Developing An Entrepreneurial Mindset

The Lean Scene

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Outline

1. Lean Manufacturing
2. 5S & Visual Controls
3. Kaizen
4. Value Streams
5. Pull Manufacturing
6. Mistake Proofing
7. Quick Changeover
8. Six Sigma
9. Lean Accounting
10. Theory of Constraints
11. Human Factors

Lean Manufacturing

Definitions

- **Value -** A capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer. Features of the product or service, availability, cost and performance are dimensions of value.

- **Waste -** Any activity that consumes resources but creates no value (waste)

What is Lean?

- Lean production focuses on eliminating waste in processes (i.e. the waste of work in progress and finished good inventories)
- Lean production is not about eliminating people
- Lean production is about expanding capacity by reducing costs and shortening cycle times between order and ship date
- Lean is about understanding what is

Thinking Lean

- Specify value
  - can only be defined by the ultimate customer
- Identify the value stream
  - exposes the enormous amounts of waste
- Create flow
  - reduce batch size and WIP
- Let the customer pull product through the value stream
  - make only what the customer has ordered
- Seek perfection
  - continuously improve quality and eliminate waste

From Lean Thinking by Womack and Jones

Benefits

- Lean provides tangible benefits
- Reduces costs not just selling price
  - Reduces delivery time, cycle time, set-up time
  - Eliminates waste
  - Seeks continuous improvement
- Improves quality
- Improves customer ratings and perceptions
- Increases overall customer satisfaction
- Improves employee involvement, morale, and company culture
- Helps “transform” manufacturers

Toyota Production System (TPS)

- Quality, Cost, Delivery
  - Shorten Production Flow by Eliminating Waste
- Just In Time
  - The Right Part at the Right Time in the Right Amount
  - Continuous Flow
  - Pull Systems
  - Level Production
- Built-In Quality
  - Error Proofing – Poka Yoke
  - Visual Controls
- Operational Stability
  - Standardized Work
  - Robust Products & Processes
  - Total Productive Maintenance
  - Supplier Involvement

Types of Waste

- Overproduction
- Excess inventory
- Defects
- Non-value added processing
- Waiting
- Underutilized people
- Excess motion
- Transportation

Lean vs. Traditional Manufacturing

- Half the hours of engineering effort
- Half the product development time
- Half the investment in machinery, tools and equipment
- Half the hours of human effort in the factory
- Half the defects in the finished product
- Half the factory space for the same output
- A tenth or less of in-process inventories

Source: The Machine that Changed the World, Womack, Jones, and Roos, 1990.

Lean vs. Traditional Manufacturing

- 99.9% Customer Schedule Attainment
- Defects of 15 PPM or less
- 4-6 Inventory Days of Supply
- 92%+ Operational Availability
- Leveled, Sequenced Production
- Order to Customer Use - Hours, not weeks
- Functioning Supplier Partnership
- Strong Production Control Function

Examples: Tier 1 Suppliers: Johnson Controls Seating, Litens Automotive Partnership, Cadimex, Denso Manufacturing, Toyota Motor Corporation.

Barriers to Lean

- Implementing Lean Can Be Difficult Because it is Counterintuitive from a Traditional Paradigm:
  - Buying multiple small machines rather than one big machine that offers economies of scale.
  - Shutting down equipment when maximum inventory levels are reached rather than running flat out.
  - Using standards to continuously improve.
- There is no step-by-step cook book
  - There are some basic steps but the how-to varies from organization to organization
  - Requires an assessment of the company in order to map out the strategy
- Company culture plays a big part in the how-to

Implementing Lean

- Gain top Management “Buy In” and Support
- Perform overall company assessment tied to company strategic, operational, and marketing plans
- Develop strategic lean deployment plan
- Integrate customized training with lean to improve specific skill sets, leverage training resources
- Team Building, Communications, Problem Solving, Change Management, Lean Manufacturing Tools
- Conduct “Kaizen blitz” high impact events
- 5S, Manufacturing Cell, Set-Up Reductions, Inventory Reductions, Work Standardization
- Use an enterprise wide approach to help “Transform” a client’s culture and the way they do business.

Progress Toward Lean

- Smaller lot sizes
- Increased capacity / throughput
- Higher inventory turns
- More available floor space
- Improved workplace organization
- Improved quality : reduced scrap / re-work
- Reduced inventories : raw, WIP, FG
- Reduced lead times
- Greater gross margin
- Improved participation & morale

Lean Is A Journey

- The Journey never ends
- Toyota estimates it is only 50% waste-free

- Where can we begin? Where can we improve?

5S & Visual Control

5S and Visual Control

- 5 Elements of 5S
- Why 5S?
- Waste
- Workplace observation
- **Sort**
- **Straighten**
- **Shine**
- **Standardize**
- **Sustain**
- Visual Factory

5 Elements of 5S

- **Sort**
- **Straighten**
- **Shine**
- **Standardize**
- **Sustain**

Why 5S?

- To eliminate the wastes that result from “uncontrolled” processes.
- To gain control on equipment, material & inventory placement and position.
- Apply Control Techniques to Eliminate Erosion of Improvements.
- Standardize Improvements for Maintenance of Critical Process Parameters.

