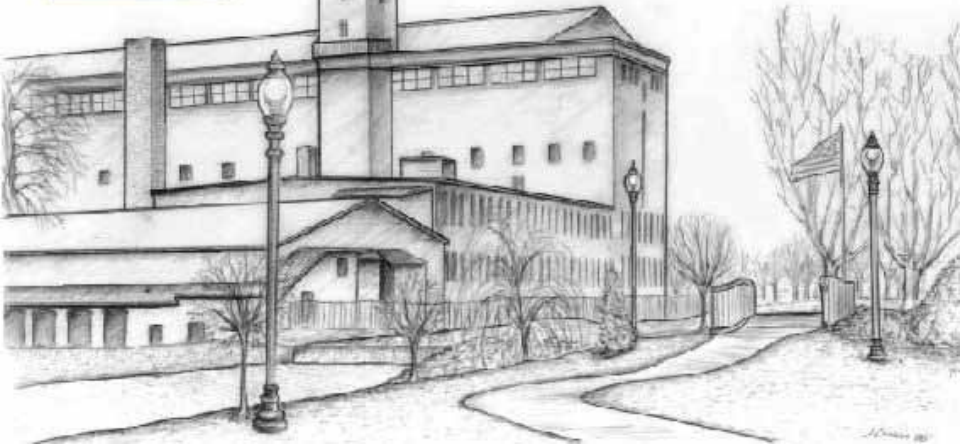




**Advent Design
Corporation**



**So you want to Automate
your process?**

**(Lean Considerations for
Automation Projects)**

May 15, 2008

Session Objectives

Agenda:

- Overview of Lean Manufacturing Principles
- How the application of Lean Manufacturing Principles can impact an operation.
- How Lean Manufacturing Principles can impact an Automation Project.



In Today's Market... Customers Demand

- **Faster delivery**
- **Smaller lot sizes**
- **100% on time**
- **100% reliable**
- **At a lower cost**



Task: Reduce Cost



Smart Path

Shortsighted Path



Cut Services



Cut Waste

Lazy Path



Just Cut



3 Ways to Reduce Cost

- **The Usual Way**

- Cut Benefits
- Freeze all Promotions
- Freeze wage increase!

- **The Shortsighted Way**

- Eliminate Jobs (Lay-Offs)
- Freeze all new Hires

- **The *SMART* Way**

- Eliminate **WASTE/Non-Value-Added activities** in the process using **Lean Manufacturing**
 - By systematically utilizing LEAN tools like VSM, 5S, SMED
 - By doing Kaizen events
 - **Selective Automation**



Lean Manufacturing 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”

-- The MEP Lean Network



A Lean Manufacturing System.....

- Focuses on value added, flow, & lead time
- Achieves improvement by focusing on waste in the value stream
- Uses the Toyota Production System (TPS) as the benchmark (JIT/Jidoka)
- Has goals based upon
 - Waste Elimination
 - Shortest Lead Time



Business Process

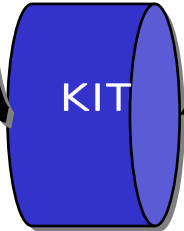
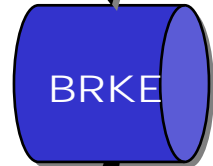
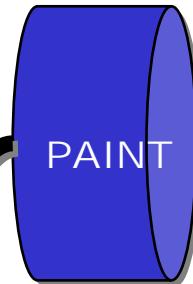
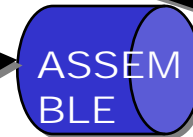
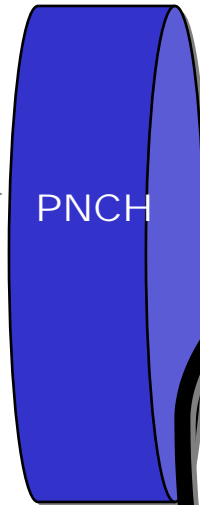
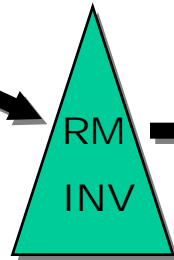
before

