

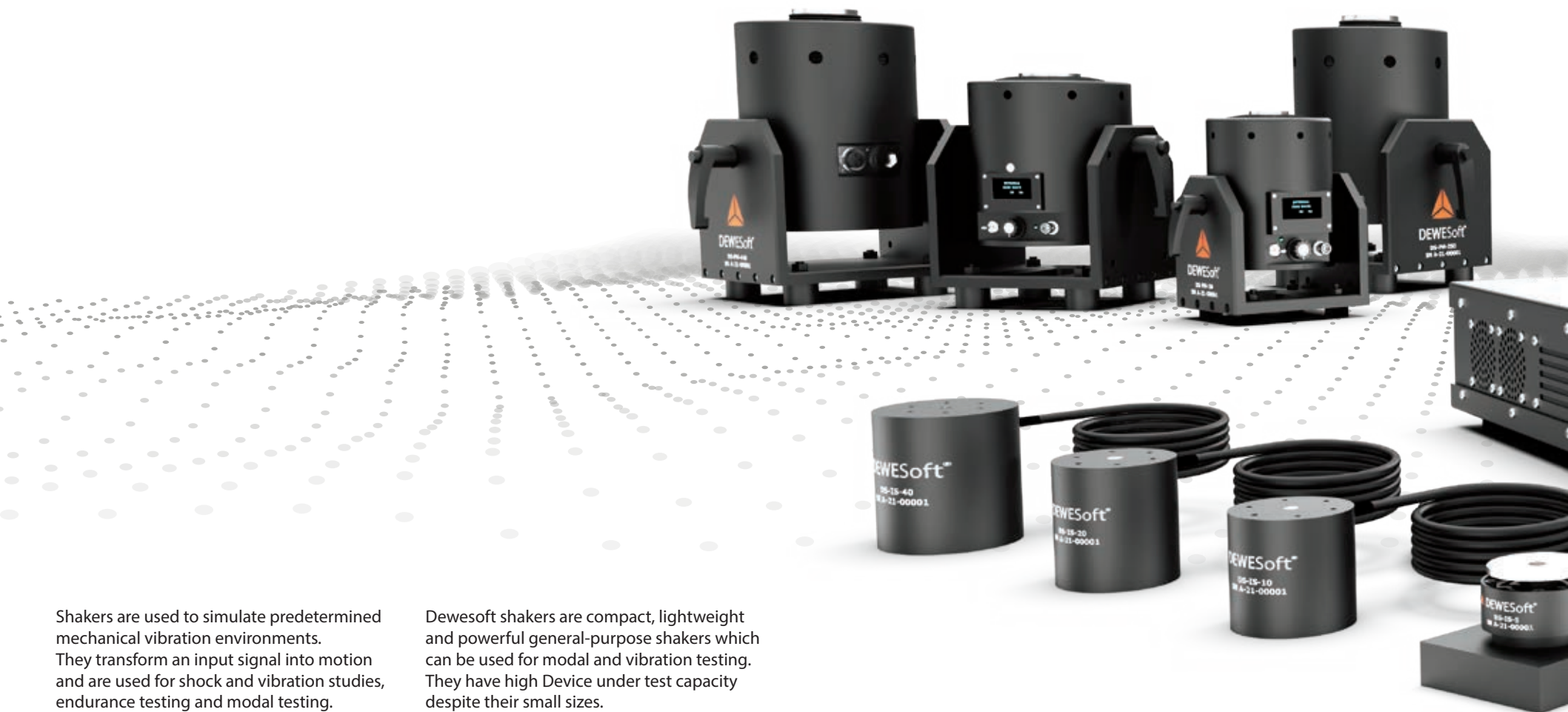
# VIBRATION SHAKERS

Easy test setup with Dewesoft modal shakers, inertial shakers and permanent magnet shakers.





