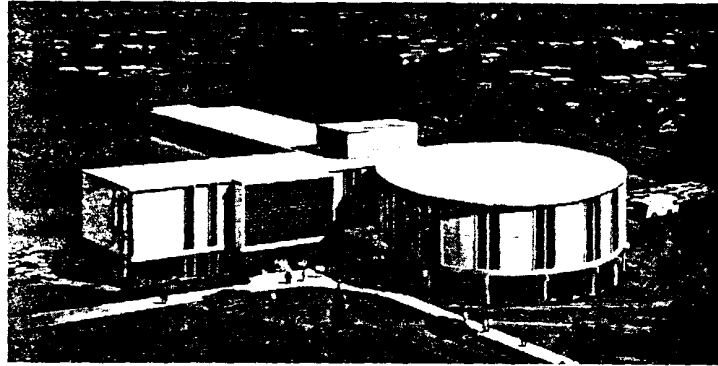




lead

LEAD INDUSTRIES ASSOCIATION, INC.

Aerial view of Doctor's Hospital.



Pb for Md

Modern hospitals are an accurate reflection of the great advances made in medicine and surgery, sanitary science, and in public health care. They occupy a place of vital importance to the community. The best hospitals are clean, airy, well planned, and are managed like business corporations. Probably a culmination in all these respects, and the only one of its kind in another, is the recently completed Doctor's Hospital in Tulsa, Oklahoma. Built for a nonprofit corporation on a ten acre site in a residential area of Tulsa, it is in the 100 bed class.

Since sanitary facilities are certainly of major importance in a hospital, it is significant that lead was used as a major component in the plumbing system. Each guest room has a shower bath adjacent. All 59 shower compartments have 4-lb. (1/16 inch thick) lead safe pans as waterproofing. Pans vary in size but all are made with 6 inch upstands. Top edges of folded, pig eared corners are lead burned (welded) to prevent capillary action of moisture between the folds damaging the structure.

All pans are protected with a brush coat of asphaltum against the corrosive attack of free lime in mortar beds laid inside them to receive finish tile. More than 5,300 pounds of sheet lead were used for the pans and for vent pipe flashings on the roofs. Such flashings are also of 4-lb. per square foot sheet lead. Base flashings vary in size but all have boot sleeves one foot high dressed down into the vent one inch.

4 lb. sheet lead shower pans.



Innumerable examples of flexible lead connections may be found throughout the project. To name a few:

- lead waste pipe on 70 lavatories and 10 drinking fountain fixtures.
- lead drum traps on 8 bath tubs equipped for hydro-therapy.
- lead waste pipe connections on all surgeons' washup sinks.
- lead connections on floor-set water closets and wall-hung urinals.

All lead bends and traps are "X.H." classification. Connections between lead pipe or between lead pipe and brass fittings are full solder wiped. Over 500 lb. of plumbers wiping solder was used in these installations.

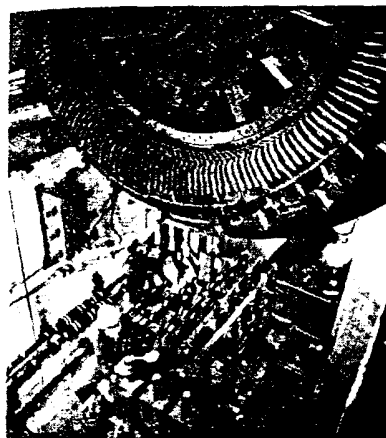
Joints in cast iron soil pipe are made with firmly packed oakum and filled with lead and calked tight. Seven tons of calking lead was needed for this part of the project.

Architects for the building were Hudgins, Thompson, Ball and Associates and the plumbing contract was handled by the Oller Heating Company, both of Tulsa and Oklahoma City.

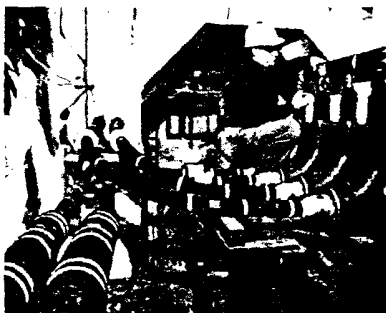
SURE-FIRE POWER FOR A STEEL MILL

... twenty years to be exact!

