CRYSTAL INSTRUMENTS

EDM 9.0

Engineering Data Management Software Release Notes

SPIDER VIBRATION CONTROL SYSTEMS (VCS)
MULTIPLE-INPUT MULTIPLE-OUTPUT VIBRATION CONTROL SYSTEMS (MIMO VCS)
EXPERIMENTAL MODAL ANALYSIS (EMA)
DYNAMIC SIGNAL ANALYSIS (DSA)
POST ANALYZER (PA)

www.crystalinstruments.com | info@go-ci.com

TABLE OF CONTENTS

RELEASE HIGHLIGHTS 4

Introducing Spider Systems Featuring 256 kHz Sampling Rate (Spider-80Hi and Spider-80Ci) 4

- Vibration Control System or Dynamic Signal Analysis 4
- Spider-80Ci (Integrated Charge Amplifiers) 4
- High Channel Count System 4
- Time Synchronization 4

Introducing the Ultra-Compact Spider-20H, Spider-HE & Spider-20i with 256 kHz Sampling Rate 4

- Spider-20H (Wi-Fi) 4
- Spider-20HE 4
- Spider-20i 4
- Extended Input Range 5
- High Channel Count Synchronized Data Acquisition 5

Synchronized Data Acquisition Between Spider-20E and Spider-80X/Spider-80Xi Systems 5

Introducing Multi-Resolution Pretest in MIMO Sine 5

Extended SRS Span for MIMO SRS 5

Multi-Resolution Support for SoR and RoR Tests 6

Introducing the Sine Beat Seismic Test Type 6

Introducing EMA Testing Plan 6

Added Shaped Random/Burst Shaped Random Output Excitation in MIMO FRF Modal Analysis 6

Patented Multi-Resolution Spectrum Technology in Modal Analysis Extended to High Channel Count System 7

Support for Strain-gage Based Sensors on Spider-80SG or Spider-80SGi 7

Save and Continue an Unfinished Test 8

Introducing Statistics Signals in EDM-DSA 8

Introducing Frequency Domain Signals in Variable Sampling Rate 8

Introducing Time Markers for Raw Time Recording Data 9

Support for Microsoft SQL Server 2017 and 2019 9

Ease of Connecting IEPE Sensors with Spider-80SGi 9

Introducing EDM-VCS Simulation 10

NEW FEATURES 10

New Features in EDM Vibration Control Software 10

- Introducing DOF Selection in the Control Panel 10
- Introducing APS Signals in Shock, TTH, TWR, SRS, and Earthquake Testing 10
- Send Digital Output Before Starting Test 10
- Scale the Synthesized SRS in SRS and Earthquake Test Types 10
- Special Half-Sine Shock Waveforms Simulating Vehicular Dynamic Conditions Added to TTH 11

New Features in EDM Dynamic Signal Analysis 11

- Adjustable X-axis Range for Live Time Stream Display 11
- Variable Sampling Rate Allows Selection of Higher Sampling Rates 11
- Offset Nulling is Available in Event Action Rules 12
- Customizable Reference in X-axis in Spectral Signals 12
- Attach Limiting Results to Run Folders 13
- DSA-SRS Reference Profile Includes Alarm and Abort 13

New Features in EDM-Modal 13

- Improvised 3D Model Reconstruction 13
- New Geometry Editor Window 13
- Optimization of ODS Capabilities 14
- Improved Trigger Window 14
- Enhanced Modal Data Selection 14
- Updated Animation Window 14

New Features in Post Analyzer 15

- Standard Deviation Added to Statistics Signals in PA 15
- Recording and Saving Simultaneously 15
- Option to Choose Acquired Time or Processed Time for Saved Signals 15
- Data Conditioning Module Added to Project Template 16

New General Features 16

- Ease of Adding Modules to Tests or Switching Tests Between Spider Systems of Different Channel Counts 16
- Channel Status and Measurement Status Added to Saved Signals and Report 16
- Introducing Advanced RTD Non-Linearity Correction for Accurate Temperature Measurements 16
- Real Time Signal Averaging Tool 17
- Simultaneously Configure All Strain Gage Input Channel Parameters 17
- Customizable Rate for Statistics Time History Signals 17
- Addition of Measurement Point, Coordinates and DOF to Input Channel Table 17

- Export to Multiple Excel Files 18

New CAN bus Features 18

- CAN bus Supports Digital Outputs 18

Major Improvements 18

EDM Vibration Control Software 18

- Save Signals in Check Only Mode 18
- Schedule Timer Settings are Included in Event Action Rules 18
- User Configurable Permissions for VCS Advanced Command Buttons and Global Settings 18
- Enhancements to Batch Export by Level 19
- View Elapsed Time in Run Schedule View 19
- Rescaling Limit Profiles by dB or Percentage 19
- Improvements in Random 19
- Improvements in Sine/RSTD/Multi-sine 20
- Improvements in Shock/TTH/SRS/Earthquake Testing/Transient Random 20

EDM MIMO Vibration Control Software 20

- Improved MIMO Random Drive Estimation 20
- Convenient Synthesized Profile for All Control Channels 20

EDM Dynamic Signal Analysis 20

- Indefinite Peak Hold Spectrum 20
- Improvements to Pre-Trigger Parameters Display 21
- Orbit Plot Supports Display of Non-displacement Signals 21

EDM Modal 21

- Simplified Trigger Setup 21
- Improved Driving Point Selection 21
- Added DOF Information to the Live Signal List 21
- Updated Band Selection 22
- Enhanced Stability Diagram 22

General Improvements 22

- Conveniently Configure and Review Recording Destination 22
- Out of Band Overload Detection on Front-end LEDs 22
- Enhanced History Review for Time History Signals 22
- Introducing Overall RMS Display for All Signals in the Plot 23
- Improvements to “Export to Single File” 23
- Customizable Line Width for Signals in Report 23
- Enhanced Calibration Notification for Strain Gage Calibration 23
- Enhanced Calibration Review Window for Strain Gage Calibration 24
- Improved Text Display for Signals with Phase (FFT/FRF/CPS) 24
- Enable Multiple Charts of SRS Reference Profiles 24
- Ability to Disable Certain Notifications in EDM 24
- Customizable Font Size of Marker Text in EDM Display and Report 24
- Expanded Details in Event Action Rules 25
- Support to TEAC – TAFFmat Data Format 25
- Improved PC Resources Check 25
- Share Global Settings with Systems on LAN 25
- Improved Signal Color Setting for Saved Signals and Live Signals 25

CAN bus Improvements 25

- Improved Alarm and Abort Functionality for CAN bus Signals 25
- Support to PCAN USB Adapter 25
- Search Feature Added to CAN bus Signals 25

Software Release History 26

System Requirements 26

Minimum System Requirements: 26

Recommended System Requirements (Minimum for Spider Systems Higher than 16 Channels): 26

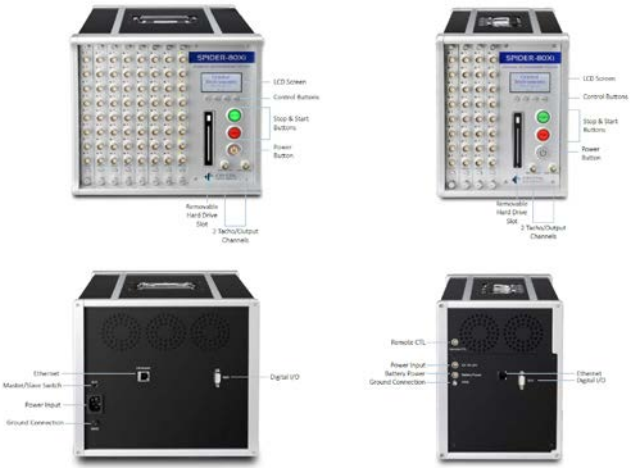
Version Compatibility 26

RELEASE HIGHLIGHTS

Introducing Spider Systems Featuring 256 kHz Sampling Rate (Spider-80Hi and Spider-80Ci)

The Spider-80Hi and Spider-80Ci are the newest and the most powerful front-end cards of the Spider 80Xi platform. These cards are equipped with sampling rates of up to 256 kHz.

The Spider-80Hi is similarly equipped as the Spider-80Xi system with dual ADC technology which provides a dynamic range of 160 dB and 58 stages of a sampling rate selection ranging from as low as 0.48 Hz to as high as 256 kHz.



Raw time data can record continuously at the 256 kHz sampling rate for all channels. The Spider-80Hi has the same form factor as the Spider-80Xi platform and can be used with a Spider-80Xi chassis or Spider-80M chassis.

Vibration Control System or Dynamic Signal Analysis

The Spider-80Hi and Spider-80Ci are equipped with synchronized output channels that enable these devices to be used as vibration control systems or for dynamic signal analysis applications.

Spider-80Ci (Integrated Charge Amplifiers)

The Spider-80Ci has integrated charge amplifiers in addition to all the features supported by the Spider-80Hi.

High Channel Count System

Multiple Spider-80Hi and Spider-80Ci front-ends can combine to create a high channel count system with up to 1024 channels. Up to 8 front-ends can fit within one chassis and multiple chassis can connect through Ethernet using a Spider-HUB industrial network switch.

The high channel count system can also include the Spider-80SGi or Spider-80Ti modules when data from strain, strain gage based sensors, RTDs, thermocouples or any other special sensors need to be acquired with Spider-80Hi system.

Time Synchronization

The integration of the IEEE 1588v2 protocol for time synchronization results in accuracy better than 100 ns. This technology provides an excellent phase match even when front-ends are used at their highest sampling rates.

New Hardware Introductions and Improvements to Existing Front-Ends					
Front-end Types	Spider-80Hi	Spider-80Ci	Spider-80Xi	Spider-80SGi	Spider-80Ti
Max Sampling Rate	256 kHz	256 kHz	102.4 kHz	102.4 kHz	2 kHz
Bandwidth	115.2 kHz	115.2 kHz	46 kHz	46 kHz	-
Max Sampling rate for Raw Time Data Recording (Max Channels)	256 kHz (8 Channels /front-end)	256 kHz (8 Channels /front-end)	102.4 kHz (8 Channels /front-end)	102.4 kHz (8 Channels /front-end)	2 kHz (16 Channels/ front-end)
Number of Inputs Per Front-end	8	8	8	8	16
Connector Type	BNC	BNC	BNC	LEMO	3-pin screwed terminal
Input Type	IEPE Voltage TEDS	IEPE Voltage TEDS Charge Inputs	IEPE Voltage TEDS	Voltage Strain gage Strain gage-based sensors MEMS DC-based sensors	3-wire RTD K type thermocouple
Max Input Range	±20Vpk	±20Vpk	±20Vpk	±10V	-------
Dynamic Range	160 dB	160 dB	160 dB	120 dB	
Input Protection Voltage	±220V	±220V	±220V	±40V	-------
Analog to Digital Converter Per Channel	Dual 24-bit ADC	Dual 24-bit ADC	Dual 24-bit ADC	24-bit ADC	-------
Phase Match	< 1° up to 20 kHz	< 1° up to 20 kHz	< 1° up to 20 kHz	< 1° up to 20 kHz	-------

Introducing the Ultra-Compact Spider-20H, Spider-HE & Spider-20i with 256 kHz Sampling Rate

Crystal Instruments' smallest form-factor portable DAQ device received an upgrade in the 9.0 release. The new generation of Spider-20 systems supports sampling rates of up to 256 kHz for data acquisition and recording.

The newest generation of Spider-20 systems are now available in three unique forms:

Spider-20H (Wi-Fi)

The Wi-Fi version of Spider-20 supports a 256 kHz sampling rate, includes 4 GB of built-in flash memory and a battery.

Spider-20HE

The Ethernet based version of Spider-20 supports a 256 kHz sampling rate, includes 4 GB of built-in flash memory and a battery.

Spider-20i

A new addition to the traditional Spider-20 series is the Spider-20i. The Spider-20i is an Ethernet based Spider-20 system supporting

a 256 kHz sampling rate with an industrial enclosure. Without any buttons or a battery, this device is suitable to be deployed in rough industrial environments for momentary or permanent data acquisition, recording or monitoring.

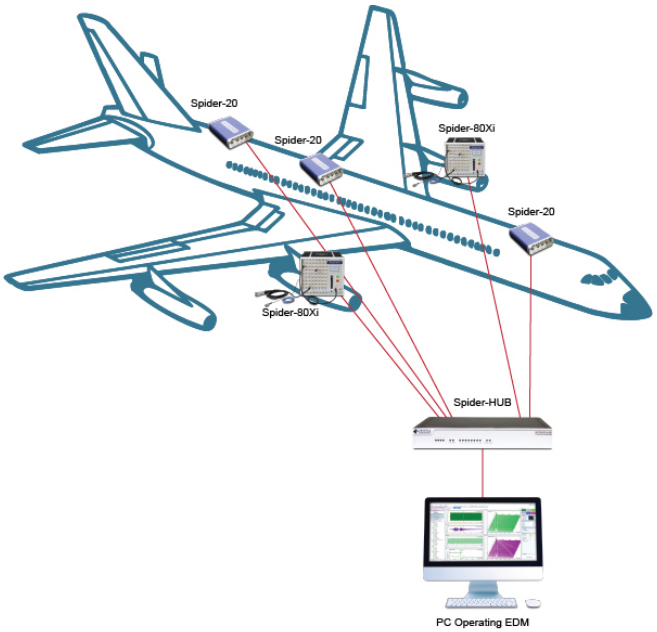
Extended Input Range

The new generation of Spider-20 products also received an upgrade to the input range. An input range of up to 20V is now available for these devices compared to the 10V input range of the previous generation.

High Channel Count Synchronized Data Acquisition

The Ethernet versions of the Spider-20 (Spider-20HE or Spider-20i) can combine into a high channel count system for synchronous data acquisition. The high precision IEEE 1588v2 protocol provides excellent phase match between the channels of different front-ends, even at the highest sampling rate of 256 kHz.

Synchronized Data Acquisition Between Spider-20E and Spider-80X/Spider-80Xi Systems



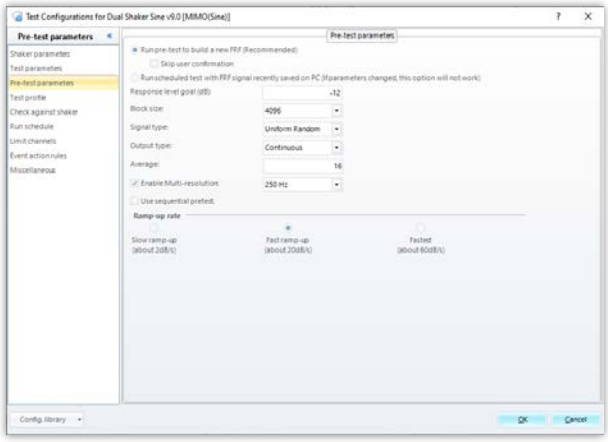
The Spider-20 series of products are ultra-portable and can be mounted at even remote locations. The Spider-80X and Spider-80Xi on the other hand are powerful front-ends that can chain together to obtain simultaneous data acquisition for up to 1024 channels.

There are times when sensor cable lengths cannot easily reach the extreme corners where data needs to be acquired. A typical example is an airplane where multiple sensors are needed near the engine, but a few sensors are also placed all along the aircraft.

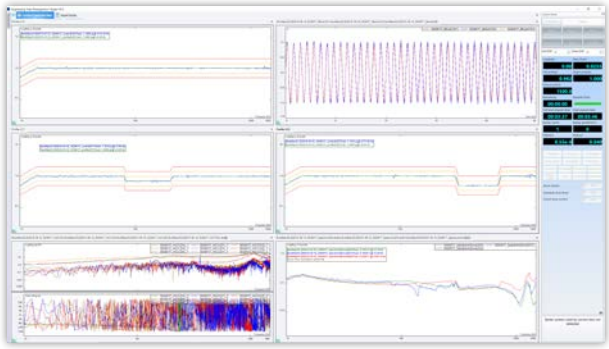
With EDM 9.0, multiple Spider-20s can be combine with the Spider-80X or Spider-80Xi front-ends to create a high channel count system. A Spider-80Xi with tens or hundreds of channels can be placed to monitor the vibrations on an engine while portable Spider-20 units can be placed far from the engine at different locations within the airplane to ensure synchronized data acquisition at all locations.