LEAN

A/R

\$

ORDER

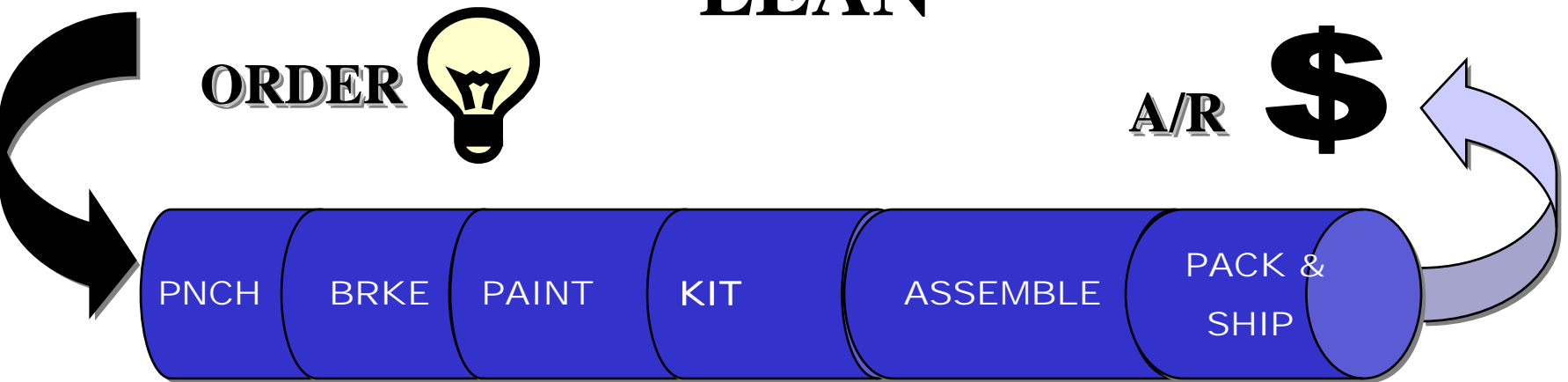


- Unorganized
- Poor alignment
- Unbalanced work
- Inefficient
- Slovenly
- Does not match consumer needs



BUSINESS PROCESS

After
LEAN



**Organized, Aligned, Balanced,
Efficient, NC&O and sized to
meet consumer needs**



Operational Keys to a Successful Lean Implementation

- **Utilization: *Keep Equipment Running***
 - > Think in terms of *total system performance*
- **Batches: *Batch Size vs. Setup Costs***
 - > Think about the benefits of *shorter cycle time*, quick response, low inventory
- **Inventory: *Just In Case Inventory***
 - > *Costs money and time*—Define the minimum quantity you must keep and how to reduce it further



Value Add Test

- Does your customer care and are they willing to pay for the activity?
- Does the activity change the fit, form or function of the product?
- Is the activity done right the first time?

All three answers must be Yes for the activity to be value added!

Definition of Waste

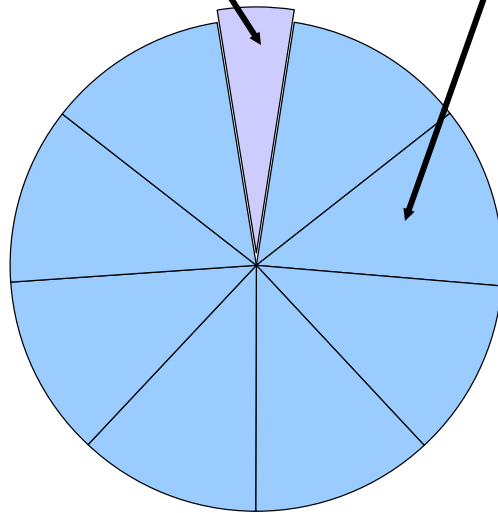
Anything More Than the Absolute Minimum Resources of Material, Equipment and Personnel required to Add Value for the Customer.



