Total Cost of Ownership
Rugged Mobile Computers vs. Consumer-Grade Devices

Introduction

Companies dealing with transportation, healthcare and field service industries need to provide their drivers and technicians with up-to-date, reliable information with the use of mobile computers. Mobile computers can slash the redundancy that workers encounter when collecting or entering data. Unfortunately, many organizations use non-rugged, or consumer-grade, handheld devices in industrial environments. These consumer-grade devices have a very large total cost of ownership (TCO).

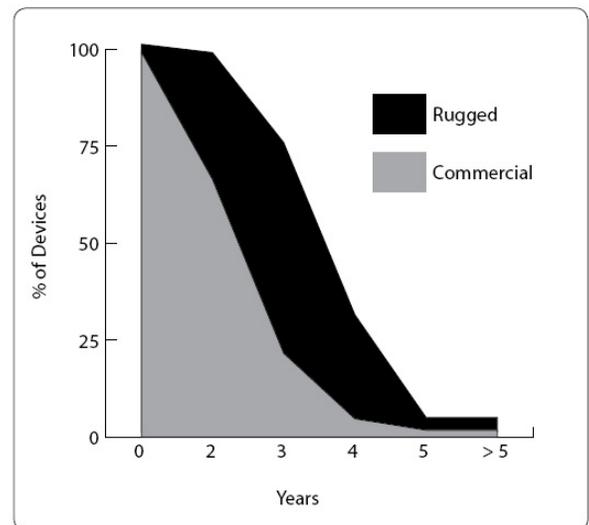Implementation costs, replacement costs, ongoing

Figure 1: Percent of Devices Remaining in the Field
Source: Venture Development Corp.

support costs, device uptime and long-term parts and service availability impact the TCO of mobile computing devices. Approximately 35% of consumer-grade devices, when used in industrial environments, are replaced within the first two years after implementation. Approximately 80% of these same devices are replaced in the next year. Rugged mobile computers such as those manufactured by Datalogic will last four to five years or more, with failure rates as low as 2% [1].

Rugged Environments are Extremely Demanding

Datalogic's rugged mobile handheld computers can withstand the challenges these environments create. Rugged devices have different standards, different operational expectations, and are tested very differently than consumer-grade devices. Fully rugged units are defined as having a 'Particulate and Water Sealing' specification of IP54. This means that the mobile computer is 'sealed' during manufacturing to withstand dust and water exposure directly to the unit. The higher the IP number, the greater the protection against dust and water. Mobile computers also have a drop-to-concrete survivability specification of 6 feet.

Non-rugged or consumer grade devices have no enhanced durability, protection or testing that certifies their operational integrity. Having a rugged device in a harsh environment decreases the risks of device failure, reduces costs and provides the user with an edge over their competition.

Buying Motives

When it comes to implementing a mobility system, organizations must understand all the costs associated with the purchase. Understanding only the initial hardware cost is not the best motive for purchasing. Buyers must also understand the cost-savings these purchases will deliver in the long term. According to Gartner Research, enterprises that base investment decisions on TCO instead of acquisition price are more successful in assessing the true cost of IT investments. With that, most people base their decisions on the hard cost: the upfront

system acquisition, deployment and training costs of mobile computers. A Venture Development Corporation (VDC) study shows that 68.4% of people base their decision on the hard cost of these devices and ignore the soft cost[2].

Soft costs are training costs, operational costs, maintenance, technical support, upgrades and downtime expenses. These costs are the majority of overall TCO and are a major factor in whether people make the right buying decision. The choice of mobile computer brand can reduce soft costs. Unlike other mobile computer manufacturers, Datalogic bundles Wavelink Avalanche™ device management products into their mobile computer products at no additional cost. The addition of Avalanche software provides users with features such as remote control and scan-to-configure that drastically reduce the deployment time, configuration errors and downtime that can be experienced at staging, deployment or failure of a mobile device.

