

# EDM 10.1

# 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) REMOTE CONDITION MONITORING (RCM)



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Improved SRS Synthesis Methods	
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System Requirements	
Minimum System Requirements:	
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Version Compatibility	

# RELEASE HIGHLIGHTS EDM Cloud and EDM Mobile App

EDM Cloud service is introduced with the EDM 10.1 Release. EDM Cloud allows users to view a test status remotely through a web browser, mobile app, or a combination of both. Multiple devices and users are allowed to simultaneously login.

EDM Cloud and EDM Mobile will be provided free of charge for an introductory period ending on March 31, 2023, for all users.

### Demo from Web Browser

All users are invited to try out EDM Cloud service features from a web browser or mobile phone app.

Access EDM Cloud from a web browser: https://cloud.go-ci.com/. Click on "Demo" and enter demo@go-ci.com in the email field.



# Demo from EDM Mobile App

Users can download the EDM Mobile app for iOS or Android. Enter demo@go-ci.com in the email field and "Spider-80X" in the password field to try out the EDM Mobile app.



EDM Cloud allows users to upload the status of current tests or upload run logs of historic tests to the cloud.

Multiple user accounts can share access to uploaded data, including live or historic test statuses.

#### Supported Modules

EDM Cloud supports vibration testing and THV (temperature/ humidity/vibration) testing.

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# **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.



#### **VCS Enterprise**

VCS Enterprise features advanced testing, expanded test data management features, test data review, and integration with third party devices. This version is designed for the industrial enterprise environment, with multiple levels of users, multiple sets of test equipment, and multiple simultaneously running tests.

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Test	Setup	Control	View	Layout	Tools	Report	Help
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The following features are included in the Enterprise version and are not available in the Standard version:

General VCS Enterprise features
Expandable to MIMO/MESA/MDOF vibration testing
User management
Review/compare mode
Multiple instances
Run history
Configuration library
Data transfer tool
Search and export data files by given criteria

Strain measurement
Temperature measurement
EDM extension tools
Data recording
PC math signals
User-defined signals
VCS Enterprise for Random
Variable sample rate
Multi-channel drive/notch limiting
Force limiting and virtual channels
Frequency ranges from 3 kHz to 46 kHz
Spectrum resolution higher than 1600
Multi-resolution control (patented)
VCS Enterprise for Sine
Multi-channel drive/notch limiting
Force limiting and virtual channels
Frequency ranges from 3 kHz to 30 kHz
Customized ramp rate in frequency ranges
Customized measurement strategy for limit channels
THD measurement
PC coherence signals
VCS Enterprise for Shock
SRS predictive notching
Additional pre-test excitation type: Random
User-defined wavelet window type (SRS)
Auto-power spectrum for input signals
User-defined SRS signals

# 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.

FFT analysis settings								
Sampling rate (fs)		256 kHz/115.2 k 👻	Forma	at				
Freq. range (fa)	-	512 kHz/230.4 kHz	^					
Block size/Line		409.6 kHz/184.32 kHz		L				
		327.68 kHz/147.456 kHz		L				
Overlap ratio	-	256 kHz/115.2 kHz		1				
LPF cutoff frequency (Hz)		204.8 kHz/92.16 kHz		L				
		163.84 kHz/73.728 kHz		L				
		128 kHz/57.6 kHz		L				
		102.4 kHz/46 kHz		L				
		81.92 kHz/37 kHz						
		64 kHz/28.8 kHz						
		51.2 kHz/23 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.

FFT analysis settings			
Sampling rate (fs)	256 kHz	•	Format
Block size/Line	256 kHz	^	
Window	163.84 kHz		
Overlap ratio	131.072 kHz 128 kHz		
Average mode	102.4 kHz		
Average number	65.536 kHz		
FFT average on/off	64 kHz 51.2 kHz		
LPF cutoff frequency (Hz)	40.96 kHz		
	32.768 kHz 32 kHz		
	25.6 kHz 20.48 kHz		
	16.384 kHz		
Test	10 KHZ 12.8 kHz		
Block T = 0.004 s	10.24 kHz 8.192 kHz		.90625E-06 s
Sampling rate (fs) = 256000	8 kHz		:50 Hz
Frequency range (fa)=1152	5.12 kHz		
	4.096 kHz 4 kHz		
	3.2 kHz		
	2.56 kHz 2.048 kHz		
	2 kHz		
	1.6 kHz	~	

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.

#### Force Limiting with Overturning Moment Limiting

Force limiting provides a notching function based on the total force and/or total overturning moment applied to the UUT. It provides the UUT protection from over-testing and also qualifies the UUT to a sufficient testing severity. This feature is available for Random and Sine vibration control.





# **Displacement Protection**

Many shaker safety features are available to ensure the shaker is protected while undergoing rigorous testing. Displacement Protection adds another layer of protection to the shaker system. The displacement of the shaker table is monitored and checked against preset alarm and abort limits. When the measured displacement exceeds the alarm or abort value, a warning is given, or the test is aborted.

Shaker tables involving two or more shakers can put the relative rotation angle under the angular displacement protection. Users can also set similar alarm and abort criteria to protect the shaker table from excessive rotation.





# Auto Create VCS Tests with Test Standards

EDM VCS users can create tests from built-in libraries based on popular standards. Additional standards will be added in future releases as they become available.

Users can filter the entire list by standard, section, test type, and keyword.

The entire list can be sorted by standard, section, profile, test type, and description.

Standard	MILSTD810	H Section	on:		*
	Stardard	Section	Pr	514.8C2.1.3a	,
101	MILSTD810H	514.8C2.1.3a	11	514.8C2.1.3b1	F
	MILSTD810H	514.8C2.1.3a	IT	514.8C2.1.3b2	F
10	MILSTD810H	514.8C2.1.3a	IV	514.8C2.4	F
2	MILSTD810H	514.8C2.1.3a		514.8C2.5	F
10	MILSTD810H	514.8C2.1.3b1	IV	514.802.8	F
	MILSTD810H	514.8C2.1.3b1	IV	5168462	F
	MILSTD810H	514.8C2.1.3b1	IV	516.8 4.6.3	F
<b></b>	MILSTD810H	514.8C2.1.3b1	VI	516.8 4.6.6	F
10	MILSTD810H	514.8C2.1.3h2	VI	Longitudinal	- P

Shandard	MILSTDERDH	· Section	·····	<ul> <li>Test type</li> </ul>	Sheek w	Keyward in description:
	Standard	Section	Profile	Test type	Shock	
81	MILSTER 10H	515.84.6.2	FVM	Shock	Sine	Terminal peak sawtooth for Procedures I - Functional Test
	MILSTD010H	515.84.6.2	GM	Shock	Randove	Terminal prait seutooth for Procedures 1 - Functional Test
11	MILSTD@10H	515.84.6.2	HSC I	Shock	RoR	Half-Sine profile for High Speed Craft - Standardized Requirements
8	MILSTD010H	515.84.6.2	RSC II	Shock	545	Hall-Sine profile for High Speed Craft - Standardized Requirements
12	MILSTOR 10H	515.84.6.2	WECC	Shock	TIN	Terminal peak sawtooth for Procedures 1 - Functional Test
	MILSTD010H	515.84.63	Official	Shock	1000 110.0-0	I Terminal peak sawtooth for Procedure II - Transportation shock test sequence
	MILSTD010H	516,84,6,2	OnRoad	Shock	Table 515,8-b	All Terminal peak saurtooth for Procedure II - Transportation shock test sequence
12	MILSTD010H	515.84.6.6	Flight Vehicle Materiel	Shock	Table S15.8-9	GII Terminal peak sawtooth for Procedure V - Crash Hazard
	MILSTD810H	315.845.5	Ground Materiel	Shock	Table 515.8-9	OII Terminal peak castooth for Procedure V - Crash Hazard