Lean = Eliminating Waste

Value Adding

Non Value Adding



- D**efects
- O**ver Production
- W**aiting
- N**ot Utilizing Employees
- T**ransportation
- I**nventory
- M**otion
- E**xtra Processing

How does this apply to the automation Question?



1. Defects

- Is the new Automation Statistically Capable?
- Can the new Automation meet the consumer's Quality Requirements?
- Does the new Automation capability exceed the requirements of the consumer (NVA)?
- Are the upstream and downstream processes/equipment Statistically capable of Delivering or Accepting product from the new Automation?

2. Overproduction

- Does the new Automation production rate match the consumer's demand? "right sized"
- Does the new Automation rates fit with the upstream and downstream processes? "balanced"



3. Waiting

- Can the upstream equipment or processes feed the new Automation to allow for it to run efficiently?
- Will the new Automation require larger amounts of inventory on hand to allow it to run efficiently?
- Will the new Automation outrun the downstream processes?

4. Not utilizing People

- Will the new Automation require a more “technical” employee?
- Will the new Automation require a culture change – i.e. empowerment of the employees?
- Will the new Automation require significant employee training?
- Is the organization ready for change? Is the organization prepared to address “That’s the way we have always done it” challenge?



5. Transportation

- Is the new Automation going to fit in the existing line or work cell?
- If there is inventory that will be queued before and after the new automation – has the space requirements been factored in?
- Has product movement into and then out of the new Automation been considered?

6. Inventory

- Will the new Automation require longer Changeovers hence larger batches?
- Will the existing kanban and inventory replenishment system be impacted?
- Maintain POUS Guidelines



7. Motion

- Does the new Automation help or hurt the product flow?
- Are we going from a Lean Layout to a traditional workplace?
- Have you considered the ergonomics of the employee?
Loading, Unloading and servicing the machine?
- Is the new Automation going to impact the work environment?
Consider noise, fumes, motion of the automation.

8. Excess Processing

- Will the new Automation do more than the Consumer requires?
- Does the New Automation require any additional inspections that might be redundant in the total system.



FLOW KILLERS

Distance between Work Stations

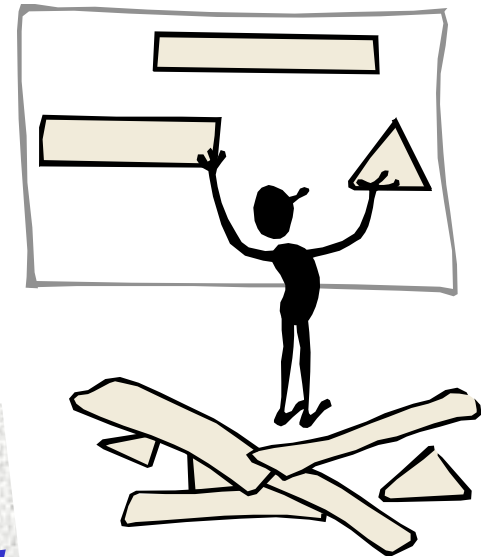
Large Batches

Quality Problems

Long Changeovers

Material Shortages

Unreliable Equipment



*When flow stops...
... Waste begins!*



Why Lean Automation?

“After implementing lean improvements such as cellular manufacturing and setup reduction, selective automation can add value and reduce human variability.”

Richard Schonberger, June 2002

Levels of Automation

Levels	Load Machine	Machine Cycle	Unload Machine	Transfer Part
1	<i>Operator</i>	<i>Operator</i>	<i>Operator</i>	<i>Operator</i>
2	<i>Operator</i>	AUTO	<i>Operator</i>	<i>Operator</i>
3	<i>Operator</i>	AUTO	AUTO	<i>Operator</i>
<i>The Great Divide</i>				
4	AUTO	AUTO	AUTO	<i>Operator</i>
5	AUTO	AUTO	AUTO	AUTO

As defined by the Lean Enterprise Institute in “Creating Continuous Flow”



How Do We Use Lean Techniques for Automation?

