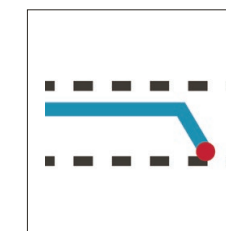
### Tracking Data

Whenever a cycle is saved, Tracking data captures all values from the cycle.



### Saving Peak & Trend Data

Whenever a cycle is saved, Peak & Trend stores mathematical/statistical values derived from the tracking data e.g. maximum load, minimum position, mean displacement.

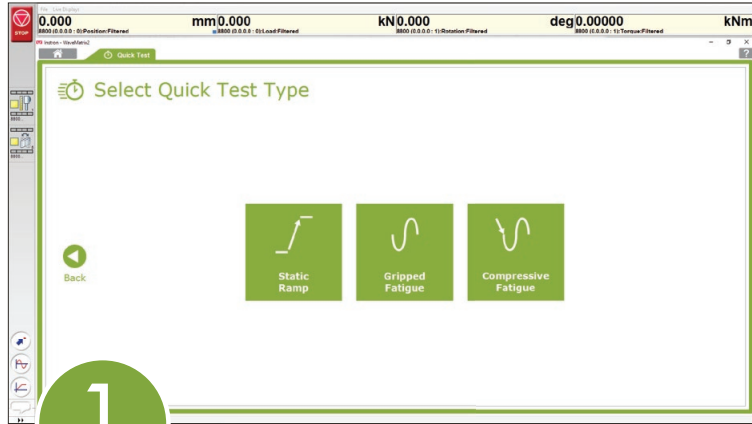


### Trend Monitor

A peak & trend event detector monitors the value of a selected peak or trend channel and triggers a user-selected action if the value changes by a specified amount (when compared to the value recorded at a reference cycle) or if it reaches a specified limit.

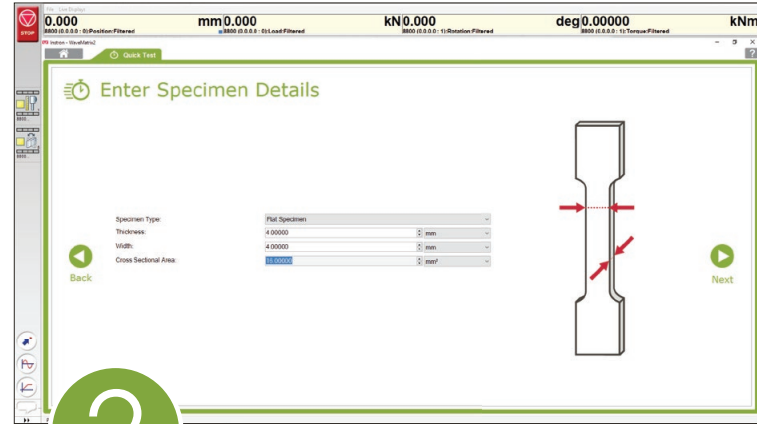
# NEW QUICK TEST

Now let us build your methods for you



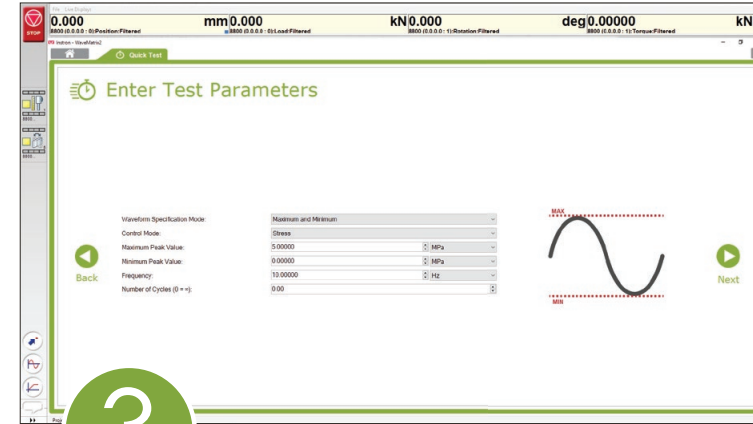
## 1 Method Type

Select between Simple Static, Grippled Fatigue or Compressive Fatigue.