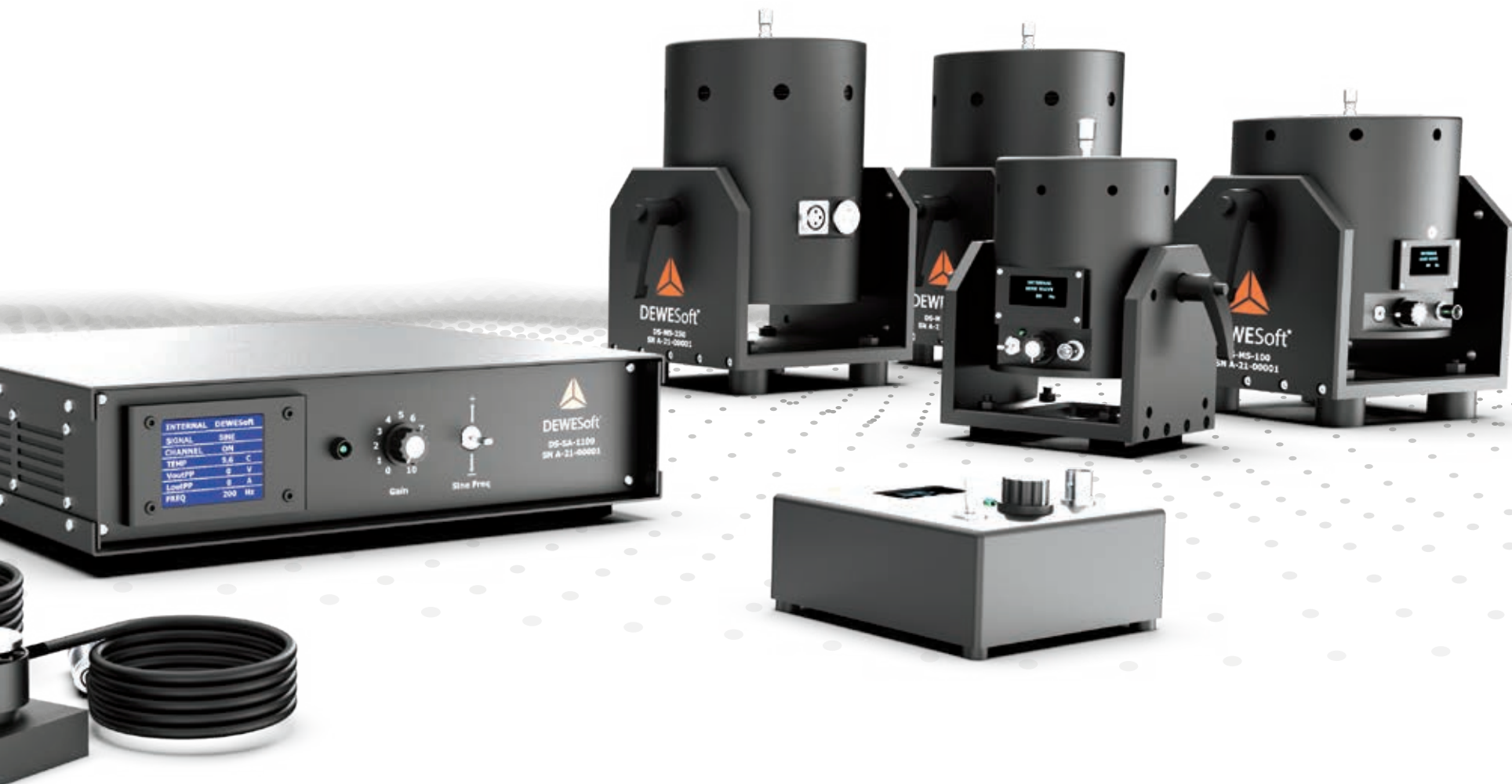
## EASY TEST SETUP WITH DEWESOFT MODAL SHAKERS, INERTIAL SHAKERS AND PERMANENT MAGNET SHAKERS.



Shakers are used to simulate predetermined mechanical vibration environments. They transform an input signal into motion and are used for shock and vibration studies, endurance testing and modal testing.

Dewesoft shakers are compact, lightweight and powerful general-purpose shakers which can be used for modal and vibration testing. They have high Device under test capacity despite their small sizes.

A complete testing system consists of a vibration control system, a shaker, a power amplifier to drive the shaker and one or more accelerometers.



