CRYSTAL INSTRUMENTS

EDM 10.1

Engineering Data Management Software Release Notes

EXPERIMENTAL MODAL ANALYSIS (EMA)

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

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RELEASE HIGHLIGHTS

EDM Supports SQLite

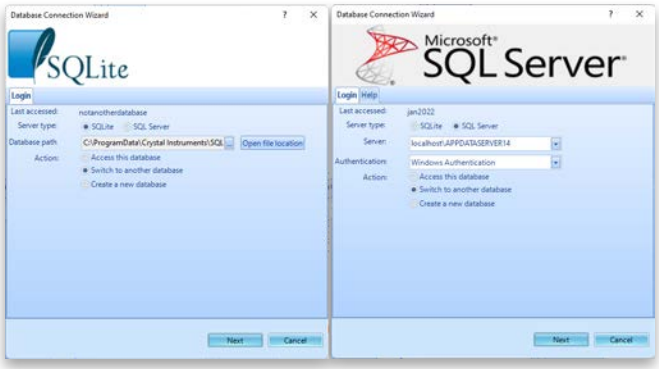
EDM 10.1 supports SQLite - a small, fast, self-contained, and reliable database engine. SQLite provides a seamless installation process and is a light-weight application. EDM reliability is further improved, and speed is increased even on computers with limited resources.

Combined with the support of SQL Server, EDM now supports the two most popular database engine forms. Users now have the choice to install and use SQLite and/or SQL Server according to their application needs.

SQLite comfortably fulfills all the capabilities required by EDM and provides a similarly fully featured experience as the existing SQL Server.

Crystal Instruments highly recommends the use of SQLite for a majority of users due to the easy installation, fast trouble-free performance, and lack of limitations.

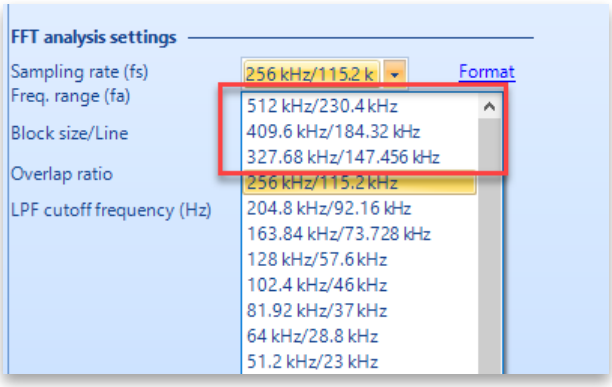
Users can create databases in either SQLite or MSSQL and migrate existing databases from one database engine to another.



512 kHz Sampling Rate for Spider-80Hi, Spider-80Ci and Spider-20HE

Users now have the ability to sample and record as high as 512 kHz on the Spider-80-Hi, Spider-80Ci, Spider-20HE, and Spider-20i.

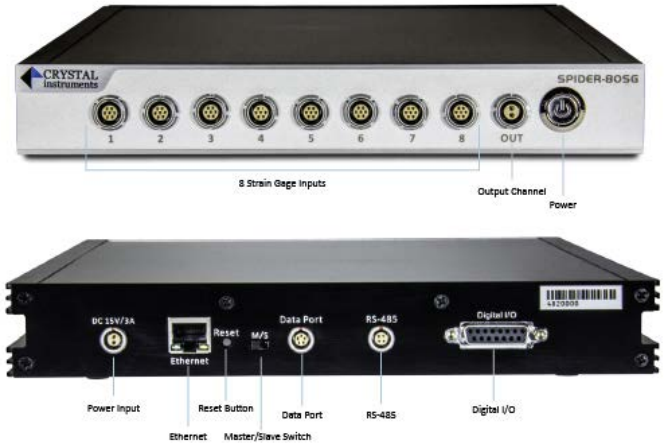
This high sampling rate allows the updated Spider hardware to capture high frequency shock and transient events. The combination of EDM 10.1 and one of the high sampling Spider modules provides three additional sampling rates at 512 kHz, 409 kHz, and 327 kHz.



Spider-80SGi V2 Supports 512 kHz Sampling Rate

EDM 10.1 upgrades the Spider-80SGi to sample and record data at rates of up to 512 kHz. The high sampling rate is essential to capture high frequency shock and transient events. The Spider-80SG/SGi can interface with a multitude of sensors ranging from MEMS, ratiometric, DC, AC and IEPE sensors.

The combination of a high sampling and compatibility with a wide range of sensors such as accelerometers, strain gauges, load cells, bridge-based sensors, and more positions the Spider-80SG as an ideal general purpose data acquisition system for any testing need.

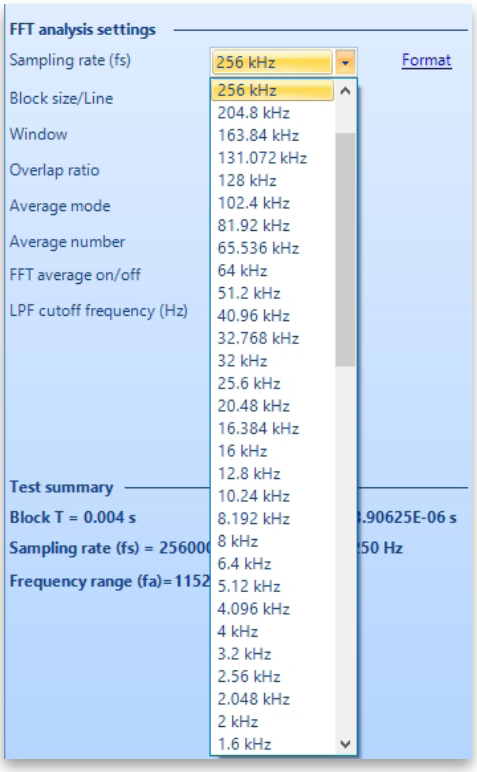


65536 (216) Hz Sampling Rate - Supports 1 Hz Frequency Resolution

Several applications including some legacy applications require a frequency resolution of 1 Hz for optimal data comparisons with historic data. This requires a sampling rate at a power of 2.

Crystal Instruments introduced a new sampling rate of 2n for all Spider and CoCo hardware to support multiples and fractions of 1 Hz frequency resolution.

With 1 Hz frequency resolution, the frequency domain signals will have integer frequencies on the X-axis enabling spectral analysis for integer frequencies.

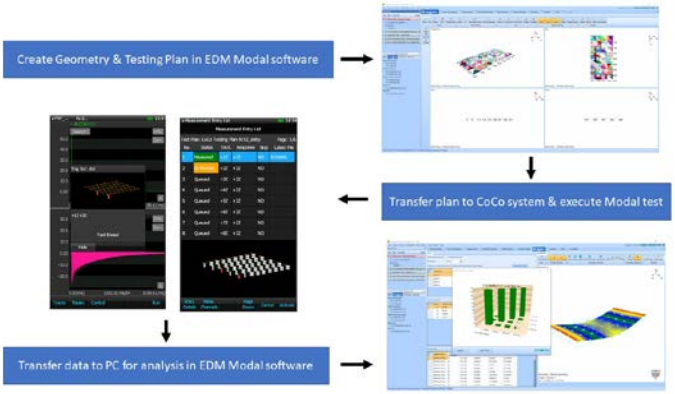


With the introduction of 65536 Hz (216) and its derivative sampling rates, frequency resolutions of 0.125 Hz, 0.5 Hz, 1 Hz, 2 Hz, 4 Hz, etc. are supported to allow spectral analysis at integer frequencies.

Together with three other sampling banks of 102.4 kHz, 81.92 kHz and 64 kHz, Crystal Instruments products now support at least 72 different and unique sampling rates.

