Is your competition working smarter than you are?
Lean and Clean—Friend or Foe?

Great Lakes Regional Pollution Prevention Roundtable Winter Conference

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Lean Manufacturing

**Lean** is a philosophy which shortens the timeline between the beginning of a process and the systematic end of that process by identifying and eliminating waste in the value stream.

[Diagram showing the flow from Customer Order to Product Shipment with a 'WASTE' block in the middle]
Clean Manufacturing

- Seeks to improve products and processes to increase competitiveness while reducing the impact on the environment.
- Optimizes use and selection of resources and technologies to eliminate waste.
- Concern for worker safety and health and company liability by examining toxicity and hazards of materials used.
# Types of Waste

## Lean
- Overproduction
- Motion
- Inventory
- Waiting
- Transportation
- Underutilized people
- Defects
- Extra processing

## Clean
- Water/wastewater
- Solid waste
- Hazardous waste
- Air emissions
- Excess energy and raw materials
- Stormwater
- Excess use of non-renewable resources
Lean and Clean Focus

Lean Focus

Clean Focus

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Lean vs Clean--Conflicts

Lean
• Customer schedule-focused
• Processing time
• Work-in-progress

Clean
• Worker safety and environment focus
• Raw material conservation
• Reducing hazardous material usage

Both Lean and Clean are concerned about reducing wastes—different types of waste
Lean vs Clean—Conflicts

Lean
Quick changeovers leading to more cleanouts

Clean
Less changeovers leading to less waste associated with cleanouts

Cleaning solution

Cleaning solution
Conflict Resolution

• To resolve a conflict between lean and clean, conduct a benefit analysis:
  – Evaluate cost, safety, ease of implementation, waste reduction, etc.
  – Determine if another alternative could be employed—possibly a compromise
  – Don’t forget cost of training, energy, regulatory reporting, etc. in benefit analysis
## Lean vs Clean--Similarities

**Lean**
- Reduce scrap
- Reduce inventory
- Continuous improvement-Kaizen

**Clean**
- Reduce waste at the source including scrap
- Reduce hazardous material inventory and that with shelf-life
- Continuous improvement-management systems
Lean Inventory

INVENTORY HIDES WASTE

SEA OF INVENTORY

- LABOR & MATERIAL IN
- NON-PRODUCTIVE MAINTENANCE
- POOR WORK BALANCING
- POOR QUALITY
- WAITING
- EXCESSIVE SETUP TIMES
- BAD HOUSEKEEPING
- INSUFFICIENT COMMUNICATION

Inventory hides waste in the following areas:
- Poor work balancing
- Poor quality
- Excessive setup times
- Bad housekeeping
- Insufficient communication
- Non-productive maintenance
- Waiting

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Where Lean Helps Clean

Traditional Manufacturing Flow Process

Parts can actually travel miles within a plant before the finished product is shipped to the customer
Where Lean Helps Clean

The less a part travels = Less chance for damage and waste

Lean Manufacturing Flow Process
Where Lean Helps Clean

• Implementing 5 S
  – Sort
  – Set In Order
  – Shine
  – Standardize
  – Sustain

We as clean practitioners need to help lean practitioners find homes for unneeded items.
Where Clean Helps Lean

• Employee Safety
  – Less hazardous and toxic materials used
  – Minimize emissions and waste
  – Reduced fire hazards
  – Less material handling
Where Clean Helps Lean

• Addresses wastes not reduced by lean manufacturing processes:
  – Excess cleaning and other auxiliary process wastes
  – Energy efficiency
  – Air emissions
  – Water and wastewater--contamination
Both Lean and Clean Practitioners Are Just Walking By Waste
Lean and Clean--Benefits

• Maximize waste reduction
  – Physical waste and time-related waste
  – Greater potential for savings

• Improve processes
  – Removing non-value added steps
  – Minimizing raw material usage
  – Utilize best practices of both lean and clean

• Improve working conditions
  – Reducing unnecessary handling and motion
  – Reducing or eliminating hazardous materials
Where Lean Failed Clean

• Ohio manufacturer implemented lean manufacturing principles and re-arranged plant layout to improve product flow
• Moved adhesive application unit from inside air-cooled room
Outcome

• Client needed to use three times more adhesive to do same task because of rapid adhesive solidification resulting in:
  – Increased adhesive costs
  – Employees exposed to more solvents
  – Possible need for an air permit
  – Additional solid waste from containers, solidified adhesive, and applicators
GSN Case Study

• 100 Employee Ohio Lockheed-Martin Supplier

• Processes include:
  – Plating
  – Machining
  – Heat Treating
  – Assembly
GSN Case Study Results

• Identified areas requiring attention:
  – Scrap and rework
  – Lead time
  – On-time delivery
  – Reduction of hazardous solvents
  – Increase plating bath life
  – Increase life of metalworking fluids
  – Lighting retrofit
  – Heat recovery and reuse

• Identified potential $60K+ savings, plus creating more efficient processes and reduction in processing time
What Is Next?

• Lean and Clean practitioners need to work together—don’t forget the safety and health and quality experts!
• Utilize existing tools and develop new tools to integrate lean and clean
• Cross-train both practitioners—we are all walking by unnecessary waste!!
End the Isolation

Safety

Productivity

Quality

Environment

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