EFFECTIVENESS OF SERIES BFM1230 MICRO/LEVEL® ISOLATORS IN REDUCING VIBRATION CAUSED BY THE OPERATION OF A 250 TON BLANKING PRESS

This report describes a series of tests made by an independent consultant to determine the effectiveness of the Series BFM1230 Micro/Level Isolators in reducing vibration due to the operation of a 250-ton blanking press.

Vibration measurements were made on the press feet, on the press foundation, on the plant floor about 10 feet away and on a roof support column about 10 feet away. The measurements were made first with the press mounted on composition pad material and bolted to the foundation, then repeated with the press installed, leveled and fine-tuned on four Type BFM1230 Micro/Level Isolators. The results of these tests are reported below.

In order to assure equivalent conditions for both sets of measurement, the following steps were taken:

- Tests were conducted during the lunch hour while other equipment was shut down.
- At the conclusion of the first set of tests, the machine was raised, anchor bolts and pad material removed, isolators installed, and the second set of tests conducted with the same reel of stock and with no chance for added die wear.

The press was a typical 250-ton production press with a 60 x 36 inch bed, tooled with a six station progressive die, operating at 60 strokes per minute, and using .035" stock.

The independent consulting engineering firm using the following instrumentation measured vibration:

- GR Type 1560 P3 Piezo Electric Accelerometer
- GR Type 1560 P40 Preamplifier
- GR Type 1558 BP Octave Band Analyzer
- GR Type 1557 A Vibration Calibrator

The peak vibration was measured using a dB meter calibrated to a constant of 100 dB-1g. Octave band readings were taken as well as overall peak vibration.

RESULTS:

The results are shown in graphs enclosed. They can be summarized as follows:

LOCATION	REDUCTION
Foundation	95.5%
Press Leg	81.8%
Floor	90.0%
Building Column	82.3%

1. Overall vibration at all measuring points on the press, foundation plates, foundation, floor and column was decreased as summarized in the following table:
2. The 95% reduction in foundation vibration correlates closely with the reduction in force transmission that the Series BFM1230 Micro/Level Isolator is designed to accomplish. The press operator reported an immediate benefit of the reduction in foundation vibration. In the past, this man's legs ached in the evening and he didn't feel like doing anything around the house. Almost immediately after installation of the isolators, his legs stopped aching and he has renewed energy and interest in engaging in household activities, work and family activities.

3. The overall floor vibration was reduced by 90%, also as anticipated. At one time it was thought that so-called isolated foundations were effective in eliminating the transmission of vibration to the building structure. These tests indicate that this is true to a certain extent. However, when is it realized that only one press was operating during these tests and that in normal production 10 to 20 presses of this general size operate in this area, it can be anticipated that the floor vibration may be 10 to 20 times as great as that shown herein.

   As each press is re-installed on similar isolators, an overall reduction in floor vibration of 90% can be anticipated.

   While the vibration intensity in the floor is not expected to create any significant damage to the floor itself, it is a major factor background or ambient noise, personnel fatigue, reduced precision in nearby machinery and interference with delicate inspection and laboratory operations. Therefore, a 90% reduction in floor vibration is extremely important to the plant in which the objectives are improved productivity of personnel and equipment.

4. The 82% reduction in vibration of the building column applied in the horizontal direction and in the vertical direction. Again this fact is not so significant insofar as the strength of the building column is concerned. This data is more significant in that the vibration in the column is transmitted directly to roof structure. The large area of the roof presents an extremely large sounding board, or noise amplifier. Although a 0.32g vertical vibration in the column may not result in a .32g vertical vibration in the roof structure (it may be less or it may be more, depending on the dynamic response of the roof structure) it is safe to assume that an 82% reduction in column vibration will bring about an equivalent reduction in the vibration transmitted by the column to the roof.

   It is also significant that a .32g vibration may approach intensity sufficient to cause settling in some types of soil. Reducing this vibration to .056 means that the isolators have reduced the danger of column footing settlement.