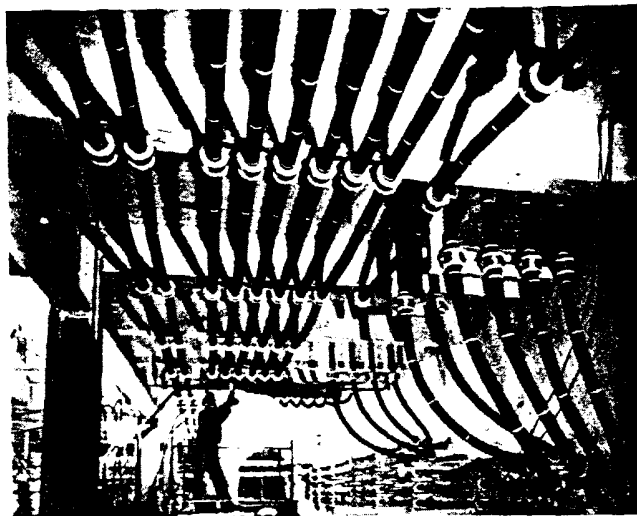
A cable termination beneath one of the mill's drive motors, partially visible at top. The four 15 kv cables being connected carry 13.8 kv power to the motors.



Four 15 kv cables being terminated beneath one of the motors of the new mill. Note the large potheads where each power cable is connected to its terminations.



Main feed lines that carry 13.8 kv power from the sub-stations to the motor switches of the cold reduction mill. The technician is wrapping fireproofing tape on one of the cables.



Lead sheathing has been providing maximum protection for underground electrical power cables at a mill of U.S. Steel Corporation for over 20 years.

During this service the lead sheathing has had to overcome some natural obstacles. For example, the ducts are normally below ground water level.

When recently faced with new major construction projects, U.S. Steel again turned to lead sheathed paper insulated power cable.

The recent installation of a six-stand cold reduction mill required that company engineers completely revamp the electrical power distribution system. Existing electrical power cables had to be replaced and rerouted around the construction site to keep other facilities in operation.

In addition, supplying power to the new mill meant the construction of new ducts and the laying of cables.

Over nine miles of lead-sheathed, paper-insulated cable were manufactured and supplied by the Wire Operations of U.S. Steel for the cold reduction mill job. Approximately 37,000 ft. of 3-conductor, 350 MCM, or 4/0 AWG compact sector cable was used to replace the existing lead-sheathed cables that had to be moved. These 8 kv rated cables carry 6,900 v

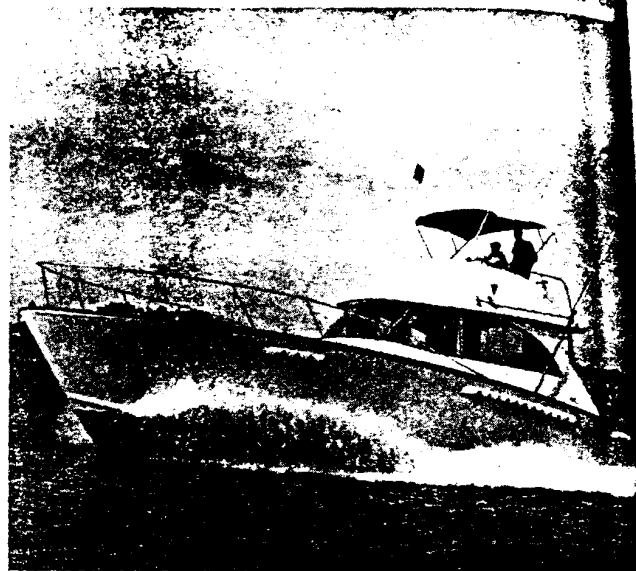
to other mill facilities.

Power at 13,800 v is carried to the new cold reduction mill by 12,000 ft. of 15 kv, 500 MCM, compact sector, lead-sheathed, paper-insulated cable. All of the 8 and 15 kv is run through underground ducts so that none of it is buried directly in the soil. The 8 kv cable is about 2.30 in. in diameter and the 15 kv is 2.81 in. It is estimated that a total of about 86 tons of lead are used on the cables.

