

LEAD INDUSTRIES ASSOCIATION, INC.

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LEAD VERSUS VIBRATION — A SUMMARY AND OUTLOOK *

Francis Kiernan

Treasurer, John F. Aburnethy & Co.

A good friend of mine, Father Bailly, used to be bothered by noises in the church public address system employed in his services. After a little investigation he decided that the microphone in his pulpit was picking up vibrations of the church building itself and injecting them into the amplifier. He knew that I worked with vibration problems and asked me whether I thought a lead pad might help.

Now, if you assume that the microphone weighed about a pound and had a base about four inches in diameter, you'll find that the accepted theory does not offer much in the way of a working solution to Father Bailly's problem through the use of lead pads.

Nevertheless, since he was a good friend, I gave him a small pad to put under the microphone. Now, gentlemen, I am not ruling out divine intervention in this case, but the facts of the matter are that Father Bailly has had no more trouble with strange noises since the day he first installed the pad.

I can't really say that there is a moral to that story. If there were one, I would have to say that in the present state of technical knowledge about lead-asbestos pads, and how they work, their use is sometimes an act of faith. We simply do not know enough about them to be able to make reasonable predictions of what they can accomplish. That, of course, is why you of Lead Industries Association have sponsored and continue to sponsor research in this field. Our company has worked with you in this area. We enthusiastically support your current efforts in this direction.

There is no doubt that we must learn more about why and how the pads work. We expect that your research will lead to usable results in this area and we hope that we will learn enough to be able to make even better pads in the future. This will certainly be reflected in increased use of lead to combat vibration.

But even though we are still operating in the dark to some extent and basing recommendations on experience and hunch, we have found a growing acceptance of the pads in the past year or so and wide increase in their use. As one directly concerned with making and selling them, I must say that I'm grateful for the great promotional job your organization has done.

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Francis Rieman

-2-

Lead Versus Vibration-
A Summary and OutlookGeneral History

Lead-asbestos pads, in virtually their present form, were made and used when I was a boy. I've been working with them for twenty-five years myself. When I first learned about them they had been investigated by Professor Miller of Columbia University for the New York Central Railroad. On the basis of his recommendation in 1916, the New York Central insisted that all buildings constructed over their tracks be supported on these pads.

Since Park Avenue, a prime building site for office and apartment buildings at that time, was directly over the New York Central tracks, there was considerable use of pads in building construction. This phase of activity ended, as building activity itself did, following the crash in 1929. Lead pads in building foundations were a long while building back up to any important volume.

In this interim, the use of pads under newspaper printing presses and other heavy vibrating machinery came to be the bulk of the use of lead. I'd like to review one of those jobs with you for a moment. Back in 1929, the New York Herald Tribune moved into new quarters. It was a good, modern plant. It's not far out of date today. Its presses, weighing 60 or 70 tons each, are supported on lead-asbestos pads that differ insignificantly from those we now make. The pad loading is about 90 to 35 psi. Furthermore, the 250 horsepower motors which drive these presses are supported on 25 x 12 inch pads only half an inch thick and loaded to a very low static figure. Let me read a portion of a letter from Mr. A. H. Burns, Mechanical Superintendent for the Herald Tribune at the time the job was completed and the plant went into operation:

"The lead and asbestos pads which were purchased from you in 1929 were placed immediately under the bed plates of our high speed printing presses and they have materially reduced the vibration which would ordinarily be transmitted to the concrete foundations by these machines. Observations made over a year after these pads were installed, and comparisons made of a similar installation without these pads, show that vibration has been reduced by their use at least 75 per cent. It is our intention to use these pads or similar ones under every installation of high speed printing machines which we may use in the future."

No one made any accurate measurements to verify Mr. Burns' estimate of what the pads accomplished. But the degree of satisfaction that his letter expresses speaks for itself.

Lead Pads Today

If you allow for the effects of the war, the peace, and the Korean war, the use of lead pads for vibration control grew modestly but more-or-less steadily until fairly recently. The pattern remained about the same -- most of the pads were used for machinery mounts, the balance for building

Francis Kiernan

-3-

Lead Versus Vibration-
A Summary and Outlook

foundations.