5. Perhaps the most significant result was the 82% reduction in overall vibration of the press feet and legs when the press was installed on the Micro/Level Isolators. Experience and analysis indicate that when a blanking press is bolted to a foundation, the press tends to destroy the foundation and the foundation tends to destroy the press. The 10 to 15g vibrations in the press is an indication of severity of the foundation reaction force on the press. The 82% reduction in press vibration substantiates the analysis of blanking press structure being carried out by Vibro/Dynamics as well as extensive experience in isolating a wide variety of such presses.

   This reduction in vibration in the press feet and legs is also significant in that flat steel plates as used in such press construction are radiators of noise. When the stamping operation is performed an intense noise emanates from the stock and die. While isolators may not reduce this direct stamping and die noise, it is evident from the data that they have a significant effect in reducing the noise radiating from the press structure due to the reduction in vibration of at least some, if not all parts of the press structure.

6. The data shows a considerable difference in the vibration in the steel foundation plates and in the foundation itself, even though the steel plates were imbedded into the foundation with a series of heavy J-anchors. It has been learned through experience with many such installations that it is virtually impossible to hold presses of this type securely to their foundations. Either the anchor bolts come loose or break; or the press feet break, due to the severe foundation reaction forces. In this case the left rear foundation plate had come loose while the press was bolted to the foundation. The vertical motion of the foundation plate attached to the press foot had eroded the concrete foundation to create a cavity that filled with lubricating fluid. At each stroke of the press, oil would squirt upward at least 14 inches. When the press was re-installed the BFM1230 isolators, this oil squirting effect was eliminated. This is indicated by the 97.8% reduction in vibration of the left rear foundation plate.

7. The forces that cause the anchor bolts or foundation plates to come loose are extremely severe. Once they loosen, the forces are reduced somewhat. This is confirmed by a comparison in the data on right front vs. left rear. While the left rear foundation plate was very loose, the right front foundation plate appeared to be secure. The press vibration was greater at the right front corner, where the plate was apparently secure.

   The use of the BFM1230 isolators not only reduced the vibration in the press structure by a large factor but also resulted in more uniform vibration. The same was true of the foundation vibration

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EFFECTIVENESS OF SERIES BFM1230 MICRO/LEVEL ISOLATORS IN REDUCING VIBRATION CAUSED BY 250 TON BLANKING PRESS						
	Acceleration Units*			dB Units**		
	Press Bolted	Press Isolated	% Reduction	Press Bolted	Press Isolated	dB Attenuation
Foundation						
• Near Right Front Foot	1.00 g	.028 g	97.2%	100 dB	69 dB	31 dB
• Near Left Rear Foot	.50 g	.040 g	92.5%	94 dB	72 dB	22 db
AVERAGE			94.6%			
Steel Foundation Plate						
• Near Right Front Foot	1.41g	.070 g	95.0%	103 db	77 db	26 dB
• Near Left Rear Leg	2.24g	.050 g	97.8%	107 db	74 db	33 dB
AVERAGE			96.9%			
Press Structure						
• Right Front Foot	15.85 g	2.24 g	85.9%	124 dB	107 dB	17 dB
• Left Rear Leg	10.00 g	2.24 g	77.6%	120 dB	107 dB	13 dB
AVERAGE			81.8%			
Floor	.089g	.0089 g	90.0%	79 dB	59dB	20 dB
Building Column						
• Horizontal-N/S	.28g	.050 g	82.3%	89 dB	74 dB	15 dB
• Horizontal-E/W	.32g	.056 g	82.3%	90 dB	75 dB	15 dB
• Vertical	.32g	.056 g	82.3%	90 dB	75 dB	15 dB
AVERAGE			82.3%			
**1g=386 in./Sec./Sec. **100db=1g*						

