Boosting Productivity by Improving Press Installations

- **Improved Die Life**
- **Reduced Downtime**
- **Reduced Reversal Loading**

Productivity vs. Downtime

Productivity is the number one objective in industry. And the best way to increase productivity in the metal stamping industry is to keep presses in operation and producing parts. Because downtime prevents presses from producing parts, keeping presses in operation has got to be a top priority in any stamping operation.

Since 1965, Vibro/Dynamics, Broadview, Illinois, has been working with hundreds of stampers to develop better ways of installing presses. By eliminating some of the major causes of downtime, these developments have resulted in substantial increases in productivity.

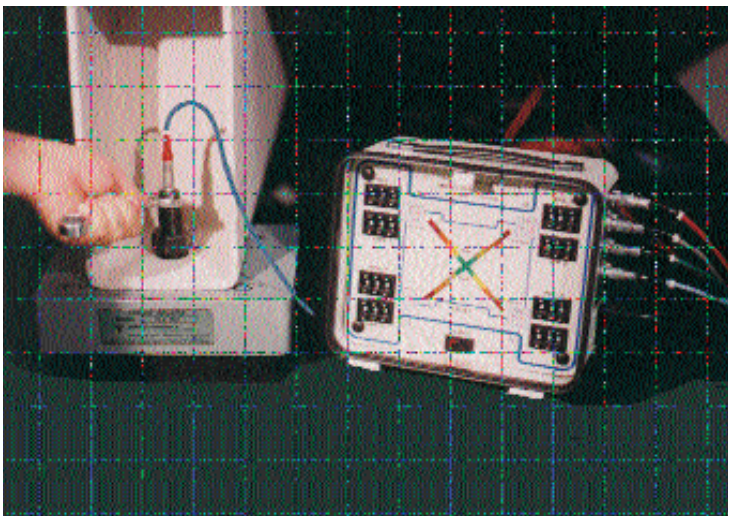
Problems Caused by Bolting

Continued studies of punch press operations have revealed that several things happen to cause downtime when a press is bolted to the floor.

1. The uneven floor or foundation exerts a twisting or warping strain in the press structure.
2. The foundation transfers impact reaction forces back into the press in response to the stamping force.
3. Reversal loading of the press at snap-through causes severe structural stress throughout the press frame.

Any of these phenomena by itself is harmful to the press. Together, they create undue wear and tear on the press and on the dies. To illustrate the harmful effects of bolting presses down, and what can be done to eliminate these harmful effects, consider the following example involving a blanking press.

A 300-ton blanking press, designed to run at 230 SPM and tooled to produce motor stator and rotor laminations using progressive dies, was originally bolted down to a heavy concrete “isolated” foundation in the mistaken belief that the foundation would absorb shock out of the press. However, the press had to be shut down repeatedly to tighten loosened fasteners, replace broken bolts and bearings and to make even more major repairs. Hardly a day went by that the press was not “down” for repairs.



Technician using the Lod/Sen System to Fine-Tune a machine.

Improved Installation

After two years of trying to keep this press in operation without success, the press builder asked Vibro/Dynamics to help solve the problem by reducing the reaction impact forces and eliminating the twisting and warping strains in the press structure.

Vibro engineers studied the operating and structural characteristics of the press and custom engineered a Lod/Sen™ System consisting of four Micro/Level® Isolators connected to a Lod/Sen™ Force Analyzer.

Leveling and Fine-Tuning

Preventing the uneven surface of the floor from causing the press bed to warp or twist is the primary purpose of leveling a press. To make certain that this ideal condition is achieved, the precision Lod/Sen leveling screw in each isolator is adjusted until the press bed is perfectly leveled and the center set of green LED lights on the graphical display of an FT-410 Fine-Tune Lod/Sen Analyzer are lit evenly.

When this condition is achieved, then the torsional stresses caused by the uneven floor are reduced to zero. Therefore, all stresses caused by the uneven floor have been eliminated because the support given to each press foot is precisely equal to the weight distribution at each corner of the press.

Figure 1 illustrates a press bed when it is perfectly supported. An evenly lit set of center LEDs shows that the press is properly supported and stress-free. The machinist's level along all four edges of the bed shows the press bed to be perfectly level and untwisted.

