

Why Customers Should Insist on DELL™ Hard Drives for Enterprise Systems

A Dell Point of View Summary

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Introduction

Dell closely manages all steps necessary to supply its customers with the high quality Hard Disk Drives (HDD) required for demanding Enterprise applications. Whether the usage is with Dell's PowerVault™ storage line of products or PowerEdge™ servers, all hard drive offerings are put through an exacting and rigorous quality control process.

All Dell Enterprise hard drives have been developed and validated to function as designed on the Dell platforms where they are offered. Each Dell hard drive includes the following:

- Dell firmware that is tuned, tested, and validated for Dell solutions.
- A specific, closely controlled, Bill of Materials set designed for optimal performance.

Dell has instituted an exacting set of manufacturing processes that include the following requirements:

- HDD Original Equipment Manufacturers (OEMs) must track and manage the complete history of every Dell Enterprise hard drive.
- Critical acceptance criteria must be met.
- Ongoing Reliability Testing for HDD lots.
- Full traceability of HDDs to enable proactive replacement.

Quality Processes

Beginning with the Quality Agreement between Dell and each supplier, a precise set of parameters and conditions must be met for a company to qualify as an HDD supplier for Dell Enterprise systems. One of the first steps in the approval process is the execution of a Quality System Audit (QSA), which must be passed before the supplier is allowed to provide hard drives to Dell. This audit includes a review of the following aspects of the prospective supplier's business:

- Quality systems
- Contracting policies
- Design control
- Documentation control
- Their supplier's quality control
- Product identification and lot control
- Process control
- Inspection procedures
- Calibration processes
- Nonconformity control
- Handling/storing/packaging/delivery of product and materials
- Control of quality records

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Once the QSA has been completed, another audit is required. The Quality Process Audit (QPA) is an audit tool used by the Dell quality engineers to validate the supplier's manufacturing processes. The audit breaks down the hard drive manufacturing process into several key segments, each of which contains a series of questions specifically pertaining to the process being examined. These questions are focused on evaluating process disciplines, control methods, process capability/technology, and attention to detail in how a process is set-up and operated.

The next step in this action plan is a requirement for all HDD manufacturers to have a Quality Management Plan (QMP). The QMP includes:

- Stringent limitations on the number of customer failures and the number of failures in the Dell manufacturing plants.
- First article inspection occurring when the first complete drives are produced. This inspection includes checks for mechanical dimensions, soldering verification, and chemical finishes, as well as actual drive testing. A two-day audit of all the supplier's manufacturing steps is held at the end of the first article inspection. The results of the audits detail where improvements need to be made.
- An On-going Reliability Test (ORT), which is a standard test Dell requires of all its suppliers. The ORT involves testing 100 drives per week per family for 6 weeks (1008 hours) to ensure quality is maintained over time.
- An On-going Defective Parts Per Million (DPPM) Test (ODT) to determine what types of failures may occur in the manufacturing process and to ensure those are caught and corrected early. Each of the suppliers has a testing process approved by Dell where they pull a number of drives off the manufacturing line each day for testing.
- A New Product Readiness Review (NPRR) Audit done for every product family. This is a 2-day audit at the supplier's factory in which they are required to pass the audit in order to ship product. All major findings in the audit need to be closed prior to that shipment.

For new products, the suppliers will create an early ODT to begin these testing processes 4 weeks before the actual production line is initiated.

Only first pass yield is acceptable to Dell. That is, the HDD must pass the supplier's final test on the first attempt to meet Dell's high quality standard.

Quality is an extremely important component of the Dell HDD delivery process and, along with the engineering processes, ensures only the most qualified drives make it to the Enterprise customer.

Engineering Processes

Complementing the quality processes, there is a comprehensive set of engineering requirements that also must be satisfied. Dell drives are developed to meet a comprehensive set of Dell specifications. These specifications are reviewed with suppliers for compliance throughout the supplier's drive development cycle.

Since Dell ships drives installed in storage or server systems, each drive's firmware is developed with specific attention to the solution stacks in which it will be included, such as working with Dell RAID controllers and the OpenManage™ systems management software. This crucial step ensures drive compatibility and functionality within Dell systems, making these drives unique to Dell. Dell's firmware is crucial to optimal operation of Dell systems.

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In addition to special firmware, the drives are tailored to work with the platforms and controllers through tests for signal integrity, shock and vibration, EMI, power consumption, and packaging constraints.

Before a specific drive is accepted at Dell, it goes through a rigorous Reliability Demonstration Test (RDT). RDT contains a large quantity of shipping-level parts that are tested at elevated temperature and Input/Output (I/O) stress, as well as for an extended duration. Strict criteria are set for failures and drives are exhaustively evaluated using Dell engineering expertise. This process culminates in validated corrective actions applied to manufacturing prior to the product shipping.

Customers should ensure their drives come directly from Dell so that the correct firmware has been included, all of the appropriate tests have been run, and it is ready for the demanding Enterprise environment.

Conclusion

Dell closely manages all the steps necessary to supply its customers with the high-quality Hard Disk Drives required for demanding Enterprise applications. From initial supplier qualification and continuous quality testing, to specific firmware creation, extensive reliability testing, and ongoing product quality certifications, all Dell Enterprise hard drives are developed to precisely match the Dell Enterprise systems and to provide customers with as productive an environment as possible.