

DESIGN FOR SIX SIGMA – A COMPANY’S ROADMAP TO LONG TERM GROWTH AND SUSTAINABILITY

In today’s competitive, global environment, differentiated new products are the key to a company’s long term growth and sustainability. Many organizations have spent the last couple of decades in intensive cost-cutting initiatives and have spent little or no time in new product development. From the pages of the Wall Street Journal and the Harvard Business Review to the halls of all the business schools, companies are expressing the dire need to refocus on innovating with breakthrough technologies, expanding their markets, enhancing customer satisfaction and creating a competitive advantage. The first step towards this goal is to have a standardized new product development process that incorporates the rigor of Design for Six Sigma.

What is Design for Six Sigma?

Design for Six Sigma (DFSS) is a business process that is incorporated into a company’s existing product development process. It takes products from concept to commercialization using data-driven decision making processes, delivering high quality, consistent, capable, defect-free products by focusing on critical design and process parameters based on the customer and market needs. It uses quality and financial metrics, data and statistics, team dynamics, risk management, resource management and project management. Design for Six Sigma uses a systematic approach to drilldown from the customer’s requirements, to detailed product properties and specifications, to product architecture and design (based on product requirements), and finally to detailed process control. All identified product and process critical parameters are controlled in production to ensure that the product is of high quality, is consistent every time, and meets the customer’s requirements.

What is the difference between Six Sigma and Design for Six Sigma?

Six Sigma is all about improving efficiencies and **reducing costs** of **existing products**. Many companies like General Electric, Honeywell, Raytheon and IBM have realized billions of dollars in cost savings, and process and quality improvement. The goal of Six Sigma is to fix problems and produce products with extremely low defects (3.4 defects in 1 million opportunities equivalent to 99.9997% good product) based on those requirements that are *critical to the customer*. Rigorous root-cause analysis and statistical techniques identify the source of the defects, and corrective actions are taken to implement a solution, and ensure that the defect never occurs again. The Six Sigma process is a standardized problem solving methodology that can be incorporated into any business. This turn-key five step process is used universally around the world. Benefits of Six Sigma initiatives are realized within a matter of four to six months and directly hit the bottom line.

Design for Six Sigma on the other hand, is about the design, development and commercialization of **new products** and processes. It is about **growth, revenue** and profitability. Unlike Six Sigma that requires a small focused team, DFSS and new

product development requires a dedicated, long-term cross functional team that typically includes business, marketing, technology, engineering, manufacturing, sales and many other support functions. There is a misconception that like Six Sigma, DFSS is a turnkey system that can be immediately incorporated and implemented with quick return on investment. This could not be farther from the truth. Every company's combination of products, processes, industry and culture is unique. The DFSS and new product development process must be tailored to that unique combination of factors for the initiative to be relevant and sustainable. Formulating this process with upper management and other important stakeholders is a necessary and vital first step.

The table below summarizes the important differences between Design for Six Sigma and Six Sigma.

Design For Six Sigma	Six Sigma
For new products and processes	For existing products and processes
Focus on growth and revenue	Focus on cost reduction
Deals with multiple customer requirements at one time	Deals with one or two customer requirements at one time
Multidisciplinary product team	Small project team
Proactive	Reactive
Process must be customized and tailored to a company's products, culture and industry	Standardized five-step turnkey process – can be used in any industry
Benefits realized long term (2 – 3 years)	Benefits realized short term (6 - 12 months)

Design for Six Sigma – The Basic Process

1. Developing the Business Case – Determining market and customer unmet needs. Understanding and quantifying the customer and market requirements. Evaluating the return on investment, growth, revenue and profitability. Evaluating the commercial risks.

2. Formulating the Technical Requirements – Translating the customer requirements to quantifiable product specifications and performance standards. Conducting feasibility analysis and technical risk assessment. Developing the project plan.

3. Designing and Developing - Product design and development. Determining the critical parameters in design and process that affect the product performance and critical customer requirements. Assessing viability, costs and profitability of prototype.

4. Verifying and Validating – Ensuring manufacturability of the product. Effective transfer from bench to production. Validating product with the customer and market.

5. Manufacturing and Commercializing – Full scale production and product launch. Tracking product manufacturability and capability. Implementing the right sales and commercial strategy. Obtaining customer and market feedback.

6. Controlling and Sustaining - Ensuring the systems, procedures and processes are in place to continue to product high quality, consistent, profitable products. Using continuous improvement to improve the process if needed.

Where can Design for Six Sigma be used?

DFSS can be used in any company that has a product or a service. Examples of where DFSS has been used in service organizations include banks (loans, credit cards), call centers, insurance, and healthcare. Many examples of manufacturing companies using DFSS include plastics and chemicals, pharmaceuticals, medical devices, aerospace, automotive, electronics and consumer goods.

Myths and Potential Barriers

One of the biggest myths of Design for Six Sigma is that it introduces extraordinary amounts of bureaucracy to the product development process. By identifying the “critical to quality” characteristics of the product, DFSS focuses on the right scope, deliverables and the necessary activities of each stage providing speed and flexibility to the process. Teams must be empowered to make decisions but should also be held accountable for those decisions.

Another misconception is that a structured product development process stifles creativity and innovation. DFSS actually stimulates innovation in product development by focusing on understanding the *unmet* needs of the market or the customer. Products that fulfill those unmet needs are the result of innovative solutions and execution. Product development is all about bringing new products to market leveraging *validated and proven* technologies and core competencies. Long-term research that creates breakthrough and disruptive technologies should be conducted at a basic research level. Once the capabilities and potential of the breakthrough technologies have been validated, they can then be used as platforms to spin off many new products for specific customers and applications using the DFSS process.

A third major misconception is that DFSS is for the technology and development group only. Effective commercialization of new products requires market intelligence, business metrics, differentiated and innovative products, production consistency and quality, skilled sales and customer service. DFSS must be multidisciplinary with dedicated, collaborative cross-functional teams.

The biggest hurdle for any initiative is the buy-in, support and *involvement* of upper management. There must be a shared vision from upper management who must be integrally involved in the process themselves and facilitate the cultural change. Results from such growth initiatives will take between two and three years to realize compared to cost-cutting and productivity programs that realize benefits in 6 months to 1 year. The commitment must be sustained for the long foreseeable future.

Benefits of Design For Six Sigma

- Increased customer satisfaction, revenues and profits
- Differentiated and high quality new products
- Cycle time reduction and speed to market
- Flexibility to respond to new market requirements, applications and regulations

- Better assessment of risks through the product development cycle
- Sustainable products and processes
- Effective communication, portfolio management, resource management and project management

Conclusion:

Design for Six Sigma can be integrated into a company's existing product development process. It uses a systematic, data-driven approach to quantify critical product requirements based on the intended use. Products are designed and developed by fundamentally understanding how components, sub-assemblies and processing quantifiably relate to the performance of the finished device and to critical customer requirements. New products can be designed, developed, manufactured, and sold with Six Sigma quality and capability meeting the customer needs, leading to product innovation, consistency, reliability and sustainable sales, revenues and profits.

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