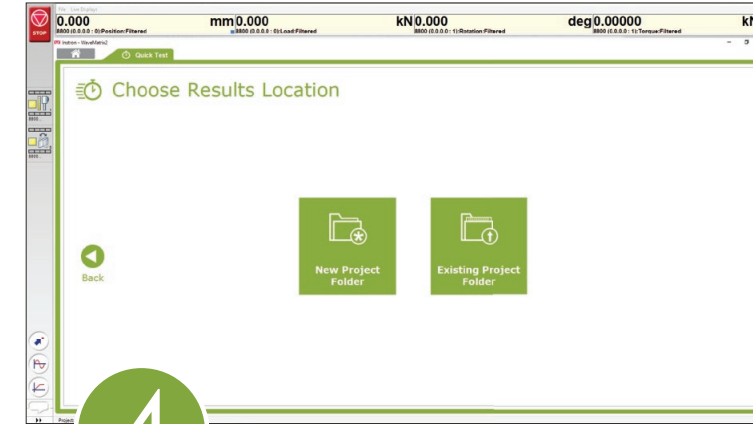
## 2 Specimen Details

Skip to test with Force and Position Only or enter details to add Stress and Strain control.



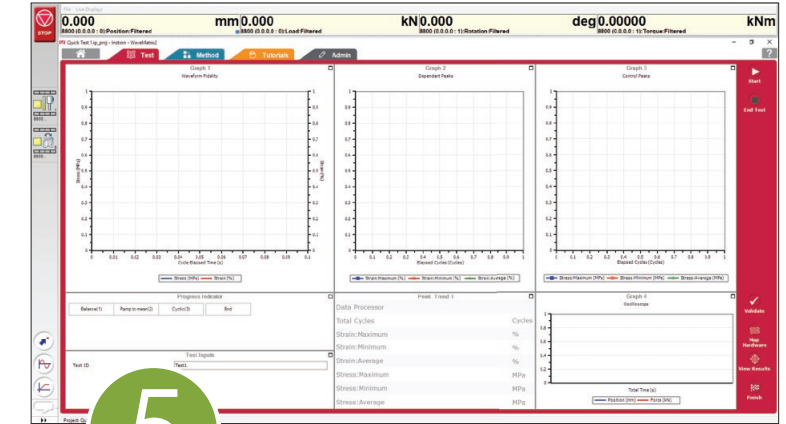
## 3 Define your test

Choose a Control Mode and enter 3 Parameters.



## 4 Project Details

Add to existing or start a New Project.

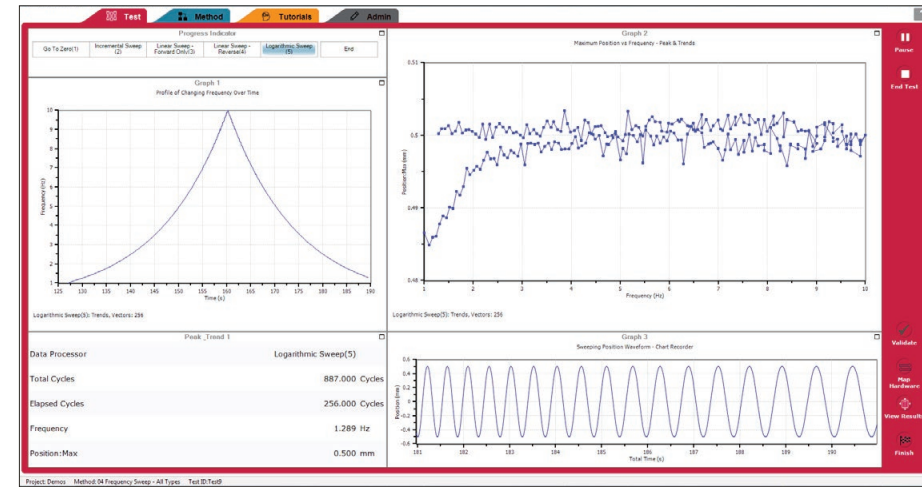
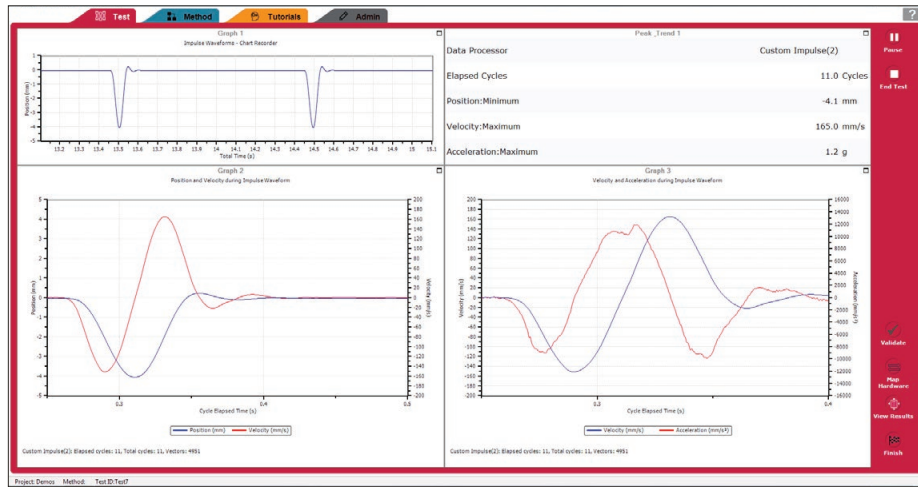


## 5 Straight to Test

Method Built, Ready to Test. You can still review and edit the method, we just set it all up for you.

