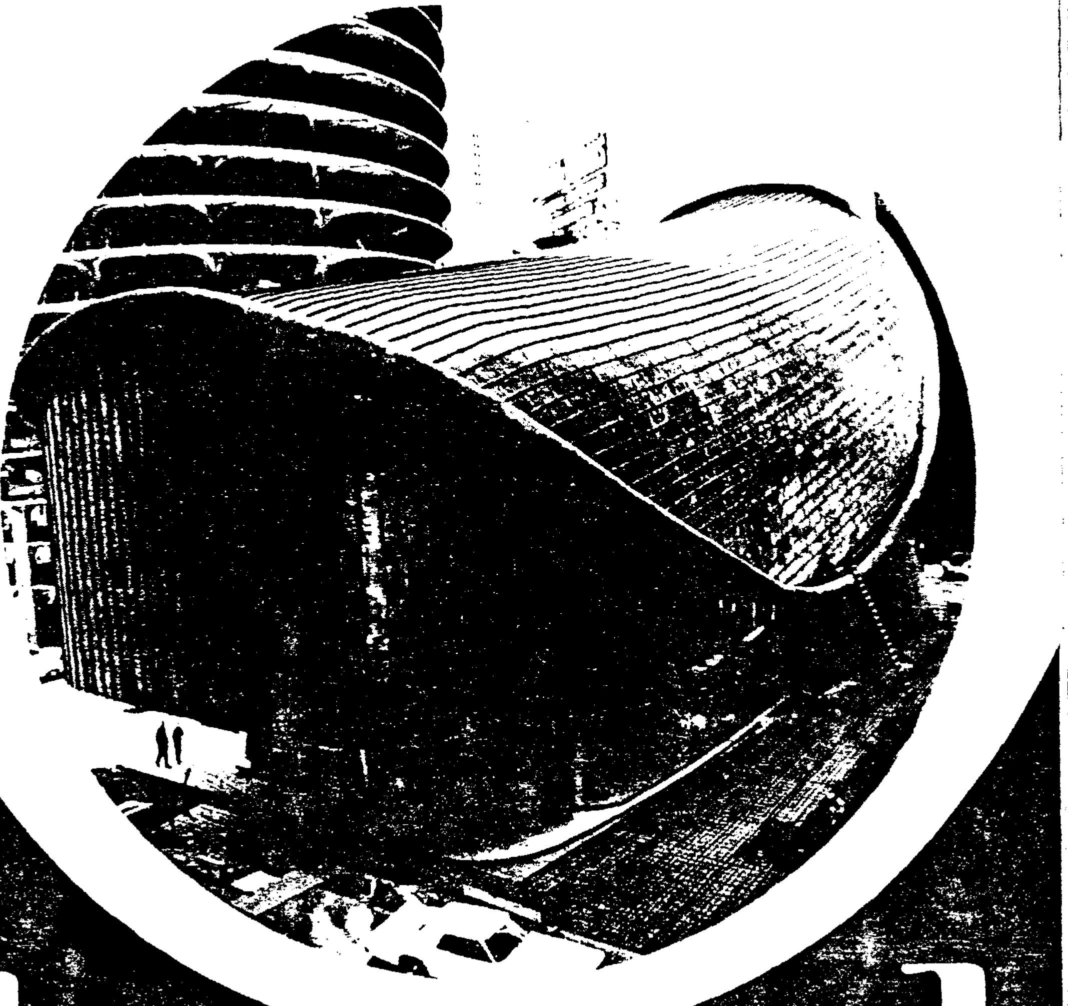


lead

LEAD INDUSTRIES ASSOCIATION, INC.

Lead-sheathed power cable wrapped in asbestos tape for thermal protection.

Lead Sheathed Power Cable "Clicks at Kodak"

Eastman Kodak Company is known around the world by its long-time leadership in the camera and film industry. Largest of the company's world-wide operations is the extensive Kodak Park Works complex at Rochester, N.Y., covering over 1,600 acres and employing more than 25,000 people. The utilities services which support this big plant are comparable to many electric utility companies.

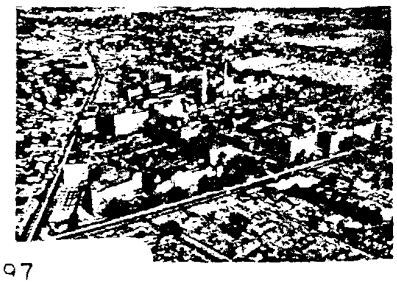
Aware of the costly dangers of even a momentary power lapse, Kodak management wisely insisted that the power transmission cable be very reliable. This, of course, meant protection with a lead sheath.

About forty miles of underground power cable — protectively encapsulated within a lead sheath—distributes this vitally important electrical power at 2.3 and 13.8 kv to load centers throughout the plant. Installed transformer capacity of these load centers is 222,432 kva. Most of the load centers are double-end, containing reserve transformer capacity. In-plant voltage to lights and small power is 480/240/120.

