



Lean and Environment Training Modules

Version 1.0 – January 2006



Lean and Environment Training Module 1

Getting Started with Lean and Environment



Purpose of the Lean and Environment Toolkit and Training Modules

- » *Lean and Environment Training Modules (Version 1.0)*
 - Trains Lean leaders and environmental assistance providers on strategies and tools for integrating Lean and the environment.

- » *Lean and Environment Toolkit (Version 1.0)*
<http://www.epa.gov/lean/toolkit>
 - Illustrates how considering environmental goals and opportunities in Lean efforts can eliminate waste, improve quality, and maximize value delivered to the customer
 - Provides practical strategies and tools for integrating environmental considerations into Lean methods



Why Connect Lean and Environment?

- » Explicitly considering environmental goals and opportunities during Lean implementation can...
 - Reduce costs
 - Improve process flow and reduce lead times
 - Lower regulatory non-compliance risk
 - Meet customer expectations
 - Improve environmental quality
 - Improve employee morale and commitment



Defining Lean

Lean is:

“A systematic approach to identifying and eliminating **waste (non-value added activities)** through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection”

—The MEP Lean Network



What Is Waste?

Waste is “anything other than the **minimum** amount of **equipment, materials, parts, space, and worker’s time** which are absolutely necessary to **add value** to the product.”

- Shoichiro Toyoda, President, Toyota



Defining Clean

Clean is:

A systematic approach to eliminating waste by optimizing use and selection of resources and technologies while lessening the impact on the environment.



Combining Lean/Clean Manufacturing

"Lean" Eliminates...

- » **D**efects
- » **O**verproduction
- » **W**aiting
- » **N**on-utilized resources
- » **T**ransportation
- » **I**nventory
- » **M**otion
- » **E**xtra processing

"Clean" adds...

- » **F**ull use of Raw Material
- » **E**nergy Efficiency
- » **W**ater conservation
- » **E**liminating Toxic Material
- » **R**eduction of:
 - Packaging Wastes
 - Emissions to Air and Water
 - Solid & Hazardous Wastes
 - Regulatory obligations and risks



Lean Production's Environmental "Coattails"

- » Less scrap, fewer defects, less spoilage = **reduced environmental waste**
- » Fewer defects, less overproduction, simpler products, right-sized equipment = **reduced use of raw materials**
- » Less storage, inventory space needed = **reduced materials, land and energy consumed**
- » Less overproduction, lighting/heating/cooling unneeded space, oversized equipment = **less energy use**
- » Less overprocessing, more efficient transport and movement = **lower emissions**



Lean's "Blind Spots"

- » Lean can be leveraged to produce even more environmental improvement, by addressing environmental "blind spots" in lean.
 - **Hidden environmental waste** is often buried in overhead and facility support costs
 - **Environmental and human health risks** are often not explicitly considered in lean initiatives
 - **Environmental impacts** throughout the **product lifecycle** can affect customers and stakeholders



Why Make Clean a Part of the Lean Methodology?

- » Eliminates more waste and reduces costs
- » Strengthens compliance and risk
- » Piggybacks environmental improvement on lean process change; more benefits cheaper and faster management
- » Removes environmental obstacles to competitiveness and lean
- » Creates a competitive advantage as customers increasingly expect products/services with less environmental footprint



Key Questions

The *Lean and Environment Training Modules* address these questions:

- » What is environmental waste?
- » Why should I identify environmental waste in my process?
- » How will I know when I see environmental waste?
- » Where should I look for environmental wastes?
- » How do I measure the environmental impacts of a process?
- » Where can I find environmentally preferable process options?





The Business Case

1. Learn to see hidden environmental waste
 - Reduce costs
 - Reduce risk
2. Enhance the effectiveness of Lean implementation
 - Anticipate and ease constraints to applying Lean to monument processes
 - Improve process flow and reduce lead times
3. Deliver what customers and employees want
 - Satisfy customer preferences for environmental attributes
 - Safeguard company and brand reputation
 - Improve employee morale and commitment
 - Improve environmental quality



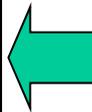
1. Learn to See Hidden Environmental Waste and Hazards

Lean's "Deadly Wastes"

1. Overproduction
2. Inventory
3. Transportation
4. Motion
5. Defects
6. Over Processing
7. Waiting

Where are environmental wastes?

- Excess materials use
- Pollution/emissions
- Scrap & non-product output
- Hazardous wastes





1. Learn to See Hidden Environmental Waste and Hazards, Continued

- » Significant environmental wastes are often missed when improvement initiatives only target the **“7 deadly wastes”**
- » Adding environmental wastes as an 8th deadly waste can reduce costs and risk
- » Environmental wastes are often a sign of inefficient production, and they frequently indicate opportunities for saving cost and time





2. Enhance the Effectiveness of Lean Implementation

- » Lean thinking can be applied to environmental management processes, such as chemical and waste management
 - Companies have found as much as 40 percent of chemical supplies went directly into hazardous waste, as they expired on the shelf or became obsolete
- » Proactive Lean and environment coordination can anticipate and ease environmental and regulatory constraints to Leaning “monument” processes
 - This can improve flow, reduce lead times, and mitigate health and safety risks



3. Deliver What Customers & Employees Want

- » Companies that deliver products and services with fewer environmental impacts have the potential to capture significant competitive advantage, provided that there are not sacrifices in time, quality, or cost
- » Products with superior environmental performance can attract new customers
- » Considering environmental waste in Lean initiatives can improve the work environment for employees