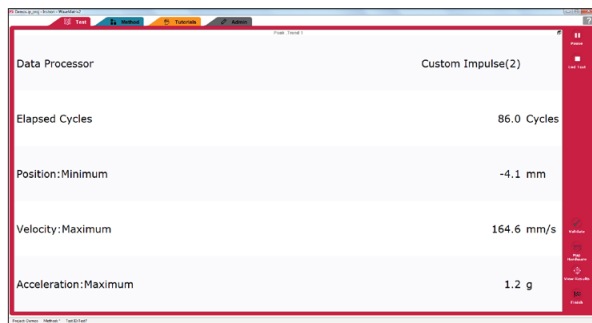
This guided wizard allows you to set up complete methods with just a few taps and even fewer input parameters. In each case, we have reduced the tests down the very simplest they could be to give your users confidence as they learn and develop. Quick Test is designed to make you feel like you have an applications engineer from Instron working by your side as we set up data acquisition, graphs, control modes, peaks, stress and strain channels for you.

In seconds you will have a method built for exactly what you need. Most importantly of all, after you use QuickTest to create a method - you are free to edit, review and modify the methods as you need, and learn from the tools and techniques we have used to build the method or of course you can just start the test.



## Graphical Displays

Customizable layout with powerful graphs that can be adjusted while running a test.



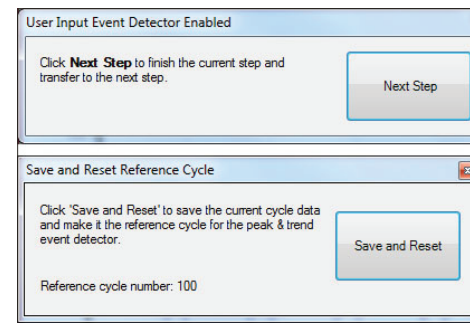
## Numerical Peak & Tracking Data

Monitor your test results with numerical display of peak values and tracking data.



## Status & Progress Monitoring

See a graphical indication of the current step as well as detailed status of the overall test.



## User Inputs

Powerful inputs to help you with your test workflow.

**A** Live Displays  
View live transducer readings as well as Application Data Displays.

**B** Always on Top  
Console and Live Displays always on top with fixed locations.

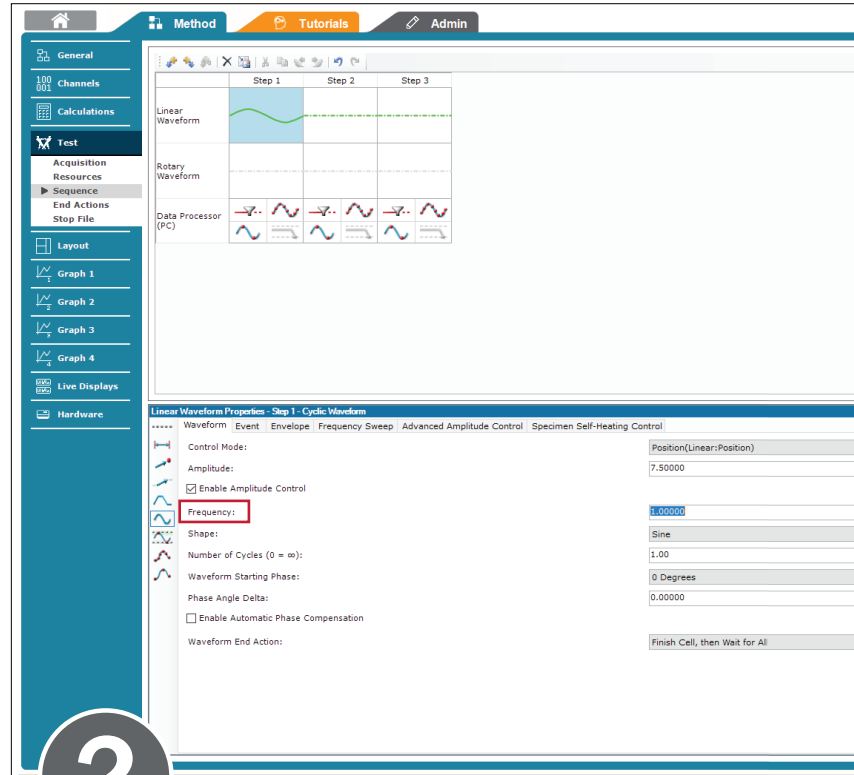
**C** Pause/Resume  
Seamless merging of data and logs when stopping and starting tests.

