

LEAD and/or ZINC
ARE IMPORTANT
ELEMENTS IN

Adhesive Tape
Aircraft
Ammunition
Appliances
Automobiles
Bearings
Bolts
Brass
Buses
Business Machines
Cable Sheathing
Canning
Cartridges
Cathodic Protection
Ceramics
Chains
Chemical Storage
Collapsible Tubes
Condensers
Cosmetics
Dental Cement
Die Castings
Dies
Dry Cell Batteries
Dyes
Dynamite
Electrical Fittings
Electroplating
Engravers' Plates
Fencing
Fertilizers
Flashing
Food
Forgings
Galvanized Steel
Gaskets
Gasolines
Glass
Glazes
Glue
Golf Balls
Gutters
Insulation
Jar Tops
Lighting Fixtures
Linoleum
Medicines
CONTINUED
ON BACK COVER

1964
ANNUAL
REPORT

St. Joseph Lead Company

Producers
of
Lead and Zinc
Essential
Elements
in American
Life

SEE CENTER GATEFOLD

Lead and Zinc

Essential Elements in American Life



Lead roofs on Istanbul's St. Sophia date from the 17th century.



Roman coin of orichalcum, a zinc alloy, minted about 40 B.C.



Lead ingots being poured at St. Joe's smelter in Herculaneum, Mo. The Company is the largest miner of lead in the country.



St. Joe's zinc smelter at Josephtown, Pa. is the largest in the United States. Drawing shows zinc slabs being cast there.

Although lead and zinc have been important to man since prehistoric times, they are more valuable today than ever before. Industrial designers and engineers are specifying these metals, their alloys, and their compounds for an extremely wide range of important jobs because they perform them better than any other materials. As a result, lead and zinc have become woven into the very fabric of American life — often, however, in ways which may be unfamiliar to the average investor.

Since St. Joe is an important producer of both metals, we felt that our stockholders would be interested in a brief survey of what lead and zinc mean to American industry. The uses described in this gatefold are only a few among thousands which make this country the world's largest consumer of the two metals. Present indications are that the uses of lead and zinc will be enlarged and extended, and that these elements will prove even more vital in tomorrow's civilization than they are in today's.

LEAD

Why Lead is a Valuable Metal

Lead has great weight in small volume, density, impermeability, comparative softness which makes it easy to work, high resistance to corrosion, virtual indestructibility. The chemical properties of lead are also of great importance. Although chemically stable itself, lead forms hundreds of alloys and compounds which can be tailored to fit the requirements of manufacturing processes. They account in great part for the present widespread use of lead, and for its future promise.

STORAGE BATTERIES 36%

Storage batteries — the most dependable devices by which electric energy can be produced and stored for future use — are more than 90 percent lead. The battery plates are made of a lead-based alloy onto which is pasted an electrolytically-active mixture of lead oxide and other forms of lead.

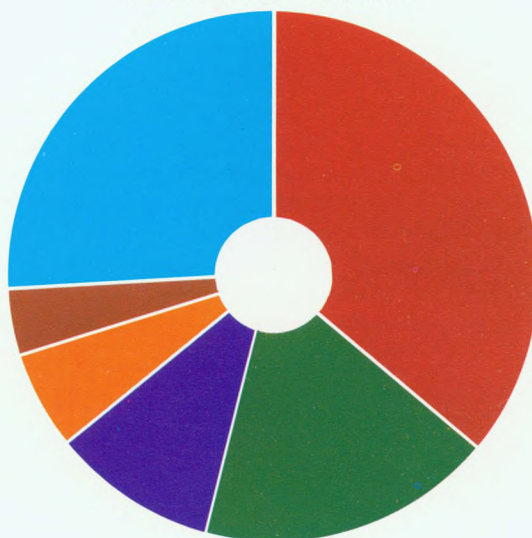
CONSTRUCTION 10%

The wide use of lead in construction stems from its corrosion resistance, comparative flexibility and softness, and low melting point. Engineers are constantly finding new solutions to their building problems by adapting lead and its alloys to meet the requirements of the job at hand.

