

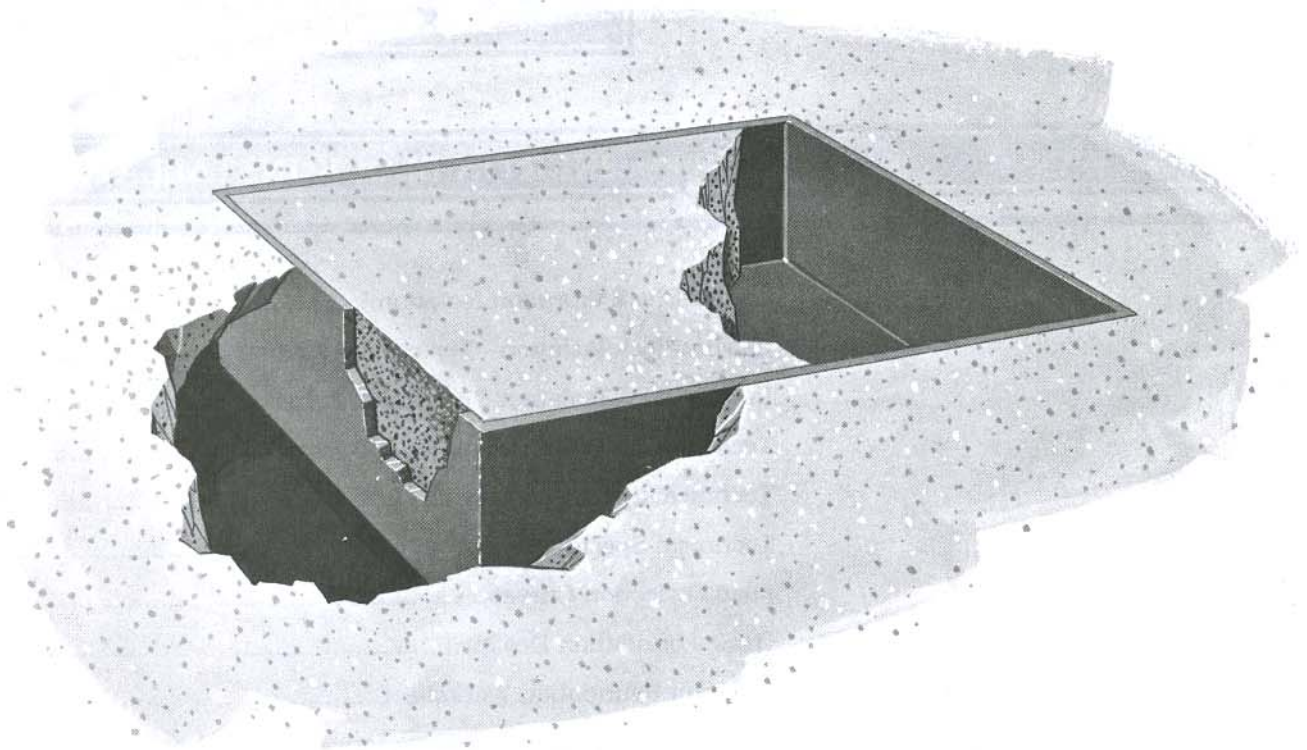
SECTION IV

INERTIA BLOCK INSTALLATIONS

Inertia Block Vibration Isolation	188
Inertia Block Isolation - Typical Application	189
Inertia Block Isolation Description & Installation	190-193
Technical Specifications of IB-500 Materials	194
Technical Specifications of IB-500 S-2 Materials	195
Technical Specifications of IB-1000 Materials	196
Load Deflection Curves	197
Basic Foundation Design	198
Isolation Foundation Worksheet	199
Inertia Block Isolation Case History	200-201
Engineering Vibration Analysis	202
Inertia Block Isolation Case Histories	203-207
Inertia Block Isolation with Novibra	208-211
Case Histories	211A-211F

INERTIA BLOCK VIBRATION ISOLATION

Inertia Block Vibration Isolation



To realize the full potential of your production machinery, you can create an isolated environment that performs the dual function of absorbing the machine's own work-generated energy and preventing transmissions of ambient vibration to the machine itself. This environment can be created effectively and permanently with the construction of an isolated inertia block. The isolated inertia block consists of an excavation lined with suitable vibra-

tion isolation material and filled with concrete. In addition to creating an isolation barrier between the machine and its environment, the inertia block provides the rigid anchoring base required to assure permanent alignment of the machine and the workpiece. This added support has become increasingly important as many machine builders have replaced cast iron bases with weldments to accommodate the demand for more varied designs.

Unisorb foundation isolation materials are manufactured by the traditional felting process in two densities. The softer material, designated IB-500-S2, is used to isolate the sidewalls of the inertia block. The firm material, IB-500-B1, is designed to be applied to the base surface of the foundation.

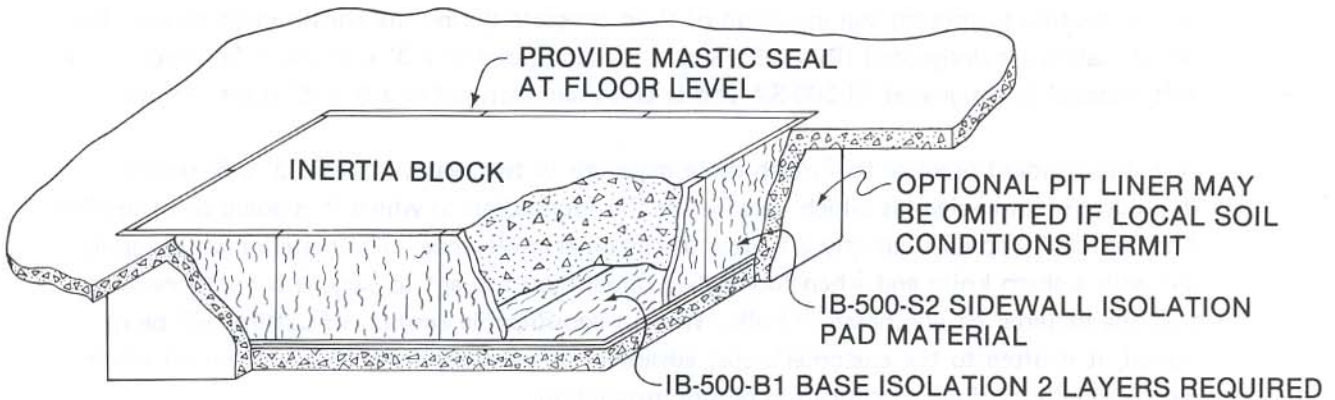
Both materials are manufactured in 1/2" thick sheets. The material may be used in layers where greater thickness is desired. The material is available from stock in 3' x 5' sheets for fast delivery. Special sizes may be cut to exact dimensions at the factory or on the job site.

The isolation material is protected from moisture migrating from fluid concrete by a water resistant covering. This also provides a tough abrasion and puncture resistant surface.

