

EDM 11.1

Engineering Data Management Software Release Notes

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



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RELEASE HIGHLIGHTS Shutdown Protection System

CI Spider systems featuring a digital input and output (DIO) interface along with EDM VCS software compatibility can run as a shutdown protection system. The main purpose of this function is to act as an independent hardware system to protect the shaker system. It can send out a shutdown digital output signal in less than 10 milliseconds based on various signal trigger conditions. It also includes various tracking filters that are identically implemented in the Sine controller.



Shutdown protection using unfiltered data

Uses time data acquired from sensors to detect if a threshold is exceeded and sends a digital output signal. It is typically useful in scenarios where the harmonics of the driving frequency potentially causes the overall vibration amplitudes to exceed acceptable limits.

The **reaction time** between the first time-domain data sample exceeding the threshold to the time of sending the digital output was determined to be about 7 ms using this approach for the shutdown system.



The reaction time is extremely quick and is less than 10 ms for any channel. This approach is extremely advantageous when the overall vibration or the vibration peak needs to be limited.

Shutdown protection using filtered data

For applications involving a comparison of amplitudes for only the driving frequency, a tracking filter is required to filter all other frequencies around the driving frequency.

Proportional Filter

The bandwidth of the Proportional Tracking Filter is proportional to the driving frequency. It is the fastest filter at any frequency range and has operational capabilities down to drive frequencies of 1 Hz with minimal delays.

A major advantage of the Proportional Filter is very high attenuation at harmonic frequencies. Considering that the harmonic frequencies are the most dominant frequencies during Sine vibration testing on a shaker, the Proportional Filter is the most ideal filter type to yield quick and accurate results.



Figure 1. Frequency response of the 100% Proportional Filter with a center frequency of 100 Hz



Figure 2. Time delay between when a square wave with a 100 Hz frequency exceeded a frequency-based limit (green cursor) and when the Spider-80Xi's digital output was triggered (blue cursor).

Fixed Bandwidth IIR Filter

The primary advantage of a Fixed Bandwidth IIR Filter is that the bandwidth is constant at all frequencies. If resonant frequencies of the DUT is a major concern, it is ideal to use the Fixed Band IIR Filter instead of the Proportional Filter because a smaller bandwidth at high frequencies can significantly attenuate the response due to resonant frequencies. As in the case of any IIR Filters, the reaction time is inversely proportional to the bandwidth of the filter.



Figure 3. Frequency response of the 2nd order 10 Hz fixed bandwidth IIR Filter with a center frequency of 100 Hz

The 2nd order filter has a reaction time around 80 ms and the 4th order filter has a reaction time around 130 ms.

Fixed Bandwidth IIR + Proportional Filter

The Fixed Bandwidth + Proportional Filter is designed so that the harmonics attenuates significantly while keeping a fixed bandwidth. Thus, the filter is extremely effective even down to 1 Hz in effectively eliminating the harmonics while keeping a fixed band at high frequencies. The reaction time is within milliseconds which makes it ideal for all applications.



Figure 4. Frequency response of the 100% Proportional + 2nd order 10 Hz Fixed Bandwidth IIR Filter with a center frequency of 100 Hz

Users can observe that the filter preserves high attenuation at harmonic frequencies while keeping a fixed bandwidth at high frequencies.

Driving Frequency	Reaction Time
10 Hz	142 ms
20 Hz	104 ms
50 Hz	92 ms
100 Hz	86 ms

Reaction time using a 100% Proportional + 2nd order IIR 10 Hz Fixed Bandwidth Filter The Fixed Bandwidth IIR + Proportional Filter resolves the Fixed Band IIR Filter issues by working effectively down to 1 Hz without increasing the reaction time at high frequencies.

Advantages of Fixed Bandwidth IIR + Proportional Filter

The Fixed Band IIR + Proportional Filter is ideal for any application with a sweep range down to low frequencies such as 1 Hz and a narrow passband is required at high frequencies.

If a Fixed Band IIR Filter is used, the bandwidth selection must be very small which makes the reaction time a matter of seconds. However, in the case of a Fixed Band IIR + Proportional Filter, the reaction time is very small and requires milliseconds even for very low driving frequencies while the reaction time is the same as the Fixed Band IIR Filter at high frequencies.

Thus, the Fixed Bandwidth + Proportional Filter works effectively where traditional analog tracking filters fail to work.

Filter Type	Reaction Time	Harmonic Attenuation	Bandwidth
Proportional	Excellent	Excellent	Excellent at low frequencies, Acceptable at high frequencies
Fixed Bandwidth IIR	Good	Not ideal at low frequencies	Not ideal at low frequencies, Excellent at high frequencies
Proportional + Fixed Bandwidth IIR	Good	Excellent	Excellent

Filter performance comparison
Reaction

In conclusion, assessing the endurance of a device through shakerinduced vibration is a widely used technique that poses potential damage to the Device Under Test. The implementation of a secondary shutdown protection system is crucial to mitigate the risk of substantial damage.

The Proportional Filter is the preferred method of implementation due to its very short reaction times.

In scenarios where a narrow band is required at frequencies higher than 100 Hz while operating effectively at 10 Hz or lower, the Crystal Instruments Fixed Band + Proportional Filter provides optimal functionality as a shutdown protection system.

Sigma Clipping is Improved by Intelligent Clipping Algorithm

Sigma Clipping limits the peaks of the drive signal distribution based on a factor of sigma. Starting from the 11.1 release, it is improved by an Intelligent Clipping algorithm so that the loss in dynamic range of the control is minimal. The algorithm also massively reduces (-40 dB) the amplitude of high frequency content to the drive signal. This comparison is with respect to the drive clipping algorithm used in our older implementation.

Improved Dynamic Range

A dynamic range of a controller is a measure of the maximum and minimum value that can be controlled simultaneously. To expand further, consider Figure 1 below. With the intelligent clipping method, the dynamic range of the drive signal (measured by the presence of a notch between 300 Hz - 700 Hz), is 30 dB better when compared to the drive signal with a sigma clipping value of 3 using the old method.



Figure 5. Drive Signals Auto Power Spectrum

Reduction of high frequency component to the signal

The consequences of limiting or hard clipping the peak values of signal are the addition of high frequency components to the signal as shown in Figure 2. This is a huge drawback considering the resonance frequencies of the DUT could fall in these high frequency contents and potentially damage the DUT. The intelligent clipping algorithm reduces the amplitude of high frequency content of the drive signal by 40 dB compared to the old algorithm.



Figure 6. Drive Signal Auto Power Spectra to show high frequency components.

Signal Viewer

Signal Viewer is a lightweight standalone software that displays signals acquired by Crystal Instruments' products. It is an .exe file and does not require installation. Simply run the file, and it provides the same user interface as EDM, along with the signal display and report builder features found in EDM.

Import and Display Signals

A main feature of Signal Viewer is to display signal data generated by VCS and other EDM software.

Signal Viewer provides users with a default view of the left side and the Data Files panel. Users can click buttons to open and remove files. Atfx files can also be imported here:

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The files will open in the panel and can be expanded to display the internal signals, including time and frequency signals. Users can display these signals in the open chart window by dragging the signals into the view. Alternatively, right-click the chart window and select the "Add/Remove Signal" option:



Users can also open new tabs and name them accordingly to organize displays:

📷 🎫 Time Signals	🔢 Frequency Signals
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Filter Data Files

Signal Viewer now includes a new filter for Data Files.

Click the Filter button in the top right corner of the Data Files panel to open the Filter Panel:

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Filters		Clear all
Date from	11/2/2023	-
Date to	11/2/2023	-
Signal Type	Time History	
Search		
₩ SIG0001	7/12/2023 2:02:42 PM	
₩ SIG0003	7/12/2023 2:03:12 PM	
₩ SIG0005	7/12/2023 2:03:40 PM	
₩ SIG0002	9/21/2023 12:23:26 PM	

Users can filter the signal files according to a Start Date and End Date. There are also options to filter the Time and Frequency signals by Signal Type and a Search option.

The features allow users to easily filter results for search and display:



Export Data Files

Users can also export data files for external use.

Inside the Data Files panel, right click on any Signal file and select the "Export" option. Several file formats are available to export the signal data:

ata files	4
Open • Remove Remo	ove All 🛛 🖓
D MM SIG0001 7/12/202 D MM SIG0003 7/12/202 D MM SIG0005 7/12/202	23 2:02:42 PM 23 2:03:12 PM 23 2:03:40 PM
Minimum Signals M	Signal Details Export Open in File Explorer Remove

Executing OMA Using Time Stamp Technology on Multiple CoCo Devices

The handheld CoCo conveniently and accurately records measurements in the field. Its rugged system features a compact display for quick, easy, and accurate data recording and analysis. This powerful hardware system combined with patented GPS time synchronization (time accuracy of 100 ns) technology and Operational Modal Analysis can be used to study the dynamic characteristics of large structures, such as bridges and buildings. The testing plans and the 3D model geometry created in EDM Modal can be transferred onto multiple CoCo devices to acquire the ambient vibration responses. The GPS time stamp technology will assist in synchronizing the measurements carried out simultaneously on the various handheld systems. The EDM Modal software will post-process and analyze the data to provide the modal parameters of the test structure. This robust workflow provides a seamless integration of the operational modal analysis process.



