

Lean and Green

Mississippi Polymer Institute

Ty Posey

(601) 266-4607

ty.posey@usm.edu

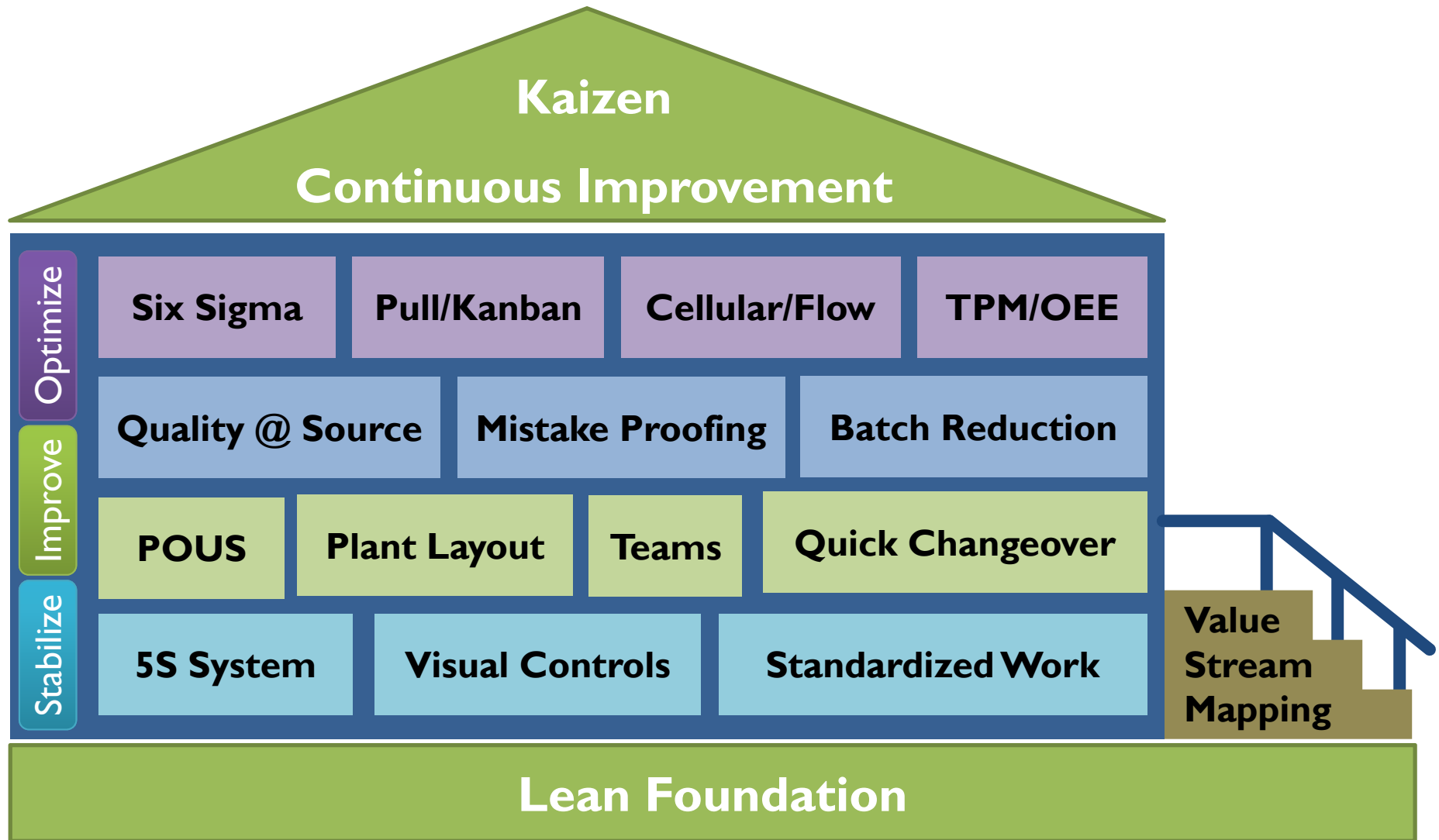


MANUFACTURING
EXTENSION PARTNERSHIP
National Network

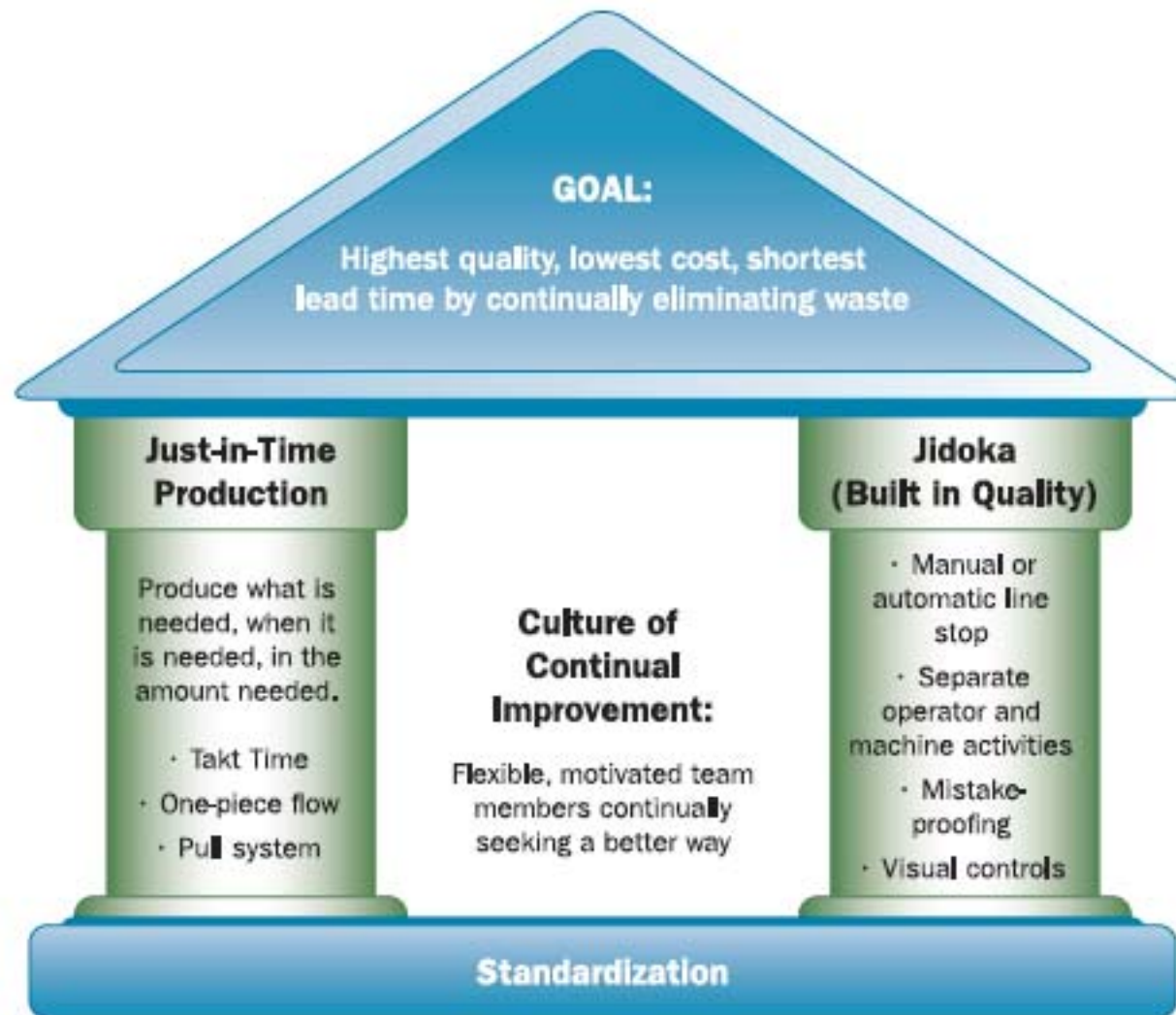


MISSISSIPPI
POLYMER
INSTITUTE

Lean Building Blocks



Toyota Production System House



Source: Adapted from multiple sources, including Dennis Pascal, *Lean Production Simplified*, Productivity Press, 2002 and TBM Consulting Group, "House of Toyota," available at www.tbmcg.com/about/ourroots/house_toyota.php.

What is Lean Manufacturing?

It is focusing on the ELIMINATION of WASTE



through CONTINUOUS IMPROVEMENT!

Food Loss And Waste

- [USDA estimates](#) the amount of food loss and waste from the food supply at the retail and consumer levels: *in 2010 food loss and waste at the retail and consumer levels was 31 percent of the food supply, equaling 133 billion pounds and almost \$162 billion.*

133 billion lbs.

\$162 billion

Perishable

Sanitation

Allergens

Organics

What the Customer Cares About

Value Added Activities

- Any activity that adds value to the product or service produced.
- Value added activities are those things your customer is willing to pay you to complete.

