



lead

LEAD INDUSTRIES ASSOCIATION, INC.

N 1179

SAN FRANCISCO'S SUBWAY SYSTEM BUILT TO LAST

Reliability has dictated to the designers and constructors of the San Francisco Bay Area Rapid Transit System (BART) that every effort be made to build a system that will last for generations. Lead has proved to be a metal of multiple uses, involving various aspects of BART's construction, and has contributed significantly to these objectives.

Underground lead sheathed cable was used to insure power reliability for the BART system. Lead performs two other vital functions that will help insure a long life for this costly venture. Miles of lead calking are used in various areas of the system to waterproof the tunnels, and lead platinum anodes are used to protect against corrosion the underwater steel shells that make up the 3.6 mile BART Trans-Bay Tube.

Cathodic protection through impressed current has been demonstrated to be the most economical

method of protecting underwater steel structures from the wearing effects of corrosion. The system at BART consists of 16 lead platinum anode platforms strategically placed at various points along the sectioned tube to insure full protection for the entire length of the steel structure.

The platforms consist of a 30-ft. long, 5-ft. deep creosoted wood base, concrete ballasted, on which is fixed the 30-ft. long, 3-in. lead platinum anode. Every 5 inches along the 30-ft. length of the anode is a darning needle sized platinum pin. The platinum increases the efficiency of the anode by acting as a catalyst and also extends the lead's life.

Inside each of the 16 tube sections to which anodes have been attached is a 24-volt DC rectifier that feeds positive current to the anode. The anode in turn returns the current back to the tube, making it neutral, thereby cancelling out the local cor-

rosion currents that occur on a steel plate immersed in sea water.

Fourteen of the sixteen anode platforms rest on the bottom surface of the Bay. The other two have been imbedded 20-ft. below the surface to accommodate a deep ship channel. The anticipated life of each anode is five years.

In areas along the BART line where steel sections used to construct the tunnels are bolted together—specifically downtown Berkeley, Oakland, and San Francisco—between-plate sections have been calked with a specially designed lead calking strip. Once again, lead was selected because of its effectiveness as a permanent waterproofing seal and because of its excellent corrosion resistance which insures long life.

The calking strip was a wedge-shaped extrusion $\frac{3}{4}$ -in. deep, $\frac{1}{4}$ -in. wide at the top and $\frac{3}{16}$ -in. wide at the bottom.

Miles of tunnel area within the BART System are waterproofed with a special design lead calking strip.



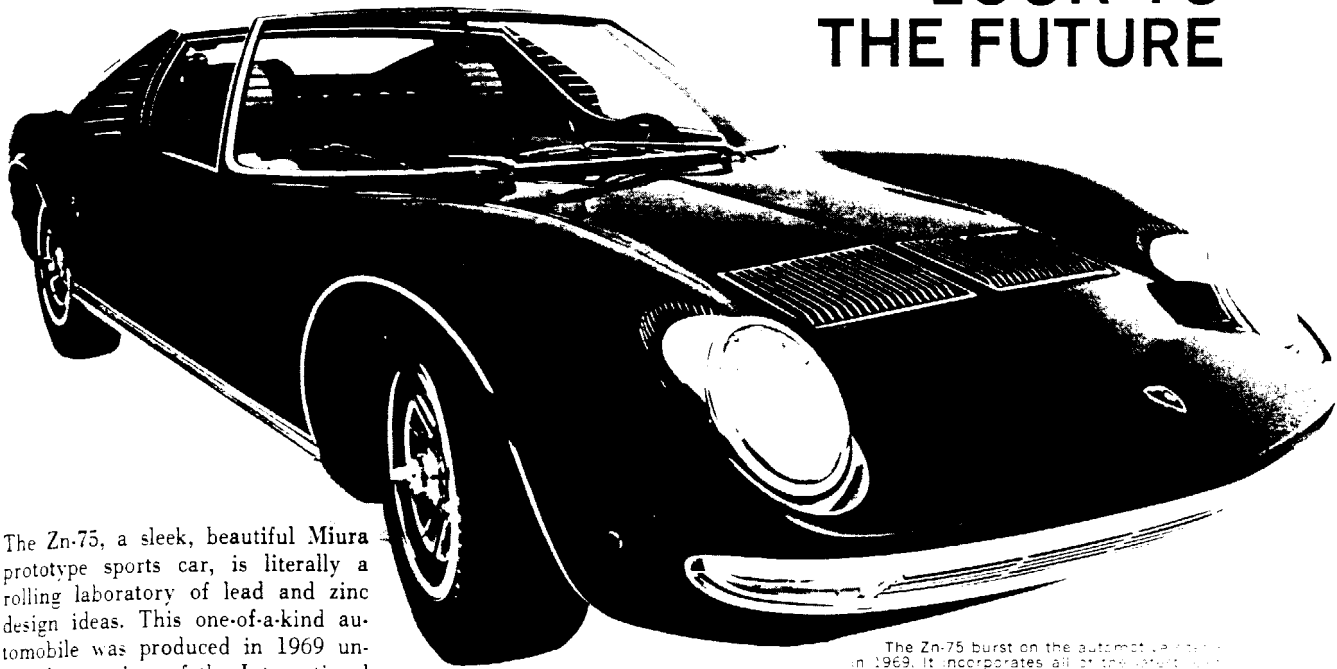
Workmen applying the wedge-shaped extrusion calking strip.