# MODAL SHAKERS

## DEWESOFT MODAL SHAKERS COVER DYNAMIC CHARACTERIZATION OF A WIDE RANGE OF STRUCTURES.



### INTRODUCTION

Modal testing and analysis are indispensable tools to determine the vibration behaviour and characteristics of a structure, its natural frequencies and modes of vibration. Typically, modal shakers are employed to provide a known excitation input force to the structure under test. Transducers are used to measure the input excitation force and the resulting vibration responses. Where structural resonances occur, the response will be amplified allowing calculation and estimation of modal parameters.

Modal shakers are the solution when high frequency excitation content or signal controlled testing is desired. Modal shakers allow for modal testing of larger and more complex structures and the use of various excitation signals.

The Dewesoft series of modal shakers are lightweight and powerful electro-magnetic actuators, which can go up to 12,000 Hz and provide force levels up to 440N with a maximum 25mm stroke. Electro-magnetic actuators are basically voice coils consisting of a permanent magnet and coil. Dewesoft modal shakers have moving coils (driving coils) whose current is controlled for vibration generation.

### APPLICATIONS

#### ELECTRONIC BOARDS, SUB-COMPONENTS, MACHINERY, VEHICLES, AIRCRAFT AND CONSTRUCTIONS

The Dewesoft modal shaker series covers a wide range of structures for dynamic characterization.

#### AEROSPACE AND AUTOMOTIVE

Modal Testing is a prerequisite for design and product validation in aerospace and automotive industries as well as many others.





MODAL SHAKERS	DS-MS-20	DS-MS-100	DS-MS-250	DS-MS-440
Output force (Sinus)	20 N	100 N	250 N	440 N
Frequency range	0 – 12 kHz	0 – 7.5 kHz	0 – 5 kHz	0 – 5 kHz
Displacement (Peak to Peak)	5 mm	10 mm	25 mm	25 mm
Max acceleration	40 g	60 g	100 g	100 g
Shaker mass	4.2 kg	7.5 kg	11.6 kg	11.8 kg
Cooling system	Air convection	Air convection	Forced Air	Forced Air
Suspension	Spring	Spring	Spring	Spring
Max. input current	5A	5A	10A	10A
<b>AMPLIFIER</b>	Integrated	Integrated	External	External
Input Voltage	1 VAC	1 VAC	10 VAC	10 VAC

## KEY FEATURES

Lightweight, durable, portable and easy to use

### ADJUSTABLE MODAL STINGER

Stinger length can be easily adjusted by the through-hole armature

### INTEGRATED SIGNAL GENERATOR

All shakers have integrated sine signal generators. This gives customers the option to try the test system or the shaker or make some simple test to understand structural behaviour.

### UP TO 25MM STROKE AND BROAD FREQUENCY RANGE

The range of modal shakers can go up to 12,000 Hz and provide force levels up to 440N with a maximum 25mm stroke.

### ADJUSTABLE TRUNNION BASE PROVIDES HIGH ANGLE FLEXIBILITY

All modal shakers have trunnion and handles allowing the shakers to be positioned in any orientation and position.

### AMPLIFIERS INCLUDED

MS-20 and MS-100 shakers have integrated amplifiers. With this integrated amplifier it is very easy to use the shaker. You only need to plug the electric cable and the shaker is ready to run. DS-MS-250 and DS-MS-440 come with a dedicated external amplifier.

# INERTIAL SHAKERS

**DEWESOFT INERTIAL SHAKERS ARE SMALL, LIGHTWEIGHT AND EASILY ATTACHABLE – THE DIRECT MOUNTING ON STRUCTURES MAKES THEM WELL-SUITED FOR ON-SITE APPLICATIONS.**



## INTRODUCTION

The inertial shakers are used for structures requiring excitation in lower frequency bands. The shakers are directly connected to the structure and the inertia motion of the shaker mass provides the necessary forces to the structure. The shakers have a small, lightweight design that provides high mobility. They are fully enclosed, permanent magnet shakers that can be mounted on to structures at any angle – they are entirely self-supporting.

The shakers that are used in modal testing and aircraft in-flight tests are usually electrodynamic shakers. However, traditional shakers are not very portable, and the attachment process takes time.

