

# VZST SHAKE TABLES



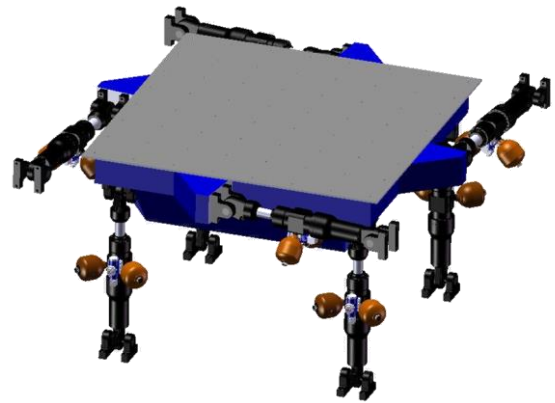
The family of VZERO Shake Tables is able to reproduce with great accuracy the mechanical environmental solicitations that devices under test find in actual operational conditions. The most advanced techniques are used to design every single component integrating VZERO Shake Tables to ensure outstanding performance. A wide variety of sizes, configurations and payloads is available to meet particular testing demands.

## APPLICATIONS

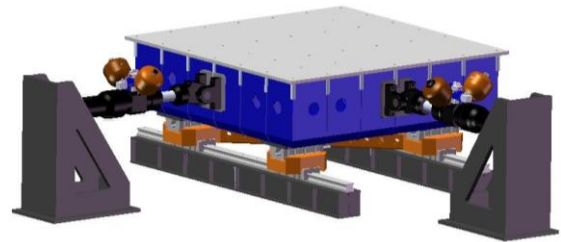
- Dynamic testing
  - Seismic testing of full or reduced scale, civil engineering structures
  - Testing of components from aerospace, automotive, energy and railway industries according to various regulations (IEEE, ATCP, etc.)

## KEY FEATURES

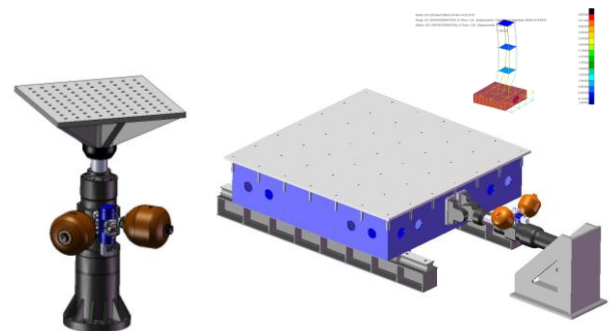
- Turnkey project approach. Design and supply of civil works, isolation system, hydraulic servoactuators, hydraulic power unit and conductions, shake table and control system.
- Degrees of freedom: 1 (X or Z), 2 (X, Y), 3 (X, Y, Z), 6 (X, Y, Z, Roll, Pitch, Yaw). Other configurations on demand.
- Sizes: 1.5 x 1.5 m, 3 x 3 m, 5 x 5 m. Other sizes on demand.
- Payloads: up to 30 ton. Other payloads on demand.
- Frequency range: up to 100 Hz. Other frequencies on demand.
- Frequency range: 0-20 Hz
- MIMO Advanced control system based on the operation of two simultaneous control loops: Outer Loop (OL) Jaguar® from Spectral Dynamics® and Inner Loop (IL)
- Testing modules: Swept Sine, Random, Shock, Transient waveform replication, Sine on Random, Random on Random, Shock Response Spectrum.
- Customized shake tables



VZST 6 DoF. 3 x 3 m



VZST 2 DoF. 3 x 3 m



VZST 1 DoF. Vertical and horizontal



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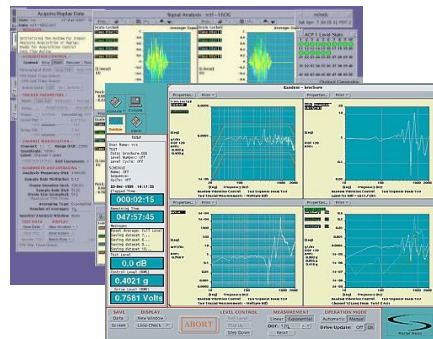
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## VZERO SHAKE TABLES VZST. SCOPE OF SUPPLY

- Civil works. Detailed design of pit, slab, retaining walls and reaction mass according to geotechnical information.
- Isolation system. Design and supply of the array of vibration isolators on which the reaction mass lays. Resonant frequencies down to 1 Hz are possible. Other types of isolators are available for less demanding vibration transmission requirements.
- Shake table. Exhaustive static and dynamic FEM studies are carried out to maximize first mode frequency and ensure appropriate dynamic behaviour and intended boundary conditions preservation.
- Pneumatic static support for shake table. Used to compensate table dead weight, when required.
- Guidance system. For 1 and 2 DoF shake tables. High performance roller or hydrostatic (when required) bearings.
- Hydraulic servoactuators. Including hydrostatic or hydrodynamic bearings to minimize friction and maximize accuracy and dynamic performance, close coupled accumulators, adjustable backlash swivels, high performance MOOG® servovalves and embedded displacement and acceleration transducers.
- Hydraulic Power Unit and accumulation system. Pressures up to 350 bar. Intelligent power consumption feature. Independent cooling and filtering circuit. Optimization of HPU and accumulation systems capacities by dynamic simulation.
- Inner Loop Controller. Inverse and Direct Kinematics solution. Individual actuator trajectory control. Advanced control algorithms: Predictive PID, System Linearization, State Space Control Schemes.
- Data Acquisition System. Highly customizable and scalable. Extensimetric, LVDT and IEPE signal conditioning.
- Outer Loop Controller: Jaguar® from Spectral Dynamics®. Advanced MIMO Degree of Freedom Control. System's Impedance Matrix online identification. Adaptive-Predictive control. Swept Sine, Random, Shock, Transient Waveform Replication, Sine on Random, Random on Random, Shock Response Spectrum. Advanced Signal Analysis features.



Outer Loop Controller: Spectral Dynamics®  
Jaguar® Hardware and Software



Inner Loop Controller: VZERO MADC  
hardware and software

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