



V I S T E K  
I N C O R P O R A T E D

## **VISTEK'S VIBRATION ISOLATION BEARINGS - - HOW THEY WORK**

Vistek Vibration Isolation Bearings (VIBs) filter the transmission of micro-vibrations in six degrees of freedom. VIBs cut off the transmission of vibrations at low frequencies. These bearings provide superior performance without the inconvenience, bulk and expense of air isolation or piezzo electric systems.

VIBs are passive and mechanical and do not require air hoses, maintenance or supporting hardware. They are scaleable and easily adapted to a wide range of applications. VIBs utilize a proprietary combination of two non-linear springs - - a horizontal spring filter and a vertical spring filter.

*Horizontal Spring Filter:* Steel balls sandwiched between precision raceways form the plane of isolation. Micro-vibrations cause the balls to displace between the two raceways and cut off the transmission of vibrations. The balls that displace between the raceways are restored to the neutral position by the force of gravity, which acts as a non-linear spring. Since the spring force (i.e., the restoring force) is non-linear, it is constant and independent of the frequency and amplitude of the input vibrations. As a result, the oscillating motion of the balls has no "natural" frequency. Rather, the motion has an infinite number of frequencies, one for each increment of displacement. Consequently, resonance between the two halves of the plane of isolation is physically impossible. Therefore, the horizontal spring filter whites out or filters out a broad band of input frequencies and insures a constant level of vibration transmission reduction.

*Vertical Spring Filter:* The isolated instrument is effectively levitated by a quasi-rigid body - - a proprietary, non-linear spring mechanism with near zero tangential stiffness for micro-vibrations. The natural frequency of the spring remains relatively low and constant across a large range of spring compression for which the compression force is matched by the restoring force. In this range, the percentage of vibrations transferred through the spring filter is very low.