

## Lean Maintenance, Repair and Overhaul

- ▶ **Location:** Knoxville, Tennessee
- ▶ **Duration:** Five Days
- ▶ **2009 Dates:** October 11-16
- ▶ **2010 Dates:** February 21-26  
May 2-7  
October 24-29
- ▶ **Tuition:** \$4,500 (includes materials, meals and lodging)
- ▶ **Website:** <http://TheCenter.utk.edu>

### Participant Profile

This course targets managers, engineers, lean change agents, and others involved in implementing lean concepts in Maintenance, Repair and Overhaul (MRO) organizations. The course will address eliminating waste, improving quality, creating flow, and enhancing responsiveness to customer needs in the MRO environment. The participants will gain insight on how to apply lean principles in the MRO world.

### Course Overview

The lean enterprise model is a proven method for eliminating waste from the value stream and for creating flow. Lean techniques can be used to improve customer lead times and product quality while reducing inventory, floor space and labor. Customers of the University of Tennessee have used lean to grow their market by providing better customer value. Simultaneously, they have met the growth in demand with their existing resources by eliminating waste.

Special problems that MRO organizations need to address when implementing lean principles include:

- ▶ High Variability in Demand Uncertainty in Workscope and Material Requirements
- ▶ Unpredictable Response Times from Support Operations and External Suppliers
- ▶ Difficulty in Managing Shared Resources
- ▶ Physical Restrictions on Movement of Work
- ▶ Restrictions Requiring Repaired Parts to be Returned to the Original Assembly
- ▶ Implications of the Diagnosis—Scheduling/Dispersal/Backshop/Assembly/Test Sequence
- ▶ Complex and Unpredictable Flow Paths

MRO organizations also face the problem of integrating different improvement tools.

- ▶ Applying the Theory of Constraints perspective and tools with the Lean Enterprise Model.
- ▶ Gaining maximum synergy between Six Sigma and Lean initiatives.

This course will demonstrate how to adapt the lean enterprise model to the MRO environment. A hands-on simulation of the MRO process is an integral part of the week-long experience. The program is:

- ▶ Unique in that it is the first program of its kind focused exclusively on MROs
- ▶ Powerful—we've assembled a set of proven tools that will work to make your organizations more competitive
- ▶ Applied—we provide hands-on experience with solutions to your most pressing day-to-day problems
- ▶ Exclusive—you will be in a class of leading

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MRO organizations from across a broad range of industries, an ideal environment for sharing best practices

- Integrative—it combines lean tools with the Theory of Constraints

The course covers the standard suite of lean tools: defining customer value, value-stream mapping, the visual factory, 5S, takt time, standard work, pull execution, mistake-proofing, cellular layout, and point-of-use material storage. In addition, we cover the following topics to address the problems existing in the MRO environment: managing variation in demand and work scope, managing bottlenecks, identifying and managing critical path flows, integrating shared resources. We show how lean and the theory of constraints work together to leverage flow in MRO processes.

The TOC tools that will be covered include: the TOC global performance measures (T, I and OE), Drum-buffer-rope, and the Critical Chain for project management. The course also discusses how organizations can achieve maximum leverage from six sigma in their lean initiatives, but does not teach the six sigma tools.

Other topics will include selling the strategic importance of MRO to the enterprise, implementing measurement systems which are aligned with strategic goals, as well as managing customer and supplier interfaces.

The course integrates presentations with extensive participant discussion. The learning environment will facilitate sharing of ideas and provide an opportunity for collaboration with other colleagues in the MRO industry. Hands-on simulations will be used to illustrate lean principles, specifically in the MRO world.

## Faculty

Course instructors are faculty of the University of Tennessee's College of Business Administration who possess a wealth of experience in lean enterprise.

- **Gary Adams**, Manager of the Continuous Improvement Support Group at Delta Air Lines

Technical Operations in Atlanta, Georgia. Gary is a licensed aircraft mechanic and pilot, and possesses a first class FCC license. He received his original aviation training with the United States Marine Corps. Gary is a certified Six Sigma Master Black Belt and has consulted with numerous organizations. Gary has traveled to many parts of the world to study various business improvement techniques in the aerospace industry.

