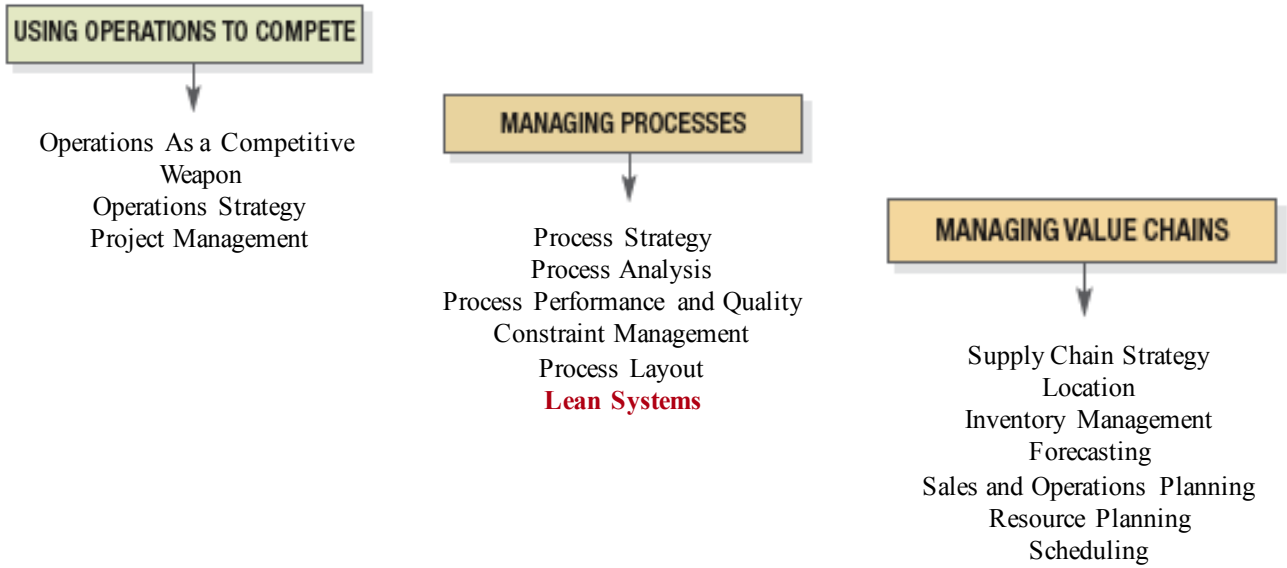
Lean Systems Roadmap

Maximize the value added, Eliminate Waste, and non-value-added activities in operations, organizes the resources, information flows, and decision rules

How Lean Systems fits the Operations Management Philosophy



Toyota Production System (TPS)

- Toyota Production System (TPS) is one of the most admired lean manufacturing systems in existence.
- They have a process of continuous improvement.
- Work is completely specified as to content, sequence, timing, and outcome.
- Services and goods do not flow to the next available person or machine, but to a specific person or machine.
- Employees are stimulated to experiment to find better ways to do their jobs.
- Improvements to the system must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible organizational level.

Lean Systems

- **Lean systems** are operations systems that maximize the value added by each of a company's activities by paring unnecessary resources and delays from them.
- **Just-in-time (JIT) philosophy** The belief that waste can be eliminated by cutting unnecessary capacity or inventory and removing non-value-added activities in operations.
- **JIT system:** A system that organizes the resources, information flows, and decision rules that enable a firm to realize the benefits of JIT principles.

Objective of JIT

To eliminate waste

by:

producing the needed items, at the right time, and the exact quantity

Benefits of JIT

- Reduced inventory (up to 90%)
- Reduced lead time (up to 90%)
- Reduced labor cost (up to 30%)
- Reduced manufacturing & storage space (up to 50%)
- Improvement of quality (up to 90%)
- Increased flexibility and adaptability to changes
- Increased productivity

A Comparison of Attitudes

Conventional Attitudes

- Large lots are efficient

- Faster production is more efficient
- Inventory provides safety
- Inventory smoothes production

JIT attitudes

- Ideal lot size is one

- Balanced production is more efficient
- Safety stock is waste
- INVENTORY IS THE ROOT OF ALL EVIL

