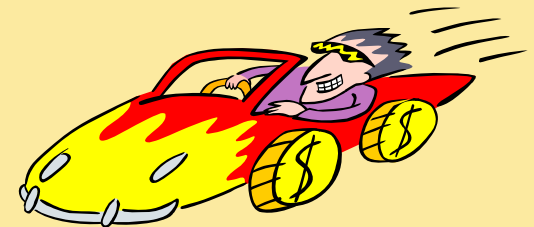


Using Lean Manufacturing Concepts To Build A Better Business Case For P2 Projects

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Main Messages

1. Lean Manufacturing is effective for reducing all forms of “waste”.
2. Businesses are *very* interested in Lean Manufacturing.
3. We can take advantage of this interest by using Lean concepts to build a better business case for P2 projects

Lean Techniques

- Pull system
- 5S
- Visual controls
- Point-of-use storage
- Quick change-over,
Reduce setup
- Facility layout
- Preventative maintenance
- Batch reduction
- Six sigma
- Takt time
- Standard work
- Machine reliability

Lean Manufacturing Is:

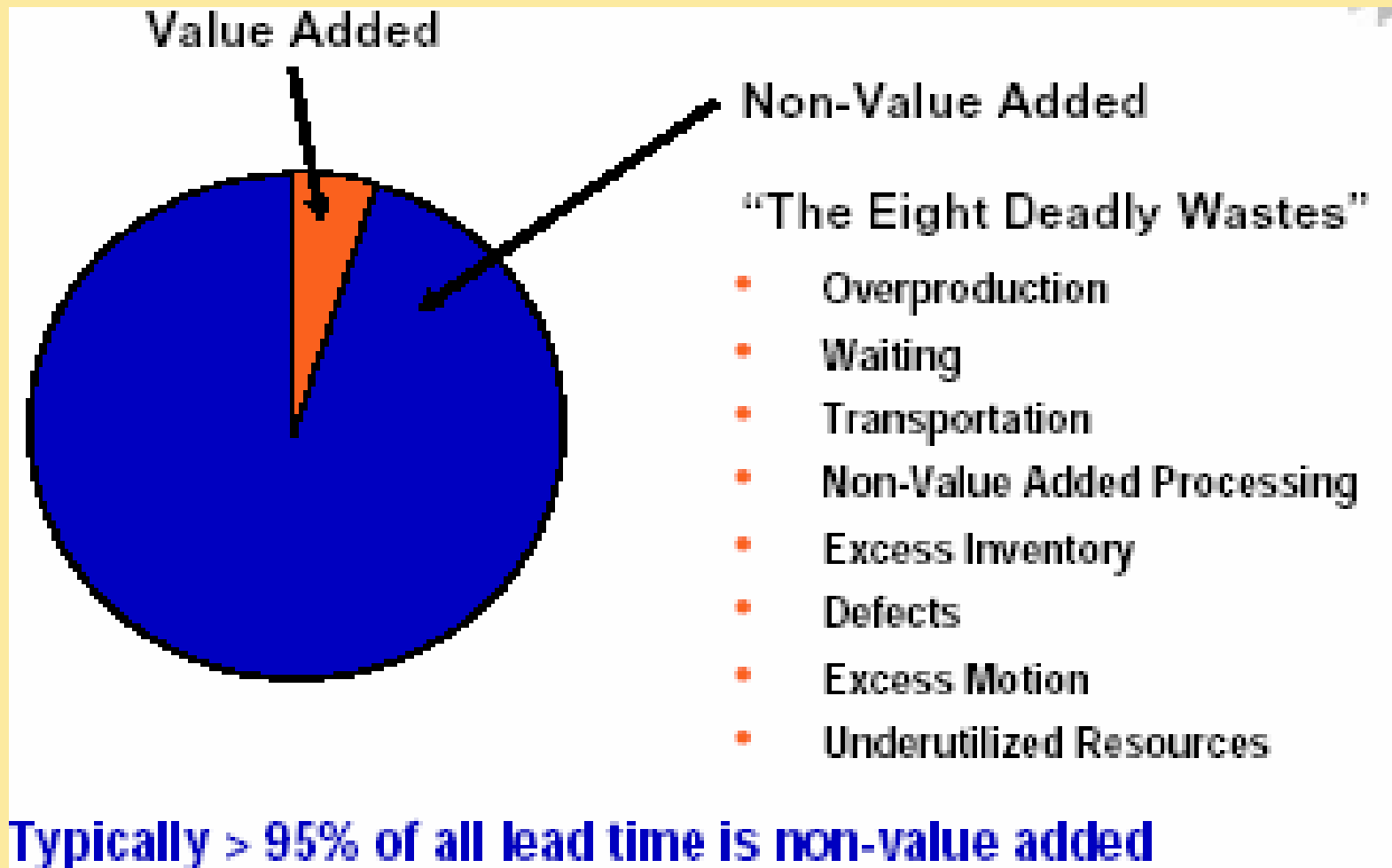
A systematic approach to identifying and eliminating waste (non-value-added activities) through continuous improvement by flowing the product at the demand of the customer, in pursuit of perfection.