LEVELING AND FINE/TUNING PRESS BED WITH FT-410 ANALYZER AND LOD/SEN™ ISOLATORS

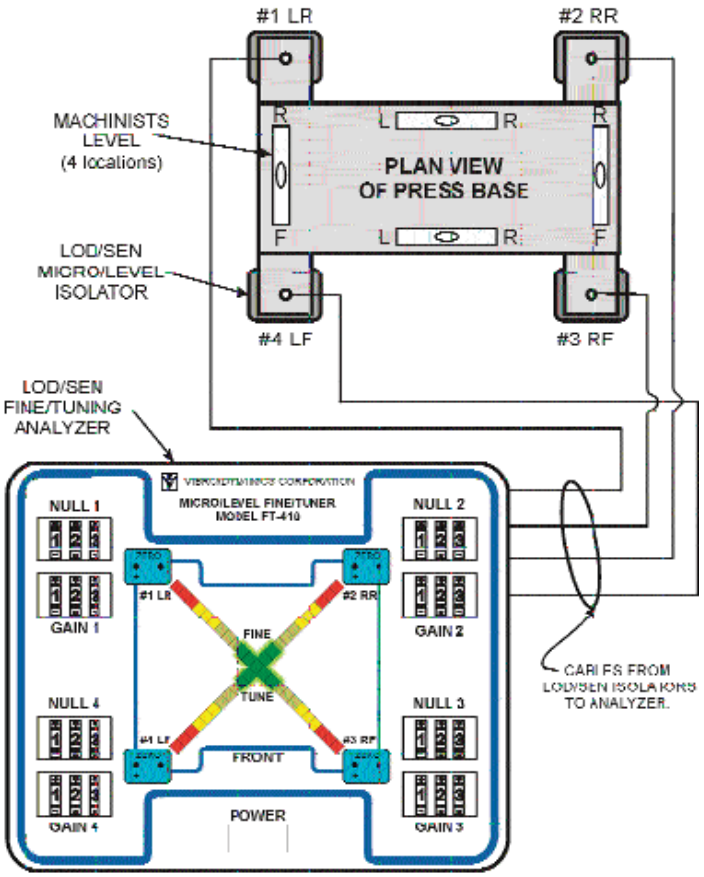


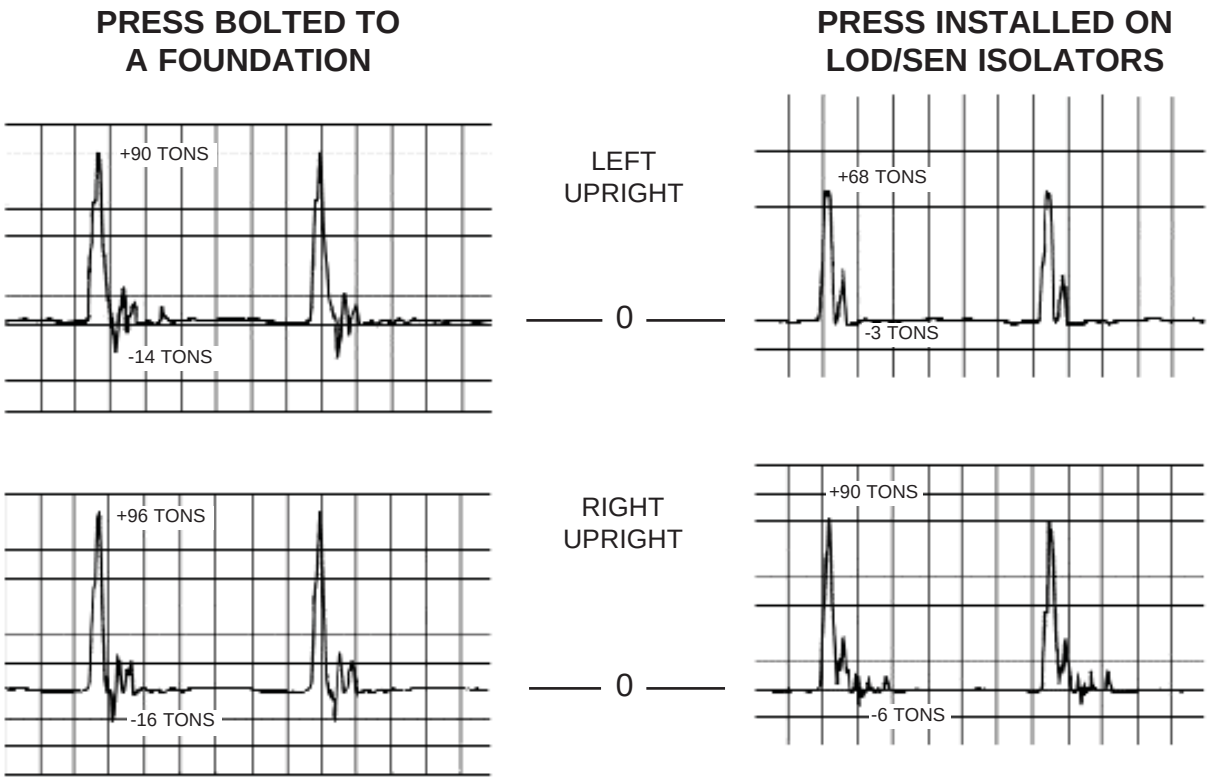
FIGURE 1

Reduced Stresses on Press Structure

The 300-ton press was equipped with strain gauge load monitors to measure the tonnage actually applied to the press structure at each stroke of the press. Force vs. time recordings were made, first when the press was bolted down, and then again after the press was reinstalled on the isolators. Figure 2 shows the effects of the isolators on reducing the loading on the press.

The recordings on the left of Figure 2 were made when the press was bolted down, while those on the right were recorded after the press was remounted on the isolators.

STAMPING FORCE MEASURED ON THE UPRIGHTS OF A 300 TON LAMINATION PRESS



	TOTAL FORCE	REVERSAL
PRESS BOLTED	186 TONS	30 TONS
PRESS ISOLATED	158 TONS	9 TONS
REDUCTION	28 TONS (15%)	21 TONS (70%)

FIGURE 2

The peak combined load on the two uprights totalled 186 tons when the press feet were bolted to the foundation. When the press feet were remounted on the Lod/Sen Isolators, the load on the uprights was reduced to 158 tons.

It is evident that only 158 tons were actually required to stamp the part. When the press was properly installed on the isolators, that's all the load that the press structure was subjected to. Previously, with the press feet bolted down, the press structure had been subjected to extra, unnecessary loading, causing the high rate of wear and tear.

Reduced Reversal Load

Press loading was not the only thing the isolators reduced. They also lessened the stress reversal resulting from snap-through. The stress reversal which occurred while the press was bolted to the concrete foundation was recorded at 30 tons, but only nine tons after the press was remounted on the isolators.

Because stress reversal is so harmful, many press builders are more concerned about stress reversal than press loading. Therefore, precautions should be taken to keep the press from experiencing any greater stress reversal than necessary. In this case, stress reversal was reduced by more than 70% after reinstallation on the isolators.

Downtime Virtually Eliminated

