Lean Six Sigma 2

Lean and Six Sigma methodologies combined offers a very large toolbox of techniques that can effectively solve almost any quality improvement, process optimization and waste reduction challenge in business today. These tools are equally applicable in improving manufacturing or transactional business processes. The application of Lean Six Sigma techniques has helped countless companies create serious business breakthroughs in a multitude of industries worldwide.

Participants will gain a working knowledge in LSS concepts and in Minitab data analysis software through extensive practice with practice data files from real Lean Six Sigma projects. Datafit Non-Linear Regression Analysis will also be introduced. Students will learn how to draw the correct conclusions from data analysis. Lean Process Optimization techniques will also be covered and practiced in detail.

- First, the concepts of LSS are discussed in detail and how that the DMAIC (Define, Measure, Analyze, Improve & Control) problem solving techniques are applied to LSS projects. Alignment of the LSS tools to the DMAIC phases will be covered. More LSS techniques, depth of training, class exercises and data analysis will be covered in the Black Belt training compared to the Green Belt Training.

- Next, participants will learn how to match up the right LSS tools to different types of projects. The correct strategy of data collection and strategy of data analysis will be covered in detail. Extensive data analysis using Minitab will be practiced.

- Lastly, participants will learn how the techniques of implementing improvements and maintaining the gains once they are implemented. Statistical Process Control (SPC) will also be covered aid in this goal.
Course Syllabus

I  IDENTIFYING INFORMATION

Course: Lean Six Sigma 2
Prerequisite: Lean Six Sigma 1
Time Frame: 80 total contact hours
Instructor: David Patrishkoff
   Bachelors and Masters Degrees in Mechanical Engineering
   30 years in the product engineering profession
   20 years in executive management
Mobile: (407) 375-6831
E-mail: davepatrishkoff@aol.com

II  REFERENCE MATERIALS

1. Lean Thinking by James Womack
2. Juran Quality Handbook by Juran and Godfrey
3. Statistical Techniques in Business and Economics by Mason, Lind & Marchal
4. Applied Linear Statistical Models by Neter
5. The Machine that changed the World by Womack
6. Good to Great by Jim Collins
7. The Logic of Failure by Dorner
8. The Trusted Advisor by Maister
9. The Visual Display of Quantitative Information by Tufte

III  COURSE GOALS AND OBJECTIVES

1. Understand the DMAIC Problem Solving Methodology
2. Understand the Strategy of Data Collection & Stratification
3. Understand the Strategy of Data Analysis and its sequence of events
4. Understand the Concepts of Lean Manufacturing and Lean Transactional
5. Understand what is means to achieve Lean optimization of a process
6. Understand what is means to achieve Six Sigma process
7. Understand classic and advanced LSS Tools
8. Understand which LSS tools to use and when
9. Understand the details of data analysis using Minitab Software
10. Understand how to use Datafit Software
11. Extensive practice of LSS tools through numerous class exercises and projects
IV     METHODOLOGY

This course is a Black Belt Level of training in LSS to solve complex business issues and achieve breakthrough improvements. Each module will introduce new material that will prepare the student for the projects to be completed. Students must take and pass an open book exam at the end of the class to qualify for a certificate of successful completion or the optional Black Belt certification if a real company project is successfully completed.

Lectures
Each detailed subject will be presented in a lecture format outlining the theory and standardized accepted methodology. Lecture note outlines will be distributed to the students for each lecture to help the student capture personal notes.

Specific Industry Examples
Real life industry examples will be covered that detail out the application of the theory to demonstrate how different companies apply these tools and techniques. This will give the students a clear understanding of how and why these techniques are utilized at different companies and industries in different manners.

In-Class Assignments
The student will conduct several projects that outline each key principal on in-class projects. These projects will increase in complexity as the students further develop their skills in applying these tools and techniques. The students will present their work to the group for review and discussion. Data analysis exercises will be practiced in class to gain a clear understanding in the use of Minitab Data Analysis Software.

