

Wireless charging reduces total cost of ownership



A recipe for failure

Rugged hand held devices are purpose-built units that allow users to roam throughout the enterprise, performing various tasks depending on the application and industry. These devices have bright displays, barcode readers and wireless radio communications that consume battery power. Depending on the application, the units must be charged daily or multiple times per day. Charging requires placing a device on a docking station.

In most cases, docking stations have spring-loaded contacts that interface with contacts at the base of hand held devices. Docking stations cradle the hand held device firmly to ensure that the contacts mate properly, but their design makes them inherently prone to capturing dust, debris, coffee, moisture, and other liquids. These contaminants can react with the material of the contact and act as abrasives. Over time they corrode and degrade the contacts. Charging becomes inconsistent and eventually the units fail to charge.

Wireless charging is an attractive option for enterprises with fleets of dozens or hundreds of rugged hand held devices, which are deployed in environments such as retail stores, warehouses, factories and delivery vehicles. Enterprises rely on these devices, as their staff uses them every day to leverage hand held technology to keep products moving from production to the consumer. Inventory management, receipt of products or materials, order picking, and order shipping are common examples of device use. Failure of a device during use is more than an inconvenience; it can impact the accuracy of inventory and the on-time delivery of product to customers. In self-shopping applications it creates serious frustrations for the consumer using the device.

Temporary and ineffective solutions

The problem of failed contacts is well known, and enterprises have created processes to help combat the issue. Decision makers anticipate device breakage by purchasing extra units to deploy as replacements when needed. Having a few devices on hand to use when charging contacts fail is a typical Band-Aid solution implemented by enterprises. This increases costs in proportion to the number of devices deployed and the number of locations within the enterprise. For example, a regional sporting goods retailer with 15 locations could have 20 devices per location in active use. Each location could maintain a safety stock of three devices. If the cost of each device is approximately \$1,500, the added cost to combat contact failure is \$67,500, which adds 15% to the cost of all deployed units.

Repair of the devices further increases the costs incurred by the contact failure. Failure of a docking or charging station is fatal in most instances. These components are not treated as repairable; in most cases the equipment is considered disposable. Replacement costs for a docking station range from \$200 to \$400, depending on the device. Damaged contacts on a rugged hand held computer are repairable. In these cases, devices can be shipped to the manufacturer or certified repair provider for service.

Enterprises in retail, transportation and logistics, manufacturing, and healthcare have relied on rugged hand held devices for over 30 years to boost efficiency and productivity. All along, devices have suffered from failures due to charging contacts that get dirty, corrode, or break.

The cost of these failures and maintenance procedures implemented for prevention rapidly increase the devices' Total Cost of Ownership (TCO). Wireless charging prevents device failure, keeps workers productive and saves enterprises money, drastically reducing TCO. An enterprise with 200-300 devices can easily reduce TCO by 15% or more deploying wireless charging devices.

Replacement of failed contacts costs \$300 to \$600, depending on the device model, age, and other factors.

Enterprises always try to maximize the benefit they receive from technology investments. In many cases companies use their rugged hand held devices for six or more years. It is not uncommon to see devices in use seven or eight years after purchase. In warm, humid or dusty environments, or applications where worker turnover is high such as warehouses and distribution centers, it is common that 30% of the devices deployed will need attention after they are out of warranty and maintenance agreements. These service periods end, on average, after four years.

With an average repair expense of \$400, the cost of repairs, for the same regional sporting goods retailer with 15 locations, can total \$40,000. The cumulative effect of safety stock, replacement of docking/charging stations and repair of contacts on mobile computers is \$107,500. This represents an increase of 24% to the TCO of the equipment.

Some enterprises create specific processes to prevent the corrosion and damage of contacts on devices and charging/docking stations. Previous experience has led them to integrate a preventive maintenance procedure for all mobile devices. Both devices are cleaned periodically on a specific schedule, which greatly increases the life of the contacts but increases the TCO.