Kodak estimates that there are sections of lead sheathed cable in the plant which have been in use for 40 years. During all of this time they have experienced no major failures, and any minor problem was easily repaired by Kodak's excellent and knowledgeable cable crew. Both mechanical joints and wiped joints are utilized throughout the system.

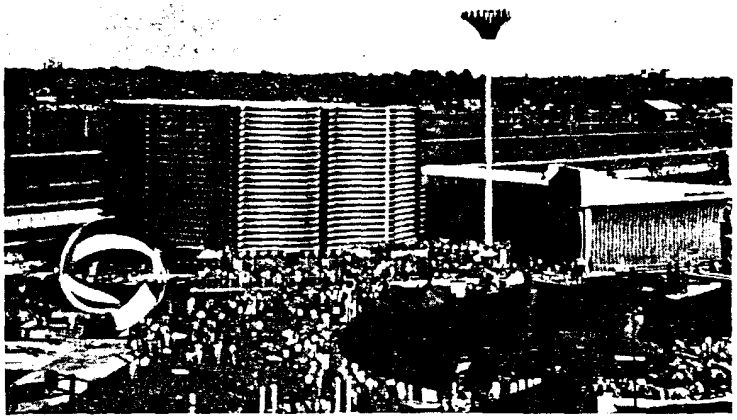
For the most part, power at 13,800 volts is carried through this huge complex by three conductor 350 MCM, compact sector, lead-sheathed, paper insulated cable. All cable has an outer PVC jacket, and where exposed, is wrapped with asbestos tape for thermal protection.

Aerial view of huge Kodak Park in Rochester, N.Y.



LIA26497

The Canadian Pacific-Cominco Pavilion at Expo 67 showing the duodecagonal theatre building with seats for 600 people, the exhibits building and the 85-foot high-rise mast.



expo 67

"We Are Young"...

While Expo '67 has taken as its theme "Man and His World", the Canadian Pacific/Cominco Pavilion has chosen to emphasize the world of youth through the film "We Are Young", produced by the Academy award winning team of Francis Thompson and Alexander Hammid, and the world of the senses through an exhibits area in which the visitor can "discover" anew the range and versatility of his five major faculties.

The visitor is less likely to notice that the "world" of the pavilion itself owes much to the metals produced by Cominco. These have been used wherever economics and good sense indicated, in applications both traditional and novel. Lead is found in its conventional applications, but in this pavilion it also was used in some novel ways.

The Expo 67 visitor is introduced to a brand new use of lead if he inspects the roof of the information kiosk at the front of the Canadain Pacific-Cominco Pavilion. The unusually shaped roof is covered with thin lead sheet laminated to rigid polyurethane foam.

Lead Plastic Laminate

The Expo visitor is introduced to a brand new use of lead if he inspects the roof of the information kiosk at the front of the Pavilion. The unusually shaped roof is covered with thin lead sheet laminated to rigid polyurethane foam. This unusual marriage of one of mankind's oldest, most useful metals with one of his most recent achievements in polymer chemistry offers the advantages of thermal insulation coupled with a long-life impermeable weather barrier —all in one easily installed material.

Lead For Sound Insulation

Lead sheet, some two tons of it, have been used in certain areas of both buildings to insulate against noise.

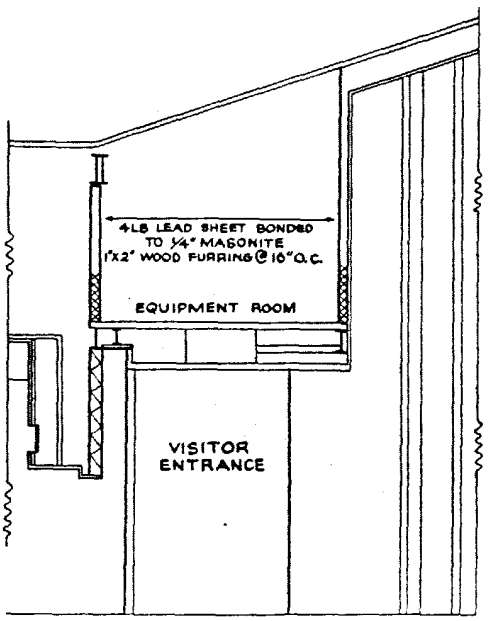
Lead sheet permits air conditioners and other mechanical equipment to do their work without transmitting noise to the public or staff areas. Noise from the multiple slide show in the exhibit area is insulated from the other exhibit areas by a lead sheet plenum barrier and lead sheet in the walls of the projection room. (See line drawing)

The Guest Lounge is quieter because of thin lead sheet in the doors.

