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Everything Goes Boom – A Product Disaster Story

3 tips for a complete AND correct BOM

whitepaper



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Alison Kingerly plopped herself down on the musty old couch in Tony Geramino’s office with that flurried air of someone with never enough time to do the job that needs to be done. That she may have been right this time did nothing except compound the frustration of Geramino, the VP of operations. Things were going badly with Detailed Storage Systems’ new Boomer-One 500-gigabyte external solid state drive (SSD) and nobody, least of all lead design engineer Kingerly, could figure out why the drives were not working out in the field the way they did back in the office.

“Go recheck all of your work, Alison,” said Tony laconically. “Every last bit of it. Maybe you missed something.”

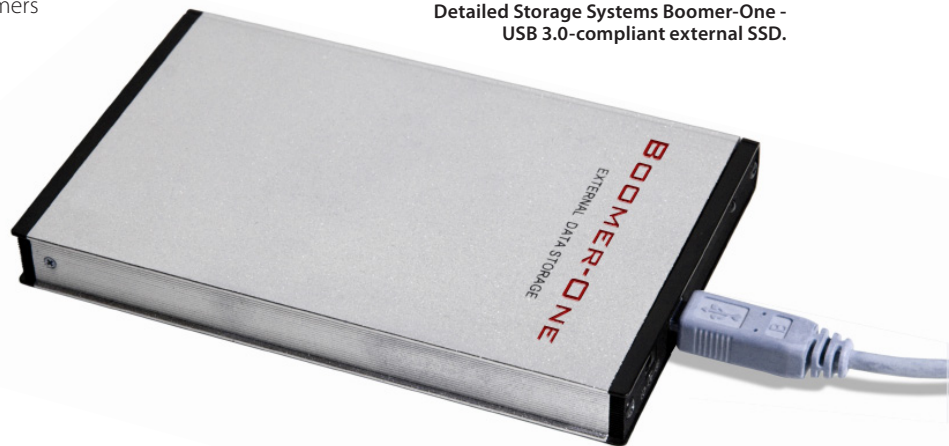
The portable Boomer-One, said the CEO at the company-wide roll-out last spring, was designed “to put Detailed Storage Systems on everyone’s radar.” Among the first commercially available USB 3.0-compliant external SSDs, the Boomer-One tested out at a throughput rate of more than 400 MB per second even after protocol overhead was factored in. About the size of a half deck of cards and offered in a variety of brightly colored translucent plastic cases, the Boomer-One had an embedded array of tiny LEDs along its top edge that flashed red then green rapidly in chasing sequence whenever it was busy – gamers were agog and geeks were all jazzed up to plug one in to see what it could do. But what really got the market going was its \$189 price tag – just \$40 more than the company’s top-of-the line Majestic drive, a 450GB USB 2.0 device.

The Boomer-One got Detailed Storage Systems firing on all cylinders. Marketing had designed glitzy packaging with the high-speed USB logo plastered all over it. Press had been flown into Los Angeles for a huge roll-out party at the Beverly Hills Hilton. Engineering was busy re-designing the company’s entire line of storage products for USB 3.0, and Eddie Drake and his manufacturing team were prepping for the first pilot lines of the BoomLets, the revamped product series, for certification. Everything was working to plan perfectly... just as it did for the Boomer-One before disaster struck.

Units were being returned in droves and the blogs were lighting up with poor reviews. “Not any faster than my old 450GB USB 2.0 drive” summed up the more family-friendly complaints. The crew in customer satisfaction had rechristened the Boomer-One the Boomerang One. And Alison, Tony, and Eddie had to find out why things were going so badly – fast. Everything depended on it, but first Tony and Eddie had to go meet with Eric.

AN UNCOMFORTABLE MEETING

Eric Grehan, the VP of marketing, was not someone you messed with. A star attacker on his college lacrosse team, he was mad enough to attack everyone involved with the design, manufacture, and shipment of the Boomer-One. He hated the aggravation and the thought of the expense of the damage control program he’d have to execute.



Detailed Storage Systems Boomer-One - USB 3.0-compliant external SSD.

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He hated even more that he was sitting around in his office waiting for the Boomer-One to get fixed so that he could implement a recall program. Most of all he hated the CEO calling him demanding that he lean on operations to fix the Boomer-One. “Why doesn’t he call Tony and bug him?” Eric kept asking himself. “Does he think I have nothing to do?”

“Well, people,” growled Eric, as he leaned on his desk toward Tony and Eddie. “What have you for me today? A solution, I presume.”

