

Learning Objectives

1. Explain how lean systems improve internal and supply chain operations
2. Describe the culture changes, tools and techniques needed for implementation
3. Apply lean to product design
4. Recognize strengths and limitations of lean systems

Lean Systems Defined

- **Just-in-time (JIT):** an older name for lean systems
- **Toyota Production System (TPS):** another name for lean systems, specifically as implemented at Toyota
- **Lean Systems Approach:** a *philosophy* of minimizing the resources needed for processes
 1. Only the good/services that customers want
 2. As quickly as customers want
 3. With only features customers want
 4. With perfect quality
 5. In minimum possible lead time
 6. Without waste
 7. With occupational development of workers

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Cost Structure Changes

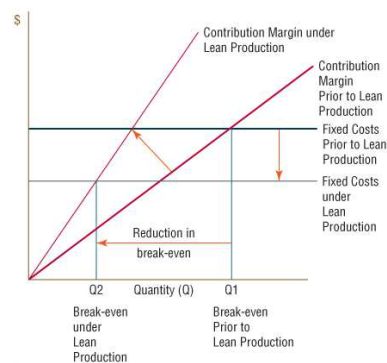


FIGURE 8-3 Changes in Cost Structure under Lean Systems

Figure 8-3

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Principle 1: Specify Value

- Customers determine value
- Suppliers must provide products/services with customer desired
 - Outcomes
 - Product features
 - Functionality
 - Capabilities

Anything that doesn't add value is waste

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Principle 2: Identify Value Stream

**Waste is a symptom of a problem,
and does not add value**

1. **Overproduction:** processing more than needed
2. **Waiting:** resources waiting for work/materials
3. **Transportation:** units moved unnecessarily
4. **Processing:** excessive or unnecessary steps
5. **Inventory:** units waiting for processing or delivery
6. **Motion:** unnecessary or excessive resource activity
7. **Defects:** scrap, rework or correction

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Principle 3 : Make Value Flow

Inventory hides problems and slows flow

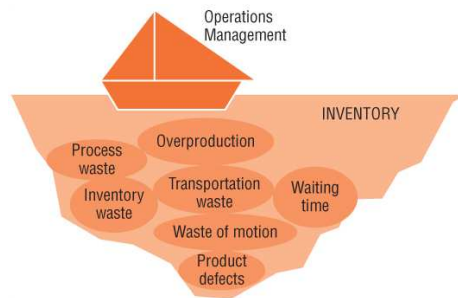


FIGURE 8-4 Inventory Hides Operating Problems

Figure 8-4

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Principle 4: Customers Pull Value

- **Pull System:** processes are activated by *actual*, not *forecasted* demand
- Customer get
 - what they want
 - when they want
 - where they want

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Principle 5: Pursue Perfection

- **Lean System Culture:** places a high value on respect for people
 - **Acceptance:** agree to goals, veterans teach new employees
 - **Flexibility:** responsive pull systems
 - **Teams:** cross-functional & cross-organizational
 - **Employee empowerment:** employees work to attack waste
 - **Manage with data:** objective over subjective
 - **Waste as a symptom:** attack root cause
 - **Goals are met:** set realistic, achievable goals
 - **Standardization:** reduces variation, simplifies problem solving
 - **Process focus:** process change for outcome change

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Lean Tools and Techniques

- **Total Productive Maintenance (TPM):** prevention of breakdowns
- **Group Technology:** bring together resources to process a family of items
- **Focused Factories:** processes designed to satisfy specific customer segment
- **Takt Time:** synchronizing output rate with demand rate
- **Kanban (Pull):** output generated in response to actual demand

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Lean Tools and Techniques cont'd

- **Level, Mixed Model (*heijunka*):** build smaller quantities more frequently
- **Set-up Reduction:** shorter, easier change-over leads to smaller batches
- **Single Minute Exchange of Dies (SMED):** Process for reducing set-up
- **Statistical Process Control (SPC):** use of statistical tools to monitor processes
- **Visual Control:** performance and problems easily, immediately visible

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Lean Tools and Techniques cont'd

- **Kaizen Events:** short-term, cross-functional focused, intense process improvement
- **Gemba:** go see it *in person*
- **Poka-Yoke:** redesign so mistakes are impossible or immediately detectable
- **5-S:** effective housekeeping (sort, straighten, scrub, systematize, standardize)
- **Simplification/Standardization:** removing non-value add steps, making processes exactly repeatable

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Lean Tools and Techniques cont'd

- **Process Analysis/Value Stream Mapping:** graphical analysis flow through a process

FIGURE 8-5 Value Stream Mapping: An Example of a Current State Map
Source: <http://office.microsoft.com/en-us/visio/HA101138241033.aspx>.

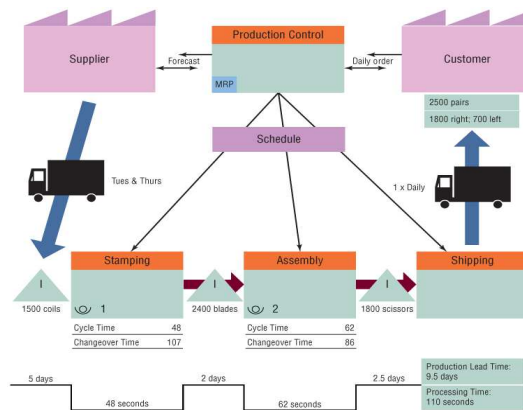


Figure 8-5

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Application of Lean

- Reduction of inventory, lead time and buffers
 - Purchase for lowest *total cost* (not price)
 - Geographically close partners
 - Fewer suppliers
 - Focus on root cause
 - Work with, not against, suppliers
- **Lean Design:** strive to meet the objectives of:
 - Exactly meet customer needs
 - Support corporate strategy
 - Reduce opportunities of waste

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Application of Lean

Reducing Product Design Waste:

- **Complexity:** few, simple processes
- **Precision:** capability to attain specifications
- **Variability:** attainable specifications
- **Sensitivity:** not easily damaged
- **Immaturity:** tested technology
- **Danger:** customers & environment are safe
- **High skill:** ease for workers and customer

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Lean Systems Summary

1. Corporate wide approach to indentify, control and eliminate waste, within firm and across supply chain
2. Seven major objectives
3. Multiple lean tools that work synergistically
4. Should be expanded across firm functions and across the supply chain
5. Not universally applicable

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