



G² Conference

Manufacturing Growth through Sustainability

Green Suppliers Network *Lean and Clean Assessments*

October 13, 2010



Green Suppliers Network



NIST MEP





Welcome

Areas of Discussion

- What is a lean and green assessment?
- The need to tear down walls for success
- What proof is there that it works?
- It won't work here
- What have your competitors learned?





Welcome

Audience Survey (we are curious too):

- How many of you are familiar with lean principles?
- How many companies have had a facility-level environmental audit?
- How many companies have had a facility-level lean audit?
- Who has been trained in lean principles?
- Who has been trained in sustainability principles?
- What do you want to walk away with from this session?





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 Lean & Clean

Lean and Clean is:

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

Stough/Fleming 2009






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'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  not explicitly considered in lean initiatives
 - **Environmental impacts** throughout the **product lifecycle** can affect customers and stakeholders
 - **Process improvement** can be enhanced if lean techniques are combined with **environmental elements**





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





Tearing Down Silos

Look for the Lean “**blind**” spots where the additional investigation of the Clean opportunities will fill the gap from the traditional Lean Only approach.

Examples:

Lean

Overproduction
Transportation/Motion
Waiting

Clean

Material Intensity
Energy Intensity




Integrate the tools of both disciplines to gain the ultimate benefit:
Visual Management with Clean,
Reduced Process Variation and Clean





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 time 
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





Key Questions



Lean and Clean assessments address:

- » What is environmental/lean waste in your operation?
- » Why should I identify environmental/lean waste in processes?
- » How will I know when I see environmental/lean waste?
- » Where should I look for environmental/lean wastes?
- » How do I measure environmental/lean impacts of a process?
- » Where can I find environmentally preferable process options that integrate with lean approaches?



GSN Assessment Purpose

Integrating Lean and Green Expertise

» Purpose of a GSN Assessment:

- To show through assessment action that lean and environmental have a synergistic value
- To identify dollar savings of combining the two disciplines into an integrated approach
- To teach the organization how to conduct lean/green assessments





What Proof is There That it Works?






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






Enhance the Effectiveness of Lean Implementation

- » Companies that deliver products and services using lean principles and 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/lean waste in improvement initiatives can improve the work environment for employees





A GSN WILL NOT WORK HERE

- » We are already proficient with lean
- » We have identified the big opportunities already
- » It sounds good, but our operation is different 
- » We don't have environmental waste issues





GSN Assessment Model Overview

Typical Process

Prefer Initial data collection, then three meetings with customer:

1. Orientation/goal setting meeting.
2. Current/Future State meeting:
 1. Interviews, tour of value stream and documentation of current state
 2. Validation of current state, development of potential improvements and future state VSM.
3. Report out





GSN Assessment Model Overview

Collect Data Ahead of 1st Visit

1. Lean Data
2. Environmental Data





GSN Assessment Model Overview

Preliminary Lean Information Collection

Competitiveness Questionnaire:

- Get key information from client prior to visit (Lean & Clean).
- Allows the team to see potential issues prior to the visit.

Transformational Planner:



- Shows the financial impacts possible.
- Income Statement and balance sheet.
- Rating comparison on eight key measures





Generic Mfg

Figure A - Initial Evaluation

	Initial Evaluation	%	Own Group: High Volume %ile (100=Best)
Annual Revenue	\$ 28,000,000		
Purchased Material	\$ 15,400,000		
Labor & Overhead	\$ 6,771,000		
Cost of Goods Sold	\$ 22,171,000		
Operating Margins	\$ 5,829,000	20.8%	43
Average Inventory	\$ 2,000,000		
Inventory Turns	11.1		60
Outside Services	\$ 780,000		
Utilities	\$ 980,000		19
Value-Added	\$ 10,840,000		
Scrap & Rework	\$ 438,000		37
Premium Freight	\$ 16,000		48
Average Receivables	\$ 3,450,000		
Days Receivables	45.0		57
On-Time Deliveries	93.0%		19
Machine Hrs Available or Manned, Avg. per Machine per Year	6240		
Machine Hrs Running, Avg. per Machine per Year	4290		
Available Hrs % Year	71.2%		93
Run Hrs % Available	68.8%		57
Schedule Bumping	6.0%		45
Annual Employee Turnover	3.0%		88
Average Number			
Hourly Employees	124		
Salary Employees	34		
FTE	173.5		
Average Work Week (Hours)	45.0		
Average Hourly Pay	\$16.78		
Value-Added per FTE	\$ 62,478		48