CoCo Hammer Impact Testing in EDM Modal

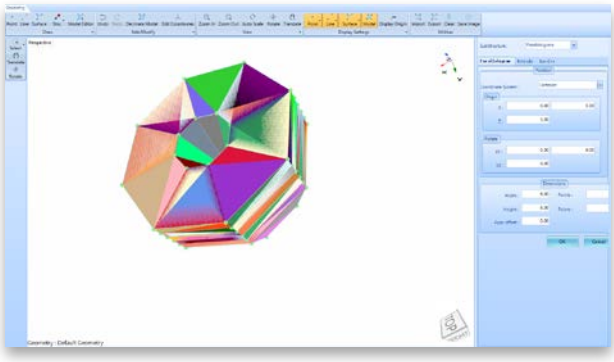
The rugged and portable CoCo hardware allows convenient measurement recording in the field. The handheld system features a compact display and accurately records and analyzes data. The powerful CoCo system integrates with EDM Modal software to provide a seamless modal analysis procedure. Users can transfer the testing plan and 3D model geometry created in EDM Modal to CoCo hardware for acquiring modal measurements. After a test is executed, users can transfer data back to EDM Modal for post-processing and modal parameter extraction.



Addition of Sub-Structure Modelling

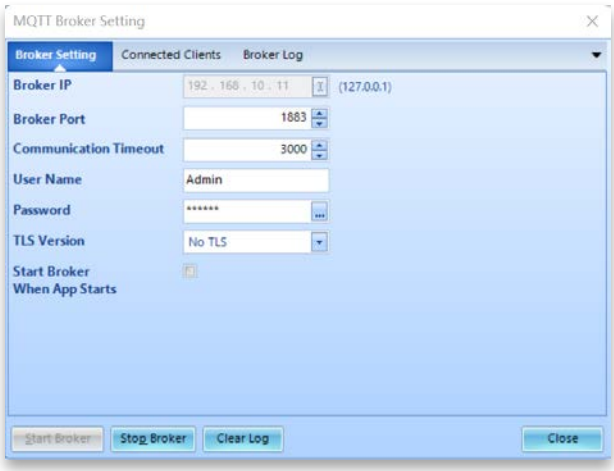
Users can create and edit geometric models seamlessly in EDM Modal. Users can choose the bottom-up approach to create 3D models which can further be edited using the Model Editor feature.

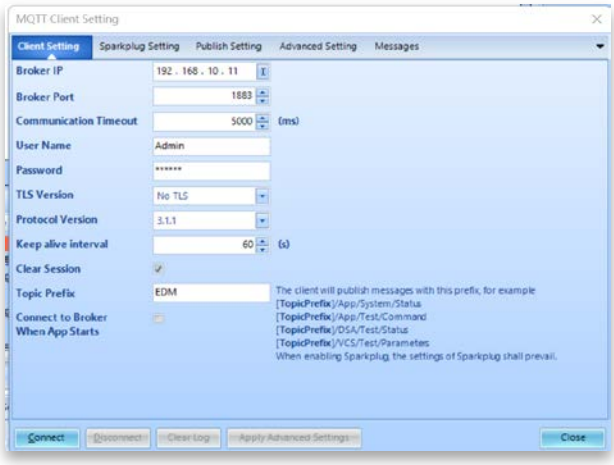
FEA/CAD models directly import into EDM Modal. Default structure libraries allow users to quickly create widely used geometries and customize them accordingly. The new addition of Sub-Structure Modelling allows users to create, extrude, and revolve models like parallelogram, triangle, trapezoid, sphere, cylinder, and cube.



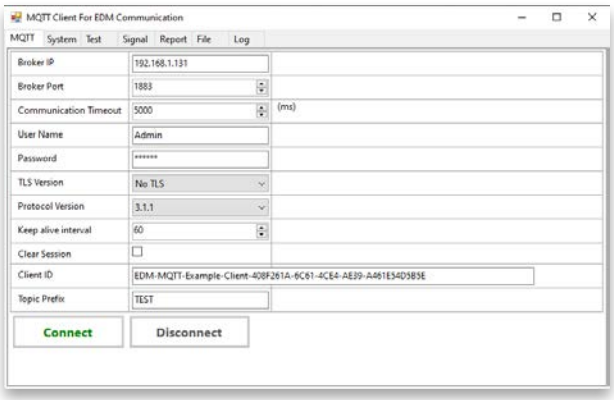
Monitor & Control EDM with MQTT IoT Messaging Protocol

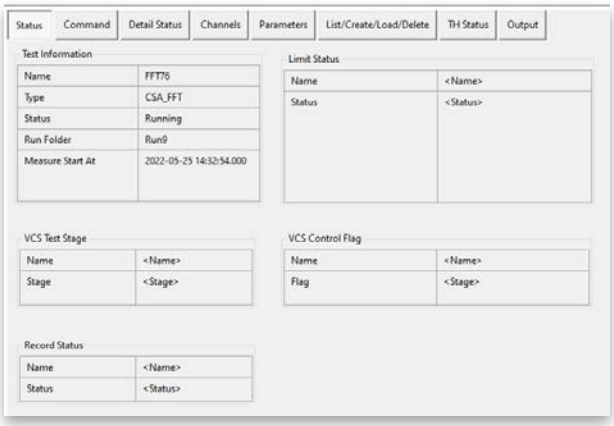
MQTT IoT is an OASIS standard messaging protocol designed for a lightweight publish & subscribe messaging network that connects to remote devices for data viewing and control. The implementation of MQTT in EDM allows users to monitor the status of environmental tests (vibration, temperature, humidity) running in EDM VCS, monitor measurements taken in EDM DSA, and even remotely run a test. This new messaging protocol will replace Socket Messages in EDM.

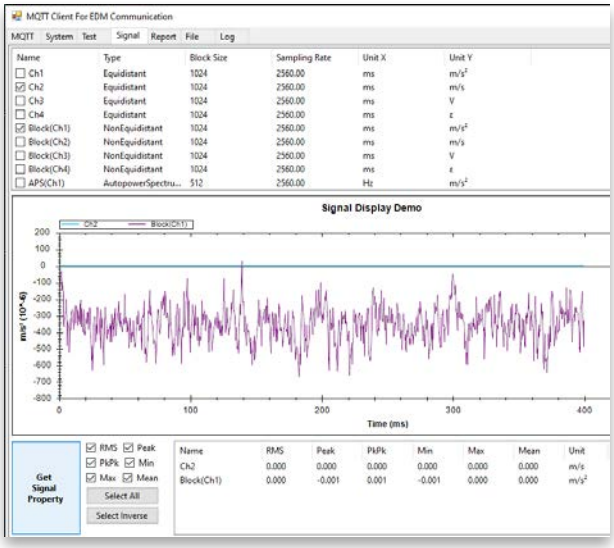




The screenshots below are from an MQTT example program that can connect to an EDM MQTT network to remotely run tests and view data.