	Vibration Contr	rol (VCS)	MIMO V	bration Control		All Templates	Standard Librar	y:
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	Stanlard	Section	Profile	Test type	Description			
22	MILSTDE10H	514.8C2.1.3a	Honghudinal	Random	Truck transportati	un over US highways		
11	MILSTDETRH	584.8C2.5.3a	1 Transverse	Random	Truck transportation	ion over US highways		
81	MILSTDINGH	594.802.5.3a	I Vertical	Random	<b>Truck transportati</b>	ion over US highways		
82	MILSTDUIGH	514.8C2.1.3a	B Enerlope	Random	Truck transportati	on over US highways		
21	MILSTORIOS	384,852,1,364	<b>IV</b> Longitudinal	Random	Inc-wheeled trail	in and wheeled vehicles		
21	MILSTDEIGH	584.802.3.354	R/ Transverse	Random	Two wheeled trail	er and alteried vehicles		
22	MILSTORING	584.8C2.1.3M	<b>IV Vertical</b>	Random	Two-wheeled trail	er and wheeled vehicles		
81	MILSTDRININ	584,8C2.1.368	V Enersiope	Random	Two-inhealed trail	er and wheeled vehicles		
25	MILSTORION	514.8523.362	VII Longitudinal	Random	Composite wheels	nd vehicle (CWVS - Profil		
11	MILSTDENIN	514.852.1.312	VII Transverse	Random	Composite wheels	nd vehicle (CWV) - Profil		
25	MILSTDATON	514.8(2.1.3b2	VII Vertical	Kandom	Composite wheels	nd webkie (CWV) - Profil		
<b>11</b>	MILSTDETOH	514.8(2.1.352	VIII Inweitspe	Random	Composite wheels	d sehicle ICWV3 - Profil_		
11	MILSTDUTOH	554,8C2.4	IKC-17	Randum	Category 7 Aircraft	t-Jet - Profile C-5, KC-1		
E1	MILSTD#10H	\$14,852,4	IKC-S	Random	Category 7 Aircraf	h-Jet - Profile C-5. KC-1		
<b>FI</b>	MILSTDATION	514,852.4	<b>EX General Exposure</b>	Random	Category 7 Alectal	h-Jet - Profile C-5. KC-1_		
81	MILSTDAIRH	514.802.4	KKC-10	Kandom	Category 7 Aircral	H-Jet - Profile C-5. KC-1		
81	MILSTDBIOH	514.8C2.4	IX KC-153 E-3	Random	Category 7 Alectal	H-Jet - Profile C-5. KC-1		
#1	MILSTDETOR	514,8C2.4	EKT-43A(737)	Random	Category 7 Nincral	h-Jet - Profile C-S. KC-1_		
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### Variance Reduction in VCS-Random

As a convention of Random control, a high number DOF requirement will result in a waiting period before the control signal variance begins to settle. When the end-user runs a shorter test, the settling time of the control variance is short. The unique Variance Reduction feature is implemented in this new release to solve this issue. The control signal variance will settle much faster than regular spectrums with this option enabled.

The variance of a random signal can be computed based on the statistics of a random signal. Once the variance is known, it can be reduced or even removed from the final spectrum in PSD format. The Variance Reduction option readily provides a smooth PSD without a long averaging process.

Variance Reduction does not affect the control loop itself. This process is applied to the computation of the control PSD by reducing its variance. The resulting control spectrum will be within the strict alarm limits much faster. This is especially beneficial when the test duration is very rapid.

The following screenshot shows the control spectrum at the start of a test without Variance Reduction enabled.



The following screenshot shows the control spectrum at the start of a test with Variance Reduction enabled.

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The control PSD is significantly smoother with Variance Reduction enabled.

# Remote Condition Monitoring for Predictive Maintenance with permanently mounted Spider modules.

Spider systems can be located within a facility or deployed remotely to simultaneously monitor equipment health or structures.

Continuous monitoring with auto alarms and notifications can conveniently monitor health and provide alerts for unusual and potentially catastrophic events.

In addition, periodic data collection with multiple sets of parameters facilitates early diagnosis of potential failures that aid in reducing the downtime of critical equipment.



Measurement entries can be individually configured, and any number of measurement entries are allowed on each Spider system.



Measurement entries can be executed or repeated according to the needs and requirements of an application.

Measurement Schedul	e >	<
	How often should data be collected?	h
Repeat type:	Disable     O Daily     Weekly	
	Monthly Ocustomize	
Measurement time:	20: 00: 00 (HH:MM:SS)	
End date:	2022/10/02 16:06:20	
Interval	1 day	
	OK Cancel	

A completely customizable hierarchy of Factory -> Space -> Machine -> Points can be created to monitor vibrations on structures.



A quick overview of the RCM project is located in the Project View tab. This includes a complete overview of different test statuses running on individual Spider systems.





#### 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 postprocessing 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.



# Shaped Random and DSA Playback Output in Run Schedule and DSA Black Box Mode

EDM 10.1 DSA now provides Playback and Shaped Random Output types when creating an entry in the Run Schedule. A profile window appears when Playback Output is selected. Users can browse for a time recording pulse to play on repeat or to add as a Run Schedule entry.



#### Shaped Random Setup

A profile breakpoint table will appear for Shaped Random output types. The profile may be added to the Run Schedule as well.

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	1.005-0-				
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		Frequency Hz	Voltage (V) <sup>2</sup> /Hz	Slope d8/Oct	
•	1	20	0.000262769		
	2	80	0.0010461		
	1	150	0.0010461		
		2000	0.000354163		
	-				
Te i	calculate	the cross-over break	point, enter '7' in any bre	akpoint line.	
	opeunit	dl/Oct			
- 24					

This outputs a custom waveform or Shaped Random while the Spider system is running in the Black Box mode.

# Create Mission Profile Analysis and Sine on Random (SOR) Profile in PA - Fatigue Damage Spectrum (FDS)

PA - FDS allows users to import raw time waveform data from field testing under multiple conditions and build a combined mission profile. Then based on the expected number of life hours (or cycles), the lifetime damage can be calculated. A new accelerated PSD can then be developed with an equivalent damage potential as the original life cycle but at a fraction of the necessary testing time.



#### Fatigue Damage Spectrum – Mission Profile Analysis

PA 10.1 allows users to add multiple time recordings, PSDs, and sine tone profiles to generate custom Random or Sine-on-Random profiles based on recordings taken from the field.

Fatigue Damage Spectrum theory is applied to convert time domain recordings into frequency domain plots with the equivalent amount of damage. Mission parameters including different weights for different load cases can be added to provide a complete assessment of the total lifetime damage accumulated by a DUT, which can be time accelerated to provide an equivalent damage assessment in a shorter time frame using FDS.