For example, a retailer with 11 distribution centers across eight states might have 20 devices in each location. As part of the preventive maintenance program, each location has four extra hand held devices. On a biannual basis, the extra units are put into service while devices that would be in use are cleaned and inspected. The process to collect, clean and inspect, then return the devices, takes approximately one hour. The process is repeated on sequential days – one group per day since the units need to be taken before the start of a shift. At a median base wage of \$13.71¹ per hour this generates an added annual cost of \$6,032 per year or \$42,226 for a seven-year life. The cost of the spare units adds \$48,226 to the TCO, an increase of approximately 15%.

When devices fail

As noted, devices fail for multiple reasons. And when they fail, there could be time lost in discovering the failure. Consider a scenario in which a worker places a device on a docking station and walks away thinking it has started charging, only to discover later the pins were dirty or broken and the unit never charged. The device then has to be repaired, at an average cost of \$300. If it cannot be repaired, a permanent replacement is necessary.

In a best-case scenario a backup unit is available, charged and ready for deployment. Otherwise, another unit must travel from another location, which requires time and effort, all of which costs money. In addition, if the

¹ Salary.com website: <https://www.salary.com/research/salary/benchmark/warehouse-worker-hourly-wages>

broken device must be returned to a supplier for repair or replacement, it takes time to pack the device, ship it, and print return addresses. Workers also must fill out and print the required paperwork, including an RMA (return material authorization).

Clearly there is a monetary impact, not only from the cost of having a backup device but also for time spent on addressing the device-failure scenario. But the impact is potentially greater than that. Without a readily available replacement, a broken device also causes downtime, which leads to productivity losses. This may affect customer service by throwing an entire workday off schedule, possibly delaying order shipments or slowing down production lines.

How wireless charging works

Wireless chargers typically consist of pads or stands. There is no need for connecting a cable. A user simply places the device on or near the stand or pad to charge it.

Wireless charging dispenses with cables and docking stations by using wire coils to transfer power through electromagnetic induction in both the transmitting and receiving units. Electric current from the transmitting device – the charger – excites electrons in the receiving device, which then turns the energy into direct current (DC) to charge its internal batteries.

A growing technology

Wireless charging as a concept dates back to the late 19th century, but its commercial use for mobile devices started in 2010 with Samsung's release of its Droid Charge² for smartphones. Since then, as wireless charging has gained popularity, a single industry standard has emerged – the Qi (pronounced chee) wireless power standard.

Leading manufacturers such as Apple, Samsung, Google, HTC, Sony and Motorola have adopted the Qi standard, and the number of products with wireless charging capability has grown into the thousands.

Those numbers are about to explode, as IHS Markit forecasts that global shipments of wireless power receivers and transmitters will hit 2.2 billion units by 2023, a fivefold increase from 450 million units in 2017³.

Wireless charger support will be increasingly common in the coming years. A myriad of devices, including laptops, voice-activated speakers, small appliances and even electric vehicles, will hit the market with wireless charging capability.

² Salary.com website: <https://www.salary.com/research/salary/benchmark/warehouse-worker-hourly-wages>

³ HIS Markit: <https://ihsmarkit.com/research-analysis/focus-on-two-new-power-energy-reports-solid-growth-projected.html>

⁴ VDC Research: <https://www.vdcresearch.com/Coverage/emob/reports/18-Total-Cost-of-Ownership.html>

Charging challenges

When enterprise budget planners and procurement officers make plans to refresh their hand held fleets, some may be skeptical about wireless charging because, from their perspective, wired charging works just fine. However, workers in a warehouse, factory floor or retail store are sure to have a different view from this “if it ain’t broke, don’t fix it” attitude. They know it’s easy to break charging contacts or get dirt and dust on them that interferes with the charging process.