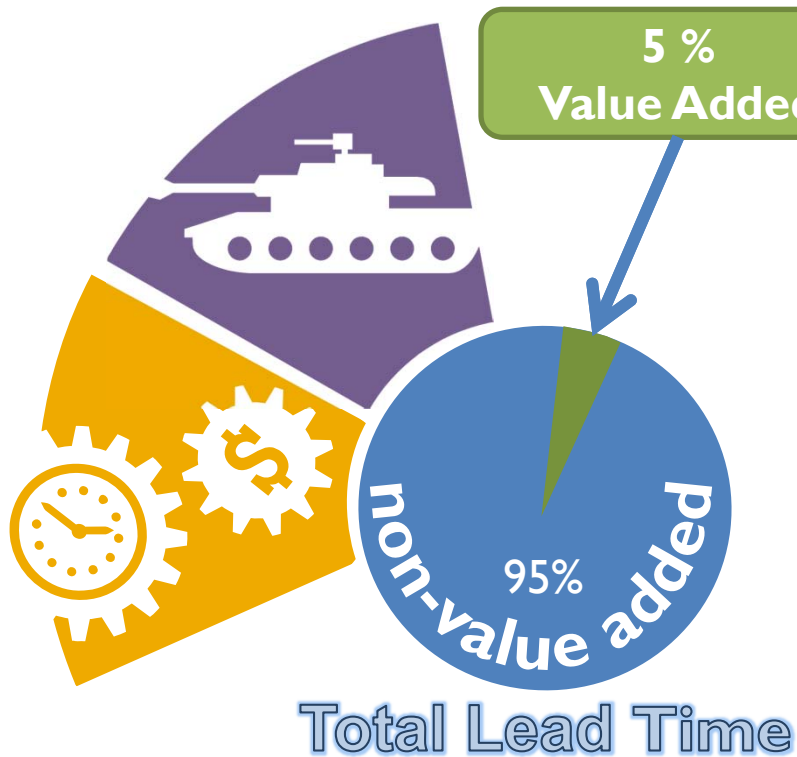
What the Customer *Does Not* Care About

Non Value Added Activities

- Any activity that does not add value or that is not necessary.
- Non-value added activities should be eliminated, simplified, reduced or integrated.

Necessary Non Value Added Activities

The Eight Wastes



DOWNTIME

1. Defects
2. Overproduction
3. Waiting
4. Not Utilizing Employees
5. Transportation
6. Inventory
7. Motion
8. Excessive Processing

Typically 95% of all lead time is non-value added

Lean, Clean, and Green

"Lean" Eliminates...

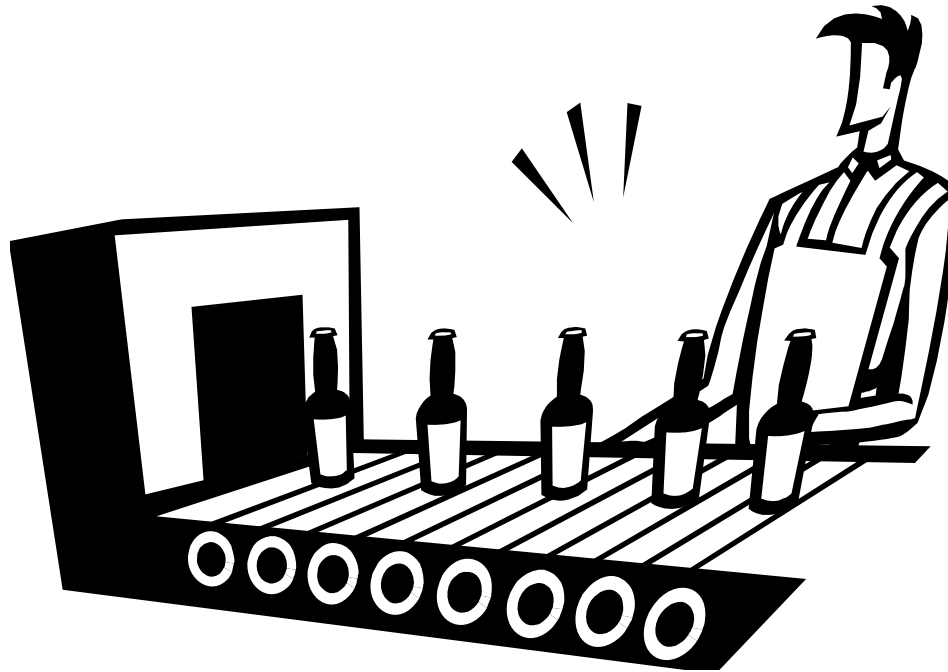
- **D**efects
- **O**verproduction
- **W**aiting
- **N**on-utilized resources
- **T**ransportation
- **I**nventory
- **M**otion
- **E**xtra processing