Value Added vs Non-Value Added

- **Value added:** Transforms raw material and information into products or services to be marketed
- **Non-value added (waste):** Consumes resources but does not contribute directly to the product or service to be marketed

Eight Deadly Wastes



Non-Value Added Activities

- Waste management
- Contaminated site clean-ups
- Extra requirements for hazardous materials
- Regulatory paperwork and reporting
- Waste treatment
- Emissions controls
- Hazardous material & right-to-know training

Potential Benefits of Lean

- 90% reduction of production times
- 50% increase in productivity
- 80% quality improvement
- 75% improvement in space utilization
- 85% reduction of "work in progress" (stuff waiting to be finished)
- *And reduction of material waste*

= Cost savings!



Leadership Must Motivate Change

Is This Enough Motivation?



China - \$19.30 + Freight



USA - \$31.47/Internal



APS/Lean - \$15.72
One Piece Flow Cell

Success Stories: P2 Through Lean Mfg

- Gary Loomis fishing rods, Woodland
- Boeing, Renton

Gary Loomis

- Reduced the time it takes to make a fishing rod from 22 days to 4 days
- Reduced hazardous waste by 4 tons/yr and became a CESQG

Boeing 737/757 Airplanes

- Reduced production time from 24 days to 12; target is 8 days
- Hazardous waste reduced 31% in 3 years
- 1 million pounds less hazardous waste in 2004 than 2003

Lean Promotes Sustainability

- Reduced material waste and raw materials
 - fewer defects, less overproduction, simpler products, right-sized equipment
- Smaller building footprint
 - less storage, inventory space
- Less energy use
 - energy not wasted on overproduction, lighting/heating/cooling unneeded space, or oversized equipment
- Lower emissions
 - less overprocessing, less transport emissions
- Fewer accidents; spills & leaks are noticed quickly

Businesses Listen To “Lean”

- The “E” word (environment = external issue)
- Lean addresses production (= core business)



Making A Better Business Case For P2

- Redefine waste as non-value added
- Emphasize Lean/production benefits of P2
- Use Lean Mfg. metrics to enhance P2
Total Cost Analysis (TCA)

Making A Better Business Case For P2

Point Out NVA

Emphasize that waste management, pollution controls, defects, scrap, waste treatment, clean-ups, waste movement and shipping, space for these, are **non-value added**, and should be reduced.

Making A Better Business Case For P2

Point Out Lean/Production Benefits of P2

- Fewer waste containers allows better floor space utilization and movement.
- Less waste means less non-value added activity spent on managing it, saving labor and increasing productivity.
- Avoiding spills reduces downtime

Making A Better Business Case For P2

Point Out Lean/Production Benefits of P2

P2 can also reduce:

- Number of steps or tasks
- Cycle time and lead time
- Work in progress (WIP), inventory
- Defects, errors

These things increase worker productivity

Lean/Production Benefits of P2

Spray gun washer reduces

- non-value activity
- set-up time
- solvent waste



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Making A Better Business Case For P2 Enhanced TCAs

2 facilities reduced their need to paint.

Basic TCA usually includes:

- Cost of raw material (incl. replacing wasted paint)
- Cost of waste disposal
- Labor to apply paint
- Labor to flush and clean paint equipment

Lean-Enhanced TCAs

Reduced need to paint, so fewer defects.