## FDS Sine-on-Random - Extracting Sine tones from Sinedominated broadband signals

PA now has the ability to extract Sine tones from a broadband signal with the help of a Tachometer. Most signals obtained from rotating machinery will have Sine tones and harmonics from periodic elements. FDS cannot be directly applied on these Sine dominated broadband tones as this would misrepresent the true damage imparted to the DUT.

The PA 10.1 FDS feature allows users to filter out Sine tones using an advanced order tracking filter. This produces a signal with an independent sine tone and another with just the broadband. FDS algorithms are used to calculate damage from the two sources and is time accelerated to produce an equivalent lifetime damage. The resulting accelerated PSD is combined with Sine tones and results in an SOR profile to run on a shaker.



# 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.

Wight broker setting		^
Broker Setting Connecte	d Clients Broker Log	
Broker IP	192 . 168 . 10 . 11 1 (127.0.0.1)	
Broker Port	1883 💼	
Communication Timeout	3000 🚔	
User Name	Admin	
Password		
TLS Version	No TLS	
Start Broker When App Starts		
Start Broker	er Clear Log	Close

Client Setting Sparkplug	Setting Publish Settin	9	Advanced Setting Messages
Broker IP	192 . 168 . 10 . 11	I	
Broker Port	1883		
Communication Timeout	5000	*	(ms)
User Name	Admin		
Password			
TLS Version	No TLS	•	
Protocol Version	3.1.1	•	
Keep alive interval	60		(s)
Clear Session	2		
Topic Prefix	EDM		The client will publish messages with this prefix, for example Topic Prefix 1/4 on System Status
Connect to Broker When App Starts			TopicPerfet/paper/splant/stand (TopicPerfet/paper/splant/stand (TopicPerfet/OSA/Test/Status (TopicPerfet/OSA/Test/Parametes When enabling Sparkplug the settings of Sparkplug shall prevail.

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

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#### **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.

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# *Third-party Equipment Control Integrated for Battery Testing* The control of the following equipment is integrated into EDM extensions. All of the following equipment is compatible with the

extensions. All of the following equipment is compatible with CAN bus interface.

## Espec chamber control



#### UMC1200 chamber controller control

<u>ļī.</u>			Fixed Value Running					
<u>A</u> 113	IP ALARM 01				2022-06-	24 15:45:01		
TEMP PV C 40 C								
sv	63.5							
HUMI -		PV						
sv	59.0	%						
R	PID area: 5 un Time: 0000:00	)	Settings	Stop	Pause	AT		
					Advanced	Disconne		

# Charge cabinet control

Anous							
Sattery pack	CAN × Char	gecabi	inet CAN	*			
Aode	Nomal mode		Open	DBC file	D:\D8C\charge.dbc	Rec. interval(s)	1.0
laud rate			Close	Record File	D:\/DBC\.charge.20220511140635.csv	Record	ON
CAN ID	CAN2	1					Advanced
Daw Oata	Constitut Co	and Dice	day Dif	Charmed	autra		
NAW LOANS	and units and	Indi Misiy	ney rus	Charge o	stres		
Manual Manual	al control of charg	ing and	discharging	equipment			
start							
Next en	Rry		Junio C				
Settings -							
Internal A	mat) 10	00 . th					
inseriai y	Ha) 10	11 (F)					



#### Water chiller control

Waterchiller Controller	r			<b>*</b> ×
Supply pressure (Bar)	0	Supply temp (°C)	0	None
Return pressure (Bar)	0	Condensing temp (°C)	0	None
Supply flow (L/Min)	0	Exhaust gas temp (°C)	0	
Liquid level (%)	0	Return temp (°C)	0	No warning.
Frequency (Hz)	0	Signal	0	
Temp. (°C)	0.00	Prov	Durana	Const
Flow (°C)	0.00	Kun	Purge	Connect
Pressure (°C)	0.00	Stop Er	nptying	Disconnect
Forced heating (°C)	0.00			
Program No.	0	Apply Loc	op Switcl	h Setting

Vaterchiller FLIZ		<b>▼</b> ×
TEMP (°C)	DIFF (b	par)
FLOW (L/min)		
Run	Error	$\bigcirc$
TEMP SV (°C)	20.0	Run
FLOW SV (L/min)	10.0	Stop
	Settings	Connect

Low voltage source, high voltage source control, water chiller, and CAN bus interface

S Second Annual	5 - 2 8 x 4 1 0 -		
A control and a control a			

Data acquisition control (2638A, LR8400)



# **NEW FEATURES**

New Features in EDM-VCS Vibration Control Software Any Channel as Drive Channel in Single-Axis EDM-VCS

When more than one output channel is enabled, any channel can be assigned as the drive channel.

worer serup output	channes for your device
Use the selected out	put channel as the drive channel
Output CH1	
Output CH1	
Output CH2	
Output CH3	
Output CH4	
Output CH5	
Output CH6	
Output CH7	
Cutor + CUS	

#### Abort Status Window

The new Abort Status window on the View toolbar provides users with an abort status during a test run and reasons why a test was aborted. The values in the window are found in Test Parameters -> Abort Sensitivity.

Abort Status			<b>▼</b> ×
Status: Running			
Abort thresholds	Measured	Limit	
Low control RMS level (dB)	0.00	40.00	
Max RMS change (dB)	1.04	13.00	
Percent of lines past abor	0.00	10.00	

#### Incremental Ramp Levels in Run Schedule

Incremental Ramp Levels is a new template option provided in the Run Schedule. This template can generate events to overwrite or add to the Run Schedule.

Template	s 🔹					
Increment	al ramp levels					
	Incremental Ramp Levels					? X
	Ramp from:	25.00 🔹 % to 100%	6			
	Step size:	25.00 🔹 %				
	Duration (<100%)	10 🔺 s or	0000:	00:	10 (HH:MM:S	S
	Duration (=100%)	300 🔹 s or	0000:	05:	00 (HH:MM:S	S)
	Overwrite existing sch	nedule			<u>O</u> K	<u>C</u> ancel
-						



#### Create Drive Signal Profile on Sine Oscillator

- Users can define the Drive Signal Profile (in voltage) using a breakpoint table of frequencies and drive peak.
- Users can set the "Drive Peak" and "Frequency" to follow the profile in the Control Panel or enter the values manually.

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	Frequency	Voltage	Segment to	pe.							Ph 5440	PLPh (mm)	
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			Const. Arrig	2. 2							1		-042-02
2	1000	1									Faran	etars.	
											Low Frequency Bits)		
											High Frequency (Hz)		
											Mart Inequency Bits		-
											(bries much (V)	10.45	-
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											Read Minister (C)	14	
											Calculate Second Table	09	
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											frequency	Date Sind	
de	ate the cross	Over point	automatical	By Ewher	T in any break	point line. Line	in format all		3	_	Della F 8140		
											Duration Type	Tire	
											Durather (seconds)		



#### PC SRS Feature

PC SRS signals can be calculated from any given channel. These signals can have a custom frequency range that is different from the RRS profile frequency range and does not interfere with the performance of SRS test control.