Other Lead Uses

Except for the lead covered letters on the main sign at the entrance to the Pavilion, other uses of lead are traditional. Lead sheet, as an impermeable waterproof membrane, is used for a planter in the reception area, the pool in the Guest Lounge, and for the staff shower areas. Also, extruded lead strips are used as a jointing material between the glass blocks in a wall of the staff lounge.

Cut-away view of projection booth.



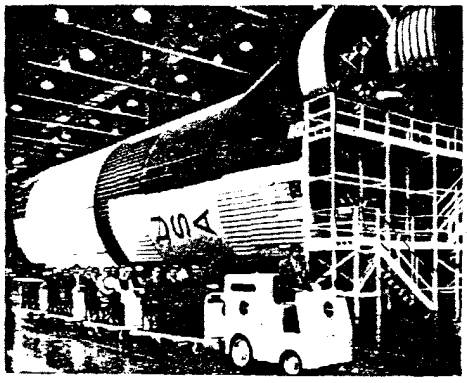
battery powered vehicles

Ride — don

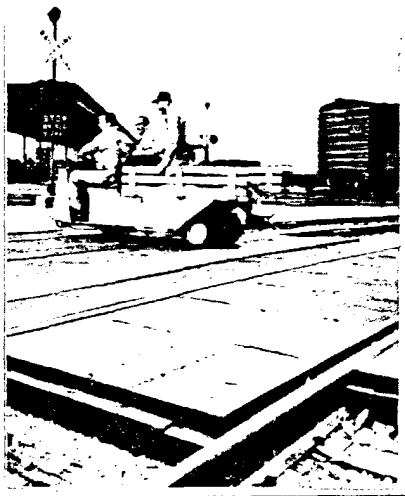
Supervisor at Fleming warehouse checks item for inventory count. Speedy electric vehicle saves many hours otherwise wasted in walking around huge floor space.

Security men check an area for hazards, ever alert to need for quick action in case of fire. Compact vehicle maneuvers easily around auto assembly plant.

Visitors tour Boeing facility in comfort and without walking the huge distances involved. Silent operation of the electric makes a description of operations easily heard over small amplifier.



Nurses operate especially designed ambulance in Boeing's Aero-Space Division. Ease of handling the vehicle is apparent.



Maintenance crew at auto plant on the way to repair assignment. Outdoor-indoor acreage involved is no problem with this means of transport.

There IS a way, and mana in more and more plants and houses is finding out that doesn't pay to keep key peop their feet, what with today's p tion and labor costs.

Take The Fleming Compan instance: headquartered in T and operating in six south c states, Fleming's modern food tribution centers provide more 5.000 items to some 900 retaile key factor in their order-filling gram is the roving supervisor; speedy electric (battery pow vehicle he roams the acres of house, untangling knots and g priority on rush orders. "O scene" guidance, they call it.

Then there's the major auto m facturer who operates an entire of "people carriers" in one of huge assembly plants. Not only supervisors be everywhere at o but the essential maintenance de ment must be mobile and read roll at a moment's notice. Their tery powered work vehicles are only equipped to carry the sk repair men, but their tools and p as well. Downtime in any asse area is held to minimum with system. Also in constant readines an especially equipped fire tr Manned by the plant security fo it is ready to handle any blaze least until major equipment can rive, if needed.

It would be difficult to imagine area more vast than one of Boein Aero-Space Division installations, here, too, electrics are doing a fi rate job of transporting the peo who help make all systems "g There are the section leaders scoot about the huge acreage, floor swe ers in constant duty to keep the sembly rooms almost surgically cle an ambulance manned by nurses assist instantly with any illness

LIA26499

Walk

...nt, and even a tour train carrying whole contingents of visitors on a ...uled basis. Truly, Boeing knows ...mobility is all about, on the ...d as well as in infinite space. ...what are the economics in the ... such vehicles in industry? ...an the cost of the equipment ...ified? One manufacturer long ...ent in this field, Cushman of ..., Nebraska, has made exhaus... ...udies with a variety of applica... ...and has come up with some ...ual data. Their research in actual ...ase histories showed that more ...an 40% of supervisor and maintenance crew time was spent in walking. When the personnel carriers were ...talled this non-productive walking ...me was reduced to about 25% and ...rking time allowable was increased ...50%. By applying the dollars in...ved in the gain, it came out that ...e vehicle completely wiped out it 's ...itial cost in three months.

Or, Kysor Industrial Corporation of Cadillac, Michigan, specialists in the small, stand-up scooter called the Jet, puts it another way: their study shows that the Jet will reduce walking time by 60%. Therefore, their chart shows that an $8,000 per year man, walking 2 hours per day, can cost $1,996 per year in non-productive time. With Kysor's personnel carrier this is reduced to $800 per year, a savings of $1,196.

And we will only mention in passing the battery powered people carriers used in such places as golf courses, hospitals, senior citizen villages, fairs and exhibits, and airports. One prominent vehicle manufacturer says: "The electric car? Nothing new about that idea, as we see it. We've been transporting people for years and we have just scratched the surface, we believe. Who knows just how soon we will expand this idea to the street vehicle application?"