Introducing Multi-Resolution Pretest in MIMO Sine

Multi-resolution for pretest is added to MIMO Sine control. The cut-off frequency can be set based on the range of the profile. This provides the FRF with much higher frequency resolution at the lower section of the frequency range in addition to improving the control accuracy and the controllable frequency range.

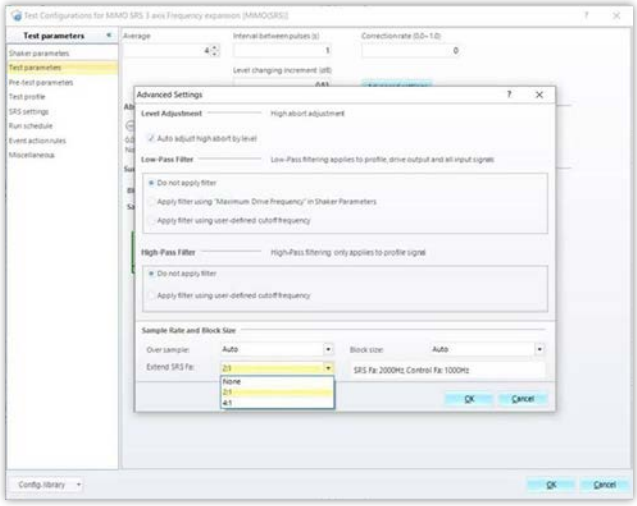


The following is a test carried out on a three-axis shaker table using the multi-resolution pretest. The control frequency range is from 10 Hz to 1500 Hz. The test shows all 3 control channels are under great control. The multi-resolution pretest feature improves the control accuracy and expands the controllable frequency range.

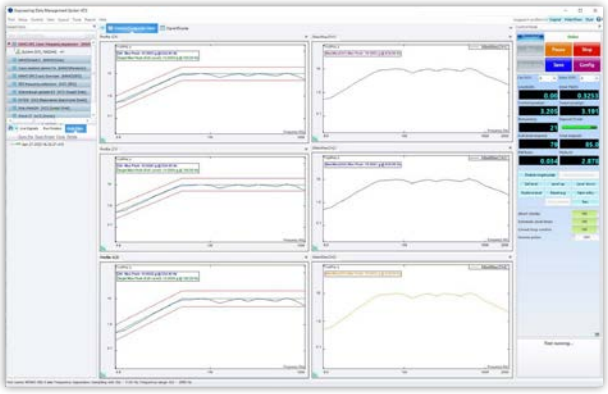


Extended SRS Span for MIMO SRS

MIMO SRS has extended the SRS analysis span. With a 2:1 or 4:1 selection, analysis SRS signals will have double or quadruple the frequency range compared to the control SRS signals.

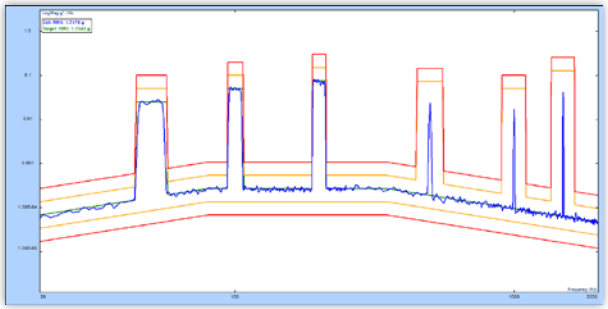


With extend SRS Fa set at 2:1 ratio, the SRS analysis span is extended over the SRS control frequency span. The analysis SRS signals covers up to 2000 Hz, while the control SRS signals' Fa is up to 1008 Hz.



Multi-Resolution Support for SoR and RoR Tests

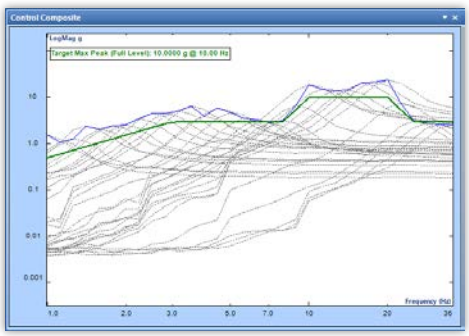
EDM 9.0 extends support for multi-resolution to Sine on Random and Random on Random tests.

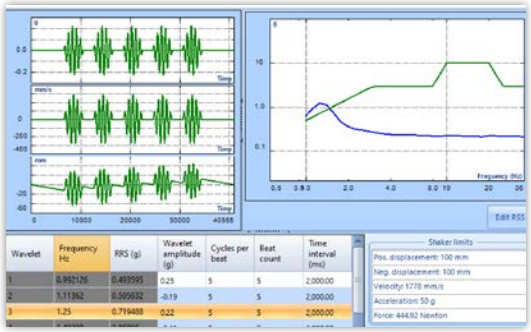


The low frequency sine tones can now be controlled and analyzed with great accuracy.

Introducing the Sine Beat Seismic Test Type

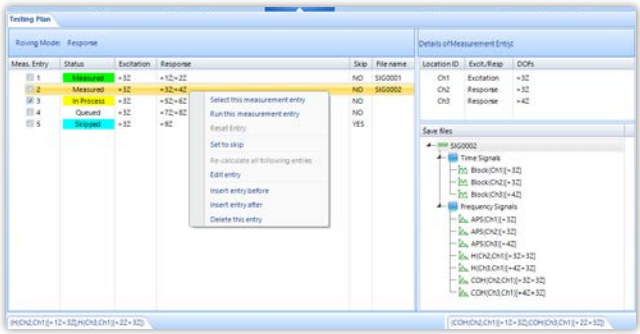
The Sine Beat Seismic test type is introduced in EDM 9.0. This test type is for the seismic qualification of electrical equipment. It complies with IEEE 344 or IEC 980. The profile is defined by the RSS, where the amplitude of each frequency point determines the amplitude of the wavelet applied to the sine beats time waveform at each frequency of the RSS. Each sine beat is defined by wavelet amplitude, cycles/beat, beat count, and time interval.

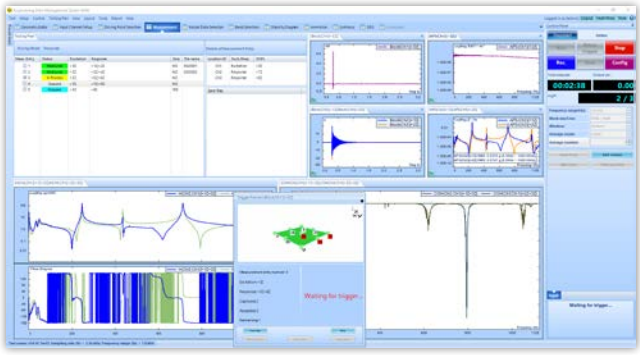




Introducing EMA Testing Plan

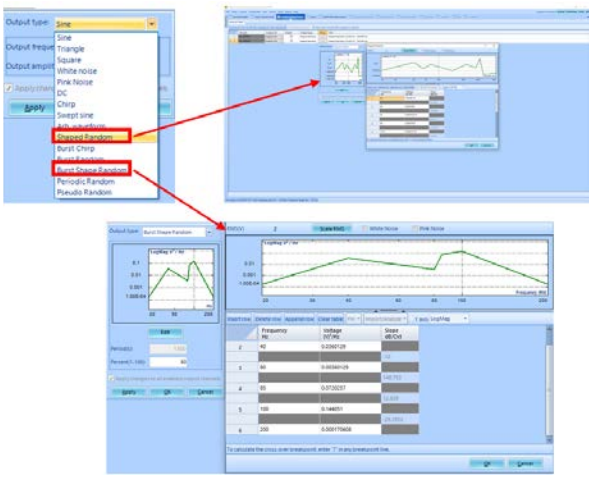
In EDM 9.0, a testing plan feature is added to provide information about the measurement acquisition status and to helps users customize and control the flow of the testing process. A quick glance of the testing plan provides information about the roving mode implemented for the modal test and the number of measurement points on the 3D geometry model. It also provides power capabilities to randomize and modify the test plan using the skip, reset, recalculate, edit and other associated options in the measurement entry list to optimize the test control and measurement procedure. Corresponding to the user operation, the status of the measurement runs is measured, queued, skipped and in process accordingly. The testing plan is docked onto the measurement tab as shown in the following screenshot.

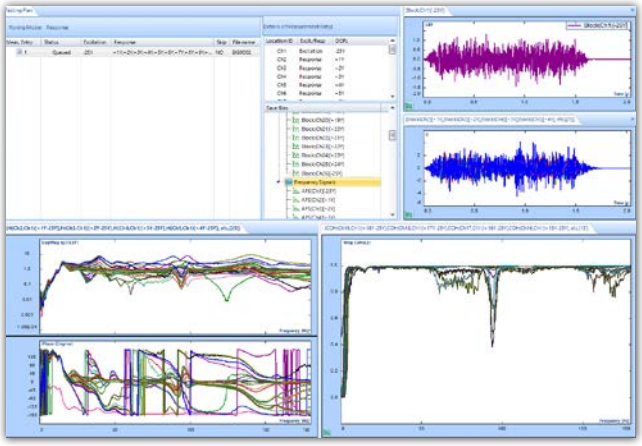




Added Shaped Random/Burst Shaped Random Output Excitation in MIMO FRF Modal Analysis

Shaped random and burst shaped random excitation is added to the MIMO FRF Modal Analysis suite. These output excitations help increase the response level at certain desired frequencies by allowing the user to input a profile in the frequency domain. Adding a burst percentage also provides an opportunity to control the time duration of no output.

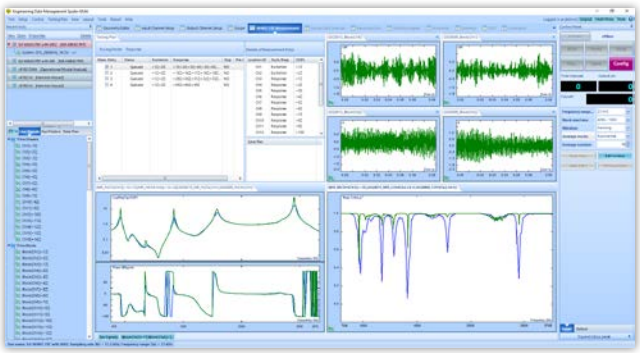


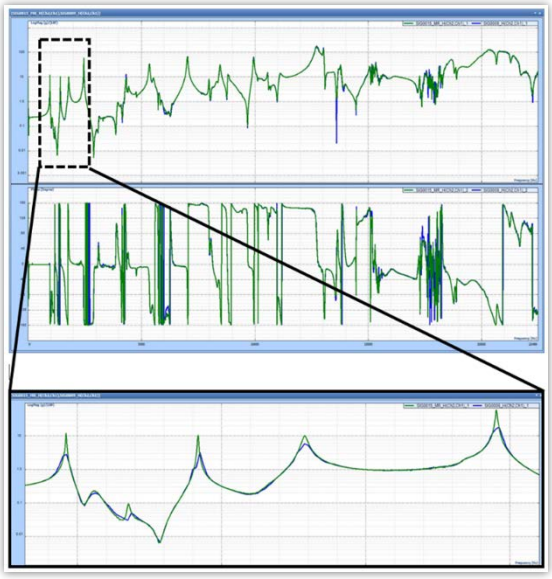


Patented Multi-Resolution Spectrum Technology in Modal Analysis Extended to High Channel Count System

Crystal Instruments' was granted a patent for the unique Multi-Resolution Spectrum technology which provides 8 times higher spectral resolution in the low frequency region compared to the high frequency region without having to use enormous block sizes or enormous computational resources.

The multi-resolution spectrum technology available in the MIMO FRF test of the EDM Modal Analysis suite has been optimized and extended for use in multiple module systems. The FRF is much sharper and more accurate with the implementation of multi-resolution technology compared to those acquired using the conventional FFT approach, which results in a better estimation of the FRF amplitude and damping.

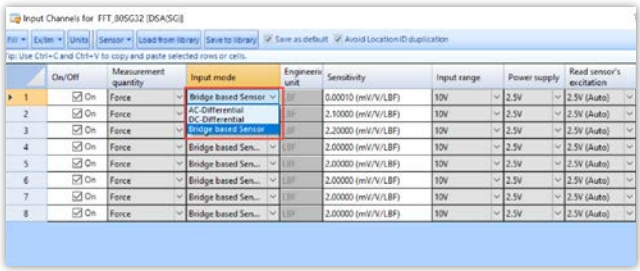




With these improvements, the advantages of multi-resolution spectrum technology can be utilized across all testing types of modal analysis and for any number of channels within the system.

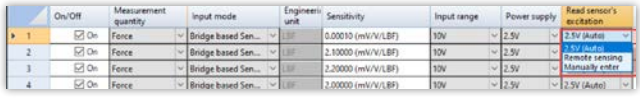
Support for Strain-gage Based Sensors on Spider-80SG or Spider-80SGi

The Spider-80SG is capable of supporting all types of strain gage based sensors along with the ability to send customized excitation voltage to the sensors.



The sensitivity of strain gage based sensors are typically ratio-metric and depends on the excitation voltage.

EDM 9.0 introduces the Bridge based sensor as one of the input modes. Selecting this option allows users to configure the sensitivity as a ratio-metric value.

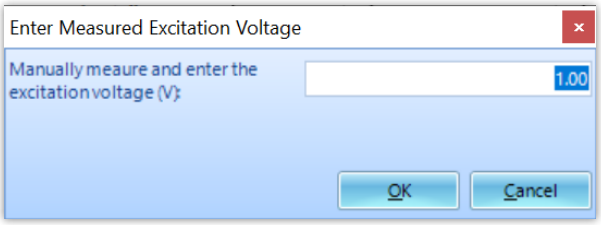


In addition to the availability of setting the sensitivity, it also important to use the accurate value of the excitation voltage to read the measurement quantity accurately.

Due to the voltage drop across the lead wires connecting the sensor to the front-end, there could be a voltage drop which, at times, could

be significant to mandate its measurement for accurately estimating the measurements.

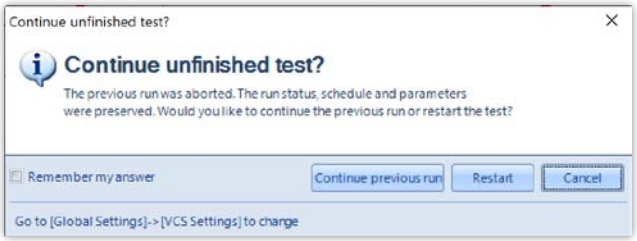
EDM 9.0 provides users with the option to automatically measure the excitation voltage as seen at the terminals by using the remote sensing feature.



Users also have the option to manually measure the excitation voltage at the terminals and to enter it. These options ensure that the excitation voltage is accurately used to measure the data with complete precision.

Save and Continue an Unfinished Test

Unfinished tests in EDM-VCS or EDM-DSA that are aborted due to a user event or by a system event are now automatically saved. The unfinished duration of these tests can now be continued exactly from the point where it was stopped.



This feature is predominantly helpful in various vibration controller tests scenarios where a test has ended prematurely or must be stopped prematurely by the user. The following scenarios illustrate helpful applications of this feature.

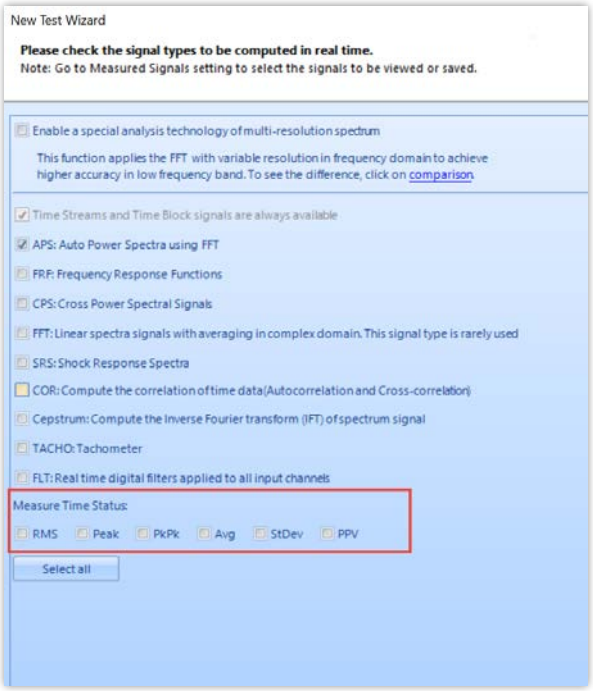
- Users can run very long vibration tests for several days by stopping the test at the end of the day and continuing it on a different day.
- Tests aborted due to sensors falling off or damaged fixtures can be continued after the necessary fixes are completed.