The vibrations generated by an Inertial shaker are produced by the movement of the shaker's own body and that reduces its weight and size. Because of the shaker's small size, it's portable and can be fixed directly to the structure. That simplifies the procedure and in return saves time.

Dewesoft inertial shakers are easily mounted and have great mobility - they can be used as portable shakers or even hand-held.

The inertial shakers are suited for principally the same fields of application as modal shakers; modal testing as well as a variety of general vibration testing applications. Depending on the dimensions of the structure and the desired excitation frequencies and levels required for vibration testing, either modal shakers or inertial shakers can be used.

## APPLICATIONS

Inertial shakers are used for testing car chassis, squeaks and rattle testing in cars, civil engineering prototype testing, building structures, floor loading resonances, ships' flight decks, helicopters rotor simulation, submarines, geophysical surveys, and vibration cancellation systems.

- CIVIL ENGINEERING
- AUTOMOTIVE
- AEROSPACE
- SHIPBUILDING
- STRUCTURAL DYNAMICS MEASUREMENTS
- IMPEDANCE MEASUREMENTS
- EXPERIMENTAL MODAL ANALYSIS
- EDUCATION AND RESEARCH



INERTIAL SHAKERS	DS-IS-05	DS-IS-10	DS-IS-20	DS-IS-40
Output force	5 N	10 N	20 N	40 N
Frequency range	10-1,000 Hz	10-3,000 Hz	10-3,000 Hz	10-3,000 Hz
Moving assembly mass	0.05kg	0.1 kg	0.1 kg	0.2 kg
Displacement (Peak-to-peak)	1 mm	5 mm	8 mm	8 mm
Dimension H x D	24mm x ø 35 mm	40mm x 42mm	46mm x 44.4mm	55mm x ø 55 mm
Total mass	0.06 kg	0.21 kg	0.28 kg	0.5 kg
Cooling system	Air convection	Air convection	Air convection	Air convection
Suspension	Spring	Spring	Spring	Spring
AMPLIFIER	External	External	External	External
Input voltage	0.5 VAC	1 VAC	1 VAC	1 VAC
Max. Input Current	1A	4A	4A	4A

## KEY FEATURES

- Amplifier included
- Low friction bearing guided

### COMPACT AND LIGHTWEIGHT DESIGN

The inertial shakers are easily mounted and have great mobility

### SUPERIOR LOW FREQUENCY PERFORMANCE

Offering optimal force performance over a wide frequency range – the inertial shaker IS series spans from 10 to 3,000 Hz

### ANY ANGLE MOUNTING

Well-suited for application on-site in small, confined locations or on larger structures

# PERMANENT MAGNET SHAKERS

**DEWESOFT PERMANENT MAGNET SHAKERS ARE COMPACT, LIGHTWEIGHT AND POWERFUL GENERAL-PURPOSE SHAKERS WHICH CAN BE USED FOR MODAL AND VIBRATION TESTING.**

## INTRODUCTION

Tests with permanent magnetic shakers can be driven at different frequencies and amplitudes. In these tests the test device under test can be directly fixed to the shaker armature and the vibrating surface area can be enlarged by using a head expander according to the specimen sizes.

The test duration and vibration levels are determined from test standards or anticipated loads during operation. These tests can take a long time to perform and therefore all shakers are made with long-term operation in mind. Cooling is provided by either connecting compressed air to a pneumatic coupling on the back of the DS-PM-20 and DS-PM-100 or by a cooling blower that comes standard with the DS-PM-250 and DS-PM-440.

Dewesoft permanent magnet shakers are trunnion-mounted, robust and compact, yet lightweight and powerful general-purpose vibration testing systems, which can be used for modal and vibration testing. Despite their small size their device-under-test capacity is high and they combine a broad frequency band with high sine force. DS-PM-20 and PM-100 has an integrated amplifier and a sine wave signal generator where the frequency can be adjusted from 1 Hz to 15,000Hz.