The network of cables supplying power to the two 19,000 hp motors that drive the rolling mill is complex. Six cables carrying 13,800 v run from a primary transformer in a substation (that steps down power from 69 kv to 13.8 kv) to the switchgear for motor 1. The motor starting switchgear is about 1100 ft. from the transformer. Four 100 ft. cables connect the motor starting switchgear to the motor. Motor 2 is served the same way except that it is about 175 ft. from its switchgear.

To control stray ground current corrosion often found near high powered electric motors and power cables, U.S. Steel power engineers specified that all cables be neoprene jacketed. Possible fire damage to cables exposed in buildings is minimized by wrapping cables in these inside runs with arc proofing tape.

La Maria III underway. Despite its power diesels, conversation is



... And Quiet, Too

Sleek, fast, seaworthy... and quiet, too. Not many power boats live up to that list of specifications. The noise from a high powered V8 or lightweight marine diesel becomes more than a nuisance in most boats. *La-Maria III*, an elegant 46 foot twin diesel yacht, custom designed and built by John Holmes, Inc., of Osprey, Florida, is a remarkable exception because it is quiet as well as fast and sure footed.

Boats like this are unusually difficult to soundproof. Transmission of noise and vibration through the frames and planking is one reason. Noise from the exhaust is another. And, of course, a major problem exists when light weight decks and bulkheads are asked to stop sound which would be blocked by a masonry or plaster wall if the same power plants were used on dry land.

To minimize the structural transmission, the engines were mounted on stringers isolated with resilient material. To subdue the exhaust roar, the mufflers were equipped with resonant cavities. This left one major area for improvement — achieving tough, lightweight decking and bulkhead construction with real sound-stopping power.

Designer Don Carter of the Holmes

organization turned to Lead Industries for help and, working with data supplied by them, developed a structural system weighing less than 3 lb./sq. ft. which achieved 50 db (decibels) attenuation at 1000 cps. (cycles per second). And this performance was turned in by the finished job—as established by actual testing of the finished boat.

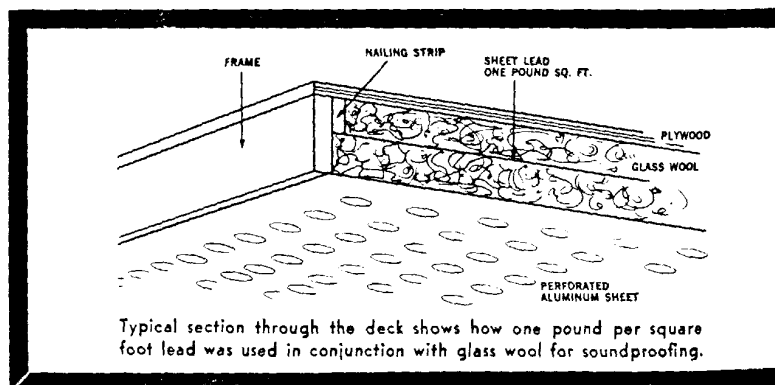
To achieve this performance, the designer settled on a double sandwich construction. A nailing strip was mounted along the inside of all frames and interframe members forming the deck surfaces over the engine room, as well as the forward bulkhead. Standard glass wool batting was compressed into these areas and lead sheet

weighing one pound per square foot was fastened in place over the nailing strips. A second layer of glass wool bat was then inserted, stapled in place with fiber screening, and a sheet of perforated aluminum with 25 per cent open area was fastened over the whole.

Lead Sandwich

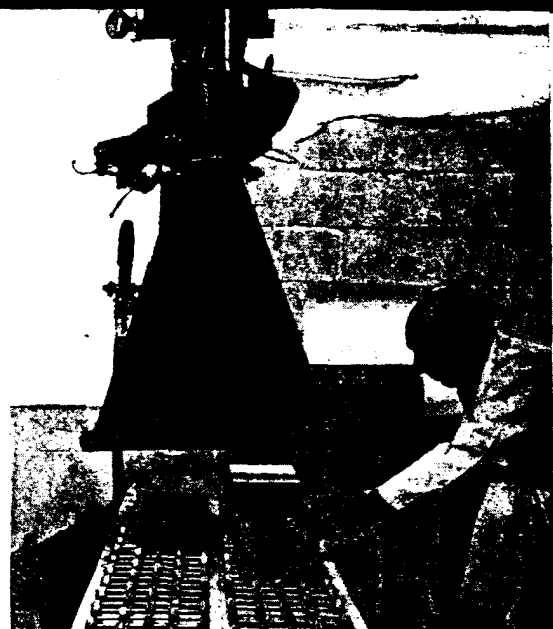
This sandwich plus the plywood structure forms the whole floor covering the engine room as well as the forward bulkhead. The after bulkhead faces the area under the cockpit. This gives it a low priority in noise reduction.