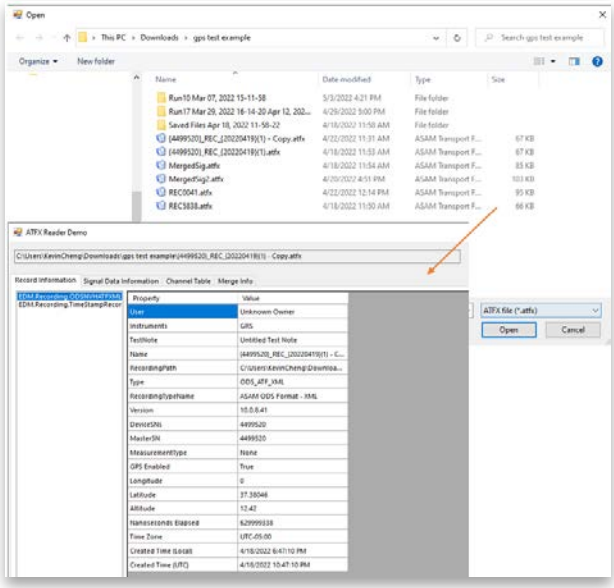


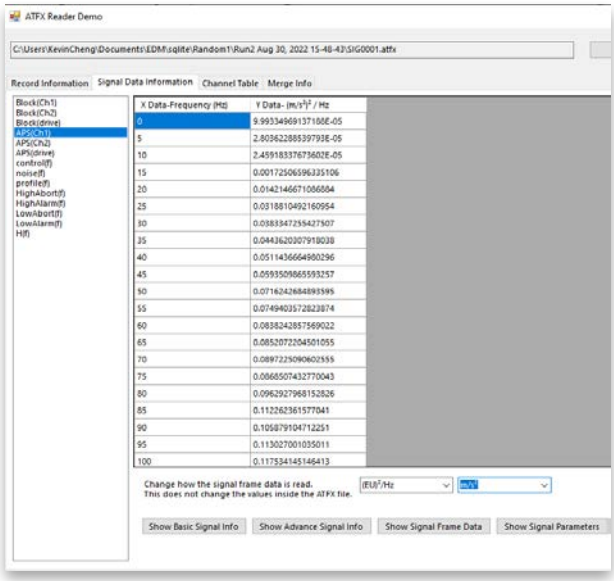


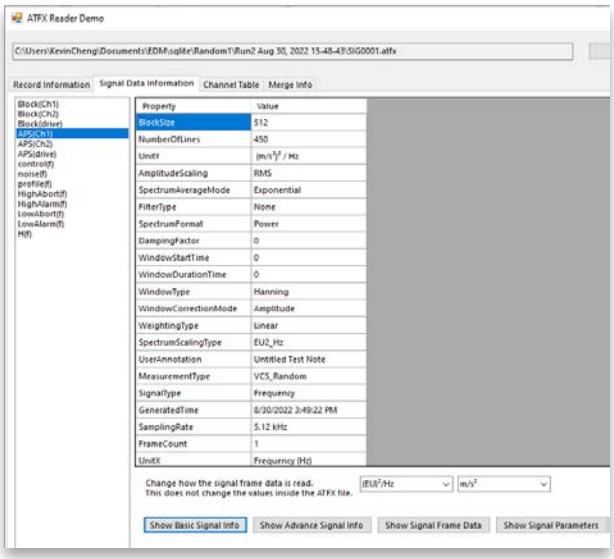
CI Data File Reader

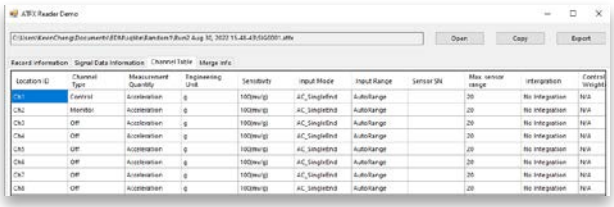
The CI Data File Reader API provides end-users with a streamlined file reading and browsing library to decode ATFX, TS and GPS files. Users can integrate the API with their own custom developed application. Crystal Instruments currently supports Windows-based programs, ideally written in C#. The same API also supports Python, MatLab and LabView.

The API offer methods and object calls to obtain data from an ATFX file, such as obtaining the DateTime with nano seconds elapsed or obtaining the saved frame data of a signal. This application also allows users to read any of the signals, time, or frequency in other engineering units (EU). Users can also read frequency domain signals in other spectrum types.





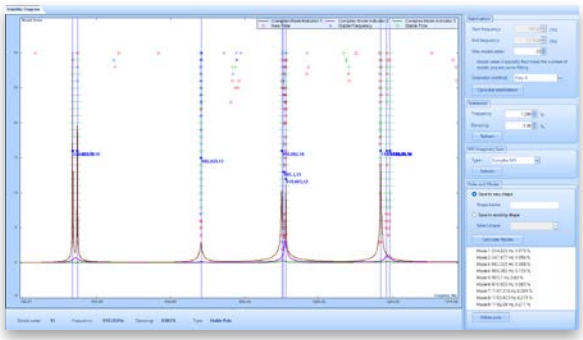




New Features in Experimental Modal Analysis

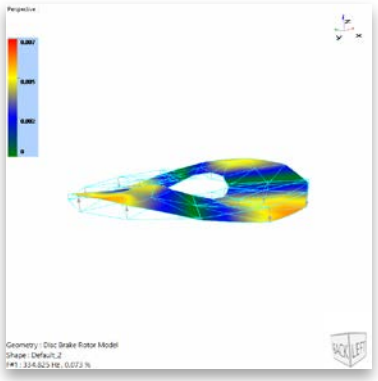
Curve-Fitting Optimization

Choosing an optimal frequency band and curve-fitting the FRFs is the most crucial step of the modal analysis process. Various Mode Indicator Functions (MIFs) like Multivariate MIF, Complex MIF, Real MIF, and Imaginary Sum assist the user in identifying all the modes in the desired frequency range. A new feature to calculate MIFs from the Band Selection in a Stability Diagram allows users to try different MIFs combined with different curve-fitting methods from the Time Domain and Frequency Domain to determine the best working combination for a measured dataset. The frequency and damping tolerances further assist in fine tuning the stability diagram.



Enhancement of Mode Shape Animation

Mode animation guides users to interpret the mode shapes of a test specimen and understand the magnitude of deformation. Amplitude and phase information of the modes is provided. The directional arrows between the undeformed and deformed structure helps users understand the phase information of modes.



New General Features

Improved Time Format Display

All EDM modules support four precision levels on the time axes: Seconds, Milliseconds, Microseconds, and Nanoseconds.

The precision options are available for both relative and absolute time displays.

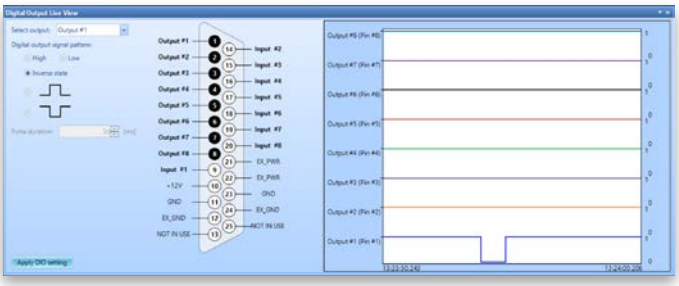
This improves the time display down to nanoseconds on displayed signals.

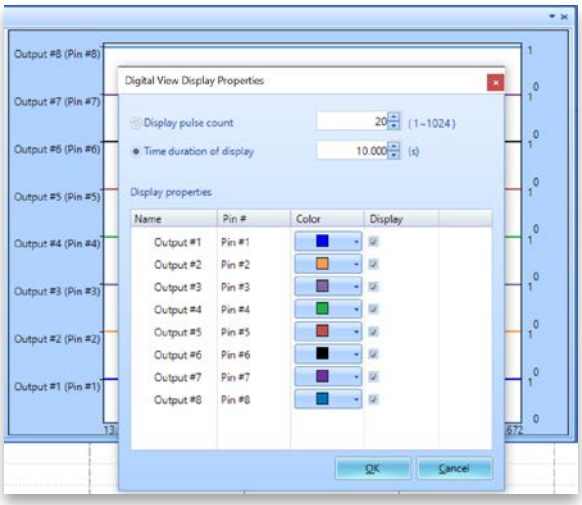
The improved Time Display allows users to display time streams in Absolute or Relative Time. Absolute Time allows users to display time streams in PC Local or UTC format.