Hard Cost/Soft Cost

Rugged mobile computers are designed for a specific purpose and not a mass market. These devices are designed to withstand harsh environments, and have many integrated components such as bar code scanning capabilities, digital cameras, GPS, WWAN, LAN radios and Bluetooth® wireless technology. Having integrated peripherals minimizes the overall TCO. Integrated peripherals make mobile computers more versatile, allowing them to act as multiple devices at once. Moreover, these peripherals carry the same rugged
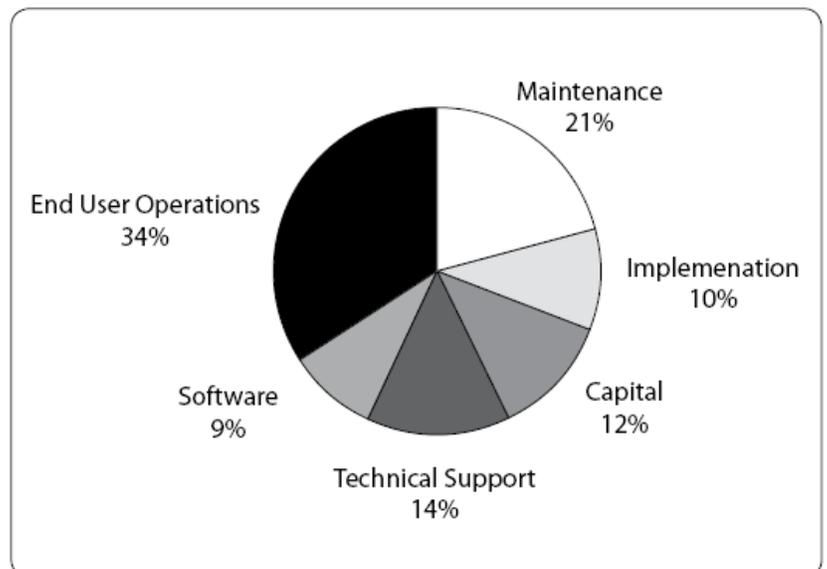

Figure 3: What Contributes to TCO?

rating as the mobile computer, making them more resistant to failure and reducing the TCO for companies who would otherwise have to buy several devices to do the job of one.

Conversely, consumer-grade handheld devices have external peripherals that increase the TCO. Because the scanners, GPS units, antennas and other peripherals are not integrated, they can break during use, be lost or suffer from compatibility problems. These peripherals, like the non-rugged computer, are not designed to be dropped, sat on, thrown in a truck or abused. Instead, these devices are intended for a consumer environment where their exposure to abuse is minimal and expectations for rugged use are low.

The TCO of consumer grade devices when used in industrial environments nearly doubles the amount of investment spent during five years as compared to rugged devices. When used in these environments, failure rates of consumer-grade devices can be as high as 30%. The labor wages and lost revenues attached can cost over $125 per hour. In a route application, each time a device fails, vehicle drivers can lose as much as 75 minutes of productivity. Yearly soft costs, including downtime and productivity loss from device failure of consumer-grade devices are approximately $3,800. For rugged mobile computers, this cost is about $1,700[3].

Mobile devices are going to be abused and a device failure will cost hundreds, if not thousands, of dollars. The key to success in a rugged environment is to minimize the risks of failure and obsolescence while maximizing mobile worker productivity. For this reason, Datalogic designs and tests their products to
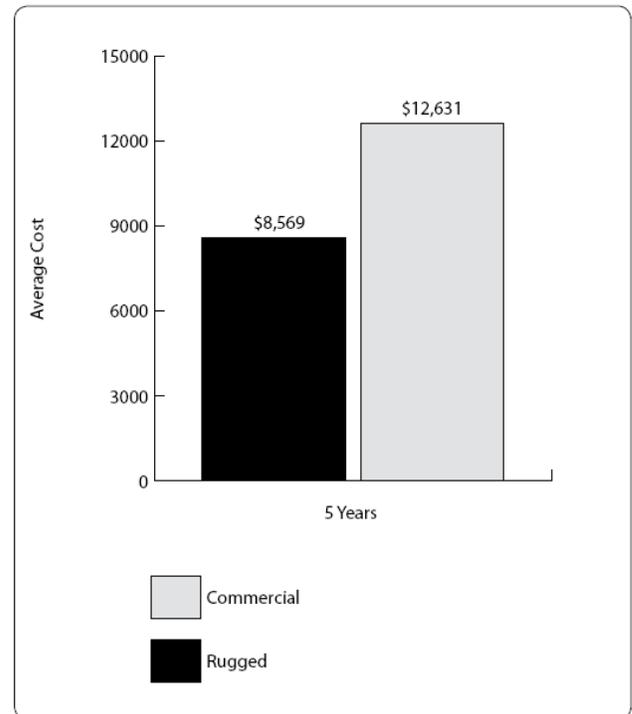

Figure 2: 5-year Average Annual TCO, Per Device, in Supply Chain Environments
Source: Venture Development Corp.

endure the rigors of the mobile workforce while maximizing the productivity of mobile computer users.