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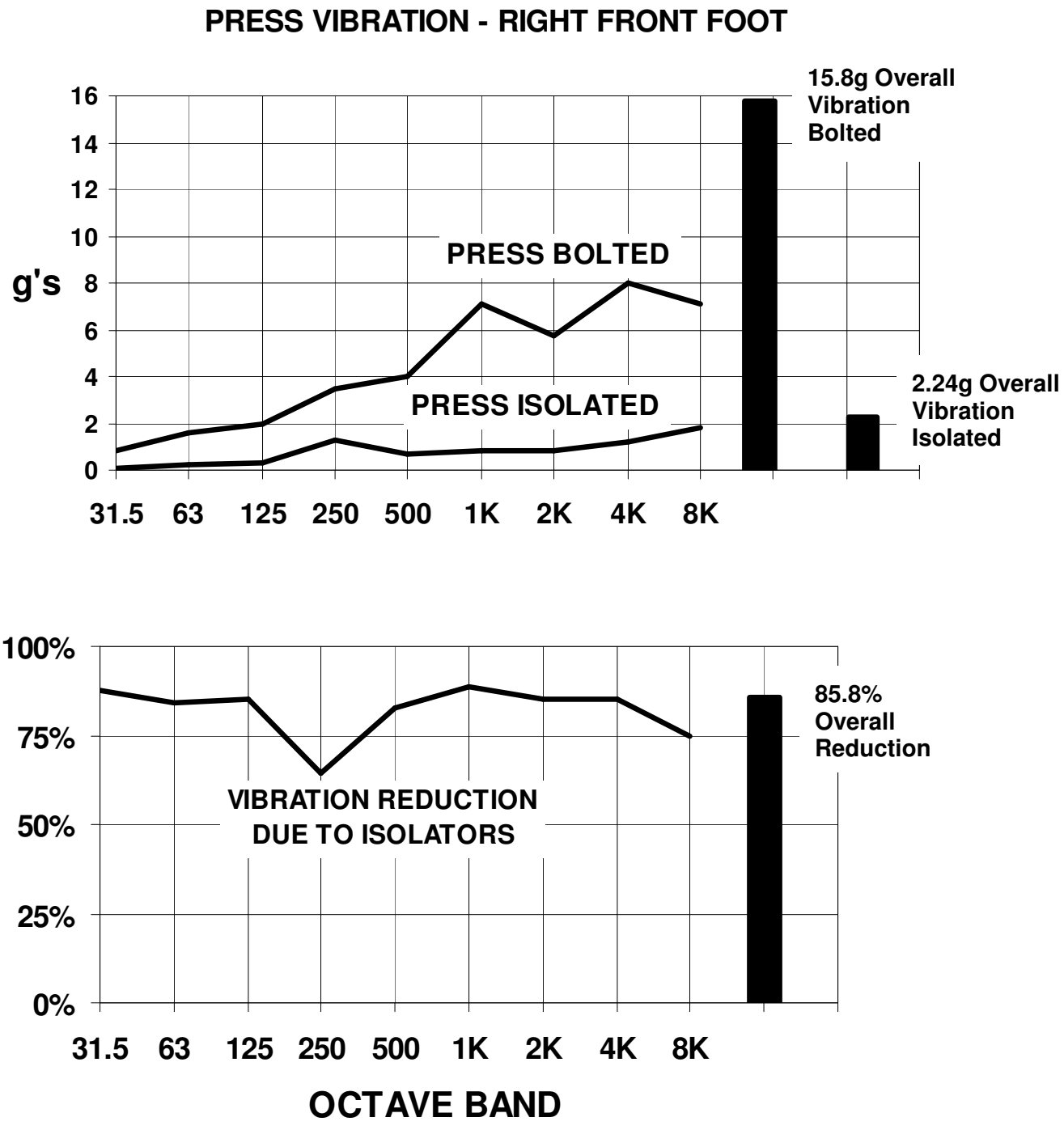