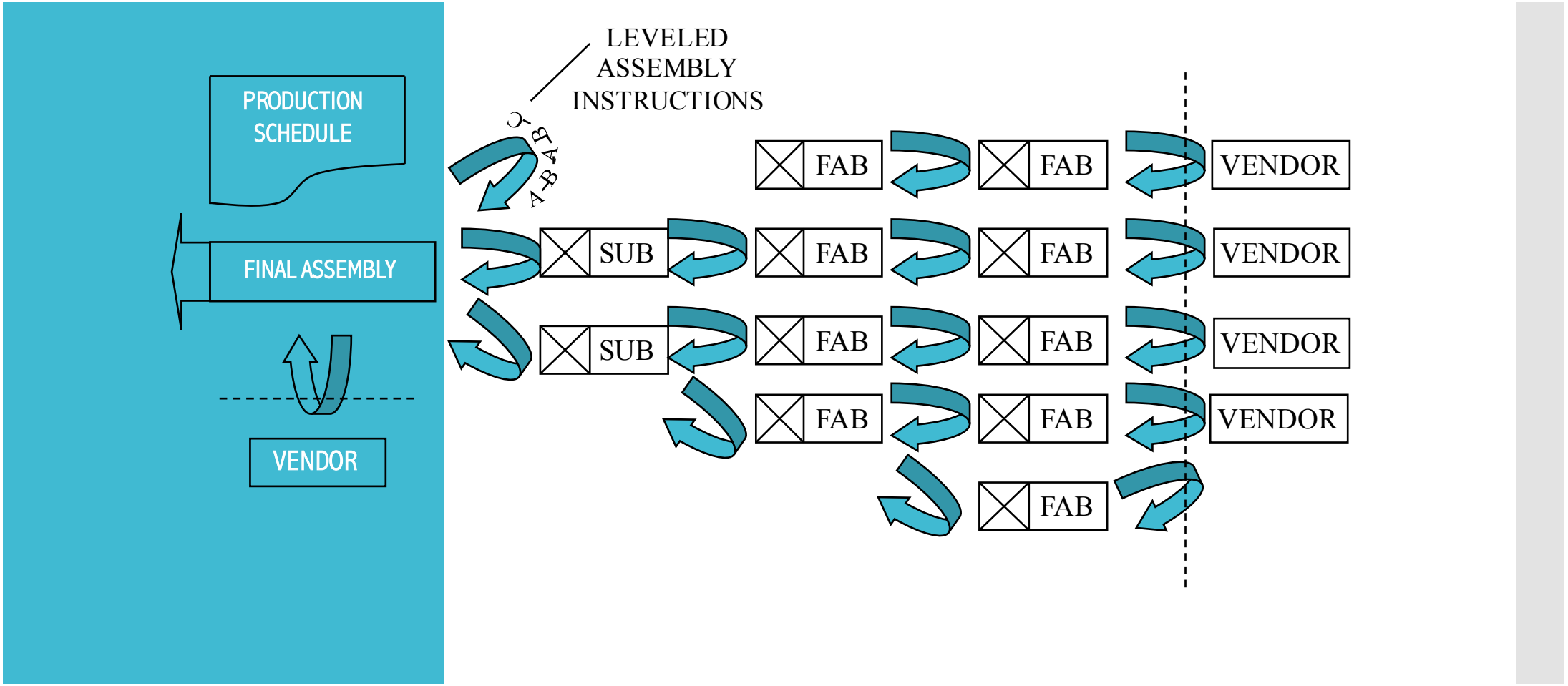
Characteristics of Lean Systems

- Pull method of work flow
- Quality at the source
- Small lot sizes
- Uniform workstation loads
- Standardized components & work methods
- Close supplier ties
- Flexible workforce
- Line flows
- Automation
- Five S
- Preventive maintenance

Push and Pull
Systems of Work Flow

- **Push method:** A method in which production of the item begins in advance of customer needs.
  - Example: A buffet where food is prepared in advance.
- **Pull Method:** A method in which customer demand activates production of the service or item.
  - Example: A restaurant where food is only prepared when orders are placed.
- Lean systems use the pull method of work flow.

Pull System


PRODUCTION SCHEDULE
FINAL ASSEMBLY
VENDOR
LEVELED ASSEMBLY INSTRUCTIONS
C
A-B
A-B
SUB
SUB
FAB
FAB
FAB
FAB
FAB
FAB
FAB
FAB
VENDOR
VENDOR
VENDOR
VENDOR

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Characteristics of Lean Systems

Quality at the Source

- **Quality at the source** is an organization-wide effort to improve the quality of a firm's products by having employees act as their own quality inspectors, and never pass defective units to next stage.
- One approach for implementing quality at the source is to use **poka-yoke,** mistake-proofing methods aimed at designing fail safe systems that minimize human error.
- Another approach for implementing quality at the source is a practice the Japanese call ***jidoka***, and ***andon***, which gives machines and machine operators the ability to detect when an abnormal condition has occurred.

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Characteristics of Lean Systems

Small Lot Sizes

- **Lot:** A quantity of items that are processed together.
- **Setup**: The group of activities needed to change or readjust a process between successive lots of items.
- **Single-digit setup:** The goal of having a setup time of less than 10 minutes.

