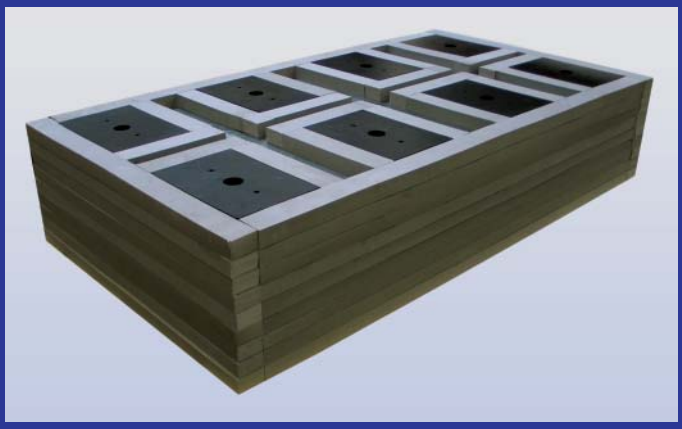
VIBRO/DYNAMICS®
vibration and shock isolation systems

Vibration and Shock Isolation Systems for the Forging Industry



MRM™ & VPS™ Isolation Elements

MICRO/LEVEL® Isolators

FSV™ and FSX™ Spring Mounts

Your best way to install forging machinery

for effective control of vibration and shock

MRM™ & VPS™ Systems

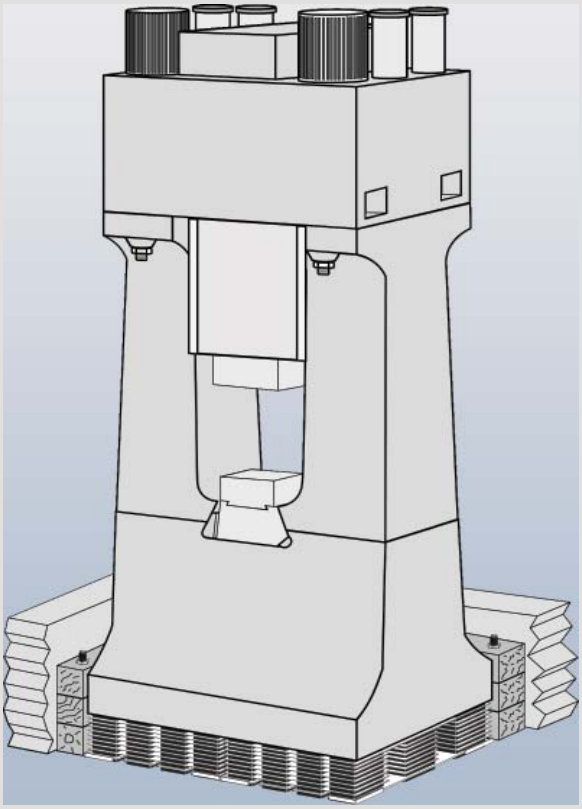
MRM™ and VPS™ Systems are specially designed for die forgers and drop hammers. These revolutionary new products have the simplicity of a layered elastomer system, with shock isolation effectiveness similar to viscous spring isolators.

MRM Systems feature thicker, softer, elastomer modules for greater vibration and shock control. Vertical dynamic natural frequencies as low as 8 Hz are achievable. Typical isolation efficiency is 60-80% reduction compared to traditional oak-timber systems. VPS Systems use stiffer, higher load capacity, elastomer modules for very effective vibration control in a more economical package.

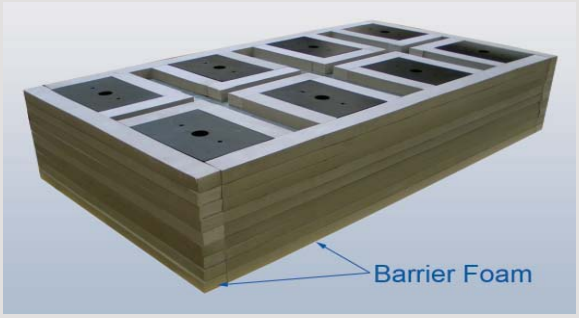
MRM and VPS Systems feature unitized construction. Each Element is constructed using alternating layers of custom elastomer modules and galvanized steel sheets that are securely fastened together. The elastomer modules are molded from proprietary compounds for superior shock isolation, durability, and creep resistance. Each Element is encased in a protective foam barrier for further protection against pit debris.

All MRM and VPS Elements are designed to be simply lowered into the foundation as complete units. No difficult and time-consuming layout and "in the pit" stacking of pads and plates is required!

The unique design features of the MRM and VPS Isolation Systems result in superior shock isolation, trouble-free installations and long lasting performance.



The MRM Isolation Element Concept.



MRM Element Model MRM8x9-0-G

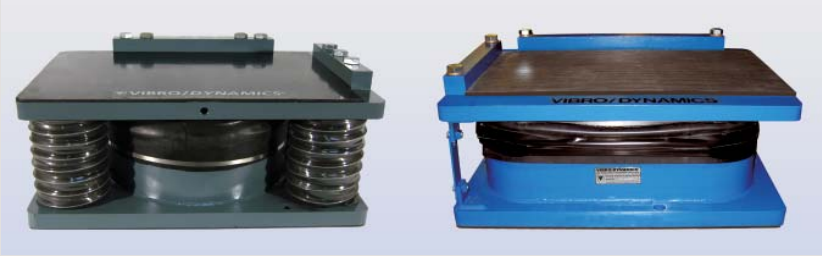
MRM Isolation Elements being lowered into a pit.

Elements quickly installed and arranged in pit.

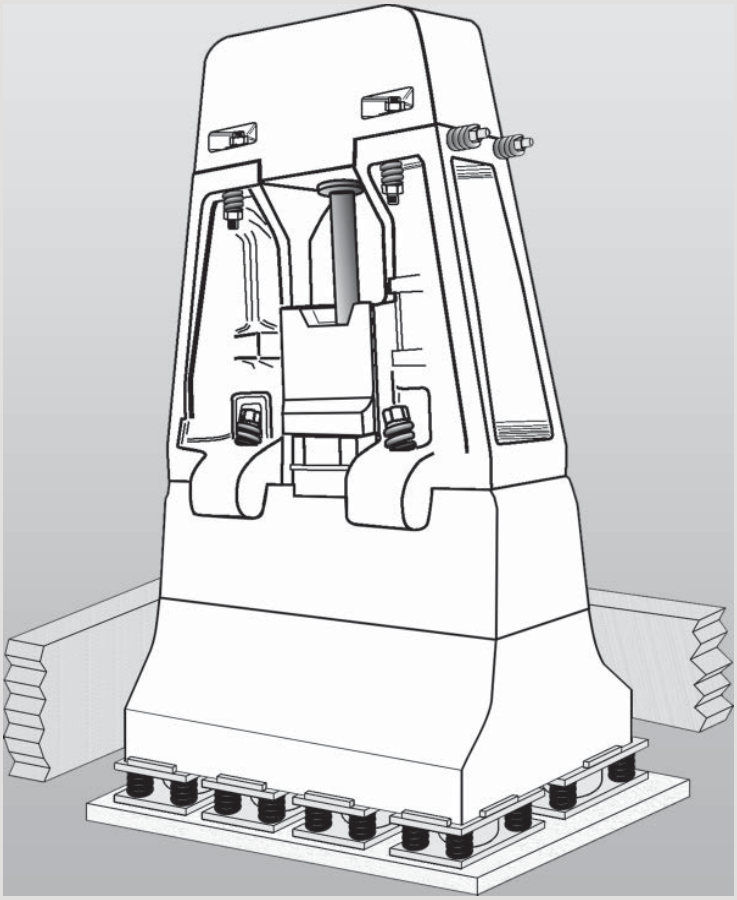
Viscous Damped Spring Mounts

FSV™ and FSX™ Spring Mounts provide the ultimate in shock isolation effectiveness. Their low stiffness and natural frequency results in shock isolation in the 80-90 percent range. Hammer motion is controlled by a very sophisticated viscous damper design, providing a fast decay of motion between hammer blows.

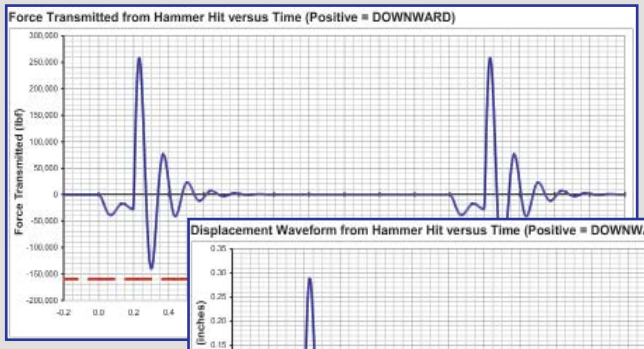
The heavy-duty, stress relieved fabrication is made to hold-up under the severe operating conditions typical to the forging industry. The FSV coil springs feature protective covers, while the FSX coil springs are totally enclosed within the damper. Both models have rim mounted seals to protect the damper from contamination.

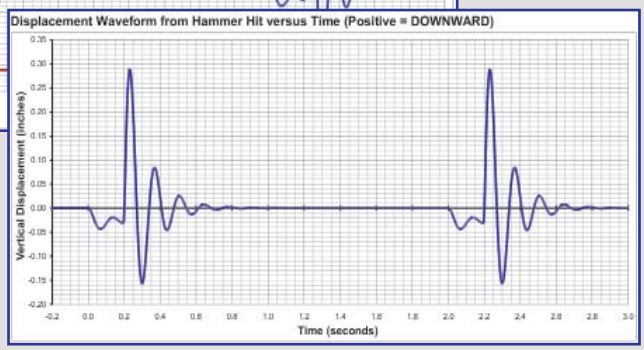


FSV20 and FSX20
Viscous Damped Spring Mounts



CECO #23 installed on FSV20-164-6S Viscous Damped Spring Mounts.





Vibro/Dynamics Engineers carefully analyze every application using proprietary computer modeling software. Motion and force transmission charts can be provided to assist the customer in their hammer installation and foundation design.

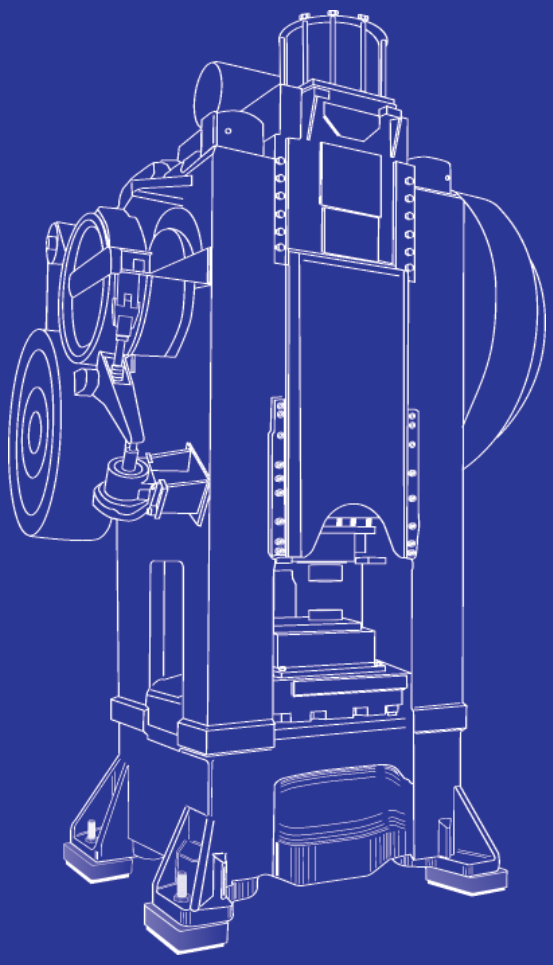
Forging Press Installations

Forging presses can be installed using either Vibro/Dynamics® Elastomer Isolators or Viscous Spring Mounts, depending on the installation and isolation requirements.

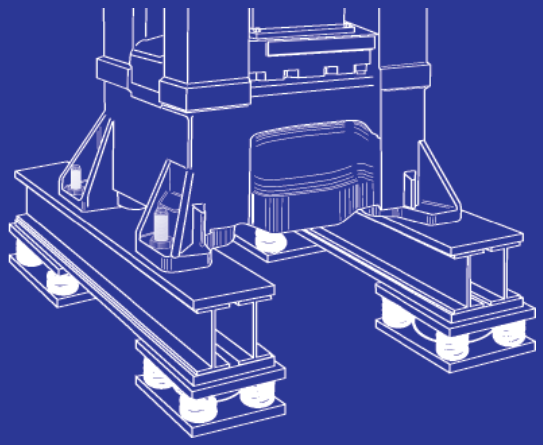
Micro/Level® Elastomer Isolators offer easier, faster installations, precision leveling and alignment; and excellent vibration and impact force isolation.

FSV™ and FSX™ viscous damped spring isolators are recommended when shock isolation requirements are high. These isolators are relatively soft, so direct mounting of the press on spring isolators may result in greater than desired motion caused by the press rocking forces. Motion can be reduced by using a steel plate or outrigger beams effectively increasing the wheelbase of the machine.

The choice is yours! Vibro/Dynamics Application Engineering Department is available to assist you in the isolator selection process.



Forging Presses can be installed using Micro/Level® Elastomeric Isolators or FS Type Spring Mounts with outriggers.



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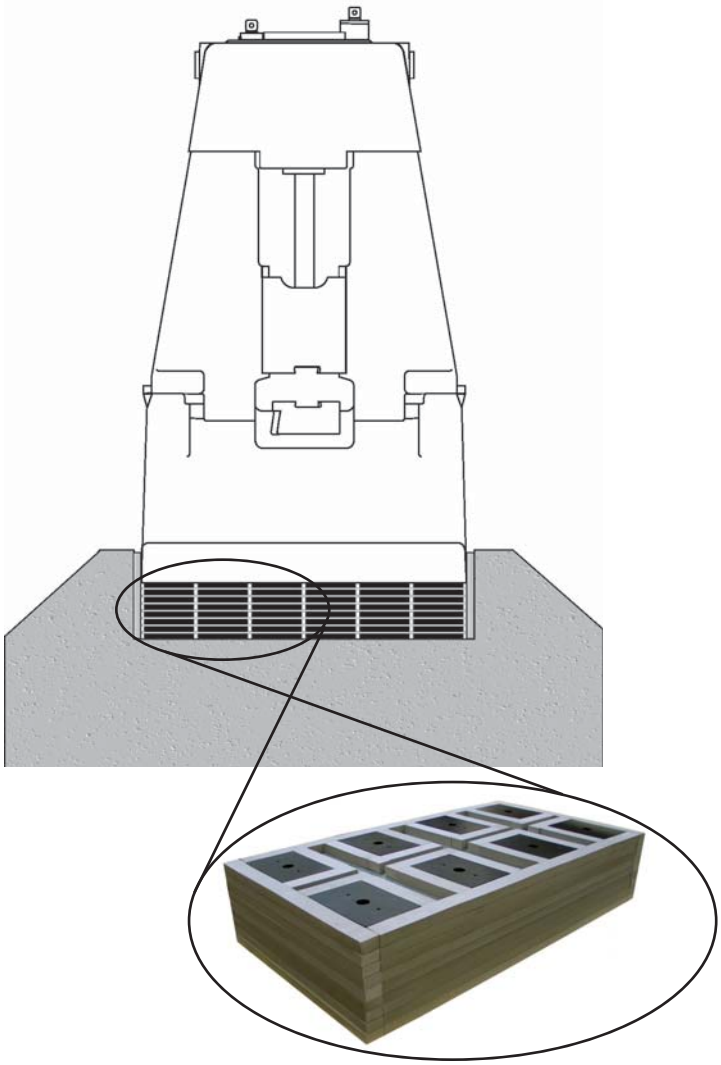
VIBRO/*DYNAMICS*

HAMMER ISOLATION SYSTEMS

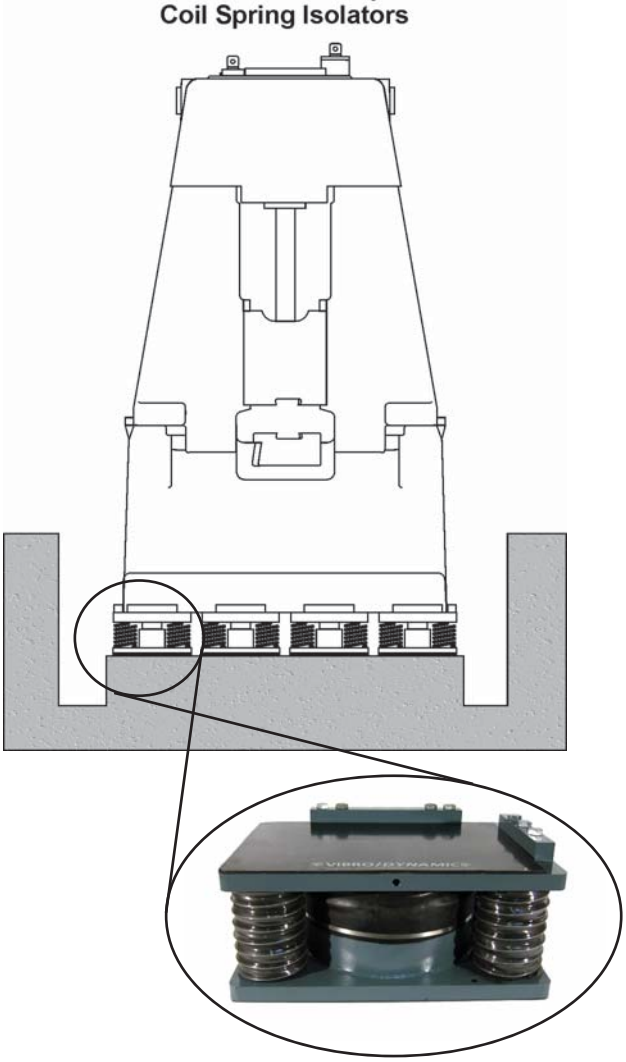
Vibro/Dynamics offers two alternative shock and vibration isolation systems for hammer installations to better fit your needs. The MRM and VPS Elastomeric Isolation Systems are modular systems that use multiple layers of custom-engineered isolation elements. Shock and vibration can be reduced up to 75%, yet the costs are comparable to traditional timber installations. These unitized systems are customized for the installation and are pre-assembled, eliminating any “in-the-pit” arrangement and assembly of elastomer layers.