Digital Output Live View

Digital Outputs now offers a live view in the EDM signal display. This feature allows users to:

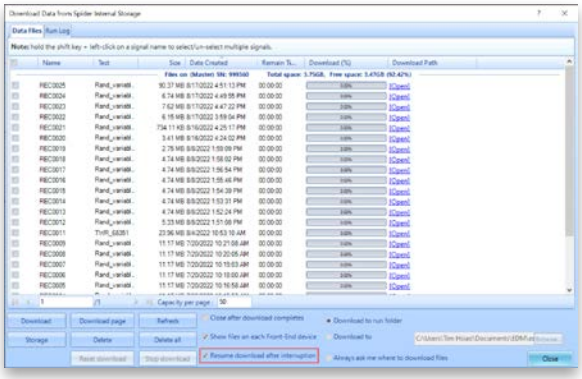
- Display all pin numbers of the DB connector
- Display the current state of each digital output pin
- Display the state of each digital output pin over a given duration
- Manually set the output pulse or state of a digital output pin
- Set the display duration and color of each digital output signal





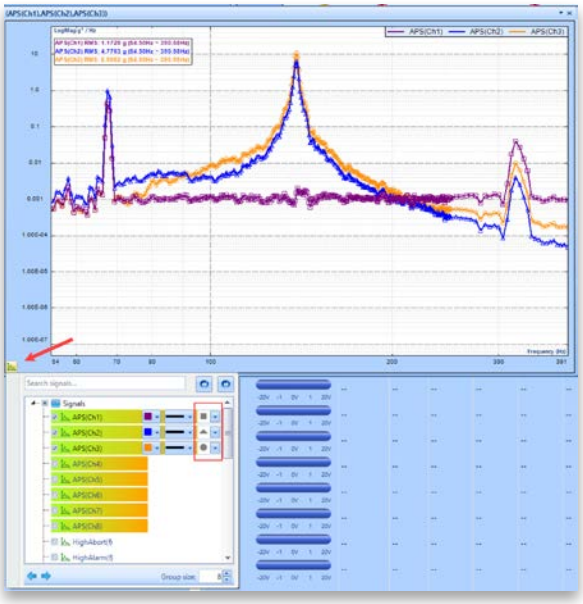
Data Download - Pause and Resume

Users can now pause and resume during data download to easily download large data files in multiple sessions.



Display Signal Symbols

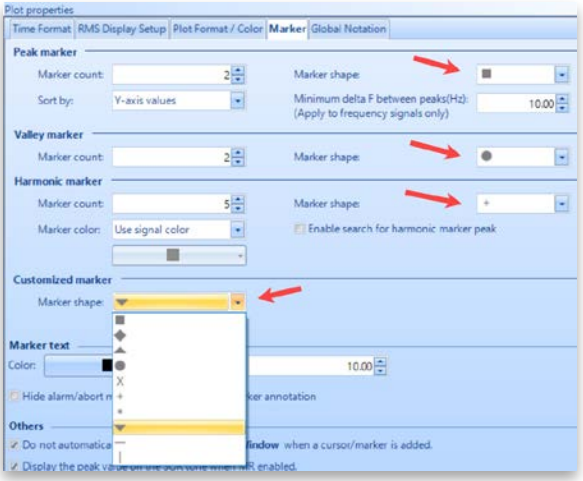
Users can select an available symbol to label a displayed signal.

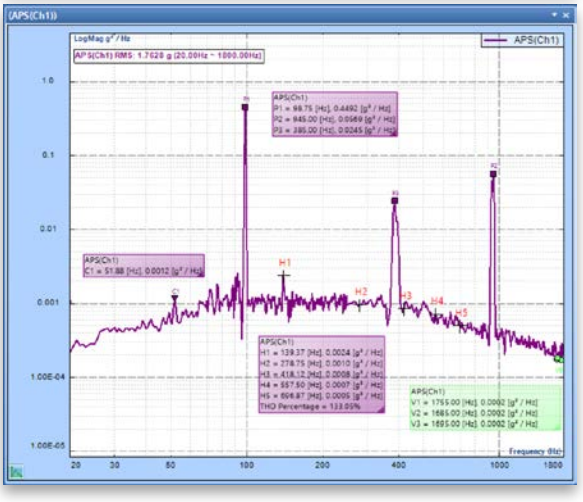


Customize Symbols for Markers

Users can select the shape of various markers including customized, peak, or harmonic markers.

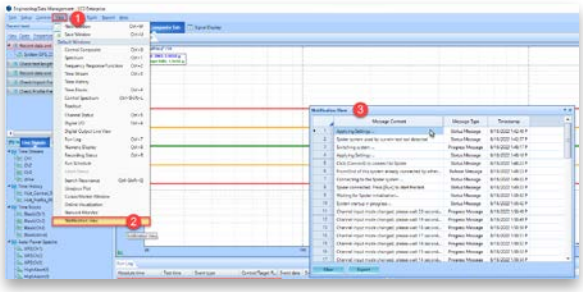
This feature provides an easy visual differentiation of markers.





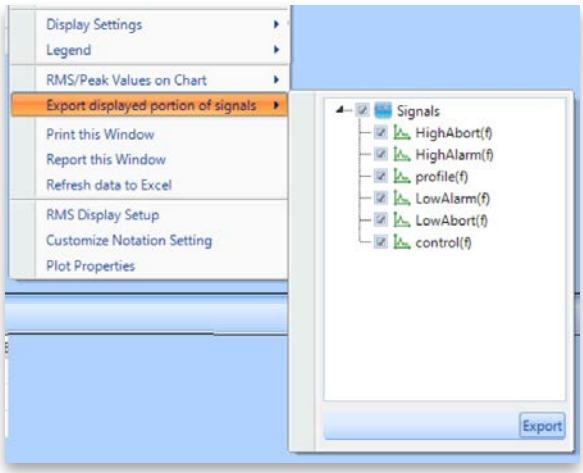
View Past Pop-up Notifications

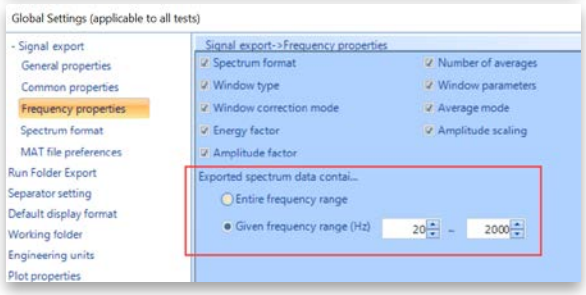
Users can now view all past pop-up notifications for a current DSA, VCS, or TDA test in the new Notification View window. This list of messages can be exported as an Excel worksheet.



Export data within specified frequency range

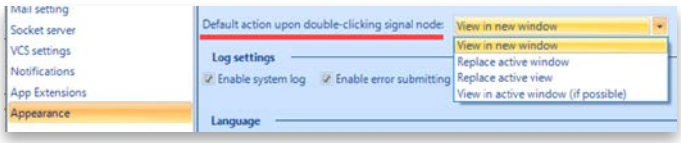
Export signal data only within a specified frequency range or only within the display range.





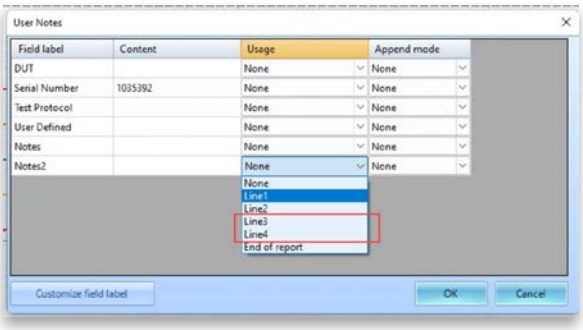
Customize double-click on signals

Users can designate the double click on a signal to perform a selectable function as shown in the following screenshot.