Lot Size and Cycle Inventory

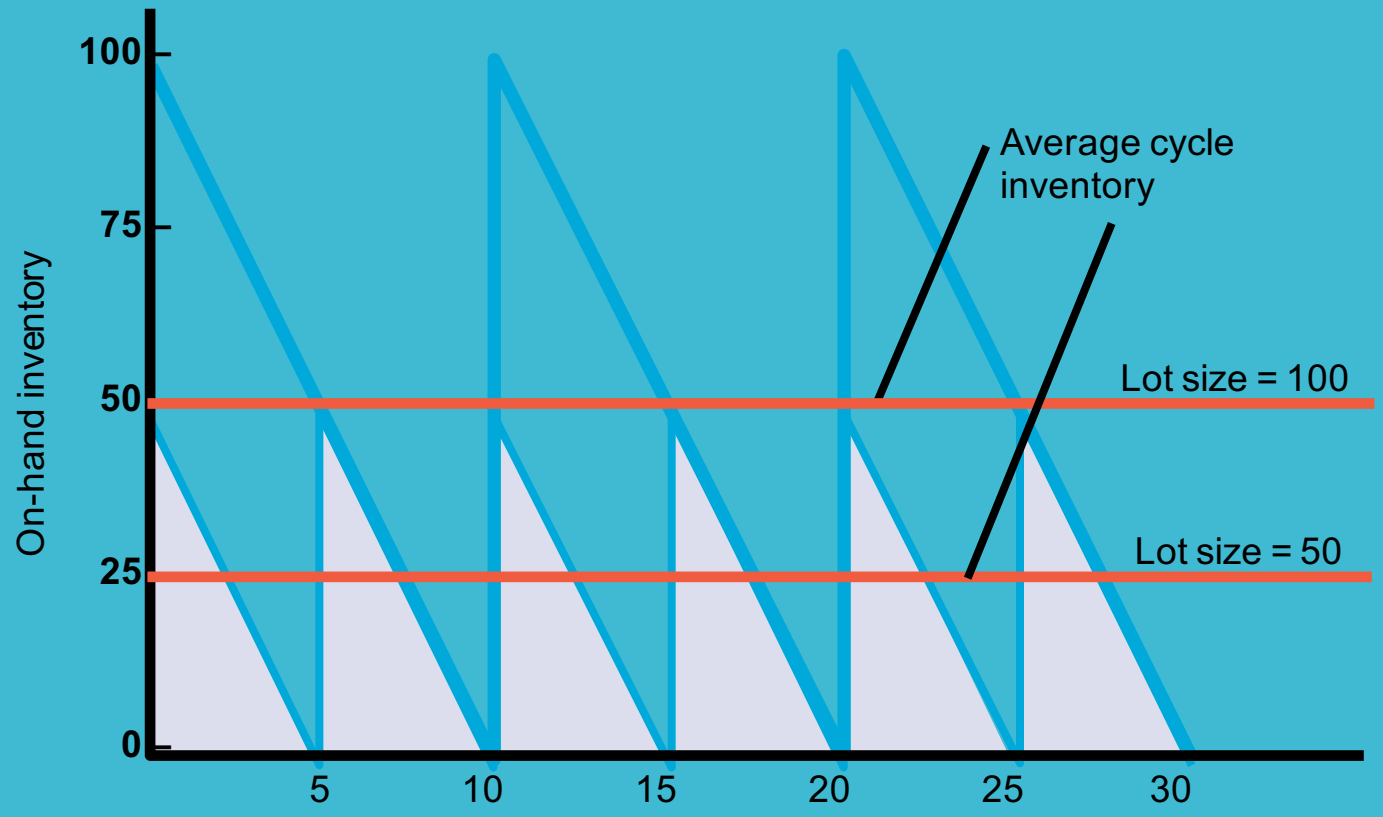

Figure 16.1

HOOD & FENDER SETUP COMPARISON (800 TON PRESS)

	Toyota	U.S.A.	Sweden	W. Germany
Setup Time	10 min	6 hr.	4 hr.	4 hr.
Setups/Day	3	1	-	1/2
Lot Size	1 day*	10 days	1 month	-

* For low demand items (less than 1000/month)
Up to 7 days

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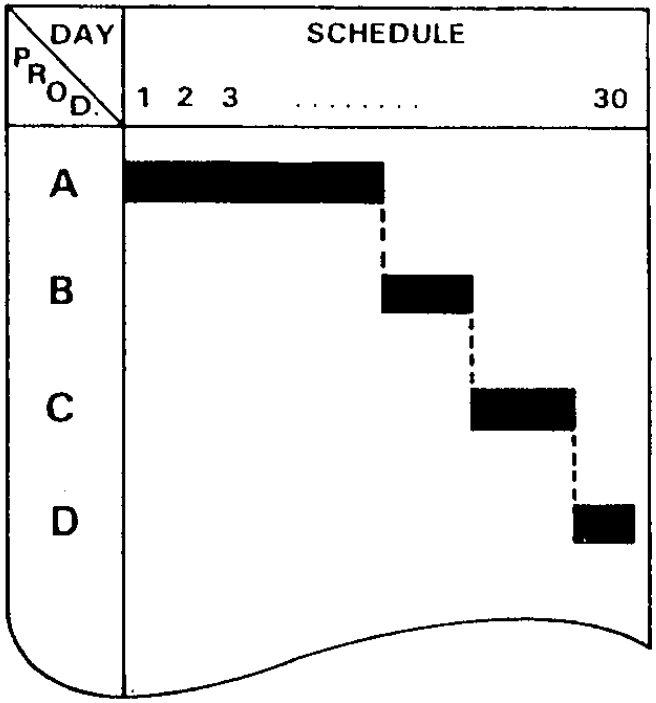
Characteristics of Lean Systems

Uniform Workstation Loads

- A lean system works best if the daily load on individual workstations is relatively uniform.
- Service processes can achieve uniform workstation loads by using reservation systems (e.g., scheduled surgeries) and differential pricing to manage the demand.
- For manufacturing processes, uniform loads can be achieved by assembling the same type and number of units each day, thus creating a uniform daily demand at all workstations.
- **Mixed-model assembly** produces a mix of models in smaller lots.