**D** View Results  
Quick link from the test environment directly to your results folders.

# RELIABLE

The right help when you need it

We understand that there is always time pressure in a productive laboratory environment and there can be challenges training new staff members to use equipment to a high standard. Through powerful **Context Specific Help** and **Tutorial Videos**, WaveMatrix2 teaches operators to get more out of the system.



## F1 Context Specific Help

The help files included are context specific, allowing you to read explanations of expert concepts in specific areas when needed.

**Control Mode** The channel of control that you want to use to run the waveform. You can choose from any of the controllable channels defined for the device.

**Amplitude** The amplitude of the waveform (half the range, i.e.  $\frac{\text{maximum value} - \text{minimum value}}{2}$ ). This value cannot exceed the full-scale value of the transducer for the control channel.

**Amplitude - Bipolar Waveform**

**Amplitude - Unipolar Waveform**

**Frequency** The number of waveform cycles that you want to run per second.

**Shape** The shape of the cyclic waveform that you want to run. Choose from the following options:

Sine
 Square
 Triangle

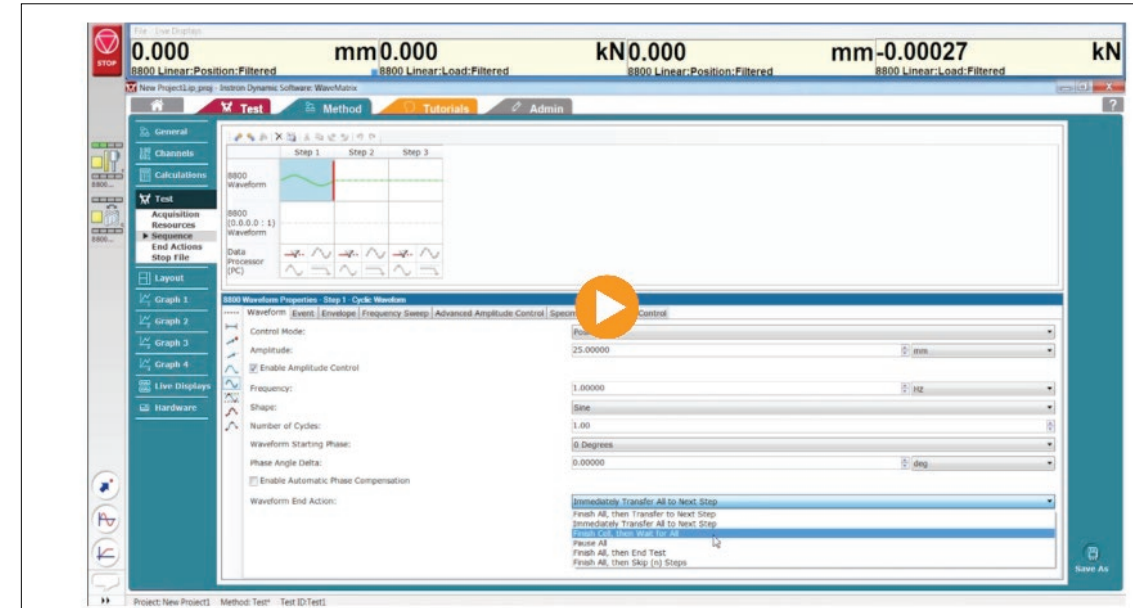
To define a Haversine, Haversquare or Havertriangle waveform, change the **Waveform Starting Phase** property.

## Graphical Help Files

The help files include expert technical knowledge as well as visual guides to give you the relevant information you need.

# NEW TUTORIAL VIDEOS

Learn more and discover new features



## WORKFLOW - Waveform/Step End Actions

When setting up any waveform or action cell in a WaveMatrix test, you have a number of options for what happens when that action cell is completed. These actions are called waveform end actions.



## NEW Video Tutorials

WaveMatrix2 launches with 20 tutorial videos about basic machine use, tips and tricks, advanced features and functionality, and more. Access expert guidance easily by browsing or searching by keywords. These are great refreshers for inexperienced users and an easy way to extend their capability of experts. All videos are accessible offline.

