

A Case for DFSS

Design for Six Sigma (DFSS) is a proactive approach, in which the requirements are systematically identified and prioritized, and key requirements are modeled and optimized (predictive engineering) to ensure that the requirements can and will be consistently met, even in the presence of variation (robust design).

The common alternative to Design for Six Sigma is the “**Build-Test-Fix**” approach, in which a first pass or prototype is built (“Build”)... then compared to the requirements (“Test”)... and then repaired (“Fix”). Often, several iterations of this approach are required (“Build – Test – Fix – Rebuild – Retest - Fix ...”). Some noteworthy examples of this approach are provided in the related presentation, “Build-Test-Fix Counter Examples”.

Several questions often come up regarding DFSS:

- “Can you show that DFSS improves product (or process or service) development?”
- “Can you share DFSS Success stories or case studies that provide evidence of the value of DFSS?”
- “Would the use of DFSS slow down our product development efforts?”

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“Can you show that DFSS improves product (or process or service) development?”

Lean and DMAIC projects usually provide a before-and-after situation that clearly shows improvement. Development projects generally don't have a clear “before-and-after”, and few companies have the resources to run parallel product development activities with and without DFSS to show a clear case.

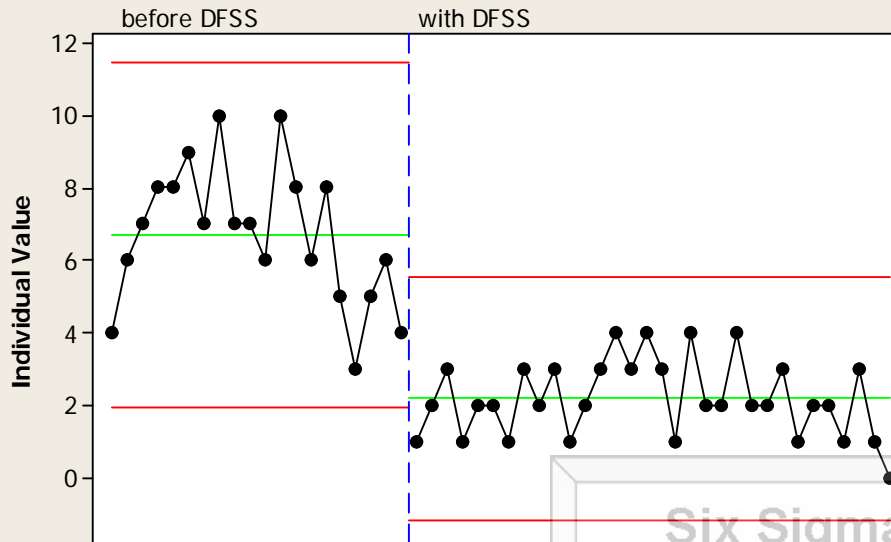
There is anecdotal evidence, including an executive at a major company who committed to Design for Six Sigma with this statement, “I've looked at our new product launches over the past several years, and the ones that have been most successful are those that used the Design for Six Sigma approach”.

There are a few examples of DFSS projects that have had a before-and-after, including the very first DFSS project at Motorola, discussed in Chapters 1 and 14 in the book, ***Applying DFSS to Software and Hardware Systems***.

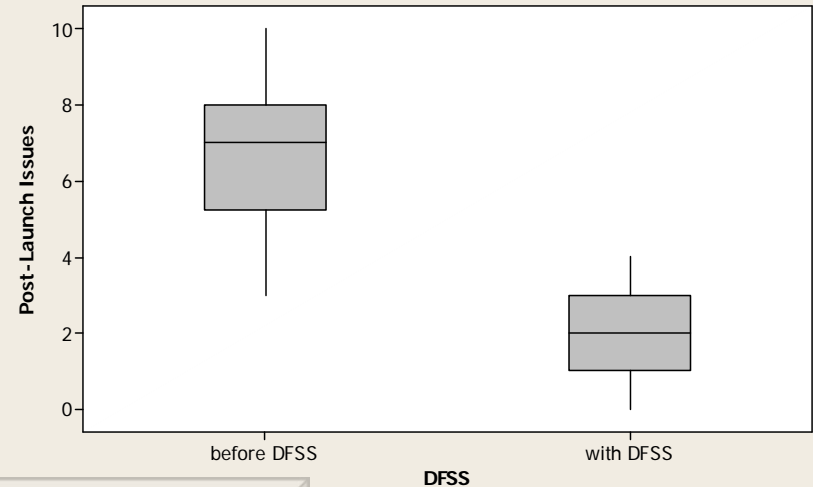
There also has been a comparison of customer issues with new products developed by a high tech organization that shows a dramatic improvement that coincides with a management commitment to using DFSS on all new products, as shown on the next page.