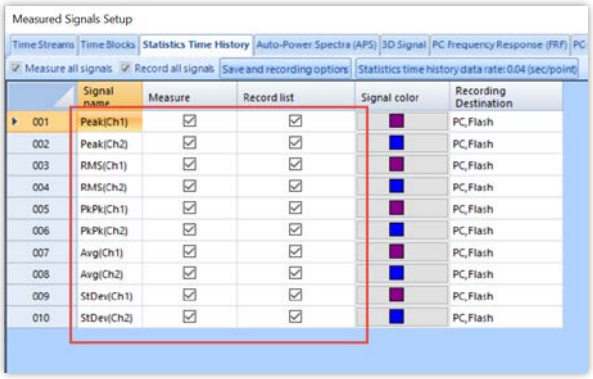
EDM 9.0 is programmed to cache the test whenever the test stops without completing the run schedule. The user has an option to continue the test from the point where it was stopped or to restart the test from the beginning.

The cached test is available even after EDM or the PC restarts.

Introducing Statistics Signals in EDM-DSA

Statistics signals including average and standard deviation are added to the FFT Analysis test in EDM-DSA. With improvements to the existing peak and RMS signals: Peak, RMS, Peak-Peak, Average and Standard Deviation are available in the FFT analysis test.

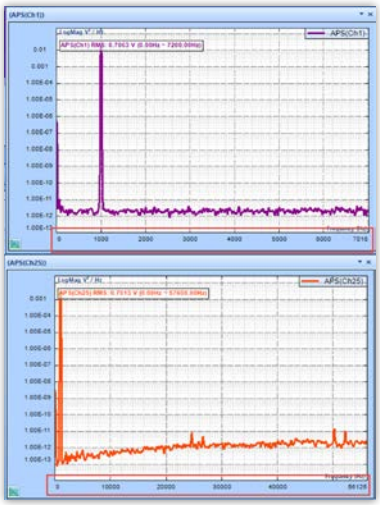




These signals are available as time history signals, which allows these signals to be recorded to the PC in real time. Thus, these signals can be viewed for the entire duration of the test during any point of the test or after the test is complete.

Introducing Frequency Domain Signals in Variable Sampling Rate

The variable sampling rate feature can calculate the frequency domain signals for all modules even when the sampling rate of a module is different from the test sampling rate.

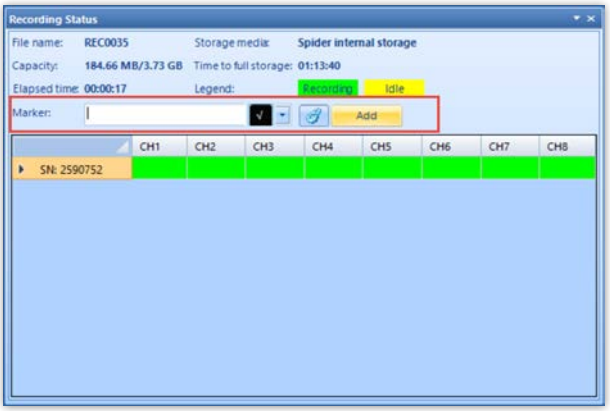


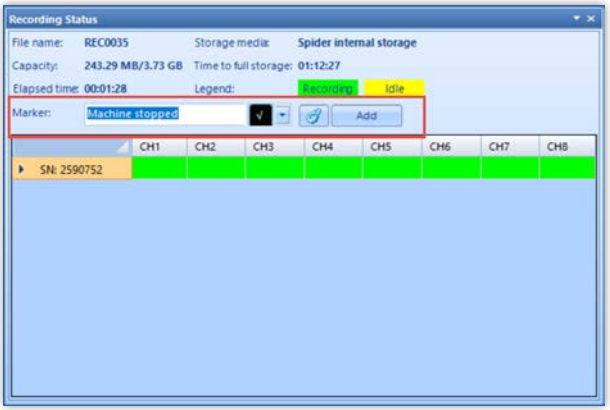
The variable sampling rate is useful with strain, temperature, and displacement sensors where frequency domain signals are not of prime importance.

Introducing Time Markers for Raw Time Recording Data

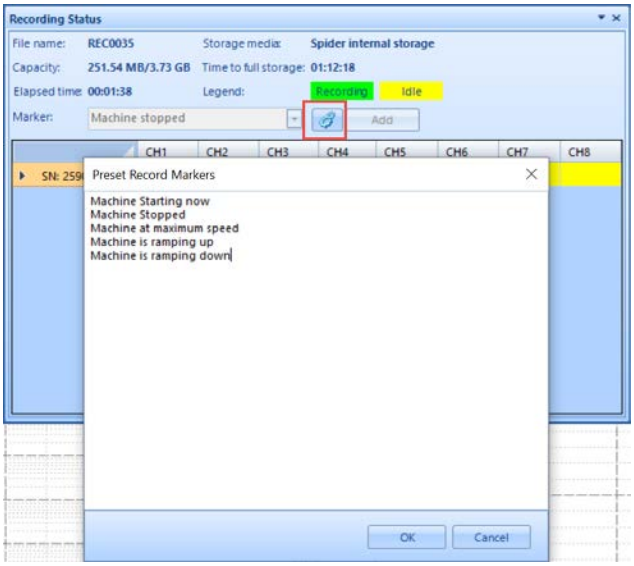
During raw time recording, users will find it useful to mark an event for review after the data is downloaded. EDM 9.0 is introducing this feature for all EDM modules.

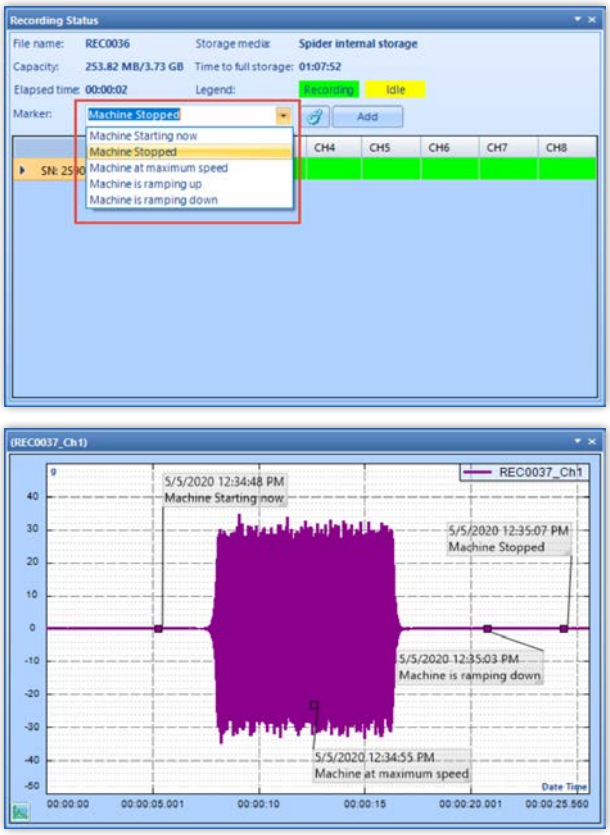
Add a simple marker by clicking on the “Add” button or add specific text into the available text box to insert further details.





Users have the option to pre-configure a list of events and to quickly select an event to mark the recording.





The added markers are available in the raw time data for a review at any time after the test is complete.

Support for Microsoft SQL Server 2017 and 2019

EDM 9.0 has received significant upgrades in all areas including support for the latest version of Microsoft SQL Server.

Support for SQL Server 2017 and 2019 is included to allow users to take advantage of the powerful features provided by this software.

Ease of Connecting IEPE Sensors with Spider-80SGi

The introduction of support for IEPE sensors extends the Spider-80SGi system capabilities as a powerful general-purpose data acquisition device. The Spider-80SGi system now supports a wide range of sensors including strain gages, strain gage-based sensors, MEMS sensors, DC sensors, and potentiometers in addition to IEPE sensors.

The provided break-box is convenient for custom connecting strain gages or any of the supported sensor types.

The new breakout box released with EDM 9.0 includes BNC connectors to facilitate effortless connections to IEPE based sensors.

Introducing EDM-VCS Simulation

EDM-VCS Simulation software is released with EDM 9.0.

This vibration control system simulation software works without any Spider hardware and allows new EDM users to evaluate the wide range of functions offered by Crystal Instruments powerful EDM-VCS software.

Existing users can also benefit by exploring the range of new features being introduced in newer EDM versions before deciding to add these features to existing equipment.

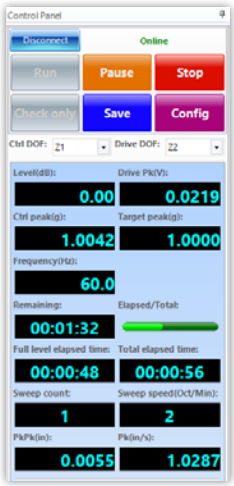
This friendly simulation utility works on SQL Lite and does not require the installation of the complete EDM Suite to explore the system's full functionality and ease of use.

NEW FEATURES

New Features in EDM Vibration Control Software

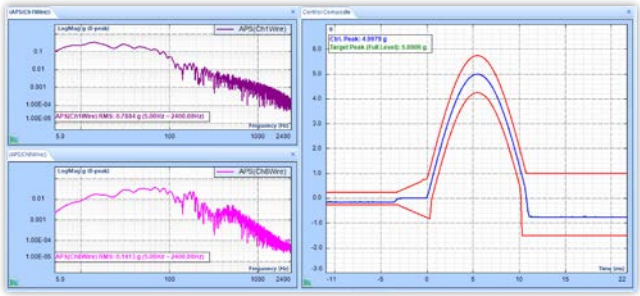
Introducing DOF Selection in the Control Panel

Users can select MIMO sine, the enhanced status panel for output/control level status display, the control DOF, or the drive DOF, and the corresponding value will be shown on the control panel.



Introducing APS Signals in Shock, Transient Time History (TTH), Time Waveform Replication (TWR), Shock Response Spectrum (SRS), and Earthquake Testing

Shock, TTH, & TWR tests are mainly controlled in the time domain and the profile is also defined in time domain. SRS and earthquake testing profiles are defined in terms of octaves.

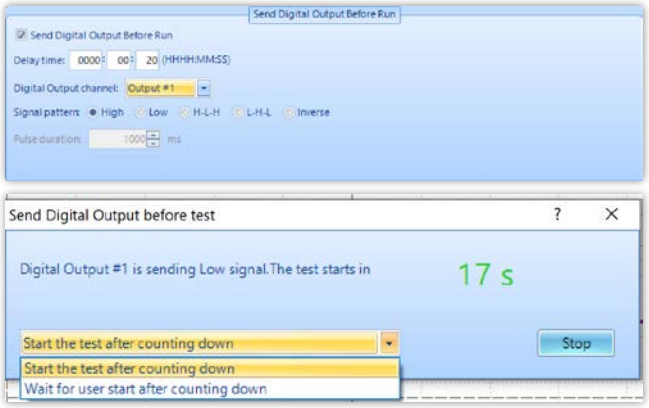


APS signals in these tests have also been increasingly used to determine the frequency characteristics of some monitor channels. APS signals, being derived from the FFT are a useful way to identify the frequency content of these time based signals.

Send Digital Output Before Starting Test

The Spider system can be used to turn on the amplifier or other equipment just before starting a test. Running the amplifier or the equipment for an indefinite amount of time prior to the test is undesirable and inefficient at times.

EDM 9.0 allows users to send the digital output and then start the test after a user specified time period.



The digital output can be configured to start the amplifier or any other equipment associated with running the vibration control test. The user can conveniently specify the duration after which the test should start to ensure that the required equipment is up and running by the time test starts.

Scale the Synthesized SRS in SRS and Earthquake Test Types

Requirements from several standards vary on how the synthesized SRS should match with the profile. While some standards require the SRS to be within the alarm limits, some standards require that at least 50% of the synthesized SRS should be above the profile.

EDM 9.0 introduces a scaling feature that is applied to the envelope of a synthesized SRS. Users can adjust these values to ensure the desired requirements of the standard is met.

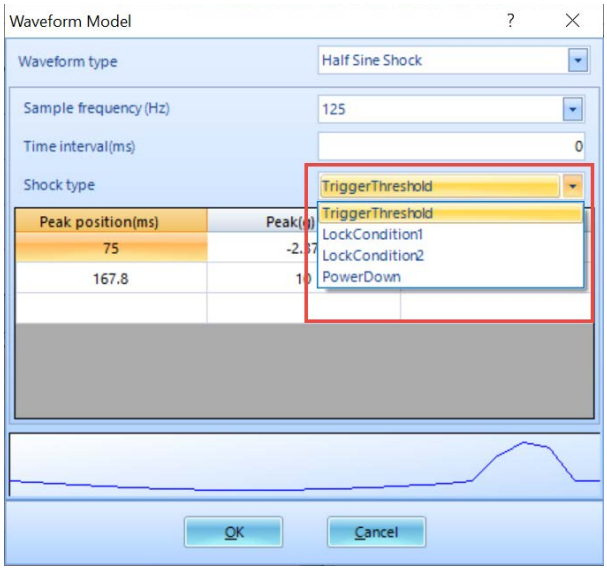
If the synthesized SRS is slightly above or below the requirements of the test standard, the user simply needs to adjust the envelope to

increase or decrease the envelope of the SRS spectrum.

Special Half-Sine Shock Waveforms Simulating Vehicular Dynamic Conditions Added to TTH

Testing for critical equipment inside vehicles needs to consider all the common and rare scenarios the vehicle may experience. Special conditions involving crashes also require sufficient testing to ensure the safety of components such as batteries.

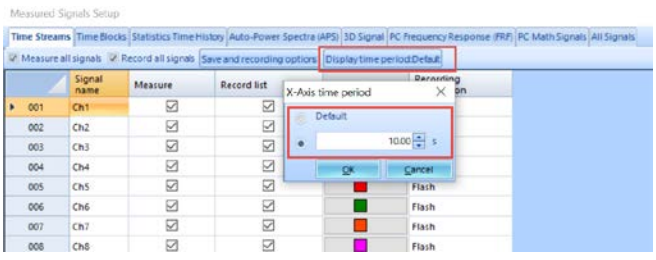
New standards have been introduced to designate waveforms that simulate various vehicular conditions. One of the standards that define rapid changes to acceleration is added to the TTH list of waveforms in the EDM 9.0 release.



Test objects mounted within the vehicles should endure these tests to prove the performance of their intended tasks under extreme circumstances.

New Features in EDM Dynamic Signal Analysis

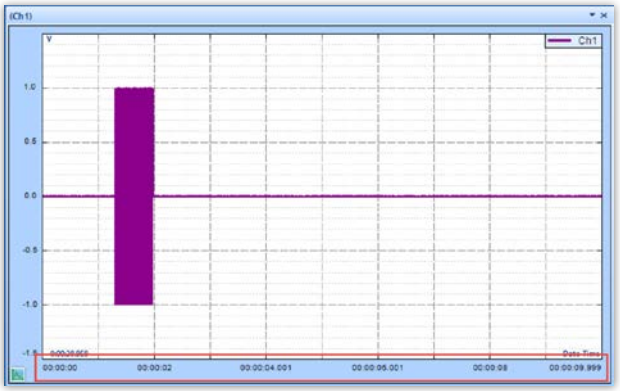
Adjustable X-axis Range for Live Time Stream Display



Certain tests or analysis require a transient to be completely visible or at times requires the duration of raw time data to be visible for several seconds.

Users can view live raw time stream displays on EDM software. However, users had little flexibility available to select the time period of the X-axis when viewing raw time data. The time period was largely limited by the selected sampling rate.

EDM 9.0 introduces a new feature that allows users to view and customize the time period of the X-axis during a live stream. Users can select large time period values, even at the highest sampling rate, to view live time data without having to record and post process.



