



Greening Manufacturing

Judy Wlodarczyk
(wool-dar-check)



1090 Elm Street, Suite 202
Rocky Hill, CT 06067

800.266.6672
www.connstep.org



CONNSTEP Mission

*As **Connecticut's Manufacturing Resource** CONNSTEP, Inc. is committed to helping Connecticut manufacturers apply modern manufacturing and management methodologies to become more Competitive, supporting the growth of Connecticut's economy.*



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Challenges

- Increasing environmental requirements around the globe
- Earth's resources are limited
- Population expect to grow by 50% over next four decades
- CO₂ emissions and global warming

Opportunities

- Manufacture in an efficient, cost effective way that minimizes impact on the environment
- Develop and market new products and services to address the challenges



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Capitalize on the Opportunities

- Broaden the definition of waste
- Begin on internal practices
- Use Lean practices to focus on “green” opportunities
- Green product development, including packaging and delivery



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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.”

MEP Lean Network



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Defining 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.”

Soichiro Toyota, President, Toyota



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Defining Lean and Green

“A systematic approach to eliminating all wastes through continuous improvement by flowing the product at the pull of the customer while lessening the impact on the environment.”

Combining Lean/Clean Manufacturing

“Lean” Eliminates...

- Defects
- Overproduction
- Waiting
- Non-utilized resources
- Transportation
- Inventory
- Motion
- Extra processing

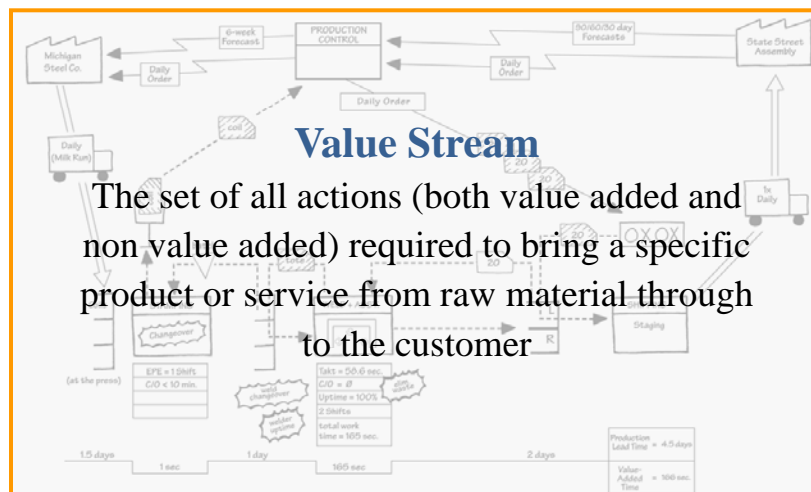
“Clean” adds...

- Full use of Raw Material
- Energy Efficiency
- Water conservation
- Eliminating Toxic Material
- Reduction of:
 - Packaging Wastes
 - Emissions to Air and Water
 - Solid & Hazardous Wastes
 - Regulatory obligations and risks

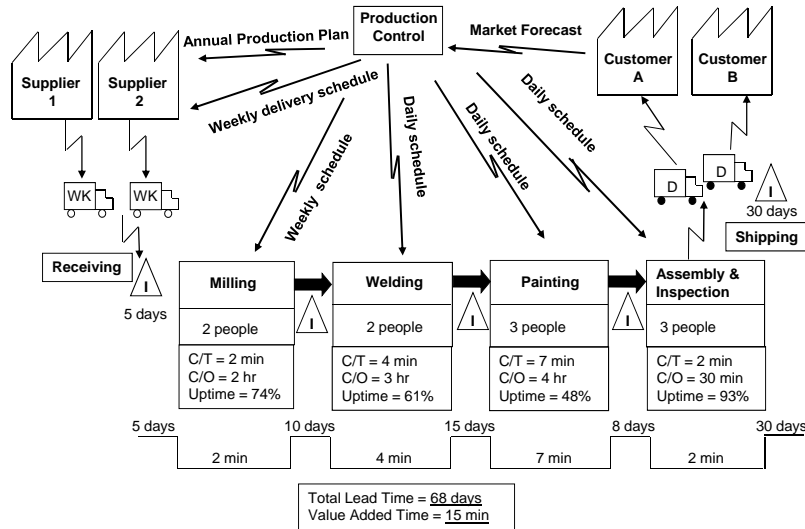
Typical Delivery Approach

- Overview of Lean principles
- Learn to see “green” opportunities
- Develop a lean/green value stream map
- Team activity on shop floor
- Facilitated brainstorming and prioritizing
- Develop and implement action plans for change

Value Stream Mapping

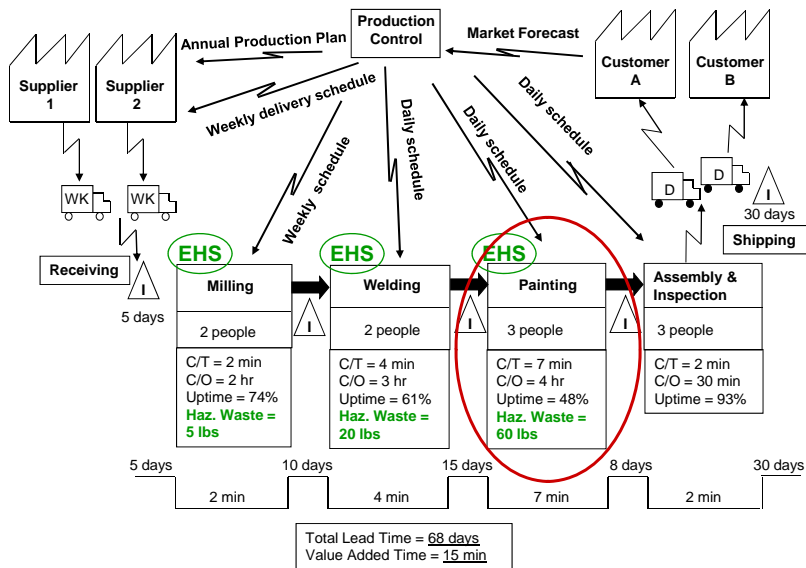


Current State Value Stream Map



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VSM with Environmental Metrics & EHS Icons



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Lean & Green Success Stories



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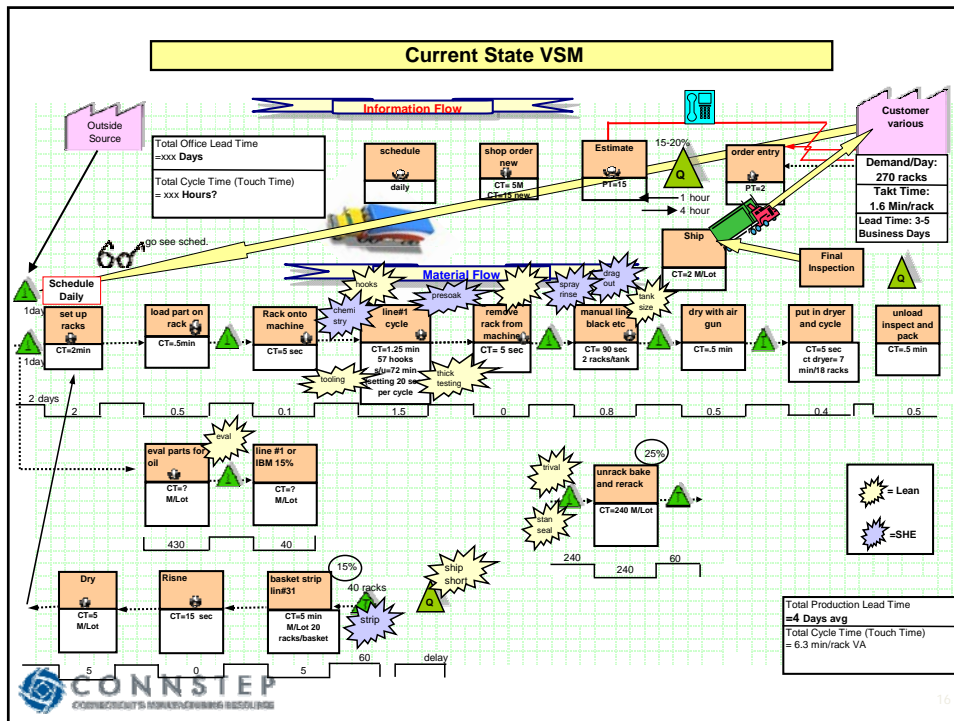
Outcomes

Focused on three projects

- **Chemical Waste**
 - \$150,000 savings per year
- **Order Entry**
 - \$4200 savings per year
 - Reduction of 2,000 hours per year
 - Eliminated 233 printouts
- **Laboratory Sample Sizes**
 - \$7500 savings per year



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Outcomes

Zinc plating line costing nearly \$80,000 in annual revenue due to high rates of rework, scrap, and waste.

- **Process Changes**
 - Reduced unnecessary steps in the process
 - Reduce scrap from 15% to 7.5%
 - Replace dip rinse tanks with spray rinse – longer term
- **Estimated results**
 - Reduce water usage by more than 120,000 gallons
 - Reduce hazardous chemicals by 1,200 lbs.
 - Reduced run time from 9 hours-8 hours/day
 - Replace with spray rinses, reduce water use by >1 million gallons/year – longer term



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TRUMPF



Paper Reduction

- **Project Objectives**
 - Reduce paper usage
 - Develop recycling process
- **Project Results – \$46,000 savings annually**
 - Reduce paper usage
 - Eliminate faxes (junk fax, order confirmations, etc.)
 - Double sided printing
 - Reduced daily waste pick-ups, \$8,000 savings
 - Increased “green” awareness
 - Set 50% goal to reduce office supplies
 - Centralized purchasing and location of office supplies to improve control and reduce redundant purchases
 - Developed a “Common Sense Cost Savings Activities ” handout



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Packaging Opportunity

- Current practice
 - Purchase \$18,000/yr. in biodegradable peanuts
 - \$280/month for two containers for recycling cardboard
- Solution
 - Shred cardboard and replace peanuts
 - Eliminated one recycling container
 - Equipment cost \$6,800
 - Annual savings \$19,680





Appliance Manufacturing

Manufacture of clothes washers

- Operations included receiving, stamping, welding, surface coating and assembly
- Current state map indicated scrap metal in all operations

Results

- Implemented improvements to the stamping process line resulting in 35% reduction in scrap metal
- Strict monitoring procedures in place to measure the generation of scrap metal
- Scrap rates overall reached an all-time low for the facility during the month following the training



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High Performance Coatings for Aerospace

Capital Plan for new spray equipment to meet New Hexavalent Chrome Standard

- 30% reduction in waste generated
- 45% increase in productivity
- \$350K equipment cost avoidance
- Increased operator awareness & compliance
- New customer relationships



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Why Make Green 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



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Judy Wlodarczyk
Director of Environment & Energy Services
860.539.4926
jwlodarczyk@connstep.org



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