Data File Browser

This is an independent application developed at Crystal Instruments to help users select saved recordings and signal files from their PC. The application is available by default when EDM / PA v11.1 is installed, and the user can find it while importing a recording or signal as a source file. It indexes the file system for all recordings and saved signals to display it on the User Interface as shown in the following figure. Basic information such as name, time, and date of the signal saved, etc. is displayed when the cursor is hovered over a recording.

Enter keywords to search			Search	h
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	Recording path	Ci/Users\PrithviKanugovi\Documents\EDM\Spider_D	SA\test46\Run2 11-2-2023 3-26-04 PM\SiG0001.a	t)
	Recording type	ASAM ODS Format - XML		
	Saved by EDM version	11.0.9.1		
	4			¢.

The key pain point addressed with this application is to prevent users from searching through their file directory for a recording. Instead, users can simply locate the recording in the UI as shown in the preceding figure and drag it into their source files list.

Spider runs as Power Stabilizer System





New EDM CoCo Mode

The user interface is redesigned to function more intuitively.



Control Multiple Units

The software now provides a straight-forward method to switch control among CoCo and GRS devices.



Batch Operations

It can become tedious to upload configurations and download data with multiple units deployed. Batch operations is a robust solution that allows users to upload and download files simultaneously from multiple devices, streamlining the data management process.

elect	CoCo name	Serial number	IP address(if detected)	Detection status	Download signal data to CoCo Host
0	CoCo-70x(2.2.1)	4373472		Not detected	Download
	CoCo-80x	4200640		Not detected	Download
	CoCo-80x	4183040	192.168.0.102	Detected	Download

Time Stamped Signals

GPS time-stamping technology is introduced to the CoCo systems. When the time accuracy of a sampling clock demands millisecond resolution, the digital input paths of the data acquisition system, especially its ADC, must be designed with control from a more accurate time base, such as GPS or IEEE 1588 PTP (precision time protocol). This newly implemented time stamping technology allows users to synchronize measurements from separate CoCos to perform spectral analysis, among other signal processing functions. Users can view time stamped data on EDM CoCo DSA and synchronize multiple time stamped datasets using Post Analyzer.



Before Synchronization:







File Viewer

The new file viewer design provides a cleaner interface to locate and manage files on the CoCo and GRS.

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Encryption

Users can encrypt SD cards with EDM software.

SD Card Encryption Setti	ngs X
Drive name :	E:\
Memory :	116 GB / 116
Encryption status :	Disabled
Enable En	cryption Format drive Cancel

Arbitrary Waveform Editor

Users can now create or edit waveforms with the CoCo-DSA software. Easily upload waveforms to the CoCo and generate a custom signal through the output channel.

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	import file	Browse		
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Sensor Library

A new sensor library allows users to download and upload sensor characteristics to the CoCo.

	Name	Manufacturer	Nodel	Description	Sensor SN	Sensor type	mode		Quantity		Unit		Sensitivity
	56150r								Acceleration		en/s ²		0.0000(mV/(m/s ²
1	Template_27_Microphone_BuiltinPreamplifier	PCB Piezotronics	378		147106		IEPE	14	Sound Pressure		Pa	4	12.1663(mW/Pa)
. 1	template_27_Microphone_BuiltinPreamplifier	PC8 Piezotronics	378		152720		IEPE	Y	Sound Pressure	¥	Pa	Y	12.2793(mW/PA)
1	Template_27_Microphone_BuiltinPreamplifier	PCB Piezotromics	130		36518		IEPE		Sound Pressure		Pa		36.4161(mW/P4)
1	Template_27_Microphone_BuiltinPreamplifier	PCB Piezotronics	130		35003		IEPE		Sound Pressure		Pa.		40.0047(mW/Pa)

New Blade Fatigue Testing Features

Blade Fatigue Testing was initially introduced in the EDM 10.0 release. Since then, Crystal Instruments has received feedback from several users recommending improvements. Our team attentively reviewed their suggestions and implemented the following enhancements.

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Configure Control Channel for Sweep and Dwell in One Place Configure separate control channels for sweep and dwell within the same input channel table. Eliminates the need for manual updates before each sweep or dwell operation.

De loput	Channels	for BFT_8c	S (VCS/BFT)											3
Input Cha	machs 5	ensors (a · Read all TE	00 Preferences		import • Exp	ert •							
in Use Ch	ri+C and C	tel+V to cop	y and pacts cale	thed rows or cells.		Second Sec		1000000000	-			S201	_	Unite comments
	Actions	On Off	Lecition ID	Measurement quantify		Engineering unit.	Server	Max. sensor sange	Sensitivity	Sweep channel type	Dwel channel type	Input mode		High-pais filter Fc (Hz)
1		20	Ch1	Acceleration	Y		N/A	20 (V)	100 (mWgi	Menitor ~	Manitar	AC-Single End		05
2	- *	10	n Ch29UT	Displacement	9	inn:	N/A	20.00	10 (mi//mm)	Menitor ~	Costrol	AC-Single Ind	4	05
3	· · ·	20	· ChSAm	Acceleration	-	÷9	N'A	20(1)	10 mil/g)	Control ~	Monitor	AC-Single Ind	4	03
4	- •	00	f CNI	Detrainetteren			N/A	20.00	100 (mWgi	Ulandra	Harabas	- the straight find	1	0.5
5		00	1 CN5	Acceleration .	10	10	N/A	20(7)	100 (mV/g:	Martin -	(Acrolle)	AC-Single Ind.	100	05
6	- +		f Ch6	Accemation		w	NA	23 (1)	100 (mWigi	- United	Monitol	AC-Seglebal	1.50	05
. 7	- •	00	f Ch7	Accementation	9	-	N/A	20.00	100 (mWg)	Uppelar	Dispana	- All Geogle Test	10	0.5
- 8	- *	00	t CNI	Accession to the	1		N/A	20 (7)	100 LmWg	Matotice of	(Accession)	AC Gegle Ind.	1	05

Configure Profile for Sweep and Dwell in One Place

Preconfigure distinct profiles for sweep and dwell to eliminate the need for manual updates each time before performing either sweep or dwell.



Manual Search, Automatic Search, and Adjust Dwell Parameters during test

Dwell frequency, target peak, and target phase can be adjusted before initiating the dwell and tracking process, as the resonance identified during the sweep may not be accurate enough, necessitating manual adjustments.

Additionally, this feature allows users to manually search for resonance if the automatic search during dwelling does not meet expectations.

Users can update certain dwell parameters in the Advanced section while a test is running in case the original schedule does not align with the test requirements after initiation.

arget peak					11/11/2023	5.58:00 A
Format:	Absolute Value				-	
Target PkPk (mm):	123	Apply			Divel	
hase control						
Target phase:	-37.26	Apply			Abort checks:	OFF
Phase clope:	e up down				Schedule clock timer:	OFF
idvanced				_	Closed loop control:	ON
Dwell time:	0013: 42:	19 (HH:MM-55)	Apply		Freque	ncy (Hz):
Dwell cycles#	10,000,000.00	Apply			A 4	
Tracking speed (Oct/Min):	05	Apply				201.20
Compression rate (d8/s):	20	Apply		×		201.38
	1.000			51		

Readout for BFT

A swift and customized numerical display presents essential test status information.



Dwell Table

Keeps records of necessary information for each dwelling frequency. Each record can be saved periodically or when a resonance frequency changes. The table can be exported to a file.



4-Shaker MIMO Random Control

MIMO Random now includes 4x4 (four shaker configuration) control.



NEW FEATURES

New Features in EDM-VCS Vibration Control Software More User Notes in Checklist and Reports

User Notes are more prominently featured in the Checklist (before running a test) and reporting feature. Additionally, the Run Folder name can be set according to the input User Notes values.

