THE ADVANTAGE OF DEPLOYING DELL RUGGED PCS

THE BENEFITS OF SCALE, EXPERIENCE AND PREDICTABLE PERFORMANCE

EXECUTIVE SUMMARY

The traditional PC market has been in decline since 2012; however, the market recorded some growth in Q1 2017[1] before shrinking 0.4% percent in Q2 2017[2], according to IDC market data. Sub-segments within the PC market, for example 2-in-1s as well as high-end gaming PCs, are partially driving this growth, reflecting an increasing need for mobility and a workforce operating outside of traditional office environments. While smaller in comparison, the rugged PC market also contributed to the positive sales report and may continue to boost sales, with an expected global CAGR of 5 percent from 2016 to 2020[3] and opportunity in higher growth markets like India and China. As the Internet of Things (IoT) continues to expand, the rugged PC market may likewise expand as operational technology in field environments is connected and integrated into IT networks, and compute, storage and data analysis move outward through the network to enable actionable insight.

Panasonic essentially created the rugged category with its Toughbook brand of notebooks and tablets and it, along with Getac and Dell, are the largest players in the historically limited rugged PC market. The complexity, testing, and development costs needed to meet rugged user industry standards prevent would-be competitors from entering this market, relegating them to markets they can more easily address. However, the scarcity of major players results in a traditional lack of choice in the market, with two of the three main OEMs lacking the scale needed to drive down costs and effectively bring out new technologies. Most of Panasonic's business is not focused on client technologies, and Getac only manufactures low-volume rugged computers and chassis. Of the three, Dell is the only scale player in this category.

Dell's unique approach to rugged computing includes a battery of tests and hardware development methods designed to produce more reliable, rugged systems, and its scale

[1] IDC Q1 2017 Market Data – April 11, 2017
[2] IDC Q2 2017 Market Data – July 12, 2017
[3] Technavio Global Rugged Device Market – December 2016

allows it to deliver the latest technologies faster and more reliably to the market. Dell's broad presence as a global PC manufacturer allows them to serve higher volume and more customers around the world, thanks to the company's existing commercial and consumer support network and supply chain. Dell's approach to rugged computing is an extension of what they have already been doing as a leading manufacturer of enterprise solutions, as well as commercial and consumer PCs.

MARKET OVERVIEW

Rugged PCs, which are predominantly used for vertically aligned commercial computing needs, are designed to meet certain stability and reliability standards in harsh environments, including extreme temperatures, dust, moisture, water, shock, and vibration. Deployed more like infrastructure than traditional commercial PCs in fields like law enforcement, fire and rescue, mining, and oil and gas exploration, rugged PCs are mission critical in these sectors where minimal downtime is a key competitive necessity and customer requirement. The integration of such devices into the operational technology will only increase the mission-critical nature of rugged PCs.

One of the customer challenges of the rugged PC market is the high cost of these systems relative to commercial and consumer PCs. The certifications, rigorous testing and a long qualification process to meet rugged PC standards add cost and make it difficult to bring the latest consumer or commercial technologies to the rugged PC market. The relatively small market size compared to the rest of the PC market also makes it hard to get to a scale that could benefit customers with more design diversity and price segmentation. In addition to the rugged PCs themselves, there are extensive integration requirements, and equipment compatibility is essential to enable vehicle docking, specialized mounting, broadband connectivity, and GPS signal.

The three major players in the rugged PC market all have different core competencies. Panasonic Toughbook is the biggest player in rugged PCs, but Panasonic's rugged business represents a very small fraction of the company's overall business and it is the only type of PC they sell in the U.S. In 2016, Panasonic recalled hundreds of thousands of Toughbook systems[4] due to flammable lithium-ion batteries, causing some to question if its focus may have shifted away from the rigorous testing and supply chain

[4] Voluntary Battery Recall: May 16, 2017

necessary for rugged PCs. Getac only builds rugged PCs with no other PC businesses, and comes from a history of manufacturing systems for GE Aerospace and MiTAC[5]. Dell is a consumer and commercial PC manufacturer, and is the second biggest player in the rugged PC space. Rugged PCs are a natural extension of the company's commercial PC business. With over ten years of experience in the rugged PC market, Dell revitalized its commitment in 2014 with an aggressive strategy and new leadership. ASUS, HP, and Lenovo do not play in the rugged space.

