



Lead Industries Association, Inc.

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March 20, 1972

TO: All Members of the Lead Industries Association

Gentlemen:

Enclosed is a copy of a new brochure published by the Industrial Storage Battery Section, National Electrical Manufacturers Association.

This is another good piece of material that can be of significant value in the decision to use IC engine power or electric battery power in material handling.

We at LIA are happy to have been able to make contributions to the composition of this brochure. Additional copies may be had from NEMA headquarters, address inside front cover.

Sincerely,

Connel A. Baker, Jr.

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Encl.

ALL THIS

**CLEAN
QUIET
FUMELESS
VERSATILE
ECONOMICAL
CONVENIENT
LOW MAINTENANCE
EFFICIENT
SAFE
MANEUVERABLE
LONG-LIVED
VIBRATIONLESS**

**AND
NON-POLLUTING
LOW-COST
BATTERY POWER
TOO!**

LIA14653



National Electrical Manufacturers Association
1400 K Street, N.W., Washington, D.C. 20004-2901

INTRODUCTION

"Shall we use electric or fuel-powered industrial trucks?" The selection between these two types has long presented a problem to buyers of these vehicles. Today, a new awareness has been added which greatly influences the decision: in-plant air pollution by fuel-powered trucks.

With the broad emphasis on pollution, what effect will this have on employee attitudes?—on Union demands?—on restrictive government regulations?

When faced with the problem of selecting replacements, or the purchase of new, additional vehicles, even satisfied users of fuel-powered trucks are forced to include this new element in their considerations.

But air pollution is only one of the factors to be considered before a final decision is reached. The other vital factors are: cost of ownership; performance; reliability; maintenance; safety; downtime; speed; power; etc.

This brochure touches on these vital factors with simple facts. Its aim is to aid buyers of industrial, powered trucks in making sound comparisons and reaching their own decisions.

WHEN WERE INDUSTRIAL ELECTRIC-POWERED TRUCKS INTRODUCED?

The Railway Express Company operated electric motor trucks before the turn of the century, but the first electric for materials handling were flat-bed trucks produced for the Pennsylvania Railroad Company in 1906. These first "stop-and-go" electrics were called baggage trucks by railroaders.

Following World War II, the fastest growing segment of the American economy has been materials handling. A wide variety of special-purpose trucks are available on the market which are capable of solving most industrial material handling problems.

WHAT ARE THE MAIN SOURCES OF POWER?

Electricity, gasoline, diesel, LP gas.

ARE THERE MORE FUEL-POWERED TRUCKS THAN ELECTRIC TRUCKS IN USE?

Yes. In America, it is estimated that there are approximately 550,000 fuel trucks and 227,000 electric trucks. In Europe, however, approximately 70% of all industrial trucks are electric-powered.

IS THE SALE OF ELECTRIC TRUCKS INCREASING IN THIS COUNTRY?

Yes. The sales of electrics as compared to the total sales of material handling trucks grew from 18% in 1960 to 33% in 1966, and to 41% in 1970.

TO WHAT IS THIS INCREASE ATTRIBUTED?

Primarily, to the tremendous improvements made by the truck manufacturers. Many new types of trucks were developed to fit material handling needs. Speed and over-all performance were improved; solid-state speed controls were developed so that the power draw during truck acceleration became stepless. With dynamic research and development programs, the battery manufacturers produced batteries with greatly increased capacities. The 50 ampere hour per positive plate battery of the late 1940's was increased to an 85 ampere hour per positive plate in the same size container, or 70%. This made the electric truck much more versatile and, also, capable of maintaining a full-shift work schedule.

LEAD-ACID BATTERY STORAGE CAPACITY HAS INCREASED

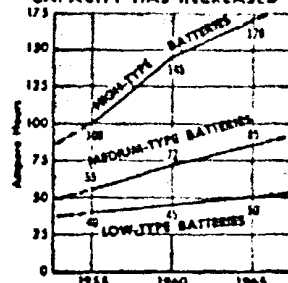


Figure 1—Design improvements have changed the energy storage capacity of lead-acid batteries. Low-, medium-, and high-type industrial batteries of the same size have made two such jumps in recent years as these trend lines show.

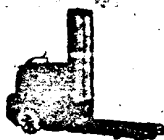
Figure 1

WHAT OTHER IMPROVEMENTS HAVE BEEN RECENTLY DEVELOPED?

In the early days, electric truck users were plagued by low impact material in the battery containers. These were then made of hard rubber which had the tendency to crack under a sharp blow, spilling acid and causing short life and short capacity troubles. Today, advanced type materials have eliminated this problem. Batteries have extremely high tolerance to rough handling. In fact, about the only attention they need is the periodic addition of water. And, of course, charging.

