Elliot Scientific
Part of the MetroTest Scientific Group

OptoSigma® Optical Tables

OptoSigma OSDVIO optical tables are designed to provide a stable, vibration-isolated platform for precision optical experiments and instrumentation. Constructed with a steel honeycomb core bonded to a ferromagnetic stainless steel top plate, these tables offer high rigidity and flatness, minimizing surface deflection and ensuring accurate optical alignment.

The honeycomb core structure provides effective damping of mechanical vibrations, critical for sensitive optical setups.

The ferromagnetic top plate allows for easy mounting of magnetic bases and optical components.

Available in various sizes and thicknesses, OSDVIO tables cater to diverse application requirements, from research laboratories to industrial settings. Local stock availability facilitates quick delivery, reducing downtime for critical projects. These tables are suitable for applications requiring high stability and minimal vibration, including interferometry, laser experiments, and precision metrology.

Delivery / Installation Services :

ESL is able to offer a complete delivery and installation service. Our specialist subcontractors are experienced in the transport, offloading and final installation- Please enquire for full details and prices . *# a site survey may be required for more complex site restrictions.*

SELECTING AN OPTICAL TABLE -

Source of Vibration

There are three primary sources of vibration which can disturb a payload, such as ground vibrations, acoustic noises, and direct force disturbances.
At one extreme, the ground vibration environment may consist of low level seismic disturbances present everywhere on earth and the disturbances, imperceptible under ordinary circumstances, present operating problems for highly sensitive equipment. When cultural vibration effects are added, even wider range of sensitive equipment is affected. For example, even low-amplitude vibration can affect the performance and yield of lithography equipment such as stepper, the resolution of electron microscopes, the accuracy of measuring machines, and the performance of many types of precision equipment and instruments for electro-optical research. The cultural disturbances affecting the sensitive equipment are man-made and caused by phenomena such as vehicle and foot traffic, human activity, air handling systems, elevators, machinery and numerous other sources.

3 Factors In A Dynamic System

In discussing vibration isolation, it is useful to identify three elements of a dynamic system.
1. The equipment need to be isolated.
2. The support structure (floor).
3. The isolation system between the equipment and the support structure.

Vibration Isolation

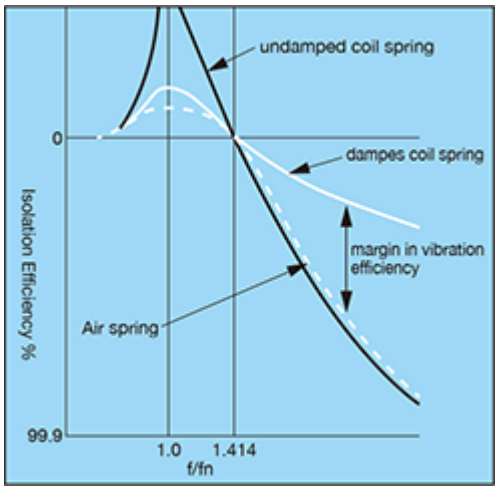
In a passive isolation system, two factors affecting isolation efficiency are the natural frequency and damping of the isolator.
The natural frequency is the rate of free oscillation per unit time and damping is the characteristic which dissipates energy in a dynamic system.
The ratio of forcing frequency (the disturbing frequency) to natural frequency (f/fn) is used to determine the isolation efficiency of any isolation systems.

Transmissibility $Tr = \left| 1 - (f/fn)^2 / 1 \right| \times 100\%$

where

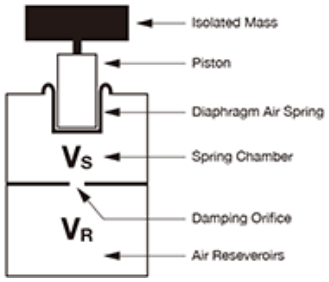
f/fn = the ratio of forcing frequency to natural frequency

Graph shows typical plots of isolation efficiency Notice that when f/fn is less than f2=1.414, the curves show that the vibration is magnified, when the forcing frequency is equal to the natural frequency (f/fn=1), maximum magnification occurs. At ratios above 1.414, the curves are in the isolation range. Typically isolators which exhibit the greatest magnification at resonance have the best isolation efficiency (undamped coil spring).



Generally speaking, low amplification at resonance as shown for the plot of a damped coil spring is desirable; however, notice that this is accomplished at the expense of isolation efficiency. Pneumatic isolators with an air spring and damping chamber on the other hand, combines the desirable characteristics of low magnification at resonance and high isolation efficiency as shown the graph.