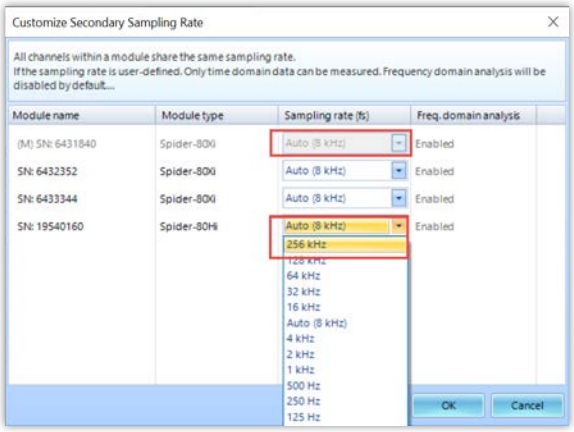
Users can select time period values of up to 60 seconds (1 minute), which displays live data along with 60 seconds of history in a live stream.

This sufficiently covers all scenarios of drop shock and pyro shock tests requiring the time display to show the transient along with time data until the test object reaches a steady state.

Variable Sampling Rate Allows Selection of Higher Sampling Rates

The Variable Sampling Rate feature is introduced to facilitate the sampling of low sampling rate signals such as temperature or strain.

Certain drop shock tests require additional time recording at the highest possible sampling rate to capture all the events, while performing spectral calculations at a lower sampling rate. The introduction of the Spider-80Hi and Spider-80Ci systems provides users with sampling rates of up to 256 kHz for time data recording while other modules perform frequency analysis at required sampling rates.



These requirements are now be easily met by designating the Spider-80Hi or Spider-80Ci as a slave and setting it to the highest possible sampling rate of 256 kHz while setting the usual test parameters for all other modules.

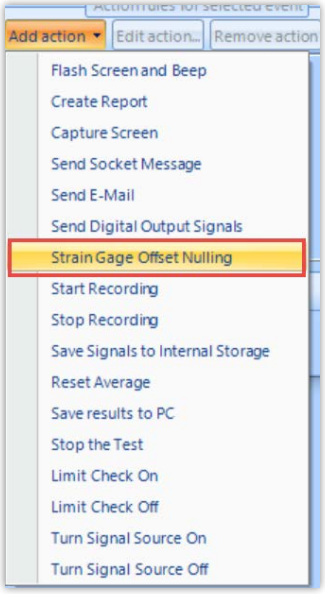
Offset Nulling is Available in Event Action Rules

Strain gages and strain gage-based sensors need to be offset corrected before starting any measurement. Users can accomplish this using the Offset Nulling feature of EDM software.

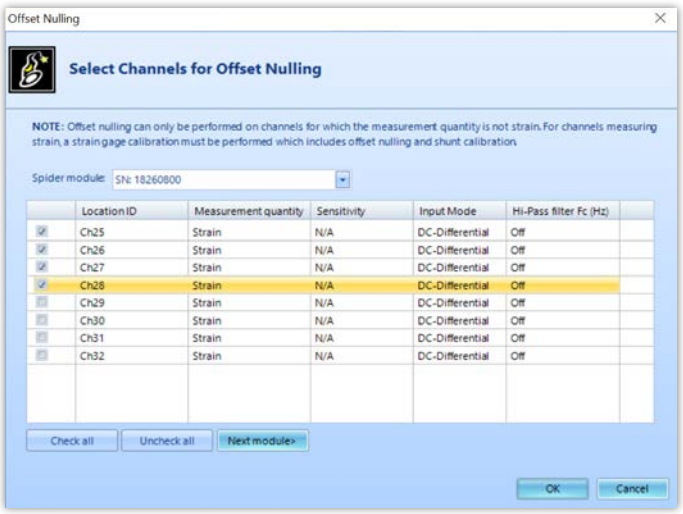
Running strain gages or strain gage based sensors may result in a drift due to heat from powering up. To obtain accurate readings, it is essential that the sensors are run until the temperature variation on the sensors is stabilized.

At this point, an offset correction is required before recording any data or before performing any measurements.

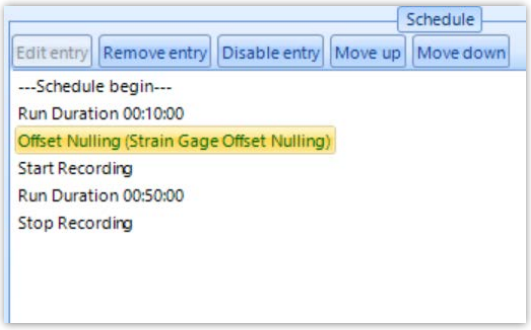
To accommodate these applications, Offset Nulling is introduced as an action in the event action rules.



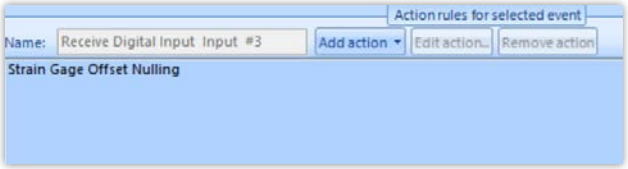
Users can set the channels requiring offset correction. Some sensors reading static pressure, torque, or displacement data should not be nulled. This feature allows the user to select sensors that need to be offset corrected.



Using the very powerful event action rules, the actions can be set as a user event and can be included in the run schedule.



It can also be used to execute at the onset of an event.

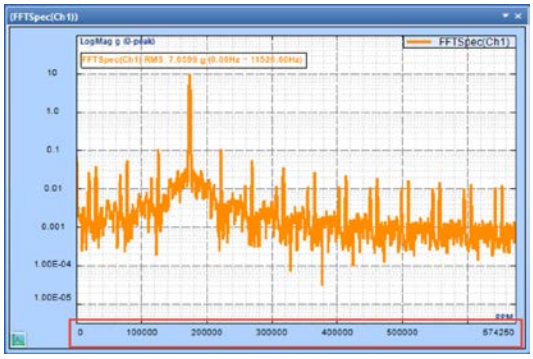


Customizable Reference in X-axis in Spectral Signals

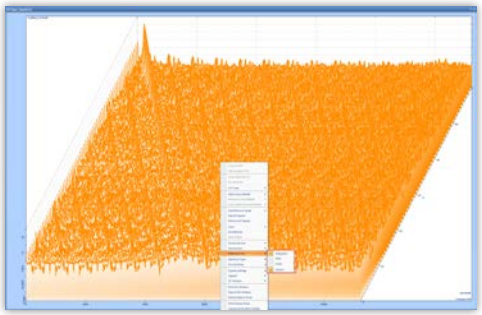
Analyzing rotating machines involves detecting the spectral peaks and their references to the speed of rotation.

Flexibility in selecting the reference for the Y-axis allows for easier analysis and ease of correlating the spectral peaks with RPM.

EDM 9.0 introduces the ability to modify the reference of the X-axis for spectral signals.



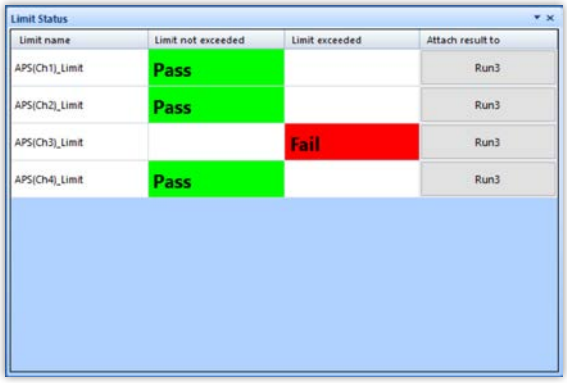
A choice of tachometers is also available to enable the selection of either tachometer as the reference.



This option is also available for 3D signals.

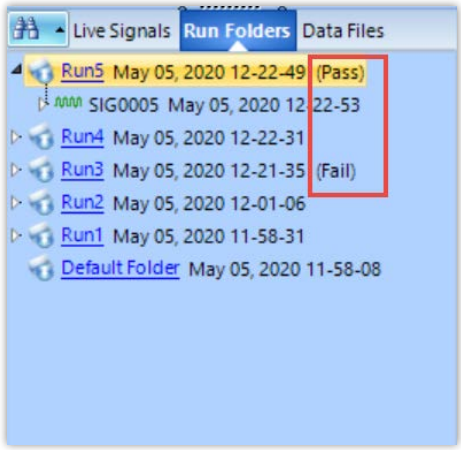
Attach Limiting Results to Run Folders

Limit tests are increasingly used for production testing and DUT testing to determine if the DUT passes or fails the set criteria.



In a typical test, each run is attributed to a specific device. EDM 9.0 includes the run information to be displayed along with the limit status.

The limit status can further be tagged to the run to determine the status of the run.

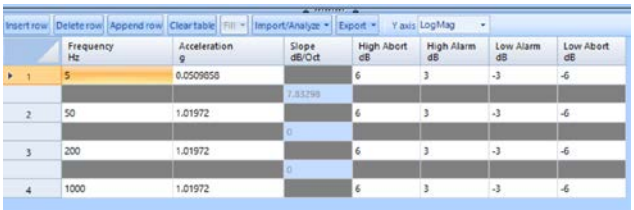


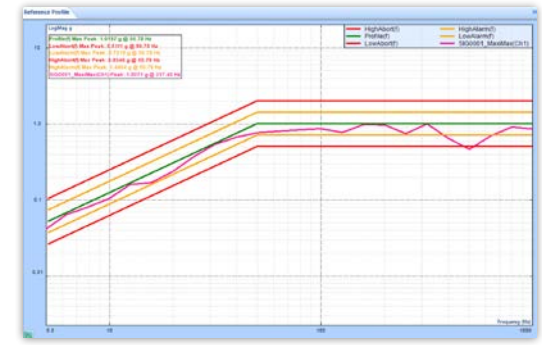
Depending on the test type, the status of a particular channel or a user defined criterion can be attached to the run. Sometimes, failure to the critical part of the DUT is more valuable criteria to disqualify a product. In such scenarios, results of a specific limit can be attached to the run.

This result of the run is displayed alongside the run in the run folders.

DSA-SRS Reference Profile Includes Alarm and Abort

The EDM-DSA FFT analysis test reference profile for SRS includes both alarm and abort lines.

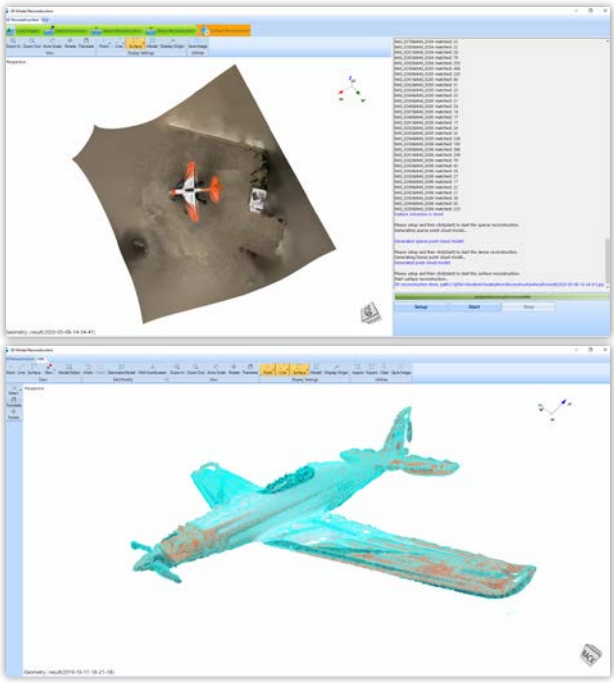




New Features in EDM-Modal

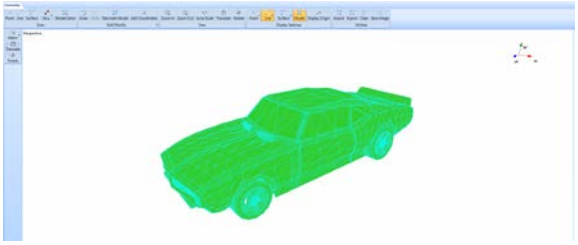
Improvised 3D Model Reconstruction

The 3D model reconstruction software is revamped with a progress bar and guided texts to make the 2D photo to 3D model conversion process faster, simpler, and more efficient. The help texts for each process helps users understand each of the setup parameters which improves the feature extraction, point generation and surface generation for 3D model reconstruction. The progress bars provide a visual of the progression of each stage completion which further aids users to fine tune the whole process.



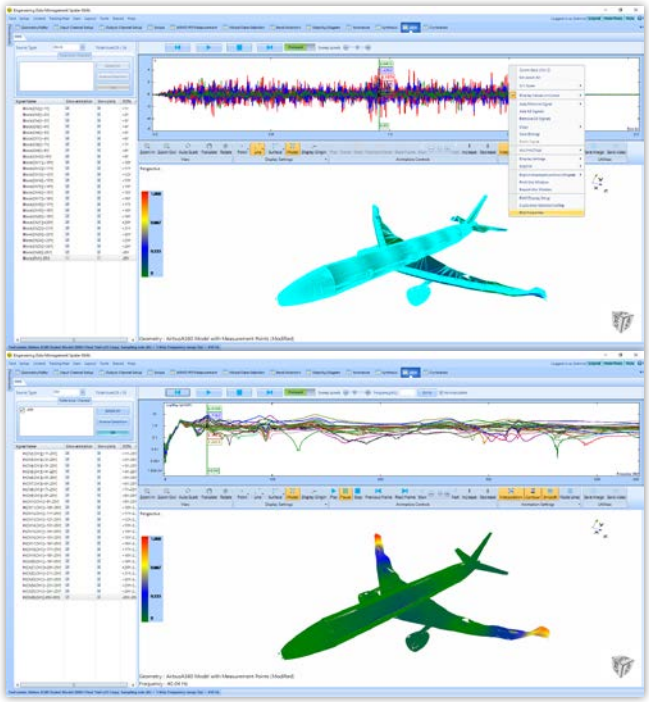
New Geometry Editor Window

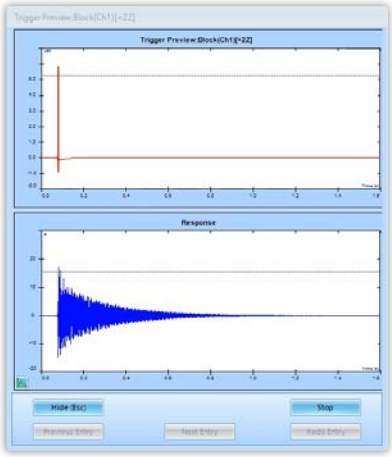
The geometry creation capabilities of EDM are optimized for intuitive and user-friendly interactions. The features are categorized according to their functionality which makes it easier to use according to the requirement. The user can have a huge number of points for higher accuracy of the geometry and still carry out measurements on a few points to interpolate the measured data to unmeasured points to observe the mode shapes of the entire model.



Optimization of ODS Capabilities

The user can choose to dwell or sweep through the FRF, Time and CPS signals to view the operational deflection shapes of the unit under test. The sweep can be executed in the forward and backward direction. A slider bar is provided to control the sweep speed as well. Normalization mode helps to observe an amplified motion of the ODS at a lower amplitude of FRF at frequencies other than natural frequencies. This feature also helps in distinguishing the transition between the modes of the structure. Changes can be made to the horizontal and vertical axis to change the display styles, axis scale etc. The text at the bottom left allows alerts to the user when the sweeping cursor is approaching and exiting a mode.



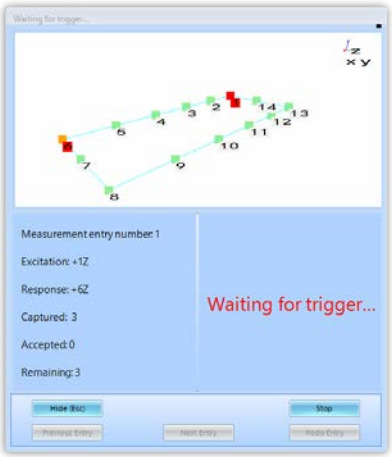


Enhanced Modal Data Selection

Features like “Check Missing FRFs” and “Validate” are useful features which make the modal data selection process very simple. The DOFs associated with the missing FRFs are highlighted on the geometry model. “Validate” check allows users to confirm all the measured signals have the same configuration settings and are compatible.