## APPLICATIONS

Vibration testing of micro parts, assemblies and electronics modal testing

- **SHOCK TESTING**
- **SENSOR CALIBRATION**
- **FATIGUE AND RESONANCE TESTING**
- **EDUCATION AND RESEARCH**







PM SHAKERS	DS-PM-20	DS-PM-100	DS-PM-250	DS-PM-440
Output Force (Sinus)	20 N	100 N	250 N	440 N
Output Force (Shock)	40 N	200 N	500 N	880 N
Frequency range	0 – 12 kHz	0 – 7.5 kHz	0 – 5 kHz	0 – 5 kHz
Displacement (Peak to Peak)	5 mm	10 mm	25 mm	25 mm
Max Acceleration	30 g	45 g	80 g	80 g
Shaker mass	4.1 kg	7.2 kg	11.6 kg	11.8 kg
Cooling system	Air convection	Air convection	Forced Air	Forced Air
Suspension	Spring	Spring	Spring	Spring
Max. Input Current	5A	5A	10A	10A
AMPLIFIER	Integrated	Integrated	External	External
Input Voltage	1 VAC	1 VAC	10 VAC	10 VAC

## KEY FEATURES

- Lightweight, durable, portable and easy to setup and use
- Broad frequency range

### ADJUSTABLE TRUNNION BASE PROVIDES A HIGH DEGREE OF FLEXIBILITY

All PM shakers have trunnion and handles allowing the shaker to be positioned in any orientation and position.