FSV Hy/Damp™ Coil Spring Isolators offer isolation in the 80-90% range. These isolators provide an improved work environment and less stress on the hammer and its components. Viscous Dampers do an excellent job of controlling motion and heavy-duty construction makes them last!

Elastomer Support with MRM Isolation Elements



Direct Spring Support with FSV Viscous Damped Coil Spring Isolators



MRM™ & VPS™ Isolation Elements

- 40-75% Shock & Vibration Isolation
- Unitized Construction - Preassembled
- Cost Effective

FSV Hy/Damp™ Spring Isolators

- 80-90% Shock & Vibration Isolation
- Viscous Damping
- Rugged Construction

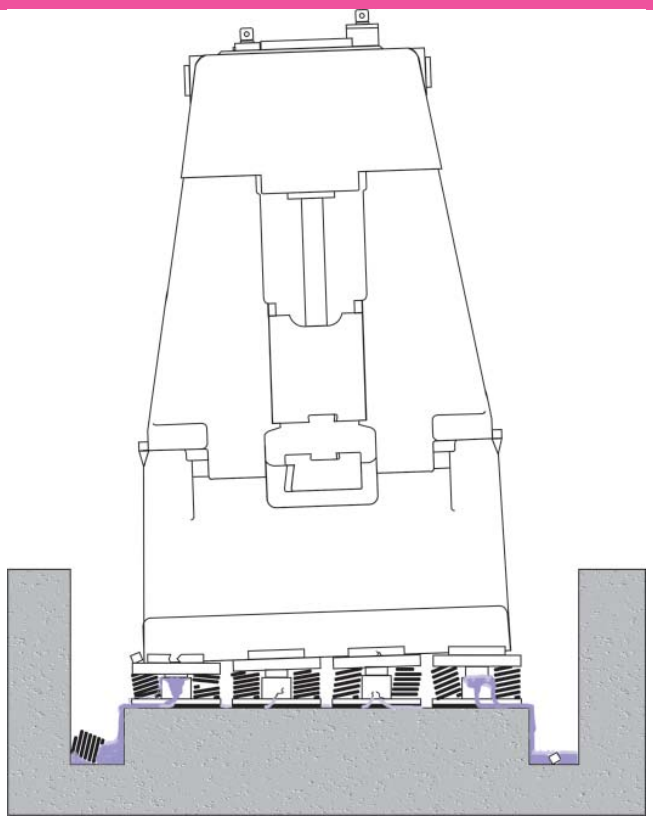
SERVICES

Is your present forge isolation system getting hammered?
Time for some preventive maintenance?
If so, Vibro/Dynamics can help!

We specialize in design and manufacture of vibration and shock isolation systems for forging machinery.

We carry an extensive inventory of replacement parts and viscous damping fluid for Vibro/Dynamics and other spring mount manufacturers.

We can also repair and rebuild your existing spring mounts, whether they are manufactured by Vibro/Dynamics or others.



Repair and Rebuild Services are available for most brands of spring mounts.

440 lb. drums of viscous damping fluids are available for various brands and styles of viscous damped steel coil spring mounts.

Springs, isolation pads, straps, keeper bars and other spring mounts components.

Call us to see how we can help!

2443 Braga Drive ● Broadview, Illinois 60155-3941 USA ● 708-345-2050 ● Toll Free 1-800-842-7668 ● Fax: 708-345-2225
www.vibrodynamics.com ● vibro@vibrodynamics.com

VIBRO/*DYNAMICS*
vibration and shock isolation systems

Elastomer and Spring Isolators

Vibration and Shock Isolation Systems for Large Stamping Presses

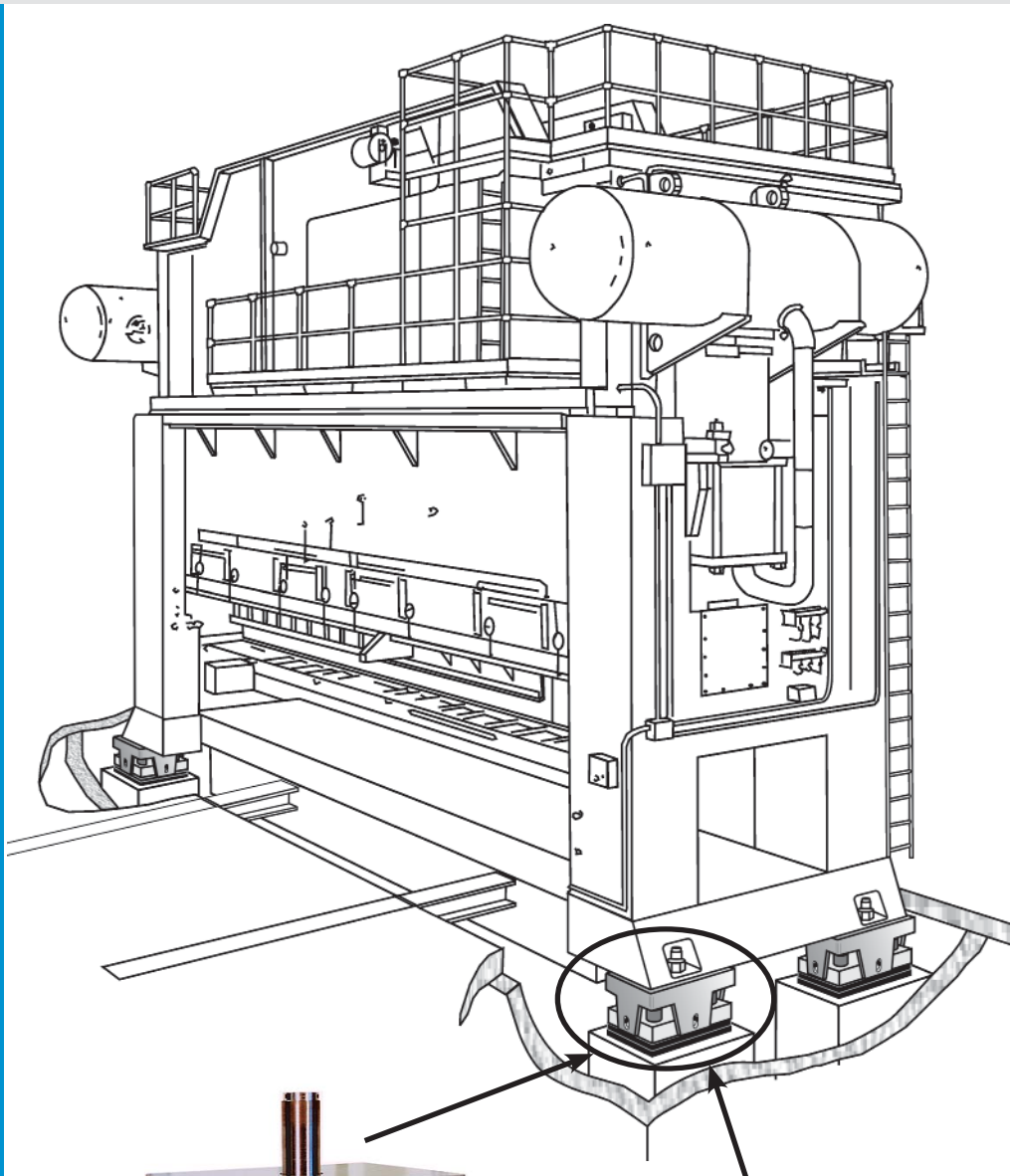
Your Best Way to Install and Level Heavy Presses for Effective Vibration and Noise Control

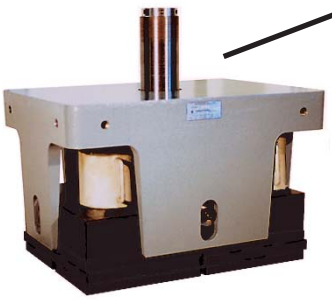
Vibro/Dynamics specializes in the installation of large stamping presses on anchorless isolation systems that provide faster, easier installations.

Both Elastomeric and Coil Spring type isolation systems are available depending on your vibration and shock isolation requirements.

MXL, MXLP and BFM models are elastomer type isolators that provide an excellent level of vibration isolation. Isolator natural frequencies as low as 8 Hz are possible with the MXL and MXLP models due to their unique multiple-layer elastomer design. Integral precision leveling combined with Hydra/Level® lift-assist capability makes leveling and alignment of even the heaviest presses accurate, fast and safe.

SVX and SVS Hy/Tuned™ Spring isolators offer the highest degree of vibration and shock isolation available. These isolators are the perfect solution for high impact presses located in vibration sensitive or unstable soil areas.





MXL Micro/Level® Isolator with portable hydraulic system shown.

SVS Hy/Tuned™Isolator with viscous damping system.

Features and Benefits

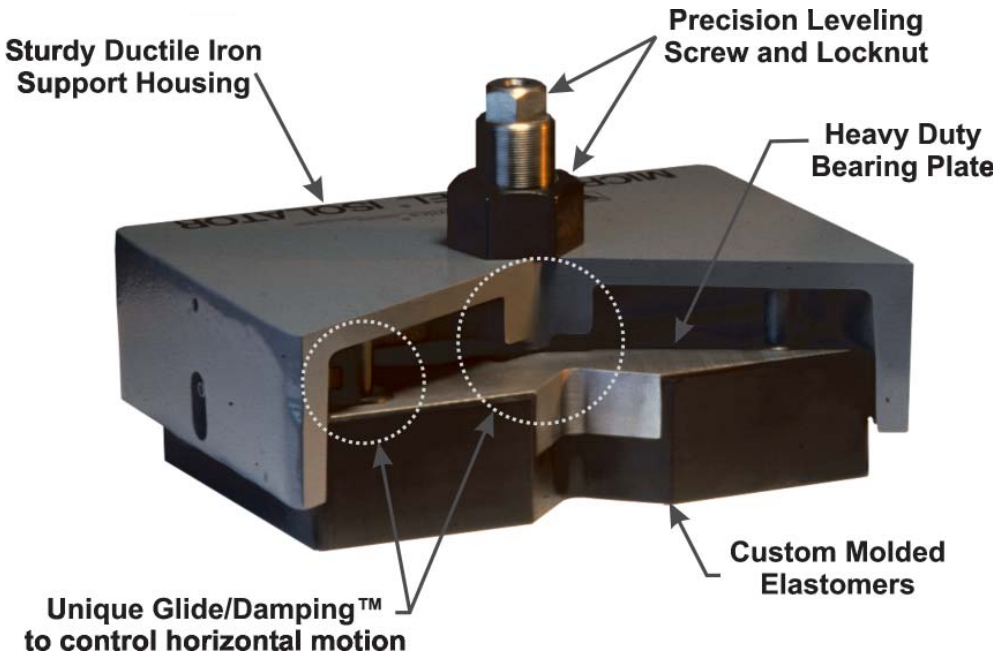
MXL(P) and BFM Model Micro/Level® Elastomer Isolators

- **Precision Leveling and Alignment**
  Ultra precise leveling system ensures precise machine geometry, resulting in reduced wear, increased tool and die life and improved part accuracy and repeatability.
- **Stable Machine Support**
  Custom molded elastomers are engineered and applied so that your installation maintains its precise geometry and elevation for the life of the installation.
- **Anchorless Installation**
  Since the isolators do not bolt to the floor, installation times and costs are greatly reduced. Anchor bolts, shims, and grout plates are not required and can be eliminated.
- **Vibration Control**
  Actual field tests have shown that our isolators can reduce vibration in a press structure by 82% and in the foundation by 98%, and reduce noise levels by up to 6.5 dB!

BFM Series Isolators

The BFM Series Isolators are designed for stamping presses weighing from 34 to 136 tons. These vertical leveling screw, elastomer type machinery mounts are designed to effectively isolate impact forces between the press and the foundation.

Among the features are a high-strength support housing and bearing plate, a heat-treated leveling adjustment screw, and a custom molded elastomer that effectively isolates vibration. Our elastomers are specifically designed and compounded for machinery mounting applications and are applied to prevent creep or packing down so your press stays level and aligned for the life of the installation.



The MXL and MXLP Series Design

MXL and MXLP Series Micro/Level® Isolators are designed for large mechanical presses weighing from 90 to 2300 tons and over. These anchorless isolators have a built-in leveling system and can swivel up to 2 degrees, eliminating the need for shims and grout plates.

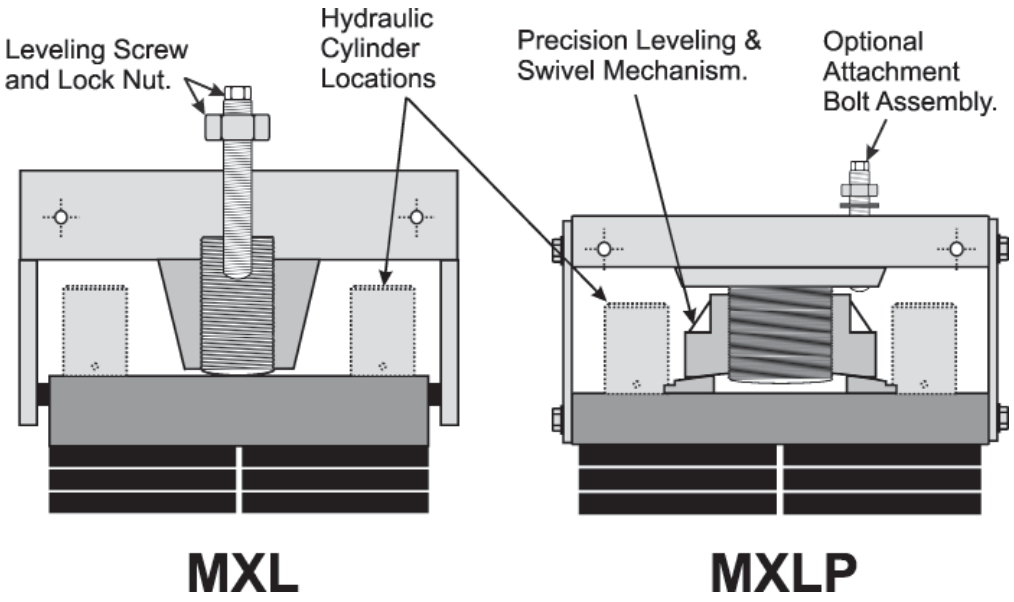
This innovative *patented* design combines multiple-layer elastomer isolation technology combined with our popular Hydra/Level® hydraulic lift-assist feature.

Using multiple layers of elastomers, isolator natural frequencies as low as 8 Hz can be obtained, resulting in very effective vibration and shock isolation.

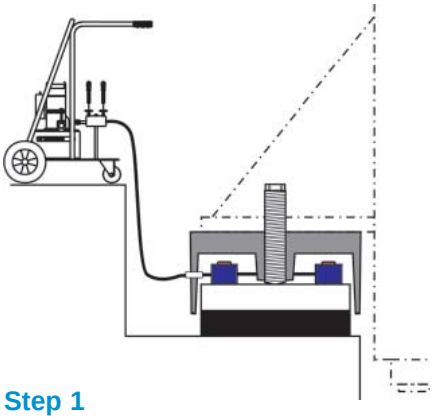
All MXL and MXLP Isolators are Hydra/Level® capable. During leveling and alignment, hydraulic cylinders can be temporarily installed in the isolators, making leveling and elevation adjustments faster, safer and more precise. No cribbing or additional jacks are required!

If your foundation should settle due to unstable soil conditions, the hydraulic cylinders can be quickly reinstalled in the isolators and the press leveled in a matter of hours.

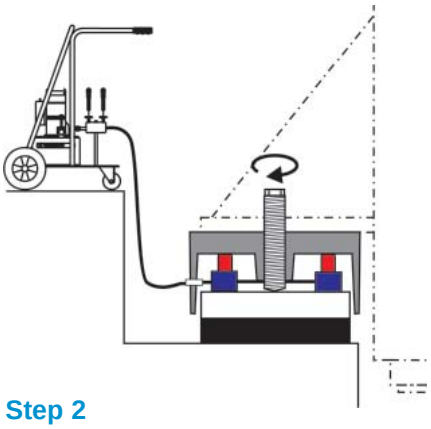
The MXL isolators with permanently built-in hydraulic cylinders are also available. The advantage is added convenience and speed during and after the initial installation.



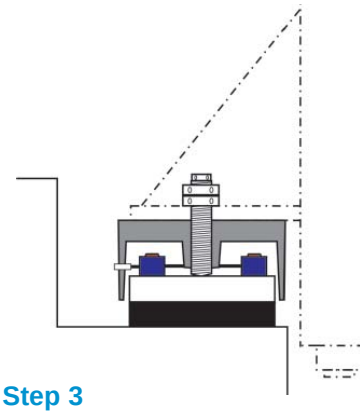
The MXL Hydra/Level® Process



Step 1
MXL Isolators are installed under each foot. The hydraulic pump is then connected to the hydraulic cylinders.



Step 2
The internal hydraulic cylinders raise the isolator housing, while maintaining load on the elastomers, until the isolator leveling screw can be turned by hand.



Step 3
After the press is perfectly leveled and the lock nuts tightened, the hydraulic cylinders are retracted and the pump disconnected.