	Signals Setup							1	×
Time stream	ns Statistics time	history Time	blocks Auto	-power Spectra (AP	5) On boar	d Shock lies	porce Spectrum (SRS)	PC Shock Response Spectrum (SRS)	- 11
C Math si	all simulations and simulations an	or all sizeals	All signals	CEC Exerciseron Par	Delete	all sineate	fam and providen of		
	Signal name	Measure	Saves	at Si	phal color	Delete	Sale destination		
001	MaxiSRS(ChT)					×	None		
				PC SRS Frequence	y Range		×		
				Custom rang					
				Min frequency (	HZ):		5.00		
				Max frequency	Hz)		1,000.00		
				-	-	Print			
						Lances			

### **Configure Specific Digital Output for Limit**

Users can configure each limit to trigger a separate Digital Output along with a separate signal pattern.

Location ID	Enabled	Edit	Digital output action
Ch1		Edit	Disabled
Ch2		Edit	Enabled
Ch3		Edit	Enabled
Ch4		Edit	Disabled
Ch5		Edit	Enabled
Ch6		Edit	Disabled
Ch7		Edit	Disabled
Ch8		Edit	Disabled



# Copy/Paste Test Profile and Limit Channels in Random and Sine Tests

Users can now copy/paste columns and profiles into Profile Editor from a CSV or similarly formatted files.

Test Configurations for I	Random8	[Random]							7	>
Test profile		R	MS (g): 1.00063	Scale RMS						
Staker parameters Test parameters Pre-test parameters		0.00	LogMag g <sup>1</sup> /Hz							
Test profile RMS limits Runschedule	-	1.000-	04						Insuran	-
Limit channels Event action rules	l	Insertrow	20 Delete row Append	now Cleartable Pro + In	io	Export • Yan	LogMag •	1000		200
Miscellaneous		,	Copy Profile	Acceleration (g) <sup>2</sup> /Hz 0.000273233	Slope dB/Oct	High Abort dB 6	High Alarm dB J	Low Atarm dB -3	Low Abo dB -6	irt
		2	80	0.00105776	3	6	3	з	-6	
			350	0.00108776		6	3	-3	-6	
					- 0					

Frequency	Accelerati	Slope	HiAbort	HiAlarm	LowAlarm	LowAbort
20	0.000273		6	3	-3	-6
80	0.001088		6	3	-3	-6
350	0.001088		6	3	-3	-6
2000	0.000191		6	3	-3	-6



HiAbort	HiAlarm	LowAlarm
6	3	-3
6	3	-3
6	3	-3

# Normalized Error Signal for Random

The Normalized Error Signal between a Control and Profile helps users determine the magnitude of error at different levels. EDM 10.1 introduces the Normalized Error Signal features which displays the ratio of error with respect to the profile at any level during a test.



# New Features in MIMO Vibration Control Software COLA in MIMO Sine

COLA is added to MIMO Sine. The Output Channel besides the Drive Channel can be specified as a COLA Output when utilizing an adequate number of output channels from the Spider hardware platform.

	a contract of the second second	1 6
Miscellaneous *	Record and save options Output settings	
MacAndon V	Interest and use options (Output setting) Market Flage options) and therein the reput device Depart type of the floorth metpol COLA year is Constant amplitude unive Depart amplitude (Yold) 5(2)	

## Push-Pull Diagram for MESA Configurations

The Push-Pull MESA shaker configuration is added as an option during test creation.



# New Features in EDM Dynamic Signal Analysis DSA – Octave Analysis supports Tach and RPM Signals

EDM 10.1 allows users to import RPM and tach-based signals in tandem with acoustic data to study and co-relate the effects of speed and RPM in acoustic measurements.

🗷 APS: Auto Power Spectra u	ising FFT
	ising the
TACHO: Tachometer	
SLM: Sound Level Meter m	neasurement using real time digital filters
🗷 OCT: Octave Analysis using	g real time digital filters
Select all	

# Time History Signals on Filtered Signals

EDM 10.1 introduces a feature to compute statistics-based signals on filtered time signals. This feature expands user capability for computing signals according to specific use cases and reduces the need for post processing signals.



# Search Resonance for Saved FRF Signals

This powerful new feature allows users to search for resonance in live or post processed FRFs. Users can define specific parameters for the resonance search such as a high level frequency range and Q factor. Users also have the choice of looking for peaks or valleys. Once the desired peaks are located, a quick one-click operation can export the results to a Microsoft Word file.



# Export APS Signals as Octave Spectrum

EDM 10.1 allows users to export single or multiple APS frames as Octave Spectrum. Right-click on an APS signal to select Export Octave Bands.



#### Run Folder Statistics in EDM-DSA

Further functionality is added across the entire EDM software package with a new Run Folder Statistics window. Users can view the location, size, and file tree of all Run Folders in a particular test with the simple click of a button.



#### Define and Allocate Circular Buffer in Time

Users can now configure Circular Recording in terms of time. This allows users to capture a post-trigger without specifying the recording memory size.

Recording options
Record duration: 0000: 01: 00 (HH:MM:SS) (Set 00:00:00 to record until stopped by user or system)
After the first recording, repeat:  No repeat Under the defined event above
epeat triggered recording with no more than 100 times. (this is only effective when input trigger is set to start the recording)
Enable Circular Recording. When using circular recording, the number of channels being recorded must be a power of 2.
Recording Size     600 → MB     Recording Length     60 → Sec     Sec

#### 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 Features in Post Analyzer Orbit Plots in PA

Users can now view Orbit Plots in PA FFT and Order Tracking tests.



#### 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



	Digital View Display	Properties			
Output #7 (Pin #7)					1
	Oisplay pulse c	ount		20 (1~1024)	0
Dutput #6 (Pin #6)	• Time duration	of display		10.000 (s)	-1
Output #5 (Pin #5)	Display properties				10
	Name	Pin≢	Color	Display	
Output #4 (Pin #4)	Output #1	Pin #1		- 12	1
	Output #2	Pin #2		- 10	
Output #3 (Pin #3)	Output #3	Pin #3		• 121	- 1 <sup>0</sup>
	Output =4	Pin #4		• 12	
Output #2 (Pin #2)	Output #5	Pin #5		• 12	10
- M 22	Output #6	Pin #6		- 10	
Output #1 (Pin #1)	Output #7	Pin #7		• 10	- 1 <sup>0</sup>
	Output #8	Pin #8		• 90	
13	a la				672 0