INFRARED GUN... Puts the focus on soldering

Ever try to make one solder joint just like another? Chances are you haven't. Most people aren't that fussy, but if you had tried, you probably wouldn't have succeeded anyway!

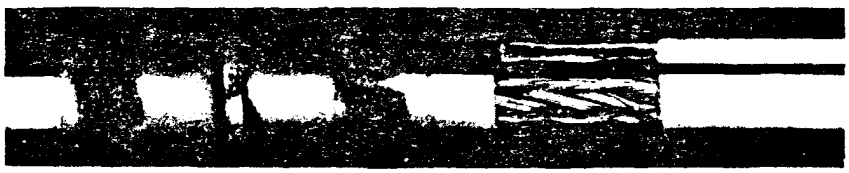
In the electronics industry it takes highly trained and skilled personnel to be able to make uniform solder joints on a routine basis. In most instances such repeatibility of the soldering operation is not necessary —but for missile hardware or delicate electronic devices, if all the solder joints are not uniformly good, it can mean failure of the entire system.

One well-known method for improving reliability (in missile guidance systems, for instance) where many solder joints have to be made in an electronic network is to reduce the human factor. That is, wherever possible, to eliminate a routine function that would ordinarily be performed by a human. It would seem that machines can usually perform routine jobs with less error than humans.

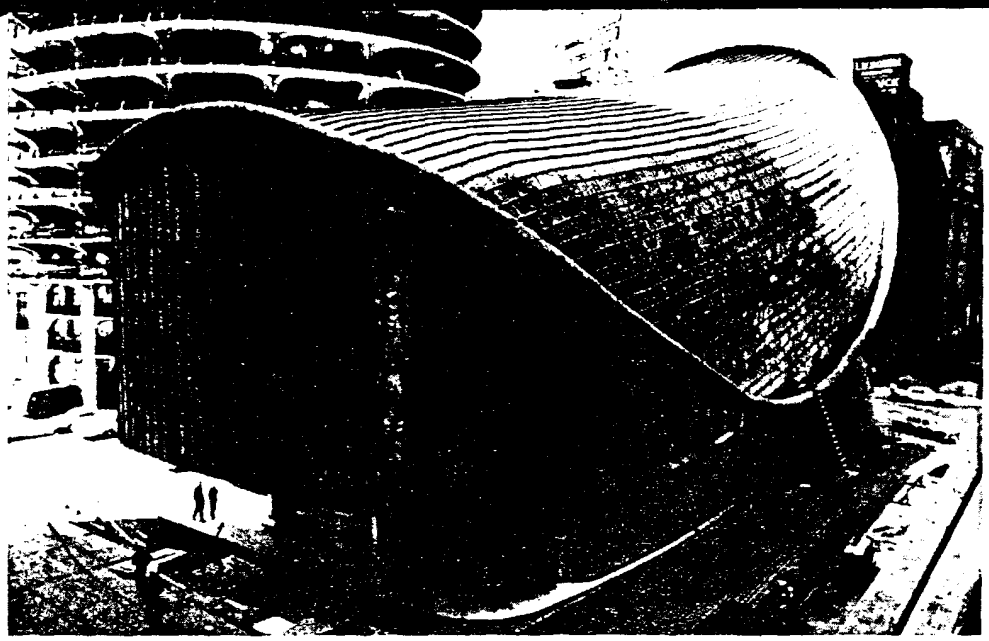
One new soldering system that has proven its reliability through innovation and reduction of the human element is the Raychem Zap Gun® and Solder Sleeve®. It uses a focused infrared lamp and heat-shrinkable sleeve containing a solder preform. Since each sleeve contains exact amounts of lead/tin solder and flux, the only operator variable is how long the sleeve must be heated to make a perfect joint. And even that is minimized. The Zap Gun® has a built-in, solid state timer that controls the heat cycle and permits adjustments from ½ to four seconds duration. Basic components of the gun are a gold reflector, a 500 watt infrared lamp, and a wire holding clamp.

The solder sleeve contains a preform of fluxed lead tin solder and meltable sealing rings at each end. Upon heating, the tube shrinks radially and the sealing rings and solder melt, forming an insulated, encapsulated, soldered tremination.

Solder sleeve about to be slipped over wires for soldering.



Solder sleeve after Zap Gun® operation—a tight permanent solder joint.



General View: Standing seams running length on 2 foot centers vertically below the concr

World

The first building of its kind in the world is a newsworthy item. When it is built in an area already world famous, it is doubly so. And when it is done by architect Bertrand Goldberg, in Marina City, Chicago, we are sure it will be a showpiece.