Typical MXL Installation

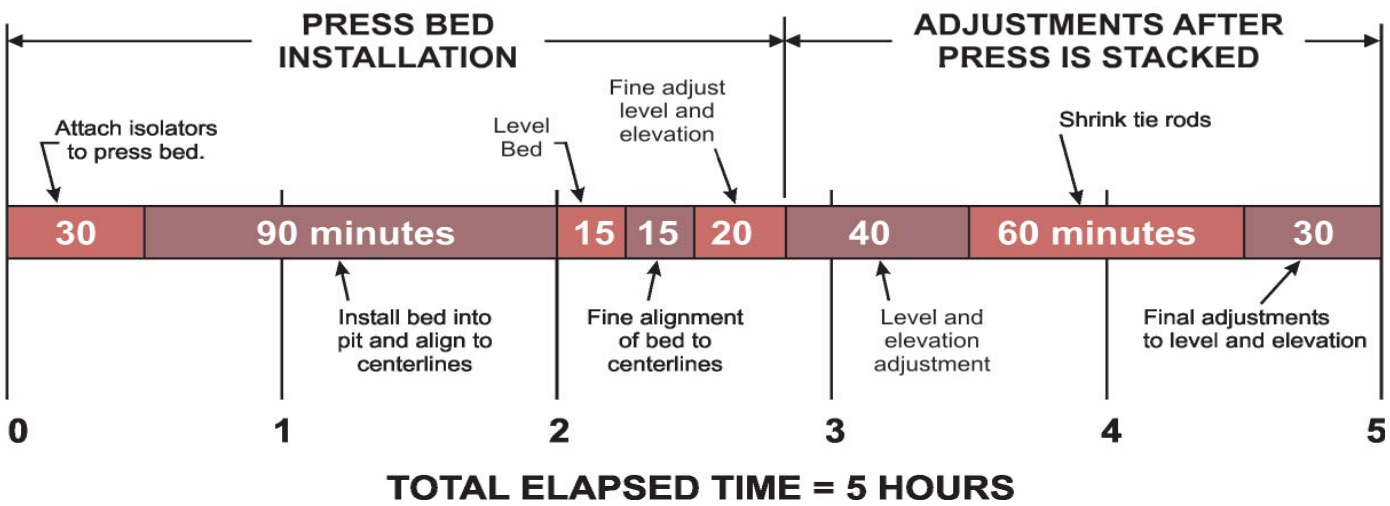
An isolator being lifted into place under a press foot.

The isolators are attached to the press feet.

The press bed is ready to be installed into the pit.

Isolators installed, press leveled, and aligned in five hours!

Press Installation Timeline



Hy/Tuned™ Spring Isolators

Vibro/Dynamics SVS and SVX HyTuned Spring Isolators are recommended for presses installed in areas that are extremely sensitive to vibration and shock transmission or in areas with poor soil support conditions.

These isolators have vertical natural frequencies as low as 2 Hz and feature viscous damping to control machine motion. Hydraulic cylinder pockets make shimming easier and safer.

Optional features include built-in leveling and our Lift/Lock™ Hydraulic System. This system is designed for presses using die carts or rolling bolsters. The Lift/Lock System keeps the press from tilting during die changes by hydraulically locking the press elevation.

Installation of an 800 ton press on SVS Viscous Damped Spring Isolators.

Reference List

Aida
AG Simpson
A.J. Rose
A.O. Smith
American Axle
Benteler Industries
Bosch Braking Systems
Brown Boggs Foundry & Machine Co.
Budd-Tallent Company
Burr Oak Tool & Gauge
CalsonicKansei Corporation
Carrier Corporation
Case Corporation
Caterpillar Inc.
Chin Fong Machine Industrial
Dana Corporation
Dayton Rogers
Delphi
Deluxe Stamping
Dennen Steel
Eagle Press & Equipment Co. Ltd.
Eaton Corporation
Elkay Manufacturing
Enprotech Mechanical Services
Federal Mogul
Flex-N-Gate
Ford Motor Co.
Freightliner
General Motors
Gestamp
The Gillette Co.
Greenerd Press
Harley-Davidson
The Heim Group
Hundai WIA Press
ITW
Jenn-Air
John Deere
Johnson Controls
Klein Tools
Knaack Manufacturing
Komatsu Press
KTH Parts Industries Inc.
Lear Corporation
Magna International
Maytag
Metalsa
Midway Products
The Minster Machine Co.
Oak Products
Orchid International
Oxford Automotive
Pacific Press Technologies
PATEC Press
PH Group
Polynorm Automotive
Press Technology Corporation
Pridgeon & Clay
QMC Die Technology
Raybestos Products Company
Schuler-Weingarten Press
Seastrom Manufacturing Company
SET Enterprises
Seyi-America
Shiloh Corporation
Sigma Stamping
Simpac Press
Spartanburg Steel Products
Square D
Steelcase
Sutherland Presses
Tempel Steel
Tower Automotive
Visteon
Vulcan Metal Products
Walker Manufacturing
Whirlpool
Williams, White & Co.
Worthington Industries
York International

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VIBRO/DYNAMICS®

technologically advanced machinery mounting systems

Machine Mounts for Precision Industrial Machinery

MICRO/LEVEL® ISOLATORS
Series 2, 6 and 8

Your best way to install and level machines

for effective control of vibration and noise

MICRO/LEVEL® Isolators for Fast, Easy and

TYPICAL APPLICATIONS

Metalworking Presses
Mechanical and Hydraulic
Turret Punch
Gap Frame
Brakes
Shears

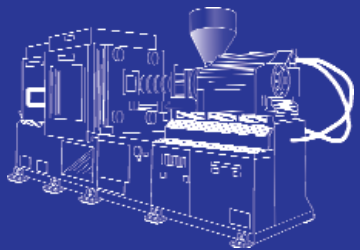
Precision Machine Tools
Broaching Machines
Cold Headers
Drills
Gear Hobbers
Jig Grinders
Lathes
Machining Centers
Milling Machines
Precision Grinders
Saws
Transfer Lines
Upsetters
Wire EDM

Die Casting & Plastic Molding
Die Cast Machines
Injection & Blow Molders

Metal Container
Bodymakers and Wall-Ironers
Necker Flangers
Decorators and Fillers

Measuring Equipment
Coordinate Measuring Machines
Optical Comparators
Surface Plates

Others
Pumps
Textile Machinery
Turbine Generators
Transformers
Woodworking Equipment



Faster, Easier Installation
Micro/Level Isolators eliminate the need for anchor bolts, shims, and grout. In most cases, no special foundations are required, getting you into production faster with minimum installation costs.

Vibration Control
Actual field tests showed that transmitted vibration can be reduced up to 98% with Micro/Level Isolators, improving machine performance, product quality, and protecting sensitive equipment and neighbors.

Precision Leveling and Alignment
The Micro/Level Isolator design makes precision leveling adjustments fast and easy. The isolator's leveling screw provides far greater leveling accuracy than shims or grout. Machinery relocations are just as fast, and if your floor or foundation should settle, releveling adjustments can be made with a simple turn of the wrench.

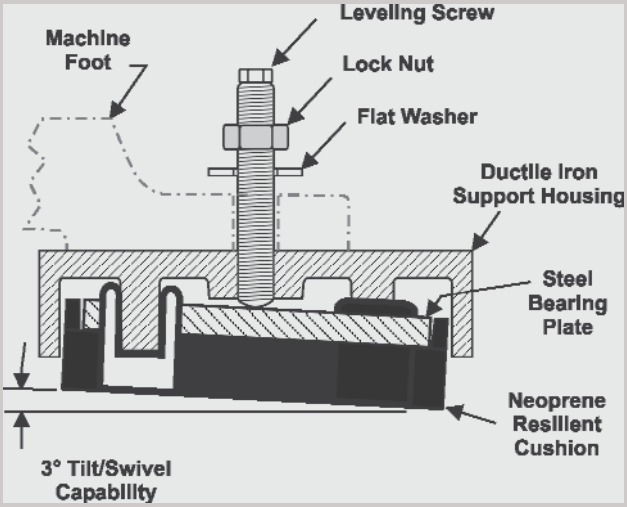
Proper Machine Support - Fine/Tuning
Precision leveling is critical to proper machine support. A machine can be level, yet not properly supported. Fine/Tuning is a process of making small, precise adjustments using the isolator's leveling screw to provide precise machine support. Fine/Tuning eliminates machine bed twist caused by improper support. Benefits include improved part quality, repeatability, and increased machine and tooling life.

Noise Reduction
A reduction in vibration results in a decrease in structural-borne noise. Noise reductions as high as 6.5 dB have been achieved using Micro/Level Isolators. Improved working conditions and reduced neighbor complaints are obvious benefits.

Meets OSHA Anchoring Requirements
The custom-engineered elastomers in Micro/Level Isolators offer an excellent coefficient of friction to eliminate machine walking to meet the OSHA anchoring requirements.

Economical Installations.

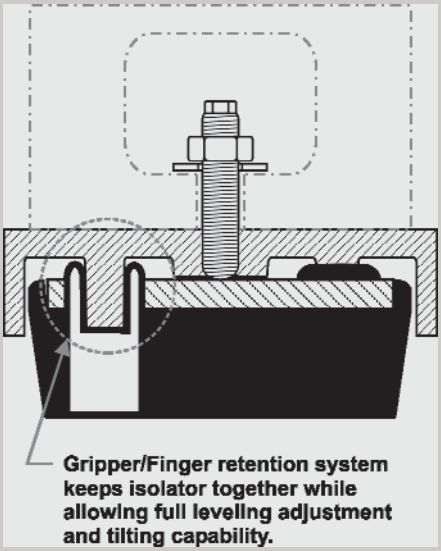
"L" & "K" Types



Series 2L, 6L and 8L **isolators are ideal for machine tool and punch press applications.** Series 6K and 8K **isolators are the best choice for machines generating high inertia force like high-speed presses, die cast machines, cold headers and plastic injection molders.**

(Use Isolator Selection Table 1 for these isolators).

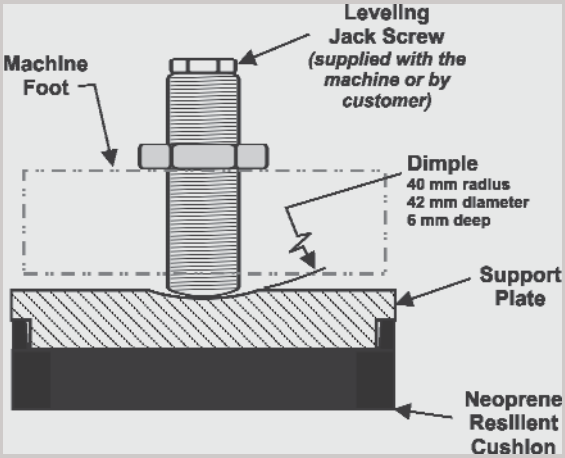
"M" Type



Series 6M and 8M **are very soft isolators with thick elastomers designed to protect precision equipment in high vibration environments. These isolators are designed for Non-Impact machines generating very low inertia. Ideal for coordinate measuring machines, surface plates, jig grinders and EDMs.**

(Use Isolator Selection Table 2 for these isolators).

"i" Type



Series 6iK, 6iL, 6iM, 8iK, 8iL and 8iM **have all of the above isolator characteristics, but are designed specifically for machines with leveling jack screws in their base. These isolators simply slide under the jack screws, replacing the existing leveling pads.**

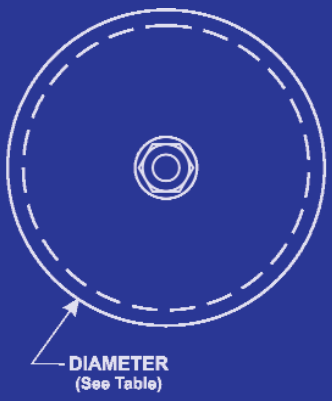
(Use Isolator Selection Table 1 or 2 depending on L, K or M Type).

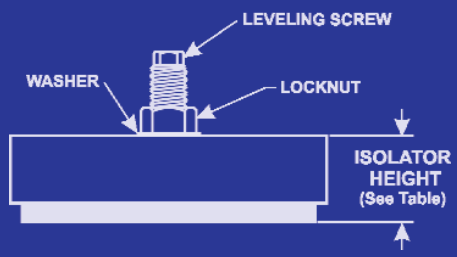
MICRO/LEVEL® ISOLATORS

ISOLATOR SPECIFICATIONS

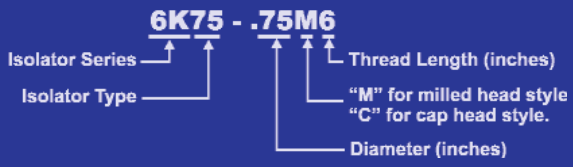
Isolator Model	Leveling Screw Diameter & Pitch	Maximum Load (lbs.)		Isolator Dimensions (inches)		
		Presses	Machine Tools	Diameter	Minimum Height	Leveling Adjustment
2L4	0.25-20 UNC	25	25	2.5	1	0.25
2L10		50	50			
2L20		100	100			
6L17	0.375-16 UNC	850	1250	5.63	1.75	0.5
	0.5-13 UNC					
	0.625-11 UNC					
6L40	0.375-16 UNC	850	1275	5.63	1.75	0.5
	0.5-13 UNC	2200	2300			
	0.625-11 UNC	2300	2300			
6K75	0.375-16 UNC	850	1275	5.63	1.88	0.5
	0.5-13 UNC	2200	3300			
	0.625-11 UNC	3500	3800			
6iL	Leveling Screws are not supplied. 40mm radius - 6 mm deep dimple provided.			5.0	1.5	
6iK						
8L150	0.625-11 UNC	3500	5250	8.13	2.5	0.75
	0.75-10 UNC	5300	7200			
	1-14 UNS	7200	7200			
8L220	0.625-11 UNC	3500	5250	8.13	2.5	0.75
	0.75-10 UNC	5300	7950			
	1-14 UNS	9300	9300			
8K80	0.625-11 UNC	3500	5250	8.13	2.5	0.75
	0.75-10 UNC	5300	7950			
	1-14 UNS	11,000	11,000			
8iL	Leveling Screws are not supplied. 40 mm radius - 6 mm deep dimple provided.			7.5	2.0	
8iK						
6M7	0.375-16 UNC	*These isolators are not recommended for presses.*	1000	5.63	2.5	0.5
	0.5-13 UNC					
	0.625-11 UNC					
6M10	0.375-16 UNC		1200	5.63	2.5	0.5
	0.5-13 UNC					
	0.625-11 UNC					
6M15	0.375-16 UNC		1275	5.63	2.5	0.5
	0.5-13 UNC		1700			
	0.625-11 UNC		1700			
6M22	0.375-16 UNC		1275	5.63	2.5	0.5
	0.5-13 UNC		2500			
	0.625-11 UNC		2500			
6iM	Leveling Screws are not supplied. 40 mm radius - 6 mm deep dimple provided.			5.0	2.18	
8M32	0.625-11 UNC	*These isolators are not recommended for presses.*	3800	8.13	3.13	0.75
	0.75-10 UNC					
	1-14 UNS					
8M55	0.625-11 UNC		4900	8.13	3.13	0.75
	0.75-10 UNC					
	1-14 UNS					
8M85	0.625-11 UNC		5250	8.13	3.13	0.75
	0.75-10 UNC		6300			
	1-14 UNS		6300			
8iM	Leveling Screws are not supplied. 40 mm radius - 6 mm deep dimple provided.			7.5	2.37	

See Isolator Selection and Application Guide for detailed information on selecting the best isolators for your machine.





ISOLATOR MODEL NUMBER KEY



LEVELING SCREW SELECTION TABLE

Leveling Screw Model	Foot Thickness Up To: (inch) Isolator Series		
	2	6	8
.25C1	0.38		
.375C4		2.4	
.375C6		4.4	
.5M3		1.3	
.5M5		3.3	
.5M8		6.3	
.625M4		2.2	1.5
.625M5		3.2	2.5
.625M6		4.2	3.5
.625M8		6.2	6.5
.75M4			1.5
.75M6			3.5
.75M8			5.5
1M4			1.4
1M5			2.4
1M6			3.4
1M8			5.4

Note: The machine mounting hole is used as a clearance hole for the isolator leveling screw.

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Isolator Selection and Application Guide

1. Select Isolators using Table 1 for General Machine Tools, Presses, Die Cast Machines and Plastic Injection Molders or Table 2 for non-impact machines like Coordinate Measuring Machines, Surface Plates, Jig Grinders and other machinery that does not generate a high amount of horizontal force.
   Note: Table 1 selects isolators based on the total weight of the machine, whereas Tables 2 selects the isolators based on the Isolator's Maximum Load.
2. For Table 1 applications, use either Column 1 or 2, depending on machine type. Follow the appropriate column downward until the machine's total weight is found.
3. Follow that row across horizontally until it intersects with the appropriate column in either the Machine Tool or Punch Press Section. Select the Isolator Model.
5. For Table 2 applications, determine the maximum load on the Isolator using Table 3. Select the Isolator.
6. Using the Leveling Screw Selection Table, select the Leveling Screw Model based on the machine's mounting hole diameter, foot thickness and maximum load on the isolator.
7. For Table 1 applications, the maximum load on the isolator must be calculated using Table 3 to select the leveling screw . This calculated load is only used for leveling screw - not isolator selection.
8. Configure the Isolator Model using the Isolator Model Number Key as an example.