A lead-platinum anode support platform ready for installation under the Bay. The anodes protect the steel tunnel shells from corrosion.



The Zn-75 LEAD AND ZINC LOOK TO THE FUTURE



The Zn-75, a sleek, beautiful Miura prototype sports car, is literally a rolling laboratory of lead and zinc design ideas. This one-of-a-kind automobile was produced in 1969 under the auspices of the International Lead Zinc Research Organization.

Styled by famed Nuccio Bertone, head of the auto body firm of Carrozzeria Nuccio Bertone of Turin, Italy, and manufactured by Automobile Ferruccio Lamborghini, Sant'Agata, Bolognese, Italy, producers of world-famed Grand Turismo autos, the Zn-75 made its debut in August, 1969, in Detroit.

While the major emphasis is on zinc, the very latest developments and advances in lead are found on the Zn-75. Several of the lead applications could start a trend in automotive design.

Malleable, easily-cut, and available in almost any desired thickness, lead sheet has been used on the Zn-75 as both a sound barrier and for vibration control. A lead sheet and polyurethane foam composite has been used as a floor underlay to muffle engine and road noises. The composite consists of a 1/4-in.-thick foam-lead-foam structure, using 1-lb. (approximately 1/64-in. thick) lead sheet.

Leaded vinyl sheet has been installed in the door panels of the Zn-

75 to damp vibration. The lead is dispersed in the vinyl sheet, which is 1/16-in. thick and weighs 0.87 lb. per sq. ft. An important and not totally unexpected bonus effect of this installation is to give the doors a good solid feel and a sound when being opened and closed that clearly denotes quality.

Terne, a lead tin alloy coated steel, has for years been used for automotive fuel tanks, oil and air filters, truck air cleaners, car heaters, gaskets, valve covers, and other automotive parts. Durability, ease of forming and drawing, ease of soldering and corrosion resistance are just a few of the particular characteristics of terne that make it desirable for automotive applications.

Dispersion strengthened lead, a wrought product consisting of 99.9% pure lead strengthened by an extremely fine, uniform dispersion of lead oxide particles, is available in a multiplicity of shapes and forms. It is used on the Zn-75 for the fuel line.

The Zn-75 burst on the automotive scene in 1969. It incorporates all of the latest lead and zinc automotive design ideas.

The fuel line tubing is 86.6-in. long, has an OD of .4-in. and a wall thickness of .040-in.

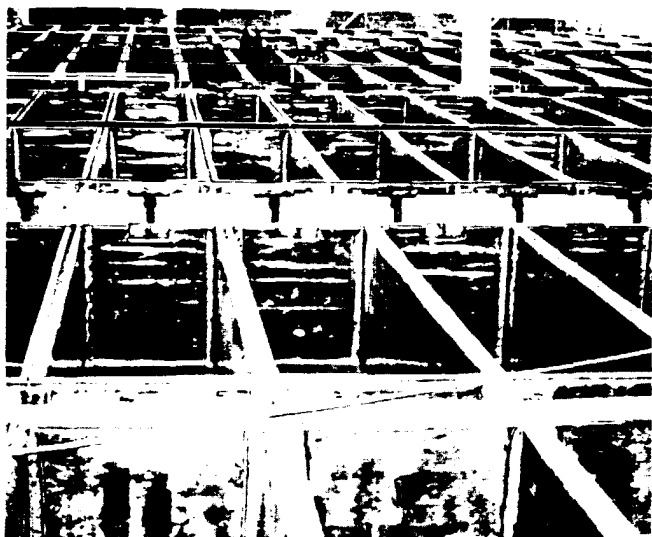
Lead's natural quality of lubricity and softness make it a leading material for automotive bearings. A newly developed material consisting of a sintered ferrous skeleton impregnated with lead was used in the manufacture of the connecting rod bearings on the Zn-75.