All openings were entirely closed.



Technician examines coated cinder blocks under the irradiation horn after treatment.

RADIATION CURED COATINGS



Paints and plastics can now be cured without solvents or heat with a new electron irradiator designed for production line use.

The irradiator, developed and manufactured by Radiation Dynamics, Inc., Westbury, N.Y., will treat coated materials—metals, plastics, wood, paper, textiles or ceramics. The result; it is possible to dispense with ordinary solvent and solids systems and to use resin monomers directly, polymerizing them *in situ* by radiation. That means lower cost starting materials and denser coatings.

Besides reducing coating cure times to less than one second, radiation eliminates heating, thus eliminating expenses for gas, electricity, oil or heat lamps, not to mention elimination of possible heat damage. Conventional curing ovens often take 48 hours to reach operating temperature.

The irradiation process also makes

entirely new coatings possible. Examples are "structured and patterned coatings in a whip cream-like consistency, and coatings with thick embossed surfaces that are highly decorative and provide amazingly increased strength to the substrate materials," says Dr. K. H. Morganstern, president of Radiation Dynamics, Inc.

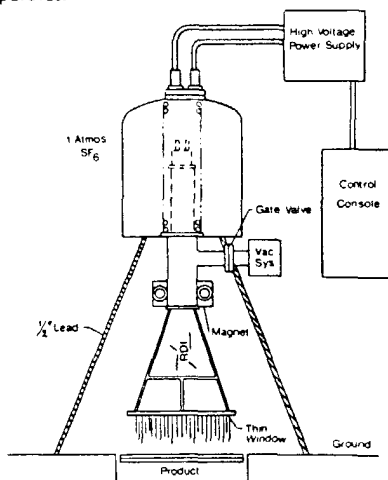
Heart of the new process is a small, relatively inexpensive particle accelerator of 300 kv, 25 ma. to 50 ma. beam strength, named the Dynacote. Power is drawn from a 220 v, single phase 60 Hz line.

Operation of the accelerator is quite simple in principle. High voltage, brought to the head energizes a thoriated tungsten filament which emits a stream of electrons. The beam is focused, accelerated to 300 kv and magnetically deflected (similar to beam deflection in TV picture tubes) and brought out through a thin titanium window at the bottom of the fan-shape scan horn. The work to be irradiated is conveyed directly under the horn.

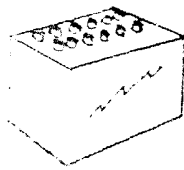
Shielding for the Dynacote is simple. Since the beam consists of 300 kv electrons it is necessary to shield against the Brems-strahlung or X-rays produced when the electrons are stopped by the work or other material.

RDI engineers determined that if shielding is localized around the irradiation area (feasible with a unit as compact as this) lead is the most practical shield material at the 300 kv level. One half inch thick sheet lead does the job (see diagram for typical installation).

Essential parts of the irradiation curing apparatus.



Maplehurst Dairy's Raymond Lamoureux makes first stop of the day with battery powered delivery truck.



Electric By George

London's snow and winter weather does not deter this battery powered milk truck from its regular rounds.



Once upon a time, just three or four decades ago, hundreds of electric trucks glided silently over the streets of American towns and cities delivering milk, baked goods, laundry and the like.

George Raymond believes it could happen again!

In fact, Maplehurst Dairy, which George and his family operate in Lincoln, Rhode Island, are so confident that it WILL happen that they bought a battery powered van over two years ago and incorporated it into their fleet of 22 trucks. They have

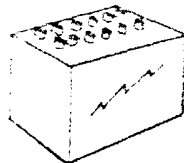
operation the truck has been in for repairs just 5 times... that is less than average for his fleet!

Oh, yes! There is snow and Lincoln in the winter time; but the battery powered delivery truck goes right on, covering the same territory as in summer, hills and all. The added bonus is a small comfort for the driver's compartment, and traction chains when needed.