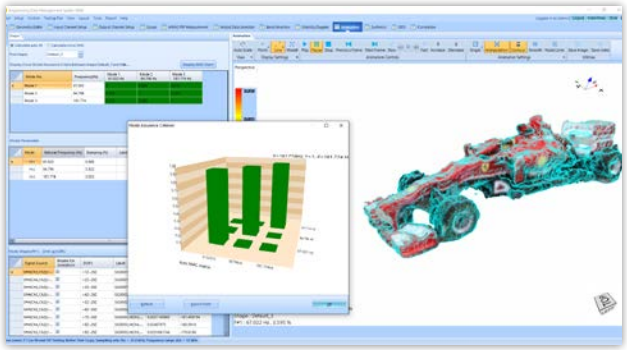
Improved Trigger Window

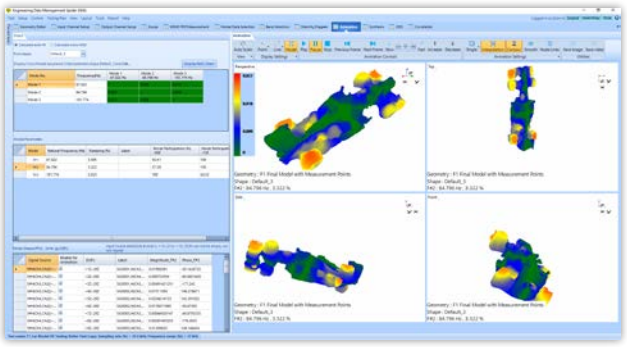
The improved trigger window guides the user to the location of measurement DOFs on the geometry model for the excitation and response channels. Based on the roving mode setup and the current DOF location of the excitation and response points, the trigger window provides a simple visual of the corresponding measurement points on the geometry model to simplify the testing process. The implemented window is also displayed on the acquired excitation and response signals which helps to optimize the configuration parameters.



Updated Animation Window

The MAC results and MAC chart display are colorized to provide a quick illustration of the correlation between the mode shapes. The green color signifies that the mode shapes have been uniquely identified and are orthogonal to each other. Major enhancements and regrouping of icons have also been implemented in the animation display window.

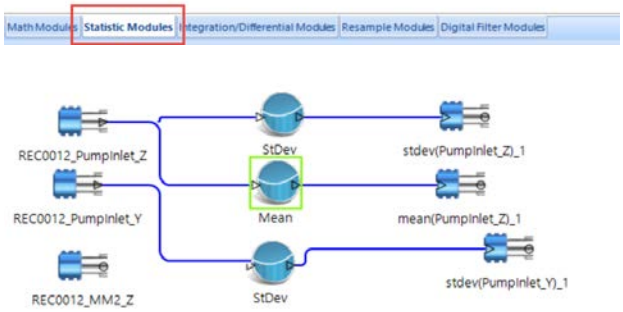




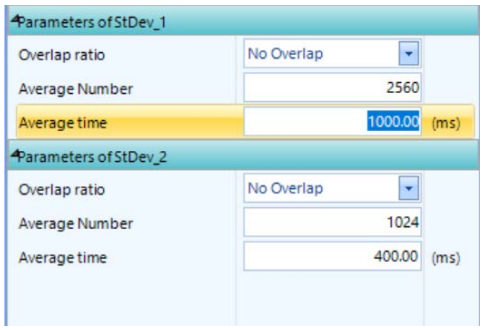
New Features in Post Analyzer

Standard Deviation Added to Statistics Signals in PA

The statistical module in PA now supports the calculation of standard deviation.



Users can add standard deviation to any number of channels. In addition, a channel can be customized to calculate the standard deviation in addition to mean or any other property or module.

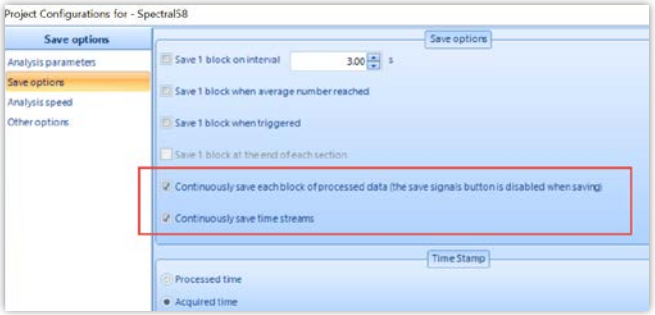


Like other statistical calculations, the duration of time for which standard deviation needs to be computed can be set by the user in terms of points or time along with the option to set the overlap.

Recording and Saving Simultaneously

Users can post process raw time data for a wide range of applications. The powerful tools available in the Post Analyzer software allows users to apply data conditioning to raw time data. Users can also process time data to derive a variety of frequency signals. Both operations can be performed simultaneously.

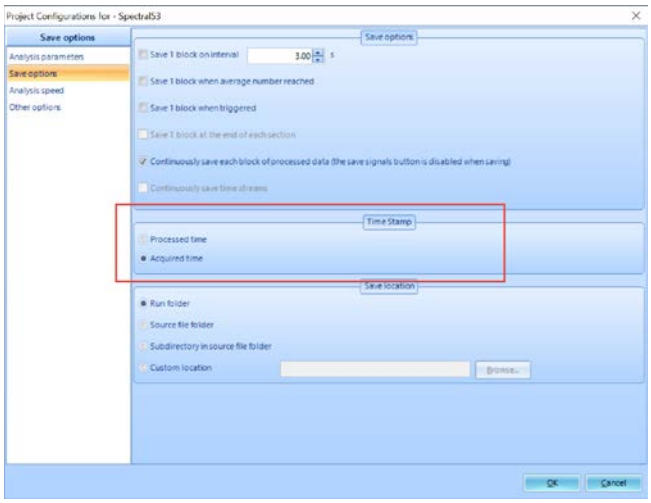
Users can record the data conditioned time data while saving the frequency signals.



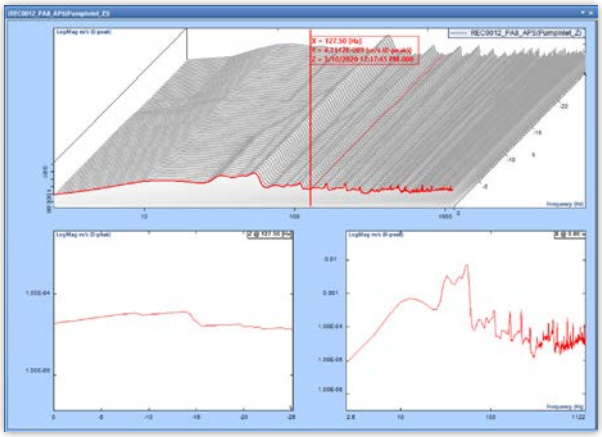
PA 9.0 also allows the user to save all blocks of processed time and frequency data along with the continuous time recording of conditioned raw time data.

Option to Choose Acquired Time or Processed Time for Saved Signals

Users can select the time stamp of saved signals or processing signals to be the original time of acquisition or the time at which the data is being processed.



In scenarios where multiple raw time files need to be processed or when batch processing is employed on data collected over a wide period of time, it is necessary to distinguish the processed data. A convenient way to associate the processed data with raw data is to associate the time stamp of the raw data to processed data.

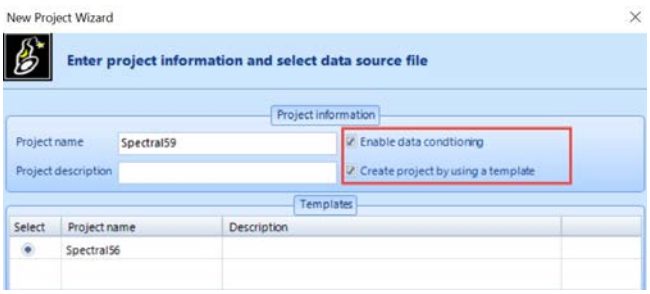


When multiple types of processing are performed on the same data, the Processed Time option can be selected to distinguish the

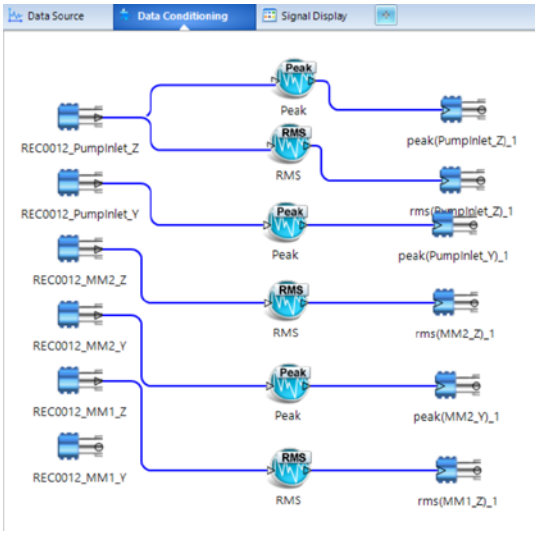
different iterations of processing.

Data Conditioning Module Added to Project Template

Selecting a project as a template now saves the data conditioning in addition to the test parameters, save settings and measured signal settings.



Enabling the data conditioning along with a template imports all the data conditioning used in the template to the new project.

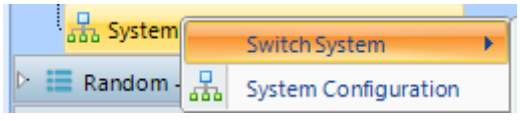


New General Features

Ease of Adding Modules to Tests or Switching Tests Between Spider Systems of Different Channel Counts

EDM 9.0 introduces a convenient way to modify the Spider system associated with the test to any other Spider system of a different channel count.

This extends the capabilities of the test templates to be used for any channel count system. In addition, a test using the Spider-NAS can be switched to a system without a Spider-NAS.



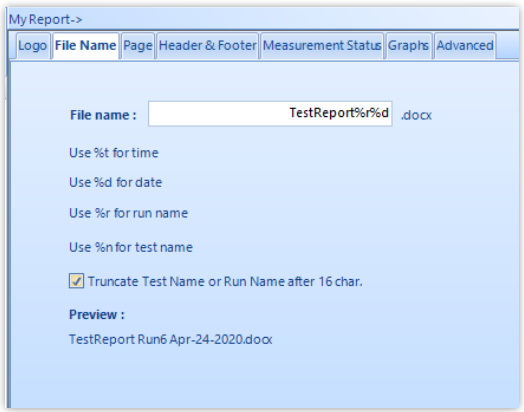
Smart algorithms handle the addition or removal of channels without deleting the existing channel configuration.

Channel specific configurations including limit channel setup are preserved for the channels that are carried over after the change to the number of input channels.

Introducing Customizable File Names for Report

File names for reports is an important aspect when there is a high quantity of reports generated from several tests.

EDM 9.0 introduces several customization characteristics to generate the file name of reports.

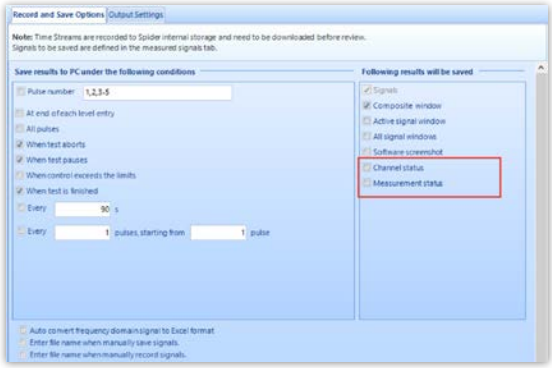


Users can generate a report using customized names combined with macros for test name, run name, date, time or a combination of any test characteristics.

Channel Status and Measurement Status Added to Saved Signals and Report

Channel status includes peak, RMS, and average values in addition to any error codes generated for a channel. The measurement status includes information about elapsed time, remaining time, control or target RMS, and peak values (VCS) to name a few.

These values are dynamic and continuously change over the course of a test. When signals are saved, it is also essential to identify the measurement status and channel status at that instant to make the signal data more meaningful and complete.



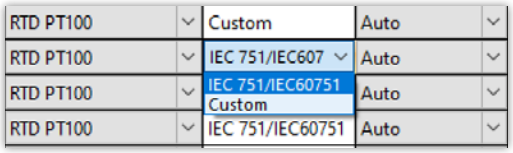
EDM 9.0 introduces saving channel status and measurement status along with the time and frequency signals. A customizable combination, called results, can be selected by the user every time needs saving.

The information is also made available when a report is generated to ensure that all the relevant information is saved to the report.

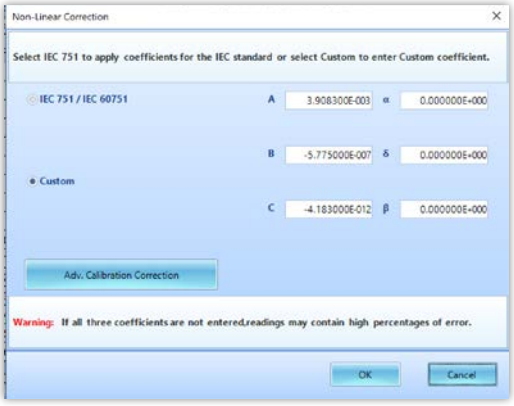
Introducing Advanced RTD Non-Linearity Correction for Accurate Temperature Measurements

RTD sensors are typically non-linear in the range of measurements that they operate. To ensure an accurate measurement of

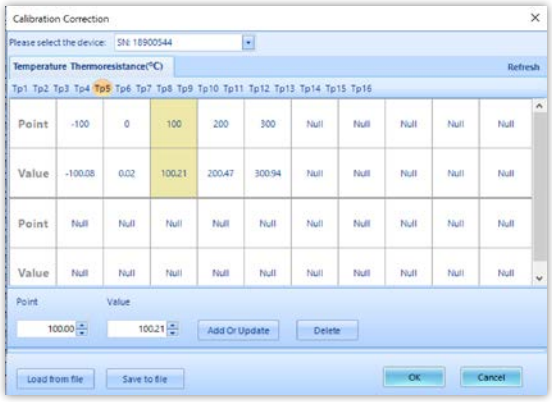
temperature from the RTDs, it is important to correct for the non-linearity.



The advanced non-linearity corrections are now available from the input channel table which can either be based on a standard or custom defined.



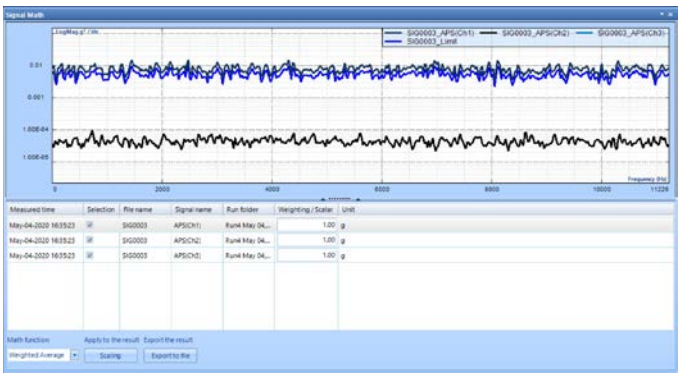
A choice of A, B and C values or α, β and δ values can be defined by the user.



RTD sensors that have deviated from the standard can be corrected using a table if the correction values are known.

Real Time Signal Averaging Tool

A real time signal averaging tool is introduced in the EDM 9.0 release for EDM-DSA.



Users can use the display math tool by dragging and dropping any number of time or frequency signals.

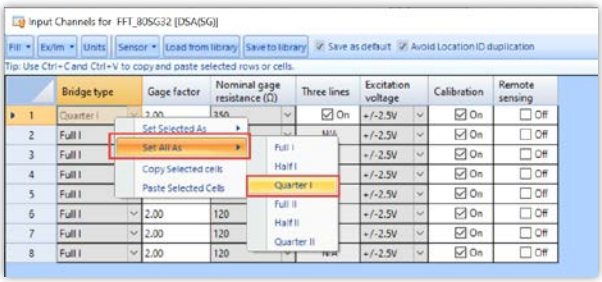
Options for standard or weighted average are available. The results generated through the average can be conveniently exported to one of the wide range of formats supported by EDM software.