TO CONSIDER

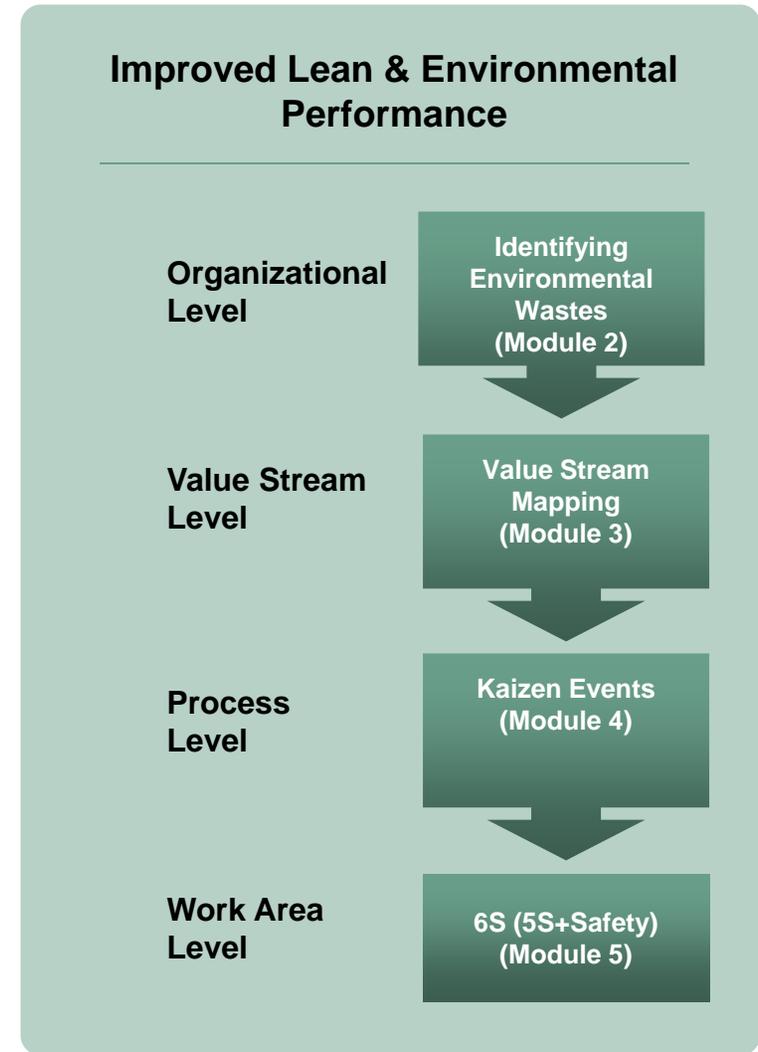
- » How could your company benefit from improved Lean and environmental performance?
- » How well coordinated are Lean and environmental management activities in your organization?
- » Do environmental, health, and safety personnel participate in Lean events and initiatives at your company?





Lean and Environment Training Modules

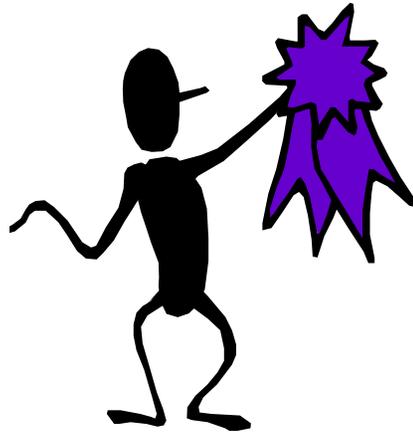
- » Version 1.0 includes 5 *Lean and Environment Training Modules*
- » Each module addresses integration opportunities at a different organizational level
- » The modules can be used independently or as a whole
- » Click on the links at the bottom of some slides to find additional information





Acknowledgments

- » EPA thanks its Lean & Environment Partners for their help developing the Training Modules and Toolkit
 - » Baxter International
 - » Chicago Manufacturing Center
 - » CONNSTEP, Inc.
 - » HNI Corporation
 - » Robins Air Force Base
 - » Rockwell Collins
 - » U.S. Army Materiel Command
- » The Training Modules and Toolkit were prepared for EPA by Ross & Associates Environmental Consulting





Lean and Environment Training Modules

- » Module 2: [Identifying Environmental Wastes](#)
- » Module 3: [Value Stream Mapping](#)
- » Module 4: [Kaizen Events](#)
- » Module 5: [6S \(5S+Safety\)](#)



Research on Lean & Environment: Evidence of Significant Opportunities

- » EPA is engaged in research, education, and tool development to help organizations to leverage greater environmental gains from Lean initiatives
 - For more information, see: www.epa.gov/lean

- » EPA research reports include:
 - Lean and Environment Report (Shingo Prize winner)
 - Boeing Case Study Lean and Environment Report
 - Lean and EMS in the Shipbuilding Sector Report

- » Download the reports from: www.epa.gov/lean/pubs.htm



What is a “Monument”?

» **Monuments** are production processes or process steps that:

- Have large equipment and/or other physical or environmental regulatory constraints
- Are very difficult or costly to move
- Can disrupt the flow sought through Lean

» Examples include:

- Painting processes with large fixed paint booths or dipping tanks
- Metal finishing processes with large tanks and/or fixed equipment

