

POWER MANAGEMENT AND DATA COLLECTION TERMINALS

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WHAT IS POWER MANAGEMENT?

Efficient operations require data collection terminals that do not impede worker productivity. Employees need confidence that their ruggedized computers will work as expected to enable them to focus on the task at hand, whether it is pick-and-pack, work in progress, or any warehouse, inventory, or manufacturing function.

There are many factors that affect data collection terminal performance, including poor scan rates, damaged keypad or touch screen, poor battery performance, and poor ergonomics. Each factor reduces total employee productive output in relation to labor input.

Fortunately, Power Management can be implemented to directly reduce labor costs.

In its most basic form, Power Management ensures that batteries do not adversely impact worker productivity. In its more formal form, Power Management is the ability to identify, monitor and maintain full effective use of handheld terminals in relation to their electrical power requirements.

Ideally, batteries should hold a minimum 80% of rate charge, be capable of recharge quickly (within 90-120 minutes), and be located alongside battery chargers in locations to enhance workflow.

The performance of new batteries and battery chargers at installation should be used as a baseline for comparing older equipment.

ELEMENTS OF POWER MANAGEMENT

Data Collection Terminals: Many manufacturers allow users to select device settings for lowering power usage. This can decrease power use by up to 30%. In addition, several manufacturers consider overall power consumption at the design stage, and create hardware that can operate up to 50% longer per comparable battery.

Batteries: Rechargeable batteries come in different types; such as Lithium Ion (Li-Ion), Nickel Metal Hydride (NiMH), and Nickel Cadmium (NiCd). "Hi-cap" batteries are typically Li-Ion batteries with higher rated mAh levels, but may make the data collection terminal "bulky" or uncomfortable. The best battery type can also depend on environmental conditions, recharge rates, and the device itself. A general rule of thumb is that device performance deteriorates when recharge levels drop below 80% of rated capacity. Below this level, the data collection terminal increases its tendency to "starve" for electrical power as the battery is depleted.

Power Management is about ensuring that batteries do not adversely impact worker productivity.

Battery Chargers: Chargers are typically 4-bay, 6-bay or 8-bay. Chargers can vary from simple linear regulators to "smart" battery chargers. Smart chargers can identify the type of battery being charged, determine the best charge cycle, monitor for overheating, and finish charge cycles when batteries are fully charged.

Battery Condition Analysis: Sometimes an analysis will be integrated within the battery charger, allowing the end-user to verify the performance of the battery. A light is normally used to indicate when recharge rates drop below 80%.

CORE STUDY ISSUES:

The labor costs below may occur as a result of poor battery performance. The actual negative impact will be unique to each facility and/or company. Each facility should consider costs as they relate to their operations and individually determine total soft labor costs.

Frequency of Battery changeout: Many manufacturers claim their equipment can operate for a full-8-hour shift without a battery change-out. Performance in the field may be less. Most of our clients typically receive 4-6 hours of performance before battery change-out is required.

Lifecycle of battery: Ideally, rechargeable batteries should have a lifecycle of 18-24 months. After this point, recharge rates will begin to drop below 80%.

Improper recharging can also impact the lifecycle of batteries, such as using batteries before they are fully charged.

Lost data: Low electrical power to the terminal can adversely impact the performance of the data collection terminal. In the extreme case, the terminal will need software rebooted or reinstalled.

Loss of connection with Access Point (AP): Low battery power reduces the data collection terminal's capacity for data transmission. At this point, workers may be forced to "roam" from the AP for a signal. Over time, workers typically learn to identify hotspots where signal strength is stronger. Additionally, some older terminals may appear to reboot if the connection to the AP is lost.

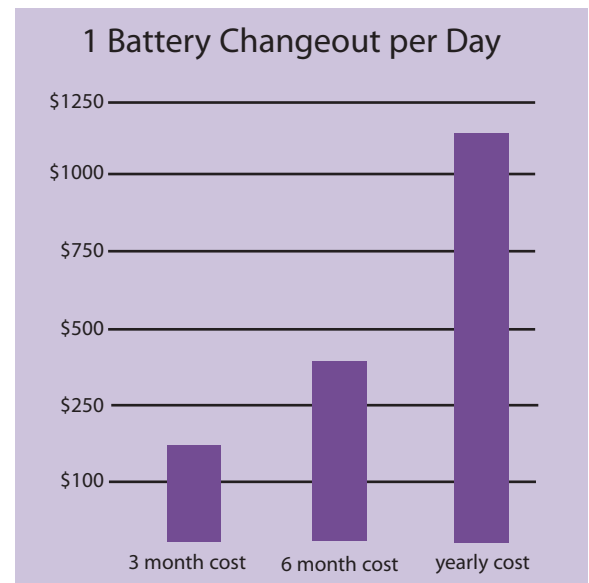
Employee frustration: A poor performing data collection terminal can adversely affect employee performance in other areas including: attention to work, accuracy of work, safety, and morale. This cost issue is a qualitative assessment left to the manager.

