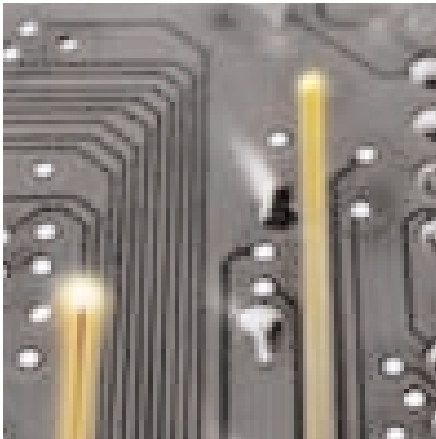


# case study



## Western Digital Rewrites Industry Standards for Quality with a Global Data Warehouse

As a 15-year veteran of Western Digital Corporation, a leader in information storage products and services, Jerry Hill has seen firsthand the dramatic effects of globalization on the hard-drive industry. “Increased competition and reduced product life cycles have eroded profit margins across the industry—to survive in this business, you’ve got to find new ways to reduce product development costs, improve quality, and deliver superior customer service.”

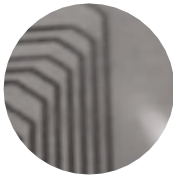
For Hill, vice president of data warehousing at Western Digital, the solution that addresses both quality and profitability challenges is the Quality Information Solution (QIS)—a single, product-centric knowledge repository that provides comprehensive product information and data mining capabilities to Western Digital employees worldwide via the corporate intranet. QIS is the first Web-enabled data warehouse deployed in the discrete manufacturing world, enabling complex quality information to be traced in a range of areas. QIS has also helped make Western Digital a leader in setting new levels of quality standards for the hard-drive industry.

Launched in April 1999, QIS is the product of Western Digital’s collaborative relationship with KPMG. Working closely with their Western Digital counterparts, a team of professionals from

KPMG’s Information, Communications & Entertainment (ICE) practice developed functional requirements for the QIS system, created an enterprise intranet architecture, integrated product data from Western Digital’s 12 disparate legacy systems, and deployed the system enterprise-wide.

### A Complex Quality Management Challenge

Western Digital designs and manufactures hard drives for personal and enterprise-wide computing, marketing them to systems manufacturers and resellers under the Western Digital brand name. The company required a product-centric data storage system that would house information about the full life cycle of each of its hard drives—from manufacturing and testing to shipment and returns—individually traceable by serial number.



Hill explains the breadth of the company's information requirements by citing the fact that "like any product, every hard drive has the potential to fail. We need to be able to trace each hard drive we manufacture through its entire life cycle, to determine root causes of failure, and to use this information to improve future products.

"When you do the math, the magnitude of the information management challenge quickly becomes clear," he continues. Western Digital's hard drives each comprise more than 200 components manufactured by outside suppliers, and the company manufactures well over 100,000 units per day. Finding the root of quality issues requires the ability to trace separate parts not only to their vendors, but also to their lot.

Prior to QIS, Western Digital's quality systems were housed on various legacy platforms. Despite rigorous implementation of quality-focused business processes, these systems did not always permit quality issues to be quickly quantified and contained. "In our previous environment, conducting root cause analysis for failed hard drives required far too much time just to locate the appropriate data," Hill says. "That time would have been better spent analyzing the data and making well-informed strategic decisions."

To expedite decision making and mitigate the business impact of drive failures, Western Digital recognized the importance of gathering and storing all quality-related data in one repository that could be accessed company-wide. Powerful, easy-to-use data mining capabilities were also a must, in order to quickly detect failure patterns and root causes.

### Developing the Quality Information Solution

"Western Digital chose KPMG because it articulated the most complete solution to our business problem," Hill says. "And then it promptly set out to make it happen." The scope of KPMG's work for Western Digital included project management, development of functional requirements, manufacturing data collection and analysis applications, development of an enterprise intranet architecture, and the integration of data from a dozen disparate systems.

"We were charting new territory with QIS, the first data warehousing application of this kind in a discrete manufacturing industry. Our project team had the strong support of senior management, who recognized an opportunity to leverage information technology to leapfrog over our competition," he says.

To demonstrate the power of QIS, the project team first built a proof-of-concept intranet site that showed how the system could capture component traceability data at the time of manufacture via the shop floor control system. Next, the team built an interim data warehouse that demonstrated QIS's ability to capture hard drive build data along with shipment information. "One of our most immediate needs was to be able to track the current status of hard drives that had already been shipped. These pilot projects provided excellent proof points that we used to rally support," Hill recalls.

Working closely together, Western Digital's IT experts and the KPMG project team then set out to build the full QIS system, which combines elements of electronic commerce, customer management, and data warehousing. KPMG pro-

vided a customized implementation methodology that drew on all of these disciplines, and was built on a foundation of aggressive project management. Hill says, "It was important that we kept forging ahead, in order to meet our launch goals. KPMG kept us all on track." Weekly meetings with top management further propelled the project forward.