One Powerful Platform

Datalogic handheld computers have GPS capabilities, allowing users to perform geo-fencing turn-by-turn navigation, bread-crumbing and more.

Geo-fencing is a tool for employees and drivers to set geographical areas. It provides dispatch managers with information warning them if company drivers are not where they are expected to be. Bread-crumbing records a driver's route activity. This information is analyzed to determine where time, traffic and distance can be saved resulting in a reduction of fuel costs and increasing the driver's productivity.

United Parcel Service (UPS) uses bread-crumbing technology and noticed that when drivers made left turns at stop lights, they wasted significant time, burning more fuel and creating a larger carbon footprint. By bread-crumbing, the company developed a strategy to slash the amount of left turns. This cut UPS's fuel costs, increased each driver's productivity, and decreased their fleet's carbon footprint.

UPS also used GPS to help drivers be more effective on the road. In 2006, UPS shaved 28.5 million miles off their delivery routes. This saved approximately 3 million gallons of gas and reduced their CO_2 emissions by 31,000 metric tons[4]. This is important for all companies, and especially those going 'green'. GPS technology can help companies become environmentally friendly. It offers drivers and management the tools necessary to increase the efficiency of their overall mobile processes.

Rugged mobile computers also have wireless radios with GSM, 802.11, and Bluetooth® wireless technology for wide area network (WWAN), local area network (LAN), and personal area network (WPAN) communications. These features keep workers connected to their

enterprise and their equipment inside and outside of the facility. GSM communications is capable of transmitting information to and from the servers located in enterprise facilities when workers are remote. Drivers can collect and send information in real-time. Real-time communications boost productivity by eliminating data entry tasks upon returning to the facility. Moreover, real-time data entry means orders, billings and other processes are entered instantaneously and begin processing before the return of the mobile worker. This speeds processing time, increases customer service levels and reduces time-to-revenue. On-site invoicing and collections can reduce customer payment cycles by 30 to 45 days.

Using their 802.11 radios, mobile computers can transmit information gathered during the day to the enterprise LAN when the drivers return to their facilities. To reduce the cost of communicating over the different networks, applications within rugged devices automatically choose the appropriate connection. For example, if both 802.11 and GMS connections are available, the computer will choose the 802.11 because it is the less expensive of the two connections. Internal 802.11 connections do not carry the costs from cellular telephone service providers.

Wireless communication features in mobile computers also ease peripheral device communications. Using Bluetooth® wireless technology, mobile computers can communicate with other devices without the use of any additional cables. Drivers can use their ear pieces for communication, wireless on-site printing, or access other devices in their vehicles. Both of these options improve productivity and safety, freeing up drivers' hands and allowing them to give customers what they need. Moreover, connection and removal of peripherals is a wear point where failure can occur leading to expensive down time.

Organizations today expect to be able to track the inventory they have on the road. All of Datalogic's mobile handheld computers offer an integrated bar code scanner. Drivers can scan all incoming and outgoing products that enter and leave the trucks. The information is transmitted wirelessly to update inventory counts. There are several bar code scanning technologies: a laser scanner reads traditional 1D bar codes. Area imagers scan 1D and 2D bar codes and provide two major advantages over laser scanners. First, area imagers are

capable of reading 2D bar codes. Also, area imagers can take black-and-white photographs for proof-of-delivery. This gives drivers the power to take pictures of damaged products or blocked gates to ensure their claims and/or credibility.

