Strategies for Quality System Deployment

by Daniel J. Le Saux, Skyworks Solutions, Inc.

Having been involved in the quality profession for some time now, I have learned that what works well in one organization, may not necessarily work in another. This holds especially true for quality system deployment.

A well-structured quality system can become the foundation of a successful organization (see Figure 1).

This mechanism allows business processes to be predictable, repeatable and provides a means to implement sustainable improvements. If they are based on the Plan/Do-Check-Act cycle (Edwards, 1986), they become self-monitoring and self-correcting.

This does not imply, however, that all quality systems are created equal. Decisions made during the design and deployment phase must consider the organization's overall business strategy. Attempting to use a "cookie-cutter" approach will result in failure and will drive top management to shy away from further quality initiatives. "Strategy" in quality system deployment is the art of translating best standard practices into formats, tools and processes that match a unique business and its market demands. This article explores the lessons learned while deploying the quality systems at Skyworks Solutions.

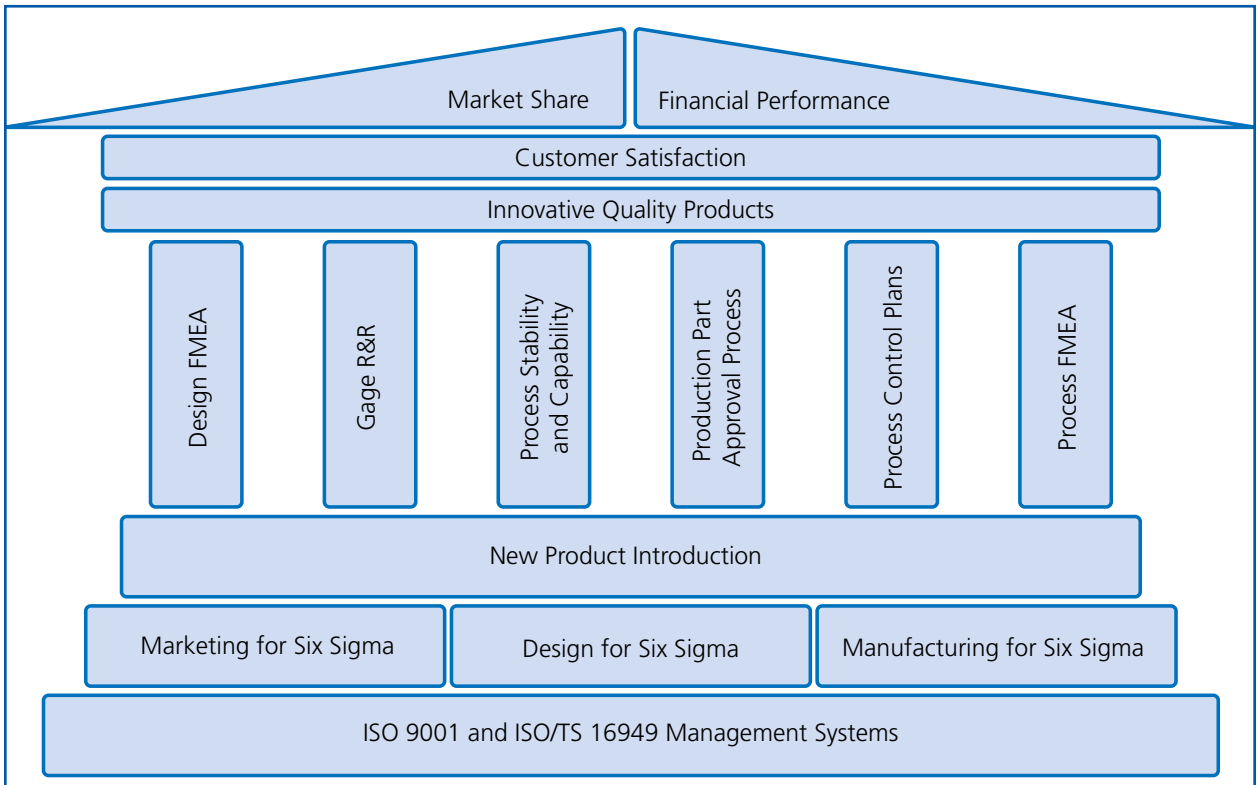

Figure 1

Something Old, Something New

Skyworks Solutions is the result of a merger between Alpha Industries in Woburn, Mass. and Conexant's wireless business in Newbury Park, Calif. There were design and manufacturing sites on both coasts as well as an assembly plant in Mexicali, Mexico.