A Case for DFSS

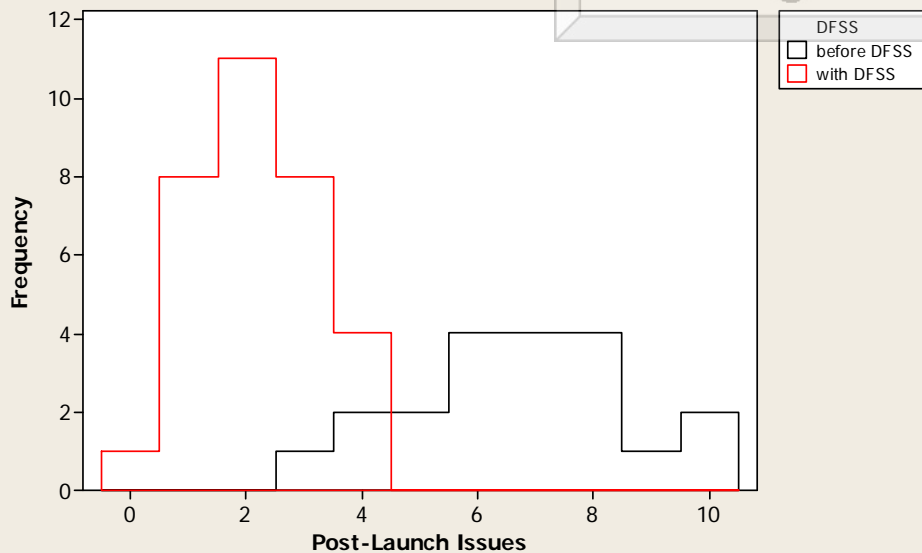
I Chart of Post-Launch Issues



Boxplot of Post-Launch Issues



Histogram of Post-Launch Issues



T-Test of difference

T-Value = 9.62 P-Value = 0.000

Mann-Whitney Test: Before, After

W = 838.0

The test is significant at 0.0000

Ordinal Logistic Regression:

Post-Launch Issues

Test that all slopes are zero:

G = 52.965, DF = 1, P-Value = 0.000

A Case for DFSS

“Can you share DFSS Success stories or case studies that provide evidence of the value of DFSS?”

Companies engaged in New product Development tend to be cautious about sharing their DFSS success stories with a wide audience, out of concern for sharing too much information with potential or actual competitors.

The appendix to this file includes links and references to books for several DFSS Success Stories and Case Studies.

Six Sigma Experts
www.sigmaexperts.com

A Case for DFSS

“Would the use of DFSS slow down our product development efforts?”

Data was gathered for dozens of new product development projects using DFSS; the associated documentation shows that development time was improved or significant schedule delays were avoided in 70% of the projects. There was no impact, favorable or unfavorable, in the other 30% of the projects. None of the projects suffered a schedule delay related to DFSS¹.

Some of the recurring, documented reasons for favorable impacts to the project schedule included:

- Saved weeks of testing
- Eliminated the need for several design iterations
- Eliminated the need for 2 prototype builds
- Gathered VOC early and effectively, minimizing changes in requirements
- Anticipated and prevented problems with meeting challenging requirements

Six Sigma Experts
www.sigmaexperts.com

¹ Maass and McNair, *Applying Design for Six Sigma to Software and Hardware Systems*, Chapter 3, Prentice-Hall, 2009.