ISOLATOR SELECTION - TABLE 1

Machine Type		Machine Tools					Punch Presses (four points of support)		
General Machine Tools & Presses	Injection Molding & Die Cast Machines	Number of Mounting Locations					Max. Press Speed (SPM)		
Machine Weight (lbs.)		12	10	8	6	4	100	150	200
250	125	2L4	2L10	2L20	2L20				
500	250	2L10	2L20						6L17
1,000	500				6L17 or 6iL17			6L17	
1,500	750						6L17		6L40
2,000	1,000								
2,500	1,250			6L17 or 6iL17					
3,000	1,500							6L40	
3,500	1,750						6L40		6K75
4,000	2,000		6L17 or 6iL17						
4,500	2,250								
5,000	2,500							6K75	8L150
6,000	3,000	6L17 or 6iL17			6L40 or 6iL40		6K75		
7,000	3,500								
8,000	4,000			6L40 or 6iL40		6K75			8L220
9,000	4,500		6L40			or		8L150	
10,000	5,000		or		6K75	6iK75			
12,000	6,000		6iL40	6K75	or		8L150		
14,000	7,000			or	6iK75			8L220	8K80
16,000	8,000	6L40	6K75	6iK75	8L150 or 8iL150				
18,000	9,000	or	or				8L220	8K80	
20,000	10,000	6iL40	6iK75	8L150 or 8iL150			8K80		
25,000	12,500				8L220	8L220/			
30,000	15,000	6K75	8L150 or 8iL150		or	8iL220			
35,000	17,500	or			8iL220	8K80			
40,000	20,000	6iK75		8L220/	8K80 /				
45,000	22,500			8iL220	8iK80				
50,000	25,000		8L220	8K80 /					
55,000	27,500		or	8iK80					
60,000	30,000	8L150	8iL220						
65,000	32,500	or	8K80 /						
70,000	35,000	8iL220	8iK80						
80,000	40,000								
85,000	42,500								
90,000	45,000								
95,000	47,500	8L220							
100,000	50,000	8iL220							

Note: All Selection Tables have built-in safety factors to guard against isolator overloading during the installation and leveling process.

ISOLATOR SELECTION - TABLE 2

Non-Impact, Low Inertia Machinery
(i.e. CMM, surface plates, jig grinders, etc.)

Isolator Series	Maximum Load per Isolator (lbs.)
6M4 & 6iM4	800
6M7 & 6iM7	1000
6M10 & 6iM10	1200
6M15 & 6iM15	1750
6M22 & 6iM22	2500
8M32 & 8iM32	3800
8M55 & 8iM55	4900
8M85 & 8iM85	6300

Table 3 - Load on Isolator

Number of Mounting Points	Maximum Load = Machine Weight x Factor
4	30%
6	25%
8	20%
10	15%
12	12%

Example: - Machine Weight = 50,000 lbs.
- Six Mounting Points

Maximum Load on Isolator =
50,000 x 25% = 12,500 lbs.

LEVELING SCREW SELECTION TABLE

Leveling Screw Model	Maximum Load (lbs.)		Foot Thickness Up To (in.):		
	Presses	Machine Tools	Isolator Series		
			2	6	8
.25C1	100	100	0.38		
.25C2			1.38		
.375C4	850	1275		2.4	
.375C6				4.4	
.5M3	2200	3300		1.3	
.5M5				3.3	
.5M8				6.3	
.625M4	3500	5250		2.2	1.5
.625M5				3.2	2.5
.625M6				4.2	3.5
.625M8				6.2	5.5
.75M4	5300	7950			1.5
.75M6					3.5
.75M8					5.5
1M4	11000	16,500			1.4
1M5					2.4
1M6					3.5
1M8					5.4

Isolator Series	Price (US $)
2L	$22.00
6L	$68.00
6iL	$64.00
6K	$74.00
6iK	$68.00
6M, 6iM	$104.00
8L, 8iL	$132.00
8K, 8iK	$142.00
8M, 8iM	$190.00

ISOLATOR MODEL NUMBER KEY

6K75 - .625M6

- Isolator Series
- Isolator Type
- Diameter (inches)
- "M" (milled head) "C" (cap head)
- Thread Length (in.)

Preparation

1.The concrete surface under the isolator must be clean, flat, and trowel finished. There should not be any holes, cracks, or lumps directly under the isolators. Patch all holes and broken concrete.

2. Clean and inspect the machine feet and legs. Repair any cracks or damage. The bottom of the machine feet must be clean and flat where it contacts the top of the isolator. Clean any debris from the mounting holes.

Installation

3. Lift the machines and position each isolator under the machine foot so there is uniform clearance between the threaded hole in the isolator and the inside surface of the mounting hole (see Figure 1). Any contact between the leveling screw and the inside surface of the mounting hole as it is turned into the isolator housing can cause the leveling screw to jam.

4.Thread the leveling screw into the isolator by hand or with a small wrench. The leveling screw should turn easily into the isolator housing until it contacts the internal bearing plate.

5.When the leveling screw contacts the bearing plate, turn the leveling screw one additional turn.

6.Carefully lower the machine onto the isolator.

Leveling

7. Refer to the machine manual for the machine's leveling locations and tolerances.

8. Using a precision machinists' level, electronic level, or laser, determine the machine's low side in the left-to-right direction. Raise all of the isolators on the low side an *equal* amount until the machine is level in that direction.

9. Repeat procedure in the front-to-back direction.

10. Repeat Steps 8 and 9 until the machine is level.

11. Isolators should not be over-adjusted to compensate for extreme out-of-level floor or foundation conditions. If a severe out-of-level condition exists, a spacer plate should be inserted between the isolator and the machine foot.

Tighten Locknuts

12. Place washer over Leveling Screw and thread on Lock Nut.

13. Tighten Locknut while using a wrench to hold the head of the leveling screw.

Additional Considerations

There should not be any solid connections between the machine and the foundation or building structure. Flexible connections are recommended for all plumbing and electrical conduit. Floor plates, walkways, railings, feeds, rolling bolster rails, etc. should *not* be attached to *both* the machine and the floor, foundation or building. Hard connections will “short-circuit” isolation effectiveness.

Caution: Vibro/Dynamics Isolators do not bolt to the floor and should not be used to mount machines that depend on anchor bolts to keep them from tipping or collapsing.

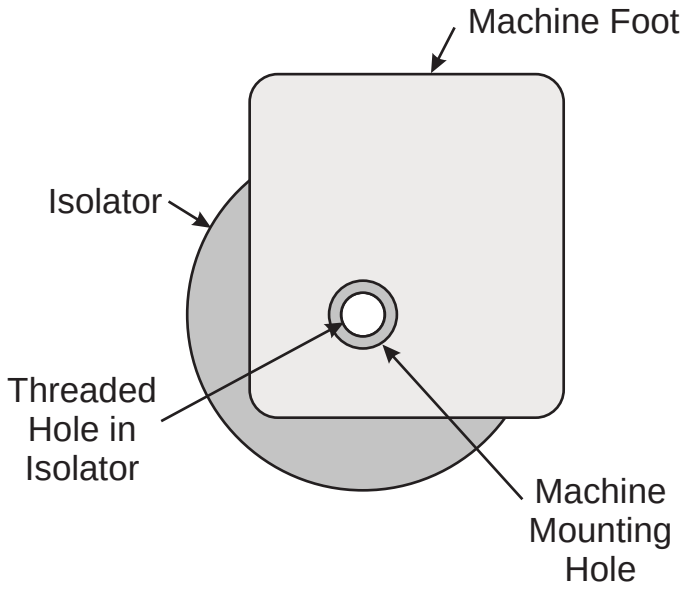

FIGURE 1

LEVELING SCREW INFORMATION (in.)		
Model No.	Head Height	Distance Across Flats
.25C_	5/32	7/16
.375C_	7/32	9/16
.5M_	3/8	3/8
.625M_	3/8	7/16
.75M_	3/8	1/2
1M_	1/2	3/4

LOCK NUT INFORMATION (in.)			
Diameter/ Pitch	Height	Distance Across	
		Flats	Corners
0.25-20 UNC	0.22	7/16	0.51
0.375-16 UNC	0.33	9/16	0.65
0.5-13 UNC	0.44	3/4	0.87
0.625-11 UNC	0.55	15/16	1.08
0.75-10 UNC	0.42	1 1/8	1.30
1-14 UNS	0.55	1 1/2	1.73

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VIBRO/DYNAMICS®

technologically advanced machinery mounting systems

MICRO/LEVEL® Isolators for Stamping Presses & Machine Tools

Series 9 to 26

Your best way to install and level machines

for effective control of vibration and noise

MICRO/LEVEL® Isolators for Fast,

Since 1964, VIBRO/DYNAMICS Corporation has been providing high quality vibration isolators and machine mounts for stamping presses and machine tools. Our simple approach has been to offer superior products with unmatched customer service and engineering support.

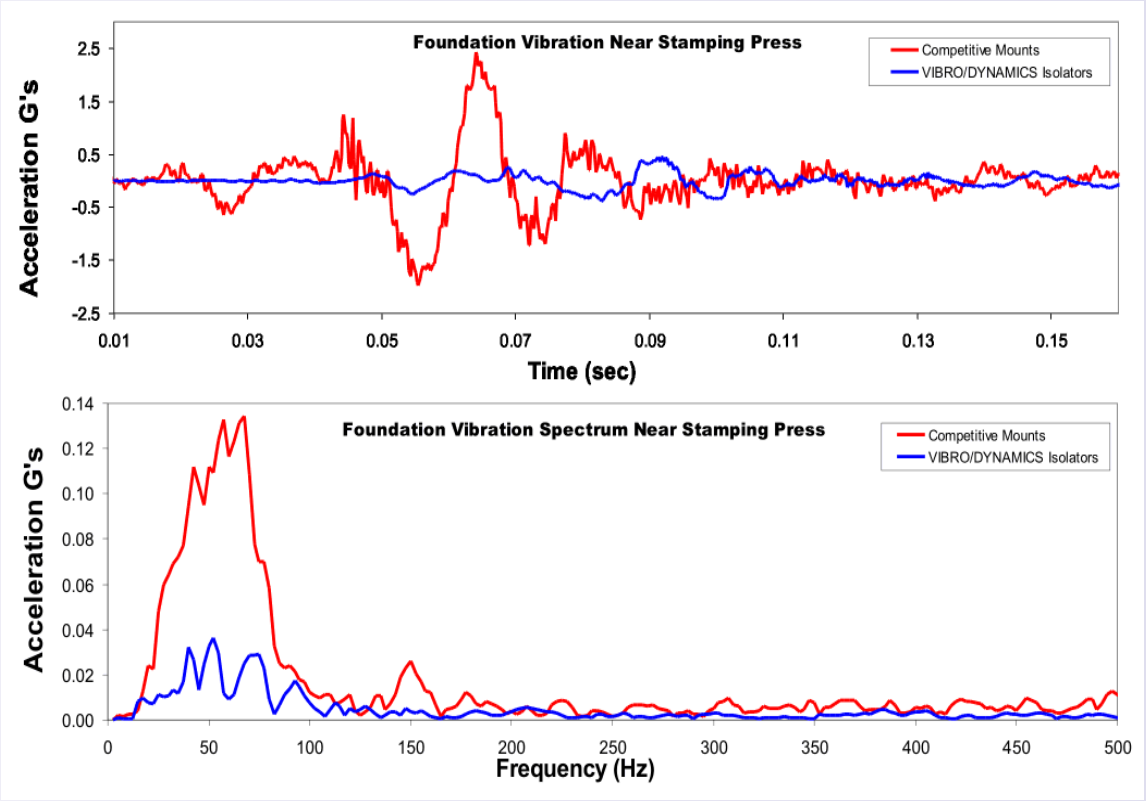
Our 9 to 26 Series Micro/Level® Isolators are made from high-quality materials: ductile-iron support housings; high-strength steel bearing plates and leveling screws; and one piece, specially compounded, compression molded elastomers that last!

Elastomer shape, thickness, and durometer are changed to obtain the desired stiffness characteristics.

Our elastomeric cushions are unsurpassed in the industry and help to separate us from the competition. Every elastomer is compression molded from high-quality, specially compounded polymers. These sturdy, homogenous elastomers are one piece and do not rely on separate inserts to adjust stiffness and to boost load ratings. Stiff inserts cause concentrated load distributions that affect proper support and elastomer stability. The high stiffness of the inserts also reduces vibration isolation performance. For flexibility in applying isolators, Vibro/Dynamics relies instead on a variety of elastomer stiffnesses available in each size. The isolator stiffness properties are varied by changing the hardness, thickness and shape of the elastomer, resulting in superior performance.

The chart shows actual vibration measurements taken from a 400 ton stamping press. This was a competitive installation where the customer was experiencing vibration transmission problems that could not be solved by the competitor after repeated requests.

Vibro/Dynamics Application Engineers reviewed the press application, found nothing unusual about the press application, and selected a set of Micro/Level® Isolators that best matched the press and its operating characteristics.



The measurements showed that the Vibro/Dynamics® Micro/Level Isolators provided an additional 80% isolation over the competitive mounts. The customer's vibration transmission problem was solved quickly!

Easy and Economical Installations.

Superior Elastomer Properties

- Low creep
- High resiliency
- Excellent chemical resistance
- High safety factor

Faster, Easier Installation

Micro/Level Isolators eliminate the need for anchor bolts, shims, and grout. In most cases, no special foundations are required, getting you into production faster with minimum installation costs.

Vibration Control

Actual field tests showed that transmitted vibration can be reduced up to 98% over hard-mounting with Micro/Level Isolators, improving machine performance, product quality, and protecting sensitive equipment and neighbors.

And, in head-to-head vibration measurements taken on a 400 ton blanking press, Vibro/Dynamics Isolators provided an additional 80% isolation over Competitive Mounts.

Precision Leveling and Alignment

The Micro/Level Isolator design makes precision leveling adjustments fast and easy. The isolator's leveling screw provides far greater leveling accuracy than shims or grout. Machinery relocations are just as fast, and if your floor or foundation should settle, releveling adjustments can be made with a simple turn of the wrench.

Proper Machine Support - Fine/Tuning

Precision leveling is critical to proper machine support. A machine can be level, yet not properly supported. Fine/Tuning is a process of making small, precise adjustments using the isolator's leveling screw to provide precise machine support. Fine/Tuning eliminates machine bed twist caused by improper support. Benefits include improved part quality, repeatability, and increased machine and tooling life.

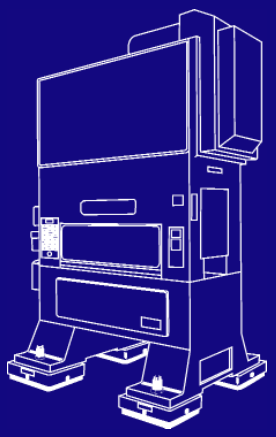
Noise Reduction

A reduction in vibration results in a decrease in structural-borne noise. Noise reductions of 6.5 dB have been achieved using Micro/Level Isolators. Improved working conditions and reduced neighbor complaints are obvious benefits.

Meets OSHA Anchoring Requirements

The custom-engineered elastomers in Micro/Level Isolators offer an excellent coefficient of friction to eliminate machine walking to meet OSHA anchoring requirements.

TYPICAL APPLICATIONS



Metalworking Presses

Mechanical
Hydraulic
Pneumatic
Forging
Turret Punch
Gap Frame
Straight-side
Press Brakes
Shears

Precision Machine Tools

Machining Centers
Grinders
Transfer Lines
Milling Machines
Cold Headers
Drills
Lathes
Grinders
Saws
Upsetters