The resulting landscape became a mix of legacy and cultural practices coupled with the organization's desire to shape something new.

It was important to allow local sites to maintain a certain level of autonomy while slowly developing a corporate mentality.

This situation affected the initial quality system deployment and continues to affect it to this day.

Starting at the Top

Choosing a quality management system (QMS) standard that supported the business objectives was the first major decision. The obvious choice was ISO 9001 since this was the most widely recognized standard and most of our existing customer base expected suppliers to achieve third-party certification.

Since Skyworks is an RF semiconductor design and manufacturing organization, we considered the TL 9000 standard. Further review showed, however, that the standard targeted the tier-one, cell phone manufacturers (i.e. our customers) and focused on a systems engineering environment as compared to a component level organization such as Skyworks; a less than ideal fit for our business. In the end, the initial quality system development proceeded based on the ISO 9001 standard.

Skyworks had already adopted many of the advanced quality tools demanded by our customers (e.g. FMEA, Gage R&R, control plans, advanced product quality planning, etc.). ISO 9001 does not require the use of these tools. In order to formalize the use of these tools, one business unit chose to use the ISO/TS 16949 standard as their business model since it did require the use of these tools. As a result, Skyworks then adopted a dual-certification approach. Despite the different certifications, all sites adopted the use of the same advanced quality tools.

Documenting the System

Ensuring factory personnel have access to the latest process documentation is critical in an environment where yield improvement and process improvement are synonymous. Modifying, reviewing, approving and releasing documents should be straightforward in order to expedite these improvements. As such, quality system deployment focused heavily on a dynamic but robust document control system.

The wafer fab manufacturing execution system (MES) included a feature that allowed each process step to have an electronic link to the corresponding process documentation. Unfortunately, the operations group had not yet implemented this feature due to the significant investment in time that was required upfront. Going forward with this feature was an easy decision that in the end, created a much more robust process than a paper-based system.

Management Review

One of the basic tenets of an effective quality system is to monitor the business processes consistently. The functional managers must identify metrics and define targets. These same managers must take action when a metric misses its target. The quality system must provide tools that track these actions to completion as well as provide easy access to the review records.

In order to address these concerns, the quality systems organization adopted the use of a management review database. During Skyworks man-

agement reviews, the quality systems representative maintains the meeting agenda and minutes and generates individual action item records for every missed target. Although deemed tedious at first, this disciplined approach to management review records became the benchmark for all sites. Customers and external auditors alike routinely recognize this practice as best-in-class (see Figure 2).