User Notes Set	tings			×			
User notes —							
Insert	Delete Append	Move	up Mov	e down			
Field la	abel In run f	folder nam	e?				
▶ 1 UUT							
2 SN		1					
3 Avis							
JAXIS		ы£.					
		0	к	Cancel			
Spider Check List	ini al anno 100 anno			? ×			
Profile	inical parameters for this test	Schedule test					
1		Item		Parameter			
Level 0.00dB, duration 00:0	2000.00 Hz	Shaker name Payload mass Target RMS Maximum level Total test durati Drive limit Sigma clipping	on	Sentek Dynamics L 0.22 lb <u>1.001 q</u> <u>0.00dB</u> 00:05:30 <u>5.00 V</u> <u>5.00</u>			
Pre-test		Input channels					
Item Pre-test mode Initial drive Response level goal Maximum drive	Parameter <u>Run pre-test with confirmation</u> 0.005 V -20.00d8 0.7 V	Location ID Ch1 (C) Ch2 Ch9 Ch10	Parameter 100.0000 (mV/q) 100.0000 (mV/q) 100.0000 (mV/q) 100.0000 (mV/q) 100.0000 (mV/q)	, AC-Single End , AC-Single End , AC-Single End , AC-Single End			
User notes		Run description					
Field label UUT SN Axis	Content Steering Wheel SN12345 X	Random/SN1234	15_X				
Test directory: C:\Users\Sc • Create a new folder every Run folder name: SN12345_X Show this window and wait f	cott\Documents\EDM\Spider_VCS\Random run Use the same folder for every run CSequence number or user confirmation.	r starts from:	Choose	heck list			

Burst Mode in ROR

In VCS SORROR, users can modify RoR and SoR profiles. Previously, there was a burst mode implemented for SoR profile, where the tones would start and stop rapidly based on user settings.

Now, RoR Profile also has this feature. Simply open Config > RoR profile, and scroll toward the bottom to the "Burst (gunfire)" section:

-	112		LET ME CHARTER AND	
RoR profile	Oemand ((g)*/Hz)	0.025		
haker parameters	High-alarm (dB)	3		
fest parameters	High-abort (dß)	6		
Pre-test parameters Test profile	Ramping rate (dB/s)	12		
UMS limits	Sweep parameters			
lun schedule	Low frequency (Hz)	53	Definition	
imit channels vent actions	High frequency (Hz)	197		
loR profile	Start frequency (Hz)	53		
ioR profile	Sweep type	Log (Oct/Min)		
ile directory	Initial direction	Up .		
lave/Recording setup	Sweep count	0		
Output settings	Extend schedule duration unt	il narrowband sweeping is	completed	
	Sweeprate			
	Number of sweeps.	2 per 00000	031 55 0HHAMAS0	
	Sweep rate (Oct/Min)	1		
	Summation technique at each t	frequency		
	Sum all narrowbands and br	oadband profile together		
	Use the largest value of name	owband or broadband prof	le	
	Burst (gunfire)			
	Burst this tone on and off rapi	dy		
	Time on (s)	to + Time off (s)	0.00	
Confin Denti +				OK Exercit

New Features in MIMO/MESA Vibration Control Software

CAN Bus support for MIMO and MESA control types

CAN Bus extension is supported in all MIMO and MESA control types. This feature allows testing for automotive applications at a new level.



New Features in EDM Dynamic Signal Analysis Measure histogram, crest factor and Kurtosis

EDM DSA software can now generate histograms from time blocks. Additionally, crest factors and Kurtosis can be derived histograms and displayed in EDM.

Create Histogram Signals			×
PC Histogram signals are computed of	on PC by using synchroniz	ed <u>Time Block signals</u>	
Select All - Ø Ch1 - Ø Ch2 - Ø Ch3 - Ø Ch4 - Ø Ch5 - Ø Ch6 - Ø Ch8	 ✓ Histogram ✓ Kurtosis ✓ Crest Factor >> << 	Histogram(Ch1) Histogram(Ch2) Histogram(Ch3) Histogram(Ch4) Histogram(Ch6) Histogram(Ch6) Histogram(Ch6) CrestFactor(Ch2) CrestFactor(Ch2) CrestFactor(Ch3) CrestFactor(Ch5) CrestFactor(Ch6) CrestFactor(Ch6)	ignals
		Kurtosis(Ch2)	-
			<u>O</u> K <u>C</u> ancel

Histograms:

EDM DSA can now plot a live signal of Histogram from all input channels. It gives the user control over the max/min range and number of bins. This is computed on the PC and not on the board, hence does not utilize any DSP resources.



Crest Factor and Kurtosis Time histories:

Similar to Histograms, Crest Factor and Kurtosis from each block is measured on the PC and is displayed as a live signal. Users can view time histories.



Spiders automatically run a test in Black Box mode after powering on

All Spiders are now designed to automatically execute a test upon powering on, if in Black Box mode. The test to be executed is defined in EDM and uploaded to the Spider front-end.



Extend recording duration when multiple triggers are received, or multiple limits are exceeded.

Numerous events can be linked to Start Recording commands. In situations where a recording is in progress, the Spider can be configured to ignore upcoming triggers/limits or instead extend the recording duration.

Save/Recording setup	Note: Saved signals, consist of one block of time and frequency data. These signals are saved to the PC and can be viewed instantly
Analysis parameters Run schedule	Recorded signals: consist of continuous time data, either processed or new, captured during a recording. These recordings are stored the Spider's internal memory and must be downloaded before viewing. The signals to be saved or recorded can be selected from the "Measured Signals" setup.
Event actions File directory	Save signals Record time streams
Save/Recording setup	
	Stop recording under the selected event
	III When digital input is received from Input #1 +
	When limit exceeded (Limits of Spectrum or Time Block must be configured in setup first)
	When time status exceeds the limit (Limits of Time Stream must be configured in setup first)
	💯 Below low alarm 💯 Below low abort 🗭 Exceeds high alarm 💯 Exceeds high abort
	Recording options
	Record duration: 0000: 01: 00 (HH:MM:SQ (Set 00:00:00 to record until stopped by user or system)
	Start Recording events during Recording Extend the recording duration Ignore © Enable circular recording When using circular recording, the number of channels being recorded must be a power of 2. • Recording size <u>Bootting</u> Mg © Recording length <u>Bootting</u> Section (Section
	Recording destinations
	Destination for raw time stream signals. Record to Front-End internal storage
	Destination for processed time signals (Peak/RMS/RPM) PC and front end internal storage When recorded to PC, generates file every day.
	File options
	Auto download data at the end of each test, and convert to affs 💽 format.
	Cocate and expand the recorded data after download
	Note 1: When there is already a file with the same name in the folder, a number will be appended to the filename.
	Note2: Signals are recorded to the Spider internal storage.

Tripartite Response Spectrum

Display Tripartite Response Spectrum of acceleration, velocity, and displacement.





DSA - SRS Statistic Window Improved

The DSA SRS statistic window now includes a tolerance tab for MIL STD 810 calculations and analysis. This feature calculates the percentage of which a measured SRS is within the abort and alarm reference limits as well as the degree to which it exceeds the reference profile.



The percentage calculation can be based on the entire frequency range or on a custom range. Right clicking the signal table allows users to select certain signals of interest. Multiple signals may be displayed on top of the reference profile.

New Features in Post Analyzer PA -SRS Statistic & tolerance window

SRS statistic and tolerance window has now been added to Post Analyzer SRS test. The SRS tolerance window is a feature that allows the analysis of an SRS signal based on the MIL STD 810 proc III. This feature calculates the percentage of which a measured SRS is within the abort and alarm reference limits as well as the degree to which it exceeds the reference profile.



The percentage calculation can be based on the entire frequency range or on a custom range. Right clicking the signal table allows users to select certain signals of interest. Multiple signals may be displayed on top of the reference profile.

Min / Max Tolerance					
Evaluate tolerances across	all frequencies	00	00000 H-		
Calculate percentages	by point cou	nt			
Configure signals		745	31 24		
Name	Exceed profile	Within Alarm	Within Abort	NegSR5(Ch1)	11 181
NegSR5(Ch2)	0.00 %	0.00 %	0.00 %	MaxiSRS(Ch1)	13
MaxiSR5(Ch2)	47.37 %	10.53 %	10.53 %	NegSRS(Ch2)	

New General Features

Support 1V range on Spider-80SG/80SGi/80Gi in all EDM Applications

	Actions	On/Off	Location ID	Measurement quantity		Engineering unit	Sensitivity	Input mode	Input range
1		🛃 On	Ch1	Voltage	\sim		1000 (mV/V)	DC-Single End 🗸 🗸	Auto ~
2		🛃 On	Ch2	Voltage	\sim		1000 (mV/V)	DC-Single End 🗸	Auto ~
3		🖸 On	Ch3	Voltage	×		1000 (mV/V)	DC-Single End 🗸 🗸	Auto 🗸
- 4		🛃 On	Ch4	Voltage	v		1000 (mV/V)	DC-Single End 🗸 🗠	Auto ~
5		🛃 On	Ch5	Voltage	v		1000 (mV/V)	DC-Single End 🛛 🗠	Auto ~
6		🖸 On	Ch6	Voltage	v		1000 (mV/V)	DC-Single End 🛛 🗠	Auto ~
7		🖸 On	Ch7	Voltage	v		1000 (mV/V)	DC-Single End 🛛 🗸	Auto 🗸
8		🖸 On	Ch8	Voltage	Y		1000 (mV/V)	DC-Single End 🛛 🗠	Auto 🗠
19		🖸 On	Ch9	Strain	v		N/A	DC-Differential ~	10mV ~
10		🖸 On	Ch10	Strain	v		N/A	DC-Differential	10V
11		🖸 On	Ch11	Strain	v		N/A	DC-Differential	100mV 3
12		🕑 On	Ch12	Strain	Y		N/A	DC-Differential 🗸	10mV
13		🕑 On	Ch13	Strain	v	με	N/A	DC-Differential 🗸	10mV ~
14	*	🔽 On	Ch14	Strain	v	με	N/A	DC-Differential 🗠	10mV ~
15		🕑 On	Ch15	Strain	v	με	N/A	DC-Differential 🗸	10mV ~
16		🖸 On	Ch16	Strain	¥	με	N/A	DC-Differential	10mV 🗸

MAJOR IMPROVEMENTS

EDM Vibration Control Software Sine Oscillator supports up to 512 channels



Test Profile Tolerance editing improvement

Improved usability features for bulk editing the breakpoint and tolerance values for a given **Test Profile**, applied in Random, Sine and SRS Synthesis test types. Use right-click menu options such as "Copy Breakpoints" / "Paste Breakpoints" or "Copy Column" / "Paste Column", as well as simplified CSV import/export flows.