#### Data Download - Pause and Resume

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

Diard	iail Data from	Spider Internal Storag					1	~
Data	Res Run Log							
Notes	hold the shift	key + left-click on a sig	pul name to select/un-select multiple	signals.				
	Name	Test	Size Date Created	Remain Ta.,	Download (%)	Download Path		
			Files on (Master) SN: 999500	Total space	3.7568, free space: 3.	4758 (92.42%)		
53	HEC0025	Rand, variable	90.37 ME 817/2022 4 51:13 PM	00:00:00	1.04	10peni		
	FIEC0024	Rand_variable	6.74 MB 817(2022 4.49 55 PM	00.00-00	0.00%	Digeni.		
11	FIEC0023	Fland_variabl.	7.62 ME 817/2022 4 47 22 PM	00.00.00	20%	10pml		
11	FEC0022	Rand_variabl.	6.15 MB 8/17/2022 3:59 04 PM	00.00.00	20%	10peni		
12	FIEC0021	Rand_variabl.	734 11 KB 8160022 4 25 17 PM	00:00:00	346	1Count		
11	<b>FEC0000</b>	Rand_cariabl	3.41 MB 816/0022 4 24 02 PM	00:00:00	104	1Canol		
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0	FEC0018	Rand_variabl.	4 74 MB 8/0/2022 1:54 30 PM	00:00:00	10%	10pent		
12	FIEC0014	Rand_veriebl.	4.74 MB 8/9/2022 1:53 31 PM	00.00.00	10%	Spect .		
0.	FEC0013	Rand_variable	4.74 MB 8/6/2022 1/52 24 PM	00:00:00	- 165	1Carol		
11	FIEC0012	Rand_variable	5.33 MB 8/6/2022 1.51 00 PM	00:00:00	104	1Cared		
12	FEC0011	THF.66351	23.96 MB 8+2022 10:53 10 AM	00.00.00	- 10%	10pm/		
13	FEC0009	Rand_veriebi .	11.17 ME 7/20/2022 10/21 06 JAM	00,00,00	12%	10peni		
6	FIEC0008	Rand_variabl.	11.17 ME 7/20/2022 10:20:46 AM	00 00 00	145	Raperd		
	FIEC0007	Raid_usrieb.	11.17 ME 720/2022 10 13:03 AM	00 00 00	0.004	1Carect		
13.1	FEC0006	Rand_variabl.	11.17 ME 729/2022 10 18:00 JW	00.00.00	225	(Cperi)		
E	FEC0005	Rand_venisbl.	15 17 ME 7/20/2022 10 16:58 JW	00:00:00	204	3 (Cpent)		
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#### **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.



#### Vibration Calculator

The Vibration Calculator tool is available in EDM 10.1 as an EDM extension. This tool is accessible from the "Setup" menu and can perform various calculations as listed below:

#### Sine Frequency/A/V/D Calculator



#### Random PSD/RMS Calculator

	Input Min/N PSD value to	Nax frequency and calculate RMS value
Sine Motion Calc.	Min Frequency (Hz)	20.00000
PSD to RMS Calc.	Max Frequency (Hz)	2000.00000
Log'	D PSD (g²/Hz)	0.05051
Log Gain Calc.	🗸 RMS (g)	10.00000
% Error Calc.	Reset	Calculate

#### **Gain Calculator**

	Input and select two values to Both input and output are power value	calculate gain and vice versa. ues, make sure select one of them.
Sine Motion Calc.	🐼 Input Value (P)	5.00000
PSD to RMS Calc.	Output Value (P)	50.00000 ×
Log	Gain (Output/Input)	
Log Gain Cak.	😰 Gain (d8)	10.00000
% Error Cala	Reset	Calculate
is circl calc.		

# **Error Calculator**

	Input and select two values to Make sure sele	calculate error percentage and vice vers ect one of True/Error value.
Sine Motion Calc.	🐼 True Value	10.00000
PSD to RMS Calc.	Z Error Value	9.92
Log	Error (%)	-0.10000
Log Gain Calc.	Error (dB)	-0.00869
<u>%</u> *	Reset	Calculate
% Error Calc.		

#### 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.



#### Add Test Progress to Report Filename

When generating multiple reports during a test, users will find it helpful to insert the test progress into the filename.

This new feature allows users to select and insert the elapsed time into the report filename.



#### 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.

Appearance	Language		
App Extensions		View in active window (if possible)	
Notifications	Fnable system log Pnable error submitting	Replace active view	
VCS settings	Log settings	View in new window	
Socket server	Default action upon double-clicking signal node:	View in new window	
Mail setting			

#### Add Additional Notes to Report Option

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



## MAJOR IMPROVEMENTS

EDM Vibration Control Software

Constant A/V/D Amplitude is added as a segment type in the Sine Profile Editor.



# Start Recording & Stop Recording System Events in Run Schedule

The new Start Recording & Stop Recording functions allow users to easily add events in the Run Schedule without creating event rules.

Select an item to insert:	Schedule
Test schedule entries     *       Start a loop     Run at Level       Start Recording     Stop Recording	Edit entry   Remove entry   Disable entry   Move up   Move down   Statecording Loop number: 1 Level 25.00%, duration 00:00:10 Level 50.00%, duration 00:00:10
User defined events  Save signals to PC Flash Screen and Beep My Report	Level 75.00%, duration 00:00:10 Level 100.00%, duration 00:05:00 End loop My Report (Create Report) 2 Stop Recording

# Configure and Control Run Log Event Types in Run Log

Users can access the Report Settings to exclude certain events such as "Flash screen and beep" or "System alarm" from appearing in the Run Log section of the report.



#### Separate Abort and Alarm Lines for SoR Sine Sweeps

Users can enable abort and alarm lines for each Sine Sweep tone from a Sine on Random test.





# Image: Algorithm of the second sec

込、HighAlarm\_Tone5(f) 込、HighAlarm\_Tone9(f)

10.000	LOWADOIL_IOILE4(I)
<u>h.</u>	LowAbort_Tone5(f)
<u> </u>	LowAbort_Tone9(f)
<u> A.</u>	LowAlarm_Tone1(f)
<u>M</u>	LowAlarm_Tone2(f)
<u> </u>	LowAlarm_Tone3(f)
<u>h.</u>	LowAlarm_Tone4(f)
Į٨.,	LowAlarm_Tone5(f)
<u>M.</u>	LowAlarm_Tone9(f)
Į٨.,	peak_tone1(f)
ta.	neak tone2(f)

#### SoR Low Abort & Low Alarm for Sine Tone

Sine tones for Sine on Random tests work with high alarms and high aborts to ensure that any Sine tones beyond the user defined limits are captured.

The EDM 10.1 release adds low abort and alarms specific to the Sine tones on the SOR profile.

This enables detection if any Sine tones have amplitudes that are less than the desired values.

Tone number								
Current tone 3	<ul> <li>Advanced settings</li> </ul>							
Sweep in harmonic mode								
Property of tone 3 —								
Use advanced profile	Edit profile							
Peak (g)	0							
High-Alarm (dB)	3.00 Low-Alarm (dB)	-3.00						
High-Abort (dB)	6.00 Low-Abort (dB)	-6.00						
Ramping rate (dB/s)	12.00							
Sween narameters								

#### Display Profile with Level in VCS-Random

Users can display a Profile with alarm and abort lines with respect to the current level or at a user defined 100% level.



Displaying it at the current level provides an easier view of the control signal with respect to the profile and alarm/abort lines.



#### Append Shaker Information to each Run

The shaker information for each test run is saved. Users can view the type of shaker used along with the shaker limits for a test run in the Run History.

