

Measurement of Hour Meter for Industrial Trucks

Prof. Dr.-Ing. Bernd Noche
M.Sc. Serpil Koc

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Goals for Project Hour Meter

- **Market research on the way of counting the performance (hour meter) of industrial trucks and the consequences.**
- **To describe and demonstrate a systematical evaluation of the use-time (hour meter) of the industrial trucks.**
- **Analysing the best way to measure the performance.**
- **What does this mean for the users and his perception of the trucks behaviour and cost?**

Truck Types



Counterbalanced Trucks
(Electric/Gas/Diesel)



Pallet Trucks



Tow Trucks



Stacker Trucks

Order Pickers



Narrow Aisle Trucks

Reach Trucks



What is Hour Meter?

The Hour meter records the total number of hours that an engine has been used.

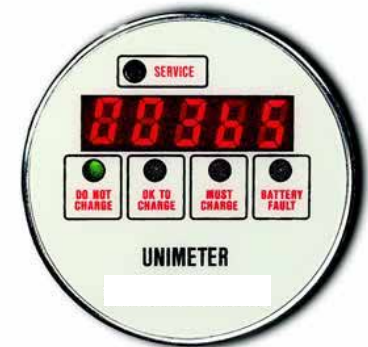


This information is used to schedule maintenance and it has to be recorded on Daily Inspection Reports.

In many cases there is no way to measure operator productivity.

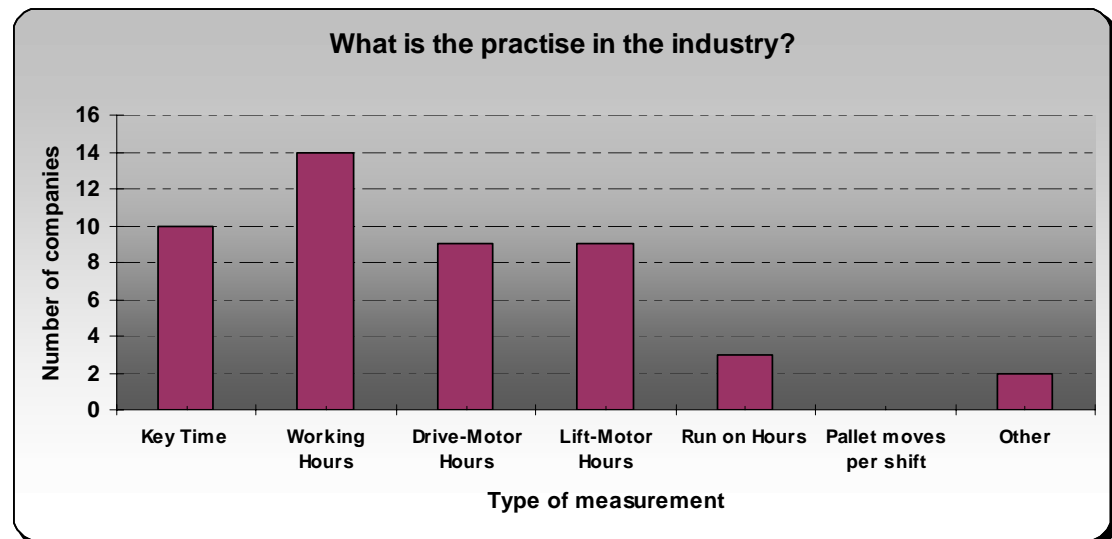
A detailed understanding of how industrial equipment is utilized and how its productivity can be measured should therefore be of vital importance to the management of any organization that operates such equipment.

As the saying goes, "**you can't manage what you can't measure.**"