## Tutorial Videos

Search for...

- NEW - Using Example Methods
- SETUP - Setting up a Sine Wave
- SETUP - What is Amplitude Control?
- SETUP - Using Console Limits
- SETUP - Understanding Limit Actions
- SETUP - Stiffness Based Tuning
- SETUP - Changing Channel Names
- SETUP - Changing Default Machine Name
- SETUP - Mapping methods from other systems
- DATA - Introducing the Data Processor
- DATA - Understanding Tracking vs Trend Data
- DATA - Using the Trend Monitor
- DATA - Creating Live Graphs and Layouts
- WORKFLOW - Waveform/Step End Actions
- WORKFLOW - User Inputs
- WORKFLOW - Loops, Loop Data and Loop Naming
- WORKFLOW - Global Channel Event Detectors
- MODULES - Introduction to Calculations
- MODULES - Introduction to Advanced Control
- MODULES - Introduction to Specimen Self Heating Control

While tutorial videos are no replacement for proper training from Instron service - they do provide a fantastic base of knowledge to refresh your memory of formal training or to raise awareness of features that you may not have used before.



### Building Operator Confidence

Working together to get your testing right. WaveMatrix2 performs a series of automated pre-test checks:

- Is the machine ready to test?
- Have you got the right transducers fitted?
- Did you remember to set limits?
- NEW Are your limits inside of the test range?

Many more...



### 3 Easy ways to find Test Data

Finding the data you need quickly and easily:

What happened at the end of the test?



Did I achieve my target stress levels?



What happened in a specific cycle?



### Results: Where do I find my files?

Separate files for different Data types:

- Includes cycle, step, and loop number to help easily navigate result files
- Common naming convention to identify files
- Universal CSV file format

Each test is saved in a single folder with:

- Log File with Tuning Values
- Archived Method File

Multiple Tests are saved in a single Project folder with:

- A log file of all testing activity
- Different Methods can be used in a single Project
- Remembers last used Method when starting new Test



### What's in a Log File?

- Operator Username
- Machine Serial Number & Computer Name
- Software & Firmware Version Number(s)
- NEW System Tuning Values
- Start Time, End Time
- Total Cycle Count
- Test End Reason
- Results File Location
- Time Stamped History e.g. User Inputs, Events, Limits Hit, Step Changes, Loop Events

# POWERFUL

## Example Methods

**Example Methods**

Before running any of these methods on your system, watch the tutorial video "Using Example Methods" to understand how they should be used and the risks involved. As always, ensure you are trained and familiar with all the hazards associated with materials testing systems before operating your system.

Search for... Current Configuration

- Waveforms - Envelope Times for Waveforms
- Waveforms - Superimposed Waveform using Sample Data
- Waveforms - Impulse Waveform using Sample Data
- Waveforms - Frequency Sweeps
- Waveforms - Specimen Self Heating Control Demo
- Data - Using Trend Monitor to Log Additional Cycles
- Data - Auto Balancing Transducers
- Data - Processing Loop Data
- Data - Velocity and Acceleration Calculations
- Data - Elastic Stiffness Calculation
- User Inputs Part 1 - Manually Advancing a Test Workflow
- User Inputs Part 2 - Skipping Multiple Steps
- Events Part 1 - Using Events to Change Test Workflow
- Events Part 2 - Using Events to Handle Unexpected Behaviour
- User Calculations Part 1 - Add a Fixed Trend line to a graph
- User Calculations Part 2 - A Fixed Trend Line Only on Step 2
- User Calculations Part 3 - Add a Step Dependent Trend Line
- User Calculations Part 4 - Create a Simple Countdown Timer
- User Calculations Part 5 - Calculated Error from Target Value

**Waveforms - Envelope Times for Waveforms**

This method shows how the Start and End Envelope function (found in the Envelope tab for cyclic waveform types) can be used to smooth the starting cycles of a waveform and equally to gently wind down the waveform.

This has the effect of gently increasing the amplitude of the control waveform until the peaks are met.

In this example the start and end envelope time is set to 5 seconds to allow you to easily see what effect it has on the test.