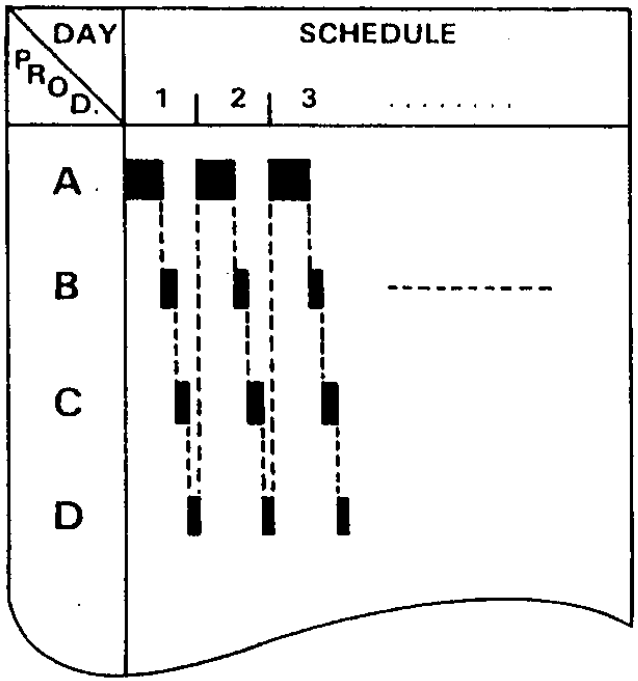
PRODUCTION PLANNING

TRADITIONAL



"Produce Monthly Quantities"

UNIFORM SCHEDULING
LOAD LEVELING



"Produce Daily Quantities"

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Characteristics of Lean Systems

Line Flows and Automation

- **Line Flows**: Managers of hybrid-office and back-office service processes can organize their employees and equipment to provide uniform work flows through the process and, thereby, eliminate wasted employee time.

- Another tactic used to reduce or eliminate setups is the one-worker, multiple-machines (OWMM) approach, which essentially is a one-person line.

- **Automation** plays a big role in lean systems and is a key to low-cost operations.

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Characteristics of Lean Systems

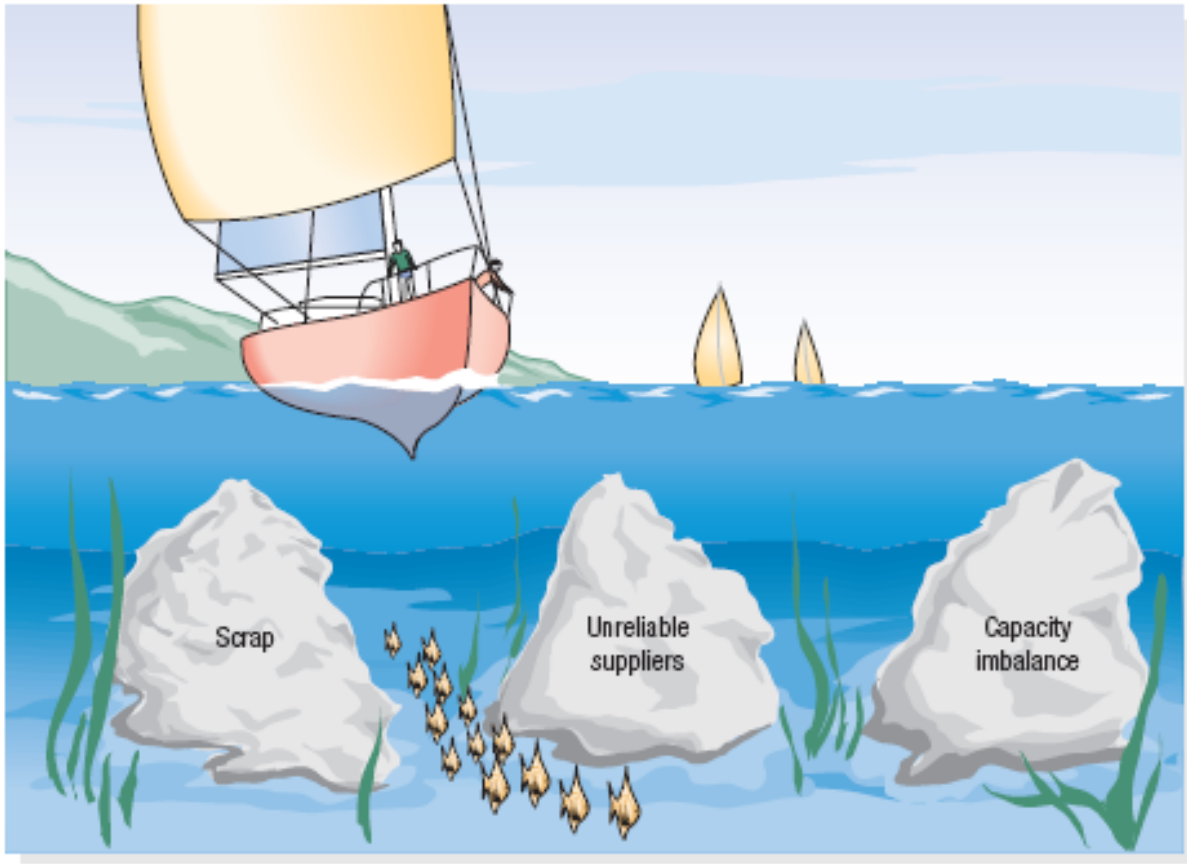
Five S (5S) A methodology consisting of five workplace practices conducive to visual controls and lean production.