Die Cast Machines

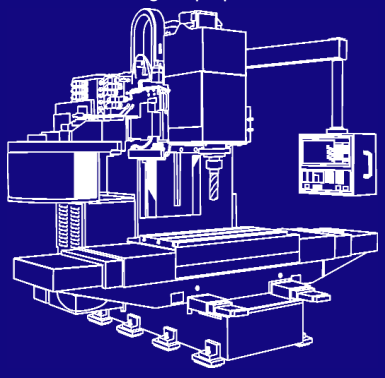
Plastic Injection Molders

Metal Container

Bodymakers
Wall-Ironers
Necker Flangers
Decorators and Fillers

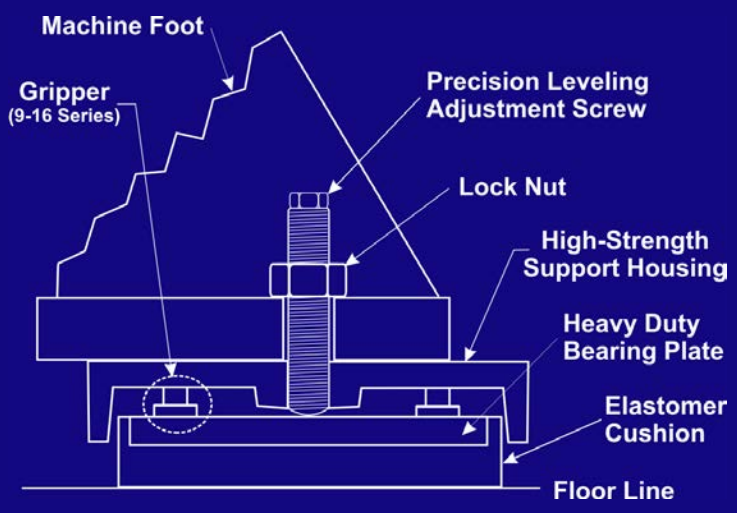
Other Applications

Pumps
Textile Machinery
Generators
Transformers
Woodworking Equipment



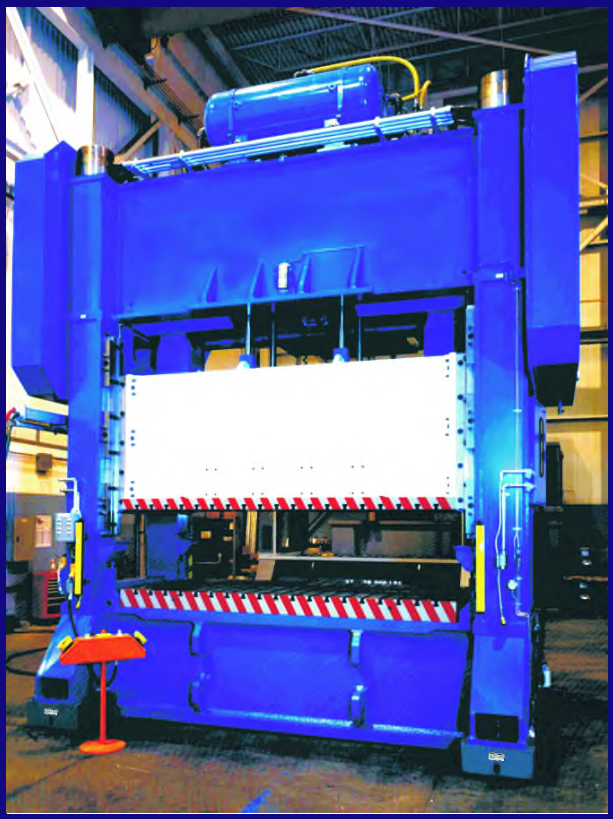
VIBRO/*DYNAMICS* MICRO/LEVEL® ISOLATORS

SPECIFICATIONS



Micro/Level® Isolator		Isolator Dimensions (inch)				Leveling Screw Diameter	
		Length	Width	Height			
Series	Model			Minimum	Maximum	Minimum	Maximum
9	9K	10 1/4	8 1/4	2 3/4	3 1/2	5/8	1 1/8
9	9L	10 1/4	8 1/4	3 1/8	3 7/8	5/8	1 1/8
9	9M	10 1/4	8 1/4	3 3/4	4 1/2	5/8	1 1/8
10	10K	12 1/8	10 1/8	3 1/4	4	3/4	1 1/4
10	10L	12 1/8	10 1/8	3 3/8	4 1/8	3/4	1 1/4
10	10M	12 1/8	10 1/8	4	4 3/4	3/4	1 1/4
12	12K	12 1/4	10 1/4	4 1/8	4 7/8	1	1 3/4
12	12L	12 1/4	10 1/4	4 1/4	5	1	1 3/4
12	12M	12 1/4	10 1/4	4 7/8	5 5/8	1	1 3/4
16	16K	16 1/4	13 1/4	5	6	1 1/2	2 3/4
16	16L	16 1/4	13 1/4	5	6	1 1/2	2 3/4
16	16M	16 1/4	13 1/4	5 3/4	6 3/4	1 1/2	2 3/4
20	BFM1230	20 1/2	14 1/2	7	8	2	3 1/2
20	BFM1150	20 1/2	14 1/2	6 3/8	7 3/8	2	3 1/2
20	BFM1340	20 1/2	14 1/2	6	7	2	3 1/2
26	BFM2660	26 1/2	19 1/2	8 3/4	9 3/4	2	3 1/2
26	BFM2676	26 1/2	19 1/2	8 3/4	9 3/4	2	3 1/2
26	BFM2690	26 1/2	19 1/2	8 3/4	9 3/4	2	3 1/2
26	BFM26100	26 1/2	19 1/2	8 1/4	9 1/4	2	3 1/2
26	BFM26110	26 1/2	19 1/2	8 1/4	9 1/4	2	3 1/2
26	BFM26135	26 1/2	19 1/2	8 1/4	9 1/4	2	3 1/2

Thousands of successful installations worldwide



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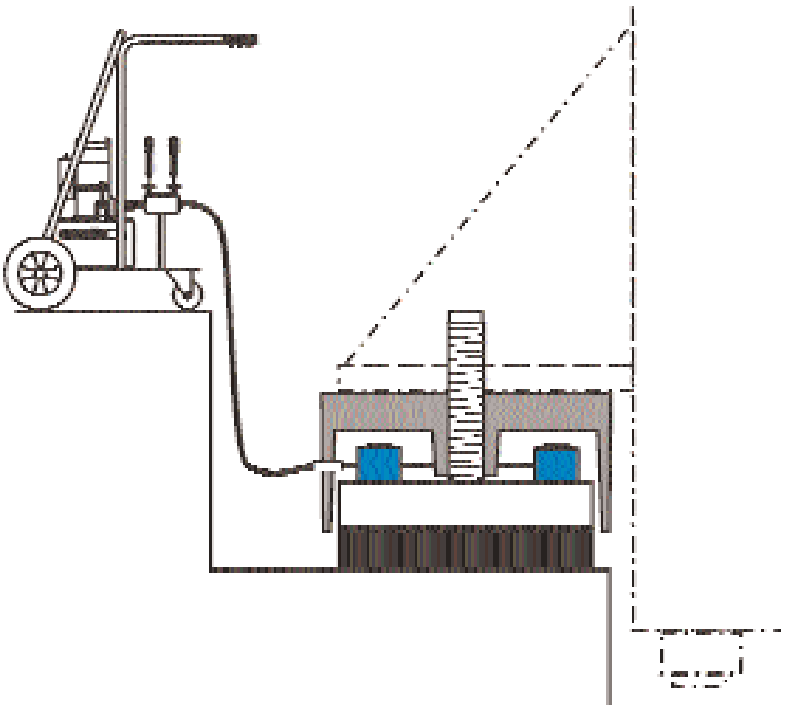
HYDRA/LEVEL ISOLATORS

1



Hydra/Level Isolators are installed under each foot and then connected to a Vibro/Dynamics HPU pump unit or equivalent.

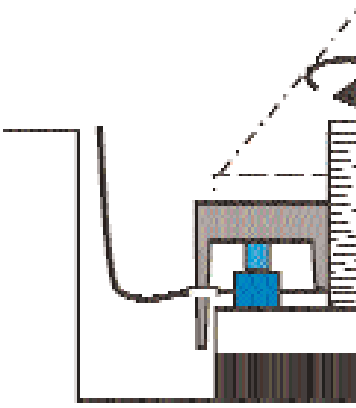
When multiple isolators are used to support one press foot, they are connected together hydraulically, ensuring that each is carrying the same load so that the press foot is properly supported.

NO SEPARATE HYDRAULIC JACKS, NO CRIBBING

Before Hydra/Level isolators, installing heavy, pit-mounted presses was a time-consuming process requiring separate hydraulic jacks, cribbing, and more expensive rigging costs.

A

2



The Hydra/Level Isolators' inter the isolator housing and press screw can be turned by hand.

You won't need any separate jack and alignment adjustments are m time and rigging costs. Press ele rolling bolster rails or die carts are

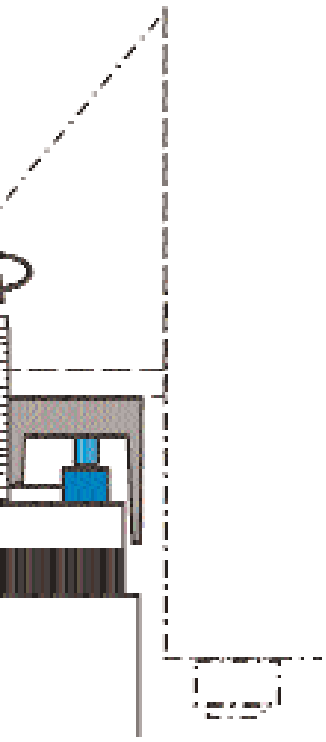
The Hydra/Level System is extrem the press bed is leveled and align and then again when the press is be quickly reactivated in the futur and leveling adjustments be requ

The Best Way to Install an

S EASY AS 1-2-3!

HYDRA/LEVEL ISOLATORS SPEED INSTALLATION AND SAVE MONEY

In a short time, presses can be precisely leveled, properly aligned, and properly supported -- a significant improvement on the more expensive and time-consuming process of hard mounting.

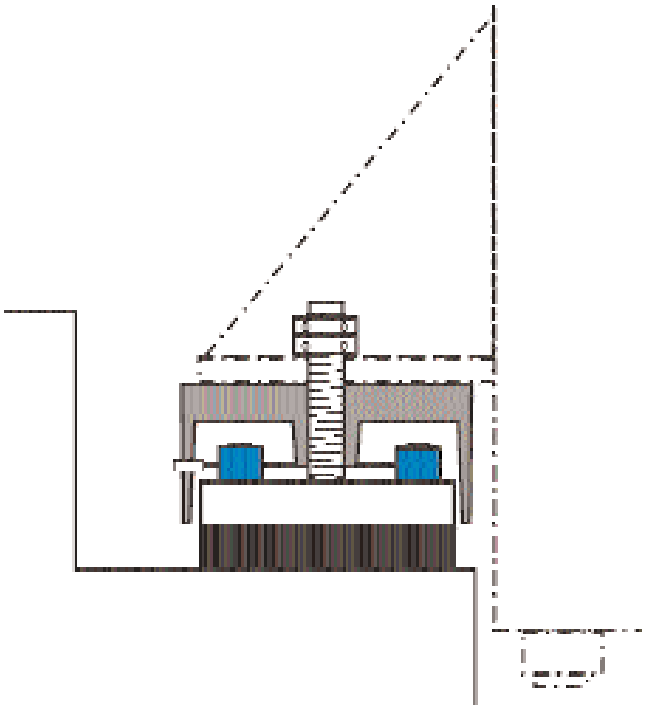


rnal hydraulic cylinders raise foot until the isolator leveling

ks or cribbing! All leveling ade quickly and easily, reducing vation adjustments to align e a breeze.

mely valuable considering that ed when first placed in the pit, fully stacked. The system can e should the foundation settle ired.

3



After the press is perfectly leveled and aligned and the locknuts tightened, the hydraulic cylinders are retracted and the pump unit is disconnected.

The Hydra/Level Isolators continue to optimally support the press in a precise level condition at the proper height. The Hydra/Level system is only used during the leveling and alignment process. The hydraulic cylinders within the isolators remain if a future need occurs.

nd Level Heavy Pit Mounted

VIBRO/DYNAMICS

Hydra/Level® System

Series HXL and HLM Isolators

Custom Fit for Your Application

We manufacture thousands of isolators and custom-engineer them to your machine and its particular operating characteristics.

The Hydra/Level hydraulic lift-assist feature is available in many isolator types, including:

Micro/Level® HLM, HXL, and MXL series for presses weighing up to 5 million pounds or more.

Hy/Tuned™ and **Hy/Speed**® Steel Coil Spring isolators for severe vibration and shock transmission problems.

Vibro/Dynamics Application Engineering Department will assist you in selecting the isolators that best suit your installation. Give us a call, and we will be happy to assist you with your selection.

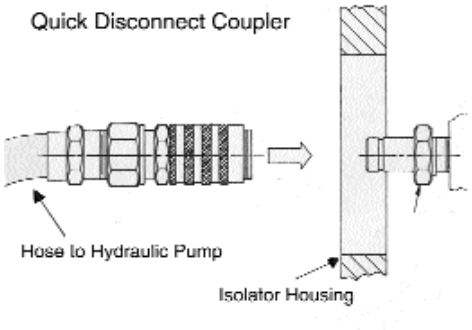
LIT-HL 083001

Service and Accessories

Vibro/Dynamics offers a wide range of Hydra/Level Services designed to assist you in the proper installation and use of our Hydra/Level products.

Hydra/Level Service includes two Field Service Technicians and the necessary Hydra/Level pumps, hoses, and power control system equipment required to properly adjust HLX and HLM model isolator heights to achieve proper machine support, level, parallelism and alignment. Two trips or services are recommended. The first service should be conducted right after the bed has been installed. The second service should be conducted after the press has been stacked, and prior to stressing the tie rods.

Vibro/Dynamics has a variety of different size HPU pump units to match the Hydra/Level Isolators recommended for your press. The multi-purpose pumps are needed only during the initial installation, and can be quickly reconnected using the quick disconnect coupler in the event that the press needs to be releveled or is relocated.



HPU1420 Hydraulic Pump Unit connected to a HLM6800 Micro/Level Isolator with the Hydra/Level feature

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VIBRO/DYNAMICS®
vibration and shock isolation systems

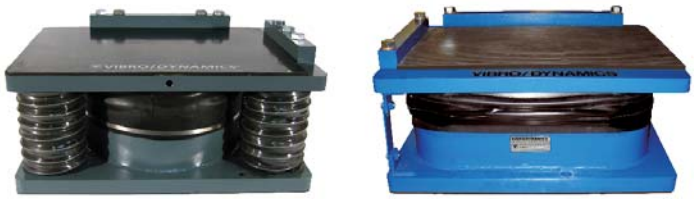
MRM™ & VPS™ Shock Isolation Systems for

Forging Hammers

Forging Hammer Isolation

Vibro/Dynamics began producing isolation systems for forging hammers in 2002 after receiving numerous requests for an improved mounting system from hammer builders and forging producers. Vibration and shock isolation of forging hammers is very difficult due to their large masses and extreme shock forces. Vibro/Dynamics first developed the FS Series Coil Spring Isolators with viscous fluid dampers and then followed with the development of MRM™ and VPS™ Elastomeric Isolation System. Both types have proven to be very effective in isolating hammer and shock forces.

Coil spring and viscous damper units provide the greatest isolation performance, but have higher initial cost, more expensive foundations, and potential maintenance issues. The viscous dampers in the spring isolators are difficult to protect if a pit should flood; a situation usually requiring the replacement of the damper fluid. Some competitive damper designs have leaked due to the cracks developing in the damper tube walls, which requires the removal and repair of the spring isolators.



FSV20 and FSX20 Viscous Damped Spring Mounts

As a result, the MRM and VPS Systems has become an accepted standard for vibration and shock isolation around the world. They offer superior isolation performance over timber and pad systems without the larger inertia mass, flooding issues, and higher maintenance cost associated with coil spring isolator systems. They are easy to install and maintain and have proven to be durable.

This document seeks to address the technical issues involved in the isolation of forging hammers. The technical understanding of the isolated hammer system can be best understood at three conditions:

1. When the ram is falling,
2. When the ram is performing work on the part,
3. When the ram rebounds.

When the ram is falling

Hammer capacity is generally rated by the amount of energy that can be delivered by the falling mass, which includes the ram and upper die. Most hammers are designed such that the falling weight starts with zero or near zero initial velocity and impacts the work piece at 6 to 7 m/s (18 to 23 ft/s). It is simple to calculate the hammer's capacity by knowing the maximum falling weight by Equation 1.

The falling mass is calculated by taking the falling weight, w, and dividing by one gravity, g = 9.8 m/s^2 or 32.2 ft/s^2. The impact velocity, v_i, should be in units of m/s or ft/s. The units of energy capacity, E, are N·m = J for metric and ft·lb for imperial measure.

$$E = \frac{1}{2} \cdot \frac{w}{g} \cdot v_i^2 \qquad (1)$$

In the case of drop hammers where the falling mass is accelerated by gravity alone, the energy capacity of the hammer may be determined by multiplying the falling weight by the height of the drop, h, per Equation 2.

$$E = w \cdot h \qquad (2)$$

Some hammers accelerate the falling weight by using a piston powered by steam or pneumatic pressure, or by hydraulic accumulators. These hammers typically hit with higher blow rates. It is important that the isolation system be applied with sufficient damping such that there is no movement when the next blow occurs. If the system is traveling downwards when the next blow arrives, the blow will increase the amplitude of the downward motion more than the prior hit, possibly overstressing the isolation system and building over several blows to an unstable situation. For soft mounting systems and when the falling weight is accelerated by the piston, the hammer's recoil may unload the isolation system, possibly leading to instability. Usually, hammers have sufficient anvil weight so recoil is a minor issue compared to the shock caused by the ram doing work on the part.

When the ram is performing work on the part

The very short time in which the ram contacts the work piece and deforms the work piece is the most important time in the operation for the hammer user. There is a wide range of forging work that can be done in a hammer, so the magnitude of the blow force and the duration of the blow force can vary significantly. Hot open die forging work will impose a lower magnitude and longer duration force between the ram/part/anvil than a hot die forge blow. The finishing blows in die forging operations are the most severe. The analysis of the reaction of the anvil to the blow is actually simplified by the fact that the anvil is much more massive than the ram and the duration of the impact is very short. The ram travels downward until the anvil velocity is increased to equal the ram velocity, and then it rebounds.

Hammer builders understand that to develop maximum force on the part, the anvil must be much more massive than the ram. Figure 1 shows the theoretical hammer force relative to an extremely massive anvil that is 100 times as large as the ram. Note that once the anvil is more than about 10 times greater in mass, there is little change to the peak force attained.

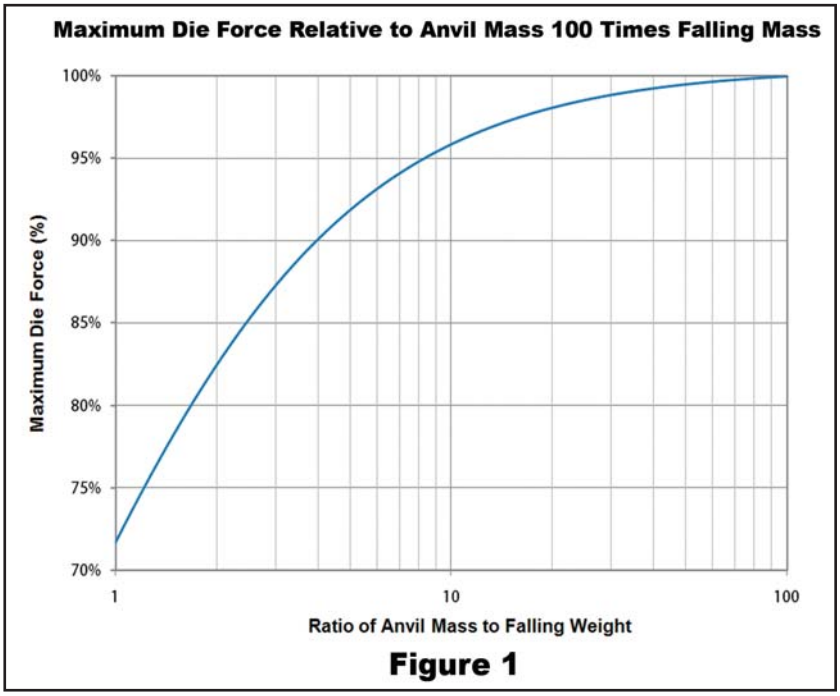


Figure 1

The anvil's inertia is used to generate the blow force. Softer isolation systems will slightly decrease the peak force of the blow. Both elastomer and spring type isolation systems reduce the available impact force to approximately 99.985% of the force compared with traditional timber support. Because only 0.015% is lost by employing a more efficient isolation system, the benefits to the hammer, foundation, personnel, and nearby equipment easily justify using an economical and reliable isolation system.