Report Builder improvements

Report Builder provides direct options to configure **Title** and **User Notes** settings, as well as **Measurement Status** entries within testing results. Reports can be generated directly from the Report Options window.

Report Options		7	×
Custom templates System templates Report sett	ngs		
Templates My Report	Create Revame Delete Import Export Reset defaults		
Report builder Logo File name Page Header &	footer Graphs		
Search report item	Edit Duplicate Remove Disable Move up Move down Clear all		
Internation User rote Sensit such advances	And exclam Lear notes Learbarg results Composite display Rais Internation Anning Test configuration Lear parameters Import Jammés Portice thorises Desting Splite system setting Channel calibration		

Report, Report Builder (all app modes) to read in run log (origlog) from file system:

After Signal Viewer was designed, it was decided to bring more testing and run information over through the atfx files. This includes the run log, which is taken directly from the run log in VCS while a test is running.

This led to some issues, however, since the run log can become very large for long runs.

Instead, the idea was born to simply take along the ".origlog" file with the atfx file, and the log can be read separately from there.

The best example for this is in Signal Viewer. When creating a report in Signal Viewer for a specific signal file, since the run log is separate, it must be chosen separately by the user:

		Report builder preview
My Report C:\Users\MCarroll\Do 15_50_07_647 fx / .dat): anal: SIG TEST.atfx origlog): ile: 2-2-2023 2-33-22	• Browse .pdf	Title section (SIG TEST) User notes (SIG TEST) Testing results (SIG TEST) Composite display Channel status Active windows Active tab Run information (2-2-2023 2-33-22 PM) Run log Test configuration (SIG TEST) Test parameters Input channels Profile Run schedule
	My Report C:\Users\MCarroll\Do 15_50_07_647 ffx / .det): anal: SIG TEST.atfx origlog): ite: 2-2-2023 2-33-22	My Report C:Users\MCarroll\Do Browse 15_50_07_647 ,pdf ftx / .det): gnal: SIG TEST.atfx origlog): ite: 2-2-2023 2-33-22

Report, When EDM generates a report, the report contents can be appended to the word file selected by a user

When generating a report in VCS or other, the user now has the option to choose an additional Word file to append to the end of the report. This is for the convenience of the user and can be accessed in the Report Settings.

In VCS, go to the top toolbar menu and go to Report > Report Settings.

Once the menu opens, users can select the option "Append selected word files to the report":

aport Options		7. 1
Custom templates System templates Report se	ttings	
Report creation		
Prompt user notes setup at time of repo	rt generation	
Automatically open report		
R Append selected word files to the report	1	
Save report to run folders	-	
Default directory for report files		
C/\Users\MCarroll\Documents\Reports	Browse	
Open XML. Cruste report in Open XML PDF Cruste report in Adole PC MS office: Cruste report in Microsoft MS MS Office/Or comparison with th Signal style	L format, which can be read by many office sub-is (recommended) of format. office format ar text.that will be defected) © Print signals in black and white	
1 PX + 2 PX 3 PX		
		Cos

Once this is selected, a menu will appear to ask which files to append when generating a report:

THE REPORT OF A DESCRIPTION OF A DESCRIP	
emplates: My Report	Create Rename Delets Import Export Reset defaults
Report builder Logo File name Page	Header & footer Graphs
Search report item	Edit Duplicate Remove Disable Move up Move down Clear all
Title section User notes Saved results during run Testing results	Title section User index Testing reality Composite display
- Composite display	Append Files ×
- Channel status	Select files to be attached to the report:
Active signal window Active signal window Active sab All signal window Run information Run log	Emore (99)
test someurenden Test pasemeters Input channels Profile Run schedule Shaker limits Limit channels Shaker some	Sale DC Cancel
test somaturation Test parameters input channels Profile Run schedule Shaker limits Limit channels Shaker specs Test check list	Sip Dr Sweet

From there, clicking OK will generate the report with the chosen word file(s) appended.

Other Improvements

Sine Oscillator, added a frequency increment of 0.01 Hz and removed 100 Hz $\,$



Notes for creating a Vector RSS signal and an Overturning Moment signal

Frequ	uency domain	Time doma	ain Advan	ced limit	Advance	d settings	User-de	fined	limit	
() Su	mmed channel	Vector	r RSS 💿 C	verturning	g moment	t Add				
Time li	imit mode: 🛛 🖲	High limit	O Low lin	mit 🔘 Hig	gh/low lin	nit 🔘 RN	IS			
	Signal name	2	Edit	signal	Freq. lin	nit Freq	. limit	Tim	e limit	
Ove	rturning Mome	ent Signal							?	
Not	Note: Only channels measuring acceleration or force are supported.									
Sign	al name:				Method	: • X	 γ 	X		
	estion ID	Includ	X-coordinate		Y-coordinate		Measur	emen	ıt	
100		includ	mr	n	mm		quantit	у		
Ch1] 1000		1000		Accelera	ation		
Ch2] 1000] 1000)	1000		Accelera	ation		
Ch3					1000		Displace	ation		
Ch5			1000		1000		Accelera	ation		
Ch6							Accelera	ation		
Ch7							Accelera	ation		
Ch8]				Accelera	ation		
							<u>0</u> K		<u>C</u> ar	
_							Y			
Freq	uency domain	Time dom	ain Advar	ced limit	Advance	ed setting	User-de	efined	limit	
🔘 Su	immed channe	I 💿 Vecto	r RSS 🔘 🤇	Overturnin	g momen	nt Add				
Time I	limit mode: 🤇 🔵) High limit	t 🔘 Low li	mit 🔘 Hi	gh/low li	mit 🔘 RM	٨S			
	Signal nam	e	Edit	signal	Freq. lir	nit Fred	ą. limit	Tin	ne limit	
	Vector RSS Sig	gnal						×		
	Note: Only c	hannels me	easuring ac	celeration	or force	are suppo	orted.			
	Signal name:									
	Location ID		ncluded	Direction	1	Measur	ement			
	Ch1			v		quantity	/ •:			
	Ch2			X	~	Accelera	tion			
	Ch3			X	~	Accelera	tion			
	Ch4			X	~	Displace	ment			
	Ch5			Х	~	Accelera	tion			
	Ch6			Х	~	Accelera	tion			
	Ch7			Х	~	Accelera	tion			
	Ch8			Х	~	Accelera	tion			
					<u>O</u> K		<u>C</u> ancel			

Import .wav files to VCS as a TWR profile

Improvements in Random

The Ramp Up rate and Level change rate can be reduced to 0.1 dB/s to better support hydraulic shakers.

Level change rate (dB/s):	0.1 🜩	
Pretest ramp-up rate		
 Slow ramp-up (about 2dB/s) 	Fast ramp-up (about 20dB/s)	 Fastest (about 60dB/s)
For pre-tests, EDM will use the lower va "Fastest" is not commonly used – pleas	lue between "Level change rate" and " e confirm system connections and safe	Pre-test ramp rate." ty concerns.

Measure, display, and save Kurtosis of each input signal.



Improvements in SoRRoR

SoR/RoR RMS Limits support % or dB

Users can set the limits manually For Random tests inside the RMS Limits panel in Config. This can be done using EU units, percentage, or dB units.

SoR and RoR tests previously did not have this feature, and instead only supported EU and percentage.

Now, SORROR tests should match this feature with a slight difference. Since Sine and Random tones can be added to the run schedule, the high limits may adjust accordingly. To adjust for this, in RMS Limits, the percentage and dB values for high alarm and abort are based on the overall RMS (including tones), and the same values for low alarm and abort are based on the standard profile RMS.

