THE ANALYSIS OF EDUCATIONAL AND TRAINING PROGRAMS FOR LEAN MANUFACTURING

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Abstract
This paper presents the results of analyses of educational and training programs for lean manufacturing. Selection of reference designs programs focused on renewed source of the world’s universities and specialized research lean and consulting centers. Finally formulates principles of the curriculum for the international project Lean lab. Project objective is developing a methodology of teaching Lean Management by ending a mechanical engineer to implement Lean Management in enterprise production process.

Key words: Lean Manufacturing education, lean training programs

INTRODUCTION
A new international project from through the Hungarian border cooperation - Slovak Republic LEAN LAB HUSK/1101/1.6.1 aims to develop specialized methods of teaching Lean Management. This outgoing is for mechanical engineers entering the service in the automotive industry. Article provides an overview of education and training programs for lean manufacturing. It analyses the main approaches to the selection of lean training modules and modifications for Lean System Design, Lean Executive Leadership and Lean manufacturing. Finally formulates principles of the curriculum for the international project Lean lab according to project objectives.

COMPARISON OF SELECTED EDUCATIONAL AND TRAINING PROGRAMS FOR LEAN MANUFACTURING

The Lean Enterprise Institute [4]
A complex educational program for the whole range of issues concerning Lean Management offers The Lean Enterprise Institute, Inc. founded by James P. Womack in 1997. This nonprofits organization provides education, publishing, research, and conference organization. Its distinctive feature is that the place of traditional “think” tanks, to “do” tank. Educational program known as lean road map is divided into 8 steps and has a total 33 days of teaching. According to the interest of students are also possible select themes.

Step 1
Key Concepts of Lean (2 Days)
Value-Stream Mapping for Manufacturing (1 Day)
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Value-Stream Mapping for Manufacturing (1 Day)

Step 2
5S - Visual Workplace (1 Day)
Creating Continuous Flow (1 Day)
Fundamentals of Lean Production - Creating Stability in the Ames (1 Day)
Lean Problem Solving (1 Day)
Standardized Work: The Foundation for Kaizen (1 Day)

Step 3
Creating Level Pull (1 Day)
Making Materials Flow (1 Day)

Step 4
Building the Lean Supply Chain: Gambia-Based Workshop (2 Days)
Change Agent Skills for Lean Implementation Leaders (2 Days)
Improving Operations in High Mix/Low Volume Organizations (1 Day)
Managing to Learn: The Use of the A3 Management Process (2 Days)
Sustainable Lean Culture: Connecting the “Product” and the “People” Value Streams (2 Days)
Value-Stream Mapping for the Office and Service (1 Day)

Step 5
Coaching Skills for Lean Implementation Leaders (1 Day)
Developing People with Capability for Lean (1 Day)
Managing Value-Stream Improvement (2 Days)

Step 6
Getting the Right Things Done (2 Days)

Step 7
Integrating Visual Management Tools and Leader Standard Work (2 Days)

Step 8
Transformational Leadership: An Experiential Program for Lean Leaders (3 Days)

Lean Executive Leadership Institute [3]
The University of Kentucky Lean Systems Program offers many activities to support and partner with organizations as they successfully navigate through this phase of their journey – to succeed with the people side of lean. Our experienced faculty and Toyota executives lead activities. Benchmarking tours of local operation will provide opportunities to “go and
see” different organizations putting lean principles into action.

The Lean Executive Leadership Institute, the participant will be able to:

- Describe the philosophy, principles, and practices of a lean enterprise
- Explain operating principles of a lean system
- Compare and contrast lean versus traditional leadership practices
- Identify lean versus traditional performance measurement
- Design and deploy a lean transformation strategy

The University of Kentucky offerings are based upon our team’s experience partnering with organizations to address the most common struggle-points:

1. True Lean Philosophy People-Strategies and Leadership “Thinking Ways” to Achieve Mutual Trust between Organization and Team Member

2. Uniform Expectations for Competencies & Behaviours — Setting & Managing throughout the Team Member Lifecycle (Recruiting, Orientation, Performance Measurements & Rewards, Employee Development/ Education, Succession Planning)

3. Systems, Processes and Skills to realize a Culture of Open Two-Way Communications

4. Processes to measure and confirm value-added-work – asking What we do; Why we do it; How it adds value and links to organization goals (aka Building Blocks)