The porcelain portion of the spark plugs in the Zn-75, as are all automotive spark plugs, are lead glazed. And the car makes use of both a paint primer consisting of a basic lead silico-chromate and 85% basic lead silicate as well as an external coating of a green, lead pearlescent paint, often used in various colors as a custom finish for luxury automobiles.

Lead solder, the 12-volt lead acid battery, and the premium gasoline containing tetraethyl lead (TEL) wrap up lead's contribution to the Zn-75—tomorrow's look in automobile engineering and design.

**TESTS AND
EXPERIENCE
PROVE . . .**

LEAD BEST FOR PLATING



Lead lined electrolytic refining tanks
at Phelps Dodge's El Paso works.



A fine-tipped torch is used to
burn the corner seam of one of
the refining tanks.

The applications of lead in corrosion resistant environments are too numerous to list. Most particularly, however, lead plays its role in the chemical processing industry where a seemingly endless list of corrosive chemicals must be handled or stored economically and over long periods of time without jeopardy to the equipment. Notable among these chemicals because of its extensive use is sulphuric acid. Lead is virtually a must in maintaining sulphuric acid vessels.

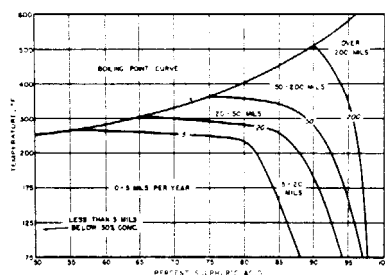
In 1968, sulphuric acid production in the United States reached 56.8 billion pounds . . . in dollars, well over \$500 million. And industry growth continues at a healthy rate according to current U. S. Department of Commerce reports.

Metalworking firms make use of sulphuric acid for such operations as pickling, plating, anodizing and other processes. In agriculture, the acid is used in the manufacture of fertilizers. One of the largest users of sulphuric acid is the chemical industry itself. Here, vast quantities are used in the manufacture of such everyday items as synthetic fibers and detergents as well as a host of other important household and industrial chemicals.

Because of sulphuric acid's widespread use and high corrosivity, the

methods and materials for lining storage vessels have been given intensive study. As new materials become available, they are tried for lining tanks and other vessels to contain the acid. For sulphuric acid service, however, tank lining is a job best entrusted to lead because of its proven performance and low corrosion rate.

Lead for use in lining vessels containing sulphuric acid concentrations ranging from 5% to 50% has a corrosion rate of less than 5 mpy (mils per year). Corrosion rates for concentrations above 50% are shown on the following curve:



Corrosion of lead by sulphuric acid as a function of temperature

Recently, Phelps Dodge Refining Corporation increased the capacity of its El Paso copper works by 33%. The electrolytic tanks in the original facility had been lead lined and had given good service. However, Phelps Dodge engineers still investigated different types of materials for possible use in lining the new electrolytic tanks.

Tests of the new materials were conducted under actual operating conditions. This meant that the materials would have to stand up in a sulphuric acid, copper sulphate electrolyte at a temperature of 150°F. Materials utilized in the experiment included built-up and pre-cast glass fiber, polyvinyl chloride and other plastic materials.

After a complete and detailed assessment of the results, Phelps Dodge engineers found lead to be the most durable and economical to use in this specific service. The new facility was completed and went on stream in December 1968.

The tanks to be lined were made from concrete. The lead linings for these tanks were made from three

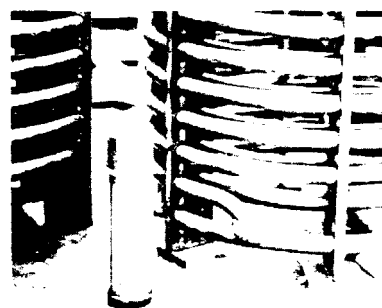
sheets. One sheet acted as the bottom and two ends, the other two made up the sides. These sheets were formed over a wood frame that duplicated the inside dimensions of the concrete tanks. The lead was clamped to the frame and the whole assembly inverted and lowered into the tanks. The top edges of the sheet lead were then secured to the top of the tanks and the form removed. The seams in the sheets were then closed by lead burning (welding). In addition to the tanks, lead was also used for coils, sumps, launders and some piping.

Lead is also being used to protect high output plating machine tanks at Albert's Plating Works in Brooklyn. One of the largest, fully automatic machines for job shop plating, this machine is currently used to plate copper-nickel-chromium or a nickel-chromium finish on tubular steel furniture parts. The machine has an hourly production rate of between 500 and 1250 parts.