We asked George about costs and he said that their records show the truck operating and maintenance totaling just 16 1/2 cents per mile. He is sure that this is substantially less than for the rest of the fleet, although there are so many variables to be considered in the other trucks that he hasn't been able to make an exact comparison. While we were discussing this, brother Leo, the controller, came out with a short adding machine containing just five sets of dials which totalled up to \$86.69. "That," said Leo, "is our entire outlay in maintenance parts on the electric since we have owned it!"

What are the disadvantages? George asked. They are few, according to George. "We would like," he said, "a little better speed, perhaps up to 25 mph now available. The truck would then be better able to compete in high-speed traffic. Of course, we just avoid that kind of traffic now, so we get along alright. Also, the Raymonds look forward to the new electronic controls now coming available and a few minor improvements in the braking system, but they feel that their experience will make a contribution to the developments and hurry them along. Our George doesn't know him, but there is another one in another

Roger Martin of Maplehurst Dairy shows ease with which battery vehicle is "refueled." Just 6 hours on charger puts vehicle in 'go' condition.



In London, an articulated vehicle, battery powered, carries 110 cases of pints, travels up to 32 miles per day on one charge. Express Dairy uses these for delivery to customers as well as to distribution points.



not been sorry. As George put it, the only thing he regrets is that these trucks are not yet available in quantity in this country, though he is sure they will be soon.

The electric at Maplehurst was assigned a regular route over the varied terrain in the Lincoln area: some flat, some quite hilly. A few of the grades are severe. The distance it travels is about 26 miles per day, 6 days per week, with 222 daily stops and starts. The time required from loading dock out and return is 8 1/2 hours; George says that in more than 2 years of

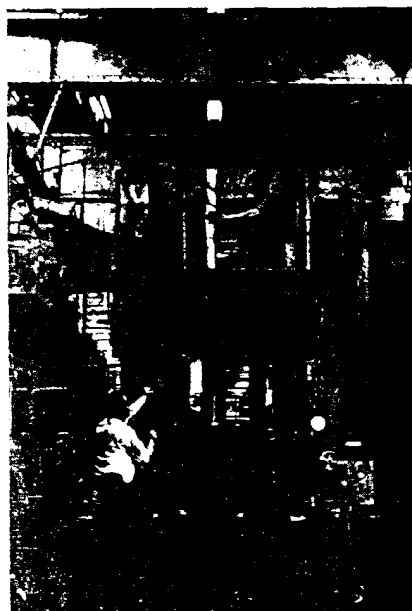
to trucks,
Free!

in country that operates more than 3,000 battery powered dairy trucks every day! George Pearson, Director of Retail Transport, Express Dairy Company, Ltd., London, England, waxes enthusiastic about his fleet of electrics at the slightest opportunity. In fact, he is considered an international expert on the subject, and it's easy to see why after a few minutes in his office. There you will see an elaborate wall chart showing each vehicle by type and number, area assigned, length of route, number of customers, driver, service record, and all pertinent facts pertaining to the fleet.

Significantly, as the size of the fleet increased over the past nine years the costs of delivery decreased, on a unit basis. The major reasons for this are the pioneering that George Pearson has done in modifying the design of the vehicles (most of which he improved, complemented in his own machine shop), and the system of routing he uses—one facet of which is to insure that no more than three miles is wasted in getting to the first stop, and back from the last stop. His shortest route is three miles out and three miles back (a man walks this one, guiding a battery powered delivery cart); his longest—51 miles and has 380 stops.

Incidentally, the other two major dairies in the London Metro area use battery powered vehicles, too, bringing the total population of such trucks to more than 13,000. Lead-acid batteries are used exclusively.

We don't know whether these two Georges will ever meet, but they have one thing in common: enthusiasm for a better way to serve their customers. And we suspect that the Maplehurst fleet, while it may not approach the size of the Express Dairy, will one day be as thoroughly saturated with electrics!



Old method of cutting sleeves required hand sawing by man atop press. Press operator had to receive sleeve lowered by rope.

Flying Saw Cuts Cable Sleeves

New automatic cutting and handling equipment has eliminated heavy manual labor in the production of lead cable sleeves at the plant of Northern Electric Company, Ltd. Lachine, Quebec.