Appendix

– Links and Published DFSS Case Studies and Success Stories

Note: This is by no means a comprehensive list. If you would like to contribute a case study, please contact eric@6sigmaexperts.com

<http://www.improvementandinnovation.com/features/articles/case-study-design-six-sigma-dfss>

Case Study: Design for Six Sigma (DFSS)

by Jim Franklin on 1st October 2006

Case study – design of compressor

<http://www.informaworld.com/smpp/content~db=all~content=a762739527>

Designing New Housing at the University of Miami: A “Six Sigma” DMADV/DFSS Case Study

Authors: J. A. Johnson a; H. Gitlow a; S. Widener b; E. Popovich c

Published in: [Quality Engineering](#), Volume [18](#), Issue [3](#) July 2006, pages 299 – 323

<http://wood.tennessee.edu/NR/rdonlyres/01B52932-E486-4492-B27A-3C47AA6F5E22/1167/ChenWeiweiethesis.pdf>

A Reliability Case Study on Estimating Extremely Small Percentiles of Strength Data for the Continuous Improvement of Medium Density Fiberboard Product Quality

A Thesis Presented for the Master of Science Degree The University of Tennessee, Knoxville
Weiwei Chen December 2005

<http://inderscience.metapress.com/app/home/contribution.asp?referrer=parent&backto=issue,2,6;journal,10,18;linkingpublicationresults,1:112380,1>

Analytical Design for Six Sigma for multiple response products. Liem Ferryanto

International Journal of Six Sigma and Competitive Advantage Issue: Volume 3, Number 1 / 2007

<http://inderscience.metapress.com/app/home/contribution.asp?referrer=parent&backto=issue,3,7;journal,2,18;linkingpublicationresults,1:112380,1>

Track roller and idler design improvement using DFSS, International Journal of Six Sigma and Competitive Advantage

Issue: Volume 5, Number 1 / 2009 **Pages:** 29 - 41 **URL:** [Linking Options](#)

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Appendix

– Links and Published DFSS Case Studies and Success Stories

From the website for Air Academy: <http://www.airacad.com/CaseStudies.aspx>

[Reduce Power Related Defects, Part 1 - Prestolite DFSS Case Study](#)
[Reduce Power Related Defects, Part 2 - Prestolite DFSS Case Study](#)

Non-Technical Applications - DFSS Case Studies:

http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=4037114

Applying Six-Sigma in the Service Industry: A Review and Case Study in Call Center Services

Chakrabarty, A. Tan, K.C.

[Management of Innovation and Technology, 2006 IEEE International Conference on](#)

Publication Date: 21-23 June 2006

Volume: 2, On page(s): 728-732

<http://europe.isixsigma.com/library/content/c070627a.asp>

Creating a Recruiting Process: DFSS for Process Design

Arne Buthmann

The following case study illustrates how a pharmaceutical company applied selected DFSS (Design for Six Sigma) tools to develop a new recruiting process for sales representatives. Tools and activities are described along the IDOV (Identify, Design, Optimize, Verify) phases, which served as a guiding roadmap through this process design project

Links and Published DFSS Case Studies and Success Stories

- Several telecommunication and wireless communication DFSS case studies:

Maass and McNair, Applying DFSS to Software and Hardware Systems, Prentice-Hall 2009.

- Several Automotive DFSS case studies:
Brunson and Hallam, Design for Six Sigma Reliability, book preview available online:

http://books.google.com/books?hl=en&lr=&id=mZjuAB0dGU8C&oi=fnd&pg=PA163&dq=dfss+case+studies&ots=R_LajXKLJr&sig=YqLLIdUzZlwlUv84HC_ZO4ztCs#v=onepage&q=dfss%20case%20studies&f=false

- Randy Perry and David Bacon, The Business Case for Design for Six Sigma, Prentice-Hall, 2006

<http://portal.acm.org/citation.cfm?id=1407785>