



## DOX 2008

The Engineering Technology Program at the University of New Hampshire at Manchester is proud to host DOX 2008. This is a unique, national award-winning, six-day program designed to help companies build a deep understanding of products and processes with a relatively small investment of experimentation time. It is presented by partners of the North Haven Group ([www.northhavengroup.com](http://www.northhavengroup.com)).

### **A Six-Day Program that Gives Your Company Hands-On Training**

A team (or individual) from each company comes to the course with a relevant company project, and works on that project throughout the course, learning the necessary methodology by applying it. For best results, participants should attend as a team, including representatives from quality assurance, engineering, and manufacturing. A representative from management is also recommended.

### **Combining Theory, Application, Follow-up, and Consultation**

The in-depth training focuses on developing actual solutions to real problems through designed experimentation. The six full-day training sessions are spaced so that teams can conduct process experiments at their companies (April 10 and 11, May 1 and 2, May 29 and 30). Between sessions, follow-up and on-site consulting are provided (as needed). A month after the sixth and final training session, teams showcase their results at a half-day symposium (morning, June 27).

### **For more information...**

The links below will take you to a detailed course description and a registration form. If you wish to register, please mail, fax, or e-mail the completed registration form to

ET Program, Attention R. Draper, UNH at Manchester, 400 Commercial Street, Manchester, NH 03101, fax 603-641-4353, [rwd@cisunix.unh.edu](mailto:rwd@cisunix.unh.edu).

For questions, please contact Ralph Draper, at 603-641-4323(O), [rwd@cisunix.unh.edu](mailto:rwd@cisunix.unh.edu), or Mia Stephens at 207-363-5739(O), [miamerl@aol.com](mailto:miamerl@aol.com).

- [Course description and schedule](#)
- [Registration form](#)



## DOX: Design and Analysis of Experiments

With application to Lean Six Sigma and Design for Six Sigma

Sponsored by the University of New Hampshire Manchester (UNHM) and hosted by the Engineering Technology program

### Program Description

April 2008

Design of experiments is a powerful technique that enables employees to build a deep understanding of products and processes with a relatively small investment of experimentation time. This knowledge is vital to:

- Identify and control critical process variables to **reduce waste and rework** in manufacturing - this reduces expensive scrap, reduces lead times and **saves money**;
- Optimize processes to **increase output, reduce process costs, decrease lead time, improve quality, and perform on target** and with little variation;
- Slash new product or process development time - **gets you to market sooner with higher customer satisfaction and lower cost.**

The course provides comprehensive training in all aspects of design of experiments, and includes numerous important topics often not included in design of experiments training. For example, participants will learn how to design split plot experiments for cases where some experimental factors cannot be completely randomized, and how to use mixture designs for experiments where the factors to be manipulated are components of a formulation (see the syllabus below for a comprehensive list of topics). Upon successful completion of the course, participants will be able to design and analyze experiments effectively for a wide range of applications and industries.

Some Lean Six Sigma and Design for Six Sigma (DFSS) tools will be introduced in order to facilitate the effective design and conduct of experiments either for continuous improvement of existing products and processes or in designing new products or processes.

Note: The course does not assume any prior training in design of experiments or statistical methods.

### Project Focus

Companies are encouraged to send teams of 3 to 5 individuals to work on actual company projects as part of the training. As a part of the course fee, the instructors will provide both in-class and out of class consulting support to the teams working on projects. This includes up to one full day of onsite support for each team.

Working as teams on real projects enhances and facilitates the learning experience and typically results in considerable cost savings for the participating companies. Help will be provided by the instructors in defining the project and developing a strategy to successfully complete the project. Historically, participating companies have realized cost savings in hundreds of thousands of dollars.

### JMP Statistical Software

The powerful JMP 7.0 statistical software from the SAS Institute will be used throughout the course to design experiments and analyze data. JMP is fully integrated into the course notes, and training in the software is provided as part of the class. Participants in the course will receive, free of charge, a fully functioning one year licensed copy of JMP 7.0.

### Continuing Education Credits

Those successfully completing the course are eligible to receive 5.0 CEU's and/or 50 professional development hours and a certificate of completion for the course.

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400 Commercial Street, Manchester, NH 03101 | 603-641-4101

[www.unhm.unh.edu](http://www.unhm.unh.edu)



### Course Fees

The fee per participant for the class is **\$1,200 for one or two attendees from a company, and \$1,000 per attendee for company teams of three or more members.** For this price, participants receive a complete set of course training materials, a free copy of JMP 7.0 (one year license), and consulting support for their project. The price also includes continental breakfast, lunch, and afternoon snacks.