Unisorb isolation materials offer superior performance because they have been specifically engineered to provide optimum compression rates for the inertia block foundation. These products are unaffected by oils, coolants, cutting fluids and other liquids normally found in the industrial environment. Unisorb isolation materials are conservatively rated, providing a life expectancy which in most cases exceeds that of the machinery. Unisorb's engineering department offers assistance in determining proper materials and procedures to meet specific inertia block requirements.

INERTIA BLOCK ISOLATION - TYPICAL APPLICATION

TYPICAL INERTIA BLOCK INSTALLATION



NOTE: VINYL OR EQUIVALENT TAPE TO BE USED ON ALL ISOLATION PAD JOINTS TO PREVENT ENTRY OF FLUID CONCRETE DURING POUR

Method I

The first approach involves preparing an excavation the exact size of the finished foundation. Two layers of IB-500-B1 base material are then placed in the bottom and one layer of IB-500-S2 sidewall material on the sides of the excavation. Reinforcing steel is placed and the concrete foundation is poured directly into the cavity. This approach normally works well with inertia blocks up to about 3' deep. The limiting factor here is the stability of the soil and whether a vertical wall can be formed.

Method II

The second method involves excavation to dimensions approximately two feet oversize. Two layers of IB-500-B1 base material are then placed on the bottom and forms for the sidewalls of the inertia block foundation are constructed. The inertia block foundation with reinforcing steel is then cast inside the forms. After the forms are removed, one layer of IB-500-S2 isolation material is applied to the perimeter of the inertia block foundation. Backfilling against the isolation pads completes the installation.

Method III

In some soil conditions it may be necessary to cast a concrete vault into which the isolation material and inertia block foundation are placed, after which the isolation materials are installed as in Method I.

Sealing

Whatever method is used, it is important that the joints in the isolation material be sealed with vinyl tape (or equivalent). This will assure that no fluid concrete enters the joints, thereby "short-circuiting" the inertia block isolation.

It is recommended that the exposed edge of the isolation material (at floor level) be sealed with a pliable mastic compound to prevent damage to the top edges of the sidewall material.

INERTIA BLOCK DESCRIPTION & INSTALLATION

I DESCRIPTION OF MATERIAL

Unisorb foundation isolation materials are manufactured by the traditional "felting" process. The materials are manufactured in two densities (the harder for application to the base surface of foundation blocks and the softer for the application to the vertical sidewall surfaces). These materials have a surface treatment consisting of a nylon fabric covering sealed with an acrylic coating to prevent the incursion of fluid concrete during the construction phase. The dense material is designated IB-500-B1 and is manufactured in a 3' x 5' sheet, ½" thick. The soft material is designated IB-500-S2, and is also manufactured in a 3' x 5' sheet, ½" thick.

It is our standard practice to furnish these materials in two ways, in bulk (3' x 5' sheets), or in a custom cut-to-size kit which exactly fits the foundation to which it is going to be applied. The approach chosen is strictly a matter of customer preference. The material can be easily cut with a sharp knife and when foundation dimensions are apt to vary, it is recommended that the material be purchased in bulk. When a considerable amount of cutting will be required, it is often to the customer's cost advantage to purchase from us a custom kit which would require no field modification before installation.

In most installations a single layer of ½" IB-500-S2 is used on the vertical sidewall portions of the foundations, with two layers (each ½" thick to make a total 1" thick layer) of IB-500-B1 applied to the base surface. The 1" thickness of the base is desirable to provide load deflection characteristics which will optimize the performance of the isolation system. A single layer can be employed but will result in a reduction in overall efficiency.

II INSTALLATION TECHNIQUES

Installation is usually accomplished in one of two ways. The first approach involves preparing an excavation the exact size of the finished foundation. Pad material is then placed on the bottom and on the sides of the excavation with the concrete foundation being poured directly into the cavity. This approach normally works well with inertia blocks up to about 3' deep. The limiting factor here is the stability of the soil and whether or not a vertical wall can be dug.

The second method involves excavation to dimensions a couple of feet oversize, placing the base material and forming the sidewalls of the foundation. The inertia block is then cast inside the forms. After the forms are removed the isolation material is applied to the perimeter of the inertia block foundation and backfilling against the isolation pads completed.

In some soil conditions it may be necessary to cast a concrete vault into which the isolation material and subsequently inertia block foundation are placed.

As wet concrete will be placed directly against the isolation material surfaces, it is important that the joints in the isolation material be sealed with vinyl tape (or equivalent) to assure that no fluid concrete enters the joint thereby "short circuiting" the isolator.

It is recommended that the exposed edge of the isolation material (at floor level) be sealed with a pliable mastic compound.

INERTIA BLOCK DESCRIPTION & INSTALLATION

III THEORY OF OPERATION

In the installation of precision tools there are two main objectives: That the machine be properly supported and that adequate isolation from external disturbances (shock/vibrations, etc.) be provided.

The isolated inertia block approach provides a solution to both problems in a cost effective manner. The primary considerations are:

1. Machine support is provided. The massive foundations block represents a uniform stiff member to which the machine is connected. Properly designed, the reaction to dynamic loads will be the same at any point on the foundation, contributing to overall consistency of performance.
2. The use of isolation material in conjunction with a large foundation block significantly limits outside disturbances felt by the machine. (It is important to note that the mass of the block itself is a very necessary part of the system.) Ambient shock and vibration may be reduced as much as 80% or better in the average installation.
3. The disturbances that do arrive at the foundation proper tend to cause the machine and foundation to move as a single unit--having an equal effect on all portions of the machine. Also, the inertia block is free from stress induced by changing loads imposed on building floors. Without the isolated inertia block this would cause inconsistencies in the way the floor reacts to a given machine imposed load.

IV WHY NOT OTHER MATERIALS

Traditionally, several other materials have been used to isolate foundations. They include: Cork, fiberboard, various types of foam material, wooden timbers, and "dried river-bottom sand." Each of these approaches has merit but over the long run they have all proven inferior to the Unisorb felt isolation material both in performance and durability.

CORK: Cork sheeting is occasionally specified for foundation isolation material. The basic problem with cork is its tendency to crumble under long exposure to vibratory loads. Several cases can be cited where foundations have settled unevenly as the cork material beneath their base deteriorated. Vibration isolation performance with cork is acceptable, with durability being the primary problem. Typical life expectancy for a cork isolated foundation would be less than 5 years.

FIBERBOARD: (Referring to many items in a family of asphalt impregnated fiber boards commonly used for expansion joint material in concrete construction.) In the application for which they are intended their performance is fine. The problem comes when these materials are used for vibration isolation. They have a tendency to compact into a dense thin mass with continued exposure to shock and vibration. Once this compaction has taken place, they present no barrier to the transmission of shock and vibration. It has been our experience that foundations so installed typically exhibit significant changes within the first year of life.