Since its inception, the rugged market has largely been stagnant, with most players offering similar types of products in similar price bands. There are still limited choices for enterprises and even more limited support options for rugged customers. Customers have reached a level of satisfaction with the ruggedization, so that incremental improvements in rugged specifications would no longer be valued. As a result, more ruggedization is no longer a disruptive innovation. Sophisticated solutions, improved designs, reduced weight, and lower cost are more enticing features in this space. As a result, the rugged PC market is due for a shakeup.

TESTING DELL'S RELIABILITY

Dell is a privately owned global PC manufacturer with the size, resources, and ability to develop, test, and support rugged PCs on a global scale without having to rely on third parties. The testing methodology for rugged PCs that Dell uses comes from many years of building and testing commercial and consumer PCs to deliver better reliability and long-term stability. Dell requested that Moor Insights & Strategy evaluate their testing methodology and results to verify the process.

Testing Methodology

Dell performs a series of tests to help identify and eliminate issues affecting reliability. This specific series of tests is designed to power cycle a computer through four different power states: cold boot, warm boot, S3 suspend, and S4 suspend. Once the computer is brought out of the power mode, it checks for any missing or erroring devices in the device manager. It also logs if any Blue Screens occur in the process of powering on the system. It does this at least 250 times per power mode, resulting in at least 1,000 tests per device at a minimum.

[5] Getac Begins

This test is a key indicator of a system's long-term reliability because many components tend to fail upon power-up, and it also reflects the different kinds of real-world power states through which a computer cycles in normal usage. Dell ran these tests thousands of times (in some cases up to 5,000 times per power cycle) across their systems to validate this process and to gather enough data to discover and resolve any issues. They provided Moor Insights & Strategy with the test results gathered from testing upwards of 500 hundred of units and testing methodology for our review.

To validate these results and the testing methodology, we purchased one of Dell's systems through Dell.com and a competitor's system through a third-party distributor. We configured both systems as closely as possible, based on what was available from both companies. We then evaluated this testing methodology on both the Dell system and the competitive system using a third-party tool designed to emulate Dell's own internal testing methodology. [6]

Each test comprises at least 250 'loops' in which the device runs through 90 seconds of powering on, and then it checks for missing devices or errored devices in the device manager. Like Dell's tool, it also logs any potential Blue Screens. This accelerated test 'ages' the hardware by constantly power cycling it hundreds of times through multiple power states. Such a methodology is how one would expect to find any potential issues with the hardware without having to test it for years in the field.

FIGURE 1: POWER STATE CYCLING TEST RESULTS

System	Cold Boot Pass Rate	Warm Boot Pass Rate	S3 Suspend Pass Rate	S4 Suspend Pass Rate	Average Pass Rate
Dell	100%	100%	100%	99.7%	99.9%
Competitor	95%	94%	99.3%	89%	94.3%

Source: Moor Insights & Strategy

The test results were impressive. Out of hundreds of tests on the Dell system, we only encountered one error across all power states. The competitor's system tested with the

[6] Testing Tool and System Configuration – Appendix A

same tests in the same amount encountered more failures. When rebooting from a warm boot, the competitive system had a failure rate of about 5 percent. Our results - while a much smaller sample size - matched Dell's results which were tested across many more systems and many hundreds to thousands of times more.

OUTCOMES

Dell's systems, as illustrated above, do not have issues with aging tests. These tests are a portion of the larger body of testing that Dell does to represent initial human interactions with the machines, but our review of their methodology and results validate their claim to greater reliability and uptime based on this series of tests.

OTHER IMPORTANT RUGGED PC CUSTOMER CONSIDERATIONS

The Buying Process

There are many reasons to consider Dell as a trusted rugged PC provider. One of the biggest benefits of buying a Dell rugged PC is that you deal directly with Dell and configure your PC with the help of staff dedicated to rugged PC customers. With this staff, we handled the entire purchase process over email and phone. Panasonic and Getac both sell their systems only through third-party distributors and integrators. We purchased the Dell Rugged notebook with an expected delivery of approximately 5-10 business days with an actual delivery of only five business days. The competitor's system was purchased with an expected lead time of 5-6 weeks but took eight weeks and was not delivered to our specifications.