Lead lined tanks contain the corrosive acids used in the process. One of these is an acid pickling tank that uses a 10% solution of sulphuric acid at room temperature. Five other lead lined tanks are used to rinse acid or electrolyte solutions from the parts. One of these operates at 180°F and the others at room temperature. An eighth tank is used in chromium plating service. The electrolyte is a combination of sulphuric and chromic acids.

The lead in these tanks has given excellent service, not having been relined from the installation of the machine in 1954 until early 1969, a 15 year period.

Antimonial lead coils are used to heat the plating bath. They transfer heat well and resist corrosive effects of the acid.



Lead sheets of lead are used to line the tanks. In an earlier workman burning the welded seams in the tank end.



Springs Mills is not in the electrical business. The company is importantly in the textile business as the manufacturers of Springmaid®, Pequot®, and Morgan-Jones® products; and as such depends on reliable electrical power to maintain maximum operating efficiency. Paper-insulated, lead sheathed cable provides the reliability.

Lead cable sheathing is flexible, completely impermeable to moisture, corrosion resistant, chemically stable and available in almost unlimited lengths.

At Springs Mills' Fort Mill, South Carolina plant a 13.8 Kv distribution system using lead cable has been in use for more than 20 years. The importance of power reliability is dramatically illustrated by the fact that a single 2,000 Kva substation may supply power to as many as 1,500 looms.

In recent years a series of new installations of paper-insulated lead sheathed cable have been added to the complex of buildings and plants at Fort Mill to meet the need for increased production facilities. Just within the past five years power sources have been increased by the installation of more than 150,000 Kva transformer capacity which is served by lead sheathed cable.

The cable's reliability was proved subsequently when air conditioning was added to the plant. The air flow between areas at slightly different temperatures and pressures through cable ducts connecting them, created condensation moisture problems that presented no problem whatsoever to the lead sheathed cable.

Underground installation of cable in ducts at the mill use a specific cable design normally used in ungrounded applications. When installed, the lead shield, as a neutral, is actually resistance-grounded which gives an added safety factor at only 2-3% higher cost.

Where it is necessary to run distribution cable in aerial trays, the same shielded conductor and paper insulation is specified but instead of the polyethylene covering, the lead is wrapped with jute and protected with galvanized armor.

Paper-insulated lead sheathed cable insures the continuing operation of the huge looms at Springs Mills' Fort Mill, South Carolina plant complex.



LEAD SHEATHED CABLE HELPS WEAVE POWER RELIABILITY AT SPRINGS MILLS

LEAD GIVES A LIFT TO ART

Lead is generally recognized as a material with a vast number of utilitarian applications. It is also known to artists and architects as a medium of unusual flexibility and enduring beauty for sculpture, and other uses that serve to "please the eye."

"Lead is a beautiful material," says Arthur F. Geisert, sculptor and art instructor at Concordia Teachers College, River Forest, Illinois. Matching action to word, Mr. Geisert has made extensive use of sheet lead for relief sculpture and encouraged other artists to follow suit by writing on the ease with which it can be used and the "how to" of working with the material.

Starting from the point-of-view that lead relief sculpture has a dignity that cannot be achieved with any other metal, Mr. Geisert spells out the unusual advantages available to the sculptor in using lead. The material is inexpensive compared to other metals that might be used. Sheet lead is soft, easily hammered and punched and yet under normal handling maintains its shape. The

metal is worked cold and requires no annealing. The equipment necessary for working the lead is minimal—a small selection of hammers and punches suffice.

Lead's well-known enduring qualities make it a natural for outdoor as well as indoor sculpture. The aging process graces it with a patina that adds rather than detracts from the metal's soft gray loveliness. And unlike other metals used for sculpture, lead will not stain stone, masonry or marble—the most likely surrounding environment for artworks of this kind.

Notable examples of artworks made of lead, from antiquity to the present day, abound. So do humbler works of art such as the lovely garden sculptures and fountains made of lead for which the world is indebted to the English.

Lead persists as a highly desirable art material right up to today with such examples as Mr. Geisert's relief sculptures and Maillol's exquisite "The River" in the garden of New York's Museum of Modern Art.

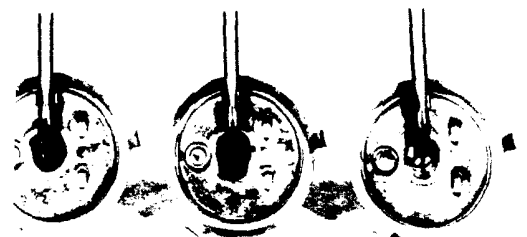
Maillol's all-lead sculpture "The River" floats over a lead-lined pool in the sculpture garden of New York's Museum of Modern Art.