Northern Electric's lead sleeves are used in the field to encase the splices in lead sheathed paper insulated cables.

The sleeves are extruded vertically in a ram type lead press. Extrusion is continuous; the press is stopped only for recharging.

In the past, the sleeves were cut manually. A workman on the top of the press cut the emerging lead pipe with a handsaw. In that fashion 80-in. lengths were cut as they came from the press. Then they were lowered to the floor on a rope. There the press operation bundled these stock sections together and they were taken to a power saw, trimmed, cut to length and individually packed into hard cardboard shipping tubes.

New method automates entire cutting operation on the press top and mechanically delivers sleeve to shop floor. Here shipping tube is fitted onto finished sleeve.



Northern Electric's engineers successfully automated the process using three synchronized and interdependent patented units: a flying saw, a transfer mechanism and an elevator.

To begin the automatic cycle, the press operator sets the desired length on the controls then air-actuated clamps grip the sleeve after it has reached that length. The saw is forced to travel at the same speed as the sleeve.

After cutting, the saw drops, and the sleeve is given to the transfer mechanism. When the saw retracts, the sleeve moves away from the press and ejects into the elevator conveyor.

The sleeve descends from the ram top to the floor (about 12 ft.) and stops at the press operator's work position. He then slides the sleeve into a cardboard shipping tube and stacks it onto a shipping pallet thus completing the cutting and packaging in one continuous step.

New home of the Newark Star-Ledger—one of the most modern newspaper plants in the nation.



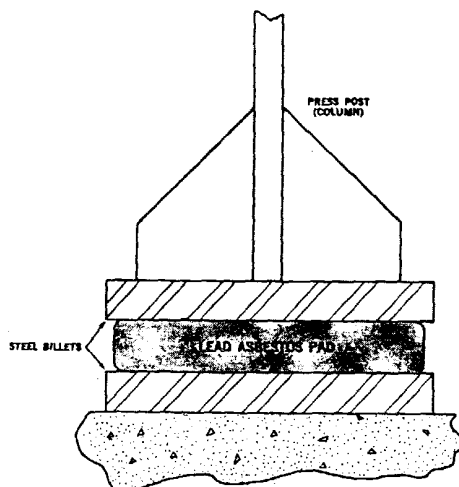
THE STORY BEHIND THE HEADLINE

how lead-asbestos pads quiet giant newspa

The daily newspaper we all take for granted is the product of a remarkable manufacturing process. Consider that hundreds of thousands of copies are distributed to newsstands and carriers within an hour or so of a late-breaking story. Reporters win Pulitzer prizes, but the press room crew and the machinery behind the production of the paper deserve some plaudits, too.

Modern newspaper presses like those in the new home of the Newark Star-Ledger in Newark, N.J. can pour out a stream of 1,000 copies of a 56-page edition every minute. The sheer

Section through the foot of a typical press post.



Pads are visible on the floor with more being installed for the 44 press posts of the Newark Star-Ledger's new press room.

physical power of the equipment to imprint, collate and trim such a mountain of paper is awesome.

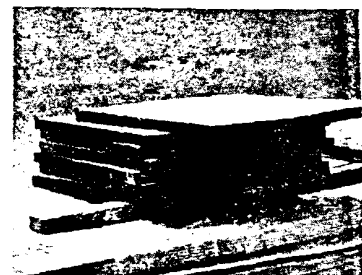
But in operation such a press would thunder out more than news were it not for the careful work of the engineers who design the foundation and structure of the machinery. William Ginsberg Associates of New York City, designers of the Newark Star-Ledger's facility has been making a science of this work since 1930 when

they did the old World-Telegram room.

Lead-asbestos anti-vibration pads were one of the tools used by William Ginsberg Associates in the New York job. "There's no one secret ingredient or magic formula in doing a good job of quieting a press," they say. "Lead-asbestos pads are not the whole answer but they can do a good job. They represent so little expense that we never leave them out unless we have to." They explained that in cases presses have to be squeezed into such tight quarters that there isn't an inch to spare.

An inch, or more exactly an inch and a quarter, is the space taken by the pad. It fits between two steel billet plates as shown in the drawing. Forty-four of these support the press posts of the Newark equipment. They are each about 24 inches and bear about 150 psi. A steel plate beneath the lead pad all the rough work of driving shims

Lead-asbestos pads.