The first completely lead-clad building ever built has just been completed on the banks of the Chicago River in that city. Marina City is a unique architectural setting to begin with and the building with which we are concerned is a fitting companion piece to the world's tallest concrete apartment buildings, two of them, which have already made that downtown area known around the world. Actually, this last building is the fifth of the group on this 3.1 acre site and will be a Center for the Performing Arts with a 600-seat auditorium as well as the home of TV station WFLD (Channel 32).

Mr. Goldberg chose lead to sheath and roof this latest addition for a variety of reasons: first, because the movement expected in the roof structure could be compensated by the limberness of sheet lead coupled with the use of loose lock joints, making it one of the most flexible of sheet materials.

Additionally, the soft grey surface patina developed on the lead by weathering would be a welcome foil or counterpoint to the considerable expanse of concrete used in the remaining buildings in Marina City. A final bonus is the well-known sound attenuation capabilities of sheet lead, which, in a studio and theater building, is particularly apropos.

Approximately 55,000 sq. ft. of sheet lead was used—enough to cover a football field with some to spare, except that a football field is flat while the Marina City Theater Building has no flat surfaces or square corners anywhere! The roof is saddled shaped, the front and side walls are built on a curve, and the connecting line between roof and side walls is a sweeping, three dimensional, compound curve. This building is the latest example of the exotically shaped structures found in increasing numbers across the country. Of course, esthetics is one thing, but the problems inherent in convoluted surfaces and compound curves in terms of roofing are quite another. As was found at Saarinen's Kresge auditorium at MIT, the answer to most of the problems lay in the use of sheet lead.

More than 5,000 separate panels of 3-lb. ($\frac{3}{64}$ in. thick) antimonial lead was used. Each piece measured approximately 24-in. wide by 48-in. long. They were locked together along the 48-in. length by standing seams. On the roof the seams were run the long way of the building and locks were rolled in the direction of slope in order to prevent moisture from entering the seam on the upper

Standing seams on roof on 2 foot centers. Flat lock seams join 4 foot long panels in a staggered pattern.

LIA26501

rst All Lead Building

side. On the short edges, sheets were joined by flat locks in a staggered pattern, again folded in the direction of slope.

Seam details for the walls are identical but with the standing seams running vertically. Panels are fastened securely on wall surfaces by means of a continuous 16 oz. copper cleat 22-in. long across the top edge of each panel. Cleats, in turn, had been nailed with copper-clad, broadhead nails, to wood grounds in the cement plaster substrate. In the more or less horizontal roof surfaces, cleats were locked into the standing seams instead of the flat seams because of the change in loading. All lock seams were weatherproofed with a bead of gun grade, plastic calking compound in the preformed bend before finally interlocking the mating parts. Standing seams were similarly treated with plastic calking material before the last fold was dressed down tight.

Several relatively new ideas in fabrication and installation were developed because of the architectural concept of the building. After the basic panel size of 24-in. length had been established, sheet lead was ordered precut to the approximate size. To avoid buckling of flat surfaces at points where there are multiple thicknesses of lead in the joints, each panel was tapered ½-in. narrower at the top edge than at the bottom. These

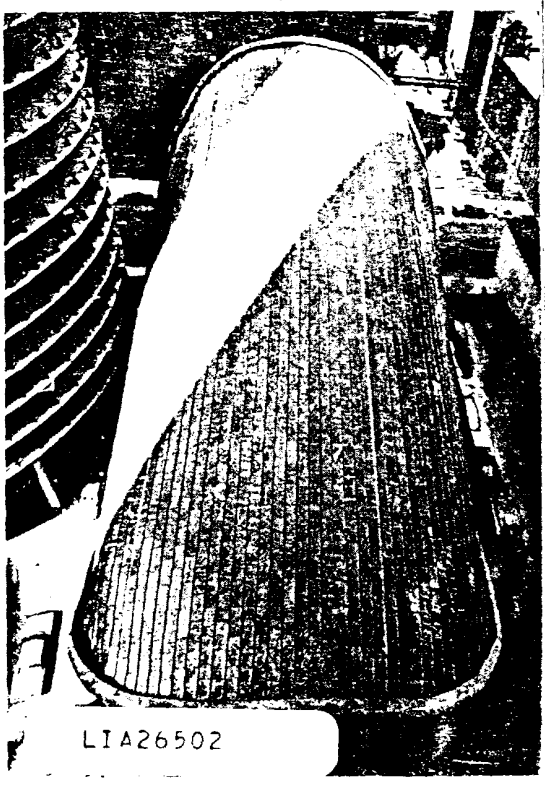
Forming standing seams—roll is in direction of flow down roof surfaces.

tapers necessitated specially designed brakes to form the panels so that each would be identical. The preformed material was then delivered to the job in crates.

