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LEAD INDUSTRIES ASSOCIATION

292 MADISON AVENUE
NEW YORK 17, N. Y.

May 4, 1961

SUBJECT: BATTERY POWERED DELIVERY TRUCKS and LEAD SOUND BARRIERS

To Members of the Lead Industries Association:

We believe that the two reprints attached, although on widely differing subjects, will be of interest to you. The one on battery-powered delivery trucks appeared in a recent issue of "Food Processing" with a circulation of 40,000 who are potential customers for this type of truck.

The other appeared in "Progressive Architecture" with a circulation of over 41,000 in the architectural profession.

With regard to the electric trucks, we hope soon to have additional cost data which will enable us to publish a more detailed brochure on the subject.

The article on sound barriers is, of course, the result of our own brochure which contained the report of Bolt Beranek and Newman.

Additional copies of each are available in quantities up to 25 free of charge. Larger quantities of the electric truck reprint can be supplied at our cost of seven cents per copy, and of the sound barrier article at five cents per copy.

Very truly yours,

Robert L. Ziegfeld

Secretary

RLZ:JRH

Att.

Lead Sound Barriers

BY WILLIAM J. McGUINNESS

Thirty years ago lead was first used as a sound barrier in a special application. Today, there are many opportunities for the use of lead as a means of sound isolation in contemporary structures. The Chairman, Department of Structural Design, School of Architecture, Pratt Institute, reports on this development.

TABLE I

Type of partition	Weight per sq ft Pounds: Listed material	Weight per sq ft Pounds: Lead	Material cost per sq ft Dollars: Listed material	Material cost per sq ft Dollars: Lead	Thickness inches: Listed material	Thickness inches: Lead
Plywood	2	.5	.31	.14	3/4	1/128
Sheet metal	3	1.8	1.75	57	1/16	1/32
Solid plaster	18	3.8	.33	1.12	2	1/16
Cinder block	22	5.5	.35	1.69	6	3/32
Plaster on studs	12	7.5	.43	2.25	6	1/8
Plaster, double studs	16	11.0	.55	3.37	8	3/16
Brick	104	15.0	1.00	4.50	8	1/4

Efficiency comparison table for equal effectiveness in transmission loss through standard partitions or a thickness of lead affording equivalent sound reduction. Abstracted from a report of the Lead Industries Association.

TABLE II

Desirable transmission loss: Occupancy	Desirable transmission loss: Decibels	Achievable transmission loss by: A selected wall or	a sheet of lead	Decibels
Moderately noisy offices	25	2" solid plaster	1/16" thick	33
Quiet offices	37	1/2" plas. on gyp. lath, both side of metal studs	1/8" thick	38
Very quiet offices	47	1/2" plas. on gyp. lath, both sides, staggered metal studs	1/4" thick	44

Goals for optimal transmission loss and selected typical construction or sheet lead of indicated thickness to achieve these results. Values are for a selected average frequency of 500 cycles per second.

Sheet lead has some interesting qualities, among which are its resistance to the passage of both X-rays and sound. These characteristics were not discovered recently; they were used, more than 30 years ago, in prominent buildings. Many hospitals then, including the New York-Cornell Medical Center, were enveloping X-ray rooms in sheet lead. The second quality, that of sound resistance, was used at about the same time for the sound isolation of studios in New York's Radio City.

A specialized professional application of a material frequently becomes adapted at some later date to broader use. This is true of the use of lead as a material for partitions and other building surfaces that must effect a transmission loss of sound intensity in spaces that need to be kept relatively quiet. The two principal properties of a good sound barrier, weight and limpness, are intrinsic in lead.

Recent demands for lead as a sound barrier motivated the Lead Industries Association to retain Bolt, Beranek & Newman, Acoustical Consultants, to study the subject. Their findings and report, recently published, describe many tests and conclusions relating to sheet thickness and behavior under varying conditions of frequency and transmission loss.

One would hardly expect that lead could compete on the basis of weight savings, yet this is shown to be true (*Table I*). It is always lighter in the order of 2/3 to 1/7 that of comparable sound barriers. Lighter structures and easier handling are indicated. Its thickness is consistently but a fraction of that of walls affording the same transmission loss.