5. Standardization of People-Side Systems & Processes) to realize authentic Gap Analyses (Current vs. Desired), Problem-solving Thinking and Reflection Tools

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**Southwest Research Institute - Lean Course Listing [7]**

**Principles of Lean Manufacturing**

- Value-Stream Management & Mapping
- 5S (Workplace Organization)
- Total Productive Maintenance
- Set-up Reduction/Quick Changeover
- Standard Work & Cellular/Flow Manufacturing
- Pull/Kanban Systems – TWI – Job Instruction for Standardized Work

- TWI – Job Methods Improvement
- TWI – Job Relations
- Lean Office
- Lean Six Sigma green belt & black belt
- Intro to Basic Six Sigma
- Toyota Production System
- 8D Problem Solving
- Managing by A3
- Effective Corrective Action
- Failure Mode and Effects Analysis (FMEA)

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Fig. 1 Lean training laboratory in The University of Kentucky
The Productivity Australia [5]

The Lean Certificate Courses

Lean Improvement Associate
- Lean Principles and Practices
- Overview of Lean Tools and Techniques
- 5S – Orderliness and Organised
- Process Activity (PAM) and Value Stream Mapping (VSM)

Lean Improvement Practitioner plus
- Tact time, Kanban and Work Balancing
- Work Flow, Just in Time Processing (JIT)

Lean Improvement Leader plus
- Problem Solving and Corrective Action – Root cause analysis
- Standardised Work

Bucker Management Education and Consulting
[1]

Lean Manufacturing Education
Technology Management/ flexible production environment.
Flow manufacturing
Small lot production
Set-up reduction
Fitness for use

People Management/ capability for rapid improvement.
Total employee involvement
Control through visibility
Housekeeping
Total quality focus

Systems Management /the careful application of resources
Level load and balanced flow
Preventative maintenance
Supplier partnerships
Pull systems

University of Michigan College of Engineering
[8]

Lean Manufacturing Certificate from the University of Michigan College of Engineering. All lean concepts will be demonstrated in the Factory simulation. The lean manufacturing simulation moves from traditional push manufacturing to pull systems with actual Kanban systems to a full lean system based on levelled production. Case studies from real companies are used to demonstrate tools and concepts the two-week University of Michigan lean manufacturing training begins with a one-day Overview of Lean Manufacturing. The balance of the program is made up of modules taken from three core categories:

I. Lean System Design
Value Stream Mapping
Design of Pull
Factory Layout for Lean Manufacturing
The Physics of Lean
Build to Order

II. Supporting Lean Tools & Methods
Cell Analysis & Design
Implementing Kaizen Bursts
Material Handling for Lean
Designing Standardized Work & Job Instruction Training

Lean Rapid Plant Assessment
III. Leadership & Team Management Tools & Methods
Integrating Six Sigma in Lean Systems

CONCLUSION

RESULTS OF ANALYSIS

In the evaluation of a set of educational and training systems Lean Management issues we focused on: profiling the content and form of teaching.

The common contents in courses are the Principles of Lean, Pull Systems, and Value-Stream Mapping, Total employee involvement.

The content is generally differentiated in two ways:

*The core of lean manufacturing includes, in particular:*
Toyota Production System
Kaizen / complex tools /
Waste elimination
Continuous Flow
Improving Operations
For Lean Material Handling
Visual factory
Lean Supply Chain
Failure Mode and Effects Analysis (FMEA)

*The core of lean leadership contains mainly:*
Transformational Leadership
Skills for Lean Implementation
Developing People with Capability for Lean Integration Lean product development, and offices manufacturing
Accounting & Measurement for Lean Manufacturing
Six Sigma
Project management

*The most common forms of education Lean Manufacturing are:*
Online Training
On call training
Face to face
Combination.

*The teaching technique are:*
Classical learning theory for Lean
Simulation exercise

Leading the Change to Lean
Accounting & Measurement for Lean Manufacturing

Laboratory training
Interactive learning-Team discussion and case study analysis
Visitors and discussion on experience in successful lean companies.

Team activities specifically designed to help each student come away from the course with a specific plan of action for implementation of Lean manufacturing.

Also in Lean Training continues technological revolution in the form of on-line learning. Online education is rapidly becoming an integral part of individual and organizational skills and knowledge of workers in high-tech productions.

References

6. Project LEAN LAB HUSK/1101/1.6.1
7. Southwest Research Institute - Lean Course Listing. www. swri.org

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