“Eddie will give you an update,” replied Tony, ignoring the dig. “But, first things first. Some of the guys just finished reviewing all of our final documentation – design, analysis, prototyping, the whole shebang. I then had them step through all of the manufacturing procedures. Everything checks out perfect. We’re about to check every individual part ordered for compliance right now. Everything was perfect, no alternates, and on time, so I’m not expecting anything there. Alison is finishing up her review of how we implemented the 3.0 specification. We’re looking for a needle in a haystack, Eric. That’s why it’s taking so long.”

“Great,” was all that Eric could manage to say through his clenched teeth as his eyes rolled in annoyance.

“Well, my report isn’t what anyone wants to hear either,” said Eddie. “You can tell management that I’ve been testing all the returns and they work just fine. Throughput averages 424 MB per second, give or take a couple of megabytes, for every unit, which exceeds specs except those damaged in shipment. I’ve opened up a few Boomers and the parts are what I had on my kit list, Eric. The assemblies look well built too – so it’s not that.”

“All right, then. Our less-than-ecstatic dealers have some 5,000 units they took off their shelves stashed in their backrooms that we need to do something about,” said Eric. “We have another 5,000 units waiting for the shrink-wrap, and the boss keeps calling me all crazy about you guys making the two new BoomLet lines sit idle waiting for you to get your act together. And I personally have a thousand angry customers that need either a refund or a working unit and a few thousand more who haven’t complained yet. Figure it out.”

“Yeah, you know, Eddie,” said Tony, “All the returns just can’t be good. You must be overlooking something.”

“I’m with Tony on that,” said Eric. “Why don’t you show us what you’re doing? I have to see this to believe it.”

A SIMPLE FIND SOLVES THE MYSTERY

Eddie, Tony, and Eric walked over to Eddie’s testing bench in manufacturing. While they were meeting in Eric’s office, another cart with about a dozen returned units had been rolled over for Eddie to test.

Grabbing a Boomer-One box from the cart, Eddie explained to Tony and Eric how he removed each one from its box and simply plugged the USB cable coming from his analyzer into the drive. The analyzer then automatically ran the Boomer-One through a series of functional tests including read/write functional tests, normal and burst read/write speed, and parametric standby/dynamic current tests. All the test results were displayed on his workstation in blocks of scrolling numbers, virtual meters, and charts that he had developed with LabVIEW. Color-coding indicated pass/fail, Eddie noted with unnecessary pride.

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Right as Eddie was finishing his explanation of his set-up, Alison walked over and asked what was going on.

“Here, watch. I’ll show you,” said Eddie, opening another box and tossing its user manual, registration form, the cable and assorted packaging materials he didn’t need into a series of larger boxes surrounding his test bench.

“Eddie, what are all those cables?” Alison asked as she plucked one up out of the pile and examined it.

“I don’t need them,” he replied. “My tester has the cable built in – I just plug the loose end into the drive. Saves a lot of time not having to untangle all those twist ties.”

“They’re the wrong cable,” exclaimed Alison with a strange mix of excitement and irritation in her voice. “They’re USB 2.0 cables. USB 3.0 has four extra pins for SuperSpeed transfers. USB 2.0 works with the 3.0 bus, but it doesn’t do SuperSpeed without the pins. If you look carefully at the 3.0 cable on the tester, you’ll see it has those extra pins and the new USB SuperSpeed icon. Look at the ends, this one from the box – no extra pins and the standard icon,” said Alison, laying the tester cable and product cable side by side. “Of course our customers think the Boomer-One is slow – we shipped Boomer with the wrong cable.”

“How is that possible?” asked Eddie to no one in particular.

“Oh, you’ve got to be kidding me,” groaned Eric, “When can we get the right cables? Think Jon in purchasing has a clue? I need to mail them out to everybody that’s complained and the dealers. There go our bonuses, folks. What am I going to say to the people who returned it? Anybody want to write that one for me? Maybe I’ll just send dealers a box of the right cables. I don’t know. That’s stupid. Sheesh. I can’t believe this.”

HOW DID BOOMER SUDDENLY BECOME A DUD?

The problem with the Boomer-One had everyone stumped. Everything about the product – design, testing, manufacturing, marketing, and launch had gone flawlessly and on schedule. Even the testing of returned units showed the Boomer-One was working flawlessly... until they discovered that they had somehow managed to ship off the Boomer-One with the wrong cable. So how’d they do that?

Each group performed its function precisely as it was supposed to. The lack of an obvious error is what made the mistake so hard to track down. After a careful comparison of Eddie’s kit list and the Excel spreadsheet-based bills of materials (BOMs) from design, marketing, and purchasing, Tony and Eddie determined that the problem with the Boomer-One was more than just the cable alone. Detailed Storage Systems had a giant communications hole in its process and operated with a bad set of assumptions.