Add Additional Notes to Report Option

Users can now add and define several lines of text to the test report.

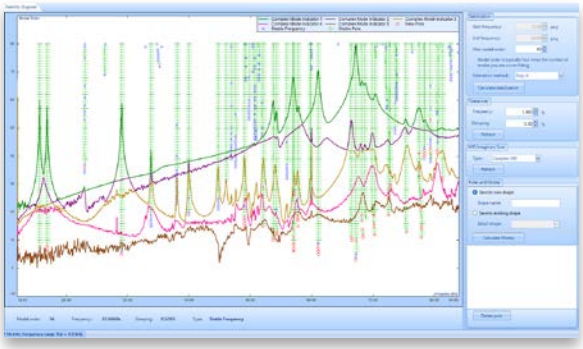


MAJOR IMPROVEMENTS

Experimental Modal Analysis

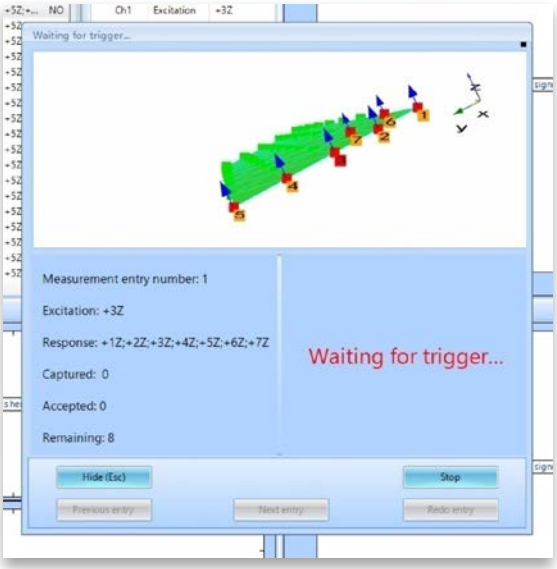
Stability Diagram Optimization

Multiple Mode Indicator Functions from multiple references assist users in identifying the global modes of the device under test. A log display further helps users to clearly observe the peaks. This provides users with guides to interpret the peak contributions of all references.



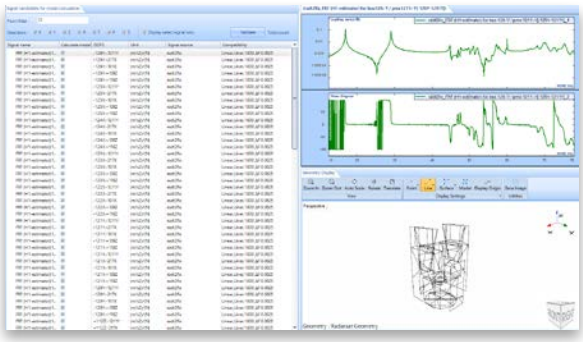
Addition of Direction Indicators to Measurement Points

The highlighted excitation and response points provide visuals of the hammer and accelerometer locations for each modal test measurement entry. The addition of highlighted direction indicators further assists users when exciting a structure with a modal hammer and mounting the accelerometer for modal measurements.



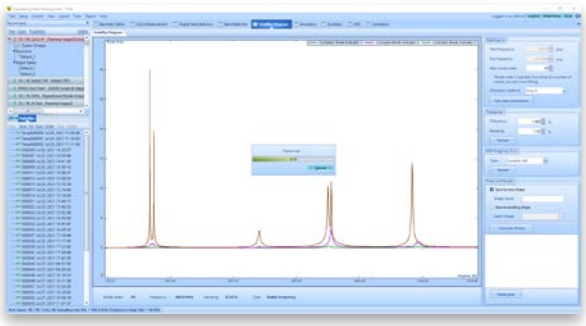
Enhancement of Modal Data Selection

The Modal Data Selection tab allows users to edit and modify the DOFs of measured FRFs. In addition, FRFs can be filtered according to the X, Y, Z directions of measurements and according to the references used for the modal test. The Point Filter Search tab allows users to search for FRFs in an interested measurement point or region.



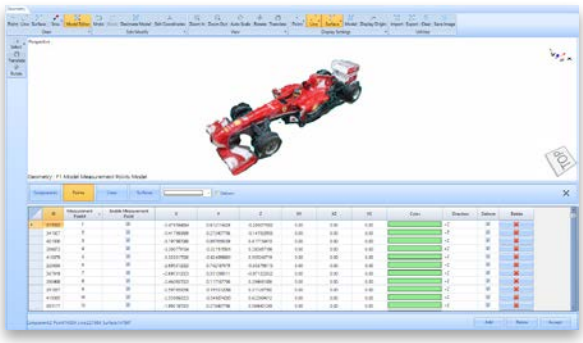
Numerical Indication for Stability Diagram Progress Bar

The numerical indication for the calculation of the stability diagram helps users track the progress of the curve-fitting stage.



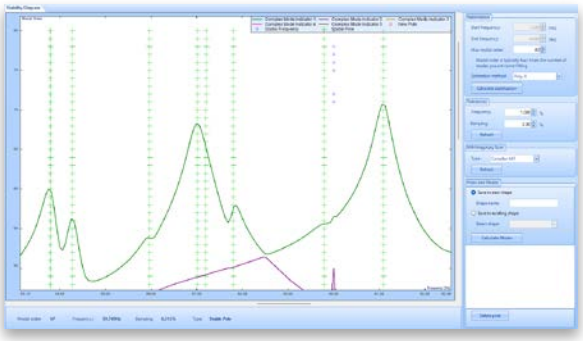
Model Editor Table Optimization

The user can copy or paste the X, Y, Z coordinates of a geometric model from an excel spreadsheet into the Model Editor table and customize various details (such as Measurement Point number, re-orientation of the axes, Point IDs, etc.).



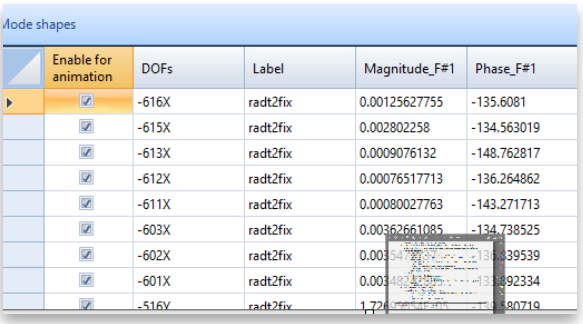
Addition of Sliding Feature in Stability Diagram

The sliding feature helps users to navigate between different modes in an interested frequency range. An example is when a user wants to choose stable poles from different modes with a similar modal order for curve-fitting among many closely spaced modes in a narrow frequency band.



Mode Shape Information Table Enhancement

The Mode Shape table is optimized to the display DOFs column for all measurement points and references. The Magnitude/Phase or Real/Imaginary information for each mode can be viewed, edited, and exported.

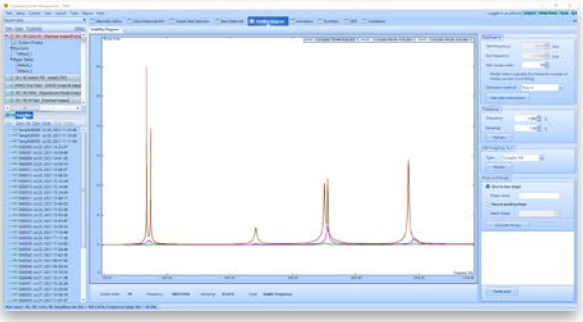


Mode shapes

Enable for animation	DOFs	Label	Magnitude_F#1	Phase_F#1
☑	-616X	radt2fix	0.00125627755	-135.6081
☑	-615X	radt2fix	0.002802258	-134.563019
☑	-613X	radt2fix	0.0009076132	-148.762817
☑	-612X	radt2fix	0.00076517713	-136.264862
☑	-611X	radt2fix	0.00080027763	-143.271713
☑	-603X	radt2fix	0.00362661085	-134.738525
☑	-602X	radt2fix	0.003	39539
☑	-601X	radt2fix	0.003	92334
☑	-516Y	radt2fix	1.72	80719

Improvement in Curve-Fitting Process

A large FRF dataset consisting of large measurement points and multi-references uses some computational time and resources to calculate a stability diagram with the default curve-fitters and parameters. This process is improved so that the user can fine-tune the parameters of the curve-fitting process before initiating the calculations.