Each defective piece also represents production time and cost:

- Production time (from Takt time or VS Map)
- Production \$ (Prod. time x operating cost, or
Prod. time x sales cost)
- Similarly, add rework time and \$; floorspace

Lean-Enhanced TCAs

Reduced need to paint, so less “down time”:

Equipment flushing and coating changes increases cycle time and overall production time

- How many units could have been painted in that time, that could have been sold for how much money?
- What does this add up to over a year's time?

Lean-Enhanced TCAs

Reduced need to paint:

Reduced **Work In Progress** (inventory)

- How many pieces are waiting for painting, being painted, or drying, and what do they represent in operating costs/time and sales?

Conclusion

Lean Manufacturing can help us to address P2 through production interests, to make a better business case for pollution prevention and sustainability.



Extra slides

Lean Mfg. Resources

- Washington Mfg. Services (MEP-NIST)
 - <http://www.wamfg.org/>
 - consultants and courses
- Northwest Lean (Renton) <http://www.nwlean.net/>
- Books
- Private consultants

“Pull” Systems

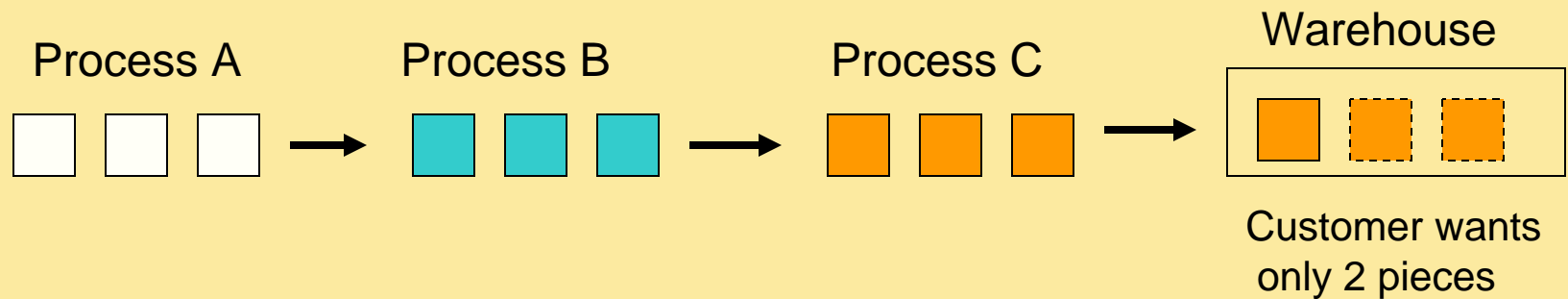
- Demand-driven
- “Just In Time” techniques

“Pull” System

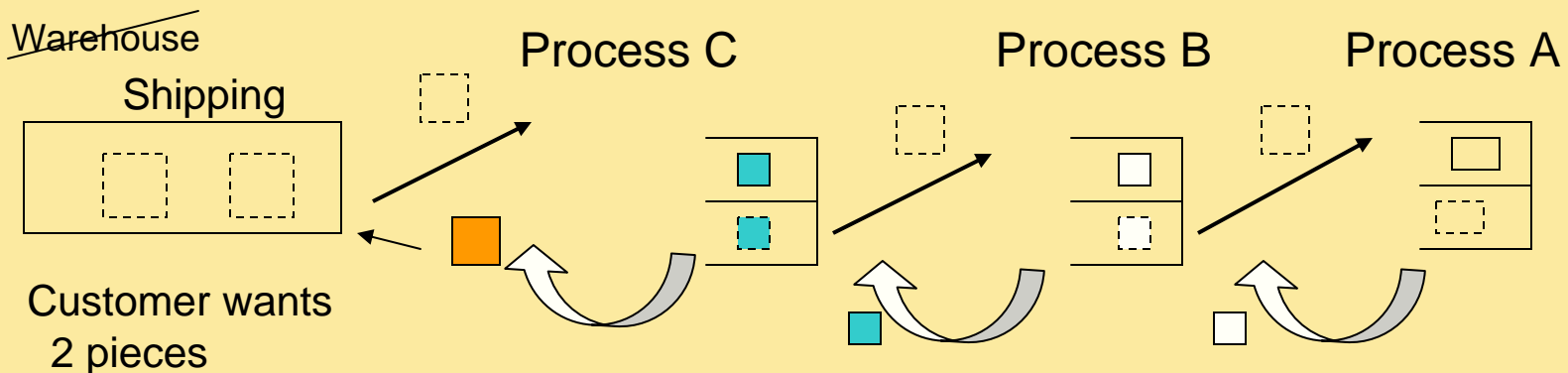
Before: 9 pieces of WIP; 30% surplus in warehouse