A widely used application for this feature is to use the resulting spectra as a limit profile.

Simultaneously Configure All Strain Gage Input Channel Parameters

Users can simultaneously assign measurement quantity and sensitivity for multiple channels in the input channel table.

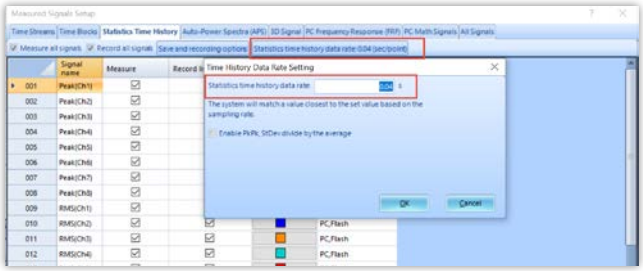
This feature is now extended to the strain gage input channels' parameters.



It is now possible to simultaneously set the bridge type, gage factor or any of the strain gage related parameters. This feature will greatly simplify the strain gage configuration for high channel count systems.

Customizable Rate for Statistics Time History Signals

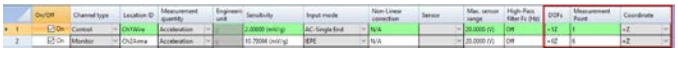
Time history signals can be customized to be measured for a user defined time period.



This new option is available where the time history signals are defined. Custom values in seconds or within hundredth of a fraction can be entered.

Addition of Measurement Point, Coordinates and DOF to Input Channel Table

The input channel table in DSA and VCS now includes measurement point, coordinate and DOF information.



This information not only acts as a reference for users but also helps during Vibration Visualization for VCS or DSA tests.

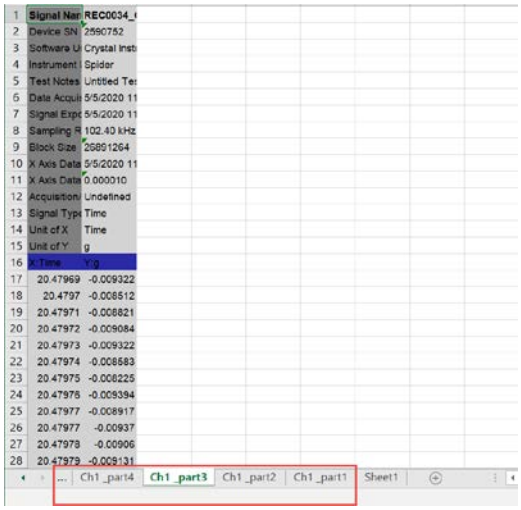
This data can also be used with EDM-Modal for Modal Analysis.

Export to Multiple Excel Files

Microsoft Excel is a useful tool for analyzing or saving data. All EDM modules support exporting time and frequency signal data to Excel files. However, Excel has a limitation to the number of rows and columns that are defined.

When exporting raw time recording data at high sampling rates, the number of data points are usually so large that it will exceed the row limitation of Excel.

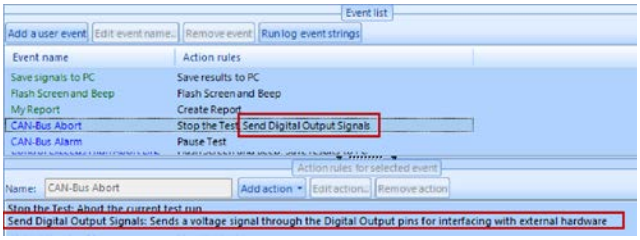
To prevent data loss, EDM 9.0 introduces the option to split and export data to multiple Excel tabs.



New CAN bus Features

CAN bus Supports Digital Outputs

Send digital output is now supported by triggering the CAN bus abort limit. Signals from CAN bus not only trigger actions by EDM, but also external devices connected to the controller.

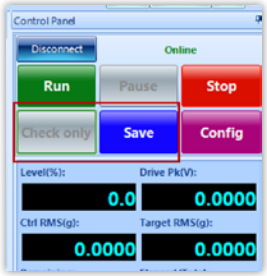


MAJOR IMPROVEMENTS

EDM Vibration Control Software

Save Signals in Check Only Mode

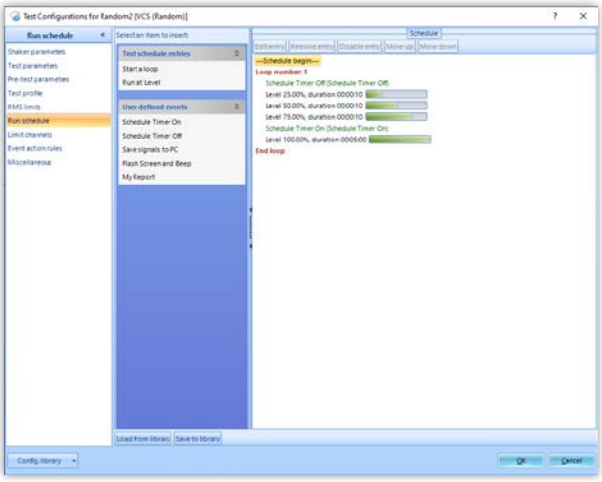
EDM-VCS has a check only mode feature where the input channels turn on, but no drive output is generated. In this mode, both time and frequency signals are available and used to determine if all channels are working according to their intended operations.



In the EDM 9.0 release, an option to save the time or frequency signals is available in addition to the raw time data recording feature.

Schedule Timer Settings are Included in Event Action Rules

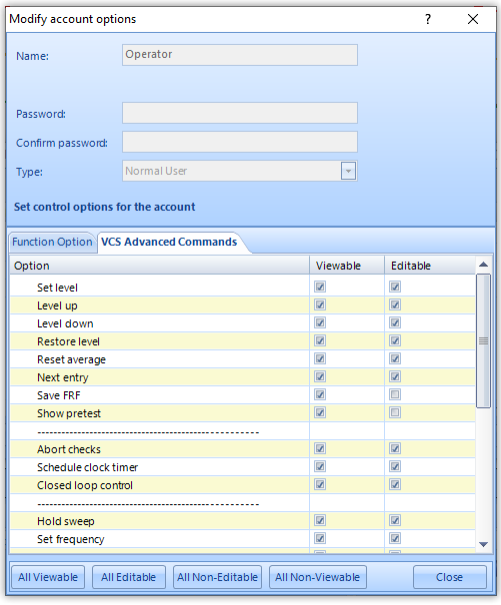
Once a run schedule is defined, the test will run according to the run schedule. In some tests, it is required to manually ensure the steady state of the device under test before proceeding towards the next entry, which can be done by turning off the schedule timer. This mode is accessible to the user from the advanced command buttons during run time. When the schedule timer is turned off, the test can continue to run in its last known state.



Users can turn the schedule timer on or off through the run schedule. Users can manually enter the next entry when the required conditions are met and schedule timer automatically kicks in, to ensure that the device is not over tested or under tested.

User Configurable Permissions for VCS Advanced Command Buttons and Global Settings

The VCS Advanced Command Buttons and Global Settings includes a wide range of settings that have varied impacts on the test being run.

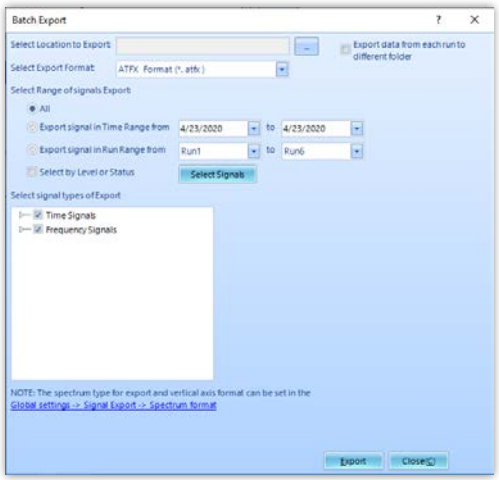


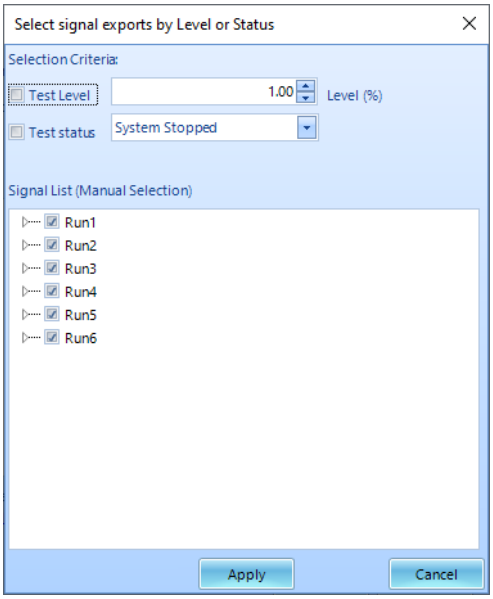
To avoid accidental changes to important parameters or settings that fall under this category, users can configure access or deny privileges for each specific setting under the advanced command

buttons or the global settings.

Enhancements to Batch Export by Level

Batch export by level conveniently chooses signals that have been saved at the desired level. Improvements to this feature allows users to select other filter criteria in addition to the level to sort the signals for exporting.

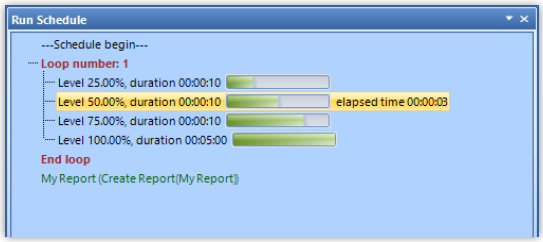




View Elapsed Time in Run Schedule View

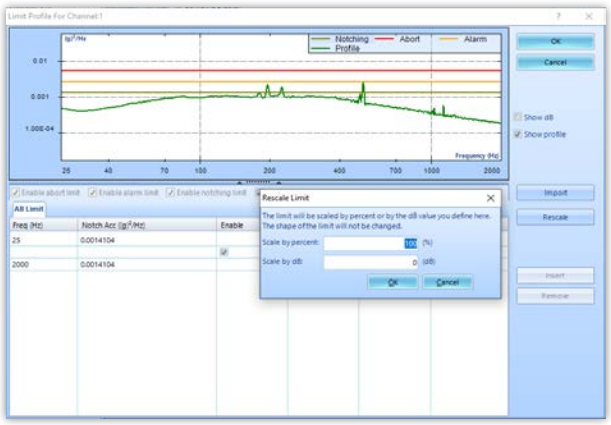
The run schedule view displays the run schedule being executed and highlights the currently running entry.

An improvement to this feature in EDM 9.0 allows the user to see the elapsed time of the run entry.



This information allows the user to conveniently view the elapsed time for this entry and the time it takes for the upcoming entry.

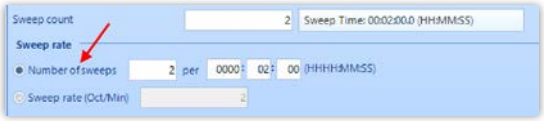
Rescaling Limit Profiles by dB or Percentage



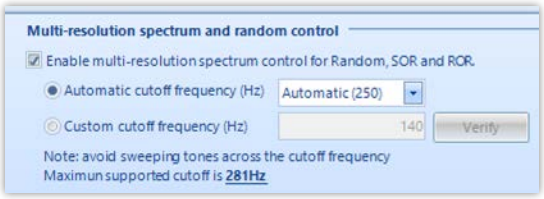
Limit profiles can now be re-scaled using percentage or dB. In most user case scenarios where limits are applied, the limits are scaled versions of the profile. This feature helps simplify the setup process.

Improvements in Random

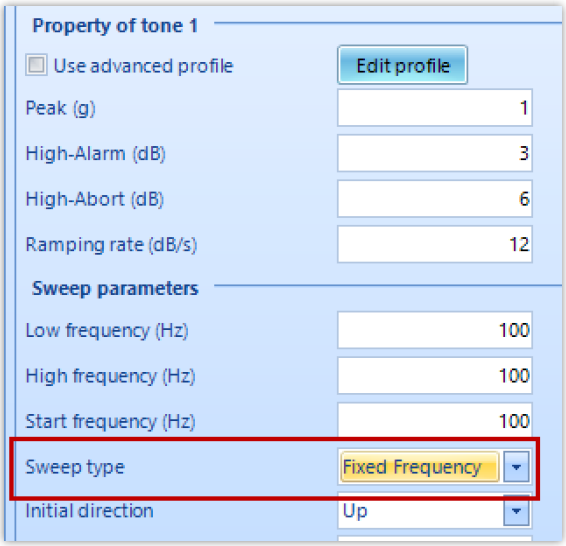
Sweep rate of a SoR sine tone can be defined by either number of sweeps over a duration or sweep rate.



Support for custom cutoff frequency in multi-resolution control settings.



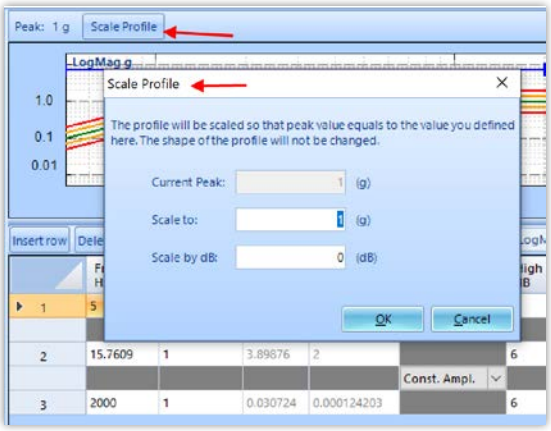
Fast setup for a dwelling sine tone in SoR.



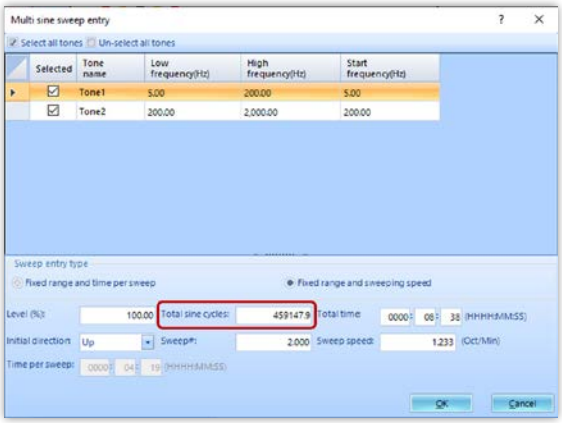
Improved UI for manual control in run schedule (random)

Improvements in Sine/RSTD/Multi-sine

Enter a number to scale the entire sine profile

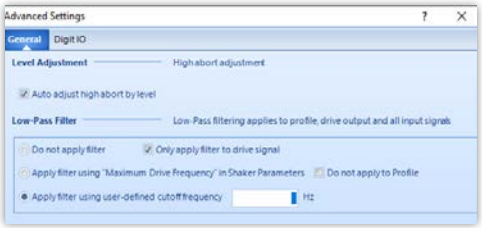


Multi-sine displays “total sine cycles” in the run schedule entry

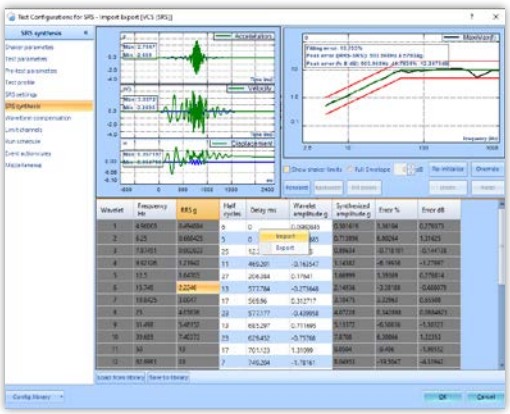


Improvements in Shock/TTH/SRS/Earthquake Testing/ Transient Random

Option for “Only apply filter to drive signal” in low-pass section under Shock advanced settings



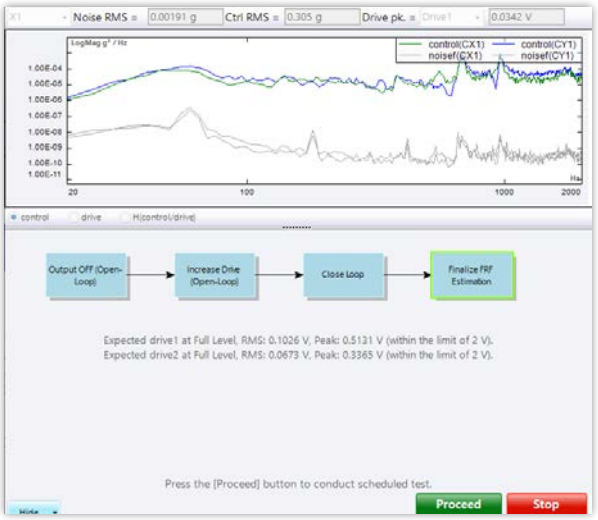
Import/Export SRS profile as CSV



EDM MIMO Vibration Control Software

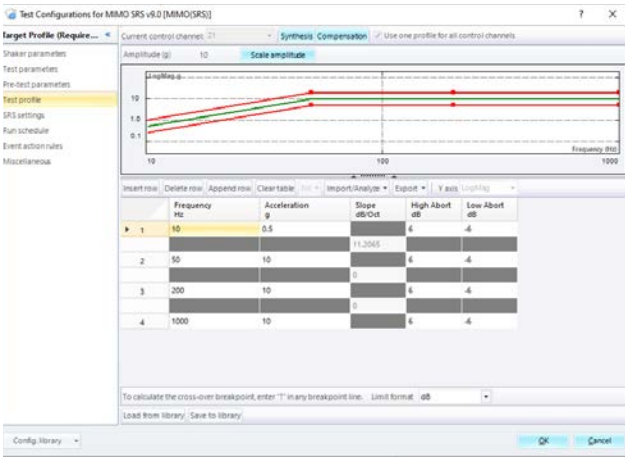
Improved MIMO Random Drive Estimation

MIMO Random expected drive signals are estimated after the pretest. This gives users a better indication of what to expect from the driving level point of view.



