



# Semiconductor Manufacturer

## Semiconductor Manufacturer Reduces Product Defects and Lost Profits through Consistent Risk Assessment

For one of the world's leading semiconductor manufacturing companies, a focus on quality and continuous improvement is necessary to meeting the needs of its global customer base. With nearly 300 worldwide customers and 20,000 employees, this company manufactures microchips that make their way into an enormous variety of electronic devices – from automobiles to smartphones.

The impact of a defective product can be extremely costly, ranging up to \$1 billion. Therefore, the ability to identify, analyze and mitigate risks involved in product manufacturing is of the utmost importance. Like its peers, this company had a goal of zero defects, so it began a search for a better process to mitigate risks and deliver quality products to its customers.

### Moving to a Consistent Quality Risk Assessment Process

With several business units spanning three continents, the semiconductor manufacturer lacked a consistent process for managing risk related to the thousands of products it produces. Instead, each business entity had its own homegrown solution. Over time, it realized that each business unit was using a unique process that provided no consistency as information was rolled up to reports across the enterprise. The Director of Quality began looking for an external partner to provide a consolidated operational risk management solution, which it found with Sphera.

The semiconductor business is especially complex because of the variety of products and the many risk analyses performed at various levels: component, equipment, technology and overall business processes. Everything is related, so an unmitigated risk at the smallest level could have a huge impact on something at a much higher level.

Through a series of design sessions, Sphera was able to identify the nine interrelated factors, including such factors as fabrication and technology, involved in risk assessment analyses and map them into a global context matrix.

In the past, the company had no centralized way of tracking these factors so the teams started from scratch with every FMEA, failure modes and effects analysis. “The team would be working in Excel to analyze what could potentially go wrong in relation to designing and manufacturing a product, but there were always multiple considerations for every row of information across the analysis. Any time one factor changed, they effectively had to undertake a whole new analysis,” remarked the Sphera consulting manager on the project.”

### CHALLENGE

- Consolidate disparate quality risk processes into a centralized system
- Decrease employee time spent on FMEAs
- Reduce product defects and associated costs

### SOLUTION

Quality Risk Management

- Failure Modes and Effect Analysis (FMEA)
- Global Context Matrix

### RESULTS

- Reduced number of FMEAs from thousands to hundreds, enabling employees to focus on higher-value tasks
- Potential for saving billions of dollars in lost profits due to product defects
- Provided company with a tool to measure the value of reduced product defects and improved quality going forward

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## Connecting Global Operations

One of the challenges of conducting stand-alone FMEAs was that the company didn't know how a risk in one area might affect another. For example, if a local team did an equipment-level FMEA in Singapore, no one would know that it might also affect the U.S. operations.

"The centralized system and context matrix solved this issue of information in silos. Now, they can see the impact of the risk created by local process changes at any one of their manufacturing locations on a global level, and not only at the equipment level, but also on the process and the technology. This means they can now put a dollar figure on the risk and see that what had seemed like a small risk in Asia for instance could have a \$100 million risk impact across sites, technologies, products," explained the Sphera consulting manager.

## Reducing the Workload and Inefficiencies

In the past, conducting FMEAs was a labor-intensive process that involved multiple people at each site. As the Sphera solution architect explains, "For example, they might have had a design FMEA person, a process flow FMEA person and someone responsible for manufacturing FMEAs. In some cases, each of these people might have to develop an FMEA for each of the nine risk analysis factors for a total of 27 separate risk assessments. Now, the company can conduct one FMEA. We've helped the company reduce the risk assessment workload by a ratio of 27:1. That's an enormous time savings."

Before the consolidated system was in place, FMEAs were conducted on an ad-hoc basis, leading to thousands of un-standardized de-centralized FMEAs worldwide. The centralized process has helped the company dramatically reduce the number of risk analyses it undertakes, while improving the quality.

Today, each team defines the business case for the FMEA before they conduct it. Therefore they know how to apply the findings to equipment, process flows and technology across the company. "If the teams are conducting 100 FMEAs now, they are more valuable than the thousands they used to do," said the Sphera solution architect.

## Decreasing Lost Profits

In addition to gains in workforce efficiency, the centralized risk assessment process helps the semiconductor manufacturer dramatically reduce lost profits associated with shipping defective products.

The amount of potential loss depends upon when the defect is discovered. The Sphera consulting manager explains, "The most affordable time to catch an error is at the design phase, although losses can still be in the millions of dollars. If they

don't find the defect before it is shipped to their customers, they have probably lost \$100 million. But, if the defective chip ends up in a consumer product, they could be looking at losses of \$1 billion."

The business imperative is to identify the defect as early as possible – ideally before the product is shipped. The company now has a much stronger process for assessing risk and identifying defects before they become even more costly

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Sphera Consulting Manager

## Improving Global Business Flexibility

Installing a common risk analysis system across three global units of the organization had an unintended benefit. It allows the company to transfer goods from one facility to another across the globe, which is sometimes advantageous due to currency fluctuations. Having common risk analysis rules governing how a specific product should be manufactured has led to more flexibility in inventory and manufacturing operations.

## Tracking Progress into the Future

Because reducing defects is a major corporate goal, senior management was involved in the decision of moving to the centralized risk assessment system. Ongoing, metrics related to defect reduction are shared globally with senior leaders.

"The risk assessment system we developed for this customer is the cornerstone of their process for improving quality and reducing product defects. They should continue to see workforce efficiencies and cost savings in the future," concluded the Sphera consulting manager.