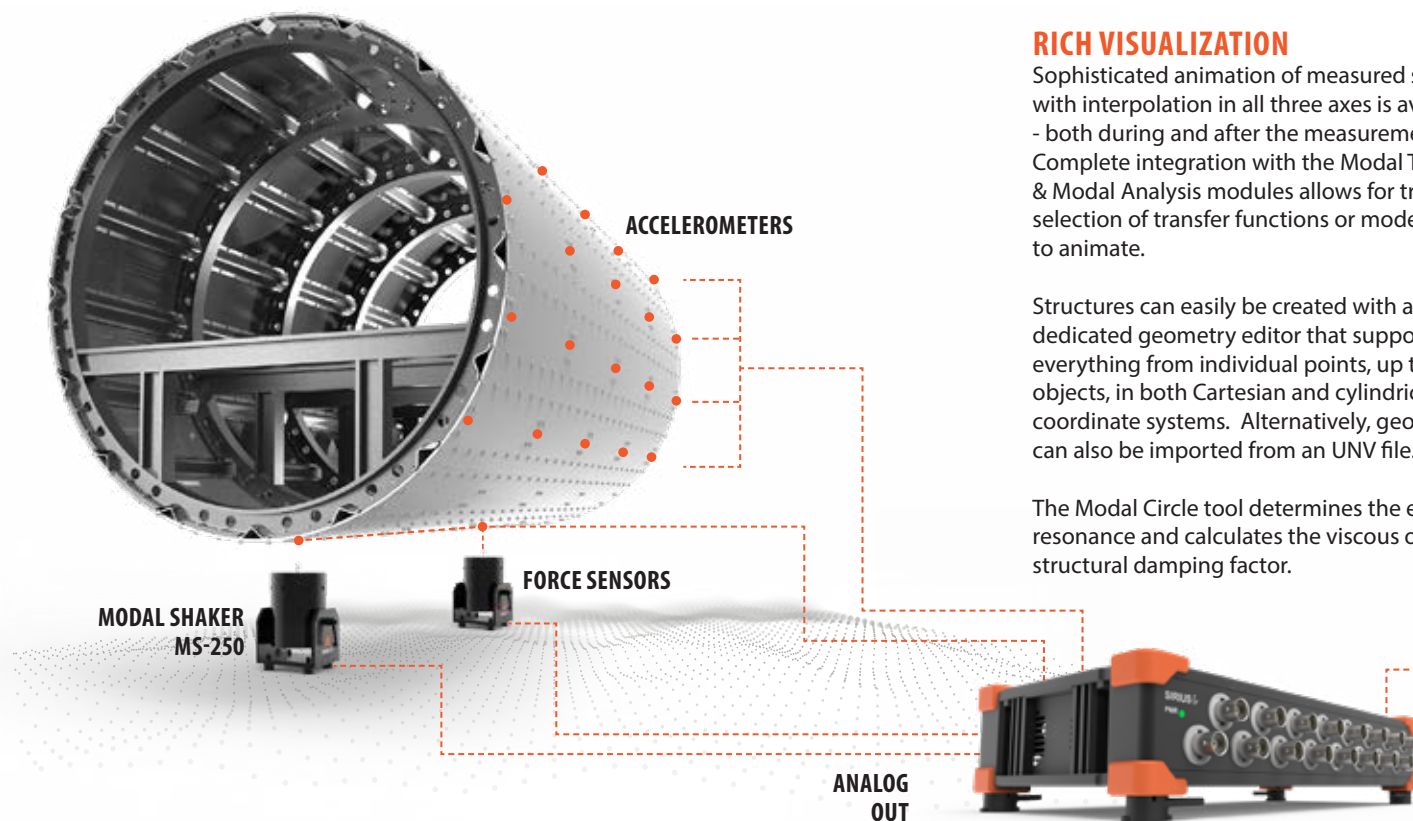
### AMPLIFIERS INCLUDED

PM-20 and PM-100 shakers have integrated amplifiers. With this integrated amplifier it is very easy to use the shaker. You only need to plug the electric cable and shaker is ready to run. DS-PM-250 and DS-PM-440 come with a dedicated external amplifier.

### INTEGRATED SIGNAL GENERATOR WITH SCREEN

All shakers have integrated sine signal generator offering the option to try the test system or shaker or to make simple tests to understand structural behaviour.

# MODAL TEST / ANALYSIS



## IMPACT HAMMER TEST (SIMO/MISO)

Hammer testing has never been easier than with Dewesoft X. Grouping, rejecting and remeasuring of measurement points is fully supported. Ability to move excitation and/or response points (roving hammer or responses) allows for full flexibility when performing measurements.

In addition to frequency response functions, coherence, (cross) PSD and MIF can also be calculated.

## SHAKER TEST (MIMO)

To analyse the most complex structures, Dewesoft X supports tests with any number of shakers. Externally driven shakers are supported, as is controlling the shakers via AO using Dewesoft's function generator (burst random, continuous random, sine sweep, step sine tests).

H1 or H2 estimators are supported for calculating the FRFs. Multiple coherence (MCOH) can be calculated to help with the setup and measurement when using multiple shakers.

## ODS

Operating Deflection Shapes (ODS) is a simple way to do dynamic analysis and see how a machine or a structure moves within its operational conditions. ODS tests are fully supported in Dewesoft X.

## RICH VISUALIZATION

Sophisticated animation of measured structure with interpolation in all three axes is available - both during and after the measurement. Complete integration with the Modal Test & Modal Analysis modules allows for trivial selection of transfer functions or mode shapes to animate.

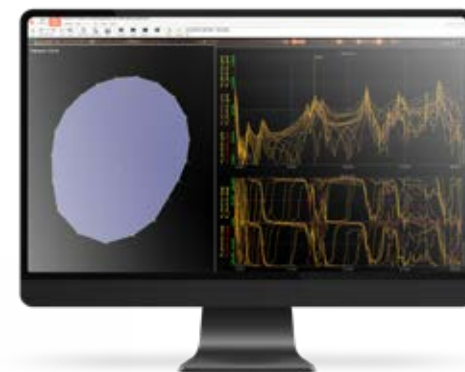
Structures can easily be created with a dedicated geometry editor that supports everything from individual points, up to simple objects, in both Cartesian and cylindrical coordinate systems. Alternatively, geometry can also be imported from an UNV file.

The Modal Circle tool determines the exact resonance and calculates the viscous or structural damping factor.

## FINE-TUNING OF MEASURED DATA

With its rich displays, Dewesoft X allows for real-time quality control of the measurement, as well as the ability to repeat the measurement of any point, all during acquisition. Additionally, all the time-domain data is stored into a datafile, which allows for offline recalculation with different parameters.

Multiple measurements done on a large structure can easily be combined into a single datafile, to analyze the entire structure at once.



## ADVANCED MODAL ANALYSIS

With the help of CMIF (complex mode indicator function) and LSCF curve fitting, finding the modes on the stabilization diagram is easy. Selected modes can be used to calculate mode frequencies, damping ratios, mode shapes, complexity, participation factors, synthesize FRFs, ...