### Course Content

- Introduction to Design of Experiments
- Overview of the Six Sigma DMAIC and IDOV processes and tools
- Basic descriptive data analysis using JMP 7
- Full factorial experiments
- Fractional factorial experiments
- Augmenting existing experiments and the use of center points for lack of fit
- Blocking strategies to account for nuisance sources of variation
- Simultaneous optimization techniques for multiple experimental responses
- Using covariates in experiments
- Split plot experiments, used when factor settings cannot be completely randomized
- Sub-sampling, nested design structures, and variance components analysis
- Space filling designs and Gaussian process models for computer simulation experiments (a key topic for DFSS)
- Response surface designs and methods
- Mixture designs
- Use of JMP software for analysis

### Other Details

The course consists of a combination of lecture, discussion; skills practice sessions, and project-related group exercises. Each participant will be asked to bring a laptop to the training. Throughout the course, we will use the JMP statistical software, along with the occasional use of Microsoft Office (Excel and Word).

### Dates and Location

The classes will be held at the UNH Campus in Manchester (UNHM), Room 362. The dates for the sessions are: April 10 and 11, May 1 and 2, and May 29 and 30. A half day wrap-up and symposium will be held on Friday, June 27.

The six training sessions will be held from 8:00 AM to 5:00 PM, and the half-day symposium will run from 8:00 AM to 12:00 PM, followed by a group lunch

### How to Apply

Send a completed registration form, along with a check payable to North Haven Group, to:

Engineering Technology Program, Attention R. Draper

UNH at Manchester

400 Commercial Street

Manchester, NH 03101.

The application deadline is March 28, 2008. Payment is expected before the first class on April 10, 2008. The cost is \$1,200 per attendee, if a company sends one or two participants. The cost for a company team of at least three participants is \$1,000 per attendee.



### Instructors

The course instructors are Philip J. Ramsey, Ph.D. and Mia L. Stephens, M.S. Dr. Ramsey and Ms. Stephens are partners in the North Haven Group, LLC, a New Hampshire based consulting firm providing global training and consulting in all aspects of Six Sigma and statistical methods ([www.northhavengroup.com](http://www.northhavengroup.com)). Design of experiments is one of the core areas of expertise for the North Haven Group.

**Philip J. Ramsey** is an industrial statistician with over twenty five years of experience in applying statistical methods to products, processes, and R&D programs, within such diverse industries and disciplines as: aerospace, chemicals, metals, microelectronics, automotive, apparel, construction, nondestructive testing, and general manufacturing. Dr. Ramsey has held the following relevant industrial positions: Senior Engineer for Materials and Processes Development, McDonnell Douglas, St. Louis, MO; Staff Scientist/Statistician, Alcoa Technical Center, Pittsburgh, PA; and Corporate Statistician/Senior Engineer, Rohm & Haas Electronic Materials, Marlboro, MA. He also has extensive experience with the design and delivery of industrial training courses in statistical process control, design of experiments, and response surface methods for process optimization. He is a faculty member in the Department of Mathematics and Statistics at the University of New Hampshire. Dr. Ramsey holds a Ph.D. in Statistics from Virginia Tech.

**Mia L. Stephens** is a trainer and consultant, with over fifteen years of experience in the application of statistical methods, project management, organizational development, organizational dynamics, and team process. Her expertise includes Lean Six Sigma and Design for Six Sigma program deployment and support. In the ten years prior to the formation of NHG, Ms. Stephens worked in private industry as a process manager, trainer, and facilitator for continuous improvement teams. Since then, she has worked with a variety of industries and with the federal government, developing training materials, teaching, and consulting in both manufacturing and non-manufacturing environments. Ms. Stephens holds an M.S. in Applied Statistics from the University of New Hampshire. She is currently located in Maine.

### Contact Information

#### Mia L. Stephens

PO Box 290  
York Harbor, ME 03911  
Business Phone: 207-363-5739 or Cell Phone: (207)450-2979  
[mstephens@northhavengroup.com](mailto:mstephens@northhavengroup.com) or [miamerl@aol.com](mailto:miamerl@aol.com)

#### Ralph W. Draper

Coordinator, Mechanical Engineering Technology Program  
University of New Hampshire at Manchester  
470 Commercial Street  
Manchester, NH, 03101  
603-641-4320 (Office)  
603-641-4323 (Direct line)  
603-641-4353 (Fax)  
603-608-8600 (Cell)  
[rwd@cisunix.unh.edu](mailto:rwd@cisunix.unh.edu)