The problems of broken parts and loose fasteners were virtually eliminated by reinstalling the press on isolators. While the press had been repeatedly shut down for repairs or replacement of parts during the two years when the feet were bolted down, shutdowns for repairs or replacement of parts were drastically reduced in the year and half after it was remounted.

It is estimated that downtime for repairs was reduced by at least six hours per week and possibly by as much as ten hours per week. Based upon a speed of 230 SPM, the increase in productivity brought about by just this increase in productive time was somewhere between 83,000 and 138,000 stator and rotor parts per week.

In the case of this 300-ton press, it was impossible to keep any meaningful record of downtime while the press was bolted down, because the press could not be kept running long enough. However, in a similar study carried on by one of the largest manufacturers of motor laminations, it was found that the use of isolators had a major effect on increasing die life. In that case, dies did not require sharpening as often, saving four hours of downtime per week per press. These 200-ton presses operated at 300 SPM.

Downtime was very costly. When the press wasn't running, there were no parts to ship. By eliminating six to ten hours of downtime per week, this press was able to produce about 5 million more parts per year, for an annual increase of about $370,000 in sales value.

This does not include the savings in repair costs from press fatigue, nor the additional economic benefits derived from increased die life, eliminating damage to the foundation, reduced power consumption, and reduced noise and vibration.

Proper mounting can reduce reversal loading, eliminate foundation-induced torques and bending moments and effectively reduce the foundation reaction forces. This permits the press to operate without additional loading from the foundation, resulting in less downtime, more parts, and lower costs.

Vibro/Dynamics makes a full range of machinery mounting systems for hundreds of industrial applications. Our products are designed to make machine installation faster and easier, and to increase uptime and profitability by maintaining proper machine alignment, extending die and mold life, and keeping machines level.

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