Cost comparisons suggest some discussion. Lead is distinctly cheaper when competing with the stiff, resounding qualities of plywood or steel. As against the bulkier and much heavier plaster, block, and brick, it is always more costly, although always lighter and thinner. Cost studies credit thin walls with the savings in floor area that they make possible. These savings effected by 4" to 6" reduction of wall thickness will often offset the higher cost of lead.

The investigations of Bolt, Beranek & Newman were comprehensive, and only the most significant results can be given here. Obviously, screening out 30 to 50 db will reduce incoming noise to a most acceptable level. It is evident that 1/4" of lead will do this as well as staggered metal studs with plaster on both surfaces (*Table II*).

The need for auxiliary material, however, is immediately evident. Bruce Fader of the Lead Industries Association cites several material combinations that are now or will soon be in use. Thin lead foil above acoustical ceiling tile can lick the problem of inter-office sound transmission through ceiling plenums above ceiling-high partitions. Lead lined folding doors now isolate school areas. A sandwich of 1/4" lead between two 3/4" plywood layers is a promising barrier. An attractive fabric with vertical lead fibers will afford a 33 db loss; two layers will raise this loss to 43 db.

Reprinted from the March, 1961 issue of PROGRESSIVE ARCHITECTURE
by LEAD INDUSTRIES ASSOCIATION, 292 Madison Avenue, New York 17, N. Y.

FOOD PROCESSING

They're slower than their gas-operated counterparts . . .
yet route drivers often finish well ahead
of previous schedules!

They cost twice as much as gas-trucks initially . . .
yet annual savings over gas make up the
extra cost in 3 to 4 years . . . and then real savings begin!

Will silent, economical-to-operate, dependable

Electric trucks take over short-route runs?

Reprinted from March 1961 FOOD PROCESSING for
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BATTERY-POWERED DELIVERY TRUCK DATA

FROM LEAD INDUSTRIES ASSOCIATION

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CHARLES V. NICHOLSON
Cleveland Electric Vehicle Co.
H. C. RIGGS
Electric Storage Battery Co.
NORB LEINEN, Associate Editor,
Food Processing

Electric trucks take over

A SILENT REVOLUTION may be in the making on the streets of America's cities and towns, and on the highways immediately surrounding the larger population centers.

Reason is re-introduction of the once familiar electric vehicle, but in an entirely new form — as a short-haul pick-up and delivery vehicle.

Several national dairy organizations are making home deliveries in electrics which cost about one-third to one-half as much to operate as conventional gas-powered trucks, and whose noisiest activity on milk routes is the clink of bottles which the driver collects.

The truck itself makes hardly any noise in operation, and, of course, never sits idling at the curb — ordinarily a source of fumes, noise and high truck-operating costs.

(As example of the economic impact of "idling," tests on the route show that a home-delivery-route truck spends 70-75 per cent of its time idling, and averages only four to five miles per gal. Idling also is one of the causes of high engine maintenance costs.)

In one test, an Atlantic City dairy compared 3000-lb-capacity electric trucks and 2500-lb-capacity gas trucks.

In a 17-day trial last April over seven routes on Atlantic City's Absecon Island, the electric "fuel" (recharging) cost of about two cents per mile compared with an average gasoline cost of 3.66 cents per mile for standard four-cylinder trucks.

Although electric "fuel" costs depend a good deal on load carried, hilliness of terrain, number of stops made and kilowatt-hr cost, a typical test run of 28 miles required 42 kw hours, or 1.375 cents per mile.

Still another test, by a dairy in Warren, Ohio, over routes ranging from 12 to 20 miles, showed an average per-mile cost of 1.5 cents for recharging. This compared with gas-and-oil costs of 12.2 cents per mile on the same routes.

In the latter test, electric power was purchased during an off-peak (batteries were recharged at night) for 0.8 cents

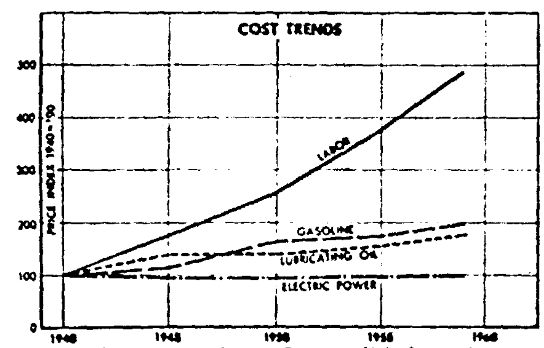

Figure 1—Cost trends source information: Department of Labor figures and earlier published information from several other federal agencies.