INERTIA BLOCK DESCRIPTION & INSTALLATION

FOAMS: There are several products available that fall into the category of foamed plastic materials which are occasionally used for foundation isolation. A main problem with these materials is durability when exposed to oils and other chemicals found in the typical industrial environment. The performance of these materials as vibration isolators depends on their remaining in good condition. The primary difference between foam and felt is that the foam does not have the ability to dissipate as much energy internally as the felts; and the difference is clearly seen in the more severe applications.

WOODEN TIMBERS: Wood has often been specified to maintain a barrier around the perimeter of foundations to prevent transmission of heavy shocks. Where conditions are extreme, some relief can be obtained through the use of wood over having done nothing at all. For the most part, wooden support systems tend to be too stiff and, therefore, transmit a high percentage of shock and vibration loads directly into the foundation. Another problem is life expectancy for below grade installations. The life expectancy problem coupled with the overall low efficiency of this approach makes it a poor choice.

RIVER SAND: Many manufacturers of machine tools requiring foundations have specified the use of dried river-bottom sand around the perimeter of the foundation. This approach does offer some vibration isolation with the primary mechanism being the ability of the river sand (which has rounded corners) to permit the inertia block to move slightly when excited by an external force. The problem with the river sand approach lies in that the sand compacts with time into a stiffer mass. Also, the presence of ground water may cause the sand to migrate from its original location and will accelerate the compaction of the material into a hard mass which is capable of transmitting nearly 100% of incoming shock and vibration to the foundation.

ADVANTAGES OF UNISORB FELTS

When compared with the materials above, Unisorb felts offer superior performance as a vibration isolator because they have been specifically engineered to provide load/compression rates which are optimum for the inertia block foundation. Also, it is the natural property of the felted materials to have a higher coefficient of internal damping (and hence the ability to absorb significantly more energy) than any of the other materials noted. As far as durability is concerned, Unisorb felts are totally unaffected by oils, coolants and other cutting fluids normally found in the industrial environment. In the foundation isolation application, the materials are very conservatively applied to assure that no change in physical properties will occur over an extended period.

The overall suitability of these materials for this application is borne out by the fact that we have documented installations ranging back to the 1950's with performance continuing unchanged today. The variety of equipment installed using Unisorb foundation isolation felts ranges from the most precision machine to presses in the 1200 ton capacity and above range.

INERTIA BLOCK DESCRIPTION & INSTALLATION

ABOUT OUR MATERIALS

Unisorb IB-500 Series pad materials are the result of a continuing research and development effort which began with the first installation of Unisorb isolated foundations in the 1950's. The basic raw materials from which present day IB-500-B1 and IB-500-S2 are manufactured are a proprietary mixture of man-made fibers including polyesters, polyamides and polyacrylanitryls. The size, shape and mechanical properties of these fibers are carefully controlled at manufacture and strict quality control procedures followed during blending to assure uniform and predictable performance as a vibration isolator. At manufacture the fibers are permanently interlocked using the patented Lowderbach process to form a uniform pad material with carefully controlled mechanical properties.

As a final phase in manufacturing, pad materials are subjected to compressive loads which are a minimum of ten times that expected to be seen in the most severe applications, thereby assuring that long-term dimensional stability will be achieved.

Two basic pad densities are manufactured, one designed for application to foundation base and the other for application to the foundation sidewall surfaces. The basic mechanical properties are described by the enclosed load deflection curves. Particular attention is paid to the uniformity and consistency of these mechanical properties during manufacture. A nylon sailcloth barrier is applied to the pad along with a sealant which prevents the incursion of water during the pouring of the concrete foundation.

Unisorb pad materials are impervious to chemicals found in the normal industrial environment and are not subjected to biological degradation as are other materials (including natural wool felts) in similar below grade applications. The pad materials may be placed in direct contact with soils and are unaffected by continuous exposure to water.

TECHNICAL SPECIFICATIONS OF IB-500 MATERIALS

TECHNICAL SPECIFICATIONS OF TYPE IB-500 MATERIALS

BASE ISOLATION PAD MATERIAL - TYPE IB-500-B1:

Thickness	1" (comprised of two permanently bonded 1/2" felt pieces)
Composition	
Pad	Proprietary blend of multiple diameter & length 100% inorganic synthetic fibers permanently interlocked by the Lowderbach process to form a uniform pad with predictable mechanical properties. No biodegradable components Mildew inheritor--none required Environmentally safe
Covering	High count, 70 denier, high tensile nylon fabric
Coating	Synthetic polymer film forming watertight coating
Rated Load	0-20 psi
Recommended Load	2-15 psi (for maximum cost/benefit ratio)
Pre-conditioning	At manufacture, IB-500-B1 pad material is placed under a compressed load which is a minimum of ten times the maximum rated load to eliminate any possibility of dimensional changes occurring as operational loads are applied.

STANDARD SHEET SIZE - 3' X 5'

TECHNICAL SPECIFICATIONS OF IB-500 S-2 MATERIALS

SIDEWALL ISOLATION PAD MATERIAL - TYPE IB-500-S2:

Thickness	1/2"
Composition	
Pad	Proprietary blend of multiple diameter & length 100% inorganic synthetic fibers permanently interlocked by the Lowderbach process to form a uniform pad with predictable mechanical properties. No biodegradable components Mildew inhibitors--none required Environmentally safe
Covering	High count, 70 denier, high tensile nylon fabric
Coating	Synthetic polymer film forming watertight coating
Rated Load	0-12 psi
Recommended Load	2-10 psi (for maximum cost/benefit ratio)
Pre-conditioning	At manufacture, IB-500-S2 pad material is placed under a compressed load which is a minimum of ten times the maximum rated load to eliminate any possibility of dimensional changes occurring as operational loads are applied.

STANDARD SHEET SIZE - 3' X 5'