- **Dr. Melissa Bowers**, Professor of Management Science. Missy's research interests include production planning and scheduling, production and operations management, and vehicle routing and has been published in many leading journals. Missy has served as a production planning and scheduling consultant for the Defense Logistics Agency as well as for several large manufacturing organizations. She also teaches in the MBA, Aerospace MBA and MS programs at Tennessee and has won numerous teaching awards, including the prestigious Keally Award.
- **Dr. Ken Gilbert**, Professor of Management Science. Ken teaches and consults in such areas as production management, information systems management, and management science. He has taught in North America, Europe and Asia and is also on the faculty of the Lean Aerospace Initiative's Lean Academy. He has worked with numerous companies in the continuous processing, logistics, and manufacturing fields utilizing lean concepts. Ken has taught in various MBA, EMBA, and executive education programs and has received teaching awards including The University of Tennessee's prestigious Keally Award for Outstanding Teaching.
- **Dr. Mandyam Srinivasan**, Ball Corporation Distinguished Professor of Business. He has more than five years professional experience with leading automobile manufacturers. His current research interests are in creating flow in high variety, low volume, manufacturing systems.

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Srini has also received many distinguished teaching awards such as the John B. Ross Outstanding Teacher Award, the Tennessee Organization of MBAs (TOMBA) Outstanding Faculty Award, and the Professional MBA Teaching Award. Srini has also been published in a wide range of academic and professional journals and is author of the recently released "Streamlined: 14 Principles for Building and Managing the Lean Supply Chain."

Collectively, the faculty have many years of experience working with manufacturing companies to improve productivity and are members of the University of Tennessee Aerospace MBA program. The faculty also work with the University of Tennessee Lean Enterprise Systems Design Institute. This one week program has been attended by thousands of executives from various manufacturing companies, including many in the aerospace industry such as Boeing, Honeywell, Hughes, Lockheed-Martin, among others.

#### Participating Companies:

- ▶ AAR Aircraft Services
- ▶ Army Fleet Support, LLC
- ▶ Aviation Center Logistics Command
- ▶ FedEx Express Corporation
- ▶ FMC Technologies, Inc.
- ▶ GE Aviation
- ▶ Lockheed Martin Aeronautics Company
- ▶ Sikorsky Aircraft Corporation
- ▶ The Boeing Company
- ▶ Union Pacific Railroad
- ▶ U.S. Air Force
- ▶ U.S. Marine Corps Logistics Command
- ▶ U.S. Navy - Naval Air Depot

#### Facilities

Classes are held in the executive classrooms at the University of Tennessee Center for Executive Education. These facilities are designed to promote group interaction in an environment conducive to applied discussions, feedback, and the development of relational networks that frequently continue well beyond the on-campus experience.

#### Tennessee Lean Enterprise Center

The *Lean Maintenance, Repair and Overhaul* course is taught through the Tennessee Lean Enterprise Center. The Center's mission is to:

- ▶ Create a network for Lean Practitioners to share best practices through Center meetings and the Lean Reference Desk.
- ▶ Be a source of lean-equipped operations personnel through lean graduate internships.
- ▶ Create an opportunity for companies to deploy lean concepts and to get results through the Lean Implementation System.
- ▶ Conduct direct-focus lean research efforts.

#### Related Courses of Interest

- ▶ Lean Enterprise Systems Design Institute
- ▶ Black Belt Certification (custom basis)

#### Contact

For more information on the *Lean Maintenance, Repair and Overhaul* course or The Tennessee Lean Enterprise Center, please call or write or email:

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**Rhonda Barton, Director**

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For current news on the Center for Executive Education and its offerings, visit our web site at <http://TheCenter.utk.edu>.

For more information on Lean activities at the University of Tennessee, please visit our web site at <http://lean.utk.edu>.

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## LEAN MAINTENANCE, REPAIR AND OVERHAUL SCHEDULE

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Introduction to the Lean	Elements of Lean	How to Make Money	Managing Batch Operations	Integrating TOC with Lean
Traditional MRO Process		The Theory of Constraints	Rate-Based Planning	Team Demos
Defining Customer Value		The Impact of Variation	Redesigning the Backshop Operation	
Value Stream Mapping	The Visual Workplace	Understanding Flows and Processes (Queuing)	Managing the Critical Chain	
Redesigning the MRO Facility	Redesigning the MRO Facility	Process Flow Simulation	Redesigning the MRO Facility	