Cost trends show why electric motive power is gaining a cost advantage over the internal combustion engine. Though not shown on chart, cost of batteries in the same period has increased about 20 per cent, with corresponding increase of about 50 per cent in life expectancy. Price of automatic charging equipment has decreased markedly in same period

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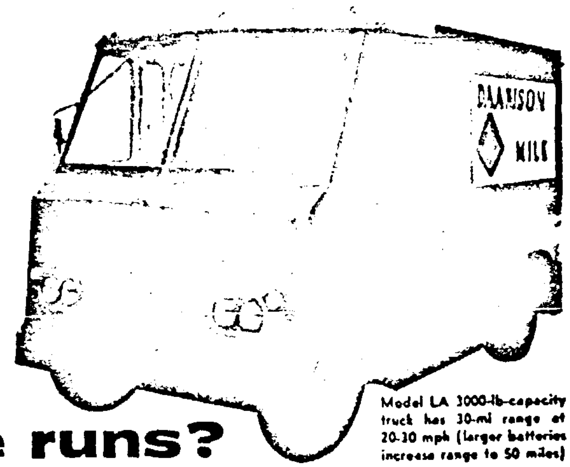

short-route runs?

Model LA 3000-lb-capacity truck has 30-mi range at 20-30 mph (larger batteries increase range to 50 miles)

per kw hr. This favorable nighttime electric power rate, however, is not offered in every community.

Maintenance records at Atlantic City for four-cylinder gas trucks on routes averaging 30-40 miles per day show that an annual maintenance labor bill of $490 and about $150 worth of parts can be expected. This is in addition to a regular overhaul at five-yr intervals.

Oil changes, antifreeze, etc., account for another $60, and average cost of tires is about $131 per yr. Annual maintenance bill, then — excluding any pro-rated five-yr-overhaul costs — amounts to about $830 for gas trucks, according to the dairy's records.

Compared to this, the electric is estimated to require $200 worth of maintenance labor a year, but only $10 worth of parts. No oil changes or antifreeze are needed, and, because of easier starts, cost of tires drops to about $100 per yr.

There is no need for major overhaul, since it is very difficult to severely damage a battery-powered DC motor. This contention is substantiated by the early-era electric trucks — some, in fact "antiques" from before World War I — still operating dependably with only conventional maintenance attention.

Total maintenance costs, then, for electrics are likely to total around $310 — at least $500 less annually than is expended for gas trucks.

These savings factors in many instances justify purchasing electrics rather than gas trucks — even though the former cost considerably more initially.

For example, initial single-unit cost of a four-cylinder gas fleet truck rated at 2500-lb load capacity is $3750 to $4000, while a comparable 3000-lb-capacity electric, with battery, would cost about $7850 delivered, plus an additional $850 for a single charger designed to keep the truck operating daily over a 30-mile route.

("Fleet quantity" prices would lower unit costs for both types of truck, as well as for the charging units.)

However, total annual cost of operating and maintaining the gas truck, plus depreciation on the basis of 14 yrs of useful life, amounts to $2750 — whereas annual total cost of operating and maintaining the electric, plus depreciation on basis of 20 yrs of useful life (a very modest estimate) is $1550.

Thus, the difference of $1200 — saved annually with the electric — can justify the initial price differential between the two truck types within four yr. From then on, the annual $1200 saving becomes a sheer "bonus" for electric truck owners.

Secondary benefits. Despite the electric's relatively slow top speed — 20-30 mph — route drivers often find themselves getting back to the garage ahead of schedule. One reason — the vehicle is extremely simple to drive (no gear shift, no clutch) and never stalls.

In addition, the trucks have a "built-in" good will factor — absence of fumes and silent operation. END

Model LA 3000-lb-capacity electric delivery truck by Cleveland Electric Vehicle Co., 221 Cherry Ave., Chardon, Ohio.

Battery by Exide Industrial Div., The Electric Storage Battery Co., Rising Sun & Adams Ave., P. O. Box 8109, Philadelphia 1, Pa.

Battery Chargers by Exide Industrial Div., The Electric Storage Battery Co.