Control RMS	limits during test ——			
 Calculate b 	ased on the table			
O Enter manu	ually (g)			
Enter manu	ually (dB)			
O Enter manu	ually (%)			
	(g)		(dB)	(%)
High abort	4.743 🔹	(+)	6.00 🖛	199.5 🔹
High alarm	3.359 🔶	(+)	3.00	141.3 🛋
Overall RMS	2.377			
Profile RMS	1.001			
Low alarm	0.7084	(-)	-3.00	70.8
Low abort	0.5013 🜩	(-)	-6.00	50.1 🜩

As pictured in the preceding figure, with one sine tone and one random narrowband active in the run schedule, the overall and profile RMS values are different, and the high and low limits are adjusted based on overall and profile RMS respectively.

SoR Advanced Profile should support "Limit format" dropdown: In VCS SORROR, users can choose to use an advanced profile when configuring the sine tones and random narrowbands. This allows users to define strict terms on how the tones and narrowbands will behave.

Inside the Advanced Profile menu, users can now use the "Limits format" dropdown menu to change the format of the limits. This can be changed between dB, percentage, and absolute value:



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

Sine Sweep Entry improvements

Previously, in VCS Swept Sine, changing the profile may have resulted in error if the new profile is outside of the defined range in the Run Schedule sweep.

Now, the Run Schedule has an updated design.

Previous design:

Sweep Entry						?	×
-Sweep entry type							
Fixed range and time	e per sweep	Fixed rate	nge and sweepir	ng speed	ł		
Left frequency (Hz):	5 🛟	Time per sweep:	0000:	05:	19 (HH:MM	I:SS)	
Start frequency (Hz):	5 🖨	Sweep speed:		1 <mark>*</mark> (0	ct/Min)		
Right frequency (Hz):	200 🖨	Sweep#:		5 ≑			
Initial sweep direction:	Up 💌	Total time:	0000:	26:	36 (HH:MM	I:SS)	
Level (%):	100.00	Total sine cycles:	844004	4 🜲			
Hold sweep after target	get level reached.						
					<u>O</u> K	<u>C</u> ar	ncel

Updated design:

Sweep Entry							?	×
Level (dB):	0.00							
Sweep range ——								
• Test profile (up)	Test profile (down) 💿 Custom						
Left frequency (Hz)	5	Right frequency	(Hz):	100 🜩				
Start frequency (Hz	: 5	Initial sweep dire	ection: Up	*				
Sweep rate								
Time per sweep	Sweep speed							
Time per sweep:	0000: 04:	19 (HH:MM:SS)	Sweep speed:		1	(Oct/Min)		
Sweep#:	2 🔹		Total time:	0000:	08:	38 (HH:MM:SS		
Total sine cycles:	16446.7 🜻							
Hold sweep after	target level reached.							
						<u>o</u> k	Cano	el

The main changes are in the "Sweep range" section. Here, the user can choose to simply sweep the profile up, down, or in a custom manner. When the test profile is changed in Swept Sine, this option will default back to "Test profile (up)", so the user will not need to change the schedule manually.

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

Displacement assisted channel (in Shock/TTH/SRS/Earthquake testing)

Add a displacement channel to enhance time waveform control for Shock/TTH/SRS/Earthquake testing. This addition improves control accuracy in both acceleration and displacement.

1	Actions	On/Off	Location D	Measurement	Engineering	Sensor	Max, sensor range	Sensitivity	Channel type	Input mode	High-pass litter Fc (Hr)
1		20 On	Ch1	Acceleration V		REF_301A11	20 (V)	101 (mW/g)	Monitor	AC-Single End	ON
2	-	210a	Ch2	Acceleration ~	4	333830-Z	20 (V)	99.442 (mV/g)	Control	AC-SingleEnd 🖂	Off
3	•	20e	Ch3	Acceleration 🔍	-	3023A1-Z	20 (V)	3.69 (mV/g)	Monitor	AC-SingleEnd 🗸	Off .
4		2 O#	Ch4	Displacement ~	enter 1	NA	20.(V)	400 (mV/mm)	Disp. Assist Control	AC-SingleEnd 🗸 🗸	Off
5		2 Ort	Ch5	Acceleration ~	9	N/A	20 (V)	100 (mV/g)	Monitor	AC-Single End ~	Off
δ.		0*	CHE	Incolumna .	<u>i</u>	NA	20 (M)	100 (mk/g)	Charles .	AC Graph Tref	OW
7	-	0#	Ch7	Liceleana a	100	NA	20 (V)	100 (mW/g)	Meratas	S.C. Single End	ON
8		0#	Ch8	Linkenton	6 3	NA	20 (V)	100 (mW/g)	Moster	AC-SegleEnd -	Off

SRS Synthesis – UI refactor and cursor support

Intuitive improvements to the SRS Synthesis page includes added cursor support to view the shock response at a particular frequency, as well as iterating on just that cursor wavelet.



Includes the advanced profile of sine tone

If a Sine tone is enabled with an advanced profile, the profile table and display are included when a report is generated.



Improvements in Transducer Calibration Measurement uncertainty at each frequency point

					~	
Calib. freq. re	sponse:		Live Signa	ls Run Folders		
Tolerance (±%	6):	5	A Sa Run2	10/26/2023 1:3	38:25 PM	
Dwell time (s)		5	p mm SI	50003 10/26/20	23 1:41:09 PM	
Point list:		Setup	p-ww SI	30002 10/26/20	023 1:39:00 PM	
Measurement	t uncertainty:		C D	S Uncertainty Ta	ble	
			Run1	10/6/2023 5:05	5:19 PM	
Calil	brating Freq sensitivity 9	. Response 95.6 (mv/g)	S Defau	<u>ult Folder</u> 10/6/2	2023 4:59:10 PM	
with						
with			D			
WITN	B ate (95% confidence	C	D	E		
A Uncertainty estim Frequency (H2)	B ate (95% confidence Spectrum(RLF) (g)	C 5, k-2) Sectrum(REF) Uncertainty(±5)	D Spectrum(Ch2) (g)	E Spectrum(Ch2) Uncertainty(F	(±%)
A Uncertainty estim Frequency (H2)	B ate (95% confidence Spectrum(RDS) (g) 0.050079	, k=2) Spectrum(REF) Uncertainty(1.5%) 0.015	D. Spectrum(Ch2) (g) 0.050594	E Spectrum(Ch2) Uncertainty	F 15%) H(Ch2,REF) Uncertaint) 0.01%	(±%) 0.01%
A Uncertainty estimation Frequency (HZ) 20	E ste (95% confidence Spectrum(RLF) (g) 0.050079 0.10008	C , t=2) Spectrum(REF) Uncertainty(± %) 0.01%	D Spectrum(Ch2) (g) 0.050694 0.10233	E Spectrum(Ch2) Uncertainty(F t %) H(Ch2,REF) Uncertaint) 0.01% 0.01%	(±%) 0.01% 0.02%
A Uncertainty estim Frequency (H2) 20 40	E te (95% confidence Spectrum(RUF) (g) 0.050079 0.10008 0.9994	C , k=2) Spectrum(REF) Uncertainty(1.%) 0.01% 0.05%	D Spectrum(Ch2) (g) 0.050694 0.10233 1.0106	E Spectrum(Ch2) Uncertainty(r 1: %) H(Ch2,REF) Uncertaint) 0.01% 0.05%	(± %) 0.01% 0.02% 0.09%
A Uncertainty estimation Frequency (H2) 10 20 40 50 50 50	5 te (95% confidence Spectrum(REF) (g) 0.050079 0.1000 0.9994 1.0003	c , k-2) Spectrum(REF) Uncertainty(2.5) 0.015 0.055 0.059	D Spectrum(Ch2) (g) 0.050694 0.10233 1.0106 1.0159	E Spectrum(Ch2) Uncertainty(5%) H(Ch2,REF) Uncertainty 0.03% 0.05% 0.05%	(± %) 0.01% 0.02% 0.09% 0.04%
A Uncertainty estim Frequency (Hz) 20 40 50 100	B ate (95% confidence Spectrum(REF) (g) 0.1000 0.9994 1.0003 0.9998	C , 4-2) Spectrum(REF) Uncertainty(1 %) 0.01% 0.05% 0.05%	D Spectrum(Ch2) (g) 0.005084 0.0233 1.0106 1.0159 1.017	E Spectrum(Ch2) Uncertainty(F 1 %) H(Ch2,REF) Uncertainty 0.01% 0.05% 0.05%	(± %) 0.01% 0.02% 0.09% 0.04% 0.06%
A Uncertainty estim Frequency (Hz) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	E ate (95% confidence 9,000079 0,000079 0,0000 0,0994 1,0000 0,09902 0,09925	C 5, k=2) 5pectrum(REF) Uncertainty(ž. %) 0.05% 0.05% 0.05%	D Spectrum(Ch2) (g) 0.000694 0.1023 1.0156 1.0157 1.0017	C Spectrum(Ch2) Uncertainty	F 1 %) H(Ch2,REF) Uncertainty 0.01% 0.05% 0.05%	(±%) 0.01% 0.02% 0.05% 0.04% 0.08% 0.13%
A A Uncertainty estimation frequency (it) 10 10 10 10 10 10 10 10 10 10 10 10 10	2 spectrum(REF) (g) 0.0000 0.9994 1.0000 0.99985 0.99985 0.99985 0.9997	C , k=2) Spectrum(REF) Uncertainty(1;5) 0.015 0.055 0.055 0.055 0.055	D Spectrum(Ch2) (g) 0.050594 0.0233 1.0105 1.0125 1.0017 1.0125 1.0017	E Spectrum(Ch2) Uncertainty(F 5.5) H(Ch2,REF) Uncertainty 0.035 0.055 0.055 0.055 0.055 0.055	(± %) 0.01% 0.02% 0.09% 0.04% 0.08% 0.13% 0.04%
A Uncertainty estim Frequency (Hz) 20 30 30 30 30 30 30 30 30 30 30 30 30 30	8 spectrum(REF) (g) 0.00007 0.0994 1.0008 0.99945 0.99955 0.99957 0.99957	C 5.8+2) 5.9+ctrum(REF) Uncertainty(1.5) 0.015 0.055 0.055 0.055 0.055	D Spectrum(Ch2) (g) 0.05024 0.0234 1.0105 1.0129 1.0017 1.0125 0.9334	E Spectrum(Ch2) Uncertainty	P 5 %) H(Ch2,R(F) Uncertaint) 0.01% 0.05% 0.05% 0.05% 0.05%	(± %) 0.01% 0.02% 0.09% 0.08% 0.13% 0.04% 0.08%
A A Directility estim frequency (it) 2 A Sol Directility Sol	5 spectrum(REF) (g) 0.00007 0.10008 0.99952 0.99925 0.99977 0.99977	C , k=2] Spectrum(REF) Uncertainty(± %) 0.01% 0.05% 0.05% 0.05% 0.05%	D Spectrum(Ch2) (g) 0.05084 0.1033 1.010 1.017 1.0017 1.0017 1.0089 0.99374 0.99775	E Spectrum(Ch2) Uncertainty(F 5.5) H(Ch2,REF) Uncertainty 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055 0.055	(± %) 0.01% 0.02% 0.08% 0.04% 0.08% 0.04% 0.08% 0.04%
A Uncertainty estima Frequency (Hz) 20 30 30 30 30 30 30 30 30 30 30 30 30 30	8 ate (95% confidence 0.050079 0.10000 0.99945 0.99952 0.99952 0.99957 0.99957 1.0000	C , k=2) Spectrum(REF) Uncertainty(1 %) 0.01% 0.05% 0.05% 0.05% 0.05% 0.05% 0.05% 0.05%	D Spectrum(Ch2) (g) 0.050594 0.02033 1.0109 1.0017 1.0127 1.0029 0.99334 0.99334 1.0225	E Spectrum(Ch2) Uncertainty(P 2 %) H(C2,R(F) Uncertaint) 0.05% 0.05% 0.05% 0.05% 0.05% 0.05% 0.05% 0.05%	(± %) 0.01% 0.02% 0.05% 0.04% 0.08% 0.08% 0.08% 0.08% 0.08%

