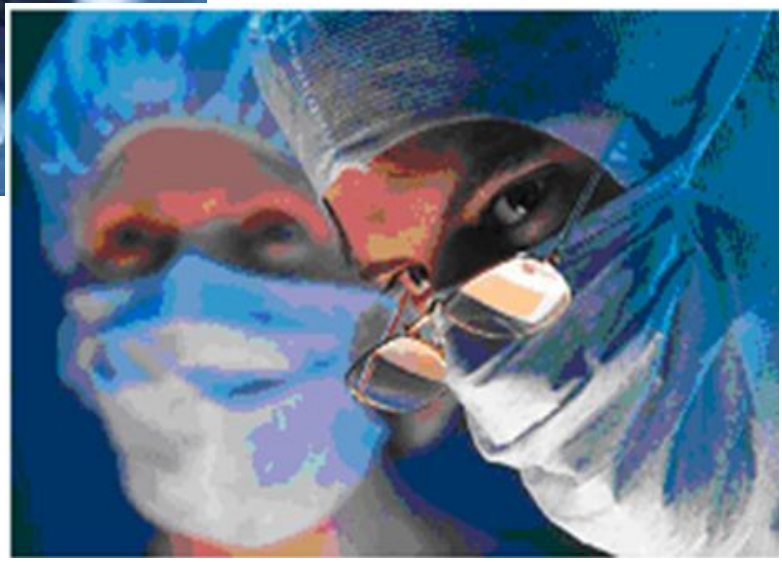
ROBERT MORRIS UNIVERSITY

CENTER FOR APPLIED RESERCH IN ENGINEERING AND SCIENCE

presents

Lean Six Sigma Training



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Executive Summary

LEAN SIX SIGMA® is an approach that has its foundation in industry and has been successfully implemented in many companies for one primary reason: *It achieves the breakthrough results that are so desperately needed*. Lean Six Sigma is a structured approach to the reduction of variation and waste in any process; its strong metric component makes it highly applicable to practically any business. **Lean/Sigma puts the customer first and uses rigorous data and information scrutiny to drive better bottom line solutions and decisions.** The tools and methods target three main areas:

- **Improving satisfaction by focusing on customer value.**
- **Reducing delivery and transaction time by dramatically cutting waste in all processes – understand and develop the value stream.**
- **Eradicating opportunities for defects occurrence through data driven process control in all areas of the enterprise.**

Lean/Sigma is a total management commitment to excellence, customer focus, process improvement, and the necessity of using capable measurement rather than "gut feel". The tools employed make every area of the enterprise better equipped to meet changes in customer needs, markets, and technologies — with benefits for employees, customers, the neighboring business community, and other stakeholders.

Though Lean/Sigma was initially focused on manufacturing processes, businesses have learned that the costs of poor service from any segment of the organization could be catastrophic and quickly harm the entire enterprise. Often times, administrative and service (transactional) processes perform below the efficiency of product generating processes, so institutions with a service delivery focus can benefit tremendously from Lean/Sigma application.

★**Who should attend SIX SIGMA?**

Executives, managers, and quality professionals involved with: Quality improvement, Risk Management, Production, Administration, Human Resources, Training, and other related areas

★**With Six Sigma you can:**

- Reduce Error Rates
- Recognize the Abnormal
- Improve Critical Thinking Skills in Your Organization
- Lower Costs

★**Training Schedule:**

- March 4, 2008 – Lean Six Sigma Introduction (1 day)
- March 17-19, 2008 – Lean Six Sigma Leadership (3 days)
- April 8-10, 2008 – Lean Six Sigma Green Belt (10 days in 4 sessions)
- May 1-2, 2008 – Lean Six Sigma Green Belt
- May 21-23, 2008 – Lean Six Sigma Green Belt
- June 16-17, 2008 – Lean Six Sigma Green Belt

Lean Six Sigma Introduction Training: 8 hours

March 4, 2008

This orientation is designed for senior management and leadership in organizations considering or deploying Lean/Sigma. This should be the first step in a full Lean/Sigma deployment. The program is led by a certified Blackbelt and includes the following topics plus additional information needed for a successful deployment in the home (participating) organization.

- What is Lean Six Sigma and why it is being adapted by many manufacturing, non-manufacturing, governmental, and educational organizations.
- How Lean Six Sigma is applied to significantly improve: **customer satisfaction, business performance, employee involvement, and sustained continuous improvement**.
- The Lean Six Sigma implementation roadmap and overview of essential tools and methods used in business process management.
- Mini case studies and breakout sessions to illustrate basic concepts.
- Roles and responsibilities in Lean/Sigma.
- How to select, coach/mentor, and train Lean/Sigma practitioners.
- How to pick projects that will be successful.
- How to sustain the gains from Lean/Sigma deployment.
- A description of the organizational structure needed to support a Lean Six Sigma implementation with proposed timelines.