### **QIS in Action**

Western Digital's QIS is built on high-performance, industry-leading technology, including an NCR Corporation WorldMark 4700 data warehouse server that stores Western Digital's information in a Teradata data warehouse database. Hewlett-Packard HP 9000 processors and an Oracle database are used to collect data from Western Digital sites in Irvine, California; Rochester, Minnesota; Malaysia; and Singapore, and also host the company's QIS Web site.

One of the most valuable aspects of QIS is the system's ability to provide on-line analytical processing (OLAP) capabilities to Western Digital employees' desktops. "The best data warehouse in the world isn't worth much if the people who need to access its information can't do so quickly and easily. From their Web browsers, Western Digital staff can query the data warehouse and analyze results in just minutes," Hill says enthusiastically.

This capability allows Western Digital representatives to deliver enhanced customer service by responding quickly to quality issues. For example, a reseller calling to report a faulty hard drive may ask if any other hard drives in a particular shipment or lot number may be affected. Using MicroStrategy DSS/Agent and DSS/Web graphical tools to build

queries, the account representative receives information from the data warehouse in the form of a grid or graph, and can respond immediately to the reseller's concerns.

Response times range from 15 seconds to several minutes, depending on the complexity of the query. Advanced users can then perform statistical analysis and data visualization on the data, to further aid in decision making.

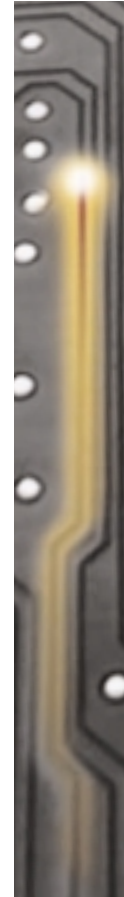
"The true power of QIS is that it gives Western Digital an opportunity to leverage customer service into true competitive advantage," Hill says. "The system is capable of accessing any Western Digital manufacturing data from around the world—data from a suspect production day, shipping data, suspect head-and-media combinations, and more. It's all in QIS."

### **QIS Delivers Strong ROI**

Already, Western Digital's QIS has provided strong, quantifiable return on investment (ROI). The new ability to pinpoint individual component-level defects before hard drives are shipped to the customer, as well as trace back the cause of potential failures in the field, has been invaluable to Western Digital, Hill says.

QIS is also making a positive impact on daily activities in numerous areas.

Western Digital's quality organization is now able to quickly analyze and contain quality issues. By leveraging QIS's Web access to data, account managers can easily find data on specific products and conduct analysis on shipments, enabling them to serve customers proactively and with greater efficiency.



“With QIS, we’ve realized a significant goal: With comprehensive product and component information at their fingertips, managers are spending significantly less time searching for data. Instead, they are freed to focus their efforts on analyzing the information and using it to make critical business decisions.”

#### The “Closed Loop” of Information

Perhaps most important of all, QIS provides Western Digital with “closed loop” feedback mechanisms that allow the company to address today’s quality issues and positively impact future business performance. For example, in the product development area, hard drive field performance parameters can be correlated back to components, manufacturing environment, and factory test parameters. “This gives us a way to detect inherent flaws and design them out of future products,” Hill says. In addition, armed with QIS’s precision data, Western Digital can negotiate with its suppliers to build better, more reliable components.

#### Leading the Industry: Western Digital’s Executive Briefing Center

To showcase its breakthrough use of data warehousing technology in a discrete manufacturing environment, Western Digital has established the Western Digital Executive Briefing Center in Irvine, California. This facility demonstrates the capabilities of the QIS system, how the technology is being used, how problems in inventory are identified, and how Western Digital has benefited from the Quality Information Solution. Since

its launch in April 1999, the Executive Briefing Center has been visited by many customers, prospects, and suppliers.

Hill summarizes, “The Executive Briefing Center underscores the sense of achievement we’ve gained in launching QIS. Ultimately, our closed-loop quality system provides capabilities that are essential to enhancing customer confidence and gaining market share in today’s fiercely competitive environment.”

#### About KPMG’s ICE Practice

KPMG’s ICE consulting practice is part of KPMG LLP. Serving companies in the communications, electronics, media, and software industries, ICE professionals help companies build the foundation they need to succeed in today’s global networked economy, from customer management through the supply chain.

#### About KPMG

KPMG LLP is the U.S. member firm of KPMG International. In the U.S., KPMG partners and professionals provide a wide range of accounting, tax, and consulting services. As a provider of information-based services, KPMG delivers understandable business advice—helping clients analyze their businesses with true clarity, raise their level of performance, achieve growth, and enhance shareholder value. KPMG International’s member firms have more than 100,000 professionals, including 6,800 partners, in 160 countries. KPMG’s Web site is <http://www.us.kpmg.com>.