Methods of Measuring Time

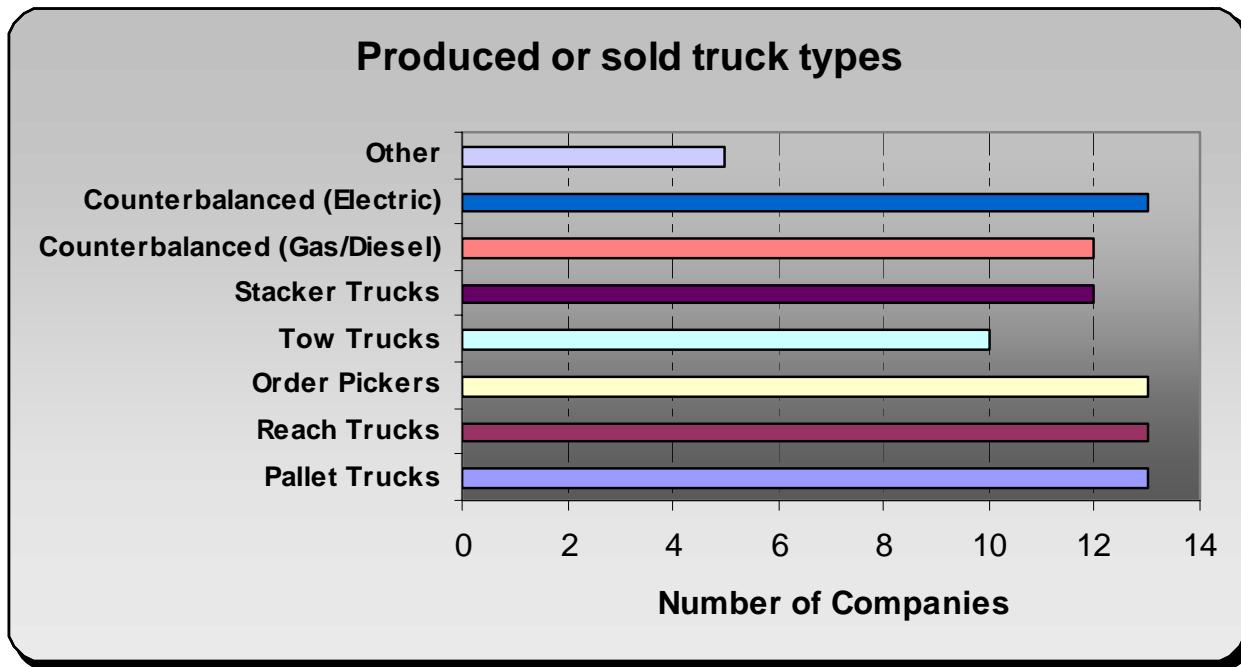
- Key time - when the truck is switched on (regardless type of use)
- Working hours - when any of the motors is actually running
- Drive-motor hours - when the drive motor is actually running
- Lift-motor hours - when the lift-motor is actually running
- Run-on hours - where the hour meter is set up to add some run-on time at the end of each motor operation
- Pallet moves per shift



Comment: The results show that there is no standard way of measuring hour meters.

Project Hour Meter

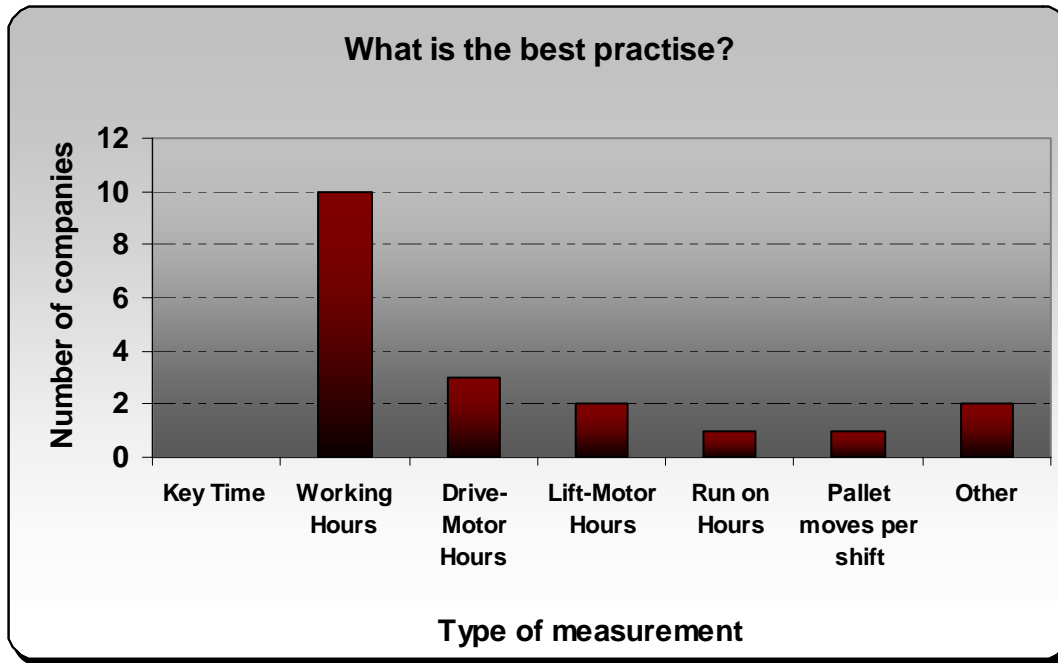
There are 14 Leading Truck Companies participated our survey and responded our questionnaire.