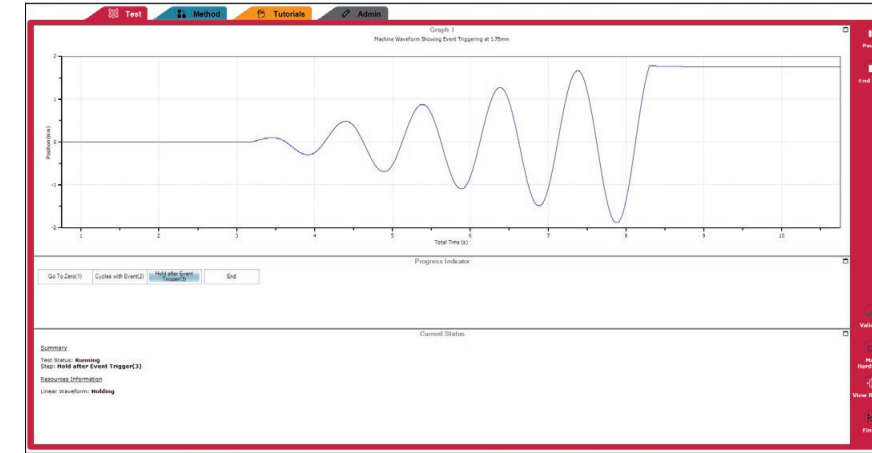
**SETUP**  
This example method is designed to run in free air without a specimen installed. You MUST ensure the full stroke of the actuator is available and that any installed fixtures will not be able to collide.



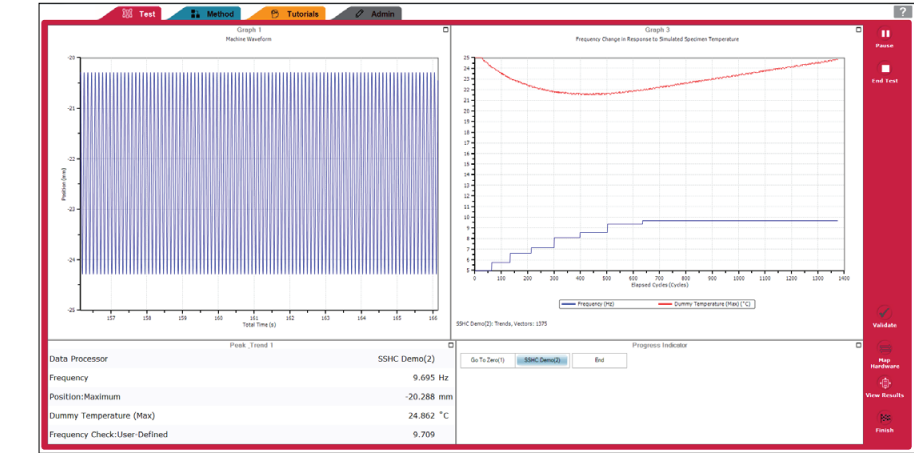
## Example Methods

As a compliment to the tutorial videos, we wanted to provide you with pre-made examples of some of the great features available in the software. Most of these methods do not require a specimen and can simply be run on the machine in free air to demonstrate certain features and functionality. There is no better way to see what your machine is capable of than seeing it in real life. It is easy to open up a method, run it and then look at the method to understand how it was configured to deliver the results.

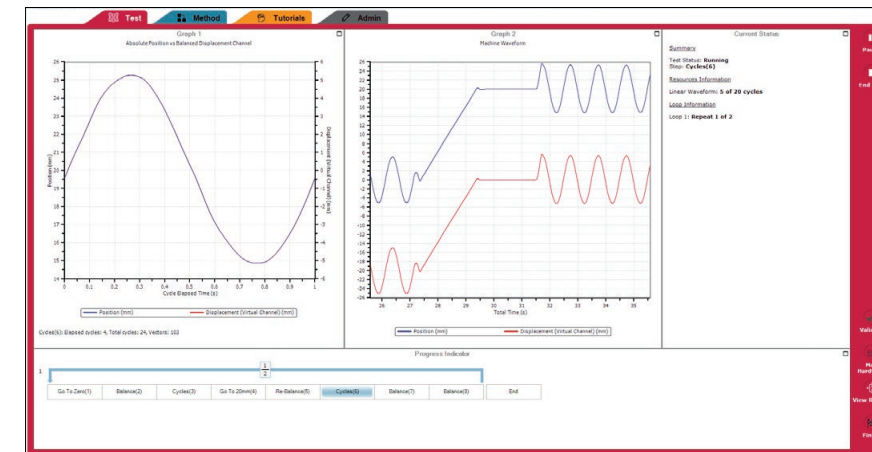
## Some of the Example Methods included in WaveMatrix2