Mr. Geisert scrutinizes his lead relief sculpture "Rhinceros", one of many that he has created.



Design by Paula Credity is another superb example of the artistic expression that can be mastered using lead as the medium.



NEW SOLDERING TECHNIQUES SPEED PRODUCTION AT GENERAL MOTORS



AC Spark Plug Division of General Motors' Lansing plant is the largest soldering unit.

Automatic soldering procedures introduced into manufacture of fuel tanks at General Motors' Oldsmobile plant in Lansing have made a major contribution to the 8,000-tank per day production requirement of the plant. The same is true at the AC Spark Plug Division plant in Flint where gasoline tank metering devices are manufactured for installation within the fuel tanks.

Filler necks, vents and gas lines are all soldered to the gasoline tanks. The filler neck soldering technique, a new one, was designed to prevent sheer in event of a collision. A filler neck is soldered automatically to a tank every 30 seconds at the Oldsmobile plant. The tank comes into position on the assembly line; 35/65 tin-lead alloy solder wire from coil stock is machine-fed into place along with liquid flux; air torches using natural gas and compressed air heat the joint and melt the solder.

The gasoline tank vents are soldered automatically as well but with a different composition solder. Here a 0.156" diameter solder wire, flux cored, is used. Production flow is consistent with the filler neck soldering operation.

The fuel level sensing device sub-assemblies (called sending units) made by the AC Spark Plug Division in Flint are equally dependent on automated soldering techniques for production efficiency. These sending units are inserted within the fuel tank and provide the means by which fuel capacity is registered on the automobile instrument panel.

The assembly consists of a fuel tube cover plate and float arrangement to which a potentiometer type sending unit is attached. Critical to the manufacturing operation is providing a perfect seal between the tube and the cover plate. Soldering with a paste consisting of 50/50 tin-lead alloy

in a glycol vehicle with ammonium chloride as a fluxing agent is the solution.

Automatic rotary type soldering machines are used for the tank units. Designed and built by the Division's manufacturing engineering development department, the machines have the capability of two complete soldering operations. Each machine holds 36 units and the various soldering phases—dispensing, pre-heating, soldering, cooling, cleaning and drying—are performed on two parts simultaneously.

Essential to the high-speed soldering techniques at both plants is the use of corrosion-resistant commercial terne, a lead-tin alloy coated steel that solders easily because the terne alloy itself is a solder. Speed of production and reliability of product characterize fuel tank manufacturing operations at General Motors.

Few
mat
mai
tant
equ
mar
Ger
Mir
visi
pan
7.00
cent
cost
acid
sign
ply
a co
tion
men
nan
but
sign
tery
lasts

BATTERY POWER LOWERS PRODUCTION COSTS AT HANNA'S ROSE VALLEY MINE

Few coal mines can claim an estimated \$0.013 per ton replacement and maintenance cost for its all-important supply and personnel haulage equipment. Yet, that is the performance record, Jesse L. Shepperd, General Manager of Underground Mines for Hanna Coal Company, Division of Consolidation Coal Company, predicts for the company's 7,000 tpd Rose Valley mine in east central Ohio.

The reason for the amazingly low costs: battery power. Today's lead acid battery-powered equipment, designed to perform the necessary supply and personnel haulage chores in a coal mine, helps to lower production costs substantially. The equipment not only requires less maintenance than other types of equipment but also requires less labor. Another significant saving in the use of battery-powered equipment is that it lasts substantially longer than the in-

ternal combustion equipment that it replaces.

The company's selection of equipment that would perform the handling and distribution functions most economically and efficiently resulted in the purchase of, among other equipment, five lead acid battery-powered tractors (16,000-lb. capacity), three battery-powered personnel carriers, ten battery-powered golf cars for personnel movement, a battery-operated front-end loader, spare batteries for the equipment, and a battery charging station.

