Design for Six Sigma (DFSS):
A Roadmap for Product Development

A book review by Dr. Michael Slocum
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The TRIZ Journal is pleased to announce the publication of <u>Design for Six Sigma: A Roadmap for Product Development</u>. Drs. Kai Yang and Basem El-Haik have delivered a tremendous research effort that will support the successful implementation of DFSS for years to come.

Basic information: <u>Design for Six Sigma: A Roadmap for Product Development</u>. 624 Pages. Published 2003 by McGraw Hill, New York, NY, USA. Price: $US 89.95 Purchase from your local book store or order from McGraw Hill. There will be volume discounts to encourage the use of this book for corporate training.

The book is organized into eighteen chapters. A table indicating the chapter content is included for your use:

Chapter	Topic[1]	Interesting Feature(s)
1	Quality Concepts	Product / Service Life Cycle Model
2	Six Sigma Fundamentals	DMAIC and Capability Review
3	Design for Six Sigma	DFSS Algorithm and Axiomatic Design linkages
4	Design for Six Sigma Deployment	Interesting discussion of momentum in SS deployment
5	Design for Six Sigma Project Algorithm	The DFSS Algorithm and the Design Synthesis Matrix
6	DFSS Transfer Function and Scorecards*	Extended discussion of the Design Synthesis Matrix
7	Quality Function Deployment	Discussion of the Hauser-Clausing Four Phase Model [2]
8	Axiomatic Design*	Excellent discussion of entropy complexity issues
9	Theory of Inventive Problem Solving (TRIZ)	Emphasis on basic functional analysis, linkage with Axiomatic Design
10	Design for X	DFX Citation Table
11	Failure Mode - Effect Analysis	Software FMEA Ratings

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[1] Those chapters relying on advanced mathematics are marked with an asterisk (*)—I don't think you need to avoid these chapters if your mathematical knowledge is not advanced enough—just be aware.

[2] This chapter is not a comprehensive review of QFD, for this the reader may want to review <u>Quality Function Deployment (QFD): Integrating Customer Requirements into Product Design</u> by Dr. Yoji Akao.

12	Fundamentals of Experimental Design	Basics of the factorial experiment
13	Taguchi's Orthogonal Array Experiment	Basics of the orthogonal array
14	Design Optimization: Taguchi's Robust Parameter Design	Discussion of the Quality Loss Function
15	Design Optimization: Advanced Taguchi's Robust Parameter Design	Dynamic versus static design
16	Tolerance Design*	Review of several TD techniques: worst-case (including tolerance allocation), nonlinear worst-case, various statistical approaches, cost-based optimization, and Taguchi tolerance design
17	Response Surface Methodology*	Discussion of response surface experimental designs
18	Design Validation	Interesting discussion of the purpose and value of prototypes

The book also has a section at the end that contains a list of acronyms and their extended forms. The usual collection of references may also be used to gather source materials for additional study. This work is an extensive collection of topics relevant to design and design optimization and forms an excellent referential basis for DFSS endeavors. The text is easy to read and understand and contains many examples for concept reinforcement. An understanding of calculus and matrix math will be very helpful for certain sections of the book (as noted in the table above).

Congratulations to the authors for their excellent reference work on the science of design. This text is the culmination and integration of several important areas of research. The integration of Axiomatic Design into most of the topics is a highlight of the text. Yang and El-Haik have published concepts that are included in this book in the TRIZ Journal[3]. The editors encourage the authors to continue and provide excellent works for our readers.

I recommend this book to anyone who is serious about design and the integration of various design methodologies.

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[3] http://www.triz-journal.com/archives/2000/10/e/index.htm, http://www.triz-journal.com/archives/2000/11/d/index.htm, http://www.triz-journal.com/archives/2000/08/d/index.htm, http://www.triz-journal.com/archives/2000/09/c/index.htm