"Green" 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

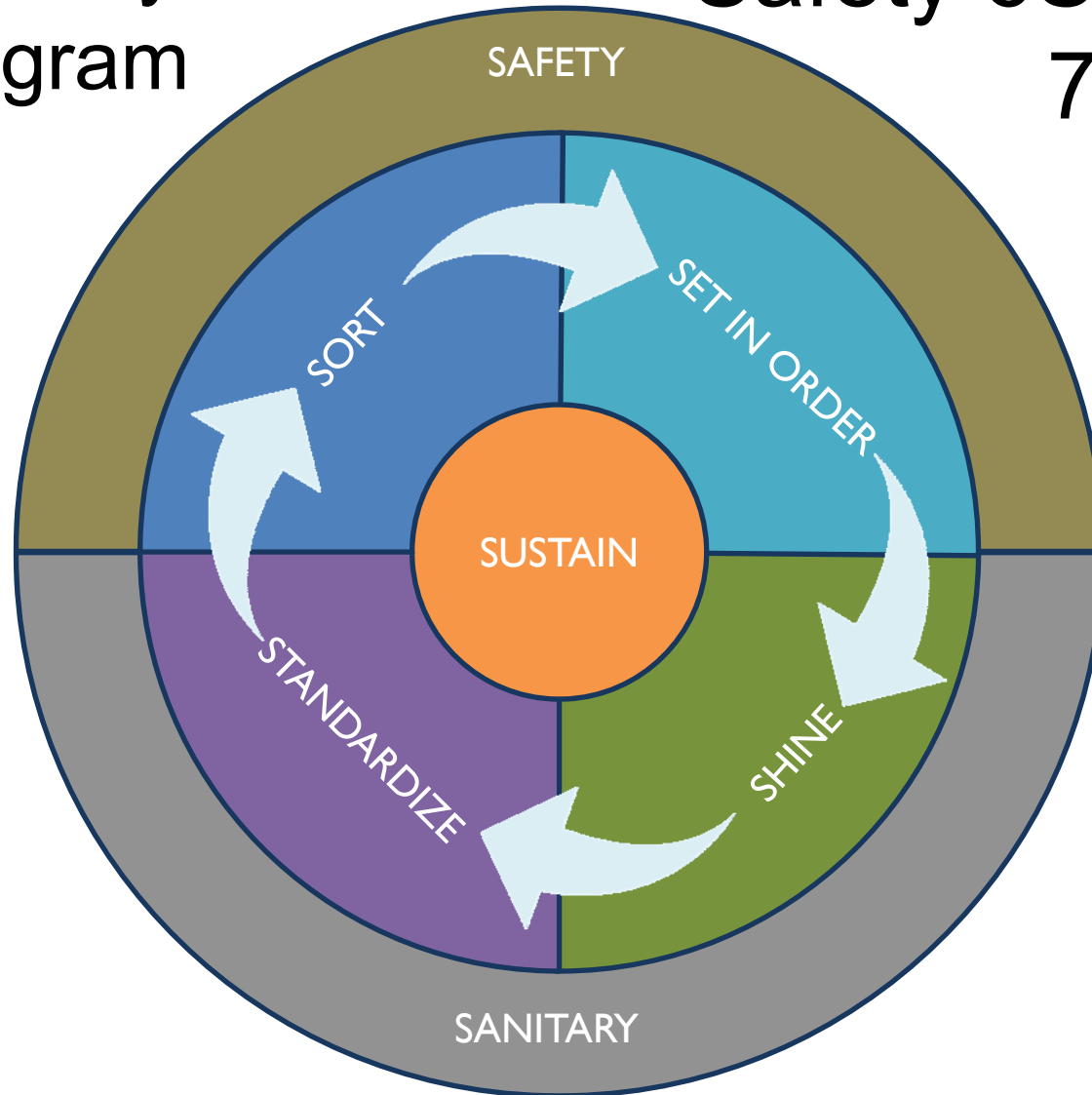
Overproduction

Most important waste to reduce
Drives other wastes



5S + Safety
6S Program

Safety 6S + Sanitary
7S Program



7S for the Food and Beverage Industry

Workplace Organization (5S)

Before



After



Workplace Organization (5S)

Before



After



Workplace Organization (5S)

Before



After



Elements of a 5S Program

Sort

- Perform “Sort Through and Sort Out,” by placing a red tag on all unneeded items and moving them to a temporary holding area. Within a predetermined time the red tag items are disposed, sold, moved or given away. “When in doubt, throw it out!”