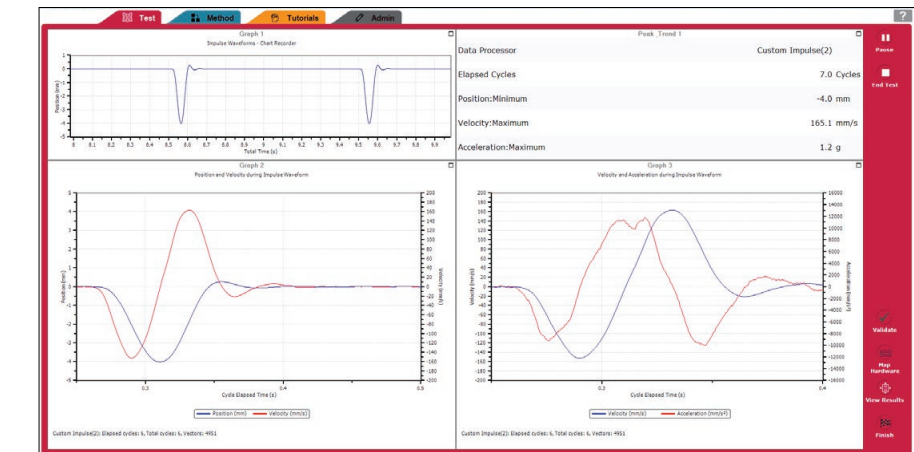
Using Events to Change Test Workflow



Specimen Self-Heating Control Demo



Auto Balancing Transducers



Velocity & Acceleration Calculations



# POWERFUL

## Calculations Module



## Calculations Module

This Module is an upgrade that offers extended capabilities for data processing and calculations. It comes with a library of more than 20 built-in calculations that are ready for immediate use.

### ! What can it do for you?

- Add and create calculated 'virtual' channels within WaveMatrix
- Derive real-time calculated data from physical transducers channels and integrate directly into the test
- Display live calculations during a test and record them alongside physical transducer data in results files
- Reduce post-processing time and gain insight into changing material properties during fatigue testing

# POWERFUL

## Advanced Control Module



## Advanced Control Module

This Module is an upgrade that offers additional control modes and waveform types.

### ! What can it do for you?

- Solve challenging materials testing requirements with a versatile control suite
- Control fatigue tests of non-linear, low-force materials using mixed-mode control
- Execute a variety of frequency sweeps ideal for Dynamic Mechanical Analysis (DMA)
- Detect and correct for phase lag in cyclic waveforms using Automatic Phase Compensation

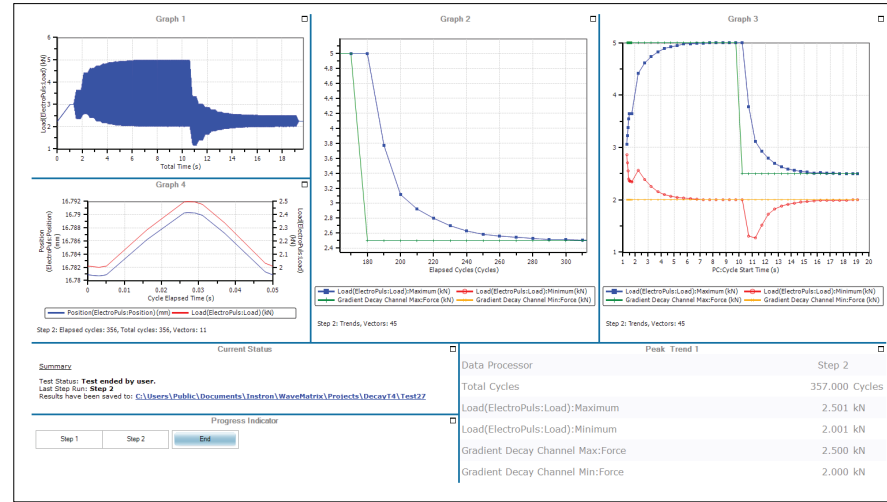


Achieve advanced functionality for special applications like energy control by combining calculations and advanced control.