A SCULPTED ROOF

Nazareth College Arts Center



FOR THE ARTS CENTER

Construction put in place of more than 450 million dollars in 1965 makes Giffels and Rossetti of Detroit the largest architect-engineer firm in the United States. Does such enormous size cause a lack of attention to those details which make up successful architecture? Not so with Giffels and Rossetti. The United States Department of Health, Education and Welfare just recently bestowed an honor award for an Arts Center done by this firm in Rochester, New York. The award competition was jointly sponsored by the A.I.A. and an affiliate of the Ford Foundation: the Educational Facilities Laboratories, Inc.

The Arts Center is for Nazareth College, a suburban liberal arts college of about 1,200 students. Three related units comprise the group—an art wing, a music section and an auditorium. The auditorium dominates the ensemble. Its distinguishing characteristic is the bold, sculptural sweep

of its roof lines.

The roof here, as in all three buildings, is standing seam terne metal. Mr. Gino Rossetti, its designer, says he selected this roof material for visual effect. Its lightness created fewer problems when used on extreme slopes and short radius curves. Its paintability allowed him to make the roof a part of the color scheme. A further bonus, of course, is the fact the choice of white for more than a third of the total roof surface (thereby reflecting heat) will return significant savings in air conditioning costs.

A total of about 45,000 square feet of terne roofing was used. Flat seams were utilized on tight curves and standing seams on 30 inch centers elsewhere. Substrate was $\frac{5}{8}$ inch exterior grade plywood on furring strips. Rosin sized paper was the immediate underlayment for the terne. General Contractor for the work was John Luther and Sons of Rochester, N. Y.

presses



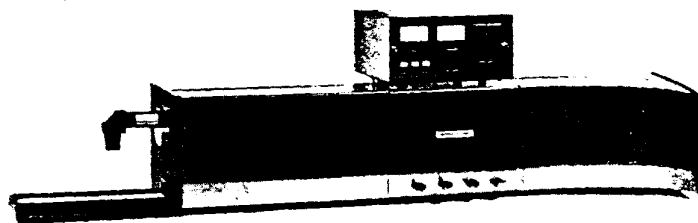
View of press room after presses were installed.

leveling) to be done without injury to the pads.

In addition, the second deck—where the pressmen work—is supported by smaller pads $\frac{1}{2}$ inch thick. There may be as many as 150 in a typical installation of this size.

The power and inertia of these big presses is such that William Ginsberg Associates always recommend that their foundation be separate from that of the building. One important function of the pads is evident in the case where both of these foundations go down to the same bedrock. In this case, the pads are the sole effective break in the vibration path.

Powerful metalworking tool, Model 6200 Molecular Laser by Perkin-Elmer. It produces 40 watts of continuous coherent infrared light for accurate soldering.



COOL

Soldering Developments

It doesn't take much heat to make a lead-alloy solder joint. Nearly any heat source will do. But when it comes to soldering tiny electronic leads (some no larger than a human hair), what do you use?

The ordinary torch or soldering iron is just too big—the equivalent of using a blowtorch to light a birthday candle. Of course, literally billions of tiny solder joints are made each year—both by hand and with elaborate machinery (see recent issues of LEAD). In every case the object is to bring the solder to its melting point as rapidly as possible with minimum heat loss to surrounding components.

One device that could fulfill these requirements admirably is a machine recently introduced by Perkin-Elmer Corp., Norwalk, Conn. Called the Model 6200, it is a continuous wave

gas laser. It has a minimum 40 watt output. Continuous output may be maintained at a minimum 40 watt level; however, the operator can select an intermittent energy level from a few milliwatts on up. Present output energy is many times that previously available—the equivalent of four million watts per square centimeter. Enormous energy such as this can be very closely controlled in a laser and accounts for its great potential in soldering, cutting, fusing, and other heating applications.

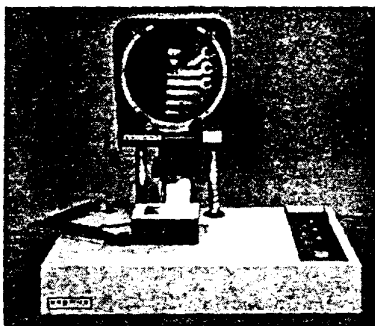
The Model 6200 laser's high-energy light beam is very narrow, thus extremely small areas can be soldered easily. With an additional lens the beam at the workpiece may be focused to a diameter of 1 mm—and mirror attachments may be used to bend the light around corners for joining in

otherwise inaccessible areas.