PAINT COMPOUNDS 4%

Lead in paint becomes an integral part of the painted surface. It produces a tough, flexible film which offers high resistance to weathering. Many lead-based paints are rust inhibitive, and are therefore widely used for exposed steel surfaces. Lead-based paints also provide a good surface for repainting.

USES OF LEAD IN 1964*



ANTI-KNOCK ADDITIVES 18%

The addition of lead alkyls to gasoline is the most economical method for boosting power and performance. The best-known of these anti-knock additives is Tetraethyl Lead, often called TEL. Ninety-eight percent of all automobile gasoline contains lead — from 2 to 2½ grams to every gallon.

SOLDER 6%

Lead solder, in the double role of joining metals and filling and smoothing metal surfaces, takes an increasing amount of lead, year after year. Easily melted, it hardens quickly, makes a firm, stable joint or surface. The form of solder and method of use are capable of many variations, depending on the job to be done.

OTHER 26%

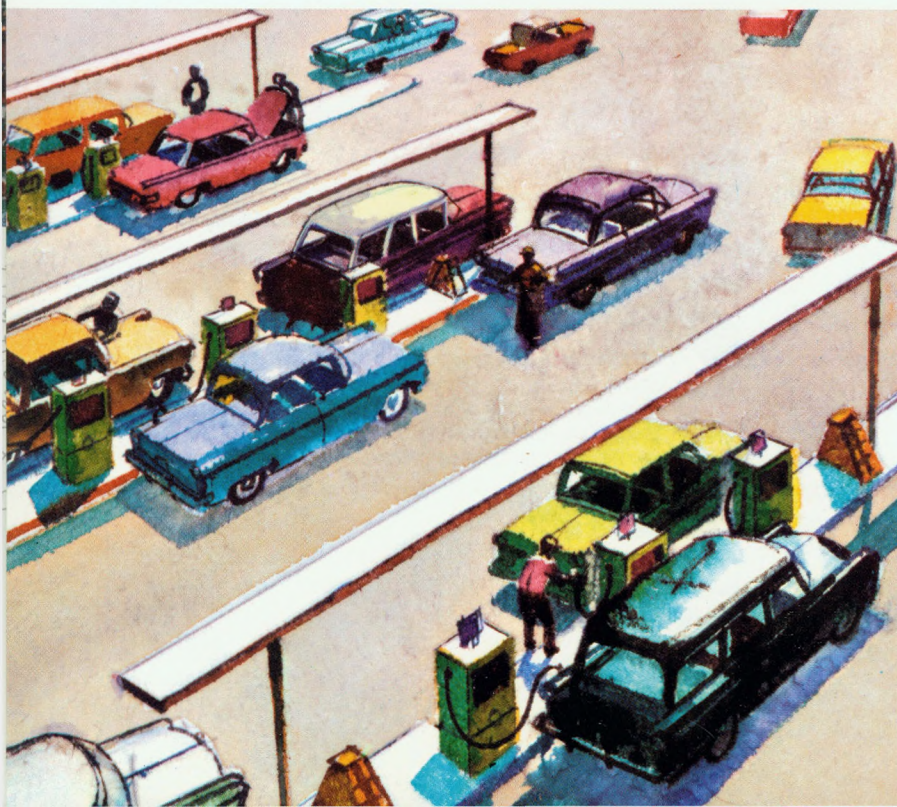
In this category are many uses: ammunition, cable sheathing, weights, ballast, type metal. There is a growing trend to explore and utilize lead's many other properties, notably in coated metal for roofs, in bearing metals, collapsible tubes, and sonar equipment.

*Estimated from U.S. Bureau of Mines Statistics

LEAD

Storage Batteries

The largest use of lead is in storage batteries, vital to transportation, communication, electric utilities and virtually every other American industry. Lead storage batteries furnish power for starters, ignition, lights, radios, and other accessories in cars, trucks and buses. They provide emergency power for hospitals, theatres, stores, and many other installations. They are in almost everything that moves — aircraft, ships, boats, farm machinery, construction equipment, and materials-handling trucks. In 1964 alone, 39,000,000 automotive batteries were manufactured in America. Our 82,000,000 motor vehicles, with their number growing yearly, are a huge market for replacement batteries.