Types of Waste

- Overproduction
- Delays (waiting)
- Transportation
- Process
- Inventories
- Motions
- Defective Products
- Untapped Resources
- Misused Resources

Elimination of Waste

5 S Element	Waste/ Improvement Item	Deliverable
Systematic Organization	Elimination of finding. Reduction of part selection errors.	Reduced Costs Improved Quality Increased Product Options
Sorting-Visual Placement	Elimination of finding. Elimination of nonconformances. Elimination of motion. Reduction of part selection errors.	Reduced Costs Increased Safety Improved Quality Increased Product Options.
Scrubbing Clean	Increased safety. Preventive maintenance. Increased equipment knowledge.	Increased Safety Improved Quality
Standardization Control	Increased equipment life. Higher morale. Clean environment. Increased visibility of nonconformances.	Improved Quality Consistent Delivery Improved Safety

Waste Identification

- **What waste can be identified in the following photos?**

After 5S

- **Clear, shiny aisles**
- **Color-coded areas**
- **Slogans & banners**
- **No work in process**

Workplace Observation

- Clearly define target area
- Identify purpose and function of target area
- Develop area map
- Show material, people, equipment flow
- Perform scan diagnostic
- Photograph problem areas
- Develop a project display board (area)

Sort

- When in doubt, move it out
- Prepare red tags
- Attach red tags to unneeded items
- Remove red-tagged items to "dinosaur burial ground"
- Evaluate / disposition of red-tagged items

Straighten

- Make it obvious where things belong
  - Lines
    - Divider lines
    - Outlines
    - Limit lines (height, minimum/maximum)
    - Arrows show direction
  - Labels
    - Color coding
    - Item location
  - Signs
    - Equipment related information
    - Show location, type, quantity, etc.

Shine

- Clean everything, inside and out
- Inspect through cleaning
- Prevent dirt, and contamination from reoccurring

  - Results in
    - Fewer breakdowns
    - Greater safety
    - Product quality
    - More satisfying work environment

Standardize

- Establish guidelines for the team 5-S conditions
- Make the standards and 5-S guidelines visual
- Maintain and monitor those conditions

Sustain

Determine the methods your team will use to maintain adherence to the standards

- 5-S concept training
- 5-S communication board
- Before and after photos
- One point lesson
- Visual standards and procedures
- Daily 5-minute 5-S activities
- Weekly 5-S application

Visual Factory Implementation

- Develop a map identifying the “access ways”(aisles, entrances, walkways etc.) and the “action” areas.
- Perform any necessary realignment of walkways, aisles, entrances.
- Assign an address to each of the major action areas.
- Mark off the walkways, aisles & entrances from the action areas
- Apply flow-direction arrows to aisles & walkways
- Perform any necessary realignment of action areas.
- Mark-off the inventory locations
- Mark-off equipment/machine locations
- Mark-off storage locations (cabinets, shelves, tables)
- Color-code the floors and respective action areas

Kaizen

What is Kaizen?

- Kaizen (Ky'zen)
- "Kai" means "change"
- "zen" means "good (for the better)"
- Gradual, orderly, and continuous improvement
- Ongoing improvement involving everyone

How to Kaizen

- Identify the customer
- Deming Cycle
  - Plan – identify what to change and how to do it
    - Current state
    - Future state
    - Implementation plan
  - Do – execute the improvement
  - Check – ensure the improvement works
  - Act – future and ongoing improvements
  - Repeat

Identify the Customer

- Value added is always determined from the customer's perspective.
- Who is the customer?
- Every process should be focused on adding value to the customer.
- Anything that does not add value is waste.
- Some non-valued added activity is necessary waste ("NVA-R")
  - Regulatory
  - Legal

Types of Waste

- Overproduction
- Excess inventory
- Defects
- Non-value added processing
- Waiting
- Underutilized people
- Excess motion
- Transportation

Identify the Current State

- Crucial first step in process improvement
- Deep understanding of the existing processes and dependencies
- Identify all the activities currently involved in developing a new product
- Observe the process first hand
- Identify Value Added (VA), Non-Value Added Required (NVA-R), and Non-Value Added (NVA)

Brainstorm and Analyze

- Kaizen team brainstorming to develop new process
- Post improvement ideas on map or by category
  - Workflow
  - Technology
  - People / Organization
  - Procedures
- Develop detailed future state map
  - New workflow
  - Value Add and Non-Value Add
  - Cycle times
  - Identify Kaizen “bursts” (immediate radical change)

Implementation Plan

- Think global / systems optimization
- Maximum impact to process
- Speed of implementation – create small victories
- Cost-benefit analysis

Execute

- Develop a concise, achievable milestone plan
- Communicate the plan to everyone
  - Suppliers
  - Team members
  - Customers
- Track activities in public
- Celebrate small victories and publicly analyze failures

Check and Sustain

- Meet regularly (weekly?) to review status of open implementation items
- Re-evaluate Future State regularly (quarterly?) for additional improvement
- Track results on a public Kaizen Board

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