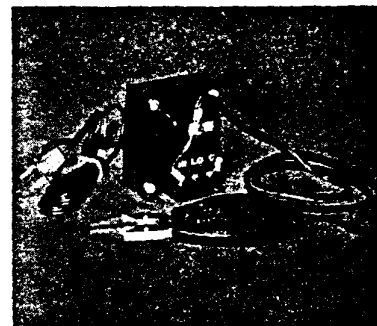
Wavelength of the Model 6200 laser's beam is 10.6 microns—in the infrared area of the light spectrum. "Of course this is a very useful area of the spectrum," notes Douglas Worth, Laser Product Sales Manager at Perkin-Elmer, "and due to an 'atmospheric window' at this wavelength the laser's power is not notably attenuated when transmitted through air."

The laser, including its self-contained power supply, measures 12" high by 12" wide by 60" long and weighs 175 lb. It operates on 115 Volts ac, 60 hz (cps). For safety and operator convenience, Perkin-Elmer's Model 6200 folds the beam down onto an asbestos sample platform which can be equipped with a micropositioner accessory that permits accurate placement for fine work.

Full Color Viewing—Controlled resistance heating provides accurate selection and repeatability of soldering temperature with this Brown Model 1900 Production Microsoldering System. Produced by Brown Engineering Co., Santa Barbara, Calif., the unit requires little training for operation, and after initial programming, all operations are automatically controlled.



Finger Grip Control—Instant finger grip heat control is a feature of this new resistance soldering tool by Triton Manufacturing Co., East Haddam, Conn. Choice of low heat output transformers permits application of accurate heat dosage without damaging delicate parts or assemblies.



Interesting Odds 'N' Ends about Lead

Mini Skirt on a Mini Bike! The Winn City Battery Bike, a British innovation, is somewhat smaller than the conventional motor bike, but is intended for the short errand trip, or for commuting, and will fit in tight traffic and parking conditions. Inventor Russell Winn claims a top speed of 30 mph and a range of 25



miles before needing a recharge of the 12 volt lead-acid battery. Recently, Mr. Winn has been in the U.S. seeking market outlets, so you may see these on our streets soon.

Old dog/new tricks. Most any freshman chemical text written before World War I has a picture and a description of making pyrophoric lead—lead powder so fine that it spontaneously bursts into a shower of sparks when tossed in the air. A report published in the *New Scientist* (London) now points out that the stunt has been dusted off and is being used in purifying gases by removing oxygen traces from them. It seems the lead is faster and easier to handle than other materials used until recently.

A lead telluride power source operating as a man-packed radar or microphone relay is being developed for the Air Force. The unit will be a 100-w, 28-v source with a life of over 1000 hr. and yet will be a 12-in. cube weighing about 20 lb. sans fuel and fuel tank. It will be a direct conversion device in which heat from burning butane, propane or other liquid hydrocarbon will be applied to a thermocouple junction to produce electricity. Advantages: silent operation, easy startup, foolproof manual control and no rotating parts.

Lead sheathed cables don't have to have conductors to be useful! Shown here is one end of a tube made by Suddeutsche Kabelwerke (Germany) using conventional cable



techniques and equipment. The tube has all the advantages of a lead sheath—it is flexible and can be produced in long, joint-free lengths—and has been incorporated in gas distribution systems where a rigid pipe would be difficult to lay, for example across rivers. The impermeable lead keeps the gas in and the water out.

The tube is 4 mm. thick with an internal diameter of 75 mm. It is made from a 0.04% tellurium-lead alloy and the various protective layers include galvanized steel strips and jute.

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Four page reprint summarizes new industrial uses for terne, a lead coated steel.

Modern chemical construction

Method of lining lead tanks

Use epoxies to line tanks with lead
Cleaning "hot" parts ultrasonically
Piezoelectric transducers
Importance of lead in glass
New electroceramic data
Lead sheathing for power cable
Materials of construction review
Corrosion data—lead & alloys
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Radiation protection
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FINISHES

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