Lean Six Sigma LeadershipTraining: 3 days

March 17-18-19, 2008

The following outlines goals/deliverables for a Leadership Lean Six Sigma training program. **The focus will on an accelerated walk through to introduce participants to essential techniques and approaches associated with Lean/Sigma to sustain continued organizational growth. The program prepares participants for leadership and involvement in actual projects designed to improve and advance the operations and services provided by an enterprise.** Participants will be introduced to the DMAIC roadmap and typical tools and methods used in Lean/Sigma deployment.

Day 1 – How to define, prioritize, and establish requirements for continuous improvement projects (Define and Measure phases).

- Identifying common elements found in most continuous improvement and quality improvement efforts.
- Working with ideas generated through team involvement – team dynamics and results.
- Source and selection of projects and how to stay focused on customer requirements.
- How to use process observations and measurements in problem solving.

Day 1 tools: Project prioritization matrix, Calculation of DPMO (Defects per Million Opportunities), Examples of Project Charters, Project Selection Matrix, SIPOC, Value Stream Mapping Templates, RACI Chart, MSA/Gage R&R, Measurement Prioritization Matrix, Pareto,

Driver (CTQ) Trees, Elements of QDF (House of Quality), Brainstorming, Murphy Analysis, Affinitizing, Fist of Five, Nominal Group Techniques, and Trystorming.

Day 2 – Techniques used to analyze data/information, identify root cause, and apply results to improve processes (Continuation of Measure Phase, overview of Analyze Phase and start of Improve phase).

- Overview of common problem solving methods.
- How to assess value added, non-value added, and enabling activities.
- Identifying the vital few bottlenecks (critical Xs) and assessing their impact on performances.
- How to develop and validate potential solution.

Day 2 tools: *Process Variable Mapping,* Cause & Effect Matrix, SPC Charts, Prioritizing Critical Xs, Multi-Vari, Box Plots, Regression, FMEA, Introduction/Elements of DOE, Minitab, SIGMA XL and other software, Hypothesis Testing and introduction to Kaizen Blitz.

Day 3 – How to sustain improvements and find/apply new best practices (Improve and Control Phases).

- Elements of success project management.
- Setting up and implementing realistic transition plans for project results.
- Developing and applying tools that are easy for practitioners to use and reference.
- Validating performance against bottom line results.
- Myths and limitations associated with Lean/Sigma.

Day 3 tools: Balanced Scorecard, Improvement Process Check List, Corrective Action Matrix, Control Charts, Control Plan, Poka-Yoke Options, 5S Radar Chart and Checklist, and TPM elements. Recommended resources of information (books, websites, and free Internet information).

At the completion of the program, participants will be able to understand and contribute in the following areas:

- ***Fundamental practices in CI and how to use available resources for improving SAE performance.***
- ***A sustaining process to identify and prioritize L/S projects.***
- ***Understand where and how to apply a phased approach in problem solving activities.***
- ***How reducing variability leads to improved performance.***
- ***How to enhance and strengthen team involvement in cross-functional problem solving.***

Lean Six Sigma Green Belt Training: 10 eight-hour days

April 8-10, 2008; May 1-2,2008; May 21-23, 2008; June 16-17, 2008

The training of Green Belt students represents the surest path to maximize the impact of Lean Six Sigma for an organization. Green Belt students receive a wide range of course materials in addition to the traditional Define, Measure, Analyze, Improve and Control (abbreviated as DMAIC and pronounced as de-MAY-ick) phases of Lean Six Sigma. Project management, classroom exercises to illustrate variation and Lean principles and tools are examples of a diverse course outline. Students receive Green Belt certification when their project demonstrates continued gains for four to six months.

Importantly, we recommend that Green Belt students come to the training program with projects selected *prior* to training. This approach provides frame of reference for the student to better apply the course material and provides instructors the ability to tailor the course content to include examples of those projects over the ten days of training.

Laptop computers are used to teach data analysis skills

Green Belt training can be provided at either RMU or *on-site* for a contracted institution. Each option has distinct benefits and disadvantages that must be weighed on a case-by-case basis. Classes can be delivered in two, five day per week sessions that ideally, would be separated by four to six weeks to allow the student time to work on their project between the two sessions. Classes can also be delivered on a more customized schedule that will be considered upon request. Knowledge transfer is provided in the following areas:

- How to build on Lean Principles to sustain Continuous Improvement (CI).
- Understanding the essentials for an organization to meet customer requirements.
- Effectively managing material and informational flow to improve process speed.
- How to eliminate defects through variability reduction.
- Understand the basics of process and systems thinking.
- Why validated data & information is critical in factual decision making,
- Team formation, dynamics, and leadership skills for timely completion of projects.
- The importance of continued learning in the CI process.