Engineering designed a USB 3.0 SSD drive perfectly to spec. In fact, it outperformed its advertised transfer speed by 5%. Further, the team delivered a design early with specified parts that brought the cost of goods sold (COGS) in below the cost target. The only mistake they made was assuming that because it was obvious to them that a USB 3.0 device required a USB 3.0 cable that it would also be obvious to everyone else. It wasn’t.

Marketing did its part by designing appealing packaging and an attention-getting advertising campaign. So well had marketing done its job, the Boomer was flying off the shelves.

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When it devised the packaging for Boomer-One, the mistake Marketing made was to assume that the commodity cable they specified to be included in the package would be the same cable they always used. After all, a few years before, when Detailed Storage Systems released its then-new Majestic USB 2.0 product, Marketing had been able to use the same cable as the USB 1.0 version. In their mind, why should moving to USB 3.0 be any different? But it was.

Tony and Eddie resisted the inclination to blame Marketing for not having any idea that USB 3.0 required a new cable. It was not Marketing's responsibility to know such a technical detail. Someone needed to tell Marketing about this crucial change, but Detailed Storage Systems' change notification process was ad hoc: it relied on e-mail and verbal communications.

So, when it became time to create the master BOM for the Boomer-One, a weakness in the Excel spreadsheets that Detailed Storage Systems used to manage its BOMs let the company down: Excel does not have the built-in intelligence to warn managers that the cable specifications in the design, engineering, manufacturing, and marketing BOMs disagreed. Further, nobody at any point throughout the entire process remembered that Alison said at a preliminary design meeting that she would change the cable specification because of USB 3.0. Consequently, nobody noticed when a BOM with the old, wrong cable specification was merged into the final release BOM.

To Tony and Eddie this really wasn't a surprise: Often no one saw changes wending their way through the design-to-manufacturing process at Detailed Storage Systems. Unfortunately, the only person who might have caught the problem – Eddie, who designed the test fixture to verify the Boomer-One worked at SuperSpeed – was not the person ordering the parts or putting the packaging together. And, he admitted to himself, he never thought about checking the cable specification. That was someone else's job, only he wasn't quite sure whose.

DECISIONS HAVE CONSEQUENCES

To do their jobs well everyone must remain focused on their own area of expertise. Engineering sees the product as the technology that people pull out of the box and proudly show off to their friends. Marketing, on the other hand, thinks of the product as a boxed item on the shelf and as a collection of the artwork, accessories, documentation and packaging and advertising that go into selling it. Manufacturing thinks of the product as components to buy, units to test, and pallets to move around. While companies need people to be good at what they do, it is better for companies when their people are aware of the impact and the wider consequences of their work on people in departments outside their own.

This narrow focus by the various departments was reinforced by a gap in Detailed Storage Systems' toolset. Departments had no reliable method of communicating changes to other groups, and they had no simple way to consolidate the BOMs from the various departments to give them a singular view of the entire product for review by all. If there were a central record of the entire product for all groups to review and comment on, this error would have been found in a review cycle instead of by a stroke of luck on the test bench.



USB cable mix-up caused trouble for Detailed Storage Systems.

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Here are 3 tips for a complete and correct BOM:

Tip #1 If it's not in the BOM, then it's not in the product.

Your product isn't just electronic, it isn't just mechanical, it's got non-modeled parts like glue, software, cables, and patch cords in addition to documentation, warranty cards, offers from business partners, and packaging – all of which can affect the working of your product as well as your customer's experience. If something doesn't make it into your BOM, it won't make it into your product. (And if the wrong part is in your BOM – the wrong part will make it into your product.)

Tip #2 Never assume that someone knows what you've changed!

Never assume that Jon in purchasing and Eddie in manufacturing spoke with Alison the engineer. Tight collaboration between all workgroups at your company provides many sets of eyes that can help you solve product problems ahead of time and avoid disasters like the one Detailed Storage Systems experienced.

Tip #3 Communicate, communicate, communicate!

Communication is key. A steady cadence of written communication – or better, use of systems that automatically communicate changes to the affected workgroups – can ensure you never risk your business on assumptions again.

Gain control of your everyday parts before your success goes down with a boom.

Learn more by visiting www.arenasolutions.com/productdisaster

This whitepaper is brought to you by Arena Solutions, which enables small to mid-sized global manufacturers to deliver their products to market on time, within budget and at high quality. Arena provides a collaborative environment for centralizing, controlling and analyzing complex and constantly changing product information, including bills of materials (BOMs), part specifications and engineering change orders (ECOs).

The repository for the product record, Arena sits at the epicenter of the broader product lifecycle management (PLM) landscape, connecting with systems like CAD, EDA, PDM and ERP and linking organizations with their supply chains. With its on-demand, software-as-a-service (SaaS) approach, Arena is a low-risk, rapid-return proposition that makes enterprise-class functionality available to companies that would otherwise have to contend with manual, time-consuming and error-prone product data management processes.

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