Specific Company Application
We will apply these tools and techniques on a specific current or past company project as a class learning project. This will help the student understand how to apply LSS at their company.

Black Belt Certification
Students should bring a real company improvement project to the class that is accepted by their management to be worked on and led by the student.
- Successful application of the LSS tools.
- Creation of a thorough final report documenting the analysis and improvement work done.
- A letter from the student’s company management verifying that the project has achieved its intended improvement goals in the company.
- Instructor approval of the final report.
# V  COURSE OUTLINE & ASSIGNMENTS

## Module 1

- Introduction to LSS and its history  
  - PowerPoint lecture
- Introduction to the different certification levels  
  - PowerPoint lecture
- Introduction to the DMAIC Methodology used in LSS  
  - PowerPoint lecture
- The 30 Classic Lean Tools & Concepts  
  - PowerPoint lecture
- The 100+ Classic Six Sigma Tools & Concepts  
  - PowerPoint lecture
- Introduction to the combined LSS toolbox  
  - PowerPoint lecture
- The Define Phase of DMAIC and its LSS tools  
  - PowerPoint lecture
- Selection of additional Class Group Projects  
  - Complete & present
- In-Class Assignment, Project Charter  
  - Complete & present

## Module 2

- The Measure Phase of DMAIC and its tools  
  - PowerPoint lecture
- In-Class assignment, The Lean Balance Chart  
  - Complete & present
- Cycle Time and Takt Time  
  - PowerPoint lecture
- In-Class assignment, Lean manufacturing exercise  
  - Complete & present
- In-Class assignment, Lean transactional exercise  
  - Complete & present
- In-Class assignment, Identifying COPQ  
  - Complete & present

## Module 3

- The Measure Phase of DMAIC and its LSS tools  
  - PowerPoint lecture
- In-Class Assignment, The Strategy of Data Collection  
  - Complete & present
- In-Class Assignment, 4W Data stratification techniques  
  - Complete & present
- In-Class Assignment, Determining Value in a Process  
  - Complete & present
- In-Class Assignment, Value Stream Mapping  
  - Complete & present
- In-Class Assignment, Value Stream Mapping  
  - Complete & present
- In-Class Assignment, Time and motion studies  
  - Complete & present

## Module 4

- In-Class Assignment, Advanced Process Mapping  
  - Complete & present
- In-Class Assignment, Process Mapping Layers of Analysis  
  - Complete & present
- In-Class Assignment, The C & c new Process Wish List  
  - Complete & present
- In-Class Assignment, Setting C & c “Wow” Targets  
  - Complete & present
- In-Class Assignment, RTY (Rolled Throughput Yield)  
  - Complete & present
- In-Class Assignment, FTY (First time yield)  
  - Complete & present
- In-Class Assignment, Total % VA calculations of a process  
  - Complete & present
Module 5
In-Class Assignment, SIPOC Diagrams Complete & present
In-Class Assignment, Waste identification Complete & present
In-Class Assignment, Spaghetti Charting Complete & present
In-Class Assignment, Spider Charting Complete & present
In-Class Assignment, Minitab Software Basics Complete & present
In-Class Assignment, Gage R & R in Minitab Software Complete & present
In-Class Assignment, Pareto Charting in Minitab Complete & present

Module 6
The Analyze Phase of DMAIC and its LSS tools PowerPoint lecture
Introduction to the Strategy of Data Analysis PowerPoint lecture
In-Class Assignment, 6M Fishbone Diagrams Complete & present
In-Class Assignment, 5Why Root Cause Brainstorming Complete & present

Module 7
In-Class Assignment, Various Time Plots in Minitab Complete & present
In-Class Assignment, Data analysis techniques in Minitab Complete & present
In-Class Assignment, Histograms & misc. stats in Minitab Complete & present
In-Class Assignment, Process Capability in Minitab Complete & present