TECHNICAL SPECIFICATIONS OF IB-1000 MATERIALS

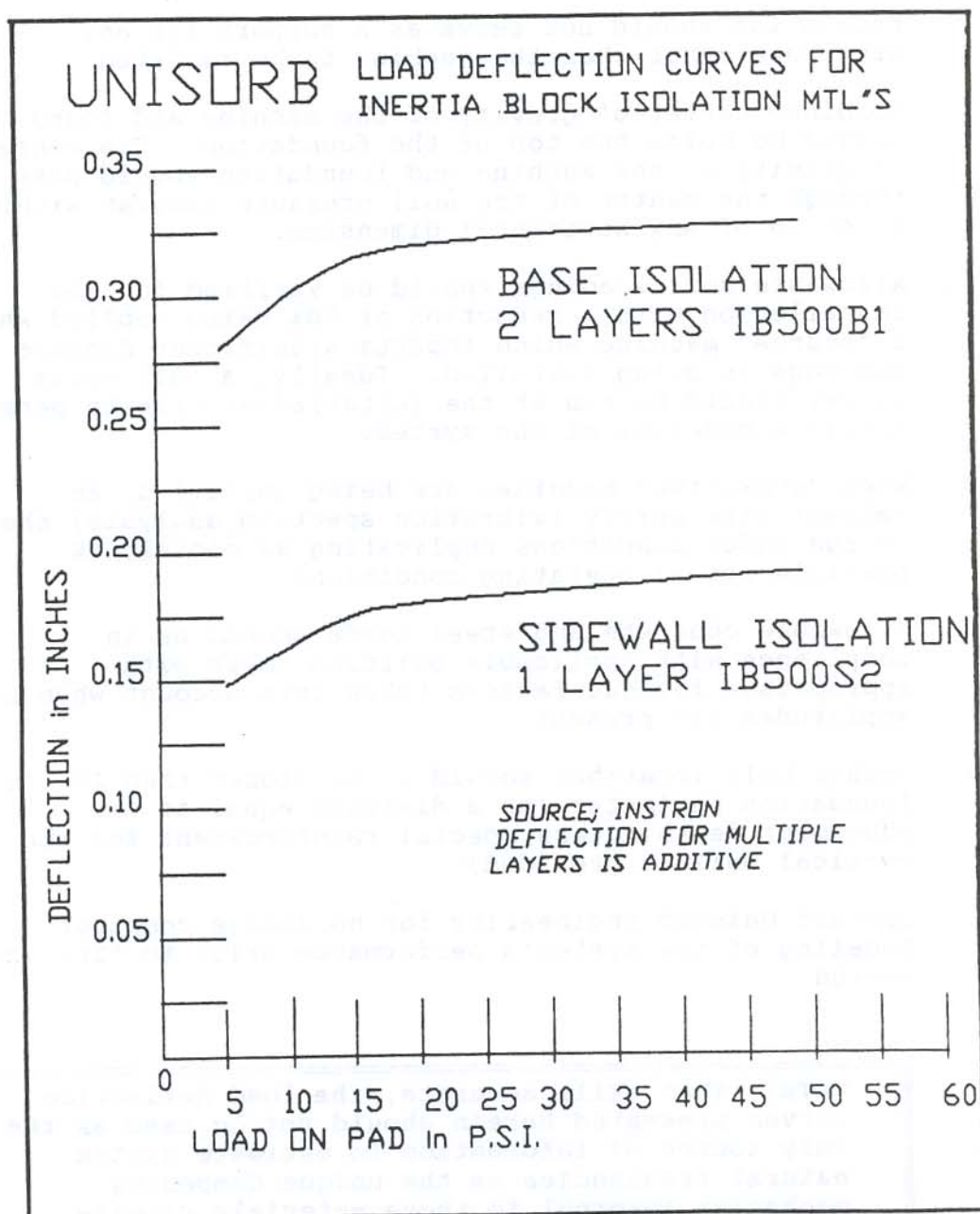
ISOLATION PAD MATERIAL - TYPE IB-1000-S2FC:

Thickness	1" (comprised of two permanently bonded 1/2" felt pieces)
Composition	
Pad	Proprietary blend of multiple diameter & length 100% inorganic synthetic fibers permanently interlocked by the Lowderbach process to form a uniform pad with predictable mechanical properties. No biodegradable components Mildew inhibitors--none required Environmentally safe
Covering	High count, 70 denier, high tensile nylon fabric
Coating	Synthetic polymer film forming watertight coating
Density	1.4 lbs./sq. ft. (1" thickness)
Tensile Strength	550 psi
Rated Load	0-12 psi
Recommended Load	2-8 psi (for maximum cost/benefit ratio)
Pre-conditioning	At manufacture, IB-1000-S2FC pad material is placed under a compressed load which is a minimum of ten times the maximum rated load to eliminate any possibility of dimensional changes occurring as operational loads are applied.

LOAD DEFLECTION CURVES

LOAD DEFLECTION CURVES FOR INERTIA BLOCK ISOLATION MATERIALS

The chart below depicts load deflection characteristics of Unisorb Inertia Block Foundation Isolation Materials. The curve for IB-500-B1 (typically used for a base isolation) is shown in a 1" thickness. The curve for IB-500-S2 (sidewall isolation) is shown in a 1/2" thickness.



BASIC FOUNDATION DESIGN

BASIC ISOLATED FOUNDATION DESIGN

Check Points

1. For support critical machinery design from allowable deflection--not allowable load. In many applications the foundation becomes part of the machine's structure.
2. For optimum cost/benefit relationship in most cases a mass ratio (foundation to machine) of approximately 1.5 to 1 is desirable.
3. Foundation should not serve as a support for any structure other than the machine to be isolated.
4. Combined center of gravity of the machine and foundation should be below the top of the foundation. The center of gravity of the machine and foundation should pass through the center of the soil pressure diagram within 5% or so of any horizontal dimension.
5. Allowable soil loadings should be verified for the installation with a reduction of 50% being applied when a "source" machine which imparts significant dynamic loadings is being installed. Ideally, a full soils survey should be run at the installation site to permit accurate modeling of the system.
6. When "sensitive" machines are being installed, an ambient site survey (vibration spectrum analysis) should be run under conditions duplicating as closely as possible actual operating conditions.
7. Allowable concrete and steel loads should be in compliance with applicable building codes with appropriate fatigue factors taken into account when high amplitudes are present.
8. Anchor bolt locations should be no closer than 12" to foundation perimeter (or a distance equal to the embedment depth unless special reinforcement for the vertical wall is provided).
9. Contact Unisorb Engineering for no charge computer modeling of the system's performance prior to finalizing design.

NOTE: That while accurate, the load deflection curves presented herein should not be used as the only source of information to estimate system natural frequencies as the unique dampening mechanism internal to these materials significantly impacts system characteristics.

ISOLATION FOUNDATION WORKSHEET

UNISORB MACHINERY INSTALLATION SYSTEMS

Isolation Foundation Worksheet

Contact Name _____

Company Name _____

Address _____

City, State _____ Zip _____

Phone No. _____ Fax No. _____

A/E (if any) _____

MACHINE INFORMATION

Manufacturer _____

Model _____

Type _____

Weight _____

Tolerances To Be Maintained _____

DESCRIPTION OF WORK TO BE DONE BY THE ABOVE MACHINE

DATA ENCLOSED (1) Foundation Layout ___ (2) Gen. Arrangement ___ (3) Plant Layout ___
(check) (4) Other _____

ENVIRONMENTAL DATA

General Description _____

Plant Floor: Thickness _____ Reinforcement Scheme _____
Condition _____ Age _____

Soil Condition: Type _____ Bearing Strength (PSF) _____
Depth to Water (sq. ft.) _____ Other Info. _____

Was Ambient Vibration Study Done (Yes/No) _____ Copies Attached (Yes/No) _____

Projected Installation Date _____

Vibration transmission from compressor reduced by 75% with isolation system

LEE SPRUIT
Chief Engineer
Autodie Corporation
Grand Rapids, MI
JOHN MOLNAR, P.E.
Editor-East

NEW SOLUTIONS

Problem

Autodie Corporation needed vibration control for the new 200-hp, V-type reciprocating air compressor that was to be installed in a building addition. The compressor, weighing some 7000 lb, is a two-cylinder, two-stage, double-acting, 708-rpm unit, with an operating pressure of 100 psig rated at 1115 cfm and a forcing frequency of 11.8 Hz.

