

Featuring SPC XL 2007, DOE Pro XL 2007, and DFSS Master 2007 software

Design *for* Six Sigma

*The Tool Guide
for Practitioners*

**Lisa A. Reagan
Mark J. Kiemele**

From the creators of *Knowledge Based Management*
and *Lean Six Sigma: A Tools Guide*

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Preface

While there are several books on the market that provide detailed training on Design for Six Sigma, practitioners have asked for a quick reference guide covering DFSS tools which integrates supporting software. We are pleased to provide such a book.

A brief overview of DFSS is given; however, we expect that users of this book are familiar with the topic already. The Identify, Design, Optimize, and Validate (IDOV) methodology is described, along with important milestones and tollgate questions. The key tools used throughout the DFSS process are summarized. For each tool discussed, examples are given and helpful hints are provided.

What sets this book apart from traditional resources on the market is the integration of DFSS software. The following software packages are used and referred to in the book: SPC XL 2007, DOE Pro XL 2007, and DFSS Master 2007. This software contains many useful tools and features for the DFSS practitioner. After a particular tool is described in the book, we show how to use and interpret that tool's supporting software (when applicable). The book is written so that even those not using the software can still gain practical insight and summaries about the DFSS tools.

Whether you are just starting your DFSS journey or you are a seasoned practitioner, this book will be useful in many ways. While in training, the book is an encyclopedia of many of the tools you'll study. Beyond the classroom, it is a helpful refresher as you apply the DFSS process. The front and back inside covers provide handy DFSS tools usage matrices that map tools to tasks within the DFSS IDOV process.

Finally, the book may be used for brief, just-in-time training of team members who are assisting with DFSS project work and may have no formal DFSS training.

1. Introduction to Design for Six Sigma (DFSS)

Design for Six Sigma (DFSS) is a highly disciplined approach to embedding the principles of Six Sigma as early as possible in the design and development process.

When problems are not discovered until well into the product life cycle, the costs to make changes, not to mention intangible costs, such as customer dissatisfaction, are considerable (see figure 1.1 below).

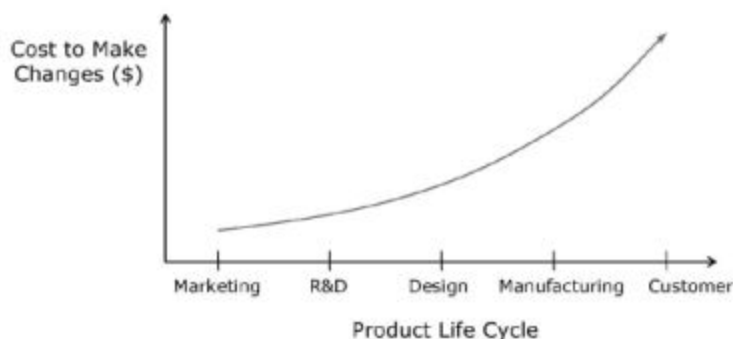
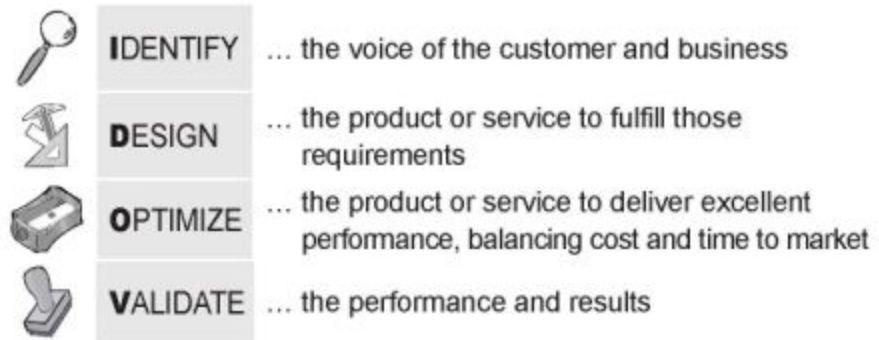


Fig. 1.1.