Since about 1960, however, there has been a dramatic change: the use of lead pads has increased by a factor of ten. And, surprisingly, nearly all this increase has been for building foundations. As I see it, there have been three reasons for this:

First, with no disrespect for the architects and engineers of, say, three decades ago, buildings today are engineered to use their structural material far more effectively than those of the 30's. Consider the difference in weight between two office buildings, one of conventional masonry facing and the other with sheet metal curtain wall. This difference in massiveness alone probably has a great deal to do with the way a building will react to vibration. You can see that when buildings are designed to tight engineering standards, with no safety factors of ten, the use of vibration pads becomes a reasonable part of the engineering.

Second, the promotional activity undertaken by the Lead Industries Assoc., when the current building boom in New York got under way, has had a traceable direct effect. In case after case I have found that the engineers and architects with whom I work first learned of lead-asbestos pads through the advertising and publicity efforts of LIA.

The third factor is somewhat more subtle. We are well into a period where big jobs are done by organizations, frequently big organizations. One man is seldom given the credit for designing or building any of the huge office buildings or other facilities now undertaken. But one man may still be singled out for infamy if there is any failure. Picture the plight of the poor engineer who is admonished not to spend a cent unnecessarily, and who will get no glory for a job well done — but who may be looking for a job for the next five years if the building doesn't come up to expectations. The existence of the abundance of successful case histories of the use of pads, publicized by LIA, puts this poor fellow in the position of using the pads as insurance. And frankly, there is no deception intended by us, and, I think, none practiced. The case histories are success stories!

Lead-asbestos pads are pretty cheap insurance, too. In any of the new buildings using them, they add about a tenth of one per cent to the cost of the building.

I should point out that some of the engineers and architects I've worked with are not "coerced" into using pads. In fact, in some cases I've been in the uneasy position of knowing less about the use of pads than the engineer who was asking for my advice. From your own experience with selling, you may recognize the situation.

This is another place where the existence of a non-profit organization like LIA proves valuable to me as a manufacturer of lead products and to you as lead producers. In working with your people I can't really say I find them impartial or disinterested where lead is concerned, but they do represent a step in that direction to the customer who must always suspect that my next move may be to reach for a contract or order book.

Francis Kiernan

Lead Versus Vibration-
A Summary and Outlook

Look at cases like these:

About a year ago, the architect for the Seminole Memorial Hospital in Sanford, Florida inquired about pads for use under a rooftop cooling tower. His problem was to preserve the traditional quiet of the hospital without putting the cooling tower in the next county. Ed Martin, your staff architect, was able to communicate with him to far better effect than I would have been. Ed supplied the information and insight he needed. Today the cooling tower is mounted on lead pads.

Six months before that job, the Brooklyn Union Gas Company began to worry about subway vibration coming into a new office building it was planning for downtown Brooklyn. Dave Bercina visited them and was able to show them how similar situations had been handled. Not only did that building go on pads, the savings bank erected next to it the following year also went on pads.

Dave was also instrumental in providing the first information which led to the use of pads under the new bank building in El Paso, Texas. Bruce Fader worked with the Transit Authority in New York. Ed Martin visited both the Health Department and the City Engineers in New York to arrive at a suitable pad arrangement for the new City Health Center where delicate laboratory instruments must be protected from vibrations caused by truck traffic. Currently, Ed, Bruce, and Dave are all working on the new studio building being erected in Manhattan for the Columbia Broadcasting System.

In the last issue of LEAD you may have noticed a story about the use of pads at Motel City in New York. This is a particularly interesting case involving the use of air rights. The unique motel, with its own garages and recreational facilities is built over the main freight trackage of the New York Central on the west side of Manhattan. Ed Martin was in on this project in the early stages. He talked to the builders about lead for pools and flashing as well as pads.