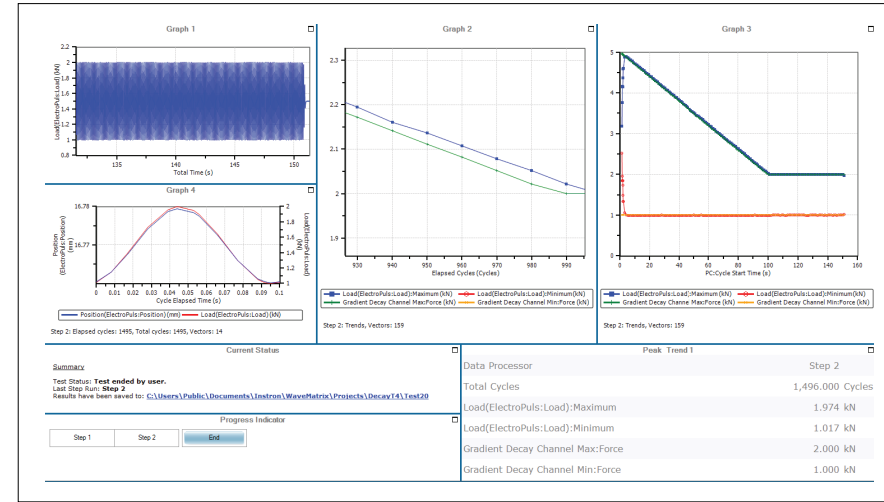
- Optimize test control by targeting peaks and trends of 'virtual' channels, e.g. Max Cycle Energy
- Set either fixed or moving targets for cyclic waveforms, e.g. variable mean load or decaying maximum load
- Perform outer-loop control using virtual channels created with 'Calculations Module', e.g. Cycle Energy

# POWERFUL

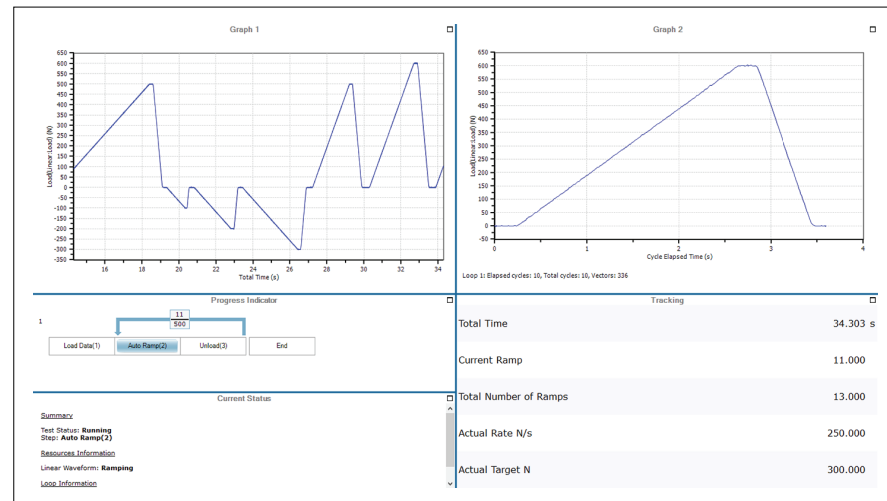
Examples of WaveMatrix customer application case studies



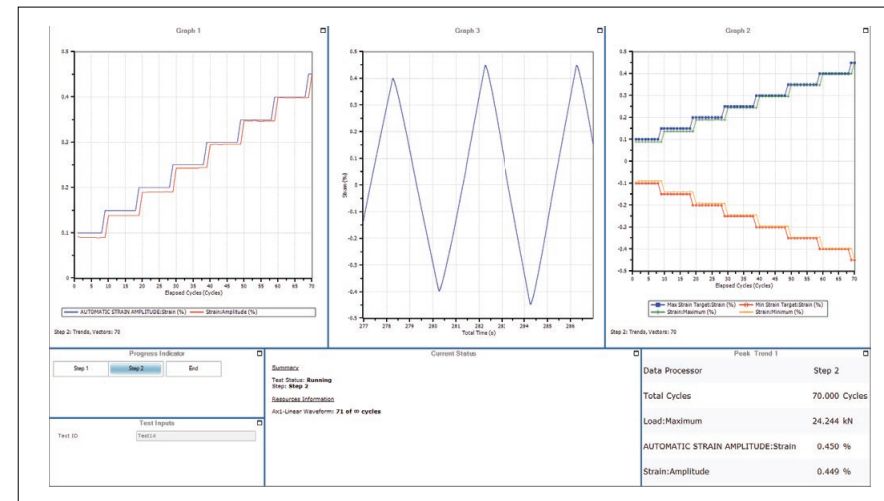
Reaction to a 2500N step change at 20Hz



3000N decay over 100S at 10Hz



Real Time Test Retune for multiple specimen properties of ElectroPuls System



Increasing Strain Through a Calculation

# IS WAVEMATRIX2 RIGHT FOR ME?

System Compatibility

WaveMatrix2 is available with new ElectroPuls and Servohydraulic systems, as well as existing dynamic testing systems with an 8800 or 8800MT controller. Upgrade today to take full advantage of all the new features and much more. Contact Instron for more information.





[www.instron.com](http://www.instron.com)

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