Users of portable data collection terminals may also consider Device Management Software that allows IT staff to monitor the performance of equipment, including battery charge levels, the number of scans performed, data transmission performance to AP's, asset tracking, security verification, performing diagnostic tests, etc.

ANALYSIS OF SOFT LABOR COSTS

The graph below outlines costs for charging one extra battery daily. The information provided is an estimate, and is provided for reference only. Each company or facility will find their situation unique. In determining soft labor costs, the following criteria are assumed:

- Costs are compared to new batteries at 100% rated charge
- Annual costs are determined using one employee at \$45.00/hr
- New battery price: \$75.00.
- Monthly cost: \$4.16 for 18-month lifecycle
- Equipment is used for a typical 8-hour work day/250 days annually
- Data collection terminals are set at standard configuration for power usage
- Workflow remains constant



Battery changeout: If one additional battery change-out per day is required, soft labor cost is conservatively estimated at 6 minutes. Changeout times may vary from a few minutes to 10 minutes, depending on operations.

Battery manufacturers typically state a 10 minute average. Using the above criteria, soft labor cost per battery changeout is \$4.50. The annual per-employee cost is \$1,125. For comparison, HandHeld Products estimates yearly cost per

employee for battery changeouts at \$1,000.

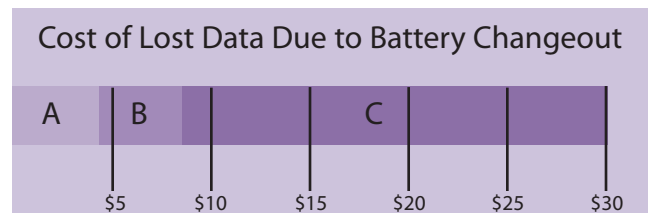
Lifecycle of battery:

Due to improper recharging, battery life is shortened by 33%; from 18 months to 12 months. Battery life varies depending on the situation. We assume that batteries need replacing when recharge rates drop below 80%, and that two batteries per device will need to be purchased. Using the above criteria, the additional annual cost per employee is: \$50.00

Lost data:

This criteria has several components:

- a) Battery change-out is required. Cost per changeout: \$4.50
- b) Lost employee productivity due to lost/reclaimed/verification of data. Estimate of four minutes: \$3.00
- c) Possible reboot/reinstall of software. Depending on operations and IT staff, 30 minutes is estimated to reboot/reinstall, including employee time to get terminal to IT staff: \$22.50



Using the above criteria, the per incident cost is \$30.00. The information provided here is again, a rough estimate. A simple, more accurate analysis is to ask I.T. how often they need to reboot or reinstall due to loss of electrical power to data collection terminals and use \$30.00 as an estimate of cost for each occurrence.

Loss of Connection with Access Point: The time required for employees to regain connection with AP can vary depending on the situation. Some employees will adjust their work patterns to accommodate, while others will grab another battery. We will assume that it takes an employee 15 seconds to search for a signal. Therefore, each scan per day that does not connect immediately

to an AP is estimated at a yearly cost of \$47.00. The information provided here is again, meant for reference only and is an estimate.

Management/employee discussions about the occasional loss of connection with AP's when batteries run low will indicate how employees respond to this disruption.

Employee frustration:

As noted earlier, this is a qualitative assessment done by the manager and should not be overlooked as a significant cost factor.

Questions to ask:

- How many hours are batteries used until they need to be recharged?
- How long does it normally take to change a battery?
- Can batteries and battery chargers be placed in a more convenient location to enhance work flow?
- Is data dropped when batteries are low?
- Is connecting to access points virtually instantaneous? If not, do they need to "roam" for a signal?

CONCLUSION

Good Power Management will put a fully functioning data collection unit into the employee's hand and allow him or her to concentrate on productive work. The greatest and most immediate Power Management are easily achieved by minimizing the amount of battery change-outs that occur. A secondary gain can be achieved by ensuring low batteries do not change work habits or work flow.

Ideally, to obtain optimal usage from your batteries, the below guidelines should be followed:

1. Strategically place batteries and battery chargers to enhance workflow
2. Use battery analyzers as a part of your daily routine to determine recharge rates
3. Retire batteries when they no longer achieve an 80% recharge rate
4. Automatically replace batteries every 18 months

5. Gain information from employees and IT to determine if poor battery performance is impacting operations.

REFERENCES

"How Mobile Computer Power Management Impacts Operators' Hard and Soft Costs"

www.handheld.com/Site.aspx/na/en/home/

"Power Management"

www.honeywellbatteries.com/index.html

ABOUT RYZEX

Ryzex is a vendor neutral third-party provider of data collection equipment and services. Our goal is to help our clients maintain and extend the life of their barcode equipment by:

- Offering new and legacy equipment from Intermec, HHP, Teklogix, Zebra, Datalogic, Symbol and other major manufacturers
- Repairing data collection equipment at our ISO 9001:2000 certified repair centers in Phoenix and Toronto
- Providing consumables such as printer media, cables and batteries
- Renting and leasing data collection equipment
- Offering Consultant Services such as RF site surveys, installations, training and consulting
- Buying back data collection equipment
- Providing e-waste solutions