#### Dr. Philip J Ramsey

Dept. of Mathematics and Statistics  
Kingsbury Hall  
Durham, NH 03824  
Home Phone: (603) 672-5651 or Cell Phone: (603)315-3518  
[pjramsey@cisunix.unh.edu](mailto:pjramsey@cisunix.unh.edu) or [pjrstats@aol.com](mailto:pjrstats@aol.com)

### Appendix: Previous Participants in the DOX Program

- Aavid Thermalloy
- Advanced Circuit Technology



- Aspen Aerogels
- BAE Systems
- Cabletron
- Continental PET Technologies
- Cooper Products Inc
- D T Magnetics
- D. G. O'Brien
- Erie Scientific Co
- Flextronics/Cabletron
- Freudenberg NOK
- GFS Manufacturing Company
- Hadco Corporation
- Hendrix Wire & Cable
- Hitchiner Manufacturing Co Inc
- Hutchinson Sealing Systems
- Jac Pac Foods
- Johnson & Johnston Associates Inc
- Johnson Controls Inc
- K.J. Quinn
- KRL/Bantry Components
- Labsphere
- Lewis & Saunders Inc
- Luminescent Systems
- Markem Corp.
- Micro Med
- Neslab Instruments
- New Hampshire Ball Bearings
- Pitco Frialator Inc
- Polyclad Laminates
- Prime Tanning Co.
- Quin-T Corp.
- Sanmina Corporation
- Saphikon
- Schleicher & Schuell Inc
- Schleuniger USA Inc
- Simplex Technologies Inc
- Thermal Dynamics Corporation
- Timken Aerospace
- Uraseal Inc.
- Velcro USA Inc
- Venture Seabrook
- Vishay Sprague
- Whitney Blake Co.
- Wyman-Gordon Investment Castings



## Registration Form

### DOX 2008: Design and Analysis of Industrial Experiments & Six Sigma

#### General Information about DOX 2008

- The DOX course provides comprehensive training in all aspects of design of experiments, with application in both continuous improvement of existing products and processes and in designing new products or processes.
- Companies are encouraged to send teams of 3 to 5 individuals to work on actual company projects as part of the training. As a part of the course fee, the instructors will provide both in-class and out of class consulting support to the teams working on projects.
- Participants in the course will receive, free of charge, a fully functioning one year licensed copy of JMP 7.0. Each participant will be asked to bring a laptop to the training
- The course consists of a combination of lecture, discussion; skills practice sessions, and project-related group exercises.

#### Course Details

- Dates: April 10 and 11, May 1 and 2, and May 29 and 30, with a half-day, wrap up and symposium on the morning of Friday, June 27.
- Location: University of New Hampshire at Manchester, Room 362

#### How to Register

- By e-mail or phone: Call Ralph Draper at 603-641-4323, [rwd@cisunix.unh.edu](mailto:rwd@cisunix.unh.edu).
- By fax: Fax the completed registration form to Ralph Draper at 603-641-4353
- By mail: Complete and return the registration form to Engineering Technology Program, Attention R. Draper, UNH at Manchester, 400 Commercial Street, Manchester, NH 03101

*Registration deadline is Friday, March 28.*

#### Form of Payment and Refund Policy

- By mail: Send check or money order, payable to North Haven Group, to Engineering Technology Program, Attention R. Draper, UNH at Manchester, 400 Commercial Street, Manchester, NH 03101
- Refunds, less a \$25 processing fee, will be given if written cancellation is received at least five business days prior to the start of the course.

*Payment must be received prior to the start of training on Thursday, April 10.*

**For more information about the program or registration:** Contact Ralph Draper at 603-641-4320 or [rwd@cisunix.unh.edu](mailto:rwd@cisunix.unh.edu), or Mia Stephens at 207-363-5739, [miamerl@aol.com](mailto:miamerl@aol.com).

#### DOX 2008 Registration Form

##### Payment

The fee per participant is \$1,200 for one or two attendees from a company, and \$1,000 per attendee for company teams of three or more members.

Number of Participants \_\_\_\_\_ Amount Enclosed (Check or MO) \_\_\_\_\_

Brief Project Description \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



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**Company Information:**

Company Name \_\_\_\_\_

Industry (Brief description of products/services provided) \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**Individual or Team Member 1:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_

**Individual or Team Member 2:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_



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**Individual or Team Member 3:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_

**Individual or Team Member 4:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_

**Individual or Team Member 5:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_





Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_

**Individual or Team Member 6:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_

**Individual or Team Member 7:**

Name (*Last, First, MI*) \_\_\_\_\_

Title/Function \_\_\_\_\_

Division or Dept \_\_\_\_\_

E-mail address \_\_\_\_\_

Work Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Day \_\_\_\_\_ Evening \_\_\_\_\_