All hammer blows occur over a very short time compared to the oscillations of the anvil after the blow is struck. See Figure 2. The time for one oscillation of the anvil is the natural period of the hammer system. Traditional hammer support systems using oak timbers may be used as a benchmark for the performance for other isolation systems. Even with timber support, the natural period of the hammer system is much greater than the shock impulse duration of the ram striking the work. The difference results in a significant reduction in the force transferred from the anvil to the foundation. However, because the blow forces are extremely large, even small levels of vibration transmitted to the surroundings may be very disruptive and damaging. In general, the softer the support system, the greater the natural period and isolation effectiveness. The transmitted shock of the hammer will be reduced if the system natural period is at least six times greater that the shock force duration. Soft systems transmit less vibration to the surroundings than stiff systems.

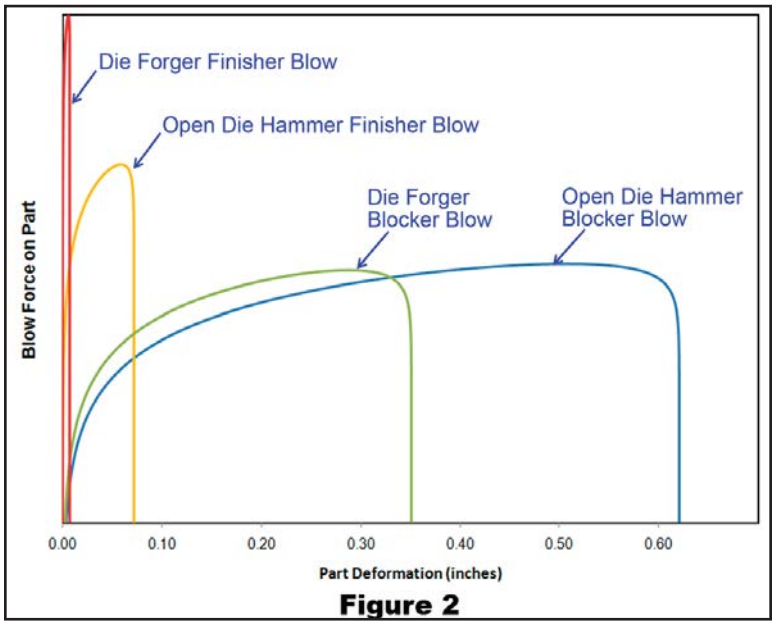


Figure 2

The collision between the ram and workpiece transfers the momentum of the ram into downward motion of the anvil and the upward rebound of the ram. Once the ram and anvil reach the same velocity the ability of the ram to do work is finished, and the maximum force on the workpiece is achieved. After this point in time, the ram rebounds upwards and the anvil continues to travel downwards.

When the ram rebounds

Once the work has been done on the workpiece and the ram is rebounding, the impact shock from the ram is transferred to the anvil and the isolation system controls the motion and transmitted forces. Because the shock impulse is of very short duration, the hammer system can be accurately modeled by using the conservation of momentum principle. Because some energy is lost in the impact of the ram upon the workpiece, the collision is termed inelastic, but the conservation of momentum laws still apply.

$$m_1 \cdot v_i + m_2 \cdot v_{2i} = m_1 \cdot v_f + m_2 \cdot v_{2f} \qquad (3)$$

Where:

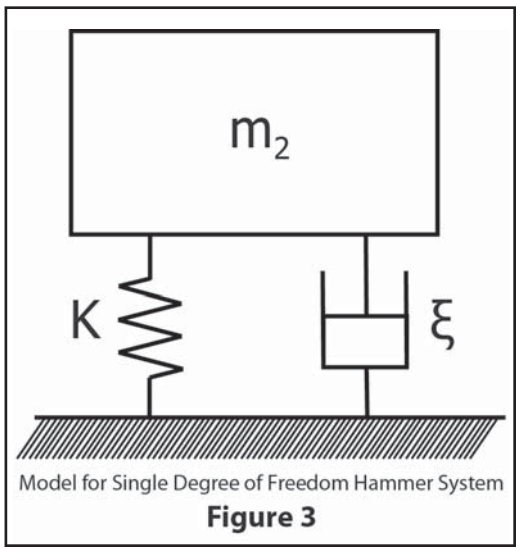
m_1 = ram mass
m_2 = anvil mass
v_i = ram velocity immediately before impact
v_{2i} = anvil velocity immediately before impact
v_f = ram velocity immediately after impact
v_{2f} = anvil velocity immediately after impact

The ram will not rebound at the same velocity; this change can be captured in the Coefficient of Restitution, C_R, defined by Equation 4.

$$C_R = \frac{v_{2f} - v_f}{v_i - v_{2i}} \qquad (4)$$

Open die forging operations that cause very large deformations in a hot work piece will have very low C_R values of 0.1-0.2. As the work piece cools with very little deformation taking place, as in the case of finishing blows in a closed die forging, C_R values may be as high as 0.5-0.6.

The hammer system can be modeled very effectively as a single degree of freedom system where the supporting isolation material is a simple spring and dashpot as shown in Figure 3. The dynamic stiffness, K , of the isolation system determines the amount of motion and the amount of force transferred to the foundation.



Model for Single Degree of Freedom Hammer System
Figure 3

The damping component, **ξ**, of the system dissipates energy as heat as the system is brought back to the static state of equilibrium. The damping has little effect on the first downward peak displacement of the anvil, but over several cycles the anvil slows to the at rest state.

After the ram has struck the work piece and the momentum of the ram is transferred to the anvil, the anvil will oscillate about the equilibrium position upon the isolation system at a frequency, called the damped natural frequency of the system, given by Equation 5.

$$\Omega_d = \sqrt{\frac{K}{m_2} \cdot (1 - \xi^2)} \qquad (5)$$

From this simple model, the equation describing the vertical motion of the anvil mass, m_2 can be solved as Equation 6.

$$x(t) = \frac{(1 + C_R) \cdot v_i \cdot \left(\frac{m_1}{m_1 + m_2}\right)}{\Omega_d} \cdot e^{-\xi \cdot \sqrt{\frac{K}{m_2}} \cdot t} \qquad (6)$$

Reviewing the variables within Equation 6;

- The motion of the hammer system is reduced when the anvil weight, m_2, is increased and,
- The motion is increased with a softer, lower natural frequency system, Ω_d.

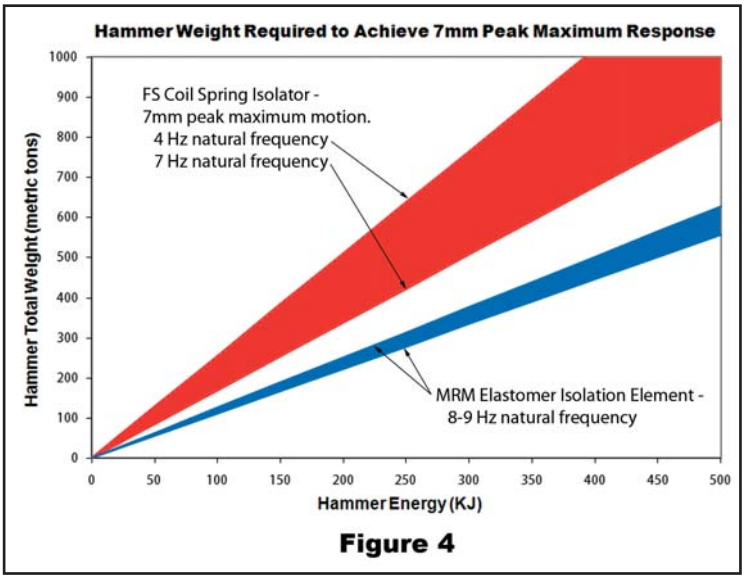


Figure 4

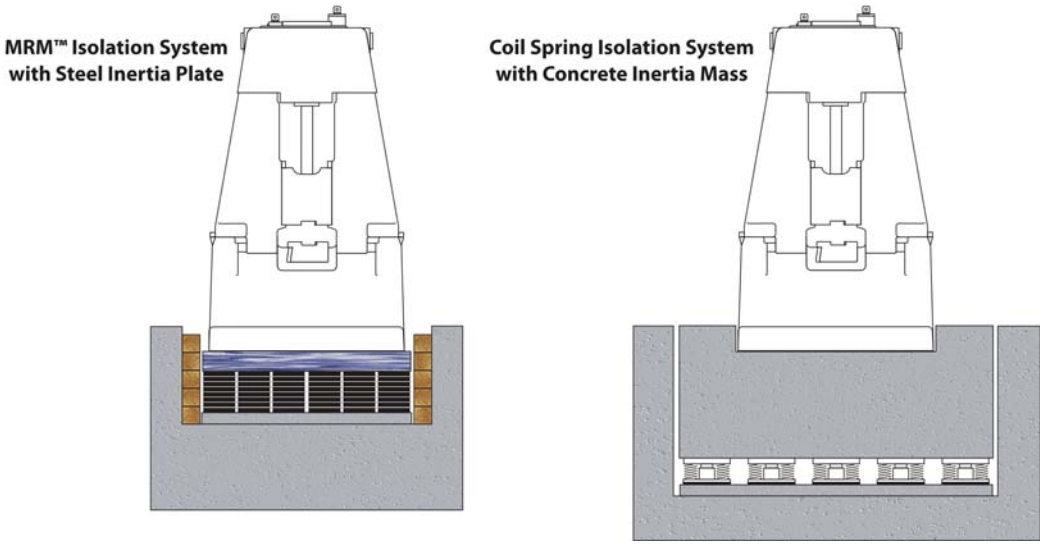
If a generally accepted limit of 7mm peak motion is applied, then it is clear that for coil spring and elastomeric systems there may be a need for the anvil to weigh more in order to maintain the natural frequency and isolation performance, as shown in Figure 4. Because of the cost to add a concrete or steel inertia mass, the MRM and VPS elastomer systems are more economical at the expense of a very small reduction in isolation effectiveness. A steel inertia mass is more economic since a steel plate is more dense and requires less space, thereby reducing the area and size of the foundation, see Figure 5. Field installations have proven the steel inertia masses to be more durable.

By Hooke's Law, the force transmitted to the foundation is the product of the isolation system dynamic stiffness, K, and the anvil motion x(t):

$$F(t) = K \cdot x(t) \qquad (7)$$

For coil spring isolators, the addition of a viscous damper mechanism adds a small amount of force to the force transmitted by the support springs. For elastomeric designs, the hysteresis damping of the material is included in the real dynamic stiffness.

Figure 5 - Inertia Mass Comparison



The forces generated in the die space are enormous. The exact magnitude and time duration are generally not known because measuring the force is not possible. However, experienced hammer operators can easily notice a significant reduction in body and arm fatigue of an isolated hammer compared to a traditionally supported hammer on timbers or thin pad material. The correct application of a well designed isolation system will result in a significant reduction of the ram's enormous impact shock. The MRM and VPS Systems transform the impact shock from a series of short duration, high magnitude impulses, as shown in Figure 2, to a series of longer duration, smaller magnitude impulses, as shown in Figure 6. Isolation of these impact shocks will decrease health problems, decrease building maintenance, decrease neighbor complaints, and decrease foundation costs.

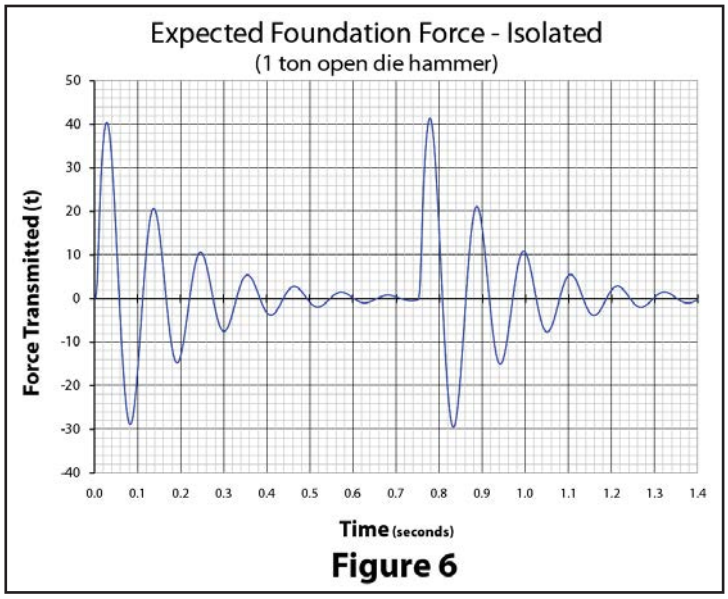


Figure 6

Summary

The MRM™ and VPS™ Elastomeric Isolation Systems have proven to be a very effective for forging hammers. When compared to traditional forge hammer installation methods, like timbers and rubber pads, the isolation performance of MRM and VPS Systems are clearly superior, yet they're faster and easier to install due to their unitized construction. MRM system isolation performance approaches that of coil spring systems, while VPS systems are slightly stiffer. Both are economical and extremely durable. See Vibro/Dynamics Technical Bulletin M/L 710 for vibration isolation comparisons.

Since Vibro/Dynamics Corporation has the technology and know how to design and build both MRM and VPS Elastomer and FS Spring Mount Isolation Systems, we are in the best position to recommend an isolation system that best fits your needs.

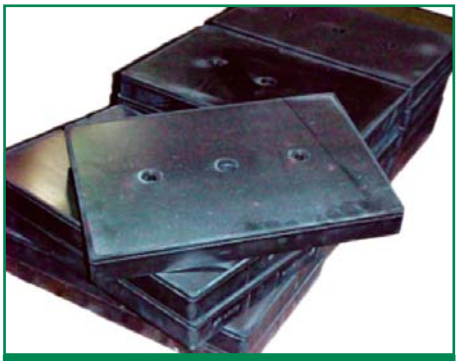
MRM™ and VPS™ Isolation Element Construction

MRM™ and VPS™ Systems are specially designed for die forgers and drop hammers. These revolutionary new products have the simplicity of a layered elastomer system, with shock isolation effectiveness similar to viscous spring isolators.

MRM Systems feature thicker, softer, elastomer modules for greater vibration and shock control. Vertical dynamic natural frequencies as low as 8 Hz are achievable. Typical isolation efficiency is 60-80% reduction compared to traditional oak-timber systems. VPS Systems use stiffer, higher load capacity, elastomer modules for very effective vibration control in a more economical package.

MRM and VPS Systems feature unitized construction. Each Element is constructed using alternating layers of custom elastomer modules and galvanized steel sheets that are securely fastened together. The elastomer modules are molded from proprietary compounds for superior shock isolation, durability, and creep resistance. Each Element is encased in a protective foam barrier for further protection against pit debris.

All MRM and VPS Elements are designed to be simply lowered into the foundation as complete units. No difficult and time-consuming layout and "in the pit" stacking of pads and plates is required!
The unique design features of the MRM Isolation System result in superior shock isolation, trouble-free installations and long lasting performance.



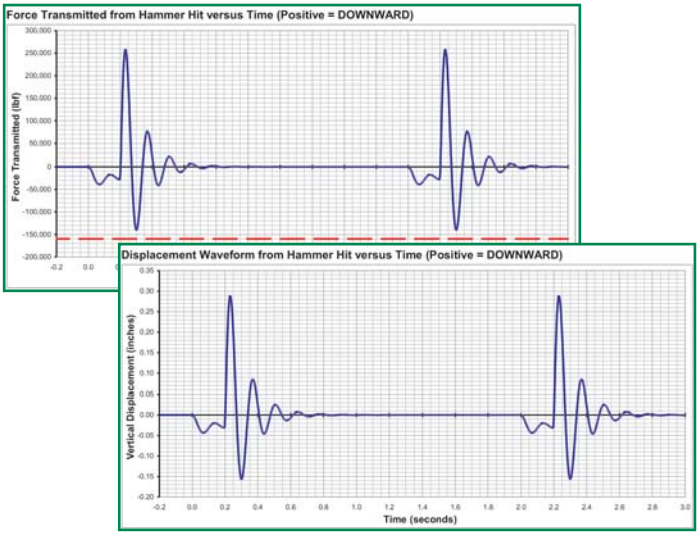
Modular Elastomers are made from proprietary compounds.

MRM4x9-12 shown with protective foam to seal against contamination from solid debris.

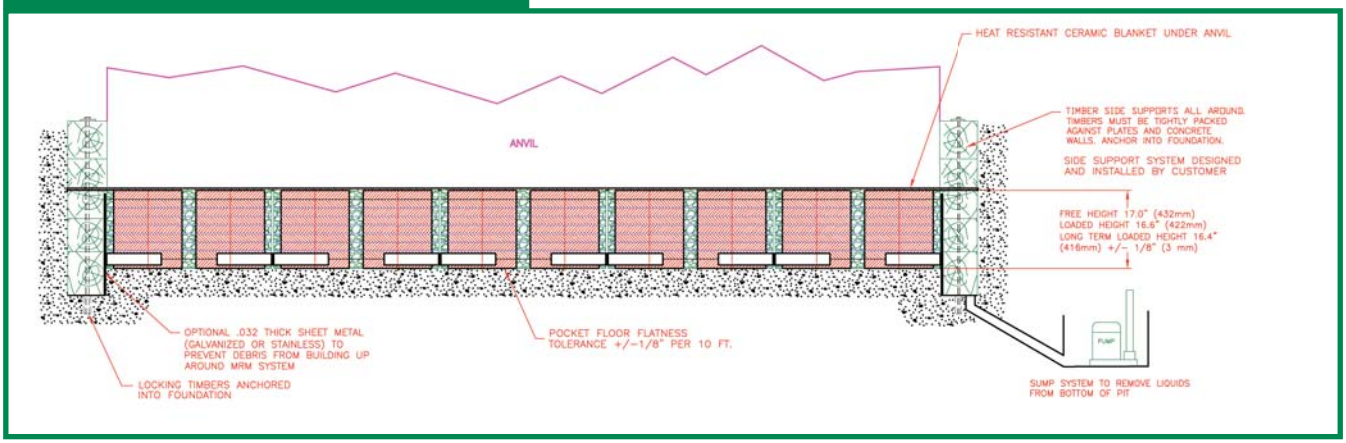
Application Engineering

Vibro/Dynamics Engineers carefully analyze every application using proprietary computer modeling software. Motion and force transmission charts are provided to assist the customer in their hammer installation and foundation design.

