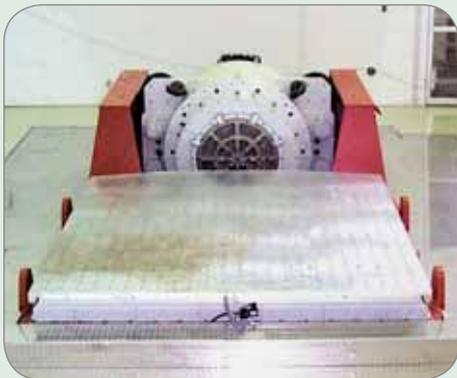




Combined and Stand-alone slip tables for 3-axis testing

- Light-weight yet rigid magnesium table allows maximum force transfer with minimal distortion
- Table sizes from 600 mm x 600 mm to 1500 mm x 1500 mm available as standard
- Wide frequency range from as low as 5 Hz with Lin-E-Air™ isolation
- Seismic base slip tables allow operation below 5 Hz
- Up to 3" working stroke
- Payloads up to 11,800 kg
- Can be used with AGREE/CERT Standard thermal chambers
- Available for shakers from V721 (3 kN) to V994 (289 kN)



Slip Tables and Combos

Industry Applications

- ✓ Aerospace and Defence
 - Satellite testing – large, dynamically complex payloads
 - Aeronautics – aircraft components and assemblies
- ✓ Electronics and Electrical
 - Product verification tests
 - Package testing
- ✓ Automotive and Transportation
 - Vehicle components, moving and fixed assemblies
- ✓ Environmental testing when used with thermal chambers

3-axis test capability for greater product reliability

Combo systems allow vibration tests to be conducted in the horizontal axis as well as the vertical. LDS combo systems allow payloads of up to 11,800 kg, and can be used with CERT/AGREE Standard thermal chambers. This combination of 3-axis tests combined with environmental changes deliver test results that are much more representative of real-world conditions, and thus give a higher level of confidence and reliability in the finished products.

LDS slip tables and combo systems are available in a range of sizes depending on the payload size and test requirements. They are available for all shakers ranging from the V721 (3 kN) to the V994 (289 kN).



v994 combo system with HBT 1500 slip table





Slip Tables and Combo Systems

Slip tables are used where vibration testing of products in 3 axes is required. 3-Dimensional testing provides a more realistic test as the test piece is stressed all 3 axes - 2 horizontal (X and Y) and 1 vertical (Z) axis.

2 options are available, separate shaker/trunnion and slip table, or a single base for mounting both the shaker and the table - known as a “combo” base. The combined trunnion and slip-table approach enables easier alignment between the shaker and the table, and reduces test setup time when changing from vertical to horizontal planes. A separate system is better when testing very large or dynamically complex payloads. Both options are available with either an LPT or HBT slip table.

LDS’ Combo systems are used in a wide variety of applications and markets, ranging from equipment and bulk package testing of electronic goods, through to testing of complete satellite systems.



V875LS Shaker with 72mm displacement and LPT600 slip plate



V850-LPT900 used for testing a vehicle sunroof in the vertical axis

LPT Slip Table

LPT (Low Pressure Table) slip tables are used for payloads up to 1,500 kg, and are generally used in production and research applications. It uses low-pressure oil used as a lubricant, which provides the optimum balance between load support and operating cost.

The slip table is manufactured from high-grade magnesium – chosen for its combined properties of high strength and light weight. This ensures that the maximum force available from the shaker is delivered to the payload with the least possible distortion.

HBT Slip Table

HBT (Hydrostatic Bearing Tables) slip tables are used for heavier payloads, typically above 1,500 kg. The largest slip tables can support payloads up to 11,800 kg and are used extensively for testing payloads such as aircraft components, bulk packages, and satellites.

These tables use oil forced through the bearings at high pressure which provides the support for much heavier payloads, as well as providing a highly reliable and long lasting solution.

The HBT uses the same granite base and magnesium slip plates as used on the LPT tables.



HBT Slip Table showing bearings along centre axis



Slip Tables and Combo Systems

Slip Table Advantages

All standard LDS slip tables use guidance bearings positioned along the centre axis of the table, which allows the table to expand and contract freely during operation. The bearings also help guide the slip table, maintaining its position in the centre thrust axis of the shaker, reducing yaw and pitch movement. Additional bearings can be positioned around the slip plate to support larger or more dynamically complex payloads. Contact: LDS for further information.