	,							~
Ver	Current Test	H 54	erh.		51		Beport the selected sums	
S., 8	Date	Test	Run duration	Test type	End condition	User	Run folder	
1	2022-08-17 16:50:55	Rand variable care	00:08:30	Kandom	User Abort	Admin	Fun14 Aug 17, 2022 16-50-50	
. 2	2222-08-17 16-49-37	Sand swiable sam	. 0000.58	Random	User Abort	Admin	Fuent2 Aug 17, 2022 16-18-33	
1	2022-06-17 16-46-59	Rand uniable cam	80.01.08	Random	User Abort	Admin	Bun12 Aug 17, 2022 16:45:55	
.4	2022-00-17 15:58:17	Earth uniable sam	00-42-50	Random	User Abort	Admin	Burill Aug 17, 2002 15-50-13	
5	2022-08-17 15:57:44	Rand satisfies an	000019	Random	User Abort	Admin	Run10 Aug 17, 2022 15-57-38	
6	2022-08-16 16:23:10	Eand spishle sam	00:02:27	Random	User Abort	Admin	Furth Aug 16, 2022 16-22-45	
.7	2022-08-16 16 13:22	Band, variable, sam	00-03-44	Eandom	User Abort	Admin	Rund Aug 16, 2022 16-13-17	
	2522-08-16 16 11:00	Earld unlable sam	00/01/25	Random	User Abort	Admin	Run7 Aug 16, 2022 16-10-41	
	2122-06-06 13-50-30	Rand uniable use	00.09.1h	Randsim	Des Jacob	S.fmin	Rund Aust 28, 2022 11, 55, 12	_
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Test Start time Stop time Duration	Rand, variable sample, J 2022-08-17 16-86-37 2022-08-17 16:50-35 00:00:58	541 (B) 5 2	un Log Ohennel Sta anufacturer aker name eylizad mass	nus Seved Files	Shaker Controller Shinkan G-2005D 0.22046	185	Open test Beview	
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#### Freeze Control or Control Composite Display

Users can freeze the display to collect a report or to analyze signals. The Spider processor continuously manages the control, limiting, and alarm features even when the display is frozen.



# Display SOR or ROR Narrowband Profile with Broadband Profile

Random Narrowband Profile display:



Random Narrowband, Sine tone, and Broadband combined profile display:



*Display Low Abort and Low Alarm Lines for Limit Channels* Limit channels now support low alarm and low abort lines.



#### Enable/Disable Auto Sine Ramp up

Users are provided an option to not ramp down and ramp up when a user event is between the end of an entry and where another entry begins.

196	Event list					
Add a user event Edit event n	ame Remove event	Run log event strings	Disable sine auto ramping or not			
Event name	Action rules					
My Report Flash Screen and Beep	Create Report Flash Screen and Ber					
Save signals to PC	Save signals to PC Save results to PC					
CAMP	Canal also Tores					

#### Set APS Signals as Profile/Limit in VCS-Random

The Random Test Profile and Limit Channels can now import previously ran APS signals.



				_					
	LogMag	w/sile_+ Ht		-					
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1.005	-09								E
	5.0	10			1	00		100	traquency b
ertrow	Delete row	Append row	Clear table	FILL .	Import/Analyze *	Export .	Y axis LogMag		
	Frequenc	y	Accelerat (m/s <sup>2</sup> ) <sup>2</sup> /H	ion	Slope dB/Oct	High dB	Abort High Alam dS	n Low Alarm dB	Low Abort dB
1	5		6.29904E-	06	11				
					8.48977	6.0206	3.0103	-3.0103	-6.0206
2	10		4.44945E	05	10.1				
	1				29.5692	6.0206	3.0103	-3.0103	+6.0205
3	15		0.0023871	7					
					24.4336	6.0206	3.0103	-3.0103	-6.0206
4	20		0.0246648						
					6.18268	6.0206	3.0103	-3.0103	-6.0206
5	25		0.0390045						
	2				-0.194452	6.0206	3.0103	-3.0103	-6.0206
6	30		0.0385479	6					
	1				5.02058	6.0206	3.0103	-3.0103	-6.0206
7	35		0.0498488		12				
	D D D D D D D D D D D D D D D D D D D					10000	0.0400	3.0403	The second



t Profile For Channel: Ch1

84/9 <sup>2</sup> 7/148			Noto	hing — Higi le	Abort H	High Alarm	OK.
							Cancel
				m			They do
					and the second	marin	V. Show profile
-				10000000	Adada		Import.
							Export CSV
						requesty (Hz)	
20	100				1000	2000	Rescale
	in the non-bang the own reaction	The second second	N. DERIGATION	mits together			InderTrates
Frequency	Notch Acc	Enable	High Alaim	High Abort			Remove row
frequency Http	Notch Acc Unix?//Hzj	Enable	High Alarm	High Abort			Remove row Clear table
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nn Frequency HD 20	Notch Acc (Inv:s*/ritip 0.024665	Enable	High Alarm (db) 3.0103	High Abort (dlg 6.0206		*0	Remove role Clear table
requency Ptg 20 25	Notch Acc (bw/s%/Hig) 0.024665 0.0396005	Enable	High Alarm (68) 3.0103 3.0103	High Abort (48) 6.0206		â	Remove rais Clear table Titl at
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ats	Notify Area           0x079/reg           <	Enable 2	High Alarm 108 3.0103 3.0103 3.0103 3.0103 3.0103	High Abort StB 6.0206 6.0206 6.0206 6.0206			Remove row Clear table Till at Fill down Fill lange, Digital subput

#### Random Profile Support Linear-Log for Slope dB/Hz

The Random test profile now shows the Frequency (Hz) in linear and Amplitude (m/s<sup>2</sup>) in log when the slope format is selected as dB/Hz.



#### Random RMS Limits Support dB

The RMS limits in Random now allows users to manual enter the limit values as dB.

RMS limits	Warning: The expe	cted values are esti-	maced. The actual shak	er cemand values may	be significantly higher. Nam	rowband RMS and	8
akei parameters	onfies.	et samplificants and	s prie spries shat will be	STATED OF IT SCHEREIN	Does not include al name	vourios ano sina v	-
it parameters	Check AVD against	shaker limita —					
e-test parameters et punfila	Physical	Profie RMS	Profile expected	Sheker limits	Expected/Shaker		
es Groite	Acceleration (n)	1.001	3002 (Peek)	SO Peaks	6.0%		
s schedule	Velocity (in/s)	0.3415	1.025 (Peak)	70 (Peak)	1.5%		
il channels	Displacement (m)	3.2096-05	0.0001926 (Pk-Pk)	0.0127 (Pk-Pk)	1.5%		
nt action rules	Force LBF)	0.5618	1.985 (Peak)	100 (RMS)	0.7%		
	Enter manually (	5)					
		a)	(d	80			
	High Abort	(a) 1.990	h}	0 60()			
	High Abort High Alarm	(g) 1990(‡ 1410(‡	h) (+)	60日 10日 10日			
	High Abort High Alarm Profile RMS	(g) 1,990 (=) 1,4134 (=) 1,0006	(e) (e)	9 600년 900년			
	High Abort High Alarn Profile RMS Low Alarm	(g) 1,000(= 1,4006 0,7000(=	h) (•) (•) (•)	9 60 1 20 1 20 1 20 1 20 1 20 1 20 1 20 1			

#### Improved SRS Synthesis Methods

SRS Synthesis methods have been refactored into the following improved methods: Pyroshock, Minimum Acceleration, MIL-STD-810 (Te), and MIL-STD-810 (TE).

