



The Right Handheld Computer for the Right Price

The value of using total cost of ownership to decide between consumer-grade and rugged handheld computers

by Dale Kyle

Businesses may be tempted to base buying decisions solely on a product's purchase price, but, while not as obvious, the product's total cost of ownership (TCO) may prove to be a more important consideration. This article assesses whether businesses should use initial cost or TCO when deciding whether to purchase rugged versus consumer-grade handheld computers.

Businesses that rely on initial cost in making their buying decision often do so because it is easier to calculate and plan for a fixed, one-time cost. What could be simpler than looking at a price tag and deciding if there's enough money in the budget to pay the bill? In the case of consumer-grade handheld devices, the purchase price is usually well below that of rugged handhelds, and budget-minded businesses may be swayed by the obvious advantage of saving money upfront.

Savvy businesses have begun relying on TCO instead of initial cost. Although calculating TCO is more complicated, it offers a more thorough analysis of a product's true, long-term cost. The TCO for handheld computers, for example, includes all the direct and indirect costs accumulated over the life cycle of the product, from acquisition to disposal. These costs—including training, software, IT support and repair costs—can be far greater than the original purchase price.

In short, businesses deciding which handheld computer to purchase face a high-stakes buying decision: Is it more cost-effective to buy a consumer-grade handheld for less money upfront? Alternatively, is it wiser to pay more money initially to purchase a more durable rugged handheld device?

The research on this topic supplies an unequivocal answer: Don't be fooled by the sticker price. Businesses that purchase rugged handheld computers will possess the right tool for outdoor environments. And they will save a significant amount of money—as well as time and energy—over the long haul.

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What's the Difference? Rugged Versus Consumer-Grade

Handheld computers were developed to offer the many advantages of portability. Of course, portability comes at a price: What is easily picked up can also easily be dropped. In addition, devices that can leave the office often end up exposed to dust, water and other potentially destructive elements such as shock, temperature extremes and vibration.

The basic difference between consumer-grade and rugged devices is quite straightforward. Consumer-grade handhelds are lightweight, fitting easily into a purse or pocket, and they are designed primarily for protected indoor use. Rugged handheld devices, on the other hand, are built to withstand dirty, dusty, hot, cold, vibrating, wet or otherwise hostile environments.

Rugged handheld computers undergo extensive testing to evaluate their ability to withstand various environmental challenges. Two basic standards—ingress protection (IP) ratings and military testing standards such as MIL-STD810F—demonstrate the ruggedness of handheld devices. IP ratings use two numbers to describe the unit's protection against dust and water. The first number (from 1 to 6) measures dust protection, and the second (1 to 8) describes water protection. An IP54 rating, for instance, means the unit is protected, though not sealed, against dust and is resistant only to sprays of water.

The second major standard, MIL-STD-810F, describe an extensive battery of test procedures that determine whether a handheld device can withstand a variety of adverse conditions such as drops, altitude, humidity and temperature shock. For example, the tests require that the unit be dropped onto a hard surface without suffering serious damage. Military-standard drop tests are conducted from 26 different angles onto a plywood-over-concrete surface, from a height of four feet.

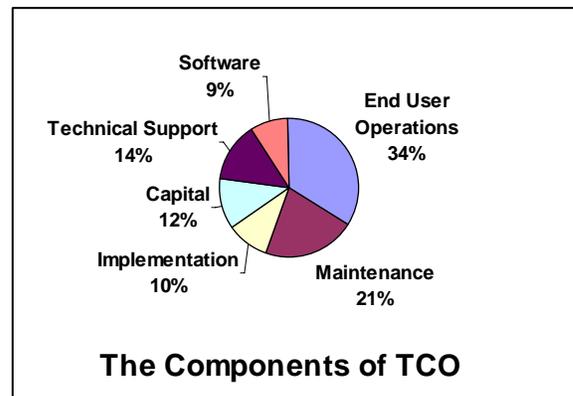
Because of their ability to survive such challenging conditions, rugged handhelds traditionally have been the device of choice for people working in the harshest field conditions—from construction workers to well drillers and firefighters. Petty Officer Justin Schnute of the U.S. Coast Guard's Station Oregon Inlet, for example, said his crew switched to rugged devices for a rather obvious reason: "At a surf boat station, you're talking about 47-foot boats going into 30-foot waves. We needed rugged."

But because dropping handheld computers or exposing them to dust or water can happen just about anywhere, rugged units are also becoming more common in less-obvious settings, such as warehouses and retail outlets. At the same time, some commercial-grade users have attempted to "ruggedize" their devices, with limited success, as described later.