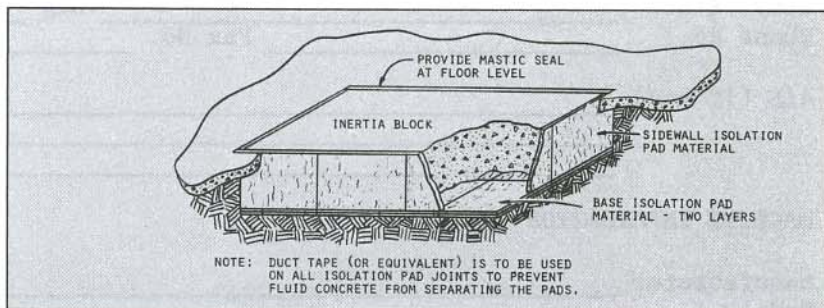
Autodie Corporation makes tools and dies for the automobile industry. The 20-year-old company has 275 employees at its 250,000-sq-ft Grand Rapids, MI facility.

The plant needed some way to isolate the compressor vibration from the new addition building structure so that disturbances to existing precision machine tools would be eliminated.

Solution

Optimum isolation performance depends upon proper isolation materials and installation techniques. The added initial installation costs for vibration isolation are generally considered insignificant when compared to corrective measures at a later date. These results are best achieved through an appropriately sized inertia block effectively isolated from the building structure.

Since the compressor installation was to coincide with the new addition construction, and the stability of the soil was considered satisfactory, the



Typical inertia block installation

plant selected an isolation pad material that could be used indirect contact with the soil without affecting its properties.

The material consists of a proprietary blend of 100% inorganic synthetic fibers, of various diameters and lengths. The material has no biodegradable components and is environmentally safe. It has a high-tensile-nylon, "sail"-grade fabric cover and a watertight coating that protects the material from moisture migration from the fluid concrete.

The base isolation pad has 900-psi tensile strength and is more dense (.8 lb/sq ft) than the sidewall isolation pad (.7 lb/sq ft) with a tensile strength of 550 psi. Both materials are manufactured in 1/2"-thick sheets. The plant used two of these 1/2" sheets under the inertia block and one of them at the sidewall.

The inertia block is reinforced concrete, 2' thick by 8' wide and 10' long. The compressor is rigidly fastened to the inertia block with anchor bolts.

The method the plant used for inertia block vibration isolation is as follows.

First, an excavation the exact size of the finished foundation was prepared. Then two layers of the isolation material were placed in the bottom and one layer on the sides of the excavation. Reinforcing steel was placed and the concrete foundation was poured

directly into the cavity.

The installation was completed in the winter of 1982.

Results

On November 10, 1983, vibration analysis tests were conducted to determine the effectiveness of the installation. Readings were taken at several critical locations around the inertia block with an electronic vibration analyzer.

Readings taken at 16 locations (8 on the inertia block and 8 off the foundation) provided an average efficiency of better than 75% transmission reduction.

The plant is satisfied with the results of the vibration control of the installation, and feels that its objectives were met. The compressor and its foundation are decoupled from the surrounding environment.

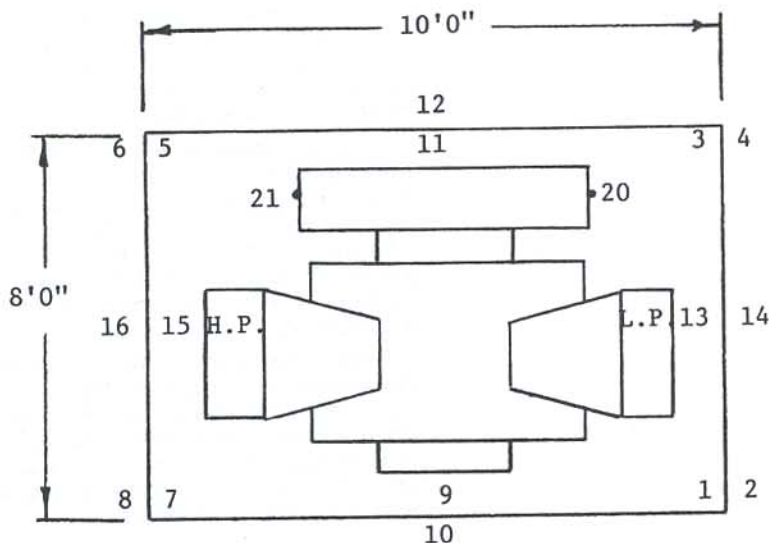
INERTIA BLOCK ISOLATION CASE HISTORY

JOY WN 112 COMPRESSOR ISOLATION TEST RESULTS
 708 RPM - 100 PSIG
 Forcing Frequency 11.8 Hz
 Autodie Corporation - Grand Rapids, MI

The following tests were completed using an electronic vibration analyzer:

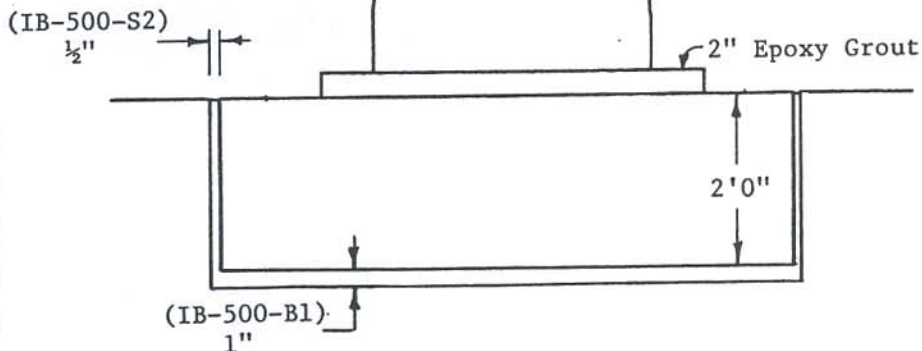
Foundation/Floor Locations Vertical Displacement in MILS

Location	Reading
1	2.5
2	0.6
3	2.2
4	0.6
5	2.3
6	0.3
7	1.6
8	0.3
9	0.65
10	0.3
11	0.5
12	0.3
13	2.4
14	0.8
15	2.2
16	0.5



Compressor Locations Displacement in MILS

Location	H	H \perp	V
17	0.9	2.8	1.0
18	2.7	8.0	7.5
19	1.9	6.3	5.0
20	1.6	9.0	7.8
21	2.5	8.0	7.3