The equation for determining the natural frequency of a pneumatic isolators is



$$fn = \frac{1}{2\pi}\sqrt{\frac{\gamma A G}{V}}$$

Where

- γ = Ratio of spectific heat, 1/4 for air
- A = Effective area of air piston, cm^2
- G = Gravity acceleration
- V = Volume of air chamber, cm^3

As seen from equation, the natural frequency of the pneumatic isolator depends on the ratio of the piston area to the volume of the air isolator

Types of Vibration Isolation Systems

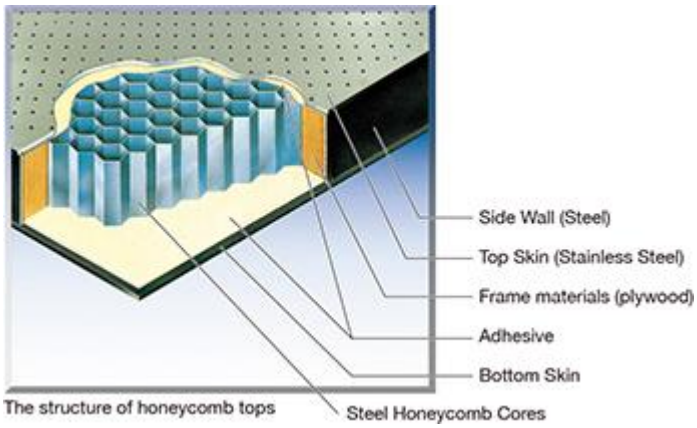
Structure of Flat Benches

Optical Tops consist of ferro-magnetic stainless steel (SUS430) top skin plates, carbon steel bottom skin plates (SPHC), plated steel honeycomb (0.25mm foil, 3.2cm^2 cell size) sandwiched between two plates and side steel panels, all bonded with high strength adhesive.

High-damping optical tops apply Broadband Damping technologies and have excellent dynamic stiffness.

Honeycomb cores (cell size 3.2cm^2) made of 0.25mm thick plated steels give maximized stiffness, extensive contact surface with two plates for high rigidity.

Top skins are precisely grinded to minimize surface curves, pressure bonded to achieve excellent top flatness, lightly sanded with a circular pattern to remove burrs and non-reflecting & non-glare finished.



The structure of honeycomb tops

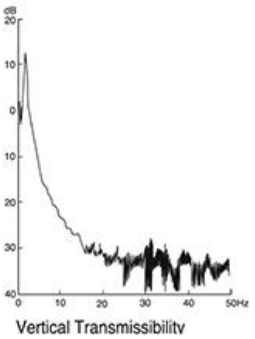
Since all mounting holes on top plates are lead-screw tapped instead of using inserts, deformation or looseness of holes does not occur. The M6(1/4-20) tapped holes are for mounting optical components, arranged in a regular interval 25mm (1").

Honeycomb cores, top/bottom plates and side walls are rigidly bonded with specially formulated high strength adhesive which allows no elastic bending and hysteresis. Since all parts are made of structural steels having the same coefficient of expansion, deformation such as overall distortion does not occur even in the repeatable temperature changes.

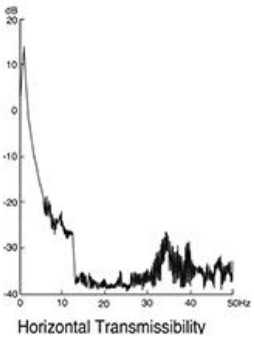
Cylindrical cups are attached on the bottom of top skins for sealing tapped holes to prevent the inflow of any chemical substances into inside honeycomb cores.

Upon customers' requests, special mounting holes and various configurations of optical tops are available.

Table Frame



Vertical Transmissibility



Horizontal Transmissibility

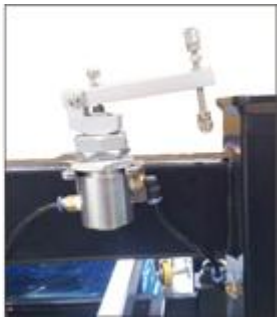
Pneumatic Vibration Isolator
Pneumatic vibration isolation supports provide an effective vibration isolation performance both in vertical and horizontal direction in regular laboratories of 10Hz - 60Hz. Compressed air supply systems are required.

Damping
Pneumatic vibration isolation supports have damping orifices quickly decreasing and settling the movement of optical tops affected by external force or weight transfer.

Auto Leveling System
Pneumatic vibration isolation supports are equipped with three auto levelling valves adjusting the inside pressure of the air spring chambers automatically. This is to maintain the height and level of table tops even under eccentric load.

Pneumatic vibration isolation supports come with casters and levellers for easy movement and installation.

Pneumatic vibration isolation supports consisting of 4 isolators can support from 500kg to 2,000kg load. For higher load, long optical tops or joined tables, quantity of isolators can be increased.



 # Custom configurations are available for many optical table options- please enquire for further details at : sales@elliotscientific.com