I would like to quote from a broadcast by Jack Walters of radio station WCBS made last December. Mr. Walters is speaking of the builder of Motel City, Mr. Budish . . . "Motel City had begun as someone else's enterprise . . . and he (Mr. Budish) stepped in after they were about to give up on the project. One of the big hazards was in designing a place in that particular air space directly over the New York Central Railroad, and in keeping out traffic sound." Later in the broadcast the commentator said, "The entire building floats on a lead and asbestos foundation, Mr. Budish told me, and this absorbs virtually all outside sound. Ninety per cent of the noise in a city, he said, which reaches the inside of a building, is the result of ground-borne vibration. So even though the motel is located directly over a railroad, and giant trailer trucks roar by outside just before they enter the Lincoln Tunnel, the entrance to which can be seen from the motel, the building is amazingly quiet."

Naturally, most of our jobs are handled without any direct action by LIA. But even here we make extensive use of the literature available through the association. And a gratifying portion of our business today is direct inquiry—proof that engineers and architects are reading the advertising and publicity about the pads. Further proof of this is the fact that while New York used

Francis Kiernan

-5-

Lead Versus Vibration-
A Summary and Outlook

to be almost 100 per cent of the building pad market, we now get inquiries and orders from Florida, Chicago, Canada, Texas, Delaware, Kansas, and other areas completely unlike New York in building density, severity of vibration sources, type of soil, and so forth.

Now in today's picture, there has been a curious trend: while we have a good start toward getting the majority of building construction jobs, where vibration is a problem, machinery mountings have become a small part of the vibration pad market. This can be partly explained by the fact that architects can easily find published information about other spectacular architectural jobs, hence they know something about pads. On the other hand, the plant engineer or chief engineer who infrequently runs up against a machinery mounting problem may not have much occasion to learn about the pads in advance.

Still, our inquiries show that engineers concerned with machinery mounting know the pads exist. We have even shipped pads for cooling tower to Australia. It may be that Mr. Hopkins can tell us how that project is progressing.

Engineers who specialize in the field of vibration control and machinery mounting are convinced that lead and asbestos is one of the best anti-vibration mounting available. Mr. Al Leichtman, a partner of the consulting engineering firm which specified lead pads under the rooftop cooling tower of the Grollier Building, was so pleased with their performance that he by-lined an article about the installation. He has used them in similar circumstance since then. Mr. Harold Cooper of William Ginsburg Associates, designers of about a third of all new newspaper pressroom facilities in this country, has said that, "There is a place for a lead pad under every piece of moving machinery."

The big problem in opening the machinery market is the engineering data which will permit these people to design intelligently with pads. As it stands, only the engineers who have had enough experience know how to work with them. The largest part of the market is therefore lost to us. We have every hope that your research program will eventually put this situation right. Let us certainly hope so. Any estimate of the size of market for buildings and for machinery must necessarily be hazy . . . but it certainly appears that the machinery mounting use will be the larger of the two by a considerable amount.

The Outlook

What conclusions can we draw from all this? First in importance, I think, is the fact that the pads are being accepted and used even though technical data to justify their use is scanty and data needed to design for their use is even harder to find. Second, that the people who know most about the pads have the greatest confidence in them. You have heard what Mr. Cooper said. You may know that Mr. Thomas Mearnsheimer, terminal engineer of the New York Central Railroad has complete confidence in the ability of the pads to do a worthwhile job as they are now used in buildings along the New York Central right-of-way. Mr. James Ruderman, one of the foremost steel structure engineers in the United States, is convinced of their efficacy.

Francis Kiernan

-5-

Lead Versus Vibration
A Summary and Outlook

It would seem apparent, then, that when we learn how the pads work and exactly what may be expected of them in all common situations, we will be able to expand our market still further.

But quite aside from what we can do for the pads, are there any other factors at work which might influence the market? Clearly there are. Let me suggest what I think is the most important of these — the relatively new term "air rights." Most of the large cities have reached a size where further enlargement in area has become exceedingly difficult. These cities can grow most easily now by going up — and this means that space over rail lines, subways, freight yards, arterial highways and other areas of intense vibration will be put to work. An interesting article in "The Wall Street Journal" for March 21 points out how widespread the movement is currently, with projects planned or under construction in Chicago, El Paso, Boston, Philadelphia, Montreal, and New York.

Add this market to what we can realistically expect from increased use of the pads in machinery mounting and I think you will agree that the future of lead-asbestos anti-vibration pads looks very good indeed.