1. **Sort:** Separate needed from unneeded items (including tools, parts, materials, and paperwork), and discard the unneeded.
2. **Straighten:** Neatly arrange what is left, with a place for everything and everything in its place. Organize the work area so that it is easy to find what is needed.
3. **Shine:** Clean and wash the work area and make it shine.
4. **Standardize:** Establish schedules and methods of performing the cleaning and sorting. Formalize the cleanliness that results from regularly doing the first three S practices so that perpetual cleanliness and a state of readiness is maintained.
5. **Sustain:** Create discipline to perform the first four S practices, whereby everyone understands, obeys, and practices the rules when in the plant. Implement mechanisms to sustain the gains by involving people and recognizing them via a performance measurement system.

Lean Systems at
New Balance Athletic Shoe Company

- The Lawrence plant makes footwear styles exclusive to the North American market. Most new designs are first made at Lawrence and then transferred out to other NB American plants, all of which follow the same production methods.
- NB migrated away from the shoe industry's traditional batch and queue method towards small-lot, cellular flow production.
- Operators never pass on a defective unit, and they always check the prior operator's work as well as their own.
- When deciding how many shoes of each style to schedule, NB thinks of "sales orders" and not "production orders."
- Instead of pushing shoes to the market, NB uses more of a pull strategy. Its production schedules are driven by market demand.
- NB's work flow is uniform and it fosters teamwork and a culture of continuous improvement.

Continuous Improvement with Lean Systems



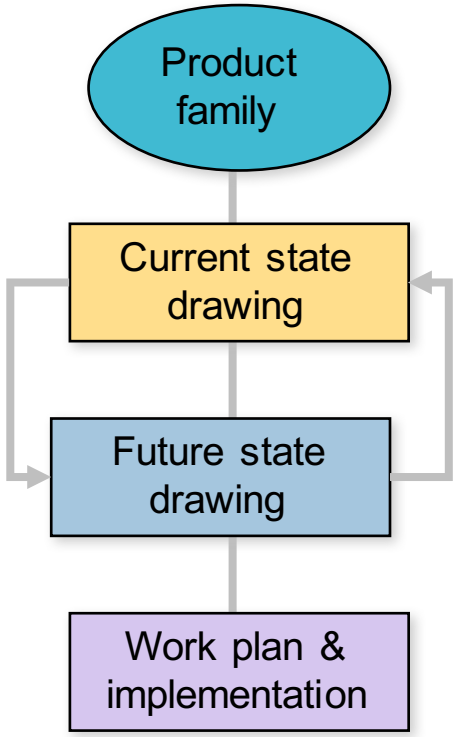
The Single-Card Kanban System

Kanban means "card" or "visible record" in Japanese & refers to cards used to control the flow of production through a factory.

General Operating Rules:

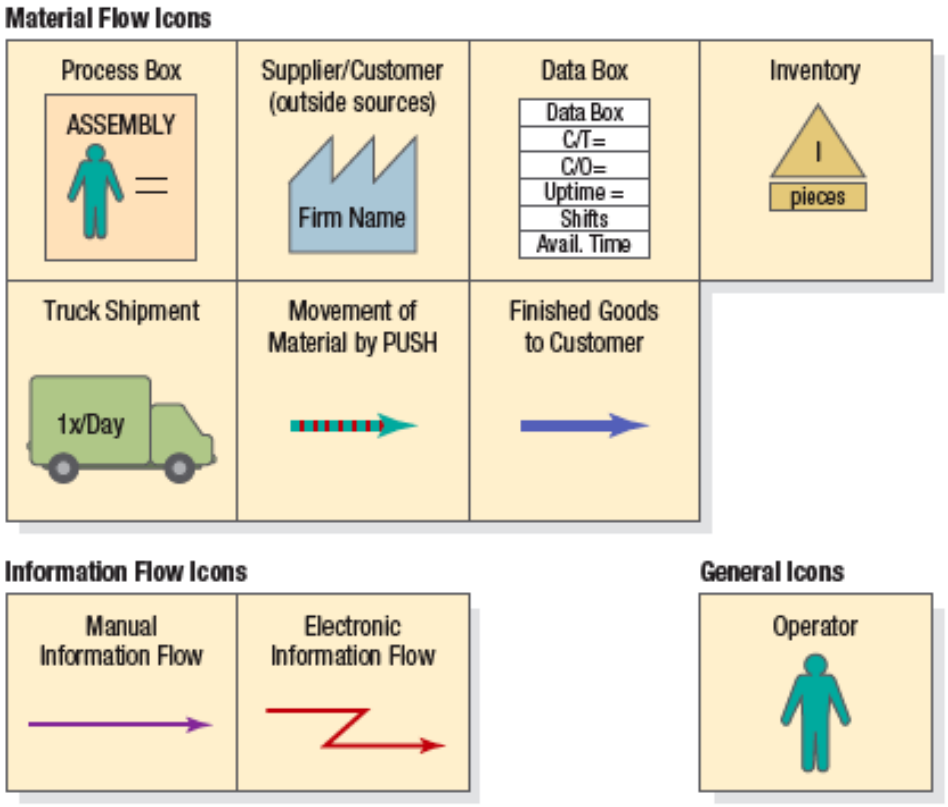
1. Each container must have a card.
2. The assembly line always withdraws materials from fabrication (pull system).
3. Containers of parts must never be removed from a storage area without a kanban being posted on the receiving post.
4. The containers should always contain the same number of good parts. The use of nonstandard containers or irregularly filled containers disrupts the production flow of the assembly line.
5. Only nondefective parts should be passed along.
6. Total production should not exceed the total amount authorized on the kanbans in the system.