According to Dell, this approach allows for them to deliver rugged systems predictably and on schedule. Moreover, this is possible within their customers' budgetary and quarterly deadlines. Dell can also deliver replacement systems more quickly because of its overall faster build times with configure-to-order systems. All of this is possible, thanks to Dell's own corporate PC supply chain.

Support

Dell also offers in-house global support, which their competitors do not offer. Dell's global support reaches110 countries and operates 24/7, which is an absolute must in mission-critical environments and in the global economy. Dell's staff provide on-site support, not through a third-party contractor. In addition, Dell offers service level agreements (SLAs) which can guarantee certain levels of service depending on the customer's needs.

Dell Technologies and the broad portfolio of solutions underneath provide customers complete end-to-end solutions, including endpoint and data security. Dell also offers enterprise-class manageability as part of their commercial Latitude value proposition on the rugged devices with unique Intel vPro optimizations and rapid imaging deployment. These unique capabilities and solutions can streamline many commercial and government IT procurement, deployment, and support activities, especially if the organizations are already Dell customers.

Scale

As a global PC provider, Dell has relationships with many software and hardware partners. These relationships allow for the smoother integration of hardware and software as well as comprehensive support capabilities. This also helps to elevate the quality of partner products through rigorous testing and validation with their rugged systems.

Dell's ability to better scale for volume orders, deliver shipments faster, and competitively price components is instrumental in delivering competitive value. According to Dell, its scale also allows them to be more disruptive in the rugged PC space, and to introduce new price points and capabilities that their competitors can't match. For instance, Dell offers a new well-appointed, semi-rugged system with the latest processor for roughly $1,200. This is a much lower price point than at which rugged systems have traditionally been made available. The company has proven that because of its scale and industry-leading experience in consumer and commercial PCs, it can deliver the latest technology at lower cost.

CONCLUSION

In the past, rugged PCs were more of a hobby for Dell, not a focus area. However, according to Dell, since 2014 they have made investments in this category specifically to improve their product designs and develop more sophisticated engineering and testing methods, and they have demonstrated a renewed commitment to the market. We have validated their testing methodology and test results for a portion of their process, and can confirm better reliability based on those results. Additionally, we experienced a significantly better buying process through Dell, compared to Getac. Lastly, Dell's scale and global support for its rugged PCs deliver unmatched benefits for its customers.

There are some limitations, however, to Dell's rugged PC business. Dell currently only offers four different models − a rugged laptop, rugged tablet, rugged 2-in-1, and a semi-rugged laptop − across all its rugged PC products. Dell claims this focused approach allows it to deliver higher performance systems and higher quality with less customer confusion between products, but the simple line-up may not satisfy all users' needs.

Dell, like the competition, is still highly dependent on Intel for the latest CPU technology. Additionally, many rugged PC customers depend on the legacy capabilities of older chipsets. Dell's rigorous testing and validation, in addition to their approach to rugged-specific testing and validation, will ensure that their products meet the rigors of daily use and the standards by which rugged devices are tested in the long-run.

Call to Action

Dell has made great strides over the years in building a competitive portfolio that is pressure-tested to survive what customers throw at them. Based on our research and validation of their development methods, Dell is certainly worth consideration for any customer looking for a compelling alternative to the status quo.

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Appendix A

System Configurations:

Dell Latitude 14 Rugged Extreme 7414

Intel Core i5-6300U Processor
Sealed Blacklit English Keyboard
Intel HD520 Graphics
256GB SSD
8GB (2x4GB) 2133 MHz DDR4 Memory
6-cell (65 Wh) Lithium Battery
Intel Dualband Wireless AC 8260 2x2
Dedicated u-blox NEO-M8 GPS card
Standard Multi RF Passthrough
Windows 7 Professional 64-bit
Priced at $4,306.66

Getac B300

Intel Core i5-6300U Processor
Rubber Backlight Keyboard
Intel HD520 Graphics
128GB SSD
8GB (4x2GB) 2133 MHz DDR4 Memory
GPS Module
Dual RF Pass Through
Windows 7 Professional 64-bit
13.3” Display (1024x68)
Priced at $4591.00