Convenient Synthesized Profile for All Control Channels

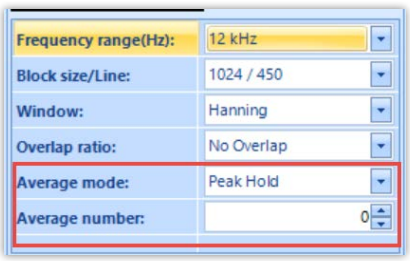
The MIMO TTH or MIMO SRS profile has the “use one profile for all control channels” option added. With this enabled, the same synthesized profile can be applied to multiple control channels.



EDM Dynamic Signal Analysis

Indefinite Peak Hold Spectrum

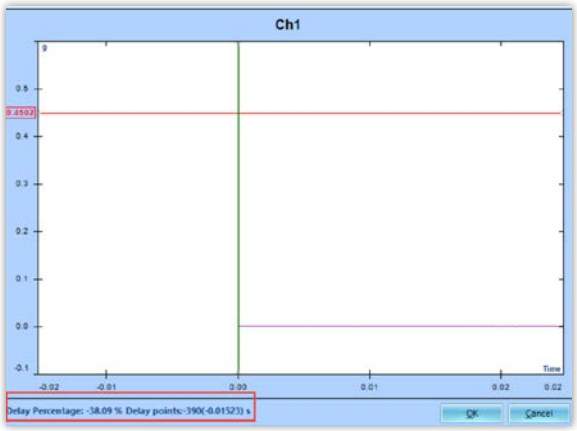
EDM 9.0 introduces the average number of 0 for peak hold averaging. This allows the peak hold computation to be performed for an indefinite duration and analyzes the peak spectral values at each frequency for the entire duration of a test.



This convenient feature will help users to identify the maximum peak values for any frequency for the entire duration of test.

Improvements to Pre-Trigger Parameters Display

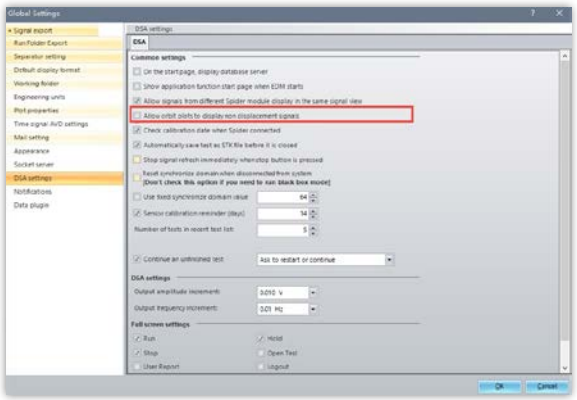
A convenient display is introduced to allow users to view the Delay Percentage, Points or Delay Time in the trigger window.

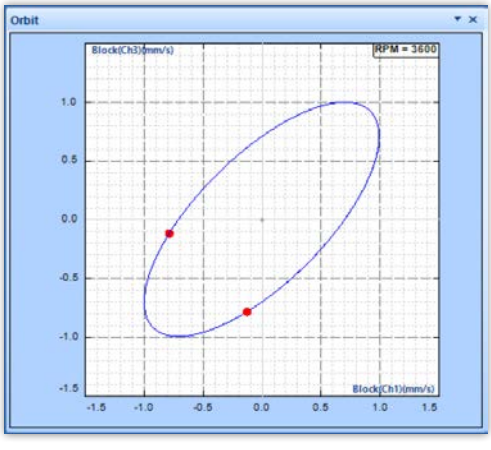


The cursors can now be used to accurately adjust the pre-trigger.

Orbit Plot Supports Display of Non-displacement Signals

The most common application of orbit plots is to plot the displacement. However, the concept of an orbit plot is very useful in some aerospace applications where position to velocity or position to acceleration plots are needed.



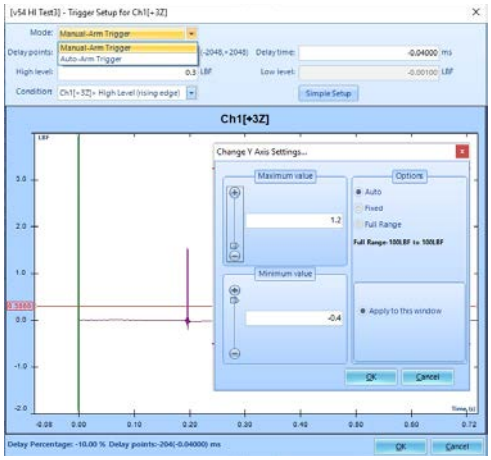


The current orbit plot feature can be comfortably extended for plotting and studying these types of X-Y plots.

EDM Modal

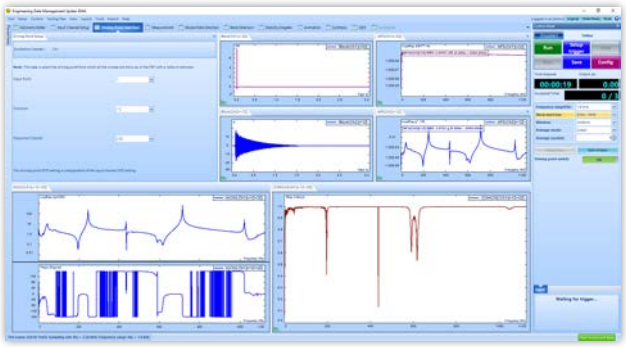
Simplified Trigger Setup

Manual-arm and auto-arm trigger mode is available in the hammer impact modal analysis suite with an optimized Y-Axis range.



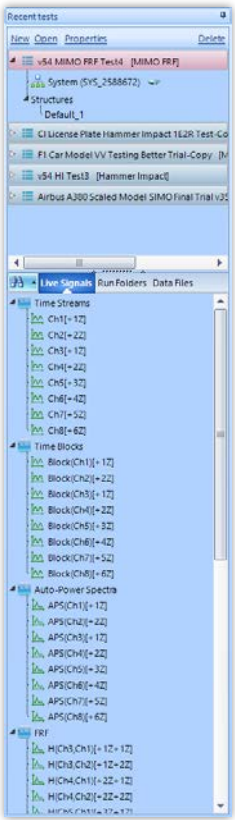
Improved Driving Point Selection

Driving point selection is updated and simplified to optimize the setup before executing the hammer impact modal test.



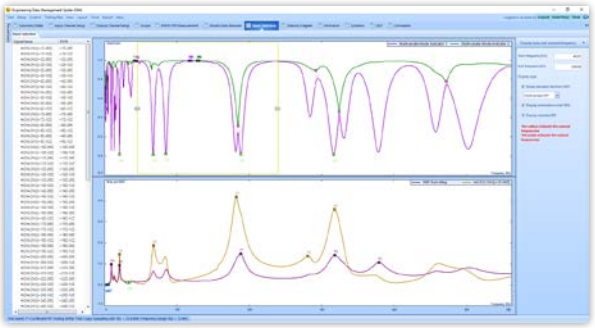
Added DOF Information to the Live Signal List

The DOF information is also displayed with each signal in the live signal list.



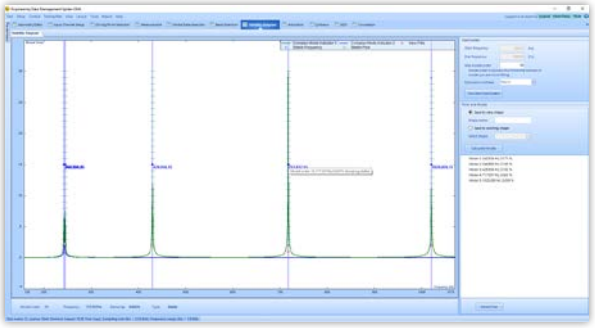
Updated Band Selection

Help text highlighted in red has been added on the right to describe the different mode indicator functions and other display styles. This helps optimize the selection of the band for the curve fitting process.



Enhanced Stability Diagram

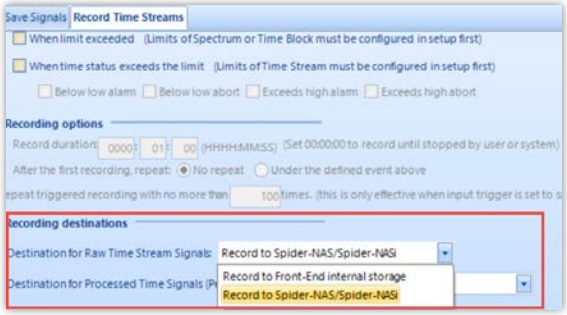
A guided hovering cursor provides details about the modal order, frequency, damping and the type of pole. This helps in choosing poles with stable frequency and damping.

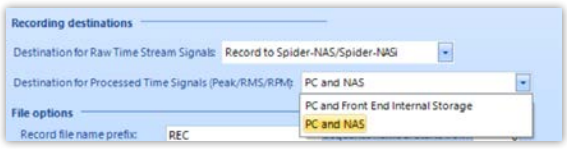


General Improvements

Conveniently Configure and Review Recording Destination

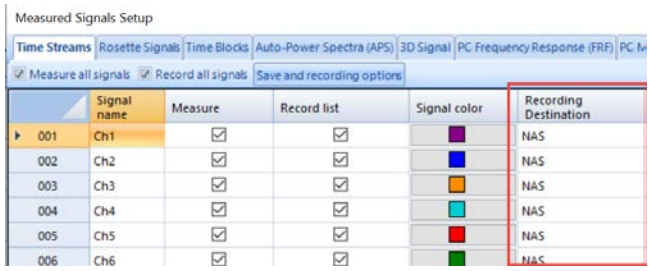
The recording destination is an important parameter when a Spider-NAS is included with a Spider system. EDM 9.0 introduces a convenient option to select the recording destination for the time stream data and statistics time data.

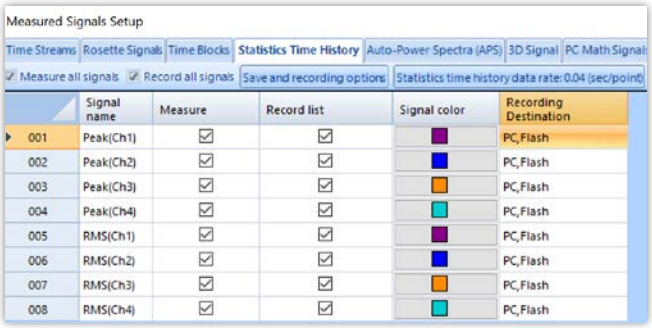




When a PC is available and connected, the statistics time signals always save to the PC for the entire duration of the test which enables users to view the historic data while the test is running. In addition, it is also possible to save the data to the front-end internal storage or Spider-NAS which helps to save data in the absence of a PC or if the network connection is not reliable.

The user selected destination or the default destination is now conveniently viewed through the Measured Signals Setup page.





Out of Band Overload Detection on Front-end LEDs

Drop shock tests, pyro shock tests or data acquisition during blast testing may at times have sufficient energy to drive the sensors at their resonance frequency. Piezo resistive sensors are the most suitable for these purposes as they have a higher resonant frequency. However, most IEPE sensors used in these tests have a resonant frequency of less than 100 kHz which may easily saturate the sensor out of its usual band.

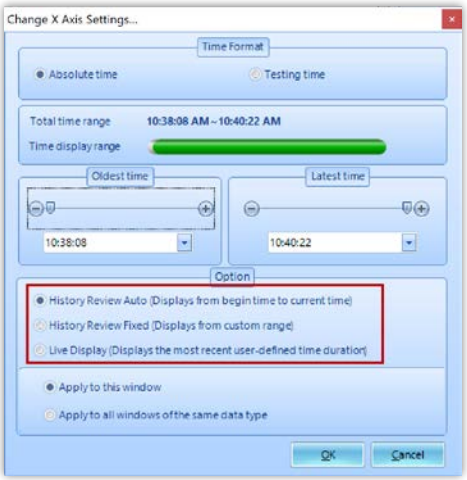
Once saturated, the data acquired is corrupted and not usable.

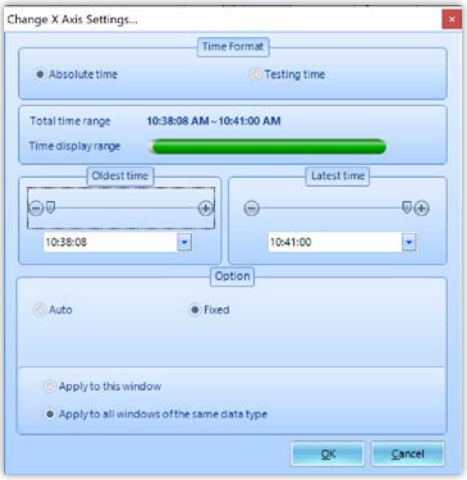
EDM 9.0 added the detection of out of band saturation before any low pass filters to ensure that the data is not corrupted. Hardware indicator LEDs have been programmed to display the out of band saturation.

Enhanced History Review for Time History Signals

Statistics signals in VCS and DSA can be viewed for the entire duration of the test using the PC Recording and History Display feature. In EDM 9.0, the History Review Mode received major improvements.

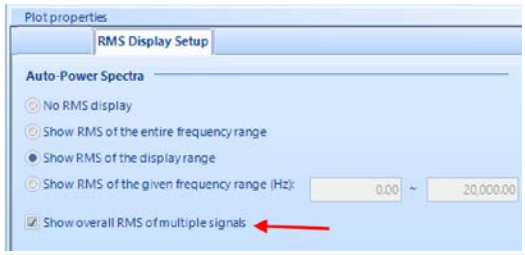
The time duration for a specific period of a historic signal or live display is now conveniently configured by the user using several featured options.

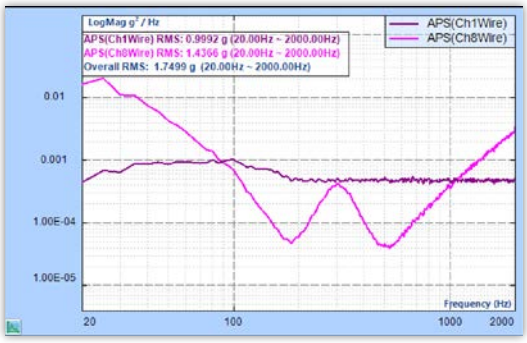




Introducing Overall RMS Display for All Signals in the Plot

In EDM 9.0, overall RMS for all the signals in a given plot can be computed and displayed.