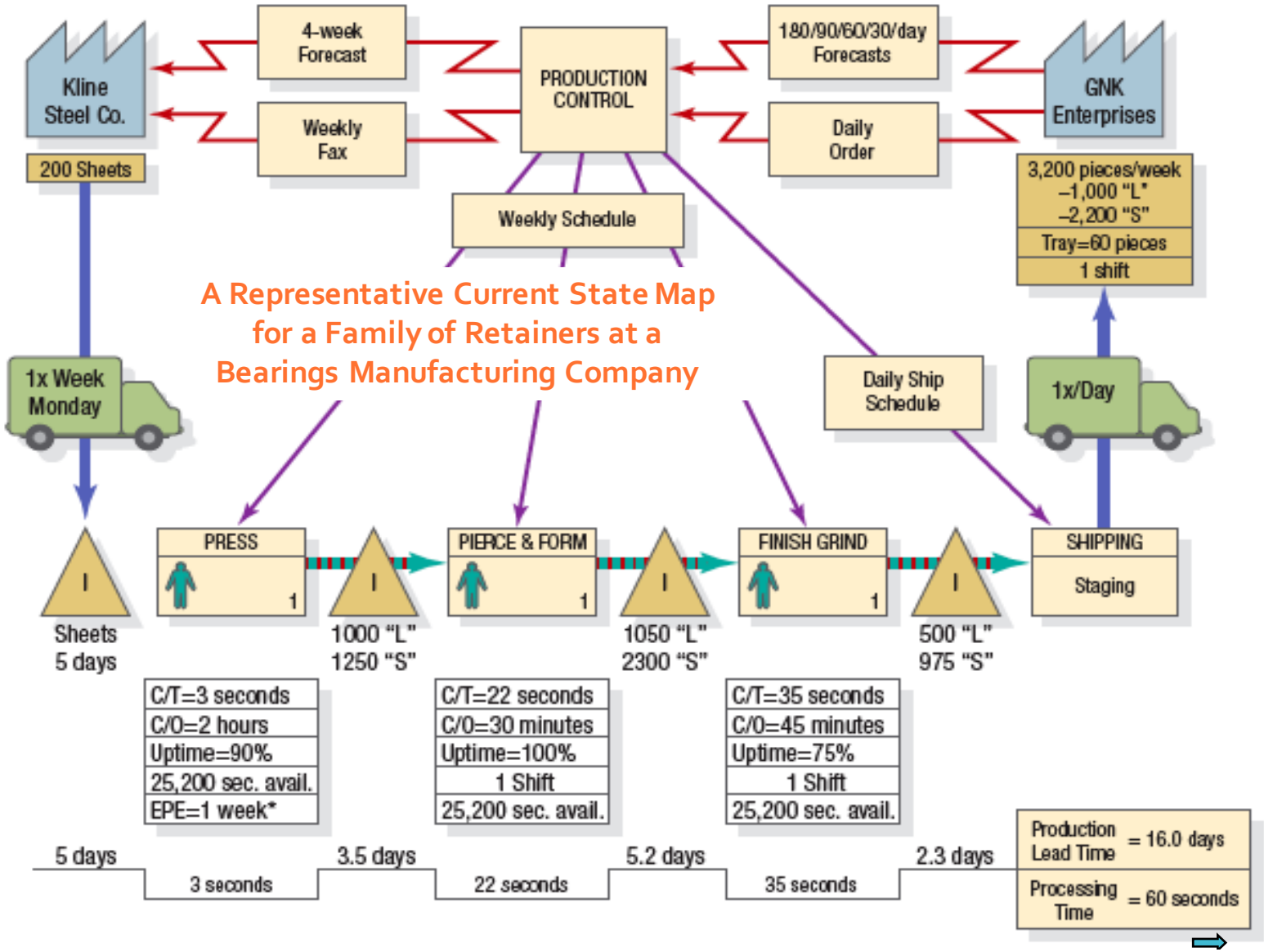
Value Stream Mapping



- **Value stream mapping (VSM)** is a qualitative lean tool for eliminating waste (or *muda*) that involves a current state drawing, a future state drawing, and an implementation plan.
- **Value stream mapping (VSM)** spans the entire value chain, from the firm's receipt of raw materials to the delivery of finished goods to the customer.

Selected Set of Value Stream Mapping Icons




Kline Steel Co.
4-week Forecast
Weekly Fax
PRODUCTION CONTROL
180/90/60/30/day Forecasts
Daily Order
GNK Enterprises
200 Sheets
Weekly Schedule
3,200 pieces/week
–1,000 "L"
–2,200 "S"
Tray=60 pieces
1 shift
A Representative Current State Map for a Family of Retainers at a Bearings Manufacturing Company
1x Week Monday
Daily Ship Schedule
1x/Day
PRESS
1
PIERCE & FORM
1
FINISH GRIND
1
SHIPPING
Staging
Sheets
5 days
1000 "L"
1250 "S"
1050 "L"
2300 "S"
500 "L"
975 "S"
C/T=3 seconds
C/O=2 hours
Uptime=90%
25,200 sec. avail.
EPE=1 week*
C/T=22 seconds
C/O=30 minutes
Uptime=100%
1 Shift
25,200 sec. avail.
C/T=35 seconds
C/O=45 minutes
Uptime=75%
1 Shift
25,200 sec. avail.
5 days
3 seconds
3.5 days
22 seconds
5.2 days
35 seconds
2.3 days
Production Lead Time = 16.0 days
Processing Time = 60 seconds

