Design of Experiments for Maximum Competitive Advantage in Manufacturing

Inaugural Workshop September 23-25, 2008 • Auburn University

Learn how to use powerful and efficient designed experiments to –

- ✓ Optimize products and manufacturing processes for maximum functionality, manufacturability, productivity and quality,
- ✓ Reduce problem solving lead times from months to a few days,
- ✓ Master your understanding of cause and effect relationships between process, materials and functionality in days instead of years and enhance your ability to innovate.

Participants will receive 2.4 continuing education credits and a free 180-day user license for Design Expert version 7 – the world's most complete and user-friendly software for the design and analysis of designed experiments!

The College of Engineering will offer this first ever workshop at Auburn University on "Design of Experiments for Maximum Competitive Advantage in Manufacturing" with assistance from the Auburn University's College of Engineering, Engineering Continuing Education, Polymer and Fiber Engineering and the ZDM Group from Atlanta, Georgia.

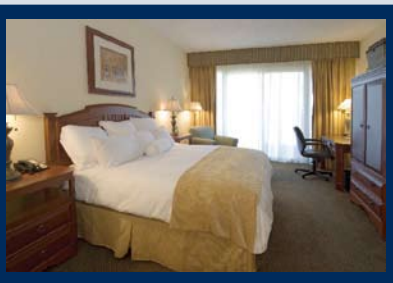
Participants will leave the workshop with skills to design, perform, analyze and interpret statistically designed experiments (DOE) for process modeling and simulation, optimization, trouble shooting and product and process development and improvement. DOE is a key methodology for any continuous improvement strategy such as Six Sigma, Design for Six Sigma or 8 D's.

Who Should Attend?

Anyone responsible for the design and optimization of new products or manufacturing processes, evaluation of new technologies, processes or materials and problem solving should attend this workshop.

Course Synopsis

- Introduction to statistically designed experiments (DOE) – what they are, when to use them, benefits
- Demonstrations to compare DOE with traditional methods of studying processes and products
- The five elements of an effective study design and the design protocol
- Review of basic statistics and the concepts of statistical significance
- Design and analysis of effects, development of effects and interaction plots and graphical and numerical product and process optimization and simulation with –
  - Fractional factorial designs to weed out the critical few factors quickly and economically
  - Complete factorial study designs to pinpoint causes
- How to run and document confirmation studies
- Development of simulations in MS Excel to easily study product and process alternatives and communicate the options to others
- Communicating the results so that everyone understands



AUBURN UNIVERSITY

Leaders

Stephen W. Zagarola, Instructor

- Georgia Institute of Technology-B.S. Mechanical Engineering
- Georgia Institute of Technology-Applied Statistics
- Georgia State University-Psychology
- Six Sigma Black Belt

Steve is a founding member of The ZDM Group. He has more than thirty years of engineering, quality systems, packaging research and development, and operations management experience in North America, South America, Europe, Africa, Asia and Australia. He regularly publishes articles and speaks at conferences in variety of industries each year. Subjects of his articles and talks include everything from effective quality systems and lean manufacturing to optimization of injection and blow molding processes for stress crack resistance to Six Sigma research and development methods. Steve authored the first plastic soft drink bottle specifications for The Coca-Cola Company in 1975. He holds patents for container design and testing methods.

Steve pioneered the use of DOE (Design of Experiments) and other Six Sigma methods for optimizing plastic, packaging, and beverage manufacturing processes. He is respected as a leading authority in the application of World Class SPC and Six Sigma methodologies in those industries. These statistical methods have consistently generated substantial operating cost savings to packaging manufacturing companies. He speaks English, Spanish, Italian and German.

Lawrence S. Mucha, Instructor

- Miami University, Oxford, Ohio-B.S. Chemistry
- Columbia University, Georgia Institute of Technology-Applied Statistics, SPC, DOE
- Ohio University-Psychology, Education
- Six Sigma Black Belt

Mr. Mucha is a management professional with over thirty years experience in the beverage and packaging industry. Prior to joining P.E.T. Terra Systems, Inc. in 2004 as Manager Future Technologies Development Larry spent 24 years with The Coca-Cola Company. During his career with Coke he was responsible for several top priority, highly visible packaging projects as well as Manager of Future Technologies, Manager of Quantum Leap, and Manager of Technical Packaging Department, NW European Division, London. Larry began his career as a packaging engineer. He has been a practitioner of statistics, SPC, and DOE for over 28 years, most recently with P.E.T. Terra Systems as a practitioner and instructor.

Larry holds two package patents and has two pending. He is certified by the Project Management Institute as a Project Management Professional and a Certified Packaging Professional by the Institute of Packaging Professionals. He is a member of American Chemical Society, Innovation Network, World Future Society, Project Management Institute and Institute of Packaging Professionals.

