



POWEREDGE QUALITY FROM CONCEPT TO END-of-LIFE

Technical Note by:

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SUMMARY

Dell EMC defines and executes to globally recognized design-for-quality and reliability practices that :

- Ensure customers receive product that will perform best in their environments
- Offer customers minimal downtime and total cost of ownership

Why focus on Reliability?

- Increase customer satisfaction
- Lengthen product lifecycle
- Reduce costs for customers
- Maximize uptime

How does Dell Improve Reliability?

- Design reliability into products
- Use both appraisal and prevention-based methods
- Leverage on-going reliability assessments
- Drive continuous improvement across supply base

How does Dell Invest in Reliability?

- Incorporate direct customer feedback into product development
- Dedicated reliability engineering staff
- Reliability labs
- Factory and supplier processes for reliability

Quality is a key attribute that many manufacturers tout to differentiate their products. Yet understanding the quality process is critical to evaluating whether a product is designed to not only perform its function, but to do so consistently over time. Dell EMC Quality Policy ensures that Dell EMC employees focus on earning the trust and loyalty of customers by providing high quality products.

End-to-end quality

For Dell EMC the quality process (see Figure 1) starts at product concept and continues over the entire product lifecycle. Dell EMC is an industry leader in many design-for-reliability methodologies based on Dell EMC quality policies and processes, including:

- Qualification of components and subsystems
- Ongoing test and validation processes throughout product development & lifecycle
- Global field support that is not only expediently reactive to customers, but also proactive in addressing issues before they become problems

Developing and designing PowerEdge servers

The quality/reliability challenges for servers have evolved with the increasing amount of memory/HDDs and higher temperature processors in the same or smaller-sized platforms and denser configurations.

Figure 1: Dell EMC Quality & Reliability Process

Yet for PowerEdge servers, service dispatches in the first 60 days post ship declined 19% from the introduction of 9th generation PowerEdge in 2006 to the current 13th generation of PowerEdge launched in 2014 (see Figure 2). Since 2015, dispatches have declined another 11%.

The quality requirements for PowerEdge products is defined two years before they actually hit production. This starts with detailed market research, collaboration with industry, technology, research, and university partners, and direct customer input. Then Dell EMC uses the Offer Lifecycle Process, or OLP, a unique process that



provides a rigorous path from conception to final product, with designated review and approval gates throughout the process. This process is aligned with the Dell EMC Quality Policy to ensure that customer needs and expectations are met, and if possible, exceeded.

Dell EMC PowerEdge product development includes a global Business Quality Engineering Team. This team incorporates specific customer inputs through VOC: voice of the customer. These inputs focus on customer quality, reliability, and usability requirements and are gathered through surveys, customer engagements and escalations, customer and industry forums, and service calls, then analyzed and put into action plans for the development process.

Quality Throughout the Development Process

The PowerEdge Reliability Engineering team and representatives from Development Engineering developed the Design for Reliability (DfR) suite of specifications and processes that guide product development. This suite is considered best-of-breed in the industry and uses prevention- and appraisal-based techniques to analyze components (as well as subsystems and complete products). All components and subsystems must be validated per the DfR suite.

Components and sub-systems are tested individually, to meet stringent specifications established for performance and reliability. The final product is tested to ensure all the sub-systems work and interoperate flawlessly.

Dell EMC has elite status as a Validation Customer with Intel. This gives Dell EMC advanced access to emerging Intel architectures, engaging in next generation feature definition, packaging, performance, latency and power optimizations.