Making Sense of TCO

In 1987, the Gartner Group developed total cost of ownership, or TCO, analysis, a calculation designed to help businesses assess the total cost of a given purchase over the life span of the item. Originally applied only to computer purchases, TCO analyses have since become widely accepted and relied upon for examining products ranging from vehicles to cell phones.

TCO tries to capture all costs incurred during the lifetime of the product-use cycle. This includes both the initial cost to acquire a given item as well as a wide range of additional direct and indirect costs incurred during the study's time span. For consumer-grade handheld computers, initial cost also includes the cost to "ruggedize" the handheld devices, making them suitable for work in the field.



The following are some of the direct costs for acquisition and deployment of handheld computers that are calculated as part of the TCO:

- Hardware and accessories: handheld devices, plus peripherals such as docks, scanners, power supplies, protective cases, radio cards, expansion sleeves, etc.
- Maintenance: software and hardware maintenance and service, extended warranties, spares, modifications and testing to support new hardware.
- Operations: fees (ASP, airtime, etc.), consumables, etc.
- Services: integration, training, management, curriculum development, support, etc.
- Software: license fees, application software, development and customization costs, etc.

Indirect costs are not as easy to predict, but to avoid unpleasant fiscal surprises, indirect costs should be a significant consideration for budget-minded businesses. The TCO takes into account such indirect costs as:

- Downtime: time spent backing up, troubleshooting, restoring and servicing devices, as well as re-entering data and recovering work lost due to device failures.
- IT support: help desk, troubleshooting, management and logistics, testing, training, etc.
- Business losses: costs associated with lowered customer service levels, dissatisfied customers, lost business opportunities, etc.

While the acquisition cost for a product makes a large initial impact on budgets, these additional costs—both direct and indirect—usually play a far larger role in the total cost of the product. The reason for this becomes clear when the impact of an indirect cost such as downtime is explored. Downtime affects the direct user, but the costs extend to many other people, from disappointed customers to those in the organization who offer support or must work around the problem.

Downtime is one example of an indirect cost that can strike a business at any time and can result in lost revenue opportunities, billing delays, late deliveries and other significant problems that are difficult to pinpoint but can be extremely costly. Only TCO provides an accurate tally of these underlying and continuing expenses.

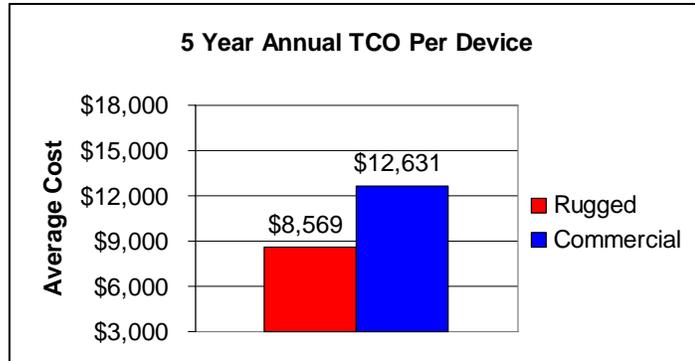
Surviving Sticker Shock: The Numbers that Really Matter

The initial purchase price for handheld computers—the cost that unduly influences some businesses—actually comprises less than 25 percent of the total annual cost of ownership. And with higher rates of breakdowns, businesses that purchase consumer-grade handheld devices to save money initially will usually end up paying a high price in repairs, support costs and lost productivity.

In 2003, Venture Development Corporation (VDC), an independent technology market research and consulting firm, compared the TCO for rugged versus consumer-grade handhelds. The VDC study found a significant TCO advantage for rugged handhelds over a five-year period and across all eight operational areas (such as supply chain and field services) studied.

The VDC study found that the sticker price is only the beginning of the costs associated with ownership of handhelds. Over the life span of the equipment, maintenance and support costs, as well as intangible costs, were 10 to 40 percent higher for consumer-grade as opposed to rugged devices.

As early as the second year of ownership, the VDC study found the initial price savings of consumer-grade computers disappeared under the weight of 44 percent higher IT support requirements, as well as lost productivity. By the five-year mark, organizations with rugged handheld computers saved an average of \$1,610 compared to those with consumer-grade devices. The consumer units, with their lower initial costs, ended up costing \$12,631 over five years, compared to \$8,569 for rugged devices.



