

Lean Maintenance, Repair and Overhaul

- **Location:** Knoxville, Tennessee
- **Duration:** Five Days
- **2011 Dates:** May 1-6 and October 9-14
- **2012 Dates:** February 19-24, April 19-May 4, and October 7-12
- **Tuition:** \$4,500 (includes 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 work scope 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. This course will show how the Theory of Constraints perspective integrates very well with the tools from the Lean Enterprise Model. It will also demonstrate how to adapt the lean enterprise model to the MRO environment.

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 organization 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 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, the course covers 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. Two hands-on simulations form an integral part of the week-long experience. The first simulation demonstrates the applicability of the lean enterprise model to the MRO process. The

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second simulation shows how TOC integrates with the Lean Enterprise to deliver significant value to the organization. This game also demonstrates to participants how the throughput world perspective espoused by TOC can deliver dramatically better results compared to the traditional cost world approach to managing businesses.

Other topics covered include the selling of the strategic importance of MRO to the enterprise, implementing measurement systems that are aligned with strategic goals, and managing customer and supplier interfaces. The course also discusses how organizations can achieve maximum leverage from six sigma in their lean initiatives, although it does not teach the six sigma tools.

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. Missie's research interests include production planning and scheduling, production and operations management, and vehicle routing. Her work has been published in many leading journals. Missie 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**, The Pilot Corporation Chair of Excellence. Srinivasan has many years of experience with leading automobile manufacturers. He has published in a wide range of academic and professional journals and is the author of the books, *Streamlined: 14 Principles for Building and Managing the Lean Supply Chain*, and *Supply Chain Management for Competitive Advantage: Concepts and Cases*. Srinivasan has also received many distinguished teaching awards. He also received the Chancellor's Award for Research and Creative Achievement in 1996. In 2006 he received the Franz Edelman Award for Achievement in Operations Research from the Institute for Operations Research and Management Sciences. Collectively, the faculty has 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

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THE UNIVERSITY of TENNESSEE 
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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.

Related Courses of Interest

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

Tennessee Lean Enterprise Center

The Lean Applied to Business Processes program is supported by 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.
- Conduct direct-focused lean research efforts.

Related Programs of Interest

- Lean Enterprise Systems Design Institute
- Lean Maintenance, Repair and Overhaul
- Lean for Healthcare
- Excellence Through Analytics
- Design of Experiments

Contact

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

Kitty Pat Cornett, Program Coordinator

Rhonda Barton, Director

Center for Executive Education
College of Business Administration
The University of Tennessee
603 Haslam Business Building
Knoxville, TN 37996-4160

Phone: (865)974-5001

FAX: (865)974-4989

E-mail: TheCenter@utk.edu

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>.

For more information on *Lean Applied to Business Processes*, please visit <http://leanbusiness.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	