After: 4 pieces of WIP; no surplus

Push system



Pull system



“5 S”

- Sort – weed out
- Set up -- organize
- Shine – clean, repair
- Standardize – label, mark limits
- Sustain – system for maintaining

Storage Area “Before”



Storage Area “After”



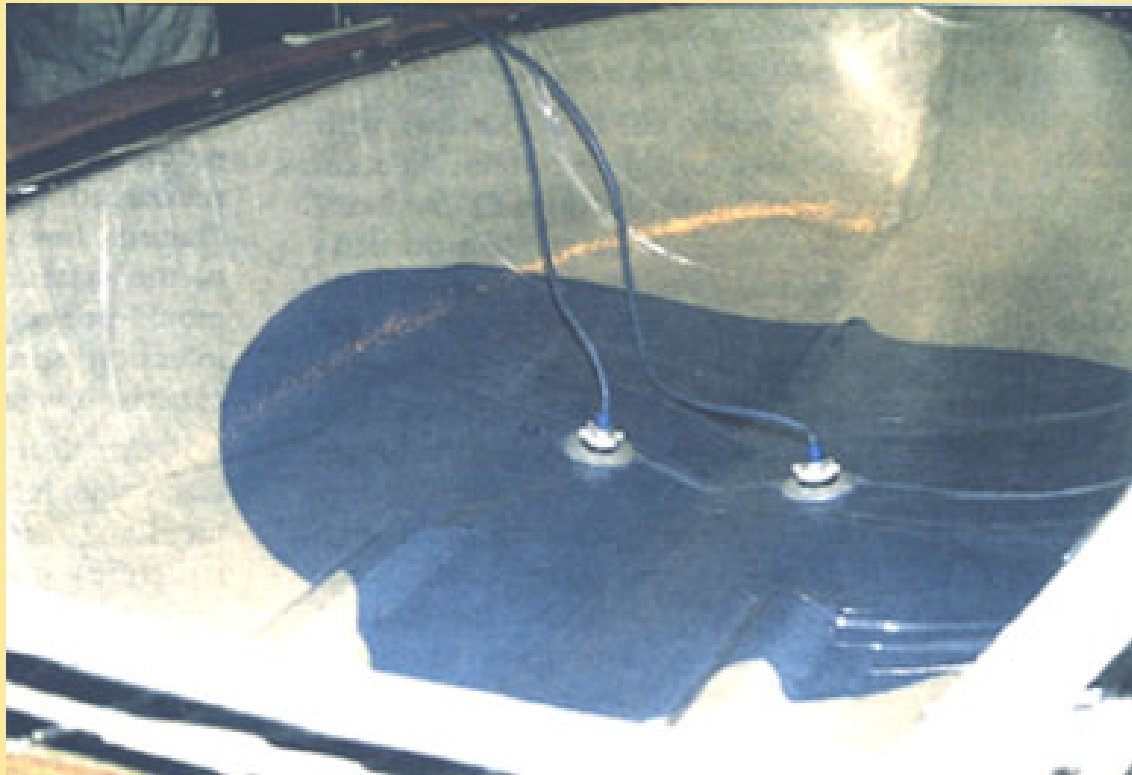
Lean/Production Benefits of P2

- Fiberglass boat building: traditional open molding



Lean/Production Benefits of P2

- Fiberglass boat building: closed molding reduces labor, waste, emissions



Lean and EMS

- Continuous improvement
- Standardization and documentation
- Measurable targets and objectives
- Employee involvement