The Minimum Acceleration method takes in a suggested Max Amplitude and Duration, and attempts to spread the wavelets evenly throughout the provided duration. Half-cycles are varied amongst wavelets to fit the Max Amplitude requirement.

The Te and TE algorithms are similar to the Minimum Acceleration, except the MIL-STD-810 specific definitions of Te and TE are used to guide the synthesis. The user should iterate between different values of Te/TE and compare that to the realized Te/TE values. The input Te/TE value can be adjusted until a satisfactory Te/TE is realized.

These methods are used in conjunction with an improved "Run Schedule" list of operations for SRS synthesis, that are repeatable to save time if an upstream parameter is changed.

Additionally, the following wavelet types are now used: Sine, Damped Sine, and Custom User-Defined waveform.



#### Vertical Cursor for SRS Synthesis

SRS Synthesis graphs now provide a vertical cursor to display each data and profile point value.



#### Add Shaker Name into VCS Testing Reports

The shaker name is integrated into the report when a Shaker Library is selected under Report Settings.



#### **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, reorientation 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.

Vode s	hapes				
	Enable for animation	DOFs	Label	Magnitude_F#1	Phase_F#1
۱.		-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	0.0035472737	136. <b>339539</b>
		-601X	radt2fix	0.00348242805	- 133.8 <mark>92334</mark>
		-516V	radt2fix	1 724 0 <del>5852E=05</del>	-130 580719

#### 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 finetune the parameters of the curve-fitting process before initiating the calculations.



# EDM Temperature, Humidity, Vibration Control Software

Specify Chamber Location in the chamber parameters. The location can be uploaded to EDM Cloud.

Home	Cloud	Al	bout					2010 Duan avenue, Santa Clara,		Nice IP:	Not conne
Chamber p	arameters										
Chamber lo	action	2090 D	Jan a	venue,	Sant	a Clara	, CA 95	054, USA	Lat, Long		
Manufactur		Sentek						Chamber serial number			
Chamber n	ame							Product model			
External dir	nension	0.0		0.0		0.0		Version of the model	0 0	0	
Internal din	nension	0.0		0.0		0.0		Temperature uniformity(±)		0.0	
Workspace	volume					0.0		Humidity uniformity(±)		0.0	96RH
Temperatur	e range		0.0			0.0		Temperature accuracy		0.0	
Humidity ra	inge		0.0			0.0	%RH	Humidity accuracy		0.0	%RH
Cooling rat	e		0.0			0.0		nonlinear		0.0	°C/min
Heating rat	e					0.0		nonlinear		0.0	"C/mir
									Cancel		Apply
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hamber pa	rameters										
hamber loa	action	37.3931	-121	962					Lat, Long		Ŷ
lanufacture	en	Sentek						Chamber serial number			

Enter address of an EDM Cloud server (CI or self-hosted servers):

#### Enter login information

Home	Cloud	About	2090 Duae avenue, Santa Clara	Device IP: Not connected
Cloud login				
			Sign in	
		Cloud server address	https://cloud.go-ci.com	
		Email	demo@go-ci.com	

#### Upload settings for the currently running test:



Create a report from an EDC\_run file

Home	Cloud	Abo	ut	2090 Dua	n avenue, Santa Clana	Device IP: Not come
Choose dev	ice					
Serial numb	er II	address		Master or slave	Is connected	Device type
20181408		91 30.90 1	85	Master	Disconnected	Spider-101
Connect	automatica	ly				



# EDM Dynamic Signal Analysis

# Improvements to Cross Plot in EDM-DSA

Users can auto scale the Cross Plot and connect the data points to obtain a more complete view of the data.



# Post Analyzer

#### **Rename PA Signals**

Users can rename PA Signals from the Setup menu using the Input Channel Label wizard. The signals related to each input channel will be modified once the name of the input channel is reconfigured.

	Current File	Revised Channel Label	
•	REC0001	ch1	
	REC0001	ch2	
	REC0001	ch3	
	REC0001	I love my Spider	
	REC0001	ch5	
	REC0001	chб	
	REC0001	ch7	
	REC0001	ch8	
Rena	ame the current chan	Bato	h modification
Rena	ame the current chan	Bato	h modification

#### Signal Map View in PA

The Signal Map feature allows users to trace each signal to the exact related hardware and Unit Under Test (UUT). This allows for accurate record-keeping during post-processing of signals originating from multiple front-ends.

This feature is especially useful when using the new signal merge function to synchronize data from multiple units and compute signals as a function of data collected from both units. Users can look at the signal map of final computed signals and backtrack to the precise source and instrument used to collect the original data.



## **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.

Test Sequence Setup							×
Items	+				Test	schedule	
Start a Loop		Remove entry	Move up	Move down	Clear	Default Test Sequence	
Pause Switch System (Tests) Random12 [Random] SORKOR2 [Random on Random AN TTH4 [TTH] Shock2 [Shock]		Loop Times 1 Random 17 SORROR2 TTH4 (TTH Shock2 (SP Sine7 (Swe Case Tow	(Random) (Random o ) reck) spt Sine) of Cinal	n Random AN	D Sine(	on Random)	

#### Improvements to Margins in Report

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

Top (cm):	2.54 🌲
Bottom (cm):	2.54 🌲
Right (cm):	1.27 🗘
Left (cm):	1.27 🌻
Header from Top (cm):	2.00 🗘
Footer from Bottom (cm):	2.00 🗘

# Enhanced Import of Sensor Data from Excel

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

4	Attach 1 Channe	ið el	Enable Import	Name	Manufacturer	Model	Serial number	Sensor type	input mode		Measu	rene ntity
	None	4		New Sensor					Charge-10000pc		Accele	ratio
	None	Ŷ		ForceSen2	Bruel & Kjaer		56706	IEPE	IEPE	4	Fo	nce
	Ch1	Ŷ		3023A1-2	Dytran Instruments		3736	Accelerometer	IEPE	¥	Accele	ratio
	Ch2	~		New Sensor2					DC-Single End	4	Accele	ratio
	None	v		ForceSen	Bruel & Kjaer		56708	IEPE	IEPE	v	Fo	ice
	None	¥		New Sensor3					Charge-10000pc	4	Accele	ratio
	Ch3	¥	Ø	New Sensore	Bruel & Kjøer		56708	IEPE	IEPE	v	Fo	101
	Ch7	v		New Sensor3(1)					Charge-10000pc	v	Accele	ratio
	Chil	ų.		New Sensor4(1)	Dytraninstruments		3736	Accelerometer	IEPE	1	Accele	ratio

	Name	Manufacturer	Model	number	Sensor type	input mode		quantity		Unit		sensiti
5	New Sensor	1				Charge-10000pc	~	Acceleration	6	m/s <sup>4</sup>	v	C.0000/pC/t
	3025A1-Z	Dytran Instruments		3736	Accelerometer	EPE	Y	Acceleration		9.	Y	0.0000(WV/
	New Sensor2					<b>DC-Single End</b>	¥	Acceleration	1	mist	14	0.0000(wV/)
	New Sensoria	Bruel & Kjøer		\$6708	EPE	RPE	Y	Force	14	Newton	Y	0.0000(mV/1
	New Sensor3(1)					Charge-10000pc	v	Acceleration		m/s <sup>a</sup>	~	0.0000/pC/t
	New Sensor4(1)	Oytran Instruments		3736	Accelerometer	IEPE	v	Acceleration	4		4	0.00009WV/