HOW ABOUT BATTERY CHARGING? ISN'T IT A PROBLEM?

No. Automatic charging equipment has been developed which virtually eliminates all the rotating equipment and manual rate adjustment of the past. Previously, specially trained employees were needed to keep the batteries properly charged—and even these men had a tendency to over-charge the batteries and so shorten battery life. Today, all the guesswork in proper charging is eliminated—and so is the electrician who had to standby to do the job. The process is so simple that all the truck operator has to do is to insert a plug and activate the device. The chargers of today are as simple, compact and dependable as electric clocks or refrigerators.



ARE ELECTRIC INDUSTRIAL TRUCKS CHEAPER THAN FUEL-POWERED TRUCKS?

The word "cheaper" often confuses buyers. The initial purchase price of fuel-powered trucks is lower than that of electric trucks. The actual "cost" to the owner over a number of years is much higher for fuel-powered trucks. For example, the cost of maintenance for gasoline trucks is higher than the sum of all other costs they incur—in general, $\frac{3}{4}$ the cost of owning and operating gasoline-powered trucks is chargeable to maintenance.

A good man in your organization with whom to discuss values is your purchasing agent, material handling engineer, cost accountant or comptroller. Each can carefully balance the various elements involved and base them on prices in your locality. For example, he will take into consideration the initial cost of the two types of vehicles—gas vs. electric.

Then, he will balance the cost of battery, charger and electric current against cost of fuel, oil and expendable parts, and project them over a period of about five to ten years . . . with tomorrow's inflationary costs in mind, too.

In actuality, when buying a battery and charger, you will be pre-purchasing a five-to-ten-year power supply. Although some of this will be "guesstimate," you will note by the following chart that fuel costs have gone up quite sharply in recent years, while electricity costs have remained comparatively stable. An important point to enter into the calculations is the fact that when a gas truck is idling, it is burning fuel, while an electric truck is using no current.

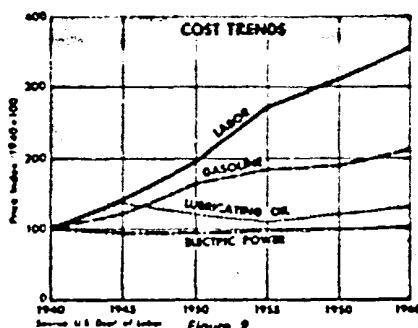


Figure 2

AT WHAT POINT IN THE OWNERSHIP OF ELECTRIC TRUCKS DO THE FUEL COSTS AND OTHER SAVINGS BALANCE OUT WITH THE LESSER INITIAL COST OF FUEL TRUCKS?

Numerous records have shown that in about 3½ years, the savings in fuel alone bring the "cost" of the two types of trucks to a par. From that point on, actual savings go up sharply in favor of electric trucks. Also keep in mind that the pre-purchased power supply in the batteries will have been only partially expended after 3½ years of use.

HOW ABOUT THE LIFE EXPECTANCY OF ELECTRIC TRUCKS?

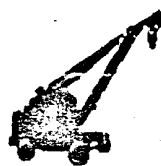
The life expectancy of electric trucks is considerably higher than that of fuel trucks. Since more than 90% of all electric trucks ever built are still in service, a favorite saying in the industry is, "Electric trucks never wear out." New models are constantly being developed by truck manufacturers to meet special requirements, such as narrower, faster-lifting trucks for warehouses where space is at a premium and aisles are narrow.

WHY IS THE LIFE OF ELECTRIC TRUCKS SO MUCH LONGER THAN THAT OF FUEL TRUCKS?

The long life of electric trucks is due, primarily, to the simplicity of the transmission of electric power. This power can be applied quickly and efficiently. Lack of vibration is also a factor, as it cuts down on the wear and tear of parts. Unlike fuel trucks with reciprocating motors, the efficiency of electric trucks does not decline with age.

DO THESE POINTS ALSO APPLY TO TRUCK MAINTENANCE?

Yes. There are fewer moving parts in electric trucks; less wear and tear in stop-and-go operations. By comparison, reciprocating motors need much more maintenance, so that it is often necessary to have standby mechanics for repairs, checks, adjustments and replacements. They must concern themselves with ignition systems, carburetion, the cooling system and the exhaust system. The electric trucks' power supply comes from a storage battery which has no moving parts and has a life expectancy of five to ten years. Maintenance on electric trucks is



limited to lubrication charging, and adding water to battery. The only moving part of the motor is the armature and the only real maintenance it needs is the occasional renewal of the brushes.