Gasoline

The second largest use of lead is as the active component of anti-knock additives — lead alkyls — which markedly improve the performance of automotive and aviation gasolines. These high octane gasolines make possible the smooth, powerful performance of high compression automobile engines. Today, virtually all automotive gasolines contain lead. The magnitude of this use can be understood from the fact that automotive traffic in the United States moved about 800 billion miles in 1964, and that it is increasing at a rate of $2\frac{1}{2}$ percent or 20 billion miles per year.

ESSENTIAL ELEMENTS

LEAD

Construction



Today's building boom has brought this use of lead to a new high. Lead serves a multitude of uses in plumbing. Other large and growing uses are for roofing, waterproofing, calking to fill joints, sound attenuation, and insulation against vibration caused by highways and railways.

Paints



Red lead (above) is the world's standard primer for iron and steel, and lead-based silico-chromate paints give excellent protection for metal surfaces. Other well-known lead paints are the brilliant yellow used for traffic markings, and white lead, renowned for water resistance out of doors.

Solder



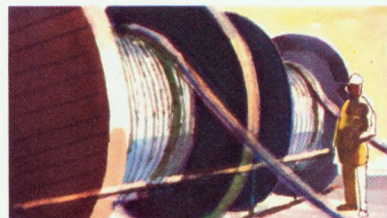
Three industries are the chief users of lead solder: automotive, electronics, and canning. Lead solder is easy to work, makes a strong, serviceable joint, and is adaptable to almost any set of conditions. As a filler for automobile bodies, it produces a smooth, even surface for painting.

Ammunition



Peacetime uses of ammunition are growing because of the great public interest in the sport of shooting. Hunters account for a large amount of ammunition, and public shooting clubs, lighted for night use, and offering skeet, trap and rifle shooting, are increasingly popular everywhere.

Cable Sheathing



As a protector of power and communications lines, either alone or in combination with other materials, lead has no equal. Lead used for this purpose is virtually indestructible underground and underwater. In many circumstances there is no acceptable substitute for lead.

Type Metal



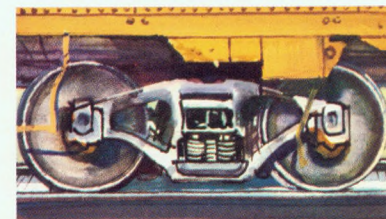
The traditional type metal is an alloy of which lead is the chief component, with antimony, tin, and sometimes copper. Its low melting point makes it easy to use in typesetting machines, and it produces an exceptionally true impression of the mold, which results in clear, clean printing.

Glass and Ceramics



For centuries, the presence of lead in glass, porcelain enamel, and in the glaze of ceramics has been a measure of their quality. Lead adds brilliance and clarity. It gives resonance to crystal and adds the properties needed for making durable, color-true enamels and glazes.

