



# Lean and Environment Training Modules

**Version 1.0 – January 2006**

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# Lean and Environment Training Module 1

## Getting Started with Lean and Environment

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# 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 8<sup>th</sup> 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

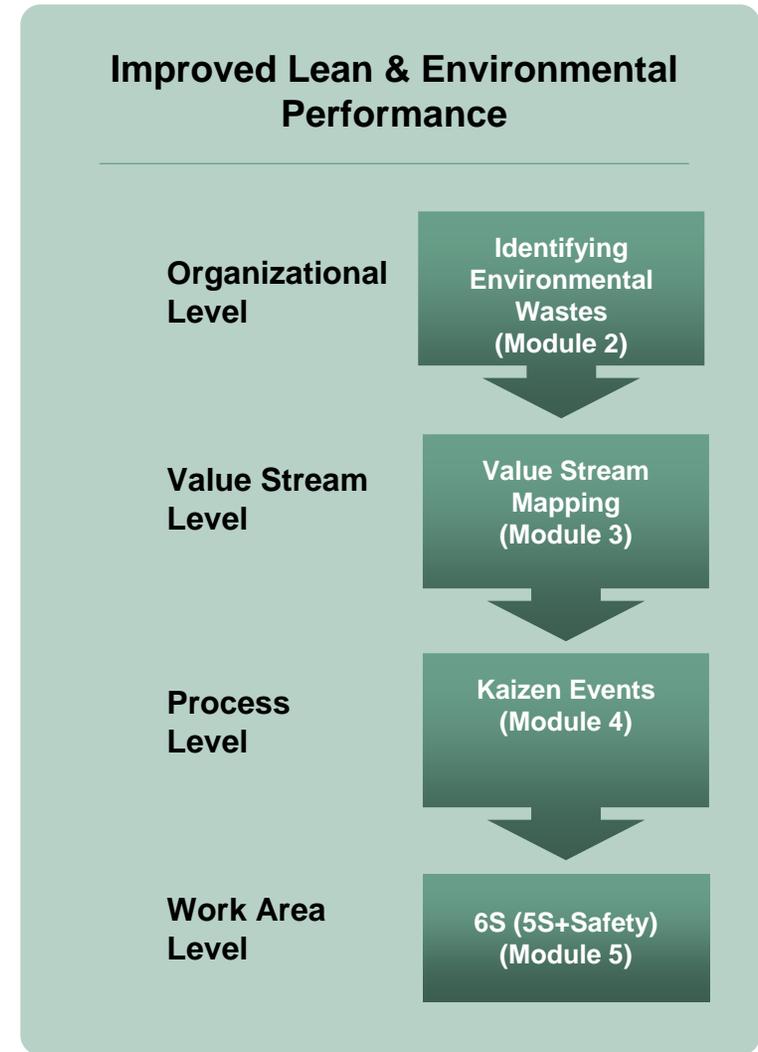
- » How could your company benefit from improved Lean and environmental performance?
- » How well coordinated are Lean and environmental management activities in your organization?
- » Do environmental, health, and safety personnel participate in Lean events and initiatives at your company?





# Lean and Environment Training Modules

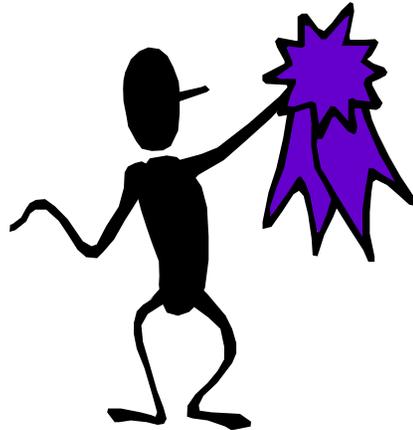
- » Version 1.0 includes 5 *Lean and Environment Training Modules*
- » Each module addresses integration opportunities at a different organizational level
- » The modules can be used independently or as a whole
- » Click on the links at the bottom of some slides to find additional information





## Acknowledgments

- » EPA thanks its Lean & Environment Partners for their help developing the Training Modules and Toolkit
  - » Baxter International
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- » 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](http://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](http://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