Dr. Edward Davis, Lab Organizer

- Ph.D., Chemical Engineering, University of Akron
- M.E., Chemical Engineering, Tulane University
- B.S.E., Biomedical Engineering, Tulane University

Dr. Davis is an Assistant Research Professor in the Polymer and Fiber Engineering department at Auburn University and will assist with the lab demonstrations during the workshop. The new curriculum for Polymer and Fiber Engineering reflects the importance of polymers, composite materials, and fibrous materials in such diverse fields as plastics, elastomers (rubber), adhesives, surface coatings (paints), paper, packaging, insulation, filtration, biomedical, automotive, aerospace, marine, construction, environmental, industrial, nonwoven, recreational, and safety materials. Many engineering achievements develop in conjunction with advances in engineered materials. Strong yet lightweight structures for aircraft, automobile components, and high performance racing bikes are a few examples. Increasingly, these engineered materials utilize polymers and fibers. The relationship between the structure, properties, and performance of these materials is critical to advances in technology.

Auburn Marriott Opelika Hotel & Conference Center at Grand National

3700 Robert Trent Jones Trail • Opelika, Alabama 36801 USA
Phone: 1-334-741-9292 Fax: 1-334-741-9733 Toll-free: 1-800-593-6456

This Inagural Workshop will be held at the Auburn Marriott Opelika Hotel and Conference Center at Grand National in Opelika, Alabama.

Overlooking the award-winning Robert Trent Jones Golf Trail, this Auburn Hotel is on par with the nation's most distinctive facilities. Nestled on 2,000 acres of lakefront countryside, the hotel offers an exceptional golf and business retreat and is a top Auburn University hotel, located in the quaint, historic town of Opelika. Situated on the shores of Lake Saugahatchee, this Auburn hotel offers a peaceful and serene atmosphere, as well as 54 challenging holes of championship golf designed by legendary architect, Robert Trent Jones. Escape from ordinary hotels in Auburn, Alabama and indulge in the finest mix of business and pleasure. Enjoy spacious guest rooms designed with the finest attention to detail including complimentary high-speed Internet access and stunning views from your own private balcony at this incredible Auburn, Alabama hotel. Discover an elegant oasis at the incomparable Marriott Auburn Hotel. The hotel is located at 3700 Robert Trent Jones Trail in Opelika. A block of rooms will be reserved at the hotel for participants of the conference. To make reservations call 800-593-6456

Workshop Agenda

Design of Experiments for Maximum Competitive Advantage in Manufacturing

Refreshments and lunches will be provided each day. A map and more logistical details will be provided to all registrants. Laboratory visits and demonstrations will be held in the Polymer and Fiber Engineering Department at Auburn University.

September 23, 2008 – 9:00 a.m. Introduction

- Workshop – demonstrations of designed experiments
- Review of the parameters of a well-designed experiment
- The protocol for a designed experiment
- The benefits of a designed experiment
- Design and selection of control factors and responses and combinations
- Generation of responses with a simulator
- Calculations of effects
- The underlying strategy distinguishing between real effects and noise
- Basic statistics, measures of dispersion, parameters versus statistics, the normal distribution
- Workshop for improving ability to detect real effects
- The "T" distribution and its application to determine significance of calculated effects
- Adjourn 5:00 p.m.

September 24, 2008 – 9:00 a.m.

- Development of the mathematical model
- Effects and interaction plots
- Using Design Expert software to design and analyze a DOE with simulated process data
- Numerical and graphical process optimization and process window definition with Design Expert
- Design, execution and analysis of a DOE for a laboratory scale injection molder
- Adjourn – 5:00 p.m.

September 25, 2008 – 9:00 a.m.

- Design and execution of confirmation studies for the injection molder DOE
- Development of simulations from the DOE results in MS Excel
- Fractional factorial designs for screening studies for faster more economical results
- Reporting on DOE results for Manufacturing process optimization, control and for R&D product commercialization including identification of opportunities to design products and processes which are robust to variation in process inputs
- Review and conclusions
- Adjourn – 5:00 p.m.

REGISTRATION FORM

September 23-25, 2008
Registration Fee - $1,350

Please complete this registration form and return to Auburn University with payment or register online at www.eng.ce.auburn.edu. All registrants will receive a confirmation package that might include logistical details for hotel accommodations, meeting room location and other pertinent details for attending this workshop. If you have questions, please contact Jan Carrington, Engineering Continuing Education (ENGCE) office at 800-446-0382 or 334-844-4370.

Name _____
First name MI Last Name

Company _____

Address _____

City _____ State _____ Zip+4 _____

Bus Phone _____ Fax No _____

E-mail _____

Payments: $1,350

❑ Check made payable to Auburn University

❑ VISA ❑ Mastercard ❑ Government invoice PO# _____

Credit Card No _____ Exp Date _____

Credit Card Name _____

PLEASE FAX OR RETURN THE COMPLETED REGISTRATION FORM(S) ASAP TO:
Engineering Continuing Education
Auburn University
217 Ramsay Hall
Auburn AL 36849-5390
800-446-0382 or 334-844-4370 or Fax 334-844-5715
Register online: www.engce.auburn.edu

AUBURN
UNIVERSITY