

With little empirical data to back up their arguments, managers continue to battle over which is best, the LP or Electric forklift.

This is the first in a series of articles that will examine the variables involved in total cost of ownership of Electric and LP forklifts (trucks) and discusses the differences and potential impact that these costs can have in the manufacturing and warehouse environment. These articles will cover how each truck operates and what costs are associated with this operation.

Historically, the LP truck has been the workhorse of the industry. If well maintained, LP trucks are efficient and relatively clean to operate. However, new developments in electric motor and motor control technology have enabled the Electric truck to replace the LP truck in some work areas. These articles will examine the cost impact for a business as it relates to the usage of Electric and LP trucks.

What are the costs differences between Electric and LP Forklifts? There are differences in the costs of the two types in purchase price, maintenance, refueling equipment, storage of fuel/ charging equipment, and refuel / recharge times. There are, for instance, the costs of an extra battery and battery charger for the Electric truck which do not exist in the LP truck. Electric trucks produce a cleaner, quieter and environmentally safer warehouse environment. However, LP trucks that are properly maintained have little environmental impact. LP trucks run longer with more lifting power and speed for more efficient warehouse operation. Here we will limit our discussion to the actual cost of fuel consumption of each type truck and not the corresponding external costs for refueling at the end of the shift.

In order for there to be a fair assessment in fuel consumption, there needs to be a median standard that allows both trucks to operate effectively. So for the purpose of this discussion we define the work cycle as an eight hour shift with two fifteen minute breaks and one half hour lunch for a total of seven hours of work time available. The work environment will be a standard controlled warehouse with no extremes in temperature or lift conditions and a smooth concrete floor surface.

Both vehicle types are designed to perform to this environment with only a single fuel load (LP tank or Battery Charge).

The standard 5,000 lift trucks in our example will use either an 8 gallon LP tank (LP) or a 480Ah, 80 volt battery (electric). The rule of thumb on electric trucks is that they use 20% of the battery's charge to operate. At the 80% of charge point, the truck begins to lose functionality (speed, lift, etc.) The efficiency of the charger and losses in the cabling, etc. is such that the battery will be charged to 105% of the rated capacity.

As a standard procedure, the LP unit must have the tank replaced or refilled after each shift and the electric unit must have the battery replaced with a charged one or recharge the battery on board for an extended period of time. These costs are not a part of this discussion but will be addressed in a future article.

To calculate the cost of fuel consumption of the electric unit, first multiply the batteries Ah rating (480Ah) times 20% to obtain the current usage. Multiply the current usage by the battery voltage (80V) to convert to Kilowatts per hour (kW). Multiply the kW by the number of hours worked (7) to get the number of kWh consumed; the kWh is multiplied by the efficiency recharge then multiply to arrive at the true kWh consumed. Multiply the kWh consumed number by the price of energy per kW to get actual power usage cost. (The advertised power rate in Atlanta is \$.088 per kW.)

480Ah X .2 (consumed) = 96 W (consumed)
96W X 80V = 7680 Watts or 7.68 kW
7.68 kW X 7 hours = 53.76kWh (kilowatt hours)
53.76 kWh X 1.25 (charge to 105%) = 67.2 kWh
67.2 kWh X .088 (power cost per kWh) = \$5.91

To calculate the cost of fuel consumption of the LP unit, multiply the tank size (8 gallons) by the price per gallon \$1.19.

8 (gallon tank) X \$1.19 = \$9.52

This article eliminated the various costs of operating and maintaining forklifts in order to arrive at a base cost of fuel consumption in a 7 hour shift operation. The cost to refuel the Electric truck per shift of operation has a lower cost at this point. In future articles, the other costs associated with each type forklift will be examined with the ultimate purpose of developing a model for determining the best or most efficient forklift for a specific business application.