

LEAD INDUSTRIES ASSOCIATION, INC.

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August 23, 1965

SUBJECT: BATTERY POWERED
INDUSTRIAL TRUCKS

To Members of the Lead Industries Association, Inc:

A matter of almost universal design, the small diameter, solid tire wheels on electric industrial trucks have more or less restricted their use to in-plant, or hard surface areas.

Now, however, we have found a company using a small fleet of electrics equipped with large diameter wheels and pneumatic and semi-pneumatic tires. In two years of experience they show excellent operating characteristics on steep grades, in loose gravel, mud and snow. They are in process of phasing out all older types and replacing with the "Lansing," made by Lansing-Bagnall, Basingstoke, England.

It is reasonable to assume that domestic manufacturers will soon consider some similar adaptations, and we are discussing the idea with them.

This information is sent you with the thought that you may wish to investigate for possible application in your own operation.

If you would like more details, please get in touch with the writer.

Yours very truly,

Connel A. Baker, Jr.
Connel A. Baker, Jr.

CB:mc



Look Ahead with Lead

There's something new to know about

BATTERY POWER

Reprinted from MODERN MATERIALS HANDLING July, 1965

for

LEAD INDUSTRIES ASSOCIATION, INC.

292 Madison Avenue
New York, N. Y. 10017

There's something new to know about BATTERY POWER

Your battery powered equipment—even if only a few years old—may well be obsolete, compared to what today's electrics can do. Here's why—the highlights of recent capability boosting developments

The best and most professional of us can feel, at times, that some aspects of the field have passed us by in a shockingly short length of time.

Nowhere is this more apparent than in the case of batteries used to power industrial trucks.

For years, most of us have had some preconceived ideas about batteries and their applications in materials handling equipment. Now, recent developments demand that we re-examine these long accepted beliefs to see whether they really stand up in the light of current conditions.

Big things have happened in the past few years. A host of improvements have been made in the batteries themselves, and in the controls and related equipment that draw power from the batteries. The net result is that batteries today have greater staying power and more productive capacity than ever before.

At the same time, lease rental plans, or some variation of them, have changed the cost picture. It now is possible, through these plans, to avoid initial investment in batteries, in chargers, in trucks, or in the whole equipment package.

BOOSTING PERFORMANCE

Today's batteries may hold as much as 50 percent more power, in the same space, than they could hold 10 or 15 years ago. Plates of 85 amp-

hour capacity now may occupy no more space than 55 or 55 amp-hour plates once did. The secret lies in better retention of active material in positive plates.

Users may pay a higher price for these higher capacity batteries, but on an amp-hour basis the cost may be the same, or even less. So the user has a choice between a smaller battery, or a battery of the same dimensions with more power for the truck.

The type of controls on a truck also has an important influence on how long a battery charge lasts. Recently introduced solid state controls are said to cut current requirements of counterbalanced rider trucks, at low speed, by as much as 50 percent. Power savings are said to be about 40 percent for "average" truck usage. So the new controls, alone, may make batteries last as much as 40 percent longer, between charges, depending on the amount of low speed operation and the frequency of stops and starts.

The combination of better batteries and better controls boosts the overall effectiveness of battery powered equipment. Users often find that rider counterbalanced trucks now can do nearly twice as much work between battery charges.

Contributing to over-all performance, too, are changes in the trucks. Travel speeds of some counterbal-

anced trucks have been increased to as much as 24 mph, when consistent with safety. Lifting speeds have been increased from 14.50 fpm to 24.50 fpm, or more. And grades as steep as 15 percent can be climbed without difficulty.

An example of early progress in controls for these trucks is the introduction of the carbon pole control. This resulted in stepless acceleration. Later, in combination with compound wound electric drive motors, or dual field windings, it became possible to provide increased torque and current even at low speeds.

Higher lifting speeds, in one case, 94 fpm, loads have been achieved with dual pumps and motors.

Another forward step is the high voltage system on counterbalanced trucks.

Some high voltage systems are dual voltage systems in which, for example, two 60-volt batteries are connected in series for high speed, 72 volt operation. Switching, say, to 60-volt operation, for lower speeds, is said to save power and improve torque. Silicone diodes have been used for electrical switching (with out contactors) between the two voltages.