Companies

BT
Clark
Crown
OM Pimespo
Atlet
Buescher
Willecke
Jungheinrich
Zeppelin
Yale
Nissan-Forklift
Linde
Toyota-Forklift
Still

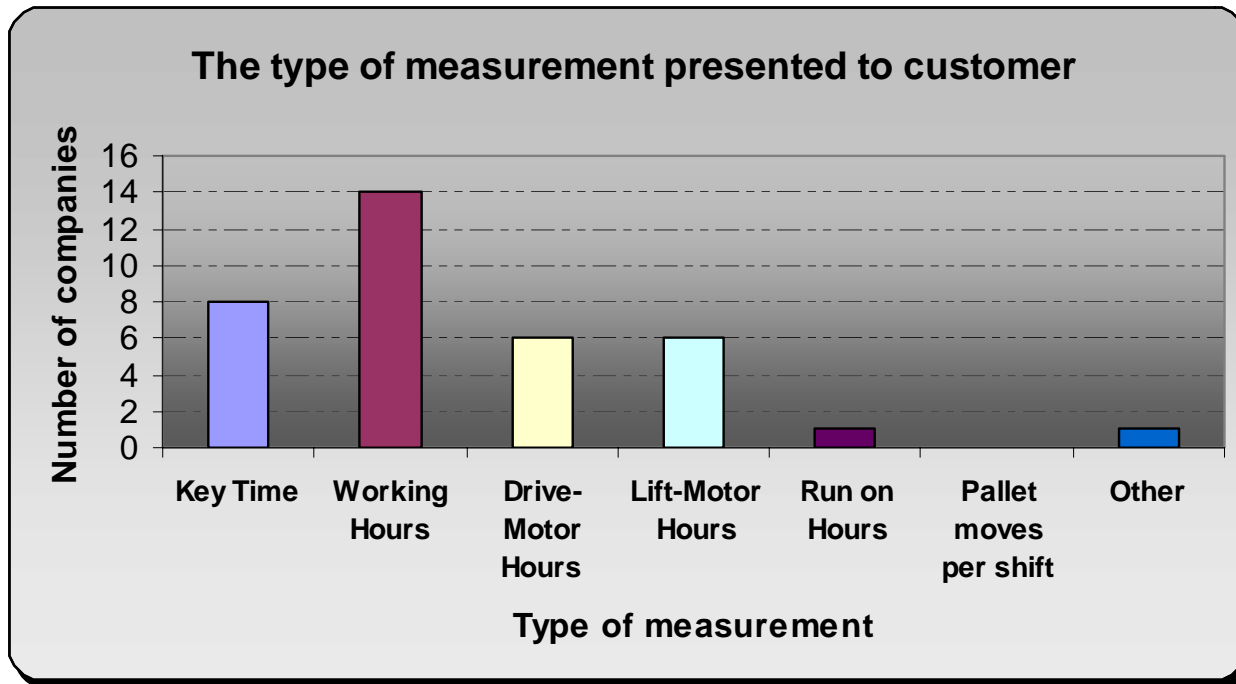
The best way of counting hour meter



The best way of measuring hour meter is responded as “Working Hours”.