- Assess the operation using a Value Stream Map and/or PFDs (Product families & Production data)
- Evaluate the layout
- Identify lean improvements & kaizens without automation
- Implement lean improvements using VSM plan
- Identify lean automation opportunities
- Design and implement lean automation
- Start the cycle again!



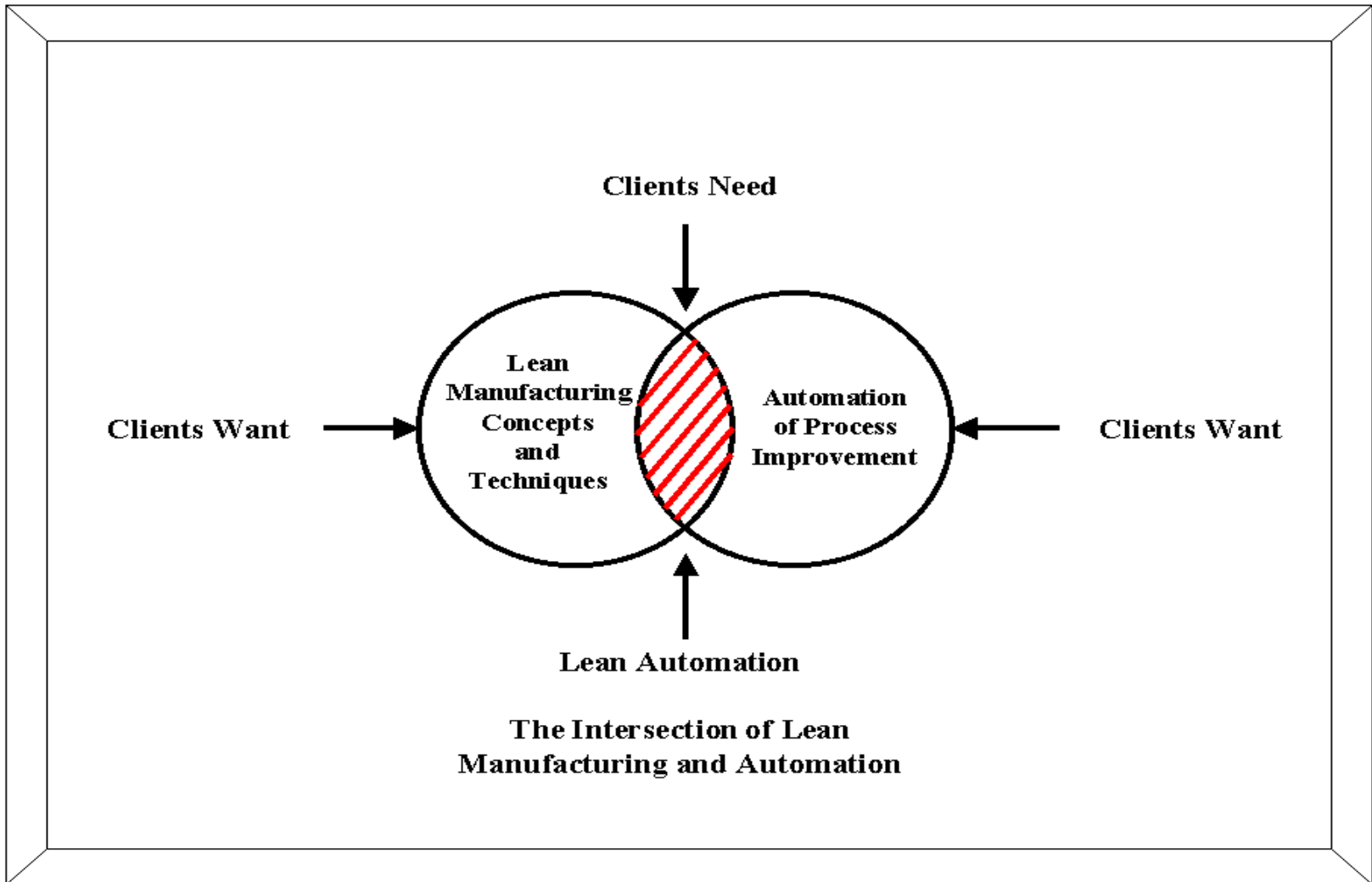
Where TO Start



- Insure that Value Stream Map has been completed prior to Automation consideration.
- Thoroughly understand process Takt time.
- Consider Statistical performance of entire line especially immediately in front of and after the new Automation.
- Don't overbuy or overbuild.