Railroad Bearings



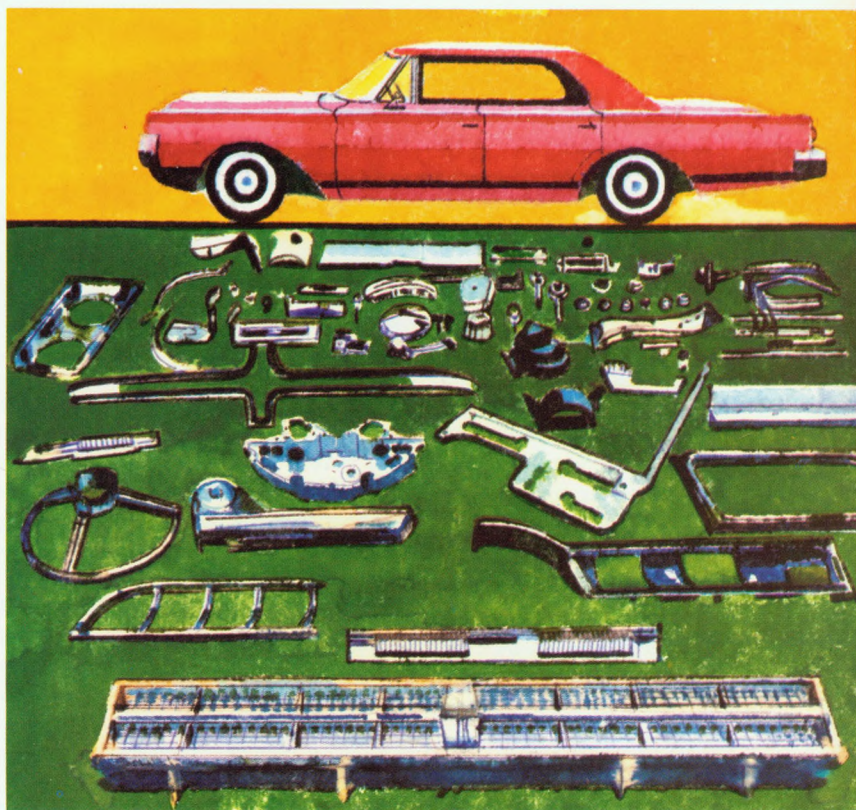
Lead has natural qualities of lubrication and resistance to wear which recommend its use in wheel bearings. In addition to railroad car journal bearings above, lead bearings have important automotive applications. They are also used in diesel engines, steel mills and all kinds of electric motors.

IN AMERICAN LIFE

ZINC

Die Castings

Die castings of zinc are precise, rugged and corrosion-resistant. They can be made fast, inexpensively and in volume, in a wide range of sizes, and in shapes of almost any complexity. They are easily machined, readily plated with chrome and other finishes. For all these reasons, the use of die castings, especially in the automobile industry, has more than doubled during the past twenty years. The 1965 model passenger automobile contains about 90 pounds of zinc die castings. The largest casting made to date is an instrument panel in a single piece. Zinc die castings are also essential components of tractors, vacuum cleaners, power mowers, office equipment, and almost every conceivable machine and appliance.



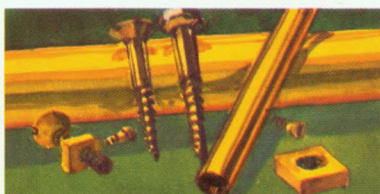
Galvanizing

Every year, millions of tons of steel and other metals are protected against rust and corrosion by galvanizing — coating them with a thin layer of zinc which continues its protection even if broken or pierced. Galvanized products take many forms, for many uses: sheets for roofing and siding of industrial and farm buildings, for air conditioning and ventilating ducts, for culverts and highway guard rails; galvanized steel wire for farm fences, bridges, telephone and telegraph cables. Two growing uses for galvanized steel are structural beams and automobile bodies. In fact, any steel product which requires effective, inexpensive protection against corrosion is likely to be galvanized with a zinc coating.



ZINC

Brass



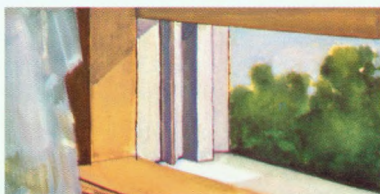
The alloy of zinc with copper results in a metal of great strength and hardness and superior corrosion resistance. Its use is growing and we see it in thousands of forms, from and-irons to marine hardware, from screws to powder compacts, from water pipes to musical instruments.

Dry Cell Batteries



Rolled zinc finds its greatest use in dry cell batteries where it serves both as the container and as an active chemical element of the power cell. It is also used for radio and television condensers and tube shields, and for engravers' plates in both letterpress and offset printing.

Weather Stripping



When exposed to weather, zinc forms its own protective coating and therefore makes an excellent material for weather stripping. Other outdoor uses of zinc are leaders, down-spouts, gutters, terrazzo stripping, and termite shields. Zinc will not stain painted walls and can be set in concrete.

Cathodic Protection



Through electro-chemical reaction, iron, steel, and other metals are protected by zinc against corrosion. Under earth or water, zinc bars or "anodes" need only be connected or attached to the other metal, as is the zinc collar to the propeller shaft in the drawing.