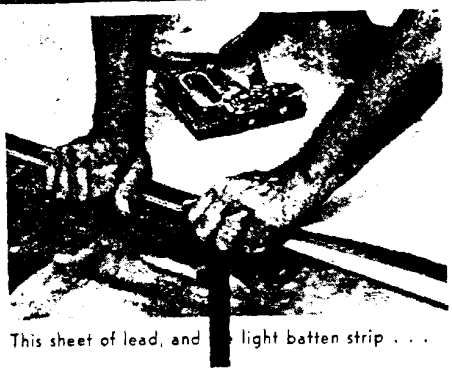
Although each sheet covered 8 sq. ft. of surface when installed, seam allowances required 10.9 sq. ft. of sheet lead to be cut. In spite of this fact, total waste on the job amounted to less than one percent. In a job of this size, such a small percentage is remarkable because 40,600 square feet of area was covered with about 85 tons of sheet lead. 3½ tons of copper cleats were used as fasteners, nailed down with 220,000 copper nails. Almost 6½ miles of calking completed the weather-proofing.

Lead work was handled by the Allied Lead Construction Company under a General Contract held by the Erik A. Borg Company, both of Chicago.

Plan view of cantilevered, doubly curved roof.

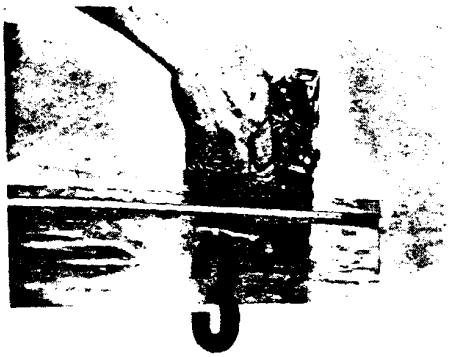


LEAD SOUNDPROOFS

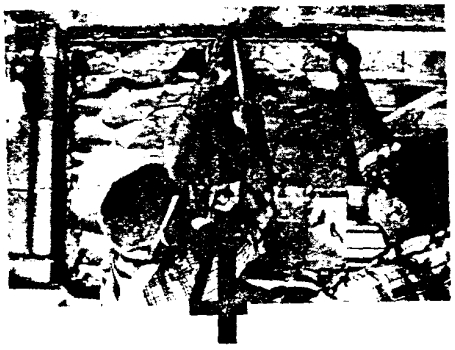


This sheet of lead, and a light batten strip . . .

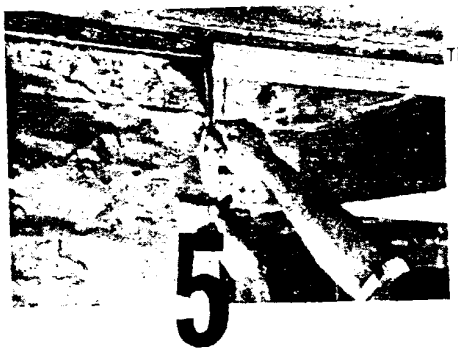
are fitted by bending the lead over . . .



and stapling so that it can be lifted . . .



up to a cleat fastened to the slab overhead



The lead is nailed to the cleat and

. . . turned out at the ends to form . . .

There's lead in the library's lead doing in the new Libr Humanities Building of New lege of Engineering? It's he preserve the quiet necessary fo and real concentration—that'

The new Library Buildin house 125,000 books, periodic technical documents needed 7,000 engineering students fr over northern New Jersey, an states, who study there. And th real provisions for study: in a to the reference and reading the college has set up small, *private* rooms with doors and tical conditioning to shut o world while sophomores and cope with the intricacies of th dynamics or electrochemistry.

A number of study rooms the main reading room on the level of the new building. In or really shut out the world a them, the architects—Epple & man of Newark—specified she plenum barriers to block the path that would otherwise exist the hung ceiling.

About 2,200 sq. ft. of the bar averaging 30-in. high, have built into these critical areas. lead, only 1 64-in. thick, weighs pound per square foot but it s sound as effectively as stiff mate up to an inch thick.

Because it is not thick, not stiff,

a simple seam. For a first-class job . . .

L1A765 03

LIBRARY

to work with. The installers
job are quick to comment
this. "We like working with
stuff."—they'll tell you, "you can
it with your hand, easily, and
n't spring back." And the bene-
don't stop there!
same formability and worka-
inherent in thin sheet lead al-
the architect and designer to
up with reasonable and rela-
simple drawings to handle
blems that would be backbreakers
olve with rigid soundproofing
riers. The contractor, too, Jacob-
& Company of Elizabeth, New
ey, finds it a boom. Imagine what
hore it would be to get a tight,
undproof seal around the cluster of
m pipes shown here if the barrier
d to be rigid sheet.
And the ultimate question—what
it cost the owner?—has a happy
wer too. The simple design, the
table detail, and the ease with
ch workmen put it in place, all
savings. These factors actually
ng the installed cost below that of
d barrier materials and well be-
that of other flexible barriers.
What's lead doing in the library?
helping tomorrow's designers
n and perhaps today's designers.

Newark College of Engineering was
ded in 1881 and has an enroll-
of 7,000 students.

seams and wall joints are taped.