Improved Calibration Report





		CALIBRA	HON CERTIFICATE	
Data table				
Frequency (Hz)	Deviation (%)	Phase (deg.)		
10	1.222	-0.633		
20	2.251	-0.459		
40	1.119	-0.703		
50	1.558	-0.580		
100	0.164	0.381		
200	1.321	-0.201		
500	0.915	0.131		
1000	-0.622	1.121		
2000	-0.208	3.281		
5000	2.891	10.339		
8000	6.444	14.206	1	

Display velocity and displacement at each measurement point and compare to shaker limits

Inse	rt rov	Delete row Ap	pend row Impor	t/Export list 🔹	
		Frequency Hz	Acceleration g	Velocity m/s	Displacement mm (pk-pk)
	1	10	1	0.1561	9.936
	2	15	1	0.1041	4.416
	3	40	2	0.07804	1.242
	4	50	2	0.06243	0.7949
	5	100	2	0.03122	0.1987
	6	200	2	0.01561	0.04968
	7	500	2	0.006243	0.007949
	8	1000	2	0.003122	0.001987
	9	2000	2	0.001561	0.0004968
	10	5000	2	0.0006243	7.949E-05
•	11	8000	2	0.0003902	3.105E-05

Supports Velocity Sensor Calibration with reference acceleration sensor

Input C	hannels S	ensors Real	d all TEDS Prefere	nces *						
1	Actions	On/Off	Channel type	Location ID	Measurement quantity	Engineering	Sensitivity	Input mode		Sensor
. 1		🗹 Ön	Control	REF	Acceleration:	1	101 (mV/g)	IEPE	V	N/A
2	main .	🗹 0n	Monitor -	Ch2	Velocity	in/s	157.41 (mV/(in/s))	IEPE	~	N/A
	_	1000		1000		-	and the second second second	10 C		1

Flexible use of any two channels for the reference sensor and the sensor under test

	Actions	On/Off	Channel type	Location ID	Measurement	Engineering	Sensitivity	Input mode	Senso
1		2 On	Control ~	REF	Acceleration		101 (mV/g)	IEPE	N/A
2		01	Monitor -	Ch2	Acceleration	a	95.6 (mV/g)	ILPE	N/A
3		01	Monitor	Ch3	Acceleration	- g/:	100 (mV/g)	AC-SingleEnd	N/A
4		0#	Mondast	Ch4	Acceleration	2	100 (mV/g)	AC-Tingle End	N/A.
5		🗹 On	Monitor ~	Ch5	Acceleration	9	100 (mV/g)	AC-Single End	N/A
6	- *	0#	Manitor 0	Ch6	Acceleration	- W.	100 (mV/g)	AC-Single End	N/A
7	- *	01	Monitor Y	Ch7	Acceleration	e gal	100 (mV/g)	AC-Single End	N/A
8		01	Monitor	Ch8	Acceleration	01	100 (mV/g)	AC-Single End	N/A
nput Cha	innels S	ensors Read	d all TEOS Preferen	ices •					
1	Actions	On/Off	Channel type	Location ID	Measurement quantity	Engineering	Sensitivity	Input mode	Senso
1		01	Monitor ~	REF	Acceleration	97	101 (mV/g)	3931	N/A
2	100	01	Monitor -	Ch2	Acceleration	a)	95.6 (mV/g)	IEPE	N/A
3	104000	1 On	Monitor ~	Ch3	Acceleration	a.	100 (mV/g)	IEPE	N/A
4		01	Mondat	Ch4	Acceleration	- 97	100 (mV/g)	AE-Sungle End	N/A
5	-144 ·	🗹 On	Control ~	Ch5	Acceleration	19	100 (mV/g)	IEPE	N/A
6		011	Maniter 0	Ch6	Acceleration	9 a.	100 (mV/g)	AC-Single End	N/A
			and the second se	1000	CARGONAL COMPANY OF THE	1.000	200 C	Company of the local state	
7	140.0	01	Mondor	Ch/	Acceleration	S. 91	100 (mV/g)	AL-Single and	N/A

Sweep from one measurement point to the next. Avoid ramping down and up.

EDM THV Control Software

Temperature Channels can be assigned to RTD100 and Thermocouple sensors respectively.

In the channel table, temperature channels can be assigned to RTD100 and Thermocouple sensors respectively.

