Lean Accounting Summit

Economies of Scale Are Dead:
Right-Designing for Effective
Cost Management and Operations

Jim Huntzinger

September 21, 2006

The Key Points are:

- Right-Designing and Right-Fit as methods of Cost Management
- Right- Designing as an attribute for Flow Implementation
- Apply Limited Production vs. Economies of Scale
- Right- Design *thinking* and *application* reduces costs
- Accountants as leaders in Right-Design deployment

No Silver Bullet: Only *Learning*

...let us also rejoice in our sufferings, because we know that suffering produces perseverance; perseverance, character; and character, hope. And hope does not disappoint us...

Guideposts, *The Guideposts Parallel Bible* (Carmel, NY: Guideposts), New International, Romans 5:3-5, p. 2860.

A Brief History of Accounting

- Today's accounting methods have their roots derived from the 14th-Century Venetians
  - Luca Pacioli of Venice, Italy (Double-Entry)
- The industrial environment prior to 1870 was manufacturers of single products and single processes
  - *The marketplace determines costs via the price in the marketplace*
  - Even if a manufacturer had a second activity, the size was insignificant enough to require any system to understand cost or the system
  - Even labor was determined by the open market – many labors were simply contracted
- The Industrial Revolution drove significant changes in accounting methods
  - Primarily during the period of 1870 to 1915
  - **The result of the *proliferation of products and processes* within a single manufacturer**
  - Changes and developments were the result of engineers, not accountants
    - ***BUT the engineers and managers who developed them had NO intrinsic interest in accounting***
    - ***Their interest lied in measuring and managing internal activities that evolve by the growth of multi-product and process firms***

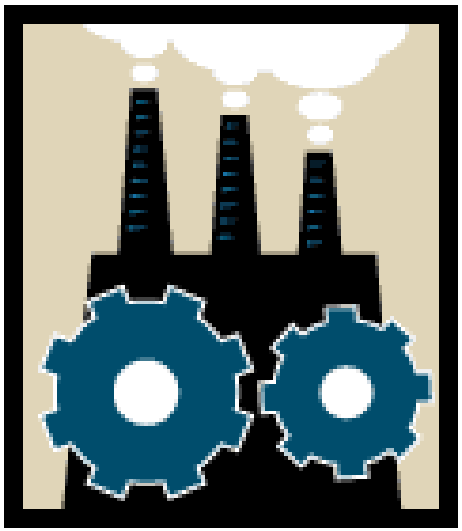
Accounting's Failure: The Evil of Overhead

- The biggest culprit of today's cost-managerial accounting irrelevancy is the overhead methods of standard costing
- *The allocation of overhead distorts product costs*
- Some products appear to cost more than they *really* do and other products appear to cost less
- The issue with overhead allocation is that it achieves wonderfully, *exactly what used to exist over one hundred years ago, but does not exist today* in the vast majority of manufacturing enterprises – single process and product operations
- The unfortunate result (the relevance lost) is that the return to the factory floor systems are still in the form of the overall financial methods and thus incapable of supplying beneficial information for managing the shopfloor
- ***The belief that an operation can be designed, controlled, and improved by the manipulation of financial information***

Relevance Lost!

