

WHAT YOU NEED TO KNOW ABOUT SHAKER TESTING

YOUR EASY ENTRY INTO SHAKER VIBRATION TESTING

Shaker Vibration Testing – An Introduction

Simulating the everyday life of any product is an integral part of its test and validation process. Without it, products might not be able to stand up to the rigours of their use and transit life. Vibration testing allows you to predict the failure modes of an equipment or component, and monitor their dynamic behaviour to improve their reliability. You can test your product or component in the vertical, longitudinal and latitudinal axis.

Shaker systems are commonly used in the automotive and aerospace industries to qualify products, test products for use in special environments, test products and/or components according to industry-specific standards as well as for research and development. Moreover, shakers are also used for applications in the following industries: telecom/audio, occupational health, education, consumer products and many more.

Shaker Systems – The General Set Up

A Shaker system can be quite complex depending on your test object and the necessary measured data: force, displacement, velocity and/or frequency. Nevertheless, every system is made up of a payload, shaker, amplifier, controller and accelerometer.

Shaker

Induces vibration into the test object. Electrodynamic shakers are basically a big electromagnet. When an electrical current is passed through a coil, it produces a magnetic field, which can be alternated to insight movement into the armature.

Amplifier

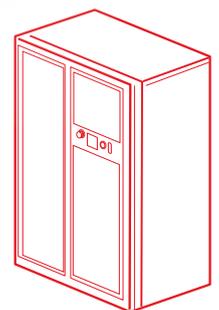
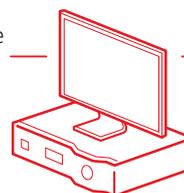
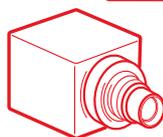
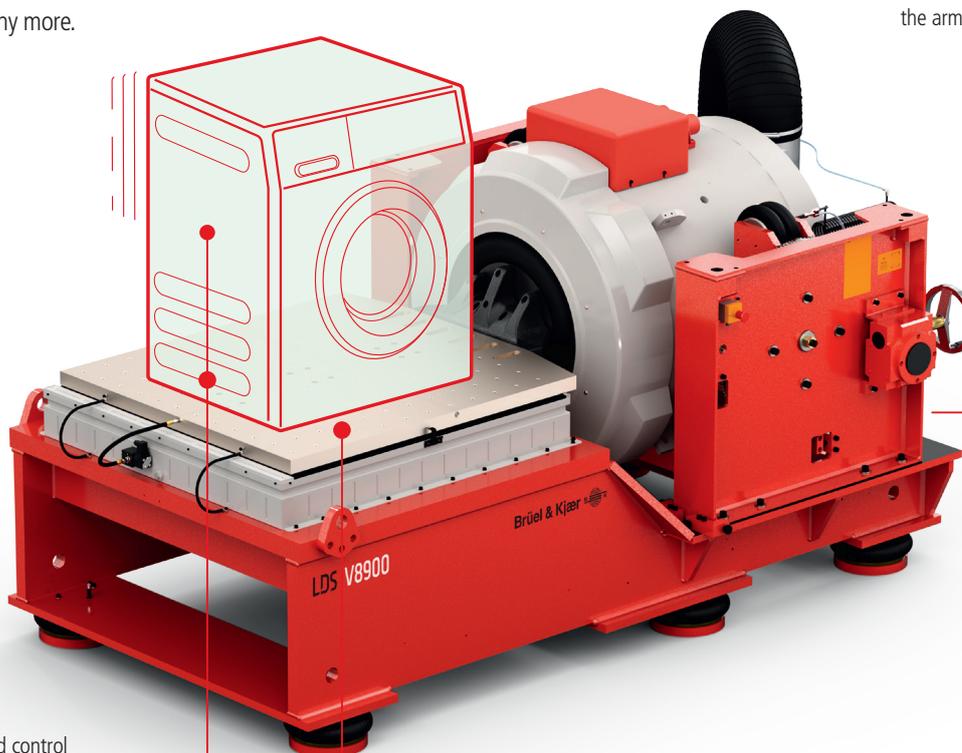
Provides the drive signal to tell the shaker what to do, which way to move and how far to move.

Accelerometer

Used to monitor and control the vibration imparted into the test object based on defined profiles. This data is fed back into the control loop, preventing damage to the object, acquiring data and enabling analysis of your measured data – immediately or post process.

Controller

Provides the testing profile for the amplifier to produce a drive signal into the shaker. The controller has an integrated software for immediate and/or post process analysis.



Start Your Vibration Test Project in 4 Steps

Step 1: Define your test object and the data you want to acquire. Vibration is expressed in force, displacement, and acceleration.

Step 2: Determine the test profile. There are four different types of profiles you can look at: sine, random, shock and mixed mode.

- The sine profile is ideal for endurance since you have a constant frequency over a range by varying the amount of displacement, velocity and acceleration.
- Random profiles are a Gaussian distribution of different levels of vibration over a broad bandwidth of frequencies, commonly used in the automotive and aerospace industry.
- Shock profiles are single or multiple pulses with a given duration

at specific frequencies, commonly used in the automotive and telecom/audio industries.

- Mixed mode profiles are a mixture of the previous three, such as sine and random, or random and random, or shock response spectrum.

Step 3: Allocate your budget. Your budget depends on the size, the product and the data you want to acquire. Our offering ranges from a basic shaker system to a permanent magnet or electromagnetic shaker system.

Step 4: Set up your shaker system. Choose the necessary hardware and software for your measurement project. Within our company, we have 19 core shakers, which range between permanent magnet, air-cooled and water cooled.

				
	Permanent Magnet Shaker	Low-force Shaker	Medium-force Shaker	High-force Shaker
Frequency range	DC to 13kHz	Up to 6,300Hz	Up to 3,000Hz	Up to 3,000Hz
Peak force	8.9N – 489N	0.94kN – 5.12kN	6.78kN – 57.83kN	80kN – 289.1kN
Industry	Education, automotive, telecom/audio	Automotive, aerospace and defence, education, telecom/audio	Aerospace and defence, space, automotive, telecom/audio	Aerospace and defence, space, automotive
Application	Structural and modal analysis, laboratory experiments	Component testing, structural testing, modal investigation, in-house testing	Parts and system qualification testing, component testing	High-force and long-duration testing, hardware testing
Cooling	Natural air-cooled	Forced air-cooled	Forced air-cooled	Air and water-cooled

Additionally, we provide different types of amplifiers as well as controllers and accessories such as load bearing platforms, head expanders, slip tables and custom fixtures. You will find more information on our website www.bksv.com/LDS.

Your best way to start is by [getting in contact with one of our sales representatives](#) and, together, start devising the specific shaker system for your needs. We are happy to help you!

HBK provides a complete portfolio of offerings that unite the physical world of sensors, test and measurement with the digital world of simulation, modelling software and analysis. By creating a scalable and open data acquisition hardware, software and simulation ecosystem, product developers can cut time-to-market, drive innovation and take the lead in a highly competitive global marketplace.

Brüel & Kjær UK Ltd.

Jarman Way, Royston, Herts, SG8 5BQ United Kingdom
 Telephone: +44 1223 389800 · www.bksv.com/LDS
 Local representatives and service organizations worldwide
 Copyright © Brüel & Kjær. All rights reserved.

Brüel & Kjær 
 an **HBK** company