Note: Key

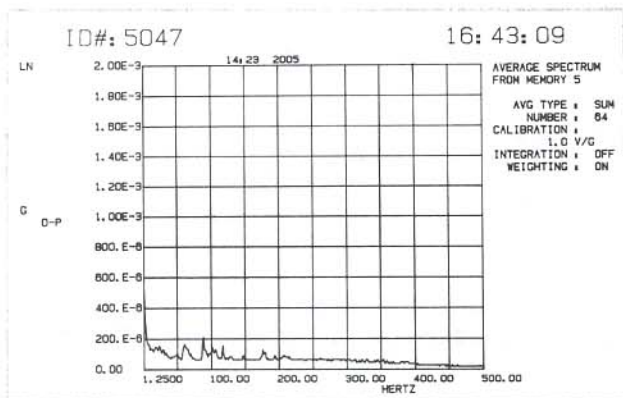
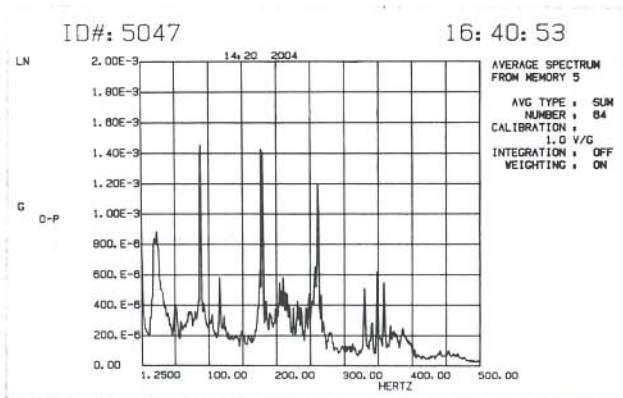
- H = Horizontal, Parallel to Crankshaft Centerline
- H \perp = Horizontal, Perpendicular to Crankshaft Centerline
- V = Vertical

ENGINEERING VIBRATION ANALYSIS

Sensitive machines in severe environments may require an ambient vibration survey to determine exact site conditions. UNISORB stands ready to help you decide when this expense is needed. We can work with the vibration analysis people to assure that the data collected is representative of actual site conditions. UNISORB also has the capacity to perform on-site surveys of this nature. Typical surveys include a day at the site to collect data which is recorded for later analysis. The analysis can also be performed on site if necessary for immediate feedback. These services should be scheduled through your UNISORB field representative.

The charts below show a vibration survey performed by UNISORB on an existing isolated inertia block installation. A grinding machine performing a rough grind operation on a crankshaft was installed on an inertia block isolated as shown on the typical inertia block installation details. During the rough grind the machine-generated vibrations were measured on the foundation. The top chart shows an average of 64 of these measurements.

Vibration measurements were also taken on the concrete floor immediately surrounding the isolated foundation. The lower chart shows an average of 64 of these measurements which were also taken during the rough grind cycle. A comparison of the upper and lower charts is a graphic illustration of the high degree of isolation efficiency provided by UNISORB inertia block isolation materials.



INERTIA BLOCK ISOLATION CASE HISTORIES

COORDINATE MEASURING MACHINE SUCCESSFULLY REINSTALLED ON UNISORB ISOLATED FOUNDATION

A Boice Coordinate Measuring Machine was recently reinstalled at John Deere Tractor Works in Waterloo, Iowa. This machine was performing quality assurance analysis of stamped tractor cab parts to $\pm 0.003\text{mm}$. The fluctuation in the display was a problem in performing this analysis and became intolerable when a shear was installed next to the quality assurance laboratory. The vibrations generated by the shear brought the fluctuation of the readouts to $\pm 0.03\text{mm}$ (10 times the resolution of the system). When the shear was not in operation, the resolution of the system was 0.001mm .

Unisorb District Manager, Mike Baranowski, visited the facility in May, 1983 and proposed an 8-1/2' long x 6' wide x 5' deep foundation isolated with Unisorb Inertia Block Isolation Material. The proposal included 1" of IB-500-B1 material on the base of the inertia block and 1" of IB-500-S2 material on the sidewall of the inertia block. In both cases the material was supplied in 3' x 5' x 1/2" thick sheets. Two sheets were stacked to provide 1" of material and the pads were field cut to the size of the foundation. The excavation began in July, 1983 and standard construction techniques were employed to apply the Unisorb isolation materials to the foundation.

The coordinate measuring machine which is now reinstalled on the Unisorb isolated foundation exhibits a fluctuation in the readout of only 0.003mm which the customer considers completely satisfactory. The Unisorb isolated inertia block approach solved the vibration problem without requiring the relocation of the shear or the quality assurance area.

PROOF POSITIVE

In July of 1986 a Landis Star Line Pin Grinder was installed at a major mid-western automotive engine plant utilizing an Unisorb isolated inertia block foundation and the Unisorb Fixator anchoring/alignment system.

The foundation design was done in accord with standard Unisorb practice with 1" full coverage of IB-500-B1 on the base and 1/2" full coverage of IB-500-S2 on the sidewalls.

In July 1988, one full year after start up, the attached spectra were taken. Plot 5047-2004 presents the vibration spectrum observed on the foundation and plot 5047-2004 the spectrum observed on the adjacent floor, 6" or so from the perimeter of the isolated foundation.

As you can see, the results are spectacular with excellent isolation (due to the superior dampening characteristics of the Unisorb isolation materials) at the lower frequencies.

User management personnel further indicated that even though this installation is in a very congested area with identical equipment nearby, there has been no hint of vibration related problems.

INERTIA BLOCK ISOLATION CASE HISTORIES

SUCCESS USING IB-500 UNDER HORIZONTAL BORING MILL

Late in 1980 the Trane/Murray Co. contacted UNISORB regarding an isolated inertia block for a new Horizontal Boring Mill. The mill, a Cincinnati Gilbert with a 4" spindle, was to perform precision milling and deep boring operations. They anticipated vibration problems because of their previous experience in installing machine tools.

Their main concern was the freight trains which regularly passed within 100' of the plant. They would slow down for a 90° turn before coming onto a bridge to cross the Mississippi River. Also, the machine was installed in an area of the shop which was built over an old creek bed and 5' of fill. To compound matters, a punch press and overhead crane were in operation in the same area as the mill.

UNISORB recommended a T shaped isolated inertia block approximately 13' x 16' x 4' deep. The customer used this approach in order to gain all the precision and finish possible from his new machine. The site was excavated of all previous fill to a depth when solid clay was reached. It was then filled with compacted sand to a depth of 4'. The IB-500-B1 and S2 materials were installed and the concrete poured.

The performance of the Cincinnati Gilbert Horizontal Boring Mill is living up to the expectations of the Trane/Murray Company and is substantially better than similar equipment installed in the conventional manner.

IB-500 SOLVES VIBRATION PROBLEM AT GILMORE

Norman S. Wright & Co., of Portland, Oregon has eliminated a vibration problem at Gilmore Steel in Vancouver, Washington with UNISORB's IB-500 series isolation material. A Niagara Model 1216-5/8 Shear was the cause of the problem. It was transmitting vibration throughout the Gilmore plant and affecting steel plate burning heads. The heads are mounted in such a way that they are sensitive enough to be thrown off the cutting path as far away as 150 feet away from the shear.