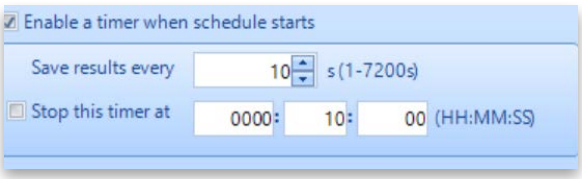


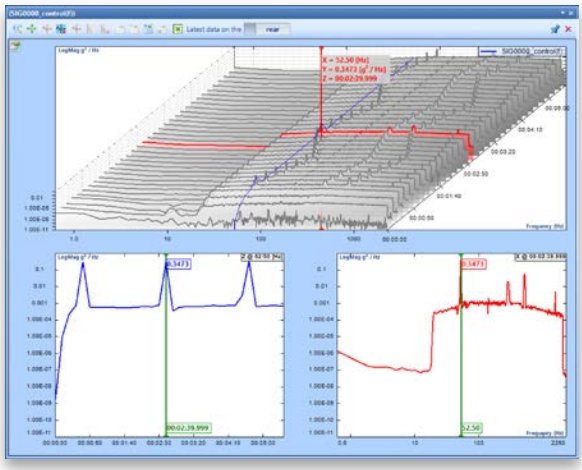
General Improvements

Improved 3D Waterfall Display

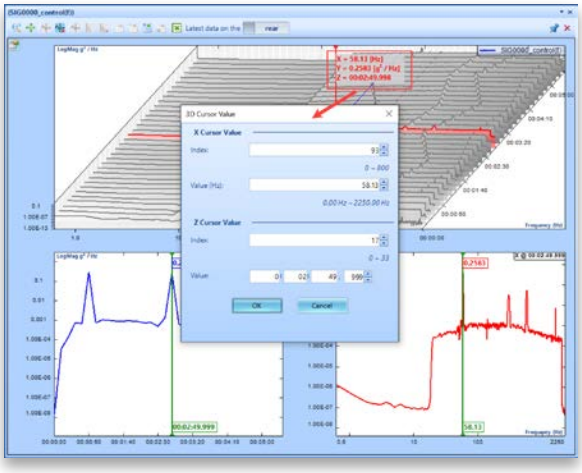
3D Waterfall Display is improved in the EDM 10.1 release.

- Synchronized display updates in 3D Plot and Slice Plots.
- Synchronized Zoom feature is introduced in 3D Plot and Slice Plots.
- Users can manually set the Z-axis range.



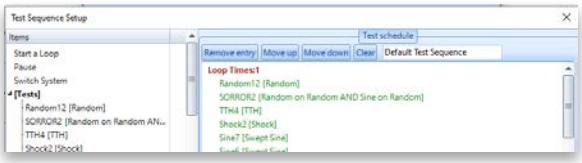


- Users can manually specify the cursor value for any axes.



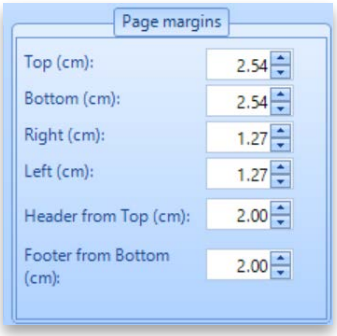
Clear in Test Sequence

The Test Sequence provides a Clear function to clear out all tests that populated the schedule by default.



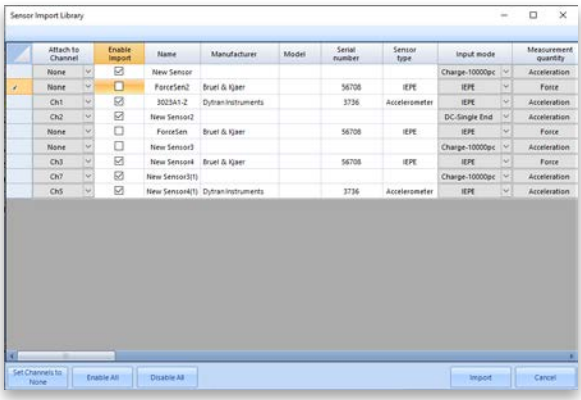
Improvements to Margins in Report

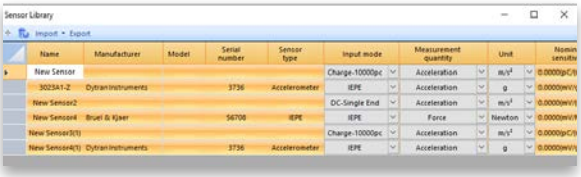
Users can set up page margins for content, header, and footer of a report template.

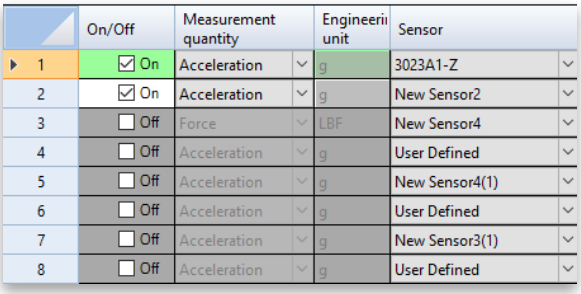


Enhanced Import of Sensor Data from Excel

An improved process for importing sensors to an Input Channel is introduced.