Set-In-Order

- Identify the best location for remaining items, relocate out of place items, set inventory limits, and install temporary location indicators.

Shine

- Clean everything, inside and out. Continue to inspect items by cleaning them and to prevent dirt, grime, and contamination from occurring.

Standardize

- Create the rules for maintaining and controlling the first 3 S's and use visual controls.

Sustain

- Ensure adherence to the 5 S standards through communication, training, and self-discipline

Sustain

- There are generally three different methods to sustain 5s improvements:
- **Daily checks**
Supervisors should be on the floor and check to make sure procedures are followed daily and to help employees with any process problems.
- **Periodic checks**
Using a 5S checklist, supervisors can perform quarterly or monthly checks to make sure 5S is being followed. They can find and address any problems in these checks.
- **Change-only checks**
Supervisors can check to make sure 5S is being followed only when a process change is being implemented. They can revisit SOPs to integrate the change and to make sure it's working well for employees.
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5M 5S

Clean as
you GO

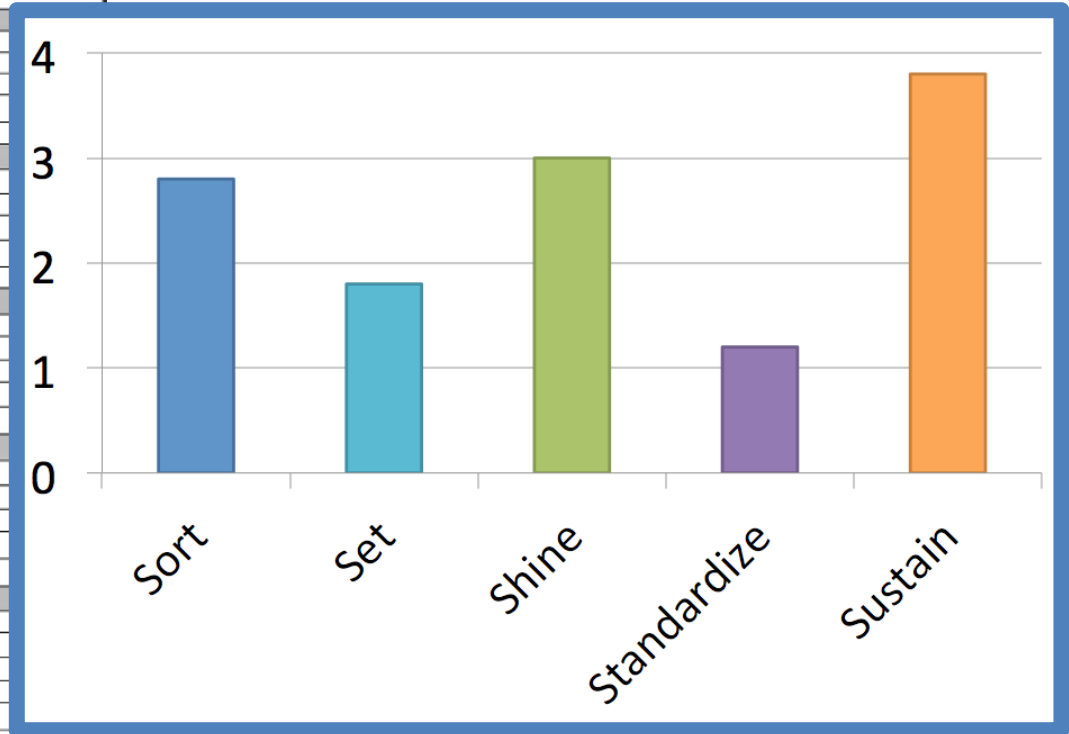
Waste Walks

Make 5S
Part of Job
Descriptions

Sustain

Making a habit of properly maintaining correct procedures

Workplace Scan Checklist									
Number of Problems	Rating Level		Year	Date	Date	Date	Date	Date	Date
5 or more	Level 0								
3 - 4	Level 1								
2	Level 2								
1	Level 3								
none	Level 4								
Category	Item	Level							
Sort	Distinguish between what is needed and not needed								
	Unneeded equipment, tools, furniture, etc. are present								
	Unneeded items are on walls, bulletin boards, etc.								
	Items are present in aisle ways, stairways, corners, etc.								
	Unneeded inventory, supplies, parts, or materials are present								
Set in Order	A place for everything and everything in its place								
	Correct places for items are not obvious								
	Items are not in their correct places								
	Aisle ways, workplaces, equipment locations are not indicated								