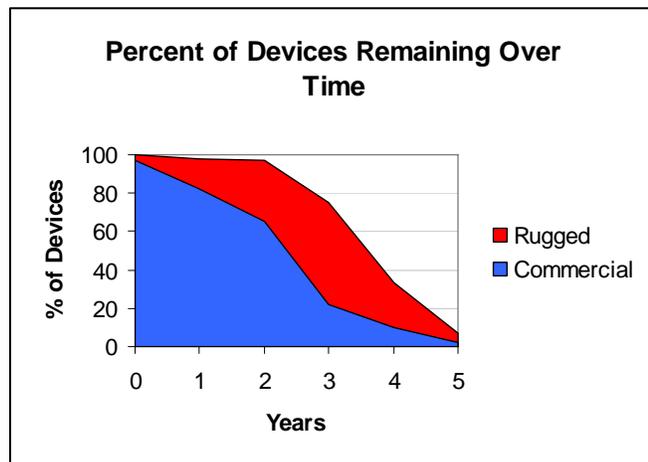
The VDC study highlighted several other differences between rugged and consumer-grade handheld computers—differences that, over time, assign a significant fiscal advantage to purchasing the rugged units.

Built to Last

Rugged handheld devices are built to last—and it shows in the durability of the units. Rugged devices suffer less downtime and are more dependable on a daily basis, plus they last one-third longer than their consumer-grade counterparts. This is not entirely surprising given the design of the rugged devices. Dropping handhelds or exposing them to dust, water or other environmental hazards is a common occurrence for most field workers, and only rugged handhelds are designed to withstand such conditions.

According to the VDC study, the average replacement cycle for rugged devices was 4.5 years, compared to just 3 years for consumer-grade. After two years of use, just 2 percent of rugged devices had to be replaced in the VDC study, compared to a remarkable 35 percent of the consumer-grade units. And 80 percent of consumer-grade units needed replacement after just three years.

In addition, rugged computers were found to break down less often during their longer life span—just 12.2 hours of downtime per unit per year, compared to 25.5 hours for consumer-grade units. Each hour of downtime costs a business in lost productivity. In fact, the VDC found that downtime costs consumer-grade users approximately four to five times more than the purchase price over the life of the units.



The Right Tool for Your Environment

A common argument for purchasing consumer-grade equipment is that it can be upgraded to rugged-like levels for a total price that still falls below that of rugged handhelds.

But, “rugged-like” will never be as good as designed-rugged. After-market ruggedization accessories generally attempt to create a bubble around a fragile device to protect it from the elements. A rugged device is generally rugged inside and out and will hold up longer than rugged-like devices.

When a unit is designed to be rugged, every aspect of the device takes into account the rugged specifications that must be met. This includes everything from the choice of individual components to the sealing and protection of seams, and the protection of fragile areas like the screen and the PC board.

In addition, the use some of after-market ruggedization upgrades often makes the unit more cumbersome and difficult to work with. This can significantly lower productivity, and that will add to the real cost of supposedly “cheaper” units.

Power Struggle

Another problem with consumer-grade devices concerns power. Because low weight, rather than long battery life, is a primary design consideration in consumer units, they generally need recharging after far less than a typical work day. With rugged units, managing power—and increasing battery life—saves time and money on a daily basis.

The importance of longer battery life becomes when one is in field conditions where recharging is not possible, at least until the worker is able to return to the office at the end of the day. In this instance, longer battery life results in greater productivity each day.

Conclusion

Finding the right IT hardware for every worker and every job is immensely challenging. Given the pressure to stay within limited budgets, businesses may understandably be tempted to purchase products with a lower initial cost, especially if the cheaper products claim they can be “built up” to roughly equate to higher-priced competitors.

However, in the case of rugged versus consumer-grade handheld computers, the initial price is a misleading, one-time snapshot of a product that should last multiple years. The consumer-grade devices suffer from more frequent downtime and a significantly shorter life span, quickly eliminating their initial price advantage. As shown through the TCO analysis, rugged handheld devices suffer less downtime and last longer than consumer-grade handhelds.

Mobile handheld computers are designed to increase productivity. The ability to do work on the move and in the field presents the opportunity for enhanced speed and accuracy. These advantages are lost, however, when devices break down, need repeated service or must be replaced. Therefore, for businesses concerned with obtaining the greatest productivity over the long term, rugged handheld computers are the clear and convincing choice.

The Gartner Group (www.gartner.com) and VDC (www.vdc-corp.com) offer additional information and research about TCO in general and as it applies specifically to mobile computing.

About Dale Kyle

Dale Kyle is Rugged Handhelds Product Manager for Tripod Data Systems, a wholly owned subsidiary of Trimble. He has more than 15 years of experience in product development, systems testing, quality assurance and customer support for GPS and other navigation hardware and software. At Magellan Corp., he managed the development and technical approval of an OEM board that combined GPS and wireless communications via the ORBCOMM satellite constellation. At Glenayre Electronics, he managed the development, marketing and early production activities of a consumer wireless/GPS personal location and asset tracking device. He also produced a number of user manuals and other technical documentation for GPS receivers and software at Thales Navigation.

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