Bar code scanners also eliminate the risk of human error when entering data into a system. Research shows that manual data collection tends to produce one error with every 300 keystrokes. In a warehouse that processes 10,000 order lines each day with an average of 10 keystrokes per line, errors generated are 333 daily or 17,000 data errors annually. Automating data entry eliminates keystroke data errors and more importantly preserves the integrity of the warehouse inventory database.

Labor Cost/Maintenance Costs

Labor and maintenance costs comprise most of the TCO for mobile devices. Finding ways to minimize these costs is essential for companies to become more efficient. One study shows that replacing paper-based maintenance procedures with automated systems can give technicians up to 40 percent more productive time[5]. Having an automated system not only increases productivity at the point of work, but also in the back-office operations.

Drivers will have information at their fingertips. This minimizes the time they spend communicating with operators, technicians and dispatch. They'll also have less paperwork and reduce the need to phone in service information. Plus, they will only have to enter invoices, reports and other service call information once. As soon as the field worker enters the data into the handheld mobile computer, it is transmitted in real-time into a company's back-office system.
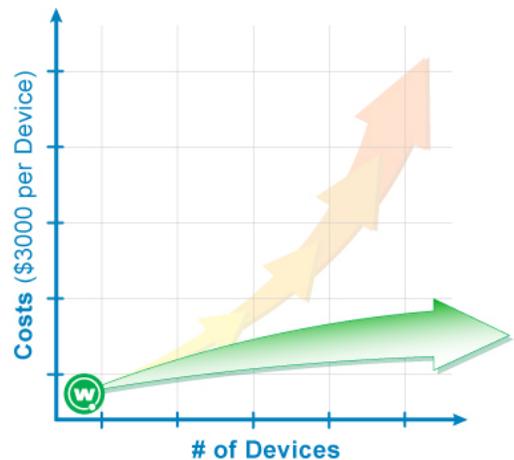
In one application, a Datalogic customer illustrated how automation can be used to meet new government requirements for the food industry. By automating a field process and using a ruggedized Datalogic mobile computer, real savings were attained. Automation gained $8,000 per technician and increased efficiency to allow four technicians to do the work of five. This saved $32,000 annually, based on industry standard wages. It used to take technicians about two hours a day to pick up and file paperwork. Because the data is now collected and transmitted using mobile computers, workers use the time they saved to complete more stops and decrease the amount of fuel they were using. Andy Deering, Vice President of sales and support for Service Pro, noted that with savings like that, rugged mobile handheld computers pay for themselves in about five months.

Warranties can also affect the total cost of ownership. Non-rugged devices carry consumer warranties that last 30 to 90 days. Also, extended warranties might not be offered or tailored to enterprise purchases. Repair or replacement can take weeks or longer. The reduction in downtime is critical to an enterprise and merits the use of Maintenance Service Agreements (MSA) as a means to reduce TCO. Datalogic is a leader in MSA implementation, taking into consideration the needs of the enterprise and offering multiple levels of MSA. One offering, the Quick Replacement Plan, maintains preconfigured spare mobile computers at a Datalogic facility. This safety stock provides almost instant replacement. A field failure can be replaced the following day with a new unit shipped overnight to the enterprise. This is just one example of how MSA can reduce downtime and keep TCO at a minimum.

Device Management

Seventy-six percent of all costs related to rugged mobile handheld computers are management costs. As mentioned earlier, 68.4% of people base their decision on the implementation costs of the hardware and software. After realizing that most costs are associated with management costs, organizations need to look deeper into the TCO of mobile devices. There are device management tools that can decrease the amount of time IT

support staff spend diagnosing failures or formatting hardware.

Device Management Software (DMS) cuts organizations' costs by reducing the burden on IT resources and eliminating labor-intensive management of mobile equipment. Datalogic provides device management tools free of charge on each of their rugged mobile computers. Datalogic bundles Avalanche device management tools from Wavelink Corporation, the de facto industry leader in remote device management.

With Avalanche DMS, users can manage hundreds of rugged mobile computers from a single PC. Management can also use it for device configuration, device monitoring, software distribution, firmware updates, licensing management, security management and operating system upgrades. Without Avalanche DMS, managing mobile devices is a one-at-a-time process. Avalanche DMS automates the process allowing managers to control or monitor multiple remote mobile easily.