	Items are not put away immediately after use								
Shine	Cleaning, and looking for problems to be organized								
	Floors, walls, stairs, and surfaces are not free of dirt, oil, and grease								
	Equipment is not kept clean and free of dirt, oil, and grease								
	Cleaning materials are not easily accessible								
	Lines, labels, signs, etc. are not clear and unbroken								
Standardize	Maintain and monitor the first three categories								
	Necessary items are not visible								
	All standards are known and visible								
	Checklists don't exist for cleaning and maintenance jobs								
	Quantities and limits are not easily recognizable								
Sustain	How many times can't be located in 30 seconds?								
	How many workers have not had 5S training?								
	How many times last week was daily 5S not performed?								
	How many times are personal belongings not easily stored?								
	How many times last week were daily 5S inspections not performed?								



Sustain

Making a habit of properly maintaining correct procedures



Golden
Broom
Award

Cleaning Station



<http://www.v-m-t.co.uk/cleaning-stations/>

Shadow Boards


















Foam Solutions



<http://www.v-m-t.co.uk/shadow-boards/>

Color Coding by Usage or Processes

 <p>FDA Compliant</p>	 <p>Metal Detectable Tools</p>	 <p>Waterfed System</p>	 <p>Food Processing</p>	 <p>Hygiene Sensitive</p>
 <p>UST</p>	 <p>Floor and Drain Tools</p>	 <p>Safety and Spill Kit</p>	 <p>Industrial</p>	 <p>Hazmat</p>
 <p>Remco 1.5" Stainless Steel Scraper 6971x</p>	 <p>Remco 3" Stainless Steel Scraper 6972x</p>	 <p>Vikan Grout Brush-Extra Stiff 7040x</p>	 <p>Top Dog 6 Mil Apron w/ 45" Length 8001x</p>	 <p>Top Dog 6 Mil Apron w/ 50" Length 8002x</p>

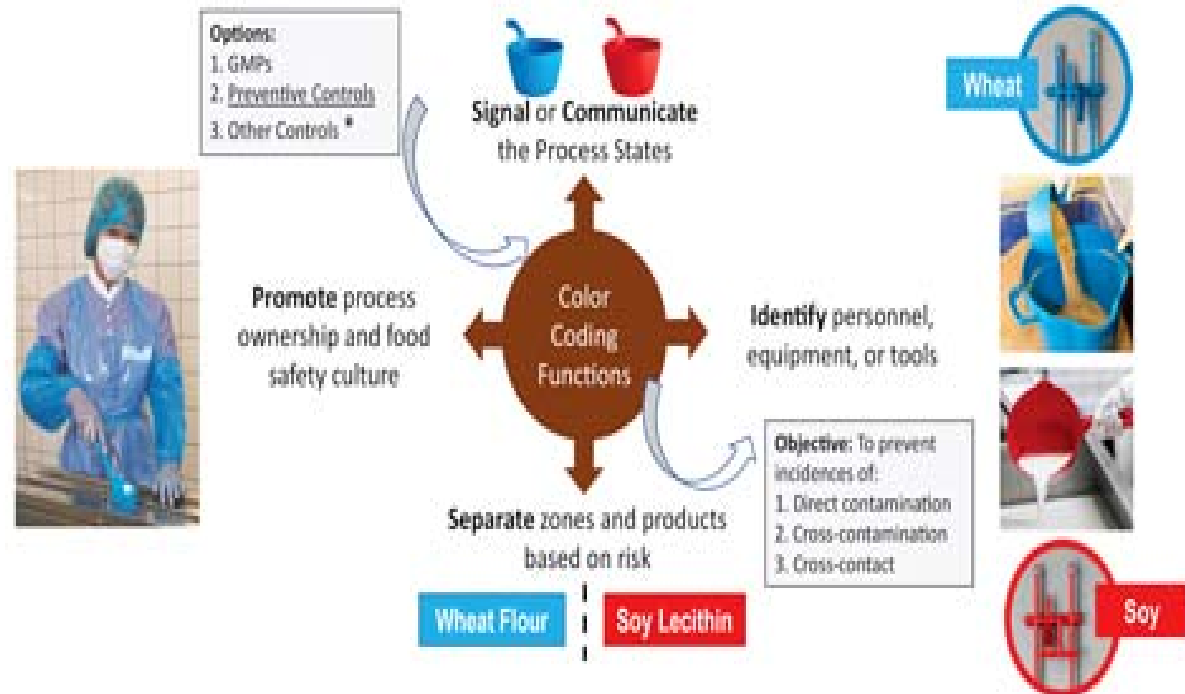
<https://remcoproducts.com/products/#/>

Color-Coding as a Preventive Control in Food Processing

According to the CDC, 1 in 6 Americans become sick by eating contaminated food every year, resulting in an estimated 3,000 deaths. As if the human cost isn't sobering enough, the Grocery Manufacturers Association also estimates the average cost of a recall to a food company is a whopping \$10 million in direct costs in addition to brand damage and lost sales.