Calculated mode shapes can be animated on a modal geometry widget. AutoMAC matrix can be displayed on a 3D bar graph to ensure the modes are well selected.

## UNV EXPORT

All data, from raw time domain signals and FRFs, to all the advanced outputs from Modal analysis, can be exported into a standard UNV file.

Modal test is an indispensable tool to determine the natural frequencies and mode shapes of any structure - offers easy to use operation with fast setup while providing rich visualization and animation of results.

# ULTIMATE ALL-IN-ONE TOOL

## DUAL CORE HIGH DYNAMIC

Dewesoft Sirius increases signal dynamic to 160 dB by using two ADC converter per channel with different gains. Both - time domain and frequency domain data have an amazing dynamic signal performance.

## NO HIDDEN COSTS

Software license is included in every system. Free lifetime software upgrades included. No yearly maintenance or upgrade fees, free online training courses.

## TOTAL SOLUTION

Combine your NVH measurements with data recording, electrical power, combustion, vehicle dynamic and other powerful Dewesoft tools.

## ALL-IN-ONE

Dewesoft hardware can perform a wide variety of measurement tasks. Every function is available in a single Dewesoft X3 software package.

## MODULAR AND EXPANDABLE

Can you imagine FFT analyzer with thousands of channels? We can... Systems can be gradually expanded from one to unlimited number of channels.

## PLUG AND PLAY

Any device, sensor or signal. Smart sensors with TEDS are recognized automatically.



## EASY TO USE AND VERSATILE

Get your measurements in 30 seconds.

## SUPERCOUNTER

Patented Supercounter technology provides perfect angle and angular speed information which is a base to align data from time to angle domain.

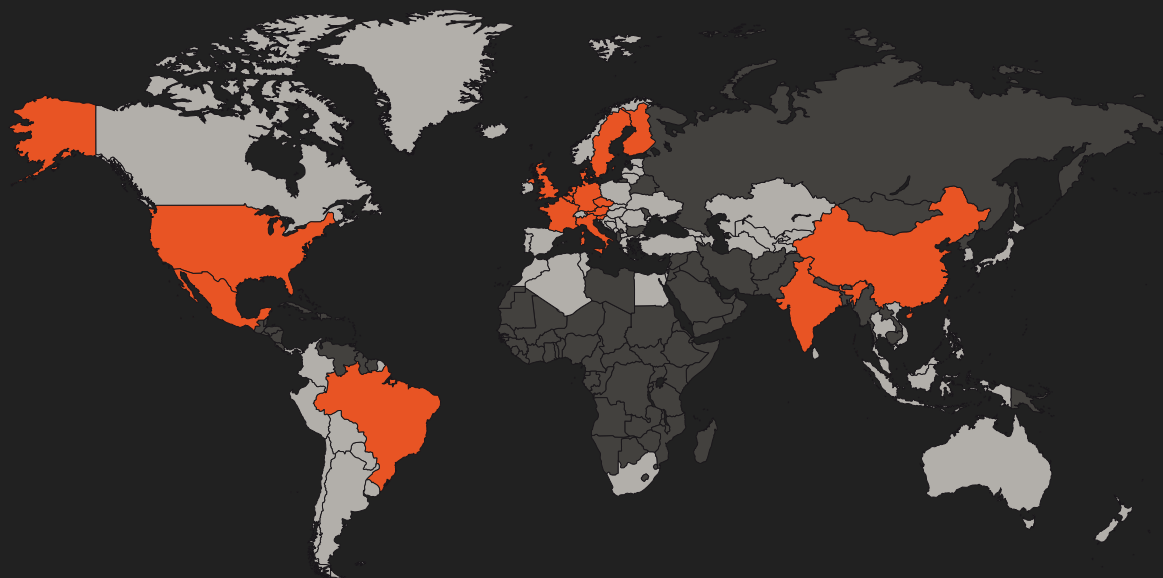
## DEEP IN FUNCTIONALITY

With an amazing set of features, Dewesoft instruments are used in most advanced research labs around the world; all functions are available at the same time in one software.

## FULLY SYNCHRONISED

Data from various sources are perfectly aligned: Analog, Digital, Counter, Vehicle buses, Video...





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