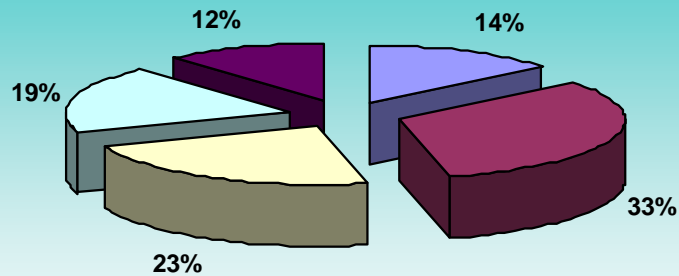
Project Hour Meter



The decision-maker for the customers is **operating hours/year**.

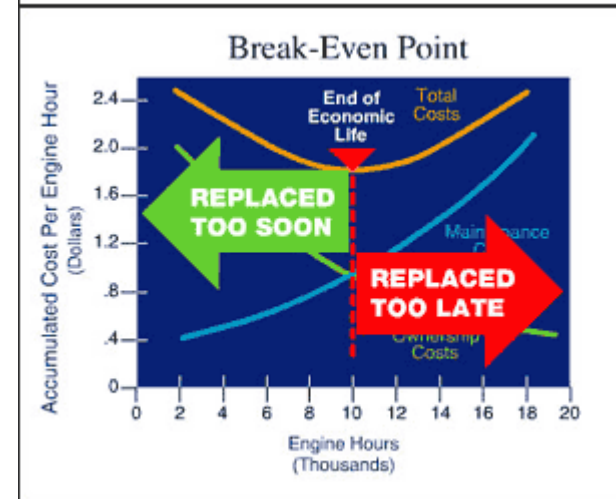
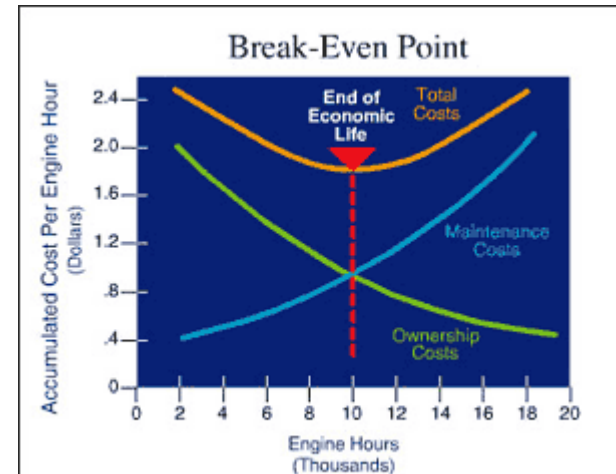
Project Hour Meter

Criteria for end of economic use of the truck



- Age of the truck
- Operating hours
- Other
- Intensity of use or utilization
- Lifetime cost of the truck

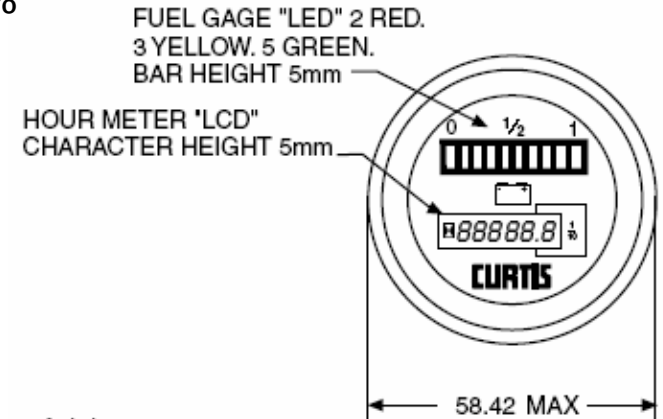
It's been estimated that at least half of the forklift population is currently being operated well beyond its economic life.



Project Hour Meter

Have you investigated the measuring method of the hour meters and the consequences for your costs?

	Number of Companies	Percentage
Yes	4	29%
No	4	29%
Partially	2	14%
Experience	4	29%
Total	14	100%



Range of operating hours during the lifetime of the trucks

(Info: the following table presents the number of the companies in every range)

	5.000h-10.000h	10.000h-15.000h	Other	No Comment
Electric trucks	1	7	3	3
Gas/Diesel trucks	0	7	3	3

A United States Department of the Interior Bureau of Land Management (BLM) study found that, industry-wide, the average life for industrial forklifts is 11.200 hours (June 30, 2003).