Since the Niagara Shear was originally installed without isolation material or a foundation other than the 6"-8" plant floor, Ron Adsley of Norman S. Wright requested an Inertia Block design from UNISORB. A 21' x 8' x 3' deep foundation was proposed to be isolated with 2 layers of IB-500-B1 Base Isolation and 1 layer of IB-500-S2 Sidewall Isolation.

Gilmore made the right decision and installed the new isolated inertia block. Since the installation, the burning heads are unaffected by vibration. The closest cutting head which is 20' away from the shear shows no sign of being disturbed by the shear.

INERTIA BLOCK ISOLATION CASE HISTORIES

BRIGGS & STRATTON - MILWAUKEE, WISCONSIN

This plant has used Unisorb products extensively to install many different types of machinery. A highlight of the installation successes is a line of six high speed presses which vary in speeds from 250-750 SPM. The presses are spaced within 10' of each other and are on individual inertia blocks. The sidewalls are lined with Unisorb IB-500-S2 material and the base with IB-500-B1 material. The inertia block design and isolation material have allowed the presses to operate efficiently together while running at different speeds and without disrupting machinery within close proximity.

DOUGLAS AIRCRAFT - LONG BEACH, CALIFORNIA

Recommendations by DeVlieg Machine Tool caused Douglas-Aircraft to use Unisorb IB-500-B1 and IB-500-S2 inertia block isolation materials to isolate a DeVlieg designed foundation. The machine was installed close to an existing and similar DeVlieg Jigmil.

Upon completion of the second installation it was found that the new machine had capabilities of accuracy many times greater than the existing machine. Douglas Aircraft's engineer, Mr. Ed Zogg, credited Unisorb's IB-500 materials for reducing ambient vibration which limited the performance of the existing machine.

FOOTE JONES - CHICAGO, ILLINOIS

Foote Jones manufactures large gears ranging in diameter to 4'. Tolerances need to be held to 2-3 tenths on gears this size and surfaces need to be to a class #14 finish. In order to accomplish repeatability and accuracy on large precision workpieces such as these, Unisorb IB-500 materials were used to line the base and sidewalls of the engineered foundations. Hobbing machine types such as American Pfauter and Hofler are currently in operation successfully.

WEB MANUFACTURING - MORGAN HILL, CA

Web Manufacturing performs highly precise production grinding work. With the advent of new technology gauging equipment, they sought a solution to hold tolerances to acceptable levels previously untried. The decision was made to mount three new Besly Grinders on engineered foundations using Unisorb IB-500-B1 material on the base of the foundation and IB-500-S2 material on the sidewalls. After installation was completed it was apparent that tolerances to 100 millionth could consistently be held.

Soon after the installation an earthquake affecting the bay area occurred measuring 5.5 on the Richter Scale. During the earthquake the grinders were in full production. Since the earthquake was considered to have possibly had an effect on part quality, extra attention was given to earthquakes. No parts were rejected during the earthquake.

INERTIA BLOCK ISOLATION CASE HISTORIES

ORIGINAL EQUIPMENT MANUFACTURERS

SPECIFYING AND/OR APPROVING UNISORB

Adams Engineering
American GFM Corporation
American Induction Heating
American Pfauter Limited
Avey Corporation

Beloit Corporation
Bergman, Inc.
E. W. Bliss Company
Brown & Sharpe Mfg. Co.
Bullard Company
Burgmaster Div. Houdaille Ind.

Campbell Grinder Co.
Cincinnati Gilbert Machine
Cincinnati Milacron
Cleveland Crane & Engineering
Crankshaft Machine Co.
Cross & Trecker

Danly Machine Division
Detroit Broach & Machine Co.
DeVlieg Machine Corp.
Droop & Rein

Farrel Company

General Electric Company
Giddings & Lewis

HPM Corporation
Hegenscheidt Corporation
Hillyer Corporation
S. E. Huffman

Ingersoll Milling Machine Co.
Ingersoll-Rand Co.

Joy Manufacturing

Kato Engineering
Komatsu Ltd.

F. Joseph Lamb Co.
Landis Tool Co.
LeBlond Incorporated

Lester Engineering
Leybold-Heraeus Vacuum Systems
Lucas Machine

Maho Machine Tool Corp.
Manufacturing Technology
Mazak Machine Tools
Micro Poise
Minster Machine Co.

NATCO
Newbury Industries

Oerlikon Motch Corp.
Oliver Machinery
Overton Machinery Corp.

Package Machinery Co.
Pratt & Whitney Machine Tool
Prince Corporation

R & B Machine Tool
Raycon Machine Tool
Reece Corporation
Rock of Ages

Scharmann Machine Tool
Schuess America
Schmiede Machine & Tool
South Bend Lathe
Strippit Division, Houdaille Ind.

Tarus Products

U. S. Amada

Van Dorn Plastic Machinery Co.
Varion Extrion
Verson Allsteel Press Co.

Warner & Swasey Co.
Werner & Pfleiderer Corp.
White Sundstrand Machine
Wotan Machine Tool

INERTIA BLOCK ISOLATION CASE HISTORIES

ROLL GRINDER ON IB-500'S

Unisorb was contacted in the second quarter of 1982 by Weirton Steel who at that time was a Division of National Steel Corporation. Weirton Steel wanted information regarding an isolated foundation for a roll grinder that would be located next to the roller mill itself. The grinder in question was a Mesta #10 roll grinder which can handle a 44" diameter x 14' workpiece and weighs approximately 147,000 lbs.

Weirton Steel desired to reinstall the roll grinder next to the roller mill to solve a material handling problem. The initial installation had the roll grinder located in a separate building from the roller mill to separate it from the vibrations generated in the mill. This, however, created a material handling problem involving transferring the roll from crane to fork truck to crane to get the material from the mill to the grinder. Locating the roll grinder next to the mill so it could be serviced by the same crane would eliminate this material handling problem but would require that they deal with the vibration generated by the mill.

To isolate the roll grinder installation from the ambient vibrations generated by the mill, Unisorb recommended an isolated foundation. The 44' long x 11' wide x 6' deep foundation would be isolated with two layers of IB-500-B1 on the base and one layer of IB-500-S2 on the side-walls. This would be accomplished with normal construction techniques. It would provide a foundation weighing approximately three times the weight of the machine and was predicted to exhibit a natural frequency of 14 Hz.

A proposal was made to Weirton Steel along with a number of case histories of precision machinery installed on Unisorb isolated foundations. Weirton Steel investigated the references provided in the case histories and decided to go with the Unisorb recommendation. The material was purchased in September, 1982 and installed shortly thereafter.

One year later the machine is performing beyond expectations and the Plant Engineering Department at Weirton Steel is extremely pleased with the installation. In fact, they are so pleased that they have designed a second roll grinder installation with Unisorb IB-500's material. In addition, they have also designed a press foundation for their research and development facilities and will include IB-500's material for the foundation.

INERTIA BLOCK ISOLATION WITH NOVIBRA

When the requirement of an Inertia Block Isolation System calls for :

elimination of 4 - 6 hertz and above

the inertia block isolation system must use NOVIBRA Type GK material.