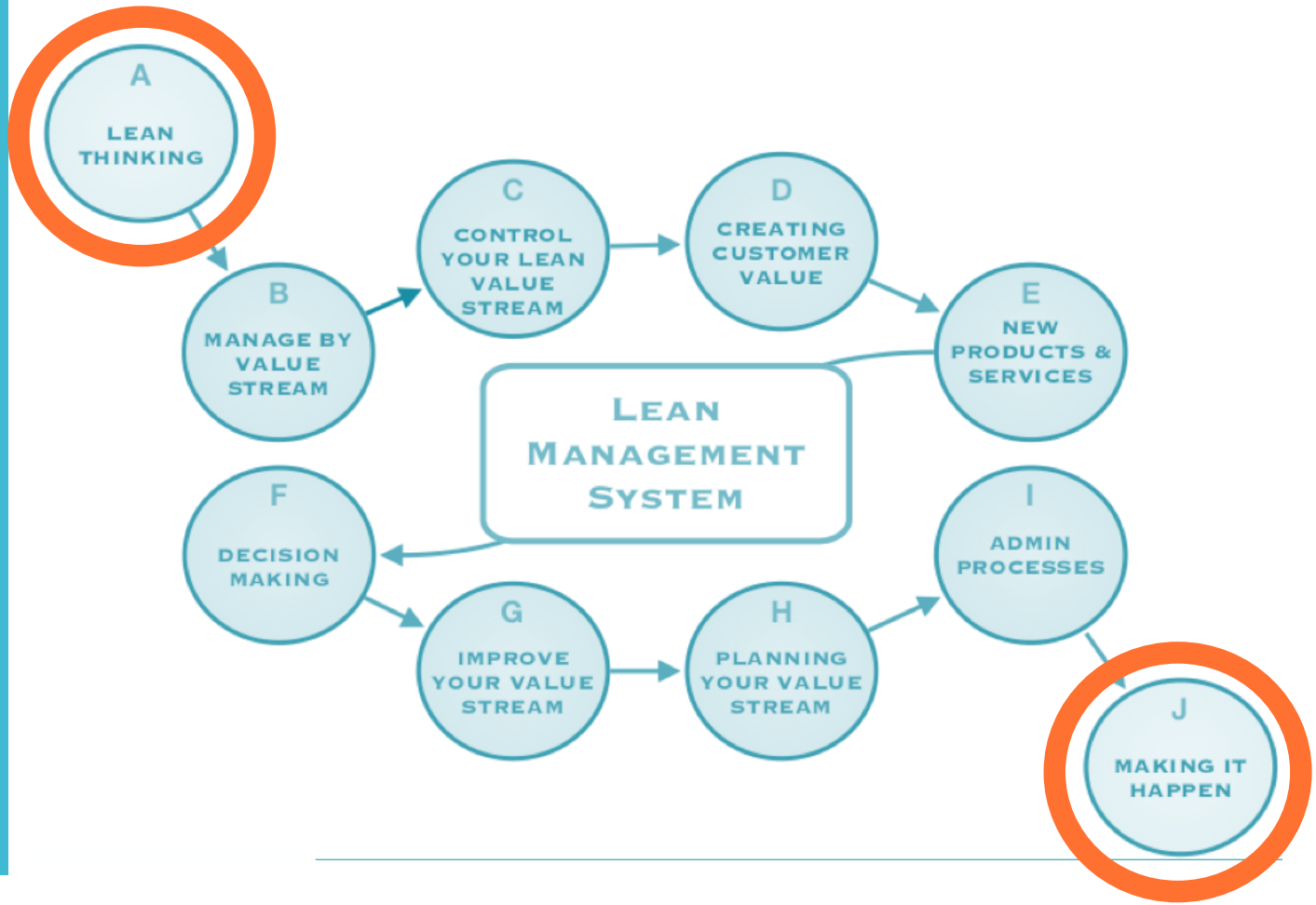
Organizational Considerations

- The human costs: Lean system implementation requires a high degree of regimentation, and sometimes it can stress the workforce.
- Cooperation & Trust: Workers and first-line supervisors must take on responsibilities formerly assigned to middle managers and support staff.
- Reward systems and labor classifications must often be revamped when a lean system is implemented.
- Existing layouts may need to be changed.

Process Considerations Inventory & Scheduling

- **Schedule Stability:** Daily production schedules in high-volume, make-to-stock environments must be stable for extended periods.
- **Setups:** If the inventory advantages of a lean system are to be realized, small lot sizes must be used.
- **Purchasing and Logistics:** If frequent, small shipments of purchased items cannot be arranged with suppliers, large inventory savings for these items cannot be realized.

Lean Thinking



Definitions

- **Value to the customer.** Organization by value stream. Faster flow of information. Materials and cash. Empowerment and respect for human accomplishment. Non-stop pursuit of the perfection.
- **Mananage by Value Stream:** Unlike most companies, lean leaders establish value streams reflecting the work flow to serve the customers. The ideal value stream contains all the tasks required to serve the customers. Sales, marketing, product customization, purchasing, receiving, production, quality, inspection, and shipping; the entire flow.
- **Control Lean Value Stream:** Traditional companies rely on ERP systems to control their processes. Lean emphasizes continuous process control. Frequent visual measures, standard work, fast problem solving, continuous improvement, weekly financial reports people can easily use, new ways to understand costs, profits, and decision-making. Control is built into the processes.
- **Creating Customer Value:** Lean organization do not place their first priority on stockholder value and/or cost cutting. These issues are very important, but in lean companies they are the *outcomes* of our work. The root causes of business success include a clear knowledge of how customer value is created, and developing processes that increase this value.
- **New Products & Services:** Lean organizations deeply understand the customers' wants and needs. Before design there is research to capture knowledge. Product development is fast, focused, and frequent. Agile product design moves along effectively; often with parallel designs. Incremental product release so as to further hear the voice of the customer.
- **Decision Making:** Decisions in lean companies are made by the people closest to the issues, rather than higher level managers. Standard decision-making methods using real, relevant data are used; not standard costs and margins. Better decisions, better revenues, lower costs, and higher profits. It also frees up the senior leaders' time.
- **Improve Value Stream:** A hallmark of lean is continuous improvement. Everyone in the company is engaged in process improvement. There are big breakthrough changes, continuous improvement projects, and frequent, small "just-do-it" improvement, and target costing to bring revenues, costs, and profits in line with strategic needs.
- **Planning Value Stream:** Lean organizations are well planned. They recognize that to achieve effective operations and continuous improvement the value streams need to be very well planned. Good planning leads to excellent results. Good planning enables value streams to be flexible and ready to address unexpected issues.
- **Administrate Process:** Administrative work is not only very important but very time consuming. This kind of work is mostly 100% waste. The tasks are important, but add no customer value. The same lean methods of visual flow, waste elimination, and freeing up people's time so they can work on more strategic activities are used to drive the company forward.
- **Make It Happen:** To introduce real lean across an organization requires: Active, culture-changing leadership from senior executives. A long-range vision for the company to become truly lean. A recognition that we do not "implement" lean. Lean is long-term commitment to value, flow,waste elimination, and engaging everybody in continuous improvement.

Lean Accounting

Lean Accounting enables your company to greatly increase profits and cash flow.

Lean Accounting is the accounting, control, and measurement system used by successful lean organizations to control and manage their operations, empower their people to make sound business decisions tailored to their lean goals, and to motivate lean improvement every day.

Lean Accounting provides timely management accounting information, lean-focused operational measurements, and is fully compliant for all external financial reporting. Lean Accounting gives your people - at every level - clear and understandable information that they can readily use to improve the business and grow the business.

Lean Accounting is much less work than traditional management accounting. It frees up time for most of your people because lean accounting is simple and requires very few transactions

Traditional management accounting and operational measures push back against lean because they were designed to motivate mass production methods. Lean Accounting drives lean forwards because it is designed for lean thinking, continuous improvement, growth, cash, and profitability.