EX.	nm + Unit	Sensor	•	Non-accelerat	ion control DC o	offset control	Load fro	im library	Save to library Signal	range 😿 Save as de	rtaut	t	1	1
	All	JII			Vibration			1	Temperature			Humidity		
Use ch	On/Off	Channel type	and	Location ID	Module:Ch#	Measurem	ent	Engineeri	Sensitivity	Input mode		Sensor		Man
1(M)	2 On	Control	×	Ch1	(M) 2581120	Acceleratio	n ~	m/s!	10.19716 (mV/(m/s*))	AC-Single End	1	N/A	×	20.0
2(M)	2 On	Monitor	4	Ch2	(M) 2581120	Acceleratio	n Y	mit	10.19716 (mV/(m/s ²))	AC-Single End	Y	N/A	×	20.0
3(M)	01	Monitor		Ch3	(M) 2581120	Acceleratio		111/5	10.19716 (mV/(m/s ²))	AC-Singly End		N/A	v	20.0
4040	Crt	Minuter	×	Ch4	(M) 2581120	Acceleratio	ar IX	10/12	10.19716 (mV/(m/s ²))	AC-Sevila End	10	N/A	×	20.0
5(M)	or or	Meritur		Ch5	(M) 2581120	Accelection		mis	10.19716 (mV/(m/s ²))	AC-Single End		N/A	4	20.0
6(M)	Off.	Monitor	14	Ch6	(M) 2581120	Acceleratio	611 Q	min	10.19716 (mV/(m/s²))	AC-Seigle End	18	N/A	4	20.
7050	C C R	Monitor	14	Ch7	(M) 2581120	Acceleratio	9,119	and a company	10.19716 (mV/(m/s ⁴))	AC-Single End	18	N/A	Y	20.
8(M)	- or	Manitur	-	Ch8	(M) 2581120	Azzeleratin	n K	invis"	10.19716 (mV/(m/s*))	At -Secie Int	N.	N/A	Y	20.
9	2 On	Control	×	Tp1	(M) 20181408	Temperatur	e 🖂	MC	N/A	RID PT100	~	N/A	V	N/
10	2 On	Monitor	V	Tp2	(M) 20181408	Temperatur	e ~	*C	N/A	RTD PT100	Y	N/A	V	N/
11	2 On	Monitor	v	Tp3	(M) 20181408	Temperatur	e 9	10	N/A	Thermocouple K	Y	N/A	v	N/
12	01	Meeiter.	10	Tp4	(M) 20181408	Tempolatia	A 9	10	N/A	100 21100		N/A	Y	N/
13	_ ce	Menitor	-	TpS	(M) 20181408	Temperatur	e	2	N/A	KTD PT100	12	N/A	Ŷ	N/
14	0.6	Maritor.	12	Трб	(M) 20181408	Temperatio	0 9	16	N/A	HID PTIDO	105	N/A	V	N/
15	C Ce	Monitor	-	Tp7	(M) 20183408	Semperatur	n 9	10	N/A	FTD PT100		N/A	Y	N/
16	00	Monitor		Tp8	(M) 20181408	Temperatur		10	N/A	SUD #7100	12	N/A	Y	N/
17	OH OH	Monitor	1	Tp/9	(M) 20181408	Temperatur	 (a) (b) (b) (c) (c)	10	N/A	RID PITO	110	N/A	×	N/r
10	[] [Circle	A.Landana		Te 10	18-01 20103-400	Terrideration		-	N/A	ETD STUDE	112	BI/A	16	AL/

16 Additional Temperature Monitoring Channels

16 additional temperature monitoring channels with the new chamber controller.

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a yes cares	AR A SA					
a pics (pic)	IX.					
	1000					
Random3 (Random)	201					
Random I (Random)	Messee	d Signah Satup				, ,
Pandent Hardent	Awrite	e history Al signals				
a varioust francest	Test (see	niny systems and some	units one local plan as	print from the right class	en and are directly thread on the computer. We	de acquiring the data, the signal set he second hore the heptiting
	D. Manuel	nut signale . I fam al	agreet.			
and the second se		Signal name:	Meanure	light color	Sava dectination	
Live Marcels Run Foldors Cata Her	3.9	PLC RETIREMENT	2		ĸ	
10 Pite 879-823-14	800	PLC, HEPL #25-LP	8		ĸ	
IN PLC_REFL.R404A.HP		PLC, REVO BLOBA HP	8	-	R	
E PLC REFJ RACAA HT	82	PLC, HET2 BACHA (P	10		ĸ	
TO PLC_REF3-RADAA-LP		AC BINADOW	6		2	
E PLC REFT RADAA LT		BUC BETT BUTH UP		-	2	
HE PLC REF HALLIP	414	BUC METS BACKALIN	61			
In PLC ADD-HU-HT	817	PLC BELLATION	6			
M PLC REF.HLHLP	814	PLC HETHRISLP	12		ĸ	
IN THE SECONDARY	010	RC RF-H2+P	P		ĸ	
the Diff Temperation	940	PLC. RET. HULLP	8		K	
(in erc (emp(i)	341	PLC, hepcil	60		ĸ	
In PLC_Temp(2)	942	#1.C. 3mmp[7]	8		K	
ht PLC_Temp(3)	80	PLC, TempEl	8		ĸ	
In: PLC,Temp(4)	318	PLC.SmpH	8		ĸ	
In PLC, Temp(5)	P 95	PLC, SeepCl	- 63		ĸ	
H: PLC, Temp(6)	4 34	PLC_beeti	18		ĸ	
H: PLC Temp(7)	M/	PLC, long(?)	E		ĸ	
M. PLC Tempili	94	PLC imp(I	8		K	
in D.C. Immeth	8 30	PLC, SmpOl			R	
in Programment	100	PLC, Steep(10)	16		ĸ	
in: PLC_Isimp(10)	1.00	PLC_Deep(10	6			
In: PLC_Temp(11)		A C Tanan C C	12		2	
In PLC_Temp(12)	201	AC Small	12		N N	
h: PLC_Temp(13)	201	BL Deep(75)	E.		K	
In: PLC, Temp(14)		PLC Second CO	8		H.	
The State Concession	-			-		

EDM THV and EDC support Spider-101 v3

EDM THV and EDC have been updated to support Spider-101 v3 as a temperature/humidity controller and a temperature/humidity/ vibration controller.





Air Dryer Support

Accelerates humidity control by actively managing the installed air dryer.

Note: Hardware support for the air dryer is essential to utilize this advanced software feature.

Product Temperature Control

Empowers the control algorithm to manage both chamber and product temperatures when a dedicated temperature sensor is installed on the product under test.

Liquid Nitrogen Cooling Support (optional)

The controller can efficiently manage a liquid nitrogen device

installed in the chamber to facilitate cooling. Execution of this software feature requires specific hardware.

Read Chamber Status with Modbus

The chamber controller is equipped with a Modbus interface to facilitate communication with external devices.

Other Improvements in EDM THV

- Report Builder implemented in EDM THV. The report builder feature is already available in EDM VCS.
- "Add existing run folders" feature implemented in EDM THV. It is already available in EDM VCS.
- An LK for Spider-101 v3 enables EDM THV and EDC software features to work with any Spider-101 v3 hardware, regardless of the serial number.
- Version control implemented for control logic files and customize EDM THV display based on different versions.

Experimental Modal Analysis

Enhancement of geometric modelling

The default libraries for quick creation of sub-structure models have been enhanced to assist users in extruding, revolving and creating intricate 3D geometries.



Front-end Calibration Tool (FECT)

Improved Message for Spider-80M Factory Calibration

The labels 'H' and 'L' on the switch of the Spider-80M FECT fixture indicate the connection to Output 1-4 or Output 5-8, respectively. Displaying 'H' or 'L' in the message helps clarify the switch position.



Apply calibration results to passing channels and skip those that failed

Allow calibration to proceed even if a channel failed. Calibration results can be applied to passing channels only and skip those that failed.



Factory Calibration Supports Keithley DMM6500

In addition to Fluke 8845A, Keithey DMM 6500 can now be used in Factory calibration (automatic and detailed calibration process and comprehensive calibration report).



Factory Calibration Supports Spider-80M FECT Fixture

Factory Calibration now supports an automatic calibration process on the Spider-80M with a designated multimeter and the Spider-80M FECT Fixture.



Include 1 V Range Measurements for Spider-80SG/80SGi/80Gi New Spider-80SG/80SGi/80Gi hardware has 1 V measurement range. FECT supports calibration of the new hardware and verification in the range.

Channel ID	Calibration Range	Reference Offset	Measured Offset	Gain Error	Results	Offset Tolerance	Gain Error Tolerance
Output 1	10 V	0 V	0.00748 V	0.05 %	Pass	± 0.15000 V	5.00 %
Output 1	0.1 V	0 V	0.00001 V	0.27 %	Pass	± 0.15000 V	5.00 %
Input 1	10 V	0 V	-0.00461 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 2	10 V	0 V	-0.00161 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 3	10 V	0 V	-0.00236 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 4	10 V	0 V	-0.00312 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 5	10 V	0 V	-0.00395 V	0.34 %	Pass	± 0.15000 V	5.00 %
Input 6	10 V	0 V	-0.00256 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 7	10 V	0 V	0.00114 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 8	10 V	0 V	0.00670 V	0.35 %	Pass	± 0.15000 V	5.00 %
Input 1	1 V	0 V	-0.00049 V	0.34 %	Pass	± 0.15000 V	5.00 %
Input 2	1 V	0 V	0.00006 V	0.34 %	Pass	± 0.15000 V	5.00 %
Input 3	1 V	0 V	-0.00004 V	0.33 %	Pass	± 0.15000 V	5.00 %
Input 4	1 V	0 V	-0.00005 V	0.34 %	Pass	± 0.15000 V	5.00 %
Input 5	1 V	0 V	0.00000 V	0.33 %	Pass	± 0.15000 V	5.00 %
Input 6	1 V	0 V	-0.00032 V	0.33 %	Pass	± 0.15000 V	5.00 %
Input 7	1 V	0 V	-0.00018 V	0.34 %	Pass	± 0.15000 V	5.00 %
Input 8	1 V	0 V	-0.00011 V	0.33 %	Pass	± 0.15000 V	5.00 %
						-	

Signal Viewer Improvements

Verified Gain and Offset Errors before Adjustment (As Found Data)

Signal Viewer report generation should have file name and directory

When generating a report in Signal Viewer, in contrast to VCS, the Generate Report menu will appear. This allows the user to select some information about the report that will be generated. Use this menu to enter a custom name or file path to export, otherwise use the defaults.