Foundation guidelines are also provided to help the forger design and maintain the hammer installation. If an inertia mass is required for reduced motion, Vibro/Dynamics will assist in determining its weight and size.

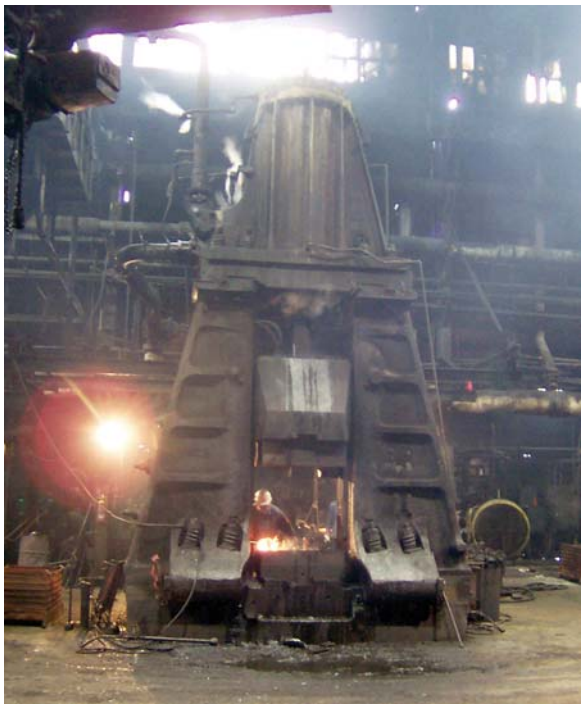


Typical Foundation Layout Drawing



Installation Photographs

50,000 lb. Erie Steam Hammer on 16) MRM6x8-2-15703.

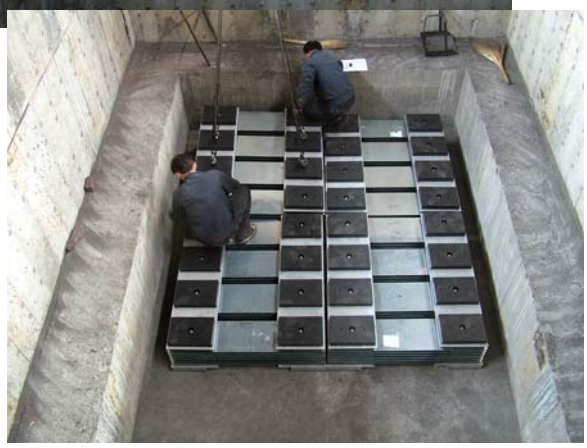


Erie 33,000 Steam Hammer on (6) MRM8x10-1-15711-G

16 Ton Die Forger on 14) MRM8x8-16366-G

3 Ton and 8 Ton Open Die Hammers

10 Ton Die Forger Foundation



VIBRO/*DYNAMICS*

vibration and shock isolation systems

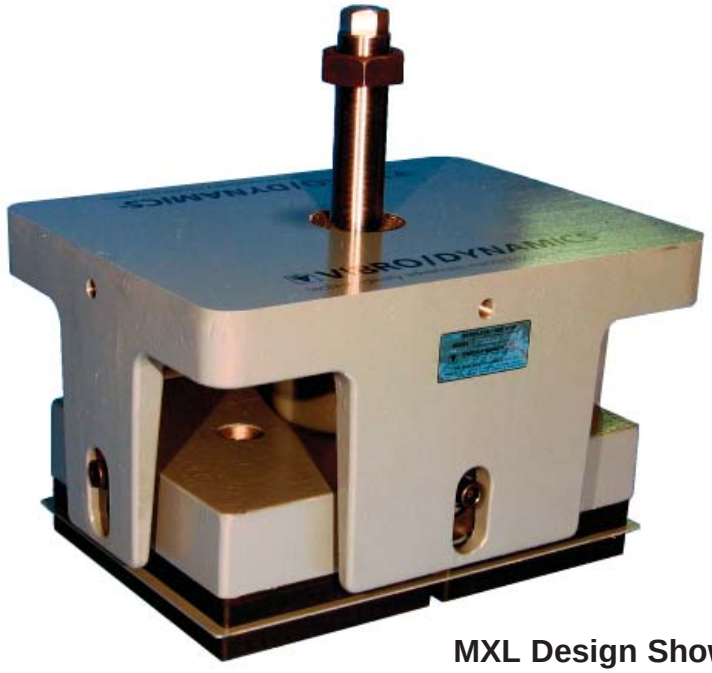
Micro/Level® Isolators

MXL / MXLP

Vibro/Dynamics MXL & MXLP Series Micro/Level Isolators are designed for the free-standing installation of large Mechanical Presses, weighing from 113,500 to over 2.3 million kg. (250,000 to 5 million lbs.)

This innovative *patented* design combines multiple layer elastomer technology with our popular Hydra/Level® hydraulic lift-assist feature.

By using multiple layers of elastomers, isolator dynamic natural frequencies can be as low as 8 Hz. This results in very effective vibration and shock isolation.



MXL Design Shown

- Faster, easier installations
- Highly effective vibration and shock control
- Precision leveling and alignment
- Proper machine support
- Built-in or portable Hydra/Level® capability

VIBRO/*DYNAMICS*

Micro/Level® Isolators

The Hydra/Level® System is a patented hydraulic lift-assist system available in MXL and HXL Micro/Level Isolators. Portable or built-in hydraulic cylinders make leveling and aligning even the heaviest machines faster and easier, especially when aligning a transfer press with rolling bolster rails.

No separate jacks or cribbing are necessary. Installation times are typically reduced by several days. In an actual Hydra/Level installation, a machine weighing 4,500,000 lb. was leveled and aligned in less than half a day.

When the internal hydraulics are activated, the load on the precision leveling screw is reduced until it can be adjusted by hand. Precision leveling adjustments are made in this manner. The process is repeated until the press is perfectly level and aligned and the support is Fine-Tuned.

Technical Assistance

To assure the best installation, our application engineers will carefully analyze your particular application needs and recommend the proper isolator for the best installation. Please give us a call, and we will be happy to assist you in your selection.

The MXL & MXLP Designs

MXL and MXLP Isolators offer Hydra/Level® lift-assist Technology in two ways.

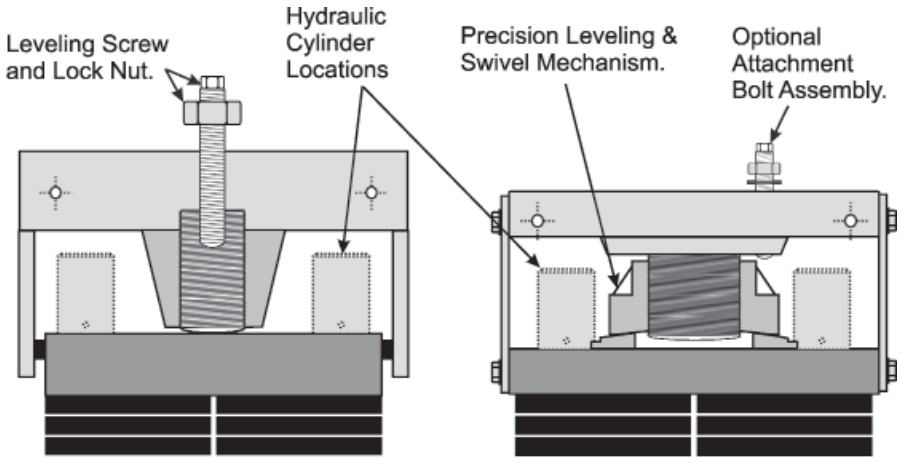
MXL and MXLP Isolators are Hydra/Level capable. Hydraulic cylinders are temporarily installed during leveling and alignment, then removed. The cylinders can then be used for another machine.

HXL and HXLP isolators have hydraulic cylinders permanently built-in.

The advantage is convenience during and after the initial installation.

Permanently mounted cylinders provide faster installations and, if your foundation should settle, provide easy releveling and alignment to get you back in production faster.

Vibro/Dynamics also offers a Hydra/Level service that includes cylinders, pumps, and supervisory assistance.



MXL **MXLP**

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LIT-MXL 2011.06

Vibration and Shock Isolation Systems for Large Stamping Presses

Your Best Way to Install and Level Heavy Presses for Effective Vibration and Noise Control

A stamping press installation system that fits your needs!

Vibro/Dynamics specializes in the installation of large stamping presses on anchorless isolation systems that provide faster, easier installations. Both Elastomer and Coil Spring type isolation systems are available depending on your vibration and shock isolation requirements.

MX Systems are elastomer type mountings that provide excellent vibration isolation. Natural frequencies as low as 8 Hz are possible with the MX systems due to their unique multi-layer, modular elastomer design. MXL and MXLP models feature integral precision leveling combined with Hydra/Level® lift-assist capability, making leveling and alignment of even the heaviest presses accurate, fast and safe. MXBP and SVX mounts have hydraulic cylinder pockets to make leveling with shims easier.

SVX Hy/Tuned™ Spring isolators offer the highest degree of vibration and shock isolation available. These isolators are the perfect solution for high impact presses located in vibration sensitive or unstable soil areas.

Determine your needs and then choose from the high quality line of Vibro/Dynamics products.

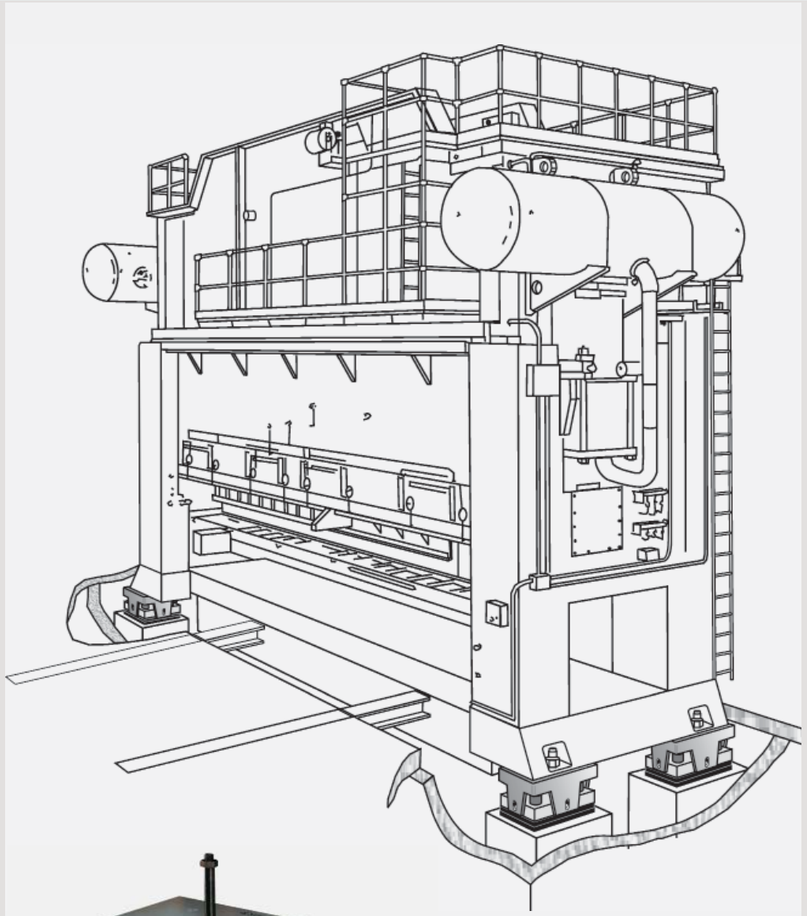
Isolator Feature Matrix

Feature/Benefit	MXL & MXLP Micro/Level® Isolators	MXBP Isolation Elements	MXBN Isolation Elements	SVX/SVXN Viscous Damped Spring Mounts
Leveling & Alignment	●●●●●	●●	●●	●●
Installation Time	●●●●●	●●	●●	●●
Vibration & Shock Isolation	●●●	●●●	●●●	●●●●●
Preventative Maintainance	●●●●●	●●●●	●●●	●●●
Foundation Design	●●●●●	●●●	●●	●●
Cost Savings	●●●●●	●●●	●●	●●
Hardware Requirements				
Sole/Grout Plates	None	Recommended	Recommended	Recommended/Required
Grout	None	Recommended	Recommended	Recommended/Required
Anchor Bolts	None	Anchor bolts may be required if grout plates must be bolted down to concrete surface.		
Installation Time/Labor	Faster - Easier	Faster - Easier	Fast - Easy	Installation of grout plates, grouting, and cure requires additional time.
Grout Plate Installation	None	Recommended	Recommended	Recommended/Required
Grout Application & Cure	None	Recommended	Recommended	Recommended/Required
Anchor Bolt Layout & Installation	None	Anchor bolts may be required if grout plates must be bolted down to concrete surface.		
Leveling & Alignment	Built in leveling device makes leveling faster, easier and more	Leveling is accomplished using shims. The resiliency of the mounts make shimming easier than hard mounting. Hydraulic cylinder pockets make inserting shims easier.		
Hydraulic Level Assist	Yes	Yes	No	SVX - Yes / SVXN - No
Foundation Design	Anchorless, swiveling designs eliminate the need for anchor bolts and grout plates, resulting in a more simple foundation design. Only a brushed concrete surface is required.	Grout or sole plates are recommended, but usually not required since the MXBP and MXBN isolation elements have generous foundation flatness and slope tolerances.		Grout Plates are recommended. The plates also distribute the high concentrated load of the hydraulic cylinders on the foundation surface.

SVX™ Viscous Damped Spring Mounts

MXL™ and MXLP™ Elastomer Isolators

MXBP™ Press Isolation Elements



MXBN™ Press Isolation Elements

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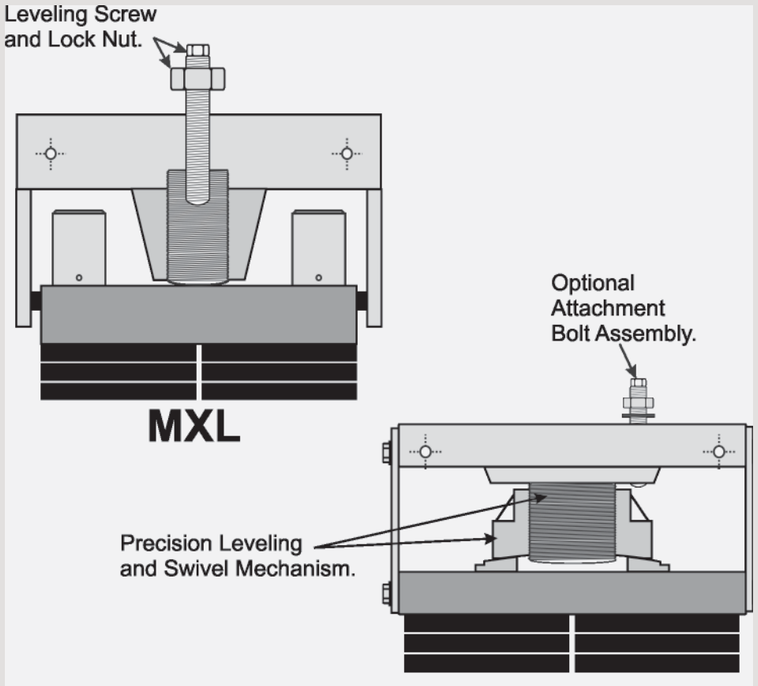
LIT-Presses 2011-06

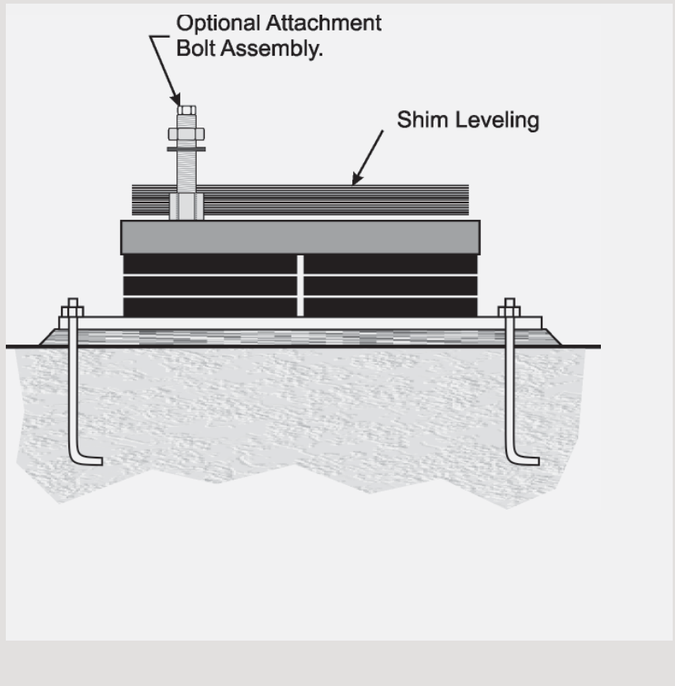
MXL and MXLP Elastomer Isolators



Features and Benefits

- Excellent isolation for effective control of vibration and shock.
- High-performance, multi-layer, modular elastomer construction.
- Hydra/Level® Assisted Leveling.
  - faster, easier leveling, alignment and elevation adjustment.
  - preventative maintenance insurance in the event of foundation settling.
- Integrated precision leveling.
  - more precise.
  - infinitely adjustable.
- Two degrees of swiveling capability.
  - uniform support.
  - eliminate foundation/grout/ sole plates.