Users maximize the implementation of Avalanche™ DMS tool with WWAN communications. This allows the DMS to manage devices while they are away from the facility. As long as the devices are connected to the network, they can be updated. This capability minimizes the amount of time that devices are connected to the network and reduces costs.

With DMS, IT managers can schedule remote device updates instead of bringing in each one to be manually updated. Updates can be scheduled day or night any day of the week. Management can also access devices remotely and troubleshoot for any problems. This reduces the amount of downtime drivers have if a device is acting up. And if a device is lost or stolen, DMS tools can automatically lock down the units, prevent any information from being stolen or completely purge all data on the device. This implementation assures that

mobile devices do not compromise enterprise data or network security.

Comparison Case Study

A comparative case study was performed between a waste management company that used 1,400 rugged mobile computers and a field service provider that used 100 non-rugged devices6. The five-year study recorded all of the hard and soft costs involved. For the waste management company with the rugged mobile computers, the annual TCO was $2,746. The non-rugged units for the field service provider had an annual TCO of $4,693. The difference in TCO was attributed to the high degree of failure of non-ruggedized devices being used in a demanding environment. The total soft cost for the rugged units was $1,100, compared to $3,282 for non-rugged units.

Hard costs can be very deceiving. Organizations believe they are making a solid investment when they have a lower initial device cost. Unfortunately they're not seeing the results they expected and they don't understand where they are losing money. Soft costs add the most to the TCO of mobile devices and need to be allocated properly to make a true IT investment.

Conclusion

When considering mobile field automation, companies must decide whether to use a consumer-grade handheld or a ruggedized mobile computer. They must consider the environment these devices are going to be functioning in. Organizations should not only consider the purchase cost of these units but also the following:

Performance: Mobile handheld computers will outperform and outlast consumer-grade products in rugged environments. Organizations using rugged devices are seeing greater ROI than those using consumer grade-devices in these environments. In just two years, rugged mobile computers provide a TCO advantage over consumer-grade devices. This ROI

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augments other gains that organizations achieve when using automated systems.

Hard and Soft Costs: Companies must account for both soft and hard costs when making purchasing decisions. The hard costs of such an application only make up 25 percent of the TCO of mobile devices. Soft costs make up the other 75 percent. The more maintenance, replacement, downtime, loss of productivity, software loading and training a device requires, the heavier the impact it has on their TCO.

Footnotes

1. *Venture Development Corporation*
2. *TCO Models for Mobile Computing and Communications Platforms, VDC, July 2007*
3. *TCO Models for Mobile Computing and Communications Platforms, VDC, July 2007*
4. *Left-Hand Turn Elimination, The New York Times Magazine, December 2007*
5. *Syclo Systems*
6. *Venture Development Corporation (VDC)*

Datalogic ADC, the world leader in Automatic Data Capture, offers state of the art solutions with fixed position retail scanners, handheld scanners and mobile computers. Datalogic ADC's range includes in-counter and on-counter point of sale scanners, general purpose and ruggedized handheld scanners, rugged mobile computers, industrial PDAs and vehicle mount computers. Solutions for applications in several sectors include healthcare, hospitality/entertainment, manufacturing, retail, services and transportation & logistics.

Businesses in the retail sector can particularly benefit from Datalogic ADC's vision-based technology solutions, analytical tools, self-shopping solutions and consumer relationship technologies.

A division of the Datalogic Group, Datalogic ADC is headquartered in the US with a presence in over 120 countries.

For more news and information on Datalogic ADC, please visit [www.datalogic.com.](www.datalogic.com)

Datalogic Group is a global leader in Automatic Data Capture and Industrial Automation markets. As a world-class producer of bar code readers, mobile computers, sensors, vision systems and laser marking systems, Datalogic offers innovative solutions for a full range of applications in the retail, transportation & logistics, manufacturing and healthcare industries. With products used in over a third of world's supermarkets and points of sale, airports, shipping and postal services, Datalogic is in a unique position to deliver solutions that can make life easier and more efficient for people. Datalogic S.p.A., listed on the STAR segment of the Italian Stock Exchange since 2001 as DAL.MI, is headquartered in Lippo di Calderara di Reno (Bologna). For more news and information on Datalogic, please visit www.datalogic.com.

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