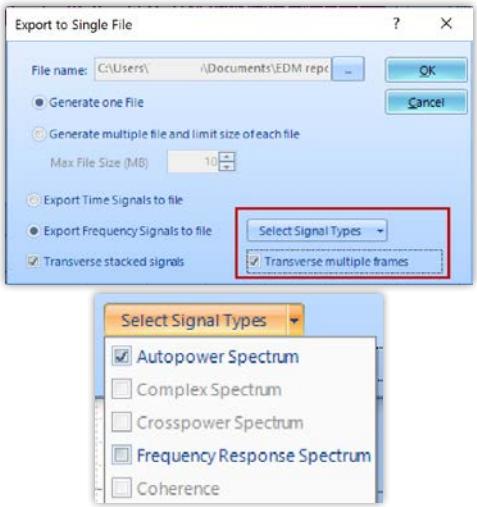




The total energy in signals acquired through sensors specialized for different frequency ranges can be acquired and the overall energy can be estimated.

Improvements to "Export to Single File"

The Export to Single File feature provides an option to export multiple signals from multiple channels as a single file.



This feature is significantly improved. In addition to more options to select the signal types, the option to export in MAT and UNV file formats is added.

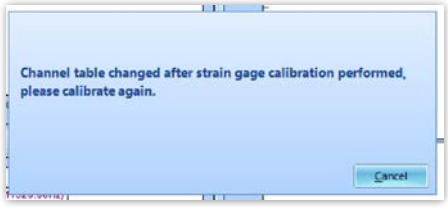
Customizable Line Width for Signals in Report

The line width can be independently adjusted for signals displayed on a report.

This allows for the optimum selection of the line width in a report without having to modify the displayed line width in EDM.

Enhanced Calibration Notification for Strain Gage Calibration

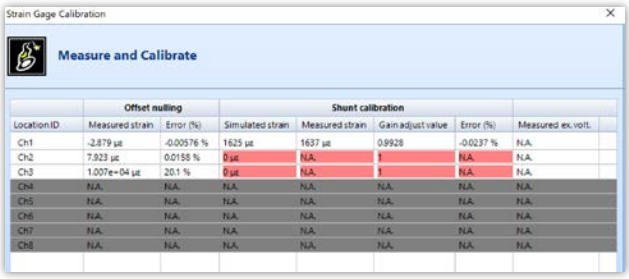
Strain gage channels need to be calibrated to determine the offset and a shunt calibration needs to be performed to accurately estimate the gain. Calculating these values is essential to calculate the strain values accurately. Since these values depend on the sensor used, a calibration needs to be performed each time a sensor (strain gage) is modified.



EDM 9.0 introduces a friendly notification to ensure that users do not forget to calibrate the strain gages to maintain the accuracy of measurements.

Enhanced Calibration Review Window for Strain Gage Calibration

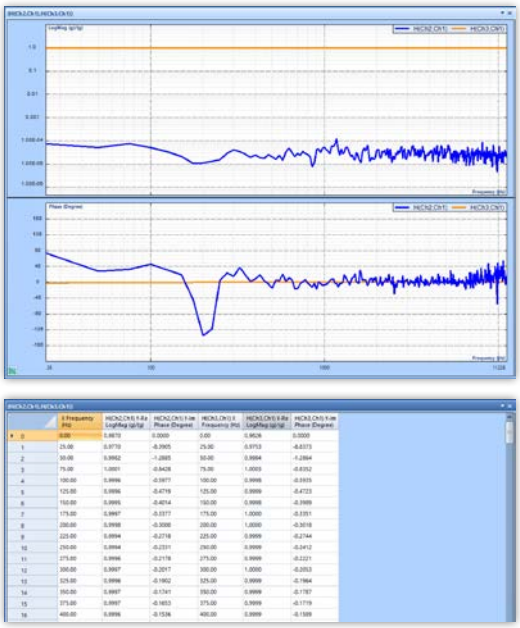
Once a strain gage calibration is performed which includes offset and gain calculations, the user must review these values to ensure that they are within the expected range.



EDM 9.0 introduces a user-friendly window to detect any obvious errors which can denote an incorrect connection or a bad sensor.

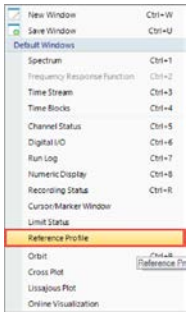
Improved Text Display for Signals with Phase (FFT/FRF/CPS)

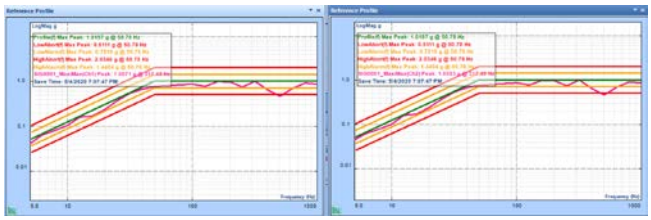
Users can conveniently display signals consisting of phase information on EDM software. Converting to text format when multiple signals are plotted within the same chart was a limitation in previous versions. Improvements to EDM 9.0 enables users to plot multiple signals on a chart and allows users to display signals in text format.



Enable Multiple Charts of SRS Reference Profiles

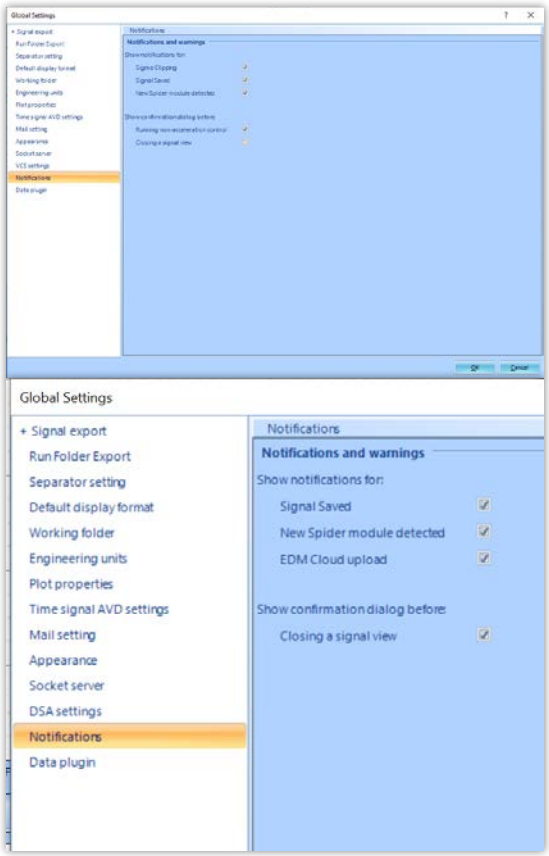
Multiple windows for SRS Reference can be created in EDM 9.0. This allows users to plot different signals in different charts.





Ability to Disable Certain Notifications in EDM

Certain notifications are expected to be seen during certain tests. For example, sigma clipping can be frequent when it is set to 3 during a random test since several frames may experience sigma clipping.

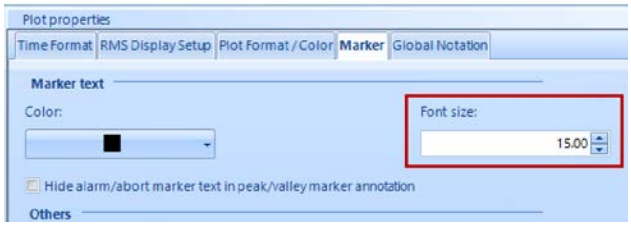


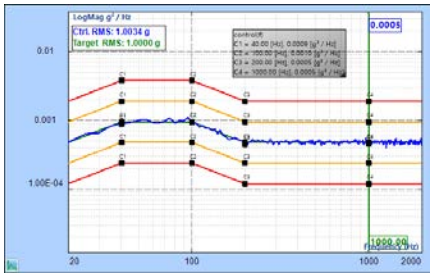
In certain tests, signals are frequently saved. In these cases, frequent notifications to the user are distracting.

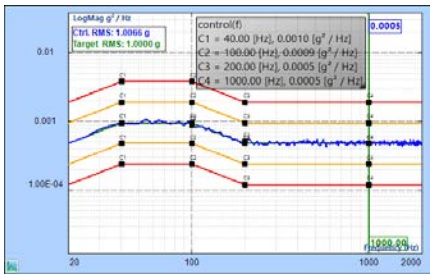
EDM 9.0 allows users to disable a selection of notifications in EDM-VCS and EDM-DSA.

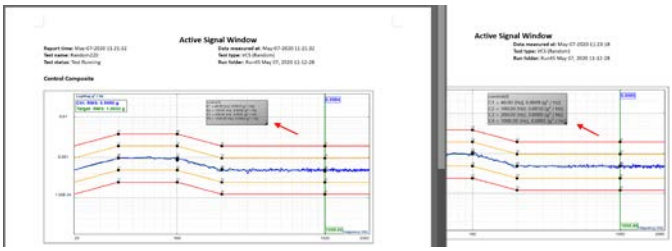
Customizable Font Size of Marker Text in EDM Display and Report

EDM 9.0 allows customizable font sizes for markers (peak markers, harmonic markers, etc.) on the display as well as on the report.





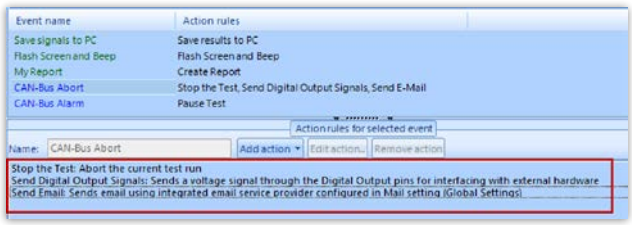




This allows the user to have an optimized size and maintain visibility without hiding data.

Expanded Details in Event Action Rules

Event action rules are a powerful component of EDM which provides users with a pseudo programming ability to configure actions towards specific system events or user defined events.



EDM 9.0 includes more details for each event to provide users with a more user-friendly, approachable, and intuitive tool.

Support to TEAC – TAFFmat Data Format

EDM 9.0 supports exporting files to the TAFFmat data format which is utilized by TEAC data recorders.

Improved PC Resources Check

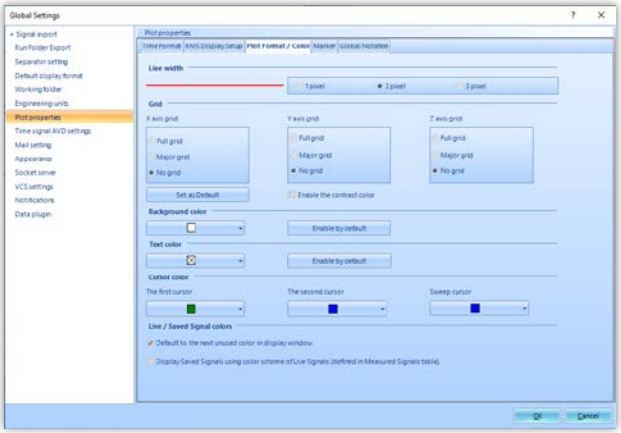
EDM 9.0 introduces an advanced PC check to ensure that the available RAM and processor speed meets the minimum requirements to efficiently run EDM software.

Share Global Settings with Systems on LAN

EDM installed on multiple computers on the same LAN can share the same global settings stored in a central place. Requires editing the global config file.

Improved Signal Color Setting for Saved Signals and Live Signals

Different applications or different users require different display requirements. In certain applications, reviewing the same signal over the course of time is essential while in other applications comparing the signals from two different channels is more essential and requires the same coloring scheme used for live signals.

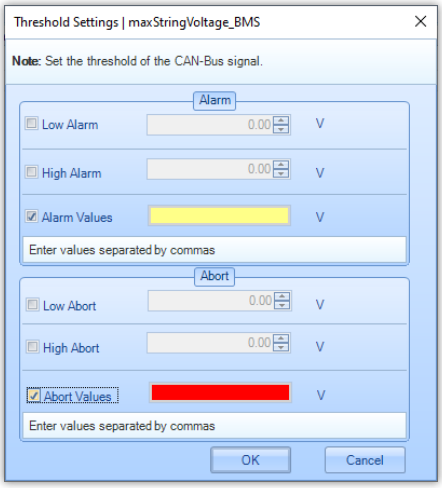


To accommodate all cases, users can select the signal coloring scheme for saved and live signals.

CAN bus Improvements

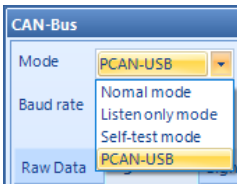
Improved Alarm and Abort Functionality for CAN bus Signals

CAN bus alarm and abort support for matching specific CAN bus values (instead of high/low limits)



Support to PCAN USB Adapter

EDM 9.0 VCS module now supports Peak Systems – PCAN USB Adapter.



Search Feature Added to CAN bus Signals

CAN bus: added search feature for easy filtering of desired signal name.

SOFTWARE RELEASE HISTORY

Dates of software releases:

Type	Release	Exact Version	Release Date
Release	EDM 4.2	CI 4.2.0.3	2/28/2014
Patch	EDM 4.2.0	CI 4.2.0.14	7/2/2014
Release	EDM 5.0	CI 5.0.0.2	11/27/2014
Patch	EDM 5.0.1	CI 5.0.1.3	2/27/2015
Release	EDM 5.1	CI 5.1.0.6	8/12/2015
Release	EDM 6.0	CI 6.0.0.1	5/19/2016
Patch	EDM 6.0.2	CI 6.0.2.9	8/9/2016
Release	EDM 6.1	CI 6.1.0.4	2/7/2017
Patch	EDM 6.1	CI 6.1.0.27	8/22/2017
Release	EDM 7.0	CI 7.0.0.6	2/1/2018
Patch	EDM 7.1	CI 7.1.0.7	7/19/2018
Release	EDM 8.0	CI 8.0.0.1	2/2/2019
Release	EDM 8.1	CI 8.1.0.1	11/13/2019
Release	EDM 9.0	CI 9.0.0.4	6/5/2020

SYSTEM REQUIREMENTS

Minimum System Requirements:

- **Operating System Support:** Windows 7 SP1 or higher
- **Operating System Type**: 32-bit or 64-bit
- **Processor Speed:** 1.5 GHz Dual-Core x86
- **RAM:** 4 GB
- **Available Storage Space:** 10 GB

Recommended System Requirements (Minimum for Spider Systems Higher than 16 Channels):

- **Ethernet Speed:** at least 1 Gbps Ethernet port on the computer
- **Network Cables:** provided by Crystal Instruments
- **Operating System:** Windows 10, 64-bit
- **Processor:** Intel Core i7, 2.0 GHz or Higher
- **RAM:** 8 GB DDR3 1600 or higher
- **Available Storage Space:** 10 GB or higher
- **Spider-HUB Firmware Version:** 2.0.5.17 or higher

VERSION COMPATIBILITY

Product and Software Version	Firmware Versions
Spider-80X/80Xi/80Hi/80Ci	
EDM Testing 9.0.0.x	9.0.0.x
Spider-81 (v7.x)	
EDM Testing 9.0.0.x	9.0.0.x
Spider-81B (v7.x)	
EDM Testing 9.0.0.x	9.0.0.x
Spider-80SG/SGi	
EDM Testing 9.0.0.x	9.0.0.x
Spider-20/20E/20HE/20H/20i	
EDM Testing 9.0.0.x	9.0.0.x

Product and Software Version	Firmware Versions
CoCo-80	
EDM 6.0.2.x	4.0.x
CoCo-70X	
EDM Testing 9.0.0.x (EDM CoCo for DSA)	1.8.x
Vibration Diagnostic System 1.4.2.x	1.8.x
CoCo-80X/90X	
EDM Testing 9.0.0.x (EDM CoCo for DSA)	1.8.x

© 2020 Crystal Instruments Corporation. All Rights Reserved. 06/2020 | www.crystalinstruments.com | info@go-ci.com

Notice: This document is for informational purposes only and does not set forth any warranty, expressed or implied, concerning any equipment, equipment feature, or service offered or to be offered by Crystal Instruments. Crystal Instruments reserves the right to make changes to this document at any time, without notice, and assumes no responsibility for its use. This informational document describes features that may not be currently available. Contact a Crystal Instruments sales representative for information on features and product availability.