Frontline workers will have greater appreciation for eliminating the battery contacts and pins in devices that over time can get dirty, bent or broken. They know from experience that each time a device is connected to a cable or placed into a charging cradle, damage can occur. Contact pins are a key point of failure for devices in industrial and retail settings. In fact, VDC Research has identified charging contacts as the top cause⁴ of hardware failure for rugged hand held devices. Even if a malfunction is caused by dirt or dust, it still takes time to carefully clean the contacts.

Damage to devices or the charging equipment can occur for a number of other reasons, such as bending or breaking the pins when roughly placing a unit on a cradle. Then there are liquid spills, accidental drops, and environmental conditions such as humidity and temperature fluctuations that can wreak havoc with electronic equipment. Another issue is that environments where rugged hand held units are used, typically are high-pressure settings where speed and productivity are paramount; this increases the chance of human error or accident.

All these charging-related problems disappear with wireless charging. Eliminating the charging contacts increases product life significantly and improves charging reliability. The removal of wires minimizes breakage potential because it means reducing the amount of equipment prone to damage. Wireless charging is also fast, devices can be put back into use quickly.

Rugged wireless charging

2010

Wireless charging is available for consumer products for about a decade.

2019

Datalogic becomes the first manufacturer to introduce wireless charging for rugged hand held units.

When to invest in wireless charging

When deciding whether to invest in wireless charging, enterprise decision-makers need to evaluate how and where their rugged hand held units are used. Application and environment are the most important factors in making the decision. Not all hand held devices are used in mission-critical situations, in which case even a modest investment in wireless charging may be harder to justify. However, wireless charging is the ideal choice for any environment where operational efficiency, worker productivity and customer service are highly dependent on properly functioning rugged hand held units.

Such environments include logistics, manufacturing and retail spaces, where the chance for breakage is highest. As it happens, they are also the environments where device failure has the greatest impact on productivity and efficiency because of the heavy dependence on the technology.

The application the rugged hand held unit is used in, is also crucial. If the device breaks, how much impact does that have on the operation? Will it cause a slowdown in shipping, manufacturing processes and in delivering services to customers? Consider, for instance, a plumbing parts distributor that experiences device failure during the spring and summer peak seasons. Or picture a retail shipping facility during the Holidays or back-to-school season. Removing the potential for breakage in these scenarios by introducing wireless charging would be a wise strategic move. It is bound to save a company a substantial amount of money in maintenance and repair costs while boosting productivity and efficiency.

Future-proofing hand held investments

Investing in wireless charging makes sense from a TCO perspective by eliminating significant costs, but it's also a smart way to future-proof a business. As noted, enterprises have to refresh their hand held fleets periodically. When they do, decision-makers will have the choice of keeping the status quo, which means continuing to pump substantial amounts of cash into maintenance for devices that require wired charging, or to take a decisive step into the future with wireless charging.

Device refreshes are necessary because technology is always evolving, adding new functionality, performance, and security features to devices. Companies that leverage innovations as the technology evolves stand to make gains in productivity, efficiency and customer service. Investing in wireless charging ensures a company only has to refresh its technology to leverage new innovations, not because it's forced to as a result of broken units or charging stations. Therefore, heads of departments that rely on hand held units to perform critical tasks should insist on wireless charging for all hand held devices by making the case that it not only helps TCO but also future-proofs the business.

The future is now

Wireless charging brings the capability to substantially boost the productivity and efficiency of an enterprise by eliminating a common point of failure in hand held devices. As such, it also eliminates the budget, staff hours and effort dedicated to maintaining hand held devices. Wireless charging is especially suited to environments where rugged devices are most needed. They happen to be the same environments where rough handling, environmental conditions, accidents and human errors are most likely.

With that in mind, enterprise decision makers should realize that the benefits of wireless charging are an additional competitive advantage and insist on devices that support this technology when replacing their fleets of rugged hand held units. Doing so will substantially reduce preventative maintenance budgets, decrease TCO and better prepare the business for the future.

Learn more at: www.datalogic.com.



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