3,000 Death/Year
Due to
Contamination

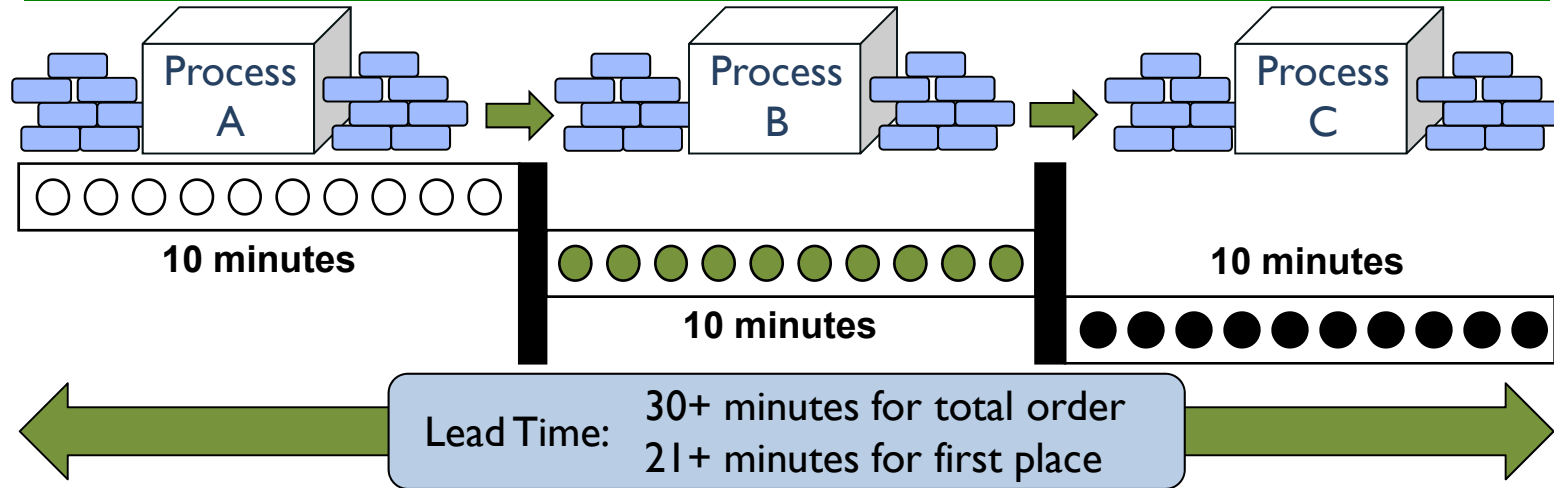
Recall Cost
\$10 Million



<https://www.foodprocessing.com/articles/2018/color-coding-in-food-processing/?show=all>

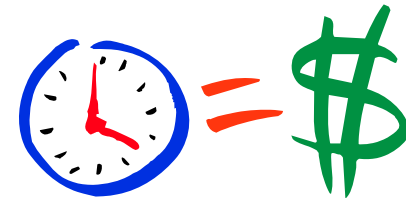
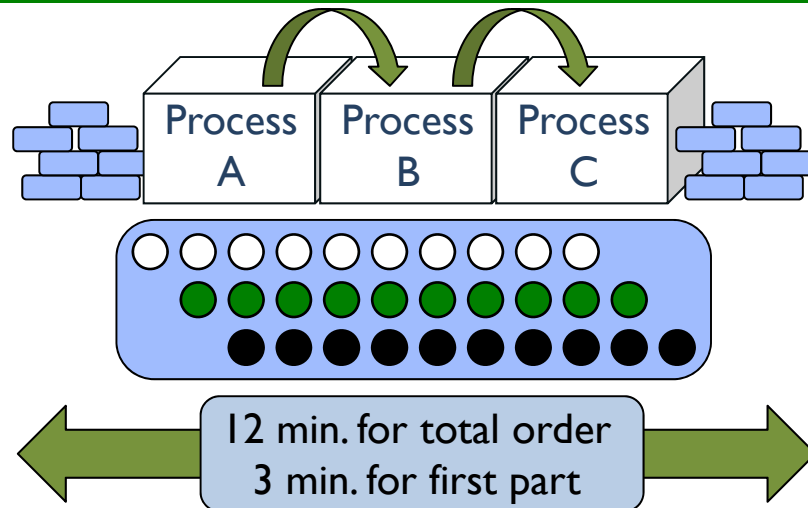
Continuous Flow Processing