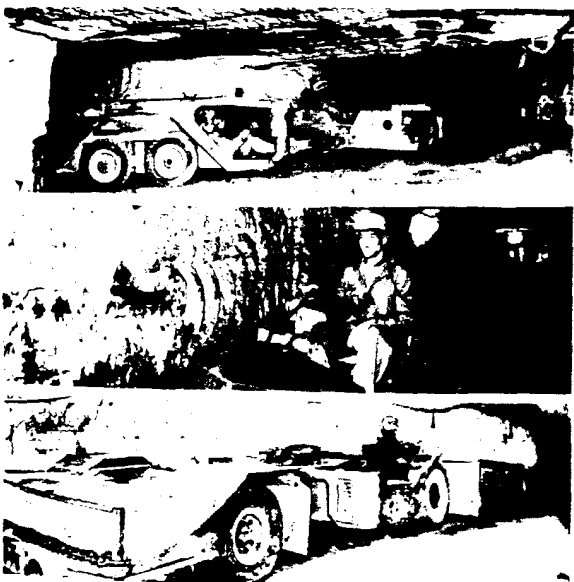
Minor equipment repairs are performed by operators and helpers on the section and supervised by the section foreman. Breakdowns of a more major nature calling for a trained mechanic bring the mine's personnel carriers and golf cars into play. The battery-powered equipment permits the necessary personnel to travel quickly and directly to a breakdown

with all necessary tools and supplies for the repair. The personnel carrier is capable of pulling a small trailer in which a welder and a set of cutting equipment is carried. It is also used to carry the heavier supply parts.

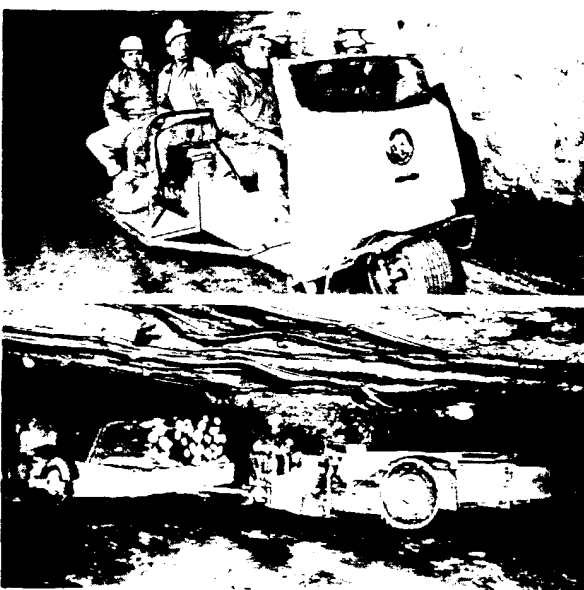
Hanna is very careful to protect its investment in equipment by demanding proper battery maintenance. The extra set of batteries for each piece of equipment enables them to substitute a fully-charged battery for the partially discharged one at the end of each shift of operation, or sooner if the equipment has been worked unusually hard. The change takes minutes since the mine has a properly constructed charging station that includes an electric crane to facilitate changing.

Mr. Shepperd reports that in addition to the low maintenance cost, the trackless equipment has reduced downtime and increased efficiency.

Battery-powered tractors with 8-ton capacity haul men and supplies as well as perform a number of other essential tasks at Rose Valley.



Battery-powered personnel carriers and golf cars are used extensively throughout the mine to expedite personnel movement.



THE LEAD AND FOAM SANDWICH... A NEW DEVELOPMENT IN NOISE SUPPRESSION

INT
AN
L

BAT
IS S

Thin sheet lead has earned widespread recognition as an efficient, economical, and easily installed sound insulation material by architects, contractors, acoustical engineers and others in the building and construction industry. Now design engineers are turning to lead with increasing frequency because of the development of new materials incorporating lead that can effectively reduce noise in machinery enclosures.

One such material now available is the composite or sandwich of thin sheet lead and polyurethane foam which both absorbs sound and prevents its transmission to the outside when used in machinery enclosures. Transmission loss provided by this material exceeds that expected from the Mass Law, yet adds only a minimum of weight to the structure being soundproofed.

The sandwich consists of 1-lb. sheet lead between two layers of 1/4" thick polyurethane foam. This can be applied to the inner wall of a machinery enclosure with any good commercial adhesive. The thin sheet lead septum provides sound insula-

tion while the adhered layer of foam provides sound absorption. The material is available with as many as four sheets of lead separated by foam, depending on the amount of sound insulation required. In testing the effectiveness of the material, it was found that a 5/8" thick sandwich adhered to 20-gage steel, with the lead weighing only 10 oz. per square foot, provided a transmission loss equivalent to a 30 lb. per square foot concrete wall.

An interesting use of the material is exemplified in a shipboard engine generator installation. During the day the generator presents few noise problems since propulsion engines are operating, people are up and around and shipboard activity is at its peak.

At night when the water is quiet and people are asleep, the automatic start up and shut down of the generator could be extremely annoying. When the lead and polyurethane foam sandwich material was placed completely around the generator compartment, the noise became unnoticeable, an obvious boon to boating.

Applications for the lead and polyurethane sandwich material which are presently being studied include outboard motors, photocopy machines, data processing equipment, heavy duty compressors, machine tools and architectural installations.