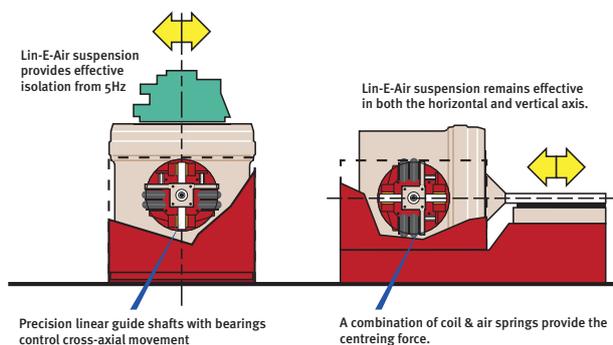
A pressurised oil film is used between the granite base and the table giving uniform load support across the whole surface, and combines with the bearings to minimise distortion of the plate caused by the payload geometry or temperature. Distortions in the plate could result in increased and uncontrolled accelerations being delivered to the payload, resulting either in an invalid test or even possible damage to the payload.

The pressurised oil also lubricates the bearings before the slip table starts to move, giving less friction and a smoother start to the test.

Lin-E-Air™ body isolation

The Lin-E-Air air isolation system by LDS provides excellent isolation between the shaker and the mounting platform (and hence the building floor), allowing tests to be conducted at frequencies as low as 5 Hz. The additional air isolation between the platform and the building floor further reduces the requirements and costs of seismic bases for simple tests.

Lin-E-Air air isolation is standard on all LDS slip-table systems.



Seismic base slip tables

Systems used for high-force shock testing and low frequency applications requiring maximum displacement can be isolated from the building by removing the Lin-E-Air suspension, and rigidly fixing the trunnion-mounted shaker to a seismic mass which itself is isolated from the building. This allows tests to be conducted below the 5 Hz limit imposed by the air suspension.

Environmental Test capability

LDS combo systems can be used with AGREE/CERT standard thermal chambers. Thermal barrier options are available for both the armature and slip table to reduce thermal transmission which may affect the correct operation of the vibration system. For wide operating ranges additional control of the slip table temperature may be necessary. Consult LDS Test and Measurement for recommendations on the use of these options.



Combo system being used with an Environmental Chamber

Tri-axial Transducers

Slip tables allow Engineers to measure the response of structures in 3 axes under controlled conditions. A tri-axial transducer simultaneously measures the vibration or shock in each of the axis allowing accurate correlation of the response against the applied forces and frequencies.



Type 4517-C-003, Miniature Charge Accelerometer



Overview

SPOTLIGHT: Space Facility stakes its reputation on LDS V994 HBT Combo system



V994 in Clean Room

When one of the worlds leading space test facilities was looking for a shock and vibration test bed to test state-of-the-art satellites for the next 10 years, there really was

only one choice. They chose the V994 shaker and a specially designed HBT slip table from LDS.

The V994 shaker is widely recognised as the industry standard shaker for satellite testing, delivering up 289 kN of force. The shaker drives a specially designed 2.5 m x 3 m HBT Slip Table with 20 hydrostatic bearings to accommodate the large payload, with the complete system being supported by a seismic mass weighing over 450,000 kg. The system is installed below floor level to allow easier access to the table.

The installation was managed by LDS' expert team of Project Engineers and completed within a very tight timescale driven by the customers test programme in order not to miss their launch window.

Available Options

Bearings

The number of bearings and their arrangement can be tailored to suit specific payloads. The design depends on the payload mass and centre of gravity, as well as its dynamic behaviour.

Similarly, the pattern and quantity of inserts used to fix the payload to the table can be modified.

Air-glide Mobility

The air-glide option allows the shaker combo to be moved by inflating air cushions under the base. The system acts as a hovercraft, which can then be easily be moved and positioned as required. A safety mechanism will deflate the cushions in the event of an emergency, bringing the combo to a safe stop.

The air-glide option is available on all combos, and is standard on the V984 and V994 combo systems.

Custom Solutions

LDS have extensive experience of providing customised solutions designed for specific applications. Whether this is a larger table, additional bearings, or even using multiple shakers to drive a single slip table (MIMO), we will be able to advise you on the best possible solution of your needs.

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