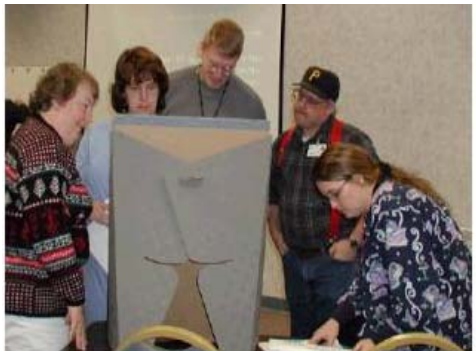
The Curriculum for Green Belt Training

Week 1 (Days 1- 5)

1. Setting the Stage for Six Sigma in Industry
    a. Pursing perfection
    b. Six Sigma examples in an industry setting
    c. Six Sigma as a statistical measure, sigma capability
    d. Six Sigma infrastructure, your role as a green belt, project overview
    e. DMAIC, DFSS overview
2. A fundamental Lesson in Variance Reduction

a. Process variation
b. Standard Deviation
c. Exercise
d. Tools for variance reduction

3. Project Management
    a. Effective meetings
    b. Team Dynamics
    c. Managing Change and cultural change
    d. Defining your project
    e. IPO and IPO matrix
    f. COPQ
    g. Managing Risk using FMEA
    h. VOC
    i. DMAIC checklist
    j. Project Timeline



Students collaborate during classroom exercises

4. How to Keep Score
    a. Characteristics, categories of metrics
    b. Metric exercise
    c. Metrics Scorecard
    d. Meeting tally sheet
    e. Attribute data, FPY, DPU, DPMO
    f. Continuous measures, descriptive statistics, spec limits, sigma level, sigma capability, quality measures
    g. Six Sigma in a transactional environment

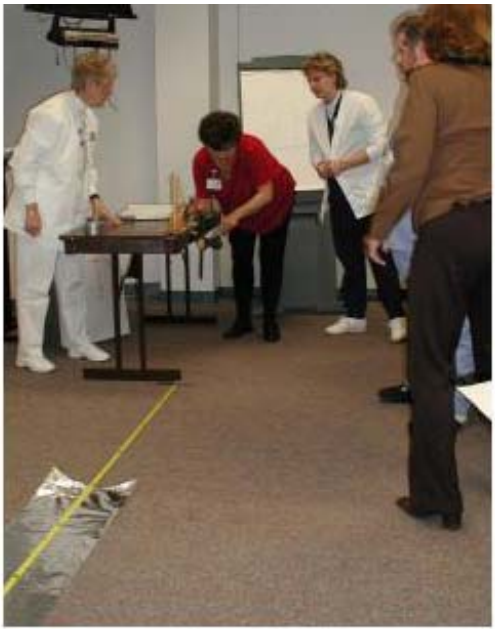
Week 2 (Days 6-10)

1. Transforming Data into Information
    a. Pareto, histograms, run charts, box plots, scatter plots
    b. Mean, median, mode, standard deviations, correlation and prediction, correlation vs. causality, CPK
2. Measurement System Analysis
    a. Fundamental principles effectiveness
    b. Probability of false rejects/acceptance and bias
    c. Repeatability, Reproducibility
    d. ANOVA
    e. Operator by part
    f. Xbar & range chart, misclassification chart.
    g. Exercise
    h. SPC XL Exercises
3. Lean Principles
    a. Lean thinking, types of activities, value stream mapping, types of waste
    b. Exercise – part 1
    c. Lean toolkit: 5S, Poka Yoke, Visual Controls, Single Piece Flow, Kanban, Work Cell Design, Kaizan Blitz
    d. Exercise – part 2
4. Statistical Process Control Charts
    a. Use of SPC in Six Sigma
    b. Interpretation of SPC
    c. Creating an SPC
    d. Project examples
    e. Exercise
5. Sustaining the Gain

a. Tools used in sustaining gains
b. Project examples
c. Barriers to sustaining project gains
d. Exercise

Action Learning Approach

All education is founded in adult learning theories and sessions include clearly stated behavioral objectives with student evaluations following the instruction. Education takes the form of small group sessions, classroom experimentation, nominal group, brainstorming, or large group PowerPoint presentations.



Classroom instruction for Green Belt students uses laptop computers and involves data analysis and presentation. Students will be expected to provide an oral presentation of their projects at the beginning of the training program and at selected intervals throughout the training process.

Active experimentation is used in many sessions to provide a truly unique experience that results in an in-depth understanding of variation, its measurement and control. Class size is part, dictated by the instructional methods used to demonstrate the tools and methods of Lean Six Sigma

Students design experiments to reduce variation in a classroom exercise

Case studies involving actual projects are used widely throughout the training sessions. These vignettes help to reinforce the material and illustrate the application of Lean Six Sigma for projects that are selected by the students.