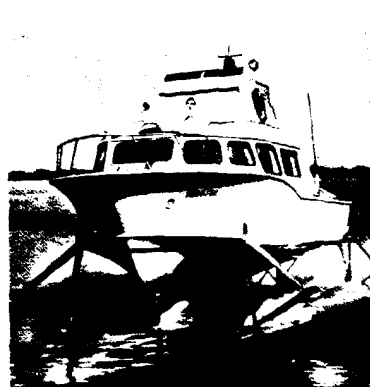
Areas for noise control that look promising are in the field of machinery for road building and heavy construction. Equipment such as jackhammers and portable air compressors are particularly in need of noise suppression.

The key to lead's growing popularity in sound control systems is found in the material's unique physical properties. Inherently dense, limp and impermeable, lead sheet is the one material which most closely approaches the "ideal" as a sound barrier. In addition, lead sheet is extremely easy to work: it can be cut to shape with the most simple tools and can be molded, folded, creased or crimped to provide an air-and-sound-tight seal around virtually any obstacle, or to fit any enclosure system. In our pollution conscious world lead foam sandwich plays its role.

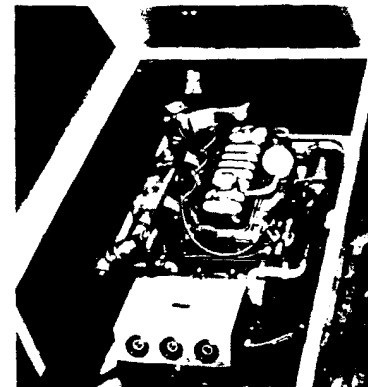
An ex
power
cently
press
quiet i
in the
neighb
tric Ex
in field
blew si
by six.
The un
contract
of Lim
project
ation, I
tion Co



A lead-foam sandwich enclosure reduced the noise level 35 db on this "Whisper-Vac" dental evacuation system.



The noise level in modern power boats is substantially reduced by engine enclosures of lead-foam that are applied as easily as carpet.



The engine enclosure is plywood. All sides, the top, and the sound traps are lined with lead-foam sandwich.

CH/
ADI
NEV

Use:
the c
have
your
you w
adder
list fo

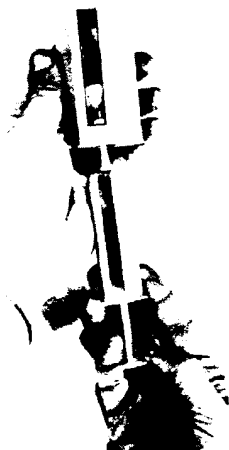
INTERESTING ODDS AND ENDS ABOUT LEAD

BATTERY TRACTOR
IS SHAPING UP!



An experimental lead acid battery powered lawn and garden tractor recently was shown to the engineering press in Chicago. The tractor is so quiet in operation it can be run early in the morning without awakening neighbors. Known as the EXT (Electric Experimental Tractor), the unit in field tests effectively mowed grass, blew snow and plowed. It is powered by six, high-density 6-volt batteries. The unit was built under a research contract by Aircraft Dynamics Corp. of Lima, Ohio. Joint sponsors to the project were Lead Industries Association, Inc., and the Farm Electrification Council.

FAIL-SAFE HANDLING OF RADIOACTIVE MEDICATIONS



Nuclear Associates, Inc., Westbury, New York, specialists in the design and manufacture of lead radiation shielding and storage equipment, has developed a new series of Gamma Vue® Shields which enable personnel to view the radioactive contents of lead-shielded containers while handling and dispensing them with complete safety. Whatever the contents of the package, radioactive medicine, syringe, vial, etc., it can be inserted in the new container and stored there prior to dose administration. Complete protection results from the use of lead for the shielding container, as well as a high density lead-glass window.

GET A LONGER DRIVE WITH THE AID OF LEAD



Lead is playing a more and more significant role in golfing. Lead acid battery-powered golf cars take you to the tee. Now a special lead-weighted golf glove is said to improve your drives and correct slicing and hooking after a little practice.

The glove, distributed by Alexander Sales Corporation, Mt. Vernon, New York, is a fine leather golf glove scientifically weighted with 8-ounces of lead. Three bars inserted in individual pockets tailored in the back of the hand portion of the glove are the secret to its success in improving one's golfing prowess.

Using one, two or three of weights can add 75 yards to your drive, correct slicing or hooking, add distance as well.



Lead Industries Association, Inc.