Industry standards and Dell EMC

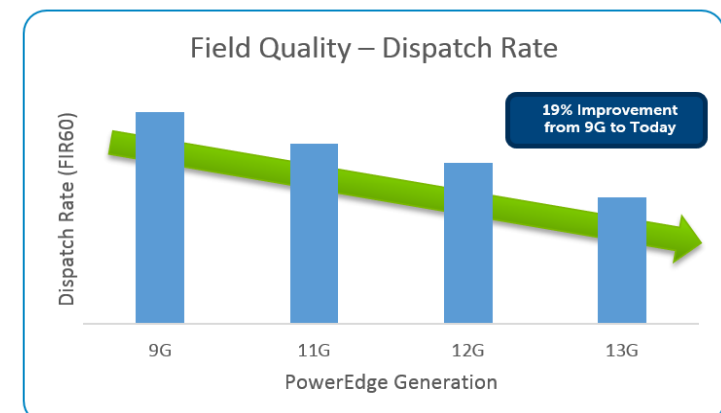
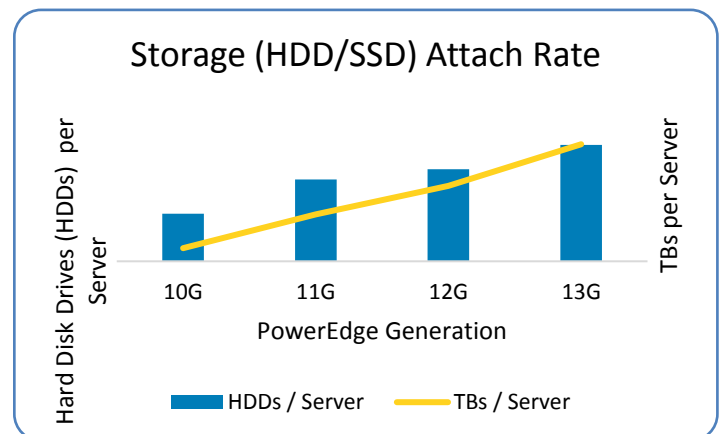
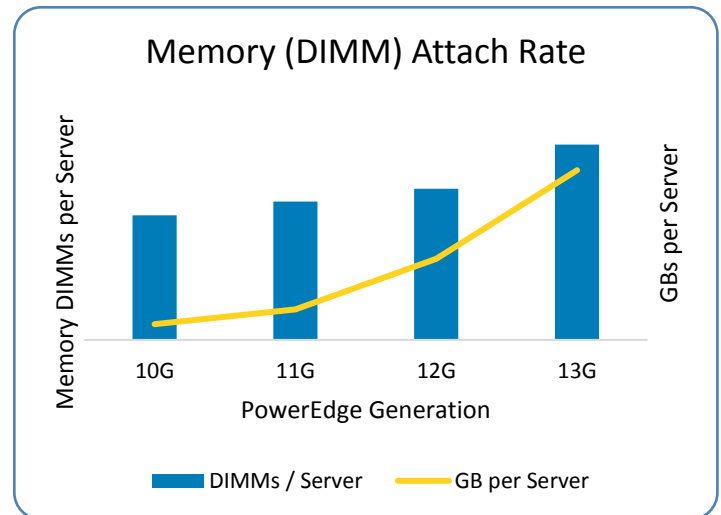
Dell EMC designs PowerEdge solutions using industry standard components to enable customers to take advantage – cost effectively -- of the latest technology developments.

Dell EMC's influence with suppliers ensures that specific components achieve Dell EMC requirements for quality/reliability, functionality, flexibility, and access. Dell EMC also has stringent requirements for a secure and environmentally/socially responsible supply chain.

All components and sub-systems within a product must be validated to function as one homogeneous system across a

variety of workloads. Although white box vendors may offer some systems with similar componentry, PowerEdge stands out for supply chain rigor and system/ environmental validation.

Figure 2: Despite the increase in memory and drive attach rates, there has been a decrease in dispatch rates for Dell EMC PowerEdge servers



Design for Serviceability

As innovation drives complexity and density, every cubic centimeter inside a Dell EMC product is vital to the overall operation. To enable ease of serviceability, sub-assemblies are designed to be easily removed and replaced to attain quick access to critical components. These sub-assemblies need to be robust enough to be handled, latched, and flexed so as not to damage components or circuit boards while maintaining proper standoffs to avoid electrical shorts, inhibit airflow, and reduce acoustics and potential for vibration.

Figure 3: PowerEdge R730



After the Sale: Reliability in Customer Environments

In addition to design and manufacturing rigor, Dell EMC also has reliability issue prevention and containment tools and processes:

- Dell EMC requires critical suppliers conduct reliability testing throughout product lifecycle
- Dell EMC has a Customer On-Site Inspection Process where Dell EMC team members from Engineering, Quality, IPS, and Services, assemble at a customer site to experience receiving, unpacking, transporting, racking, cabling, power on, and deploying OS on their PowerEdge server
- Unique tools that enable Dell EMC to identify issues, determine their impact, and, most importantly, proactively address them always working to ensure that customers experience top performance without downtime

Commitment to Quality

Dell EMC's extraordinary commitment to and investment in developing high quality and reliable PowerEdge servers is a key tenet of the Dell EMC Quality Policy. Customers expect their Dell EMC products and solutions to demonstrate reliable performance over time, and this strength is one reason they choose Dell EMC.

Source: "Walker Research, 2017"