Project Hour Meter

Lifetime of the trucks

	Number of companies	Percentage
4 to 5 years	0	0%
5 to 6 years	1	7%
6 to 8 years	3	21%
over 8 years	10	71%
Total	14	100%

The average electric truck is being traded in at 26,000 hours.

The average internal combustion truck gets traded in at 22,500 hours.

Most lift truck manufacturers have found that the best time to trade-in lift trucks is at 10,000 to 12,000 hours. In other words, on a truck that runs an average of 2,000 hours a year, it's being kept in a fleet for anywhere from **five to six years** beyond its economic life.

Project Hour Meter

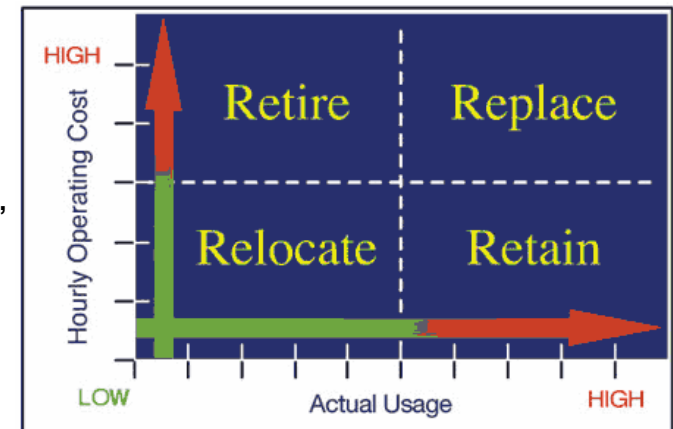
Operating Percentage/Utilization of the trucks

By uncovering the actual utilization, operating costs, specifications and applications for each piece of equipment used, it is possible to see existing opportunities to maximize the fleet of the trucks.

	Number of companies	Percentage
up to 20%	0	0%
20% to 40%	0	0%
40% to 60%	5	36%
60% to 80%	5	36%
80% to 100%	1	7%
No Comment	3	21%
Total	14	100%

But the average utilization in North America is only 25 percent.

Source: From the Jan/Feb issue of Warehousing Management By Amanda Loudin, Contributing Editor, <http://www.geocities.com/waynem48/ergon.html>



Management aspects by the help of measurement hour meter

	<u>Number of companies</u>
Maintenance Interval	11
Calculation of lifetime cost	4
Calculation of service and rental prices	14
Other	1

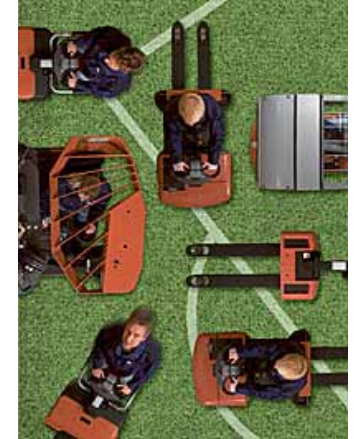
The decision-maker in leasing contracts is **km/year** or **operating hours/year**.

For the manufacturers it is very important to define a standard measurement type of operating hours of the truck.

Project Hour Meter

How do you specify the operating costs of a lift truck?

	<u>Number of companies</u>
Truck cost per hour	11
Truck cost per meter	0
Cost per pallet moved	2
Other	1
No Comment	1



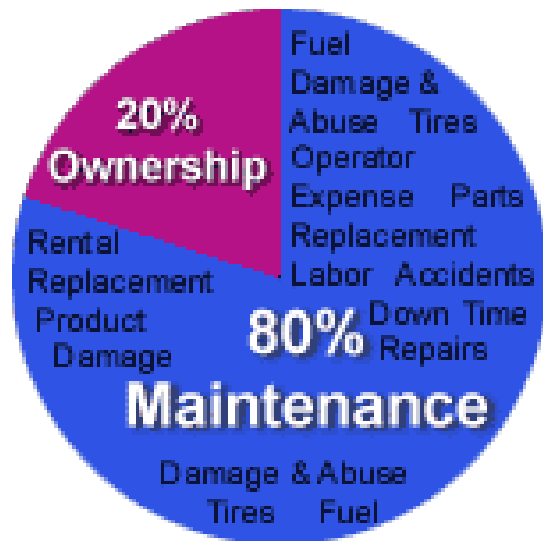
Proportional percentage of indirect costs on the total cost