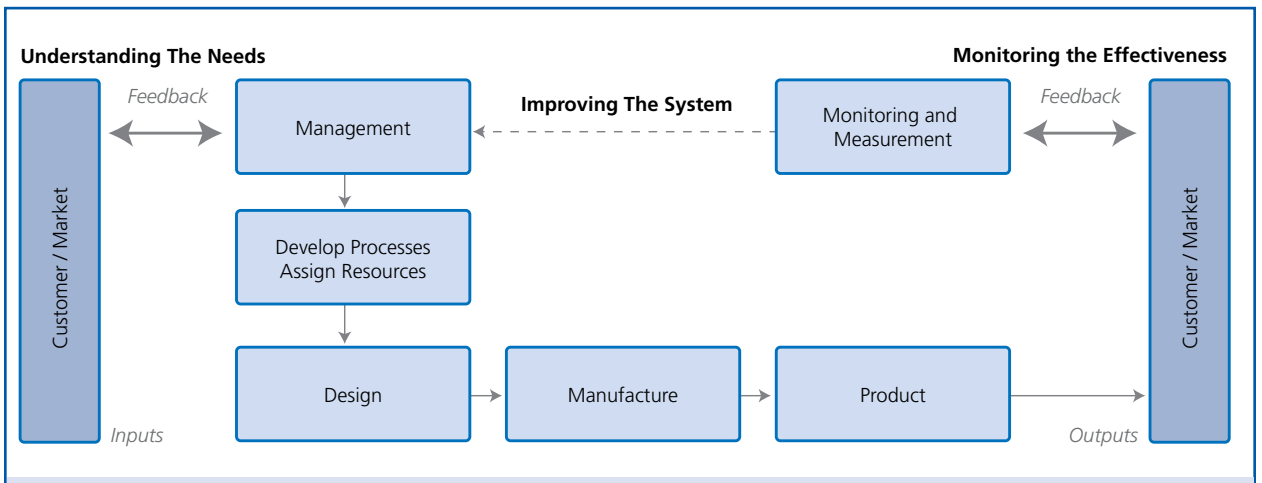

Figure 2

New Product Design

New designs are the lifeblood of any high-tech company where product lifecycles between one to three years are typical. The design and development process must accommodate anything from a single chip-in-a-package to complex multichip front-end modules. The current product realization process uses a phase-gate approach that generates dozens of deliverables (e.g. FMEA, process-control plans, design scorecards, etc.). There is a strong interdependency between the deliverables that results in entering the same information multiple times. This creates opportunities for error.

In order to avoid multiple data entry, Skyworks created an electronic workbook that captures data once and self populates all other dependent deliverables automatically. We also built in many validation rules throughout the workbook that resulted in a "self-auditing" record. Since format does drive content, the resulting workbook forces consistent information input, reducing variation during the design process.

Supplier Control

Even though Skyworks maintains its own wafer fabrication and assembly capabilities in house, it still relies on its supplier base and manufacturing partners to provide competitive, high-value products to its customers. The scope of supplier activity varies greatly from raw materials in the wafer fabs, components in the assembly plants to full-scale assembly and test partners. Suppliers are scattered all over the globe with multiple disciplines responsible for different parts of the supply chain. It quickly became critical to have the supplier quality leaders act as one, operating under a common set of policies and protocol.

In order to achieve this, Skyworks developed a global set of supplier quality metrics and scheduled meetings that brought the different disciplines together, reviewing the same data and working towards the same goals. As a result, all metrics improved rapidly and the group became a virtual, unified department.

Auditing and Improving the System

The Plan/Do-Check-Act cycle is akin to a three-legged stool: a breakdown of any one of these activities results in a collapse of the system. As such, it was important to implement a robust internal audit and corrective action program (i.e. the check and act events).

An audit program is only as effective as the individuals performing the audit. Since I was already active in my local ASQ section teaching a Certified Quality Auditor refresher course, I decided to use the same curricula to train internal auditors at Skyworks.

I developed several iterations of databases to manage the audit schedules, checklists and reports. I linked the corrective action system to the internal audit database to ensure consistent containment and closure of all audit findings.

In addition to understanding the contents of a quality-system standard, the auditors must also comprehend why each requirement was included. In order to promote this thought process, we adopted a simple tool: any audit finding was followed by the question, "so what?" (i.e. "why does this requirement matter?"). Being able to articulate an answer provided real meaning and substance to the requirement.

Audits provide early warning signals to the organization. Once an audit identifies a discrepancy, you must minimize the probability of subsequent reoccurrences. The quality system organization developed and provided comprehensive problem-solving training to all area managers and engineers to promote a systematic root-cause analysis and corrective-action mentality.

This mentality encourages the quality mindset that is crucial to the long-term viability of all quality initiatives.

Conclusions

A quality system must not become a self-serving bureaucracy but rather, must facilitate the larger business objectives of the organization. Applying a standard with little or no adaptation to the business lacks strategic impact. The key strategic challenge is to translate a best practice, quality standard effectively in order to apply the spirit of the standard to the unique business setting.

It takes several years and a panel of industry experts to develop a Quality system standard. I have learned to give the standard the "benefit of the doubt". Once the intent of the standard becomes clear, aligning it to the business objectives becomes straightforward and facilitates deployment.

Bibliography

Edwards, W. D. (1986). Out of the Crisis. MIT Center for Advanced Engineering Study.

TL 9000. QUEST Forum.

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For more information about Skyworks and its Quality initiatives, please visit www.skyworksinc.com.

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