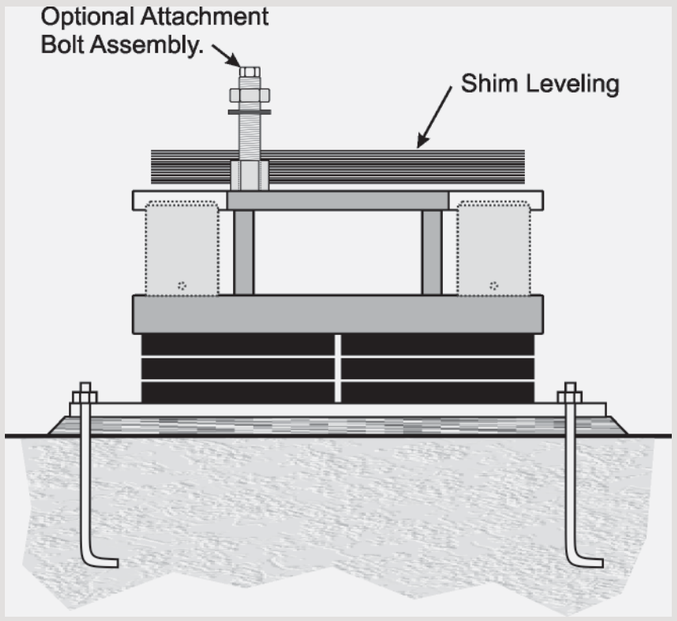
MXBN Press Isolation Elements



Features and Benefits

- High-performance, multi-layer, modular elastomer construction.
- Shim leveling using Vibro/Dynamics supplied metal shims and non-slip material.
- Large anchor bolts not required to keep press from walking.
- Grout or sole plates are recommended, but not usually required due to generous foundation tilt and slope tolerance of the Isolation Element.

MXBP Press Isolation Elements

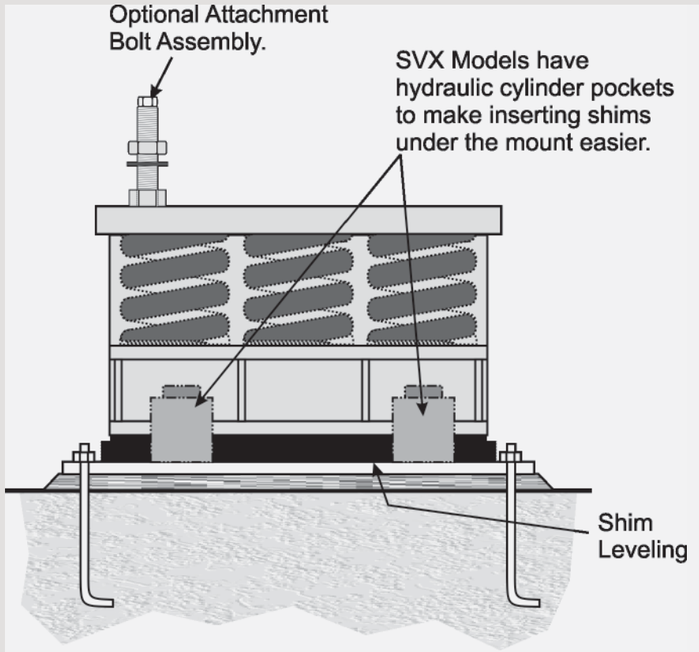


Features and Benefits

- High-performance, multi-layer, modular elastomer construction.
- Cylinder Pockets for hydraulic assisted leveling.
- Shim leveling using Vibro/Dynamics supplied metal shims and non-slip material.
- Large anchor bolts not required to keep press from walking.
- Grout or sole plates are recommended, but not usually required due to generous foundation tilt and slope tolerance of the Isolation Element.

Note: Hydraulic cylinders are optional accessories. (Supplied by Vibro/Dynamics or others.)

SVX and SVXN Viscous Damped Spring Mounts



Features and Benefits

- Ultimate control of vibration and shock transmission.
- Shim leveling using Vibro/Dynamics supplied non-slip, jute material.
- Grout or sole plates are recommended.

VIBRO/*DYNAMICS*
vibration and shock isolation systems

Hy/Tuned™ Spring Isolators

SVX, SVS & SMS

Viscous & Material Damped Spring Mounts

Vibro/Dynamics Hy/Tuned™ Spring Isolators are a series of modular spring isolators designed to solve the toughest vibration and shock transmission problems.

Their low natural frequency design makes them the ideal solution for solving vibration and shock problems associated with large stamping presses. These isolators are designed to effectively isolate impact forces up to 99%.

Vibro/Dynamics Hy/Tuned™ Isolators also effectively protect sensitive machinery and building structures from incoming vibration and shock.

We specialize in custom designs and application engineering.

Model SVS4808R

EXTREME VIBRATION and SHOCK ISOLATION

VIBRO/DYNAMICS

Hy/Tuned™ Spring Isolators

SVX, SVS, & SMS Series Features and Benefits

Model SVX6009

Model SVS3308

Extra Vibration Protection and Proper Support

Unlike conventional spring mounts, Hy/Tuned Spring Isolators come equipped with a high-quality resilient cushion that provides a uniform contact surface between the isolator and the floor. This cushion also isolates high-frequency vibration caused by coil spring resonance.

Damping Systems

Selecting the proper damping system is essential for controlling machine motion. SMS Isolators feature a material damping system, while SVX and SVS Isolators have viscous damping systems. SVX has a totally enclosed spring and damper design.

Viscous damping is best suited for presses that have a high degree of unbalanced inertia force. This type of damping is also desirable for presses that generate high forces during clutching and braking.

Material damping is best suited for presses with moderate vertical and horizontal inertia forces. Also, material damped isolators are desirable for installations that have isolator space constraints since their design is more compact than viscous damped isolators.

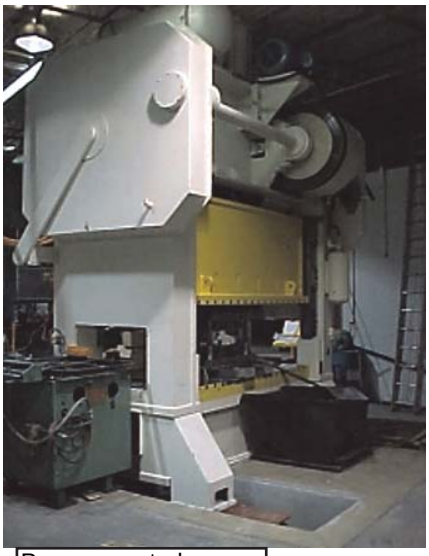
Custom Design and Engineering

Vibro/Dynamics will work with your design team to design and build a spring isolator to suit your particular need.

We have numerous damper types and can offer pre-compressed and non-compressed designs.

Built Tough To Last

Vibro/Dynamics combines its low-stress isolator design philosophy with high-quality materials to ensure the longest effective isolator life. Our isolators are built to last even under the most severe operating conditions.



Press mounted on SVS spring isolators.

Close-up of an isolator and outrigger beam under a press foot.

Technical Assistance

To assure the best installation, our application engineers will carefully analyze your particular application needs and recommend the proper isolator for the best installation. Please give us a call, and we will be happy to assist you in your selection.

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VIBRO/DYNAMICS

vibration and shock isolation systems

Hy/Speed® Spring Isolators

VSM

Model VSML1208

Vibro/Dynamics Hy/Speed® VSM Spring Isolators are ideal for controlling vibration from high-speed machinery weighing up to 72,700 lb. (33,000 kg). The low natural frequency design of the VSM Isolators effectively isolates both impact and inertia forces by up to 99%. VSM Isolators have material damping and high quality materials and construction. The VSML model also has a built-in leveling feature for precision alignment.

VIBRATION AND SHOCK ISOLATION FOR HIGH-SPEED PRESSES

VSM & VSML Series Features and Benefits

Material Damping

Selecting the proper damping is essential to control machine motion. VSM model isolators feature a material damping system.

Material damping systems are best suited for machines that have low out-of-balance forces relative to machine weight; pass through resonance quickly; and operate at least 1.42 times above the natural frequency of the isolator.

Extra Vibration Protection and Proper Support

Unlike conventional spring mounts, Hy/Speed Spring Isolators come equipped with a high-quality resilient cushion that provides a uniform contact surface between the isolator and the floor. This cushion also isolates high-frequency vibration caused by coil spring resonance.

Built Tough To Last

Vibro/Dynamics combines its low-stress isolator design philosophy with high-quality materials to ensure the longest effective isolator life.

VSML Series Hy/Speed Isolators also feature an internal snubbing system that further protects the isolator and prevents spring overloading.

Built-In Precision Leveling

Vibro/Dynamics VSML Series Hy/Speed Isolators are equipped with precision leveling screws for fast and easy leveling.

Even months after initial installation, re-leveling adjustments can be made with a simple turn of a wrench.

Precision leveling means better alignment of machine components, resulting in increased machine accuracy and improved machine and tooling life.

This built-in leveling capability lets you get into production faster by leveling your machines quicker with far greater accuracy than the trial and error method offered by shims and grout.

Installation of a high-speed press on VSML Isolators

Technical Assistance

To assure the best installation, our application engineers will carefully analyze your particular application needs and recommend the proper isolator for the best installation. Please give us a call, and we will be happy to assist you in your selection.

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VIBRO/DYNAMICS

vibration and shock control systems

Hy/Speed® Spring Isolators

VSV

Vibro/Dynamics Hy/Speed® VSV Spring Isolators are the ultimate in vibration control for high-speed machinery. The low natural frequency design of the VSV Series Isolators effectively isolates both impact and inertia forces by up to 99%. VSV Hy/Speed Isolators have viscous damping and high quality materials and construction. The VSVL model also has a built-in leveling feature.

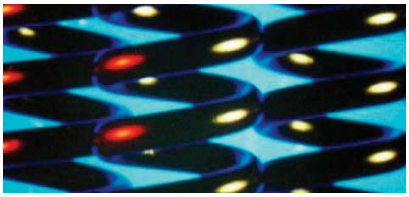
VIBRATION AND SHOCK ISOLATION FOR HIGH-SPEED PRESSES

VSV & VSVL Series Features & Benefits

Viscous Damping

Selecting the proper damping is essential to control machine motion. This is why VSV Series Hy/Speed Isolators are available in different viscous damping designs and configurations.

Viscous damping systems are best suited for machines that pass through resonance slowly and have large out-of-balance forces relative to machine weight, or whose operating speed is close to the natural frequency of the machine.



Extra Vibration Protection and Proper Support

Hy/Speed Spring Isolators come equipped with a high-quality resilient cushion that provides a uniform contact surface between the isolator and the floor. This cushion also isolates high-frequency vibration caused by coil spring resonance.

Built Tough To Last

Vibro/Dynamics combines its low-stress isolator design philosophy with high-quality materials to ensure the longest effective isolator life.

VSV Series Hy/Speed Isolators also feature an internal snubbing system that further protects the isolator and prevents spring overloading.

Built-in Precision Leveling

The VSVL Model Series are equipped with either a precision vertical leveling screw or a wedge leveling device for fast and easy leveling.

Precision leveling means better alignment of machine components, resulting in increased machine accuracy and improved machine and tooling life.

A built-in leveling feature lets you get into production faster by leveling your machines quicker with far greater accuracy than the trial and error method offered by shims and grout.

Installation of a high-speed press on VSVL2408 Isolators

VSVL Series with Wedge Leveling Device

Technical Assistance

To assure the best installation, our application engineers will carefully analyze your particular application needs and recommend the proper isolator for the best installation. Please give us a call, and we will be happy to assist you in your selection.

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VIBRO/*DYNAMICS*

Wedge Isolators
Series 12W, 16W and 24W

Wedge Isolators

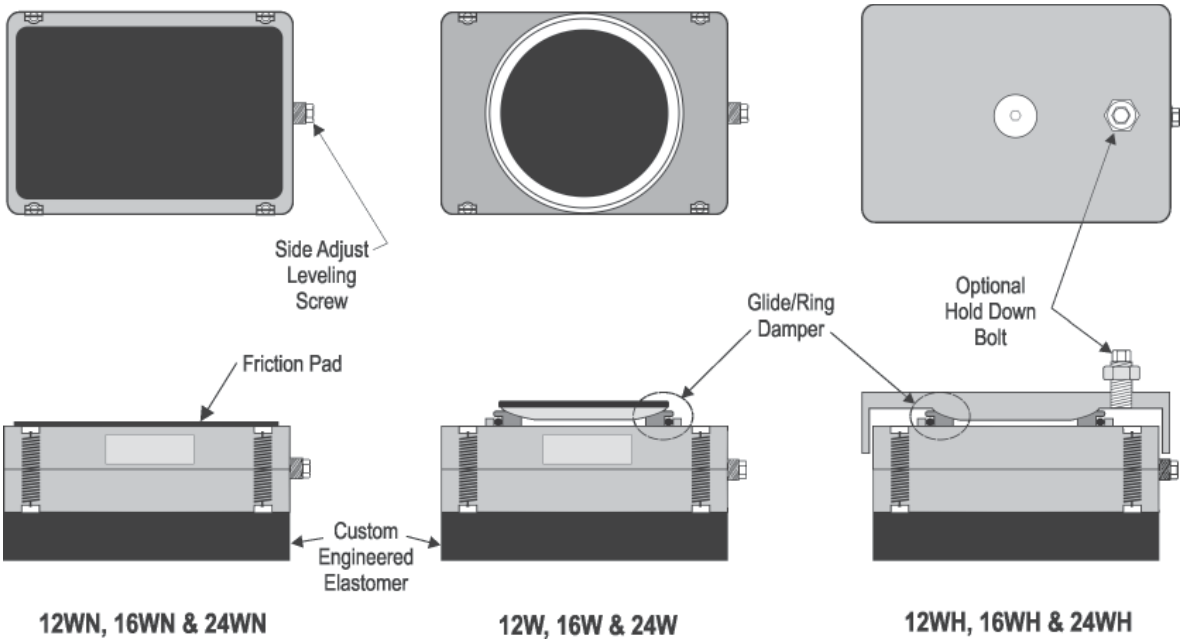
Vibro/*Dynamics* Wedge Isolators are designed for the free-standing installation of stamping presses, machine tools, plastic injection molding and die cast machinery.

The wedge design with its side adjust leveling screw makes them ideal for leveling and installing machines that cannot use vertical leveling screw type isolators because the mounting holes are too small or nonexistent.

Wedge Isolators are also available with our unique Glide/Ring™ damper designed to dissipate horizontal forces that cause some machines to walk. The Glide/Ring damper's built-in swivel automatically adjusts for an out-of-parallel condition between the foundation and bottom of the machine feet for improved machine support and isolator performance.

- **Quickly level and align machines with easy turning adjustment screw.**
- **Effectively isolate vibration with custom engineered elastomers.**
- **Uniformly support machinery with special swivel feature.**
- **Prevent walking with the unique Glide/Ring™ damper.**

Wedge Isolators



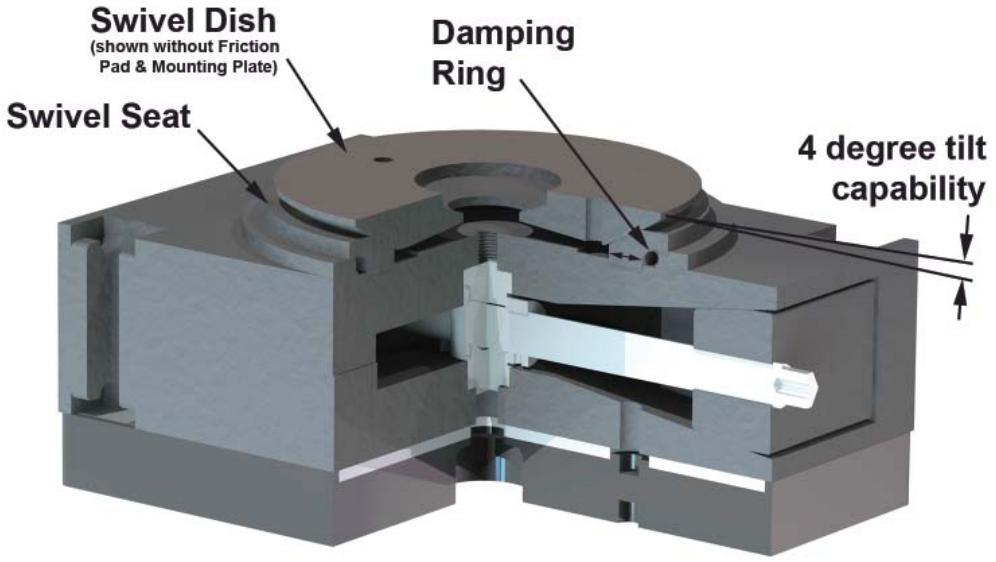
Vibro/Dynamics Wedge Isolators are available in three styles with static load ranges from 2,100 - 65,300 kg per isolator. Also available are versions with multiple layers of elastomers for added vibration and shock isolation.

Glide/Ring™ Damper

The Glide/Ring Damper is a unique device that provides uniform support and keeps machines from walking. It consists of a Swivel Dish, Swivel Seat, Damping Ring and Retainer Ring.

The Glide/Ring Damper has two functions. First, the Swivel Dish has a four degree tilt capability that automatically adjusts when the foundation and the bottom of the machine feet are not parallel. In an extreme out-of-parallel condition, one side of the isolator will compress more than the other, resulting in an uneven load pattern on both the machine's foot and the isolator's elastomer. The Glide/Ring damper provides uniform support for improved machine and isolator performance.

Second, the swivel seat is designed to move slightly in the horizontal direction, dissipating horizontal forces that cause some high-speed machines to walk.



Technical Assistance

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