Statistics are one component of the Lean Six Sigma toolkit and the use of KISS (Keep It Simple Statistically) approach maintains a focus on *selection* and *interpretation* of various statistical tests, not the math that is used to perform the calculation. To this end, SPC XL © is used to keep the Measure and Analysis phases within reach for those who may not have had a college-level statistics course.

Bio of the Instructors

Andrew Wowczuk, PE

Andy has a successful track record driving system improvements, innovation, and providing quality leadership in innovative and fast-paced environments. He is a senior member of American Society of Quality (ASQ) and an ASQ Certified Six Sigma Black Belt. Andy is a registered professional engineer in Pennsylvanian and West Virginia with experience evaluating processing and production methods from concept through application. His involvement and contribution in Project Management and Lean/Sigma started at Westinghouse and his educational groundwork includes Fintek Associates, Robert Morris Univeristy and MoreSteam University.

Andy has worked with start-up companies to developed and launch new products in consumer, medical implant devices, detection/law enforcement, and food processing. He has supported manufacturing by transforming shop floor production techniques through cost reduction based lean/synchronous flow projects, 5S+2 events, focused continuous improvement programs (Kaizen Blitz), and introduction of new technologies. Andy has led/managed design engineering, product line/manufacturing engineering, training/instructional design, and product line sections with up to 73 staff members. Entrepreneurial spirit and a passion for technology have turned ideas into actual commercial products – supported and named in a number of patents: CCCP, RoadSpike, Laser Welded Sleeving, Diamond Inspection, 2 Piece Railroad Fastener, Rotopeening/MHI Shotpeening, garment button inspection, robotic laser welding, symmetrical fastener inspection, and Westinghouse Fluidized Coal Gasifier/Non-Mechanical Valve.

Selected company association: Honeywell/Bendix, Westinghouse (Navy and Commercial Nuclear), Joy Mining, PMG, Koppers Company, Wabash National, Donaldson Corp. NTTC, NASA, US Navy, Bayer MaterialScience (consulting master Black Belt) and the US Maritime Administration.

Rick Beaver, VP Quality, Heritage Valley Health System

Rick was appointed to the position of Vice President, Quality and Safety Officer for Heritage Valley Health System (HVHS) July 9, 2001. Rick also serves as the head of Six Sigma Connections for Healthcare ©, a separate business venture of HVHS that supports the integration of Lean Six Sigma into other healthcare organizations and provides a full range of education for staff, leadership, board members and physicians.

Rick previously served as the leader of Operational Excellence and Quality for Nova Chemicals Inc. in Monaca, PA. Prior to working at Nova, Rick was employed by Sony Electronics Inc. in Mount Pleasant, Pa. as the leader of Operations, Manufacturing, Engineering, Maintenance and Inspection. In both positions, Rick developed an expertise in Lean Six Sigma and other continuous improvement techniques, which he is now applying toward improvement of the processes surrounding patient care. Rick was with Sony from 1993-1999 and with PPG Industries Inc. in Pittsburgh as an engineering project leader for the Fiber Glass Division from 1980-1993.

Rick earned a B.S. in Chemistry at the University of Pittsburgh in 1978 and continued his education with graduate work in polymer chemistry at Carnegie Mellon University. He has 14 patents and is published in the areas of healthcare quality, chemistry, engineering and Lean Six Sigma. His most recent publication was in Quality Digest, March 2004. Rick completed leadership training at the Center for Creative Leadership and obtained his "Black Belt" in Lean Six Sigma techniques at SONY and NOVA Chemicals.

Zbigniew J. Czajkiewicz, Ph.D., Professor of Engineering, RMU
Head of the Center for Applied Research in Engineering and Science

Dr. Czajkiewicz joined the RMU faculty in 2004. He has served as president of his own consulting company since 2000, engaging in many international projects involving the implementation of automation and large-scale software systems and process improvements. He previously served as a faculty member at Texas Tech University, the University of Toledo, Wichita State University and California State University-Fresno, where he was professor and coordinator of the industrial engineering program and director of the Computer Integrated Manufacturing Center from 1989 to 2000. During his career in academia, Dr. Czajkiewicz taught a variety of courses from statistics to management decision support/information systems design. He has more than 50 publications, more than 20 externally funded research grants and many more consultancy cases to his credit. His consulting and industrial experience includes work in England, Kazakhstan, Germany, USA and Poland. The scope of projects includes analysis and productivity improvements, reengineering, implementation of computer management systems (ERP), Total Quality Management (TQM), production automation and project management. Dr. Czajkiewicz earned an M.S. in industrial engineering and management as well as a Ph.D. in industrial engineering from Technical University of Wroclaw in Poland.