(Info: the following table presents the number of the companies in every range)

	<u>up to 20%</u>	<u>20% to 40%</u>	<u>40% to 60%</u>
Part costs	3	2	3
Labour costs	2	3	3
Additional costs	7	0	0
Other	1	1	1
No Comment	5	5	5

The 80/20 Rule

On average, over the life of a forklift, only 20% of its cost is ownership.
Approximately 80% of total forklift costs are operating costs.



When the measurement method of hour meter differs:

It leads

- lack of timely information on the health of equipment
- inefficient process for maintenance planning
- poor control of equipment that needs maintenance

and contributes

- increased equipment down time
- Increased maintenance costs
- reduced productivity

What is the proportional percentage between Preventive Maintenance cost and Breakdown cost?

(Info: the following table presents the number of the companies in every range)

	up to 20%	20% to 40%	40% to 60%
Preventive Maintenance Cost	0	5	1
Breakdown Cost	1	2	3
Other	0	0	0
No Comment	8	8	8

Preventative maintenance events (PMs) are usually performed according to a vehicle's hour meter or by calendar. In many applications, actual vehicle drive time averages less than 50 percent of "key time" hour meter readings.

Source: www.specialityvehiclesonline.com, Reprinted from the March/April 2004 issue of Industrial • Utility Vehicle & Mobile Equipment Magazine

Project Hour Meter

The two most frequent causes are operator abuse of the equipment and lack of regularly scheduled preventive maintenance.

Most frequent causes of downtime	Number of companies
Operator abuse of the equipment	12
Lack of maintenance	10
Insufficient preventive maintenance	7
Production failures of the truck	0
Insufficient supply of spare parts	0
Other	0

What can we do to reduce abuse?

- to make the operator part of the preventive maintenance process
- install devices on the units which are designed to detect abuse
- high visibility strobe lights, backup alarms

Operator's Daily Checklist: Gas or LPG Forklift

Check each item before the shift starts. Put a check in the box if the item is OK. Explain any unchecked items at the bottom and report them to a supervisor. Do not use an unsafe forklift! Your safety is at risk.

Forklift Serial Number: _____

Operator: _____

HourMeterReading: _____

Date: _____

Visual Check	
<input checked="" type="checkbox"/>	Tires are inflated and free of excessive wear or damage. Nuts are tight.
<input type="checkbox"/>	Forks and mast are not bent, worn, or cracked.
<input type="checkbox"/>	Load back rest extension is in place and not bent, cracked, or loose.
<input type="checkbox"/>	Overhead guard is in place and not bent, cracked, or loose.
<input type="checkbox"/>	Attachments (if equipped) operate OK and are not damaged.
<input type="checkbox"/>	Forklift body is free of excessive lint, grease, or oil.
<input type="checkbox"/>	Engine oil is full and free of leaks.
<input type="checkbox"/>	Hydraulic oil is full and free of leaks.
<input type="checkbox"/>	Radiator is full and free of leaks.
<input type="checkbox"/>	Fuel level is OK and free of leaks.
<input type="checkbox"/>	Battery connections are tight.
<input type="checkbox"/>	Covers over battery and other hazardous parts are in place and secure.
<input type="checkbox"/>	Load rating plate is present and readable.
<input type="checkbox"/>	Warning decals and operators' manual are present and readable.
<input type="checkbox"/>	Seat belt or restraint is accessible and not damaged, oily, or dirty.
<input type="checkbox"/>	Engine runs smooth and quiet without leaks or sparks from the exhaust.
<input type="checkbox"/>	Horn works.
<input type="checkbox"/>	Turn signal (if equipped) operates smoothly.
<input type="checkbox"/>	Lights (head, tail, and warning) work and are aimed correctly.
<input type="checkbox"/>	Gauges and instruments are working.
<input type="checkbox"/>	Lift and lower operates smoothly without excess drift.
<input type="checkbox"/>	Tilt operates smoothly without excessive drift or "chatter".
<input type="checkbox"/>	Control levers are labeled, not loose or binding and freely return to neutral.
<input type="checkbox"/>	Steering is smooth and responsive, free of excessive play.
<input type="checkbox"/>	Brakes work and function smoothly without grabbing. No fluid leaks.
<input type="checkbox"/>	Parking brake will hold the forklift on an incline.
<input type="checkbox"/>	Backup alarm (if equipped) works.
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

Appendix A

Revised 11/01/2001

Labor & Industries suggested documentation form

Apr

Do you measure the energy consumption of your trucks?