CHANGE OF ADDRESS OR NEW READER

Use this side of the coupon if you have recently changed your address or if you would like to be added to the mailing list for LEAD

☐ FOR CHANGE OF ADDRESS PLEASE
WRITE IN NUMBER FROM TOP OF
ADDRESS OR ATTACH OLD LABEL.

☐ ADD ME TO YOUR
MAILING LIST

PLEASE
CHECK
INTEREST

(please check one)

ATTACH MAILING LABEL HERE

To
Name, Title

Company

Street

City, state, zip code

- ☐ Painting
- ☐ Health & Safety
- ☐ Architectural & Building
- ☐ Design & Radiation Engineers
- ☐ Ceramics
- ☐ Chemical Engrs.
- ☐ Battery Power
- ☐ Miscellaneous (please specify)

LIA26579

NEW LISTINGS

Lead applications for building and construction

Reprint of article from *Progressive Architecture* reviewing the latest developments in the use of lead in architecture and construction. Twelve pages. A-10

ARCHITECTURAL

Lead armor soundproofs new arts center

Chicago's new Center for the Performing Arts is sheathed entirely in lead. A general description is given of the job and how the lead was handled. Four pages, illustrated. A-7.

The effects of waste line effluents on synthetic rubber gaskets for cast iron soilpipe

Synthetic rubber of a type similar to that used as gaskets in waste line joints was exposed to many effluents found in the plumbing waste system. Twelve pages, charts, tables and illustrations. D-5

CERAMICS

Microstructures and Magnetic Properties of Lead Ferrites

Investigation of isotropic high lead ferrites shows they can be prepared with energy products greater than 1.4×10^{11} G Oe. Eight page reprint. B-9

CABLE SHEATHING

Lead sheathing for power cable

Design guide for use of lead sheathed power cable. Factors governing cable selection are also reviewed. Twenty-four pages, illustrated. C-1

PLUMBING

Will caked lead joints withstand high temperatures?

Describes tests on uncoated cast iron soil pipe with lead and oakum joints. Such joints were found to withstand temperatures to 170° F without leakage. Four pages, reprint. D-4

ANODES FOR CATHODIC PROTECTION

Lead-silver alloy anodes in cathodic protection of ships

Operating efficiency and behavior of lead-silver anodes for corrosion protection of ships. Other anodes are compared. Details of operation, costs and other important factors are discussed. Eight page reprint, tables and illustrations. E-1

PAINTS

Red lead based paint systems

Technical booklet lists properties and applications for twenty-four red lead paint systems. Specific uses, e.g. fresh water, marine, etc. suggested for a wide variety of formulations. Preparation of surfaces discussed in detail. Thirty-two pages, charts. F-1

ANTI-VIBRATION PADS

Ways to reduce press vibration

Two installations of lead asbestos pads to reduce heavy machinery vibrations. Sectional drawings and loadings are given. Two pages, illustrated. G-1

CHEMICAL CONSTRUCTION & CORROSION PROTECTION

Lead in modern chemical construction

Reprint from *Encyclopedia of Chemical Process Equipment*. Describes installation, proper design application, and testing of lead linings. Twelve pages, illustrated. H-1

SOLDERING AND WELDING

Soldering alloys

Describes numerous alloys used as solders and discusses advantages and drawbacks of many. Flux requirements for soldering most metals, both ferrous and non-ferrous are listed. Four pages, tables and charts. I-3

SOUND BARRIERS

Practical application of sheet lead for sound barriers

Twelve page manual gives specific wall construction and performances. Tables, charts and illustrations. J-1

BATTERIES

Lift trucks: Accent on muscle, and talent too

Report discusses latest developments in the lift truck field together with future forecasts. Contains concise details on the economy of electrics. L-8

Industrial truck cost calculator

Three nomographs permit estimation of costs for gas vs. battery powered industrial trucks in two or three minutes. Twelve pages, charts and tables. L-1

GENERAL

The U.S. Lead Industry—1968

An annual review of activity within the industry that contains a general summary for the year and a series of charts and tables giving current statistics on lead production and consumption. M-14

Publications and films

This booklet lists all the material currently available from Lead Industries Association, Inc. Sixteen pages. M-13

Primary lead production areas in the U.S.

For schools, libraries. 11"x14" map showing locations in U.S. of most lead smelters and refineries, and lead mines. M-11

This magazine is reproduced from lead type

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

PLEASE SEND ME
THE PUBLICATIONS
MARKED BELOW

WRITE IN CODE NO.

←TO REQUEST LITER
MAIL TO:
LEAD INDUSTRIES
ASSN. INC.
292 MADISON AV
NEW YORK, N.Y.

LIA26580