Cabinets such as these are designed to house high powered X-ray equipment used for inspection or critical war materials such as shells for Vietnam.

LEAD HELPS PASS THE AMMUNITION

As any G.I. knows, a "dud" shell is worse than none at all. It could even be disastrous. A flaw in the shell casing may cause a round to fall short or even explode in the gun.

Ordinarily, whether shell casings are inspected on a sample lot basis or individually, the inspection routine is costly and time consuming. Now it is possible to eliminate this inspection bottleneck. Lead lined industrial radiographic machines are available that can "see" material defects and flaws in the casings before they reach the soldier in the field.

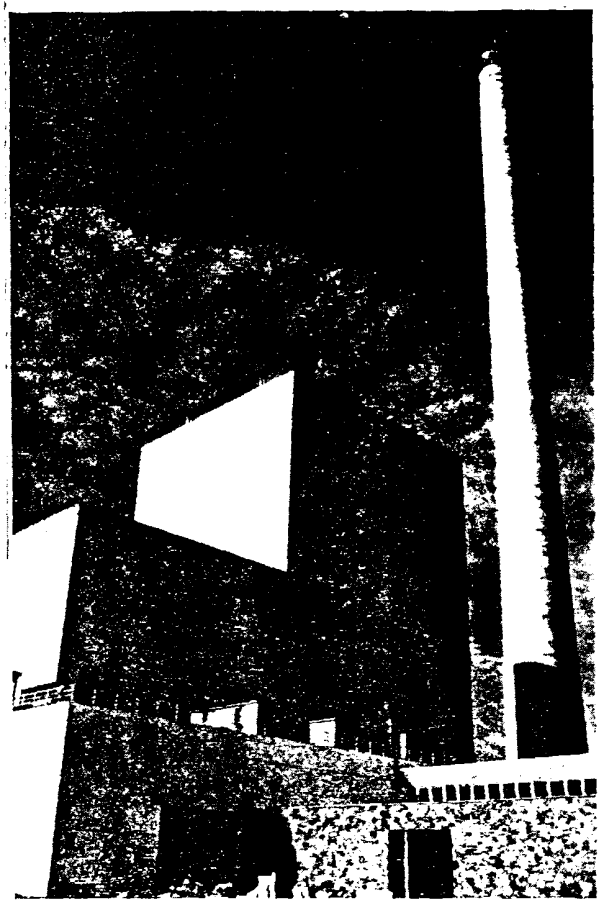
Both new casings and empties back from Vietnam are being checked this way. Typical radiographic cabinets such as this one, built by Allied Lead Construction Company of Chicago, are being used by major industrial suppliers and Government manufacturing facilities.

A highly important element in the use and construction of these radiographic cabinets is the lead lining. In this particular cabinet the shell is steel plate, and $\frac{3}{8}$-in. thick sheet lead has been adhesively bonded to it to provide positive radiation protection for operating personnel. Lead thicknesses required are, of course, dictated by the radiation source, and for high energy applications (2 or 3 million electron volts) as much as 2 in. or more of lead shielding may be needed.

Additional features offered on this type cabinet are an electrically powered elevator to raise or lower the X-ray machine to any given height above the work, and a ball bearing mounted truck, holding the X-ray equipment and allowing it to be rolled through the top doors for servicing. Air operated work doors and interior fluorescent lighting are also available.

A wide range of diverse products can be routinely inspected with this type of equipment, for example, shoes, areospace parts and golf balls.

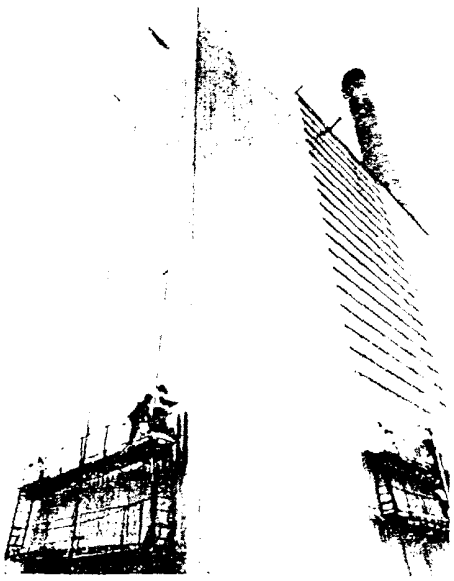
With the ever-increasing use of radio-active materials in medicine, laboratories, public utilities and industry in general, the use of such lead lined equipment is expected to grow at a rapid pace.



Handsomely finished with a porcelain-on-aluminum skin, this new LILCO power station when completed will supply enough electricity to light 700,000 Long Island homes.

at Northport, N. Y. . . .

LILCO PACKAGES POWER IN LEADED PORCELAIN



LOW MAINTENANCE leaded porcelain panels being erected at Northport, N.Y. Colorful glass coating will protect and beautify this generating station for years to come.