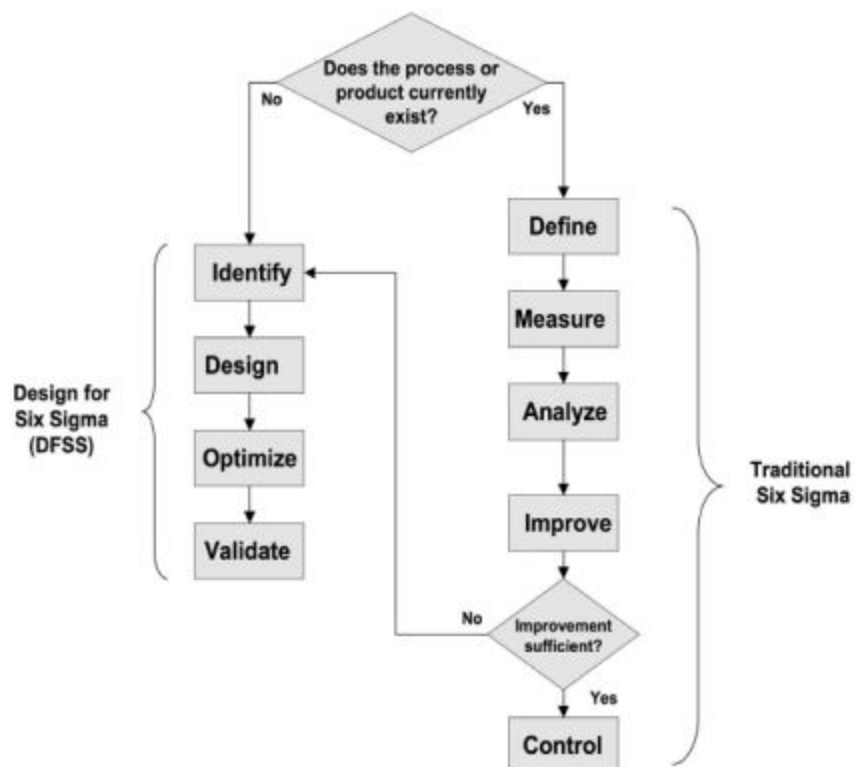
Traditional Six Sigma is applied to processes or products that currently exist. The Define, Measure, Analyze, Improve, Control (DMAIC) methodology is used as a structured approach to analyzing the root causes of poor performance and making improvements. However, when processes or products have not yet been developed, the DMAIC methodology can be problematic to apply. For example, the “Measure” phase of DMAIC requires a measure of current performance to get a baseline. For new processes or products, such baseline data will not exist. Thus, when applying Six Sigma to new process and product development, an alternative methodology (or roadmap) is used.

The DFSS methodology described in this book has four phases:



The IDOV four-phase DFSS process originated with Dr. Norm Kuchar, formerly of General Electric Corporate R&D and who led GE's worldwide deployment of DFSS, and is used by permission. It should be noted that other acronyms often are used to describe the DFSS methodology, such as DCOV (Define, Characterize, Optimize, Verify) and DMADV (Define, Measure, Analyze, Design, Verify). Unfortunately, there is no standard convention used across industry. In this book, we will not spend time reviewing all the acronyms, as this is not the most important part of DFSS. It is not the label you use, but rather the disciplined, systematic, and rigorous approach to producing the required deliverables that is most important in DFSS. Regardless of whether you use IDOV, DCOV, DMADV, or any one of the other countless acronyms, the basic steps and methodology remain constant. Furthermore, unless a company

Fig. 1.2.



is going to change the name of its new product/service development process, which is highly doubtful, the methods and tools described in this book must be mapped onto the organization's new product/service development process anyway. Thus, the reader should not be dismayed over the use of IDOV or any other acronym, but should concentrate on becoming competent at "doing" DFSS.

Figure 1.2 shows the synergy between traditional Six Sigma and DFSS. The reader will find that Six Sigma and DFSS share many common tools. Oftentimes the two methodologies are used in combination, especially in situations wherein a DMAIC project does not result in sufficient improvement in costs, cycle time, and performance, among other metrics.

The vision is to move from reactive design to predictive design as illustrated in figure 1.3 by introducing Six Sigma as early in the design cycle as possible.

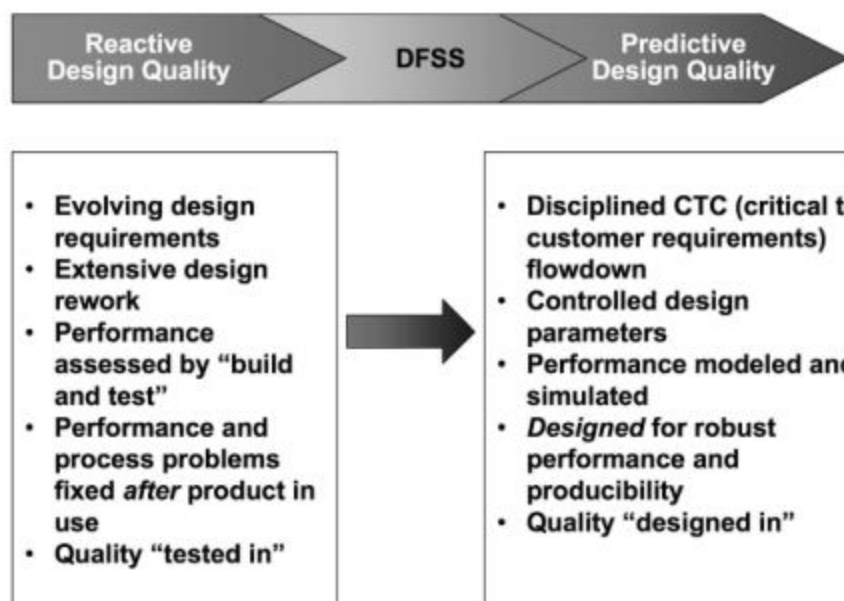


Fig. 1.3. Used by permission of Dr. Norm Kuchar.

Without DFSS, the typical product development process, in terms of time and resources, often resembles the graph in figure 1.4. As product launch draws closer, more bodies and resources are needed to meet the launch date and solve problems. Then a dip in resources is typically seen as the team breathes a sigh of relief until the first set of problems starts to roll in. Just a short time later, we typically see another surge in resources as engineers (who could be working on next-generation development efforts) are tied up solving problems and making design changes.

In the DFSS approach, resources are assigned from the very beginning. And companies that have successfully implemented DFSS have found that this enables the product launch date to actually move up with a lower overall total development cost (as depicted by the area