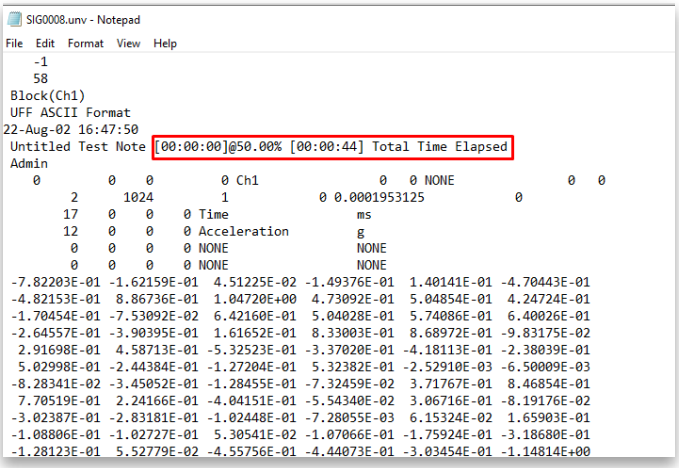


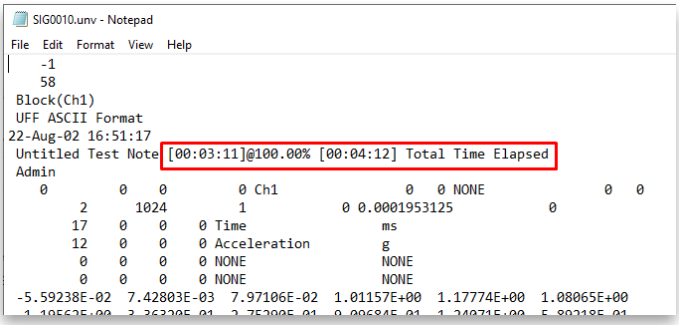




Add Time Elapsed at Full Level & Start of Test Run to UFF, UNV files

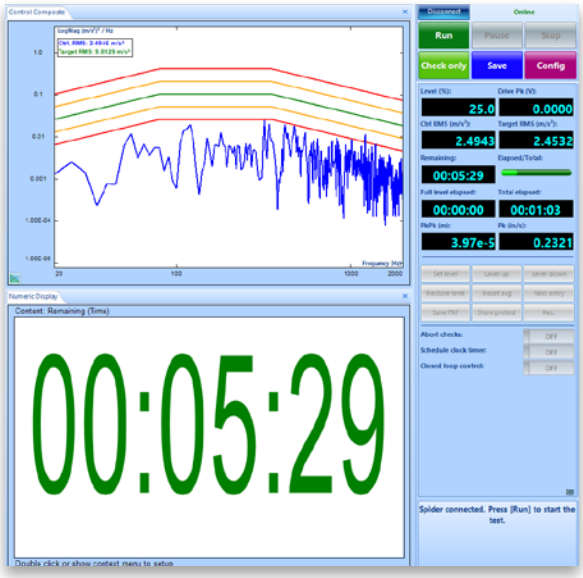
UFF and UNV files now appends the time elapsed at full level and total run time when exporting a signal.





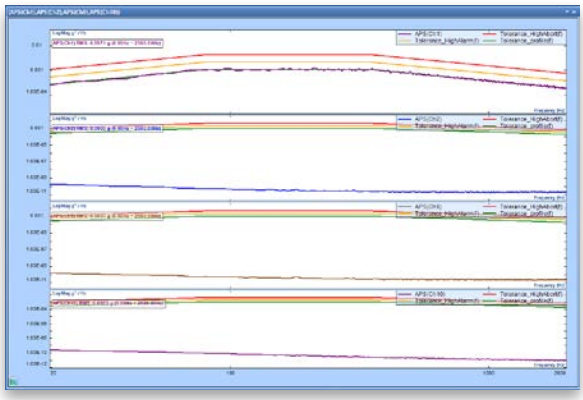
Numeric Display Improvements - Remaining Test Time

Numeric Display now displays the remaining test time.



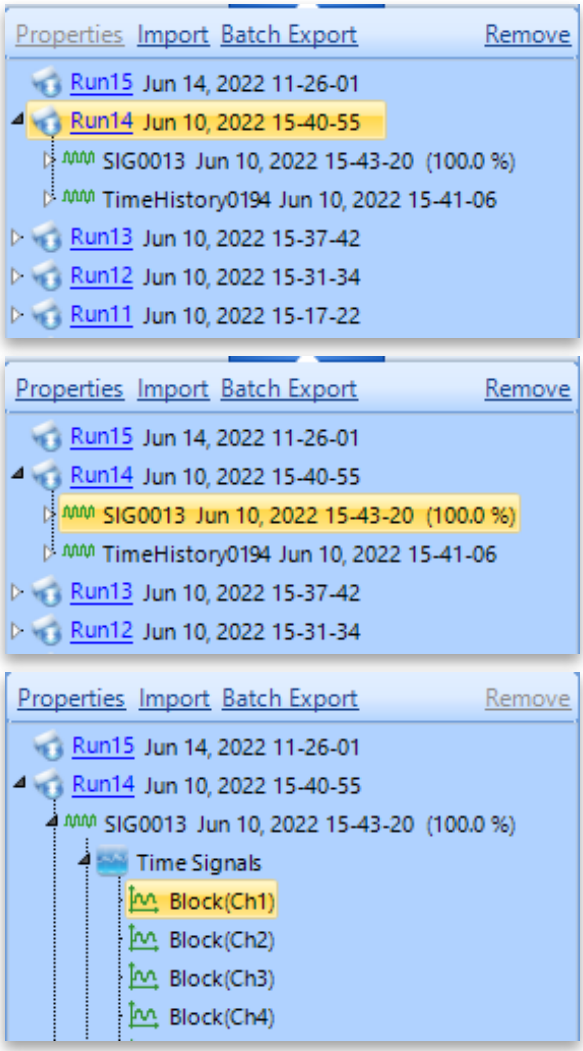
Individual Tolerance Signals for Stack Plots

Stack plot graphs can display their own tolerance signals.



Improved Run Folder Options Accessibility

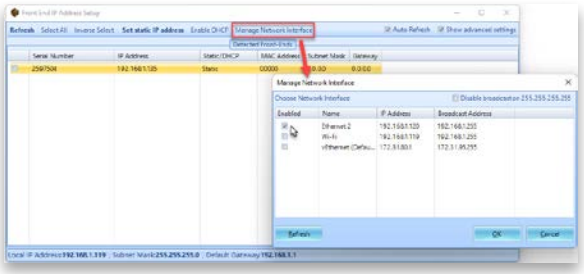
The Run Folder below Recent Tests displays commonly used options to view a Run Folder or Signal Properties, and further options to import, export and remove from view.



Selecting the Network Adapter on Front End IP Address Setup

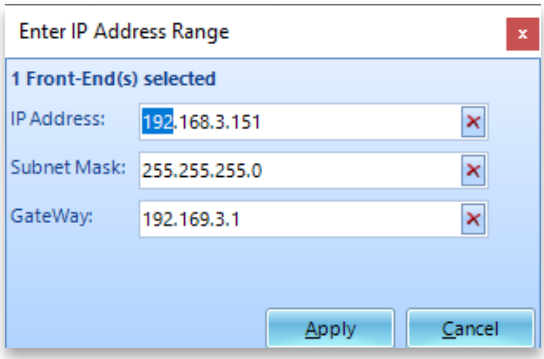
The Spider Configuration's Manage Network Interface feature to improve EDM-Spider connectivity is added to the Front-End IP Address Setup program. This streamlines the first-install Spider

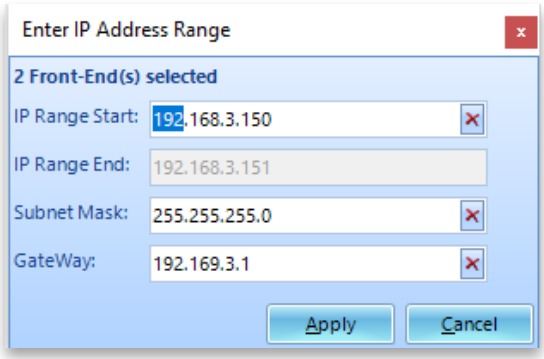
configuration by allowing users to select the network adapter on which the Spiders are available before EDM is even opened.

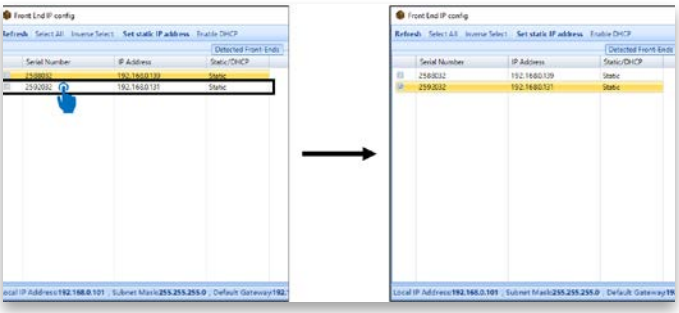


Front-End IP Address Tool Configuration Improvements

Front-End IP Configuration Tool provides an improved user interface to set up Spider device IP addresses and to select Spider devices.