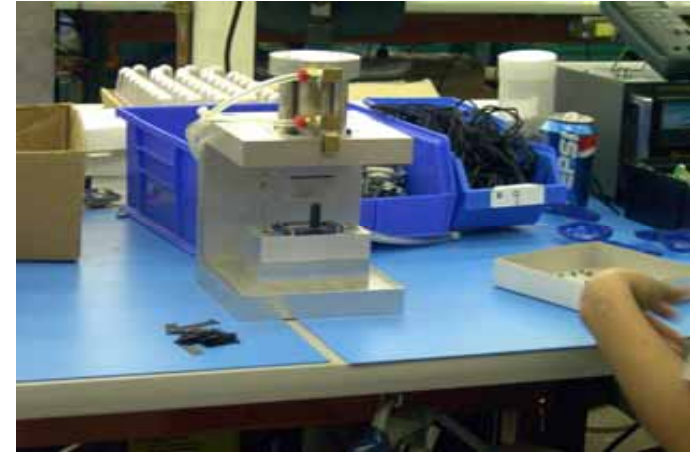


Lean Automation Concept

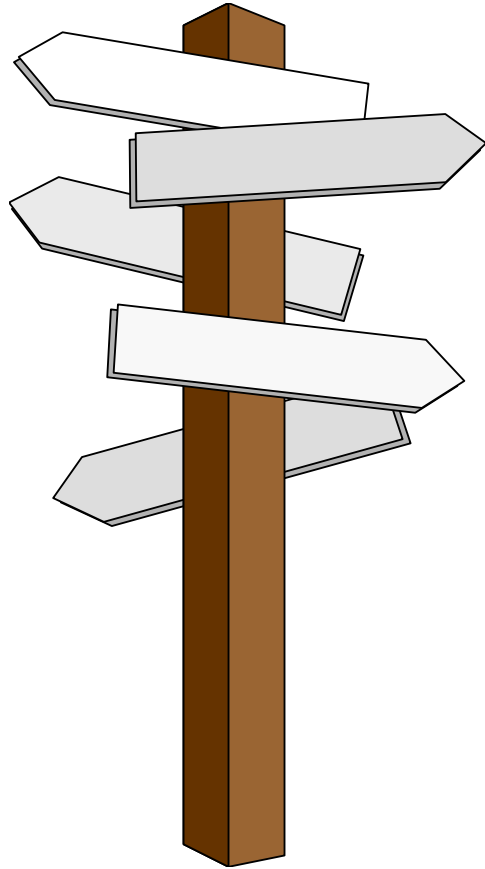


Typical Lean Automation Applications

- Simplest.....Assembly Fixtures
- Machine Loading
- Visual Inspection Systems
- Product Testing



What Do You Need to Do?



- Become knowledgeable of Lean Techniques
- Question automation assumptions
- Implement Lean solutions first...then automate
- Design engineers must think differently
- Get work force involved: Use of automation kaizens
- Establish a cycle of continuous improvement



Where Some Companies Fail

- Automating a poor process
- Not considering Total System Performance.
- Set-up times not considered.
- Incomplete training of the entire team (Manufacturing, Maintenance and Quality control).
- Forgetting to consider the system Takt time.
- Forgetting to review upstream practices.



Benefits of Lean Automation

Summary

- Lower cost automation
- Simpler implementation & faster acceptance
- Greater flexibility for setup & material flow
- Maximizes operator utilization
- Better use of floor space
- Useful data providing a knowledge base for more profitable solutions in the future, and supporting a cycle of Continuous Improvement.



Reduced costs

Shorter cycle times

Smaller batch sizes

Reduced inventory

Improved quality

Greater flexibility

**Lean Automation Makes Us All
Winners!**



Your Lean Transformation Guides

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