Batch and Queue Processing

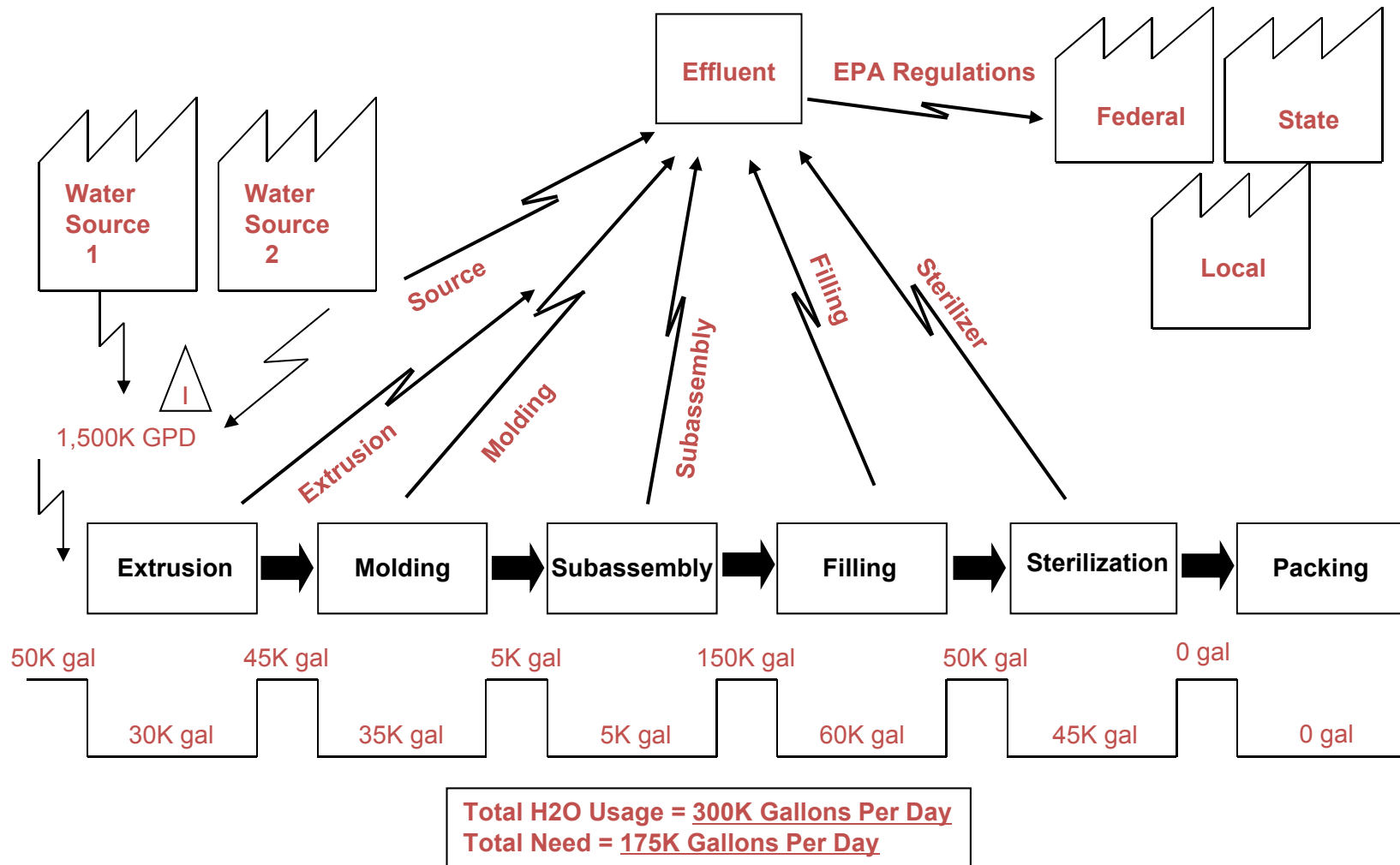


Continuous Flow Processing

Impact of
Batch Size
Reduction



Value Stream Mapping for Water Usage



Types of Environmental Metrics

Energy Use	Air Emissions
Materials Use	Hazardous Waste Generation
Chemical Use	Solid Waste Generation
Water Use	Wastewater Discharges

Lean Building Blocks

