

The Fast Eat The Slow!

Typical results from lean:

- 90% reduction in lead times
- 90% reduction in all inventories
- 100% increase in productivity
- 50% reduction in errors
- Fewer injuries

Core Ideas

1. Determine and create value.
2. Use "pull" instead of "push" systems to avoid overproduction.
3. One piece flow—Make the work "flow," one piece at a time; minimize interruptions.
4. Eliminate the seven speed bumps using the five S's (see reverse).
5. Use the "five whys?" of root cause problem solving to eliminate defects. Lean thinking will invariably free up cash, people, and space. The most difficult step is the first one.

Demand immediate results. Pick a pilot area that's open to change and jump right in. Line up the machines and work steps. Eliminate delays. Slash the inventories. Dramatic reductions in lead times, inventories, space, and defects should be possible in six to twelve months.

Set big, hairy audacious goals (BHAG)

- 50% reduction in defects every year
- 100% on-time delivery
- Reduce order-to-ship time to less than a day
- Increase Inventory turns per year
- Reduce time-to-market by 75%
- Reduce costs (hours/widget)

Get Started Immediately

- Reorganize your company by product and value stream. Topple the silos and implement flow.
- Move machines and people into product cells.
- Help your remaining suppliers implement "lean."
- Improve each value stream multiple times.
- Right-size your machines and tools.

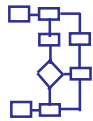
Key Tools



Voice of the Customer: Systematically explores and links customer requirements to design, parts, and production characteristics.



Line Graph: Show data trends over time. The Y-axis (left) shows the defects, time, cost and the X-axis (bottom) shows time (minute, hour, day, week, etc.).



Flowchart: Show the flow of work through a process including all activities, decisions, and measurement points.



Value Added Flow Analysis: Systematically identifies delays and rework opportunities in a process.

Glossary

Cell: a close arrangement of people and machines in a processing sequence to facilitate flow.

Kanban: Japanese word for card, ticket, or sign. It's a key tool for managing flow in a pull system. In a grocery store, it's the card at the back of the shelf indicating the product is sold out or back ordered.

Andon: Visual signal that alerts workers to problems. Andon is like a dashboard with warning lights to alert you to problems.

Heijunka: Level out the work load.

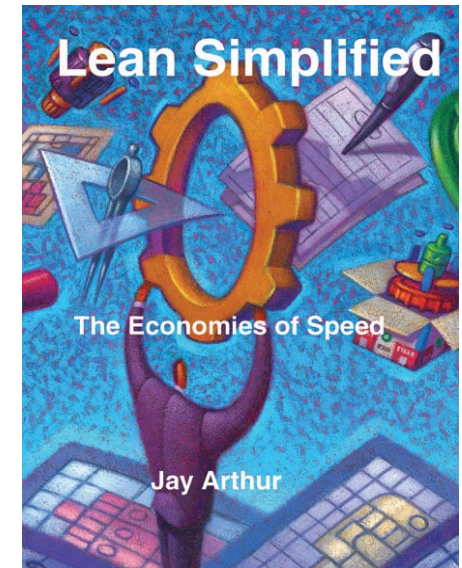
Jidoka: Automation with the human touch.

Takt Time: a German word for rhythm or meter. In lean, takt is the rate of customer demand. It's like a speedometer. Takt Time = Available hours worked per day/Required production to meet demand.

Poka-Yoke: Mistake-proofing a process so that a person cannot make an error.

Lean Simplified

How to Double Your Speed, Productivity and Profitability



Quick Reference Card

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The Seven Speed Bumps

Purpose: To accelerate flow, you will want to eliminate the seven speed bumps all of which are considered "Muda"—non-value added waste—it is any activity which absorbs money, time, and people but creates no value.

- 1. Over production** (the most common type of waste) which creates inventories that take up space and capital.
- 2. Excess inventory** caused by over production.
- 3. Waiting**—Don't you hate standing in line? So do your products or services. So do employees. Are they always waiting for something?
- 4. Unnecessary movement of work products.** When you break the silos into cells, the products don't have to travel so far between processes.
- 5. Unnecessary movement of employees.** Are parts and tools too far from where they're needed?
- 6. Unnecessary or incorrect processing.** Why have people watch a machine that can be taught to monitor itself?
- 7. Defects** leading to repair, rework, or scrap.

Lean thinking will help you reduce or eliminate numbers 1-5. Six Sigma will help you reduce 6-7.

When you rearrange your production or service floor into production cells with right-sized machines and quick change over, you can quickly reduce most of these common kinds of waste by 50-90 percent.

Get Started:

1. Flowchart the value stream; add times to each step, decision or arrow.
2. Analyze each element for non-value added work—delay or rework.
3. Redesign the flow to eliminate as much of the non-value added work as possible and standardize the ongoing process.

Design for One-Piece Flow

Purpose: Stop producing big batches of product; Start producing one piece at a time

1. Focus on the part, product or service itself. Follow the product through its entire production cycle looking for opportunities to reduce delay, inventory, waste, and rework.
 - In a hospital** you would follow a patient from admission to discharge.
 - In a printing company**, you'd follow a job from start to delivery.
 - In a manufacturing plant**, you'd follow the product from order to delivery.
2. Ignore traditional boundaries, layouts, etc. In other words, forget what you know.
3. Realign the work flow into production "cells" to eliminate delay, rework, and scrap.
4. "Right size" the machines and technology to support smaller batches, quick changeover, and one-piece flow. This often means using simpler, slower, and less automated machines that may actually be more accurate and reliable.

The goal of flow is to eliminate all delays, interruptions and stoppages, and not to rest until you succeed. Focus the improvement effort to avoid wasting valuable time and money.

Focus on mission- and profit-critical processes and issues first!

Common measures of flow:

- **Lead (or cycle) time:** time product stays in the system
- **Value-added ratio:** $(\text{Value-added time})/(\text{lead time})$
- **Travel distance** of the product or people doing the work
- **Productivity:** (people hours)/unit
- **Number of handoffs**
- **Quality rate or first pass yield**

The Five S's

Purpose: To remove the waste, we turn to the five S's. The principles of reorganizing work so that it's simpler, more straightforward, and visually manageable are:

- 1. Sort** — keep only what is needed. Pitch everything else. The workplace often becomes cluttered with products, tools, and waste materials that don't really belong there. Get rid of them.
- 2. Straighten** — A place for everything and everything in its place. Establish standardized places for incoming raw materials, tools, etc.
- 3. Shine** — clean machines and work area to expose problems.
- 4. Standardize** — develop systems and procedures to monitor conformance to the first three rules. (This includes the define and measure aspects of Six Sigma's DMAIC.)
- 5. Sustain** — maintain a stable workflow. (This includes the Analyze, Improve, and Control phases of Six Sigma.)

Lean Production vs	Mass Production
Build to Order	Make and Sell
Economies of <i>Speed</i>	Economies of Scale
Effective	Efficient
Pull (from Customer)	Push (to Customer)
Small Lots	Large Batches
Quick changeover	Changeover unimportant
Production Cells	Functional Silos
Right-sized Machines	Big, Fast Machines
Fast to respond	Slow to change
Adaptive	Rigid, inflexible
General knowledge	Specialized knowledge