The next three pages show a Inertia Block Isolation System

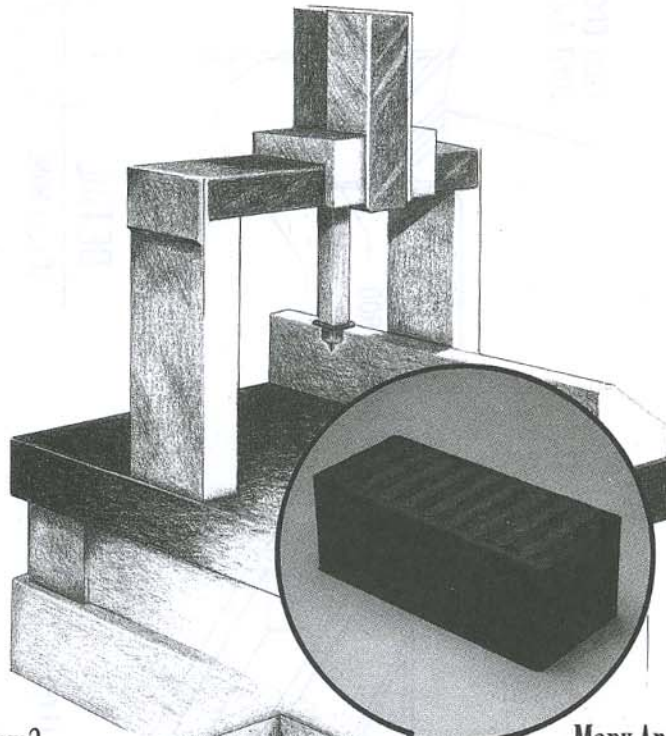
using NOVIBRA type GK material

with illustrations & procedures as to how it is installed.

For the user , just simply call ACORN - Toll Free and we provide the system procedures for you.

INERTIA BLOCK ISOLATION WITH NOVIBRA

REDUCE TRANSMITTED VIBRATION UP 98 % IN CONCRETE FOUNDATIONS



Ambient Vibrations A CMM Problem?

When using larger coordinate measuring machines and other measuring instruments on the shop floor, do you get the same level of accuracy as you get from your laboratory measuring instruments? Until now, it has been virtually impossible to eliminate ambient vibrations within a plant floor which affect Measurement Assurance*. UNISORB® GK Blocks provide the environment for the accuracy you require.

UNISORB® Has A Solution

Measuring machines and other extremely sensitive equipment can now be installed on foundations which rest on UNISORB® GK Blocks. Made of a specially formulated rubber, GK Blocks provide a high degree of isolation, both vertically and laterally. UNISORB® GK Blocks absorb and isolate up to 98% of interfering frequencies before they reach a machine's foundation. System natural frequencies as low as 2 to 3 Hz are easily obtained.

Many Applications for GK Blocks

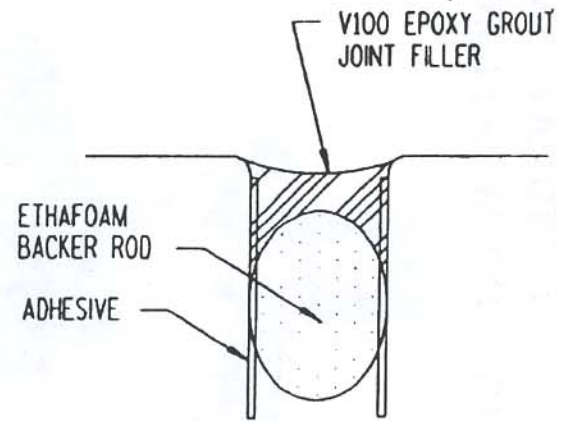
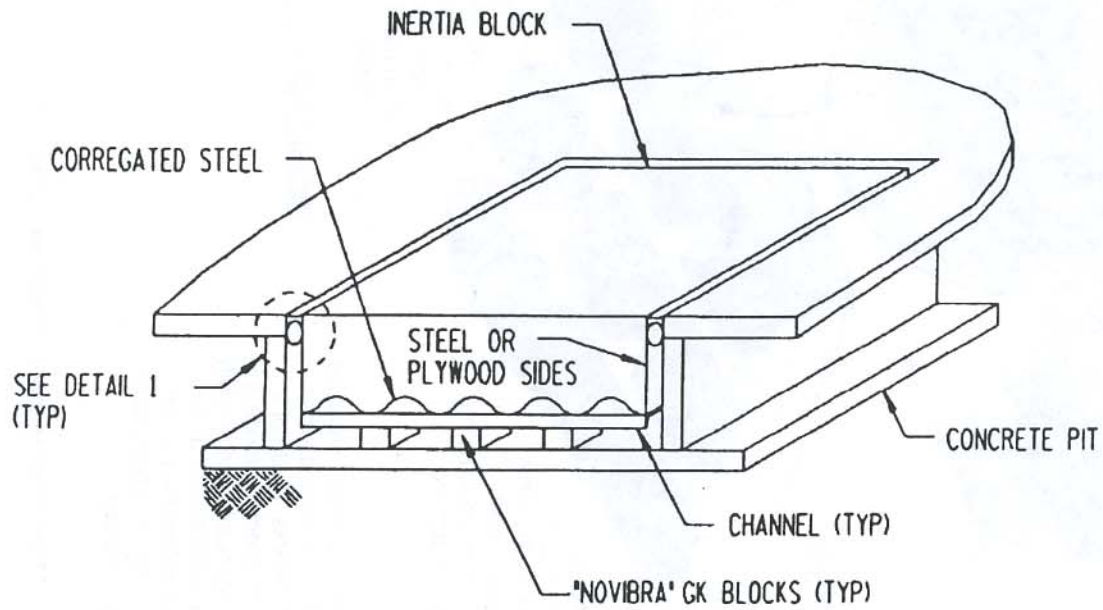
UNISORB® GK Blocks also have applications in a variety of installations requiring isolation of machinery generating heavy vibration.

Individual GK Blocks can support from 4,408 to 17,637 pounds per block.

This makes them ideal for installations such as sound enclosures, paper mills, rolling mills and converters. They also offer superior performance when used with mixers, industrial fans and floating structures.

Complete Engineering Assistance

*"Measurement Assurance" will be ISO standard 10012-2 of ISO-9000.



DETAIL 1
SCALE: NONE

The above illustration shows the Novibra Type GK Block being used to support a concrete foundation. This is a very widely used application for this product. Used in this way, the GK Blocks can be very effectively used to isolate extremely sensitive machinery such as precision grinders and coordinate measuring machines, thus protecting them from ambient plant vibrations. The GK Block can obtain deflections up to 1.18 inches, and can isolate down to a natural frequency of 4 Hz.

Other applications for use of the GK Block are:

- | | |
|-----------------|---------------------|
| Rolling Mills | Paper Mills |
| Mixers | Converters |
| Gear Wheels | Sound Enclosures |
| Industrial Fans | Floating Structures |