One high voltage system switches from series to parallel field windings in the drive motors as speed is increased. This is said to eliminate power-wasting resistance in three of

more efficient, and speed, and to extend the full range.

The latest advance, installed in both highway buses and in some storage systems, is the application of solid state controls (AMNH, Mar. 1965, p. 12). These controls, SCR and power transistor types, are used for travel speed but not for lifting speed. The drastically controls help. They save current when other controlled classed trucks are operated at charging, reduced speeds, about 50 per cent of top speed, with SCR control.

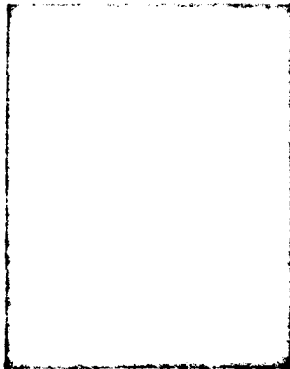
One power transistor type is the pulse width modulation (PWM) system which furnishes power in "on-off" intervals of 100 cycles. The pulse frequency is constant but the power "on" period is varied according to speed and load demands.

In at least operations, solid state controls provide the ultimate in making performance, coupled with lower maintenance costs, with fewer moving parts.

It has been assumed that these controls can save little battery power on low loads and at high speeds. But some users find that significant savings are achieved if the trucks must frequently slow down to pass intersections or obstructions.

Also helping users to take full ad-

vantage of battery power is the use of solid state controls in powered hand trucks and can be played out one handily through control. These units help to keep the battery in their work areas.



CUTTING INVESTMENT COST

Lease rental plans now are being applied to batteries and chargers, also. The effect of these plans is to convert to operating cost a substantial investment in power equipment. Then users are free to consider investing in a truck on the basis of charges and alone. And they can compare the "total power cost" (batteries and chargers, as well as electricity) with the costs of other kinds of motive power.

The manufacturer of batteries and chargers supplies this equipment on rental contracts that feature periodic payments in proportion to equipment use.

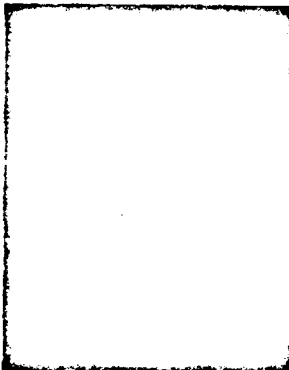
This manufacturer supplies a watt-hour meter with the charger. Periodic payments, except for a certain minimum cost, are based on the amount of power metered to the charger.

Under this approach, contracts may be set up for periods of one to seven years. Five year terms are representative. On long term contracts, the typical metered cost of a battery and charger may be from 5 to 10 cents per kWh. The actual cost depends on the value of the equipment, which, in effect, is "spread" over the estimated average power requirement for the truck. No payments are small.

Lease rental plans also are readily available for battery powered trucks of all types. Metering ranges from one to seven years, and you don't need an AAA rating to qualify for financing.

Plans with purchase options, if reserved, may be construed as purchase contracts. If so, the Internal Revenue Service will require you to capitalize the equipment and depreciate it under prescribed rules. But lease rental plans with reserve working capital. No down payment is required, and the rental or depreciation becomes a business expense.

Representative plans include: The level payment lease plan with purchase option (no down payment, with equal payments); accelerated lease plan with purchase option (no down payment, but larger initial payments); true lease with purchase option (no transfer of ownership); monthly rental plans (with or without guaranteed maintenance); and time sales plan (for payment in equal installments). The choice is yours.



The great impact of such plans is to make any equipment more attractive, where initial cost would otherwise be a deterrent. In addition, these lease rental plans, when they terminate, help to make more used trucks, batteries, and chargers available, from dealers or manufacturers, for users' short term rental applications. So users in many areas can easily rent this equipment to take care of their emergency requirements.

vantage of battery power is improved charging equipment. Today's chargers help to extend the life of batteries by automatically matching the requirements of each charging cycle.