Module 8
In-Class Assignment, Advanced data charting in Minitab Complete & present
In-Class Assignment, Stratified data charting in Minitab Complete & present
In-Class Assignment, Data normality tests in Minitab Complete & present
In-Class Assignment, Non-normal data distributions Complete & present
In-Class Assignment, Matrix Plots in Minitab Complete & present
In-Class Assignment, Simple Regression Analysis Complete & present

Module 9
In-Class Assignment, Multiple Variable Regression (MVR) Complete & present

Module 10
In-Class Assignment, Non-Linear MVR in Datafit Software Complete & present
In-Class Assignment, Contour & 3D Plots in Minitab Complete & present
### Module 11
- In-Class Assignment, Logistic Regression analysis  Complete & present
- In-Class Assignment, Transforming non-normal Data  Complete & present
- In-Class Assignment, Design of Experiments  Complete & present

### Module 12
- In-Class Assignment, Design of Experiments (cont’d)  Complete & present

### Module 13
- The Improve Phase of DMAIC and its LSS tools  PowerPoint lecture
- In-Class Assignment, Modern Innovation Techniques  Complete & present
- In-Class Assignment, Classic TRIZ Innovation Techniques  Complete & present
- In-Class Assignment, Product maturity S-Curve  Complete & present
- In-Class Assignment, The Ideality Ratio  Complete & present
- In-Class Assignment, Advanced TRIZ Directed Evolution  Complete & present

### Module 14
- Follow-Along, FMEA  Complete & discuss
- In-Class Assignment, Waterfall Charts  Complete & present
- Follow-Along, Converting downtime to Pit Stop Events  Complete & present
- In-Class Assignment, Quick Changeovers  Complete & present
- In-Class Assignment, Error-Proofing Techniques  Complete & present
- In-Class Assignment, Selecting Solutions  Complete & present

### Module 15
- In-Class Assignment, Confidence Intervals in Minitab  Complete & present
- In-Class Assignment, Hypothesis Testing in Minitab  Complete & present
- In-Class Assignment, Creating 5 How improvement Plans  Complete & present
- In-Class Assignment, Creating detailed project trackers  Complete & present

### Module 16
- The Control Phase of DMAIC and its LSS tools  PowerPoint lecture
- In-Class Assignment, Common Cause & Special Causes  Complete & present
- In-Class Assignment, Interpreting Time Plots & Trends  Complete & present
- In-Class Assignment, SPC charting & Analysis in Minitab  Complete & present
- In-Class Assignment, VOC vs. the VOP  Complete & present
- In-Class Assignment, Visual Controls & SOPs  Complete & present
## Module 17
- Integrated Maintenance (aka TPM)  
  - PowerPoint lecture
- Just in Time Concepts (JIT)  
  - PowerPoint lecture
- One piece flow concepts  
  - PowerPoint lecture
- Kanban concepts  
  - PowerPoint lecture
- Visual Management and Andon concepts  
  - PowerPoint lecture
- Sequencing concepts  
  - PowerPoint lecture
- In-Class Assignment, Using Kaizen Blitz Events  
  - Complete & present

## Module 18
- Minitab Follow-along, Data Analysis on a LSS Project  
  - Complete & discuss
- Follow-along, Final Report creation on a LSS Project  
  - Complete & discuss
- Case Study, Final Report creation on a LSS Project  
  - PowerPoint lecture

## Module 19
- In-Class Assignment, Data Analysis on a LSS Project  
  - Complete & present
- In-Class Assignment, Creating a LSS Project Report  
  - Complete & present
- In-Class Assignment, Creating an abbreviated Storyboard  
  - Complete & present
- In-Class Assignment, Creating a Project Elevator Speech  
  - Complete & present

## Module 20
- Project Presentations of Data Analysis and Final Reports  
  - Presentations
- Follow-along, the right LSS tools for different projects  
  - Complete & present
- Open Book Black Belt Exam  
  - Complete