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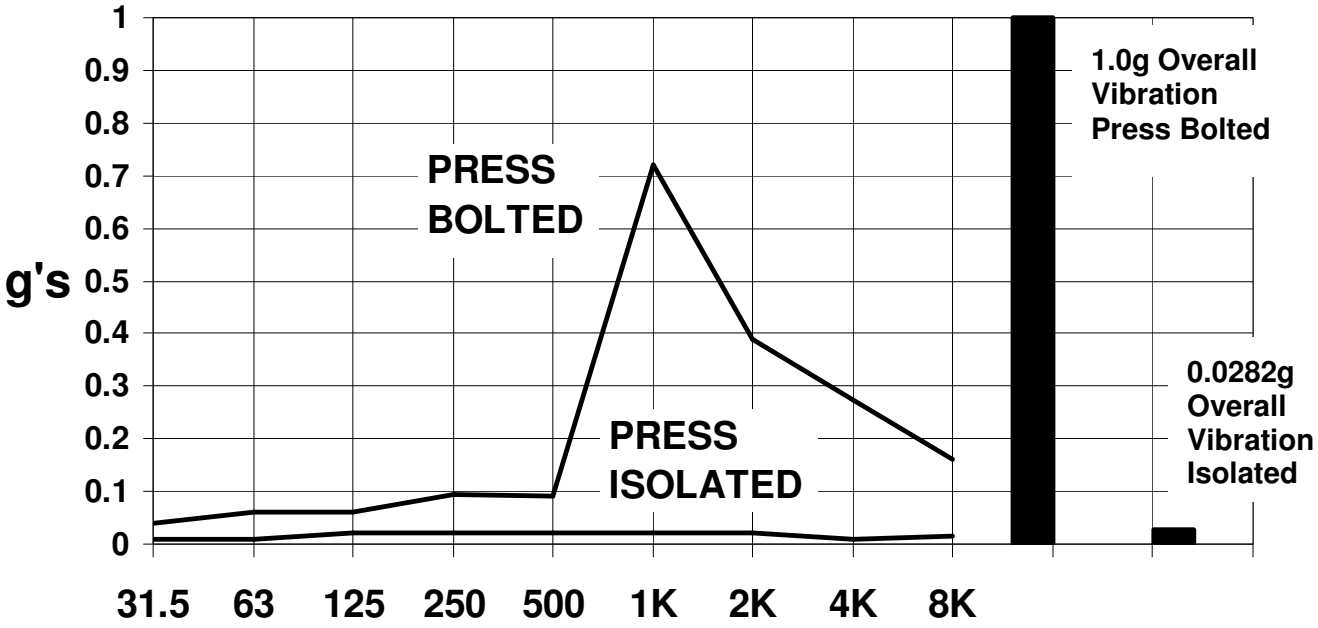
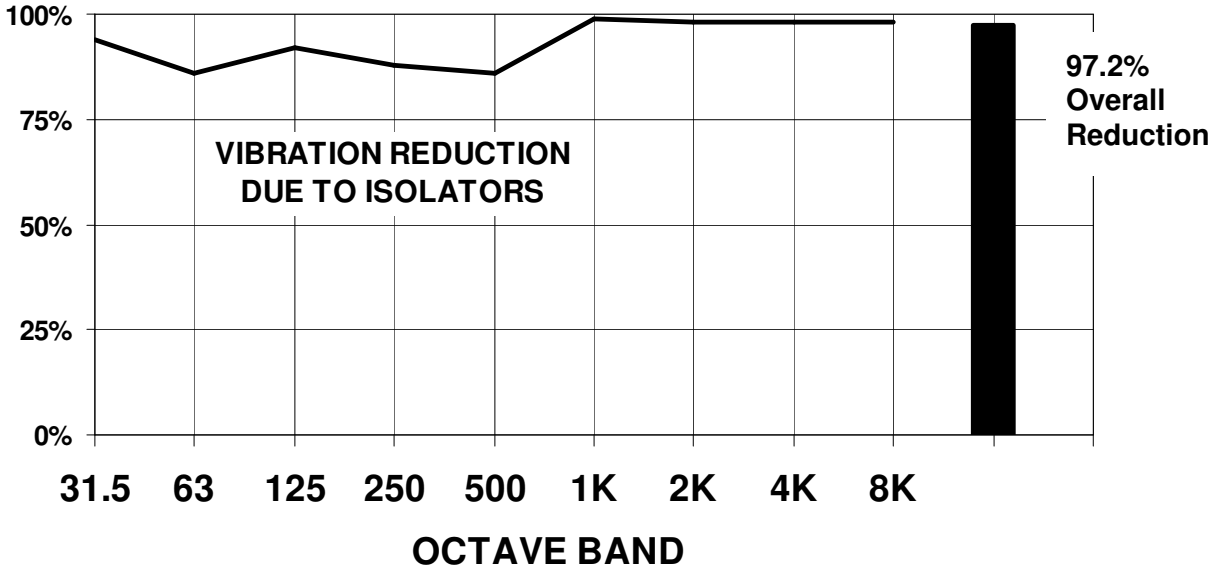
FOUNDATION VIBRATION - RIGHT FRONT