ZINC OXIDE

Automobile Tires



More than half the zinc oxide used in America goes into rubber. It is essential in the manufacture of both natural and synthetic rubber. Also, by protecting white-wall tires and other white rubber products from the rays of the sun, zinc oxide keeps them white, prevents cracking, and helps insure long life.

Paints



The second largest use of zinc oxide is as an additive in paints, to help them retain their original color. Zinc oxide has good hiding power and helps protect paint against mildew, and the eroding effects of wind and weather. Most paints intended for exterior use contain zinc oxide.

Bathroom Ceramics



Zinc oxide is an important ingredient in the glaze of bathroom ceramics. It also assists in the proper working-out of ceramics manufacture. In opaque glass, zinc oxide serves as the principal pigment agent. In still another related use, it controls the colors in ruby and opal glass.

Medicines



Zinc oxide has soothing and healing qualities which account for its use in ointments and lotions. It is an ingredient of insulin. It is also used in dandruff shampoo and in medicinal powders, because it resists fungus. Adhesive tape owes its sticking power to the action of zinc oxide.

ZINC

Why Zinc is a Valuable Metal

Zinc combines three very desirable qualities: comparatively light weight, hardness and durability, and a low melting point. Zinc is also highly resistant to corrosion and is able to impart this resistance to iron and other vulnerable metals. It combines with other elements, notably copper, to produce a wide variety of useful alloys.

DIE CASTINGS 42%

Zinc is used for making die castings because it molds quickly and easily into simple or complex shapes, requires relatively inexpensive tools, and accepts many finishes, notably chrome-plating.

BRASS 12%

Brass is an alloy of zinc and copper. Its properties can be changed by varying the proportions. Brass can be beaten, drawn into wires, tooled and die-cast. It is among the most corrosion-resistant of all metals.

OTHER 4%

About three-quarters of this category is pure zinc from which a special high-grade zinc oxide and zinc metal pigments are made. Zinc oxide, as an independent product, is also important to American industry.

ZINC OXIDE

Why Zinc Oxide is a Valuable Compound

Zinc oxide is a fluffy white powder made up of extremely fine particles. It has hundreds of industrial uses as a pigment and a chemical and is important in a wide variety of manufacturing processes.

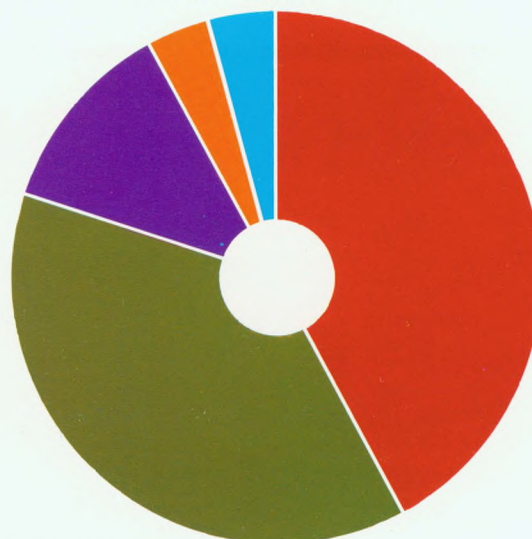
RUBBER 55%

Zinc oxide is indispensable in vulcanizing rubber. It adds strength, dissipates heat, and extends service life.

CERAMICS 6%

As an important ingredient of ceramic glazes, zinc oxide's function is to assist in successful firing.

USES OF ZINC IN 1964*



GALVANIZING 38%

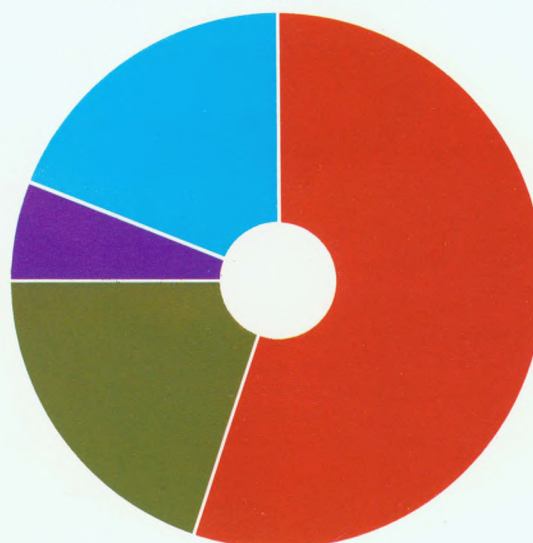
Thin zinc coatings protect steel against corrosion, and thus preserve its strength, serving as an effective shield which continues to protect, through electro-chemical action, even if it is broken.