As a general rule, a power plant is not a thing of beauty. Often, since such plants are usually located in remote and isolated areas, there is no need for expensive landscaping or other concessions to beauty.

A striking exception to that rule is the new power generating complex of the Long Island Lighting Company (LILCO), at Northport, Long Island, New York.

It is a project that abounds in superlatives: it has the Island's biggest electric power generators and the Island's tallest structures—twin 600-ft. stacks—and it also represents the largest single investment and is the most beautiful generating station in the LILCO system.

Consisting of two separate units, one just completed and the other due onstream in 1968, it will be capable of producing 760,000 kilowatts. This will increase by 50% LILCO's generating capacity.

Because the station is adjacent to a residential area, LILCO has been particularly conscious of aesthetic considerations —both in landscaping and color selection. Beige, chocolate brown and yellow colored porcelain enameled aluminum was chosen to blend the buildings harmoniously with the bluffs in the background.

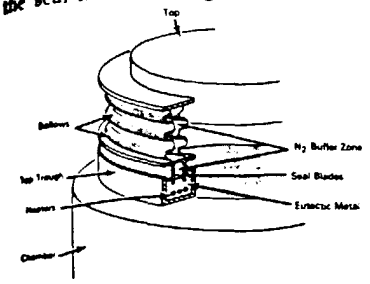
Leaded porcelain on aluminum was chosen to sheathe both units for several other reasons too, including durability and anticipated lower maintenance costs. Naturally, since these units are being built to meet Long Island's present and future power requirements, both durability of the color coating and lower maintenance costs became a major consideration in selection of the sheathing material.

Color reproductibility was another factor, of course. It so happens that different enameling contractors are doing each unit, however, a lasting color match with leaded porcelain will be no problem—as it might have been with either paint or anodized finishes.

Some 200,000 sq. ft. of leaded porcelain enameled aluminum will be required before both units of the power station are completed.

Interesting Odds 'N' Ends about Lead

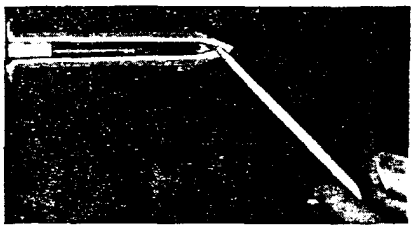
Now you seal it . . . now you don't. NASA had a problem a while back in sealing vacuum chambers. The head of the chamber had to be precisely positioned vertically and the seal had to be tight. Solution? A



bellows-driven cap with seal baffles immersed in a 45 lead—55 bismuth alloy. Electric heating wire in the alloy quickly change it from solid to liquid (at 255°F) and pressure in the bellows takes care of positioning. The whole rig is controlled remotely.

Talk about soldering guns . . . Western Electric has been assigned a patent on a device which shoots out a spray of molten solder with such force that it blasts its way through the oxide coating usually found on metal surfaces. The trick is the use of an ultrasonic 'projector' just below the surface of a molten solder bath.

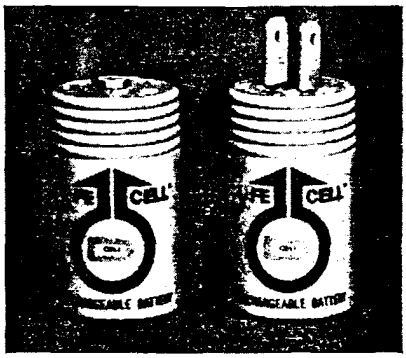
Mothers' Little Helper — lead bismuth alloys are employed inside a pop-up cooking timer that visually indicates when meat is cooked to its succulent best. When the breast meat in a turkey, for example, reaches the melting temperature of the alloy, the



meat is cooked. The alloy then releases a spring and up pops a red indicator signaling that the turkey is ready to be served. Called the Dun-Rite Timer, it has been tested and approved for use by the Department of Agriculture.

Solder plated wire . . . miles of it — uniformly. 100,000,000,000,000 miles of wire and not more than .0002" variance. Due to uniformity of plate (a new process developed by Sylvania Electric Products), they will guarantee up to 6 months shelf life on materials plated .0002" or better, depending on customers environmental conditions. Uniform plating thickness range available from .0002" up to .0005".

Lead-acid D cell . . . a self-contained rechargeable unit delivering a nominal 1.5 v. Power ratings: 950 ma for a 20-hour discharge rate; 450 ma for a 1-hour discharge rate. The manufacturer (Waldon Electronics, Inc., Chicago, Ill.) claims a cycle life of 150 to 200 recharges.



Cell is in two sections. To recharge, remove the top, reverse it and plug it back into the bottom section. This exposes a standard male a-c plug that fits a-c wall outlets. After recharging, the process is reversed.

CHANGE OF ADDRESS OR NEW READER

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- ☐ Ceramics
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