		On/Off	Measurement quantity		Engineerii unit	Sensor	
₽	1	🗹 On	Acceleration	$\sim$	g	3023A1-Z	$\sim$
	2	🗹 On	Acceleration	$\sim$	g	New Sensor2	$\sim$
	3	Off	Force		LBF	New Sensor4	$\sim$
	4	Off	Acceleration	$\sim$	g	User Defined	$\sim$
	5	Off	Acceleration	$\sim$	g	New Sensor4(1)	$\sim$
	6	Off	Acceleration	$\sim$	g	User Defined	$\sim$
	7	Off	Acceleration	$\sim$	g	New Sensor3(1)	$\sim$
	8	Off	Acceleration	$\sim$	g	User Defined	$\sim$

# 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.

	SIG000	B.unv - N	lotep	pad							
File	Edit	Format	Vi	iew Help							
	-1										
	58										
<b>B1</b> (	ock(C	h1)									
UFI	F ASC	II For	rma:	t							
22-1	Aug-0	2 16:4	17:	50					_		
Unt	title	d Test	t No	ote [00	:00	:00]@50.00% [	00:00:44] Tota	al Time Elapse	ed		
Adr	nin										
	0		0	0		0 Ch1	0	Ø NONE		0	0
		2	1	1024		1	0 0.000195	3125	0		
		17	0	0	0	Time	ms				
		12	0	0	0	Acceleration	g				
		0	0	0	0	NONE	NONE				
		0	0	0	0	NONE	NONE				
-7	. 8220	3E-01	-1	.62159E	-01	4.51225E-02	-1.49376E-01	1.40141E-01	-4.70443	2-01	
-4	.8215	3E-01	8	.86736E	-01	1.04720E+00	4.73092E-01	5.04854E-01	4.24724	2-01	
-1	.7045	4E-01	-7	.53092E	-02	6.42160E-01	5.04028E-01	5.74086E-01	6.40026	2-01	
-2	.6455	7E-01	-3	.90395E	-01	1.61652E-01	8.33003E-01	8.68972E-01	-9.83175	2-02	
2	.9169	8E-01	4	.58713E	-01	-5.32523E-01	-3.37020E-01	-4.18113E-01	-2.38039	2-01	
5	.0299	8E-01	-2	.44384E	-01	-1.27204E-01	5.32382E-01	-2.52910E-03	-6.50009	2-03	
-8	. 2834	1E-02	-3	.45052E	-01	-1.28455E-01	-7.32459E-02	3.71767E-01	8.46854	2-01	
7	.7051	9E-01	2	.24166E	-01	-4.04151E-01	-5.54340E-02	3.06716E-01	-8.19176	2-02	
-3	.0238	7E-01	-2	.83181E	-01	-1.02448E-01	-7.28055E-03	6.15324E-02	1.65903	-01	
-1	. 0880	6E-01	-1	.02727E	-01	5.30541E-02	-1.07066E-01	-1.75924E-01	-3.18680	-01	
-1	. 2812	3E-01	5	.52779E	-02	-4.55756E-01	-4.44073E-01	-3.03454E-01	-1.14814	÷+00	1



#### *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.

Properties Import Batch Export	Remove
n 14, 2022 11-26-01	
4 🔨 Run14 Jun 10, 2022 15-40-55	
ISIG0013 Jun 10, 2022 15-43-20 (1)	00.0 %)
🖟 🕬 TimeHistory0194 Jun 10, 2022 15-	41-06
▷ 📢 Run13 Jun 10, 2022 15-37-42	
▷ 📢 Run12 Jun 10, 2022 15-31-34	
▷ 🕎 <u>Run11</u> Jun 10, 2022 15-17-22	
	-
Properties Import Batch Export	Remove
🕤 Run15 Jun 14, 2022 11-26-01	
4 🏹 Run14 Jun 10, 2022 15-40-55	
ISIG0013 Jun 10, 2022 15-43-20 (1)	00.0 %)
MM TimeHistory0194 Jun 10, 2022 15-	41-06
▷ 📆 Run13 Jun 10, 2022 15-37-42	
▷ 🕎 Run12 Jun 10, 2022 15-31-34	
Properties Import Batch Export	Remove
Run15 Jun 14, 2022 11-26-01	
A Sun14 Jun 10, 2022 15-40-55	
AMM SIG0013 Jun 10, 2022 15-43-20 (1	00.0 %)
A 🔤 Time Signals	
M Block(Ch1)	
M. Block(Ch2)	
M. Block(Ch3)	
M. Block(Ch4)	

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.

1 Front-End(s)	selected		
IP Address:	<mark>192</mark> .168.3.151		×
Subnet Mask:	255.255.255.0		×
GateWay:	192.169.3.1		×
		Apply	<u>C</u> ancel
Enter IP Addr	ess Range		x
2 Front-End(s)	selected		
IP Range Start:	<mark>192</mark> .168.3.150		×
IP Range End:	192.168.3.151		
Subnet Mask:	255.255.255.0		×
GateWay:	192.169.3.1		×
		Apply	<u>C</u> ancel
unte Totort - Set static (Pachtons - Tra	lie DHCP	Front End IP coming     Refersh Select All Incom	ne Select - Set static IP address - Fruit
Ø Address	Detected Front Ends Static/DHCP	Serial Number	IP Address
192,165,0139 192,165,0131	Static Static	(1) 2563032 (2) 2592032	192.1680.139 5 192.1680.131 5
		<u> </u>	

#### 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.

spider Check List			· ^		
Nease confirm the followi	ng critical parameters for this test:				
Profile		Schedule test			
1		Item	Parameter		
		Shaker name Payload mass	Sentek L0211A-PAS102/AIF/ 0.22 LBS		
Level 100.00% duration	2000.00 Hz + 00-0500	Target RMS Maximum lev Total test dura Drive limit Sigma clippin	el <u>1.001 g</u> el <u>100%</u> atton 00:05:30 <u>2.00 V</u> g <u>5.00</u>		
Pre-test		Input channels			
ltem	Parameter	Location ID	Parameter		
Pre-test Mode Initial drive Response level goal Maximum drive	Bun pre-test with confirmation 0.005 V 10% 0.7 V	Ch1 (C) Ch2 Ch9 Ch10	100.0000 (mW/g), AC-Single End 100.0000 (mW/g), AC-Single End 100.0000 (mW/g), AC-Single End 100.0000 (mW/g), AC-Single End		
Run description (will be se	eved as user annotation into file)	281	Charles I. Charles		
Random12/Run4			Check List		
Create a new folder ev	ery run 🕐 Use the same folder for every ru	in -			
lun folder name: Run	Sequence number starts from:	4			
	had a second as a second		and a second		

#### **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

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

Туре	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 Softw	vare Version	Firmware Versions			
CoCo-80					
EDM 6.0.2.x		4.0.x			
CoCo-70X					
EDM Testing 10 CoCo for DSA)	.1.0.x (EDM	2.0.x or above			
CoCo-80X/90X					
EDM Testing 10 CoCo for DSA)	.1.0.x (EDM	2.0.x or above			

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