ARE THERE ANY OTHER DEVELOPMENTS AND ADVANTAGES?

Several. For example, solid-state controls now cut current requirements of electric trucks by as much as 70%. This makes the battery power last 40% longer between charges while doing more work.

Electric trucks operate well in high temperatures and are ideal for work in refrigerated spaces such as food warehouses. Here, they have added advantages of emitting no exhaust fumes which may taint foodstuffs.

Electric trucks are more versatile. They are more adaptable, so there are more types being manufactured for special uses. They are ideal as "walkers" and for use in narrow aisles and areas with restricted spaces.

Safety is another factor. Being vibrationless and "silent," they cut down a great deal in operator fatigue. And, they emit no poisonous fumes. Both noise pollution and fumes cut down employee efficiency and are often the cause of accidents.

ARE NOT GAS-POWERED TRUCKS PREFERABLE FOR SOME USES?

They are superior for use outdoor, over long hauls, over very bumpy roads and on extremely steep ramps. In some applications they are also preferable when pneumatic tires are used.

ARE NOT GAS TRUCKS FASTER?

In a drag race of 800 feet or more, gas trucks are "faster," even though speed levels of electric trucks have been increased to 7½-9½ mph. But most industrial fork trucks are not used to run races, and only a few have to cover distances of 800 feet or longer.

The primary use of industrial trucks is loading and unloading and stacking pallets. For this type of work, electric trucks are "faster." The DC motor develops its maximum torque at low speeds, as

compared to the internal combustion engine which balks at low speeds and needs gear shift or automatic transmissions.

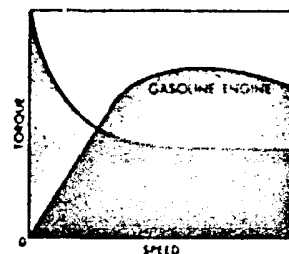


Figure 3—Comparison of the torque versus load characteristics of the internal combustion engine with a DC series motor used in electric trucks. Note the low speed characteristics particularly.

Figure 3

IS AIR POLLUTION A PROBLEM?

Air pollution from fuel trucks—especially indoors—in much more of a problem than many realize. Also, it is posing serious threats for the future, to which users of industrial trucks must give sober thought.

The war against the poisonous emissions of the internal combustion engine has just begun. The federal government has established a deadline of 1975 for automobile manufacturers to meet stringent regulations. The crusade is bound to move from the highways of America into its industrial plants.

Gasoline-powered industrial trucks pollute the air around them—often inside of a building. Local public health agencies don't like it. Employees don't like it. Unions don't like it.

In California, workers resented moving from the smog-laden air of the outdoors into the fumes-fouled air inside of their plants. California now has an "In-plant Pollution Code." It stands to reason that, soon, every state will control the atmosphere of industrial plants with similar codes.

These codes may result in obsolete equipment—or expensive safeguards. They may force building alterations, new ventilating equipment, slower hauling speeds, higher wages for combustion truck operators, high insurance rates.

Soon, it may not pay industries to use fuel-powered trucks—not when battery-powered trucks can eliminate the burden of additional controls and restrictions, and can do the work adequately, efficiently and—in the long run—more economically.



THE SUMMING UP

ADVANTAGES OF FUEL-POWERED TRUCKS

Lower initial cost of ownership ...
Higher speeds over long distances ...
Best for long outdoor hauls ...
Best over bumpy roads ...

NEEDS OF FUEL-POWERED TRUCKS

Extensive plant ventilation ...
Skilled standby mechanics ...
Expensive replacement parts ...
Summer coolants ...
Fuels whose costs constantly rise ...

ADVANTAGES OF BATTERY-POWERED TRUCKS

Pollution-free power.
No health hazards, odors, noise ...
Less maintenance ...
Better maneuverability ...
Lowest cost per ton-mile ...
Easy-to-handle controls ...
Hedge against inflation ...
Cool and smooth-running motors ...
Extremely long life ...
Less operator fatigue ...
Safety ...

NEEDS OF BATTERY- POWERED TRUCKS

Modern batteries that give 5 or more years' service ...
Modern, fully-automatic chargers ...

ELECTRIC TRUCKS ARE:

Economical
Clean
Quiet
Fumeless
Versatile
Convenient
Low maintenance
Safe
Maneuverable
Efficient
Long-lived
Vibrationless

ELECTRIC TRUCKS ARE THE NOW TRUCKS...
AND THE TOMORROW TRUCKS FOR AMERICAN INDUSTRY



Approved by the Industrial Design Society of America (International Design Society)