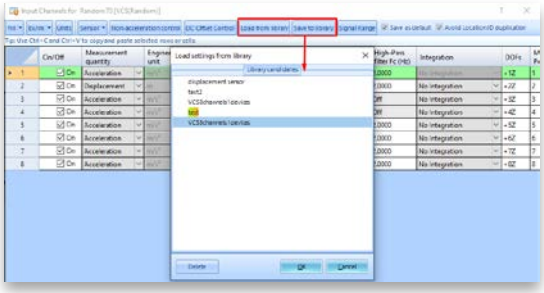


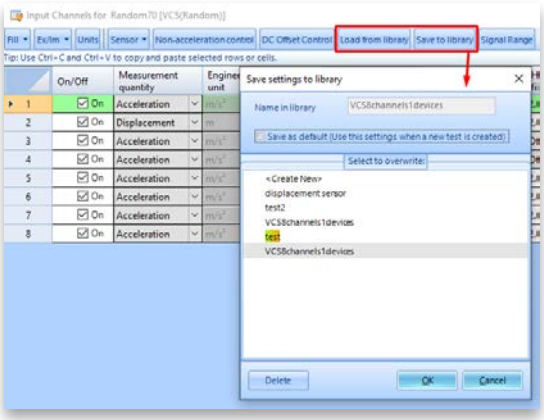


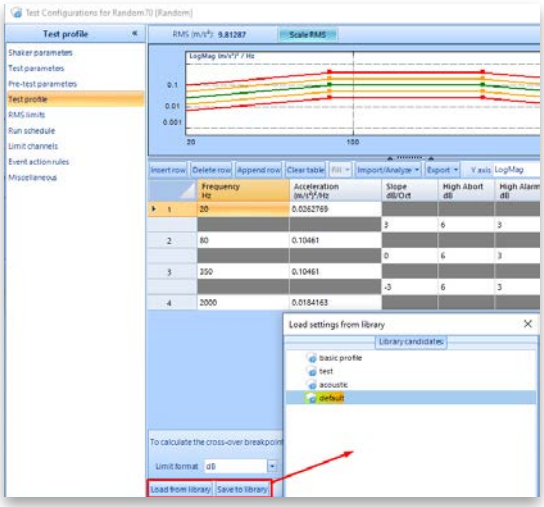


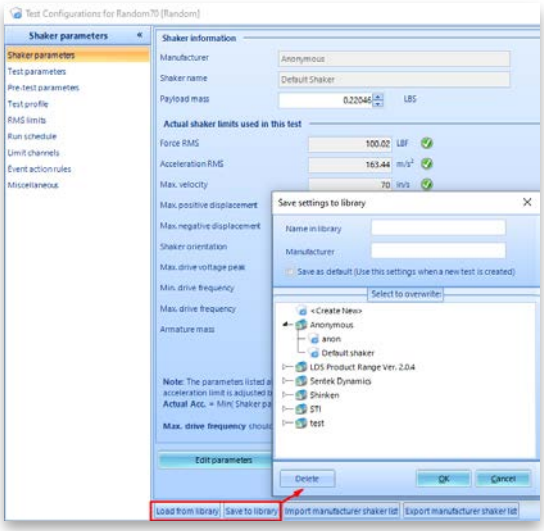
Improvements to Save/Load from Library Feature

Improved user interface to save or load from the library in EDM VCS.



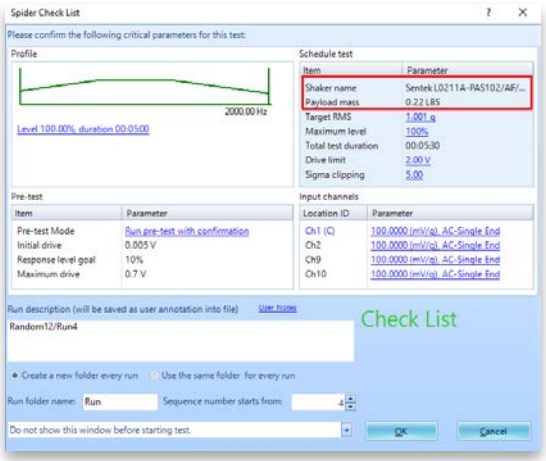






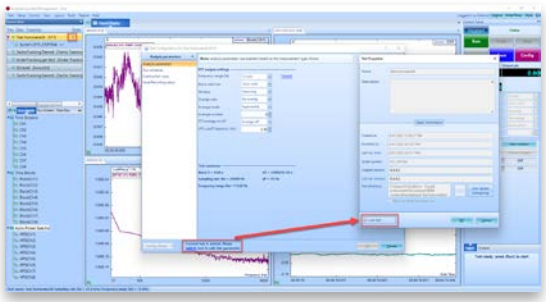
Checklist Includes Shaker Information

The test checklist displayed before a run now includes the Shaker Manufacturer, Shaker Name and Payload Mass information.



Test Locked Warning

A warning is generated if there is an attempt to change a locked test. To unlock and edit a test, select the hyperlink in the warning and unlock the test.



EDM Installation and Initial Setup Convenience

EDM 10.1 makes the user installation process as easy as possible and includes general updates and stronger default passwords to comply with newer trends in IT policy. These general improvements reduce the total number of steps required by new users to start testing with Crystal Instruments products.

SOFTWARE RELEASE HISTORY

Dates of software releases

Type	Release	Exact Version	Release Date
Release	EDM 4.2	CI 4.2.0.3	02/28/2014
Patch	EDM 4.2.0	CI 4.2.0.14	07/02/2014
Release	EDM 5.0	CI 5.0.0.2	11/27/2014
Patch	EDM 5.0.1	CI 5.0.1.3	02/27/2015
Release	EDM 5.1	CI 5.1.0.6	08/12/2015
Release	EDM 6.0	CI 6.0.0.1	05/19/2016
Patch	EDM 6.0.2	CI 6.0.2.9	08/09/2016
Release	EDM 6.1	CI 6.1.0.4	02/07/2017
Patch	EDM 6.1	CI 6.1.0.27	08/22/2017
Release	EDM 7.0	CI 7.0.0.6	02/01/2018
Patch	EDM 7.1	CI 7.1.0.7	07/19/2018
Release	EDM 8.0	CI 8.0.0.1	02/02/2019
Release	EDM 8.1	CI 8.1.0.1	11/13/2019
Release	EDM 9.0	CI 9.0.0.4	06/05/2020
Release	EDM 9.1	CI 9.1.0.0	02/03/2021
Release	EDM 10.0	CI 10.0.0.2	10/26/2021
Release	EDM 10.1	CI 10.1.0.1	09/09/2022

Type	Release	Exact Version	Release Date
Release	VDS 1.2	VDS 1.2.0.6	02/08/2019
Release	VDS 1.3	VDS 1.3.0.6	10/10/2019
Release	VDS 1.4	VDS 1.4.2.16	07/06/2020
Release	VDS 1.5	VDS 1.5.0.4	10/16/2020
Release	VDS 1.6	VDS 1.6.0.1	04/09/2021
Release	VDS 1.7	VDS 1.7.0.6	10/27/2021

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 10.0.0.x	10.0.0.x
Spider-81 (v7.x)	
EDM Testing 10.0.0.x	10.0.0.x
Spider-81B (v7.x)	
EDM Testing 10.0.0.x	10.0.0.x
Spider-80SG/SGi	
EDM Testing 10.0.0.x	10.0.0.x
Spider-20HE/20i	
EDM Testing 10.0.0.x	10.0.0.x

Product and Software Version	Firmware Versions
CoCo-80	
EDM 6.0.2.x	4.0.x
CoCo-70X	
EDM Testing 10.1.0.x (EDM CoCo for DSA)	2.0.x or above
CoCo-80X/90X	
EDM Testing 10.1.0.x (EDM CoCo for DSA)	2.0.x or above

Crystal Instruments Corporation
2090 Duane Avenue
Santa Clara, CA 95054 (USA)

Phone: +1 (408) 986-8880
Fax: +1 (408) 834-7818

Crystal Instruments Lab
1548A Roger Dale Carter Drive
Kannapolis, NC 28081 (USA)

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