ROLLED ZINC 4%

Zinc is ductile and malleable and is, therefore, easily worked into a wide variety of shapes and forms ranging from sheet to ribbon to wire. Its inherent resistance to corrosion is valuable indoors or out.

*Estimated from U.S. Bureau of Mines Statistics

USES OF ZINC OXIDE IN 1964*



PAINTS 20%

Durability, lasting color, resistance to mildew and erosion are qualities which zinc oxide brings to paint.

OTHER 19%

Other valuable uses of zinc oxide are in ointments, medicines, fine chemicals, plant foods, soil builders.

*Estimated

Important Elements in America's Future

On the preceding pages, we have shown why lead, zinc and zinc oxide are valuable materials and are used for many important jobs in American industry. For the future, St. Joe is actively seeking new and better uses for its products through continuing programs of research and development to expand present uses, as well as to create new markets for these products. This work is being conducted in our own laboratories; by independent scientific organizations on a contract basis; and by the International Lead-Zinc Research Organization, which is currently administering more than fifty projects designed to expand the uses of lead and zinc. The following is a partial list of the areas in which research is presently being pursued:

LEAD

D-S Lead... (Dispersion-Strengthened Lead) is being investigated as a new lead material having superior resistance to creep and abrasion, that would have a wide variety of uses, such as better storage batteries for automobiles, hand power tools and other appliances. Among the design advantages of such batteries are longer life, improved rechargeability, and lower cost.

Flame-Sprayed Ceramic Coatings... New ceramic glazes, with lead as an important component, are being developed for such uses as coating for concrete blocks, structural steel members, glassware and other materials. This material would be flame sprayed rather than fired in a kiln and would make it practical to coat or patch material at both the point of manufacture and in the field. Such a development could well effect a revolution in the appearance of the exteriors of new buildings as well as in the techniques for their construction.

Protective Chemicals... Chemical lead compounds, for protecting wood, cotton and wool fabrics, and other materials against insects and fungus, are being researched. Such chemicals would have application to wooden piles and docks to repel marine borers, on railway ties and trestles to resist termites, and for similar uses.

Sound and Vibration Attenuation... Lightweight lead sheet is being perfected, which would serve to control sound and vibration in walls, partitions or ceilings in hotels, motels, office buildings and factories.

ZINC

Structural Uses... Development work is being conducted on wrought zinc products, such as extrusions for door and window frames, and architectural hardware such as leaders and gutters, knobs, locks, handrails, etc., to take advantage of zinc's resistance to corrosion and its ability to accept a variety of finishes.

Other Current Development Work... A wide variety of other potential uses of zinc are being investigated, such as lightweight storage batteries, bonding of zinc to itself and other materials, improved corrosion resistance of plated zinc die castings, wrought zinc applications for automobile trim, galvanized steel reinforcement bars in concrete and prestressed concrete members, zinc dust primers for painting of automobiles, structural steel work and marine structures, zinc for shot blasting steel to give it temporary protection against corrosion, and application to cotton textiles to improve their weather resistance.

Current Zinc Oxide Development Work... The uses of zinc oxide are already numerous and varied, but additional research is being conducted in its possible uses as an ingredient in coating photo-copy paper (which would make it possible to make color reproductions on office copiers)... to improve color control and increase strength of structural clay products... as a component of paints to prevent blistering... for improved glazes for such products as electrical insulators... and in specialized glasses required for rockets and missiles. In addition, basic research is being conducted to determine how much zinc is necessary for development of plant and animal organisms.