Design For Six Sigma

By Peter Peterka

Design for Six Sigma (DFSS) is the application of Six Sigma principles to the design of products

and their manufacturing and support processes. Whereas Six Sigma by definition focuses on the production phase of a product, DFSS focuses on research, design, and development phases. DFSS combines many of the tools that are used to improve existing products or services and integrates the voice of the customer and simulation methods to predict new process and product performance.

DFSS can be compared to DMAIC (Design, Measure, Analyze, Improve, Control) and often the acronym DMADV (Define, Measure, Analyze, Design, Verify) is used to describe the strategy of DFSS. The precise phases or steps of a DFSS methodology are not universally defined. Most organizations will implement DFSS to suit their business, industry, and culture. DFSS methodology, instead of the DMAIC methodology, should be used when:

* A product or process is not in existence at your company and one needs to be developed * The existing product or process exists and has been optimized (using either DMAIC or not) and still doesn't meet the level of customer specification or six sigma level DFSS is a way to implement the Six Sigma methodology as early in the product or service life cycle as possible. It is a strategy toward extraordinary ROI by designing to meet customer needs and process capability. DFSS can produce the same order of magnitude in financial benefits as DMAIC. But it also greatly helps an organization innovate, exceed customer expectations, and become a market leader.

DFSS is the Six Sigma approach to product design−−namely, designing products that are resistant to variation in the manufacturing process. Using DFSS means designing quality into the product from the start. You are preventing wasteful variation before it happens, thus being able to identify and correct problems early when the solution costs are less. A successful DFSS implementation requires the same ingredients as any other Six Sigma project: a significant commitment and leadership from the top, planning that identifies and establishes measurable program goals and timeline, and the training and involvement of everyone.

Planning for DFSS requires collecting the necessary information that will allow for error free production of defect−free products and processes that satisfy the customer profitably. DFSS attempts to predict

how the designs under consideration will behave and to correct for variation prior to it occurring. That means understanding the real needs of your customers and translating those needs into vital technical characteristics of the product and ultimately into critical to quality (CTQ) characteristics of the product and process. You can then use design of experiments (DOE) to develop a robust design that optimizes efficiency and reduces defects.

Valid and reliable metrics to monitor the progress of the project are established early in the project, during the Measure phase if using DMADV. Key inputs are prioritized to establish a short list to study in more detail. With a prioritized list of inputs in hand, the DFSS team will determine the potential ways the process could go wrong and take preemptive action to mitigate or prevent those failures. Through analysis, the DFSS team can determine the causes of the problem that needs improvement and how to eliminate the gap between existing performance and the desired level of performance. This involves discovering why defects are generated by identifying the key variables that are most likely to create process variation. Failure Mode and Effect Analysis (FMEA) and Anticipatory Failure Determination

(AFD) can be used for both the design of the product and the design of the process.

DFSS provides a structured way to constructively use the information learned from these analyses. Armed with real data produced by the DFSS process, you can develop competent manufacturing processes and choose processes that are capable of meeting the design requirements. Further analysis can verify and validate that the product design will meet the quality targets. This can be accomplished through peer reviews, design reviews, simulation and analysis, qualification testing, or production validation testing.

The benefits of DFSS are more difficult to quantify and are more long−term. It can take over six months after the launch of the new product before you will begin to see the true measure of the project improvements. However, the eventual return on investment can be profound. This is especially true when the organization can use the DFSS project as a template for fundamental changes in the way it develops new products and processes across the organization.

Peter Peterka is the principal Six Sigma Consultant

http://www.6sigma.us/aboutus.php

in practice

areas of DMAIC and DFSS. Peter has over 15 years experience including implementation of Six Sigma in Healthcare

http://www.6sigma.us/six−sigma−healthcare.php

.

Countering The False Notion That Six Sigma Is Elitist

By Peter Peterka

Too often, when people think of Six Sigma and black belts they see them as having an elitist connotation. The opinion that Six Sigma is elitist or that black belts are elitist, however, are false. In its purest form Six Sigma is a "way of life" for an organization serious about process improvement. It just happens to have certain characteristics that people like to throw stones at. That some people have come to believe this false notion is because they have misinterpreted the nature of Six Sigma and not seen the complete picture.

There is an air of mysteriousness that surrounds what Six Sigma black belts do. People experience projects where black belts are left alone to crunch numbers and work on long projects in isolated offices far from the factory floor. They wonder what exactly happens behind the scenes and not knowing, become apprehensive. This is especially true when they know the outcomes will affect them. If employees have not received any training in Six Sigma, their ignorance about the processes will lead them to mistrust and even fear the Six Sigma project and the experts guiding the project.

Other people have developed resentment toward Six Sigma consultants themselves. Certainly, there are some individual consultants who are arrogant, uncooperative, and insensitive to others. That, though, reflects on that individual and does not represent Six Sigma. There are people in all fields and professions who are not nice or have an inflated opinion of themselves. Six Sigma is not about self−aggrandizement. It is not about lording over people. Unfortunately, some people are more concerned with obtaining a Six Sigma certification than with appreciating what the newly acquired skills will allow them to deliver to their organization. The priority of Six Sigma training should be to deliver value to one's business and to the customers of one's business. Training to become a Six Sigma team leader gives one skills and tools, but doesn't give one a right to be elitist.

Six Sigma is about getting everyone involved. A Six Sigma project forms a team of people who work together to identify problems and develop solutions. Such teams are not elitist teams rearranging the world for everyone else to live in. These teams are serving the organization by employing the skills and tools they have learned to increase quality and reduce defects. The Six Sigma black belts who are leading these teams are likewise seeking only to lend their skills learned through training.

There are plenty of ways to fail and it is always convenient to blame the tool. If you look hard enough though, the failure is the fault of a lack of planning and training. If an organization does not plan properly and train properly, there is no doubt about the outcome of that program. If management truly has their eye on the goals and is intent on providing quality products and services, then Six Sigma can keep everyone focused and part of the team. The reality is that Six Sigma isn't glamorous and it isn't sexy. It is just plain hard work.

Countering the false idea that Six Sigma is elitist is part of ensuring the success of your Six Sigma initiatives. The best way to do that is training all members of your organization in basic Six Sigma concepts can go a long way toward taking away the mysteriousness of Six Sigma and the elitist misconception some people have. Give people the knowledge and tools they need to do the job and they will thrive. Help all the members of your organization understand what Six Sigma does and how it does it. Not everyone needs to go through all of the Six Sigma training required to reach black belt qualification, but there are simple programs you can put in place to help people learn Six Sigma basics.

If you look only to the number crunching part of Six Sigma and ignore the organizational and human side, ignorance, and the resentment that comes from it, are inevitable. Including everyone affected by the Six Sigma project and giving them information they need to understand what is going on and how they can contribute will yield dividends.

http://www.6sigma.us/

Peter Peterka is the Principal Consultant in practice areas of DMAIC and DFSS.

Peter has eleven years of experience performing as a Master Black Belt, and has over 15 years experience in industry as an improvement specialist and engineer working with numerous companies.