

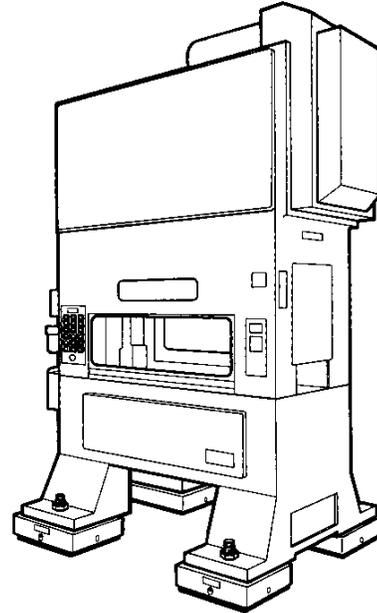
### ISOLATION OF METALWORKING PRESSES TO CONTROL NOISE AND VIBRATION - THE MICRO/LEVEL® CONCEPT

Controlling noise and vibration in metalworking presses is one of the major problems facing the industry today. In 1965, Vibro/Dynamics LLC made a major contribution to the control of noise and vibration by developing an improved concept of press installation. The Micro/Level Concept of press installation provides proper press support, reducing stress in the press structure and in the foundation to a minimum. Press installations using the Micro/Level Concept not only help to control noise and vibration, but also allow the press to operate at maximum efficiency with reduced wear and tear on the press, tooling, and foundation.

The Micro/Level Concept of machine installation is centered about a unique design of press mounting, which incorporates characteristics required for optimum press performance as well as effective control of noise and vibration.

These characteristics are tailored for each press installation taking into consideration the operating and structural characteristics of the press, the structural characteristics of the foundation, building and soil, the range of stamping operations to be performed by the press, the stroke, and the range of speeds at which the press is designed to operate.

The first step in designing the Micro/Level installation is an analysis of the forces associated with the operation of the press, the effects of the supporting foundation on the press, and the effects of the supporting foundation, floor and soil on the propagation and amplification of noise and vibration. These analyses provide the basis for designing the most effective Micro/Level isolation system for each press.



#### NOISE IN METALWORKING

The impact of the dies is the primary cause of noise in a metalworking press. The noise intensity is amplified by the press structure and by the building where the press is installed. In addition to the direct noise caused by the metalworking operation, other sources of noise come from the pneumatic lines, gears, material handling, pumps, compressors and motors, to name a few. These other noise sources, while they are annoying, are usually easy to treat.

However, the noise associated with the metalworking process is usually much more intense, involving extremely high levels of energy, and are amplified to a very high degree by the foundation to which the press is anchored. To control noise from the primary source involves the decoupling of the press structure from the foundation. While this is not the only step required in an effective noise control program, it is one of the most essential steps.

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The Micro/Level Concept of machine installation controls noise and vibration:

1. By reducing the transmission of impact forces and high frequency vibration into the foundation. When the press is anchored to the foundation, the stamping forces are transmitted by the press structure into the foundation. The forces are then distributed throughout the building structure. The large floor area and walls, vibrating in response to these forces, act as loud speakers or sounding boards. Each Micro/Level Isolation System is designed to effectively reduce this soundboard effect by isolating the detrimental high frequency vibration resulting from the impact reaction forces. Noise is reduced in the immediate vicinity of the machine and is virtually eliminated in other areas such as offices.
2. By reducing the feedback of impact and vibration forces from the foundation back into the press. When the press is anchored down, the anchor bolts and foundation apply additional forces to the press structure. The noise created by stamping forces is intensified by the foundation effect. Each Micro/Level Isolation System is designed to virtually eliminate feedback as a source of noise amplification.
3. By providing a level and uniform support for the four press feet, the gibs are brought into precise alignment, and the press structure is free from excessive and non-uniform stresses from any external sources. The press bed and the bottom of the slide are also brought into precise parallelism.
4. By increasing the operating efficiency of the press itself. When the press is anchored to a foundation, a considerable amount of energy is lost reacting against the forces imposed by the foundation. If the press is twisted, energy is required to straighten the press before each stroke. Each Micro/Level Isolation System reduces this energy loss to a minimum, reducing stresses in the drive train and making more power available for the actual stamping operation.
5. By reducing stresses in the crown structure, fasteners remain tight, motors, controls and other structural elements are kept from rattling, and part breakage is reduced.
6. By essentially eliminating the transmission and feedback of horizontal dynamic forces between the press feet and foundation, bending moments in the press structure are substantially reduced. When the press is anchored, the foundation imposes horizontal forces on the press feet in response to horizontal inertia forces of crankshafts and feeds, and in response to torque when the clutch is engaged and disengaged. These horizontal reaction forces tend to bend the press, allowing the crown and bed to move out of alignment at each stroke, causing the dies to close at one angle and open at another. Each Micro/Level Isolator incorporates the unique Glide/Damping™ principle developed by Vibro/Dynamics LLC engineers to eliminate the transmission and feedback of these harmful horizontal dynamic forces.
7. By reducing damage to foundations and preventing loosening of anchor bolts. When presses are anchored, the press feet exert tensile impact forces on the foundation. Such damage adds to noise amplification.

It is interesting to note that each of the above contributions to the control of noise also contributes to improved machine performance, precision, efficiency and life.

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