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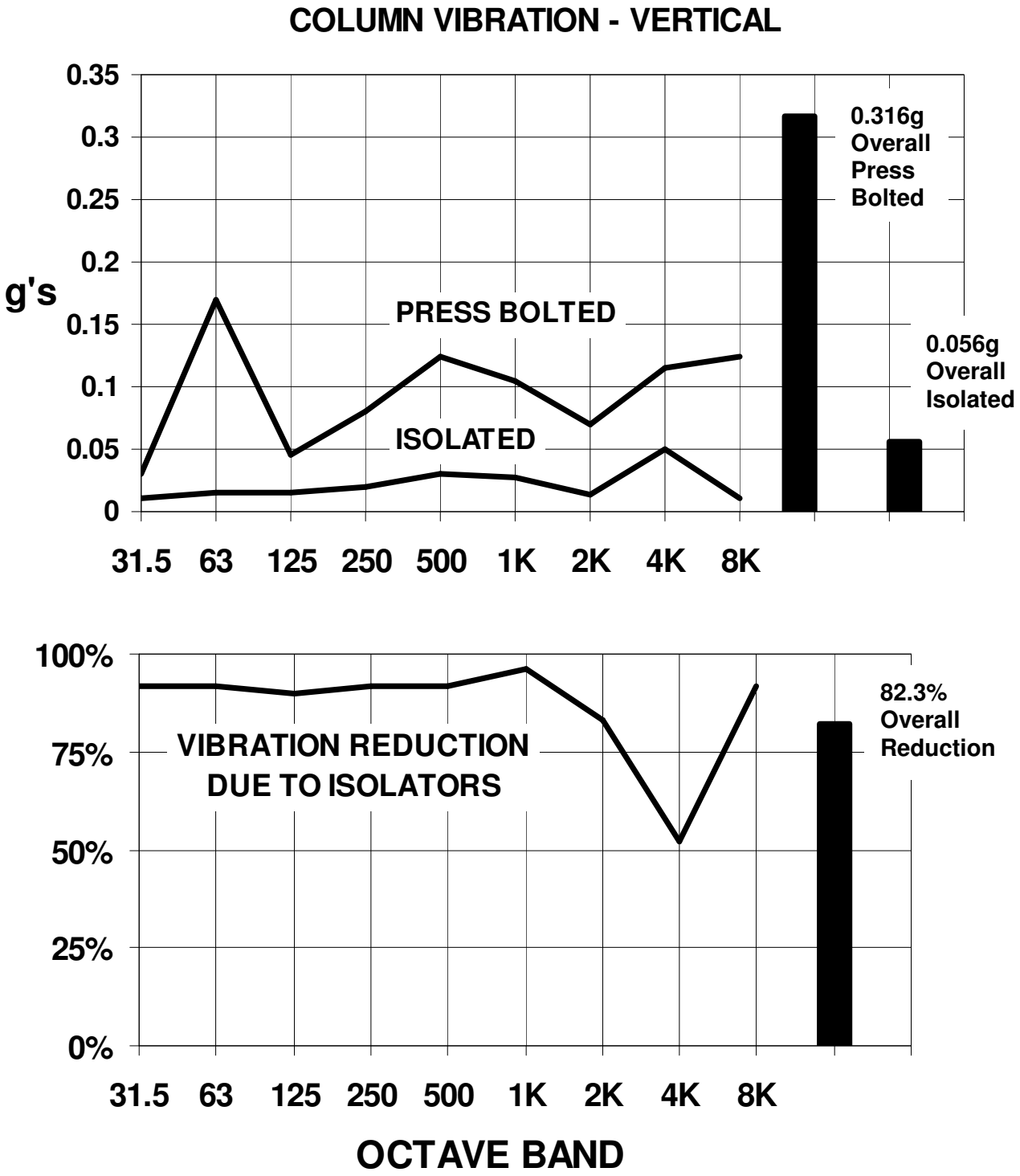

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