	<u>Number of companies</u>
Yes	3
No	2
Partially	9
Total	14

How do you measure the energy consumption of your trucks?

	<u>Number of companies</u>
Over the fuel consumption (Gas/Diesel)	10
Over the number of battery cycles (Battery change)	5
Over the number of battery load cycles	7

The batteries typically provide enough power for one standard eight-hour shift, which translates into 5 or 6 hours of constant usage.

There are two primary advantages to electric-powered forklifts: **zero emissions** and **lower cost per hour**. But higher initial cost: new electric forklifts can cost 20% to 40% more than similarly rated IC forklifts.

Which types of contracts do you offer?

Contract types	Number of companies
Purchase	14
Purchase with return of the used machine	14
Leasing with full service	13
Leasing	14
Short time rent	14
Long time rent	14
Hire purchase	14
Trade-in	14
Full Service	14
Preventive maintenance	12
Other	1

Because of the high initial cost, almost all forklifts are either leased or financed.

Another alternative is the long-term rental. Usually defined as a rental for over 12 months, a long-term rental differs from a lease in that it is based on a monthly fee and can be cancelled at any time after the minimum.

Wireless Management of Industrial Vehicles

There are basically four wireless communication options:

- **Satellite: especially on military and railcar applications**
- **Cellular: tractor-trailer**
- **High-bandwidth radio frequency (RF): warehouse management systems**
- **Narrow-band RF: from heavy industrial manufacturers to consumer goods producers and retailers to government agencies**

Source: www.specialityvehiclesonline.com, Reprinted from the March/April 2004 issue of Industrial • Utility Vehicle & Mobile Equipment Magazine

Top factors influencing forklift buys

Mitsubishi Caterpillar Forklift America recently conducted a telephone survey of 300 people who buy or specify for purchase the types of material-handling equipment used by their companies. The respondents ranked criteria on a scale of one to 10, with 10 the most important. Here are the results: Factors critical in decision-making.

1. Lift truck is highly reliable and durable **9.7***
2. Dealers have parts available when needed **9.3**
3. Dealer responds promptly to service needs **9.2**
4. Lift truck is easy to maintain and service **8.9**
5. Lift truck is easy to operate **8.8**
6. Manufacturer offers excellent warranties/guarantees **8.8**
7. Manufacturer offers the most value for initial price **8.5**
8. Manufacturer has a good reputation **8.3**
9. Lift truck offers excellent cost of ownership **8.2**
10. Dealer delivers promptly **7.3**
11. Manufacturer offers lowest initial purchase price **7.2**
12. Dealer has rental trucks available **6.8**
13. Dealer has convenient locations **6.8**
14. Manufacturer offers complete product line **6.5**
15. Dealer provides application analysis **6.1**
16. Manufacturer offers fleet-management services **6.1**
17. Manufacturer offers financing options **4.7**

•Indicates mean rating of each decision-critical factor on a scale of one to 10, with 10 the most important. These decision-critical factors corroborate a similar survey conducted in 1994

Source: Mitsubishi Forklift Trucks

It's not just about comfort, either: Ergonomics in design is also an issue of productivity.

Seats

Hydraulic-mounted seat or an adjustable seat that also offers adjustable arm rests



Controls

- Move your arm forward or back with small movements
- Simultaneously actualizing real-time data like weight on forks, travel speed, fork position and maintenance reminders to a display panel for the user.

Pedals and brakes

- One-touch control
- Vacuum-boosted brakes

Cab design

- Larger cabs, padded floor mats
- Improved visibility and heating systems for trucks



Thank you for your attention