Options			Report builder preview
Template:	My Report		Title section (SIG0001, SIG0005, SIG0003, SIG0002)
Default directory:	C:\Users\MCarroll\Do	Browse	User notes (SIG0001, SIG0005, SIG0003, SIG0002) Testing results (SIG0001, SIG0005, SIG0003, SIG0002)
Report name:	11_12_17_717	.pdf	Composite display
Select saved sin SIG0003.atfx, S Run log to report (. Select run log t PM.origlog	<u>mar:</u> sisouu 1.ath; Sisou Good2.ath; origlog): <u>ile</u> ; 2-2-2023 2-33-22	uub.atb,	Run information (2-2-2023 2-33-22 PM) Run log Test configuration (SIG0001, SIG0005, SIG0003, SIG0002 Test parameters Input channels Profile Run schedule Shaker limits Limit channels

Generate report menu should not open if no signal files are loaded

Signal Viewer is designed to always associate reporting with one or more signal files. The program will check to see if any loaded signals can be reported before the user opens the Generate Report menu to select a signal to report and to specify various details. If none exists, it will not let the user proceed.

Custom templates Report settings		
emplates My Report	Create Fename Oslete Import Export Reset defaults	
Report builder Logo Page Graphs		
Search report item	Edit Duplicate Remove Disable Move up Move down Clear all	
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Default signal to report should be any plotted signals

Based on user feedback, the active signals are selected by default when a new report is generated. The user can still select different signals from the menu if necessary:



Use the following sequence of actions to check for a default signal:

- Check the current active window.
- If none, check the current active tab.
- If none, check for the first signal in the tree.
- If none at the end, do not let the user generate a report.

Signal Viewer should preload all opened signals for improved filtering performance

Due to the accommodation made long ago for the Data Files panel, recording nodes would normally have to be expanded before the internal categories and signals would be loaded. However, the filtering function in Signal Viewer is always applied if active. If this filter is supposed to remove a certain type of signal, and all signals inside a recording are filtered out, the recording will be grayed out and disabled. This is not possible if the signal files are not loaded immediately, so this change was made to the Signal Viewer's import process.

Open - Rem	ove Remove All	T
Filters		Clear all
Date from	11/1/2023	•
Date to	11/1/2023	*
Signal Type	Time History	•
Search		
Applied filters		Clear all
Signal Type 🗙		
MM SIG000	1 7/12/2023 2:02:42 PM	
MM SIG000	3 7/12/2023 2:03:12 PM	
MM SIG000	5 7/12/2023 2:03:40 PM	
MM SIG000	2 9/21/2023 12:23:26 PM	
MM SIG TES	T 10/10/2023 2:40:52 PM	

Change text to add .origlog and .atfx extensions in Report Generation window

The window that appears after clicking Generate Report in the report templates menu will display the recommended file types for the signals and run folders:

Generate Report			
Options			Report builder preview
Template:	My Report		Title section (SIG TEST)
Default directory:	C:\Users\MCarroll\Do	Browse	User notes (SIG TEST) Testing results (SIG TEST)
Report name:	11_21_39_132	.pdf	Composite display
Signal to report (<u>Select saved si</u> Run log to report (<u>Select run log</u> PM.origlog	tfx / .dat): gnal: SIG TEST.atfx .origlog): file: 2-2-2023 2-33-22		Active windows Active tab Run information (2-2-2023 2-33-22 PM) Run log Test configuration (SIG TEST) Test parameters Input channels Profile Run schedule Shaker limits Limit channels

Added a "Remove all" button next to "Remove"

Previously, a Remove button was provided to remove one signal or folder at a time in the Data Files panel. Now, a "Remove all" button is added for convenience:



General Improvements

EDM Software supports In-line Charge Converter and External Charge Amplifier on all Spider products

	Actio	ers.	On/Off	Location ID	Measurement		Engineering	Sensor	Max. sensor range	Sensitivity	Channel type		Input mode
1	1.44	-	2 On	Ch1	Acceleration	v	0	N/A	20 (V)	101 (mV/g)	Control	Ŷ	IEPE 🗸
2	1	•	Ø On	Ch2	Acceleration	0	ā.	N/A	20 (V)	99.442 (mV/g)	Monitor	~	IEPE v
3		-	0 M	Ch3	Acceleration	Y	ĝ	N/A	20 (V)	9.69 (mV/g)	Monitor	Y	IEPE
4		-	Ø Øn	Ch4	Acceleration	4	<u> </u>	N/A	20 (V)	10.701 (mV/g)	Monitor	v	DC-Single End
5	1.44	-	1 On	Ch5	Acceleration	Ý	9	N/A	20 (V)	100 (mV/g)	Monitor	Ŷ	AC-Differential
6			0	Ch6	Acceleration	1	÷	N/A	20 (V)	100 (mV/g)	Manitas	1	In-Line Charge Convert
7			Ot	Ch7	Acceleration	×	9	N/A	20 (V)	100 (mV/g)	Miniher	2	External Charge Amplif
	_	_			Inc. of the second second			144		244 1 244 2			External Charge Amplin

Rename Test

Improved convenience method to rename a test, as well as its test directory for future runs

Recent tests			ф
New Open	roperties		<u>Delete</u>
	TC (CCT)		
	New Test		
<u> </u>	Save Test		
▷ :≡ FF	Duplicate Test		
▷ :≡ FF	Rename Test		
▷ :≡ FF	Export Test	×	
▶ := FF1	Report Test		

Cursor / Marker window no longer automatically shows

When plotting cursor or markers, the Cursor / Marker Window no longer automatically pops up. Instead, there is a dedicated rightclick menu option to show the Cursor / Marker Window.



RMS box now supports copying to clipboard

Right-click on the RMS box display to copy the RMS values to clipboard



Spectrum Format (Global Settings) refactor

The previously separate **Signal export > Spectrum format** and Default display format pages (both in Global Settings) have now been consolidated to a **Spectrum Format** page directly under **Global Settings**.

The default values adhere to industry standards (different between VCS, DSA, Modal, etc.)



Drag file to plot signal

Files (ex: SIG007) can be dragged and dropped onto a plot. This will attempt to plot any matching signals (ex: Spectrum(Ch1)) already present on the plot. This is useful for comparing the same channel signal across different timestamps or multiple test runs.

In the example below, the signal Spectrum(Ch1) is compared between SIG007 and SIG006



Saving Multiple Licenses

To save multiple licenses into one file, users can shift click licenses in the License Key Management page.

ctive Hardware	device	Serial number	License type	Brow	vse new license key
Spider-81	Spider-80X [1033504 2590976, 2583008, 2	2 Flexible master license	-	and the line of the second second
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Clicking "Save this license key" will allow users to choose where to save the .licm file.

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Import the .licm keys back into EDM by clicking the "Browse new license key" button.

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Active Key Column

The active column indicates which license key is currently active.

Active	Hardware device	Serial number	License type
	Spider-81 Spider-80X	1033504 2590976, 2583008, 2	Flexible master license
	CoCo-80 Spider-81 S	337037, 339827, 341253 9805	Flexible master license
	Spider-80X SpiderVSN	2589408, 2616000 17964064	Flexible master license
1	Spider-80X Spider-N	2600416 3544192, 3544096	Flexible master license

Improvements to Spider-80T/Ti temperature calibration interface

Temperature Calibration Wizard	? ×
Validate Channel 1	
 Input 4.096 mV (100 °C) using the thermocouple calibrator. Click "Measure" when ready Click "Next" if the calibration passed. Otherwise repeat calibration or skip channel and the calibration of the	el.
4.087mV Measure Skip	
Export report Kert >	Cancel

SOFTWARE RELEASE HISTORY

Туре	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
Release	EDM 11.0	CI 11.0.0.1	01/19/2023
Release	EDM 11.1	CI 11.1.0.0	11/23/2023

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

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

Crystal Instruments Testing Lab www.crystalinstruments.com

Crystal Instruments Testing Lab 1548A Roger Dale Carter Boulevard Kannapolis, NC 28081

VERSION COMPATIBILITY

Product and Software Version	Firmware Versions			
Spider-80X/80Xi/80Hi/80Ci				
EDM Testing 11.0.0.x	11.1.0.x			
Spider-81 (v7.x)				
EDM Testing 11.0.0.x	11.1.0.x			
Spider-81B (v7.x)				
EDM Testing 11.0.0.x	11.1.0.x			
Spider-80SG/SGi				
EDM Testing 11.0.0.x	11.1.0.x			
Spider-20HE/20i				
EDM Testing 11.0.0.x	11.1.0.x			

Product and Software Version	Firmware Versions
CoCo-80X/90X	
EDM Testing 11.0.0.x (EDM CoCo for DSA)	2.0.x or above
CoCo-70X	
EDM Testing 11.0.0.x (EDM CoCo for DSA)	2.0.x or above

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