PROFILE – J. SPRAT MANUFACTURING COMPANY

Transformational Planner Data



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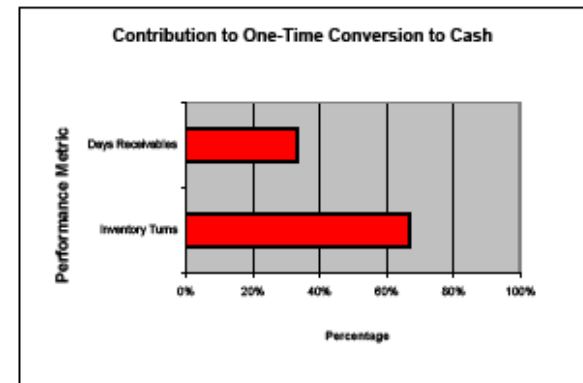
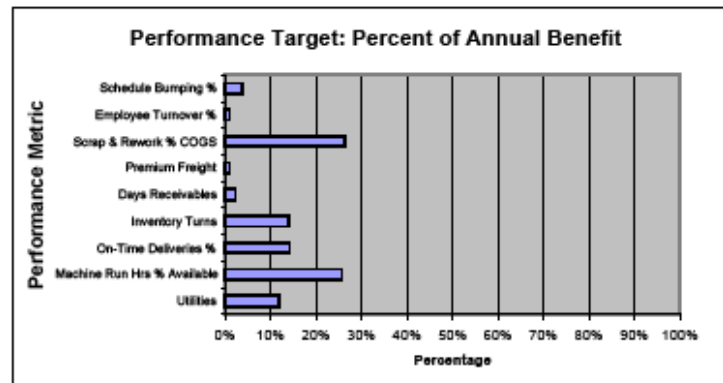
Transformational Planner Data

Generic Mfg



Figure B - Opportunities and Cost Benefits

Performance Metric	Current:		Model Proposed Target:		Final Target:		Annual \$ Benefit	One-Time Conversion to Cash	% of Total Annual Benefit	% of One-Time Conversion to Cash	
	Percentile	Value	Percentile	Value	Percentile	Value					
Utilities	19	\$ 980,000	44	\$ 491,491	21	\$ 882,000	\$98,000		11.9%		
Machine Run Hrs % Available	57	68.75%	82	82.92%	70	75.00%	\$211,594		25.7%		
On-Time Deliveries %	19	93.00%	44	97.28%	42	97.00%	\$116,580		14.1%		
Inventory Turns	60	11.1	85	18.8	84	18.0	\$115,242	\$768,278	14.0%	66.8%	
Days Receivables	57	45	82	33	69	40	\$19,075	\$381,507	2.3%	33.2%	
Premium Freight	48	\$ 16,000	73	\$ 3,903	63	\$ 8,000	\$8,000		1.0%		
Scrap & Rework % COGS	37	1.98%	62	0.80%	57	1.00%	\$216,290		26.2%		
Employee Turnover %	88	3.00%	90	2.22%	90	2.00%	\$7,861		1.0%		
Schedule Bumping %	45	6.00%	70	2.43%	66	3.00%	\$31,739		3.9%		
Total							\$824,381	\$1,149,785			



v5



PROFILE – J. SPRAT MANUFACTURING COMPANY

Figure D - Targets Opportunity

Generic Mfg

Transformational Planner Data

	Initial Evaluation	%	Target Objectives	%	Opportunity
Income Statement:					
Annual Revenue	\$ 28,000,000		\$ 28,000,000		
Cost of Goods Sold	\$ 22,171,000		\$ 21,348,619		
Operating Margin	\$ 5,829,000	20.8%	\$ 6,653,381	23.8%	\$ 824,381 Annual Benefit
Balance Sheet:					
Average Inventory	\$ 2,000,000		\$ 1,231,722		
Receivables	\$ 3,450,000		\$ 3,088,493		\$ 1,149,785 One-Time Benefit

Estimated Improvement Budget \$ **412,191** (Half of Annual Benefit)


Internal Resources \$	-	0%	Company to determine %
Capital Improvements \$	-	0%	
Outside Resources \$	-	0%	
			Sum to 100%

v5



GSN Assessment Model Overview


Preliminary Environmental Information

- » **Energy** (electricity & natural gas) data purchased annually
- » **Water/Sewer** data, the annual cost of water and sewer purchased for the last full year of records 
- » **Emission Permits**, a list liquid or hazardous waste permits and environmental reports submitted to environmental regulatory agencies





GSN Assessment Model Overview

- » **Hazardous waste** costs for the last full year of records
- » **Trash**, annual cost of trash disposal (solid waste)
- » **Chemicals**, list of any chemicals used on the product line, or for operations and maintenance in a year 
- » **Oils**, amount of oils purchased for the last year
- » **Recycling**, list of all materials recycled; the monthly volume and any revenue generated as a result of the recycling





GSN Assessment Model Overview

Report Generation

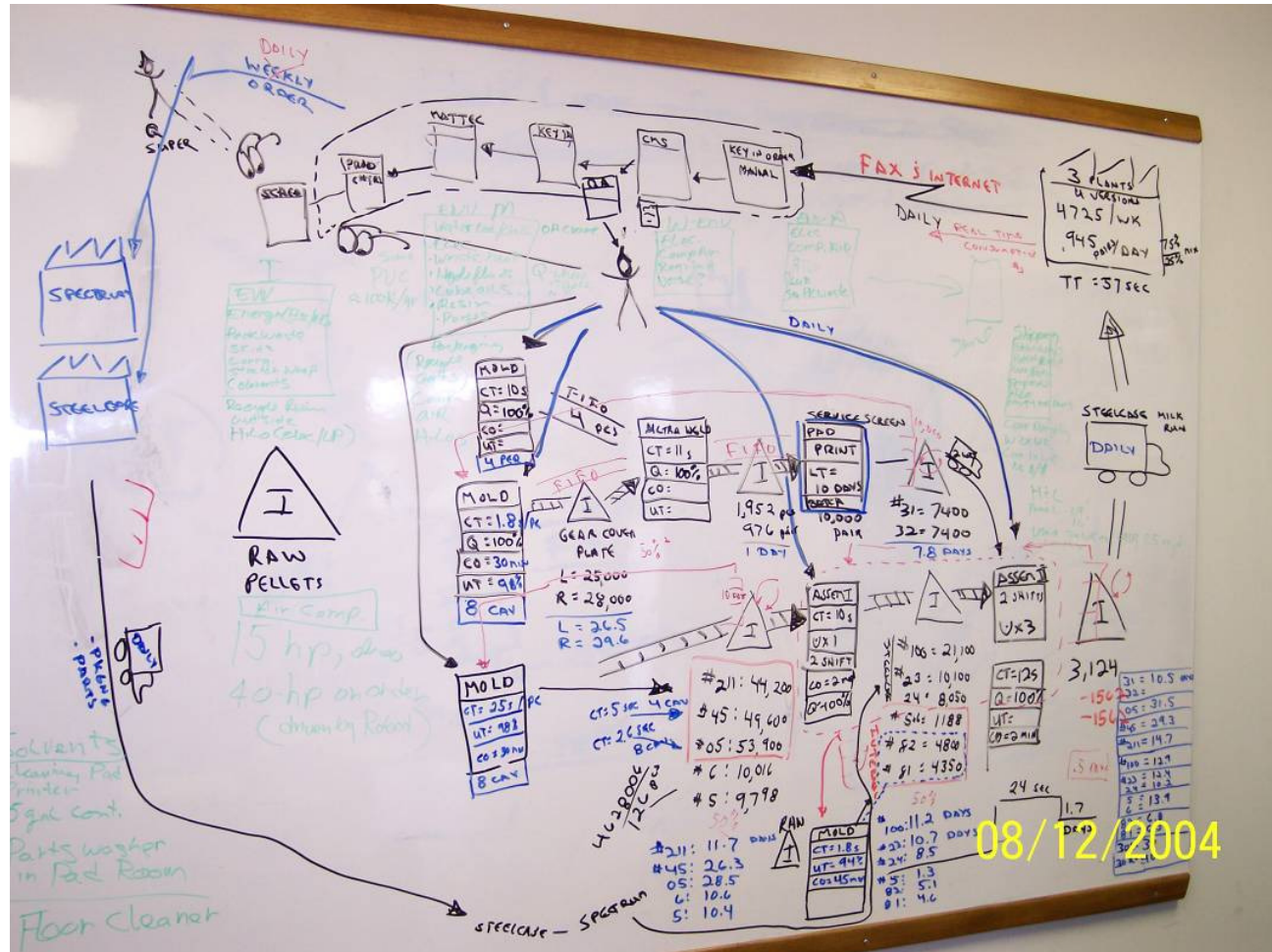
1. Development of lean and clean current state
2. Iterative process with lean and green assessors to capture major improvement issues to develop a draft report
3. Green assessor applies environmental data to lean findings in dollar and unit savings
4. All findings are integrated into the final report



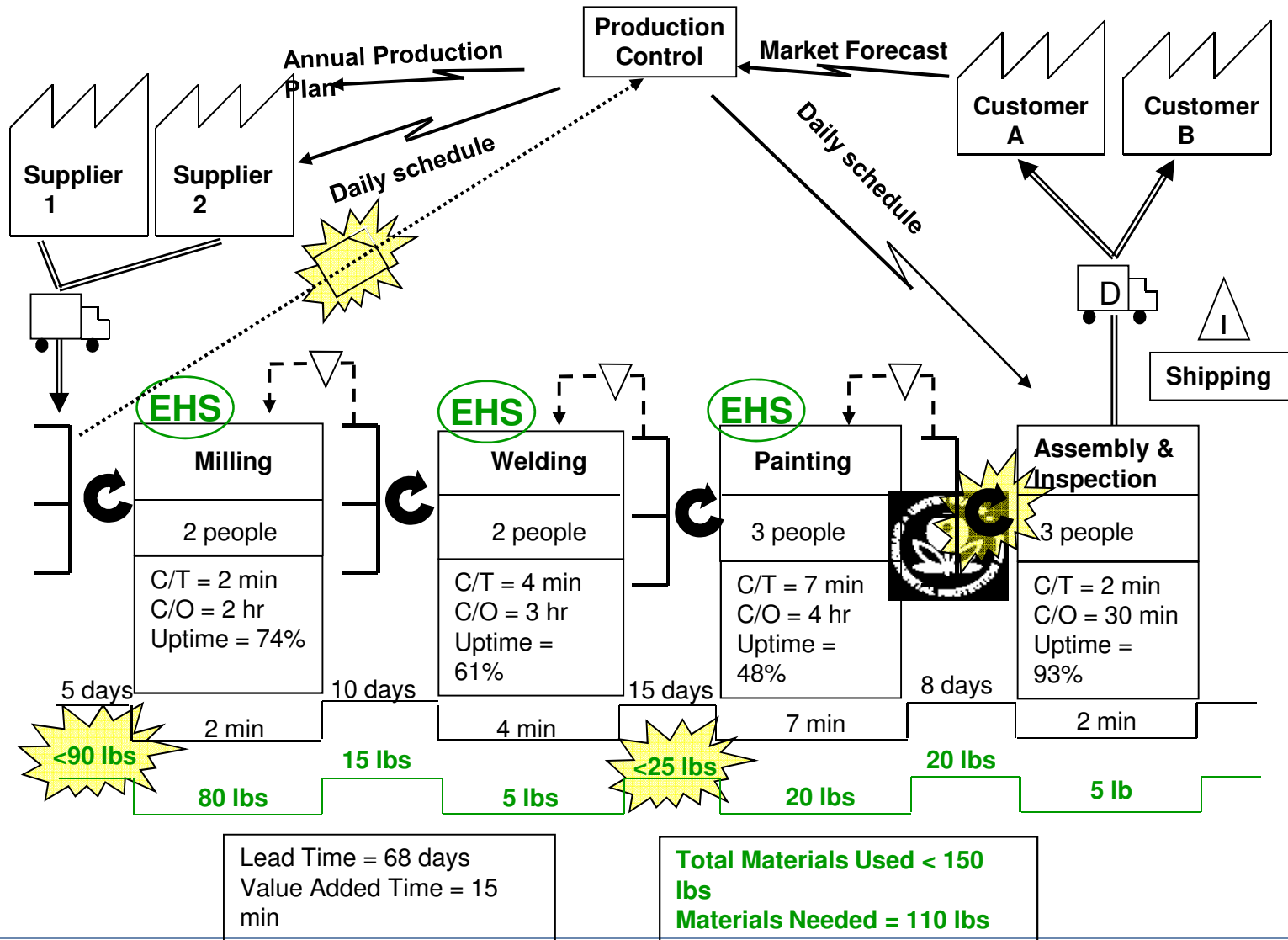


FUTURE STATE VSM

J. SPRAT MANUFACTURING COMPANY



Value Stream Mapping – Future State





WHAT DOES A REPORT CONTAIN?

VALUE STREAM MAP – CURRENT STATE

- » Transformation Planner
- » Lean Observations
- » Clean Observations

IMPROVEMENT OPPORTUNITIES – LEAN & CLEAN EXAMPLES:

- » Management
- » Inventory Turns
- » Increase of Throughput without increasing Resources
- » Equipment
- » Quality
- » Material Efficiency
- » Solid Waste
- » Water/Sewer Use
- » Chemical Use
- » Energy Use





What have your competitors learned?





MMTC-WEST MICHIGAN GSN IDENTIFIED LEAN & GREEN SAVINGS						
			Green Savings		Lean Savings	Total Savings
2006						
Co. 1			\$ 28,620.00		\$ 606,891.00	\$ 635,511.00
Co. 2			\$ 350,420.00		\$ 212,954.00	\$ 563,374.00
Co. 3			\$ 109,161.00		\$ 133,000.00	\$ 242,161.00
2007						
Co. 4			\$ 126,035.00		\$ 820,824.00	\$ 946,859.00
Co. 5			\$ 106,750.00		\$ 355,640.00	\$ 462,390.00
2008						
Co. 7			\$ 549,906.00		\$ 724,327.00	\$ 1,274,233.00
Co. 8			\$ 208,336.00		\$ 469,077.00	\$ 677,413.00
Co. 9			\$ 112,800.00		\$1,084,417.00	\$ 1,197,217.00
Co. 10			\$ 253,600.00		\$1,172,646.00	\$ 1,426,246.00
Co. 11			\$ 31,700.00		\$ 796,375.00	\$ 828,075.00
Co. 12			\$ 285,270.00		\$ 950,054.00	\$ 1,235,324.00
Co. 13			\$ 48,164.00		\$ 275,657.00	\$ 323,821.00
Co. 14			\$ 126,300.00		\$ 227,599.00	\$ 353,899.00
2009						
Co. 15			\$ 180,200.00		\$ 95,574.00	\$ 275,774.00
Co. 16			\$ 94,800.00		\$ 350,517.00	\$ 445,317.00
Co. 17			\$ 135,250.00		\$ 249,445.00	\$ 384,695.00
Co. 18			\$ 29,100.00		\$ 43,878.00	\$ 72,978.00
Co. 19			\$ 216,117.00		\$ 96,417.00	\$ 312,534.00
Co. 20			\$ 386,600.00		\$ 596,964.00	\$ 983,564.00
Co. 21			\$ 121,000.00		\$ 99,308.00	\$ 220,308.00
						\$ -
Total Annual Savings			\$3,500,129.00		\$9,361,564.00	\$ 12,861,693.00
Average Annual Savings/Co.			\$ 166,672.81		\$ 445,788.76	\$ 612,461.57





Speaker Contact Information

Bill Stough

Principal, Sustainable Research Group

PO BOX 1684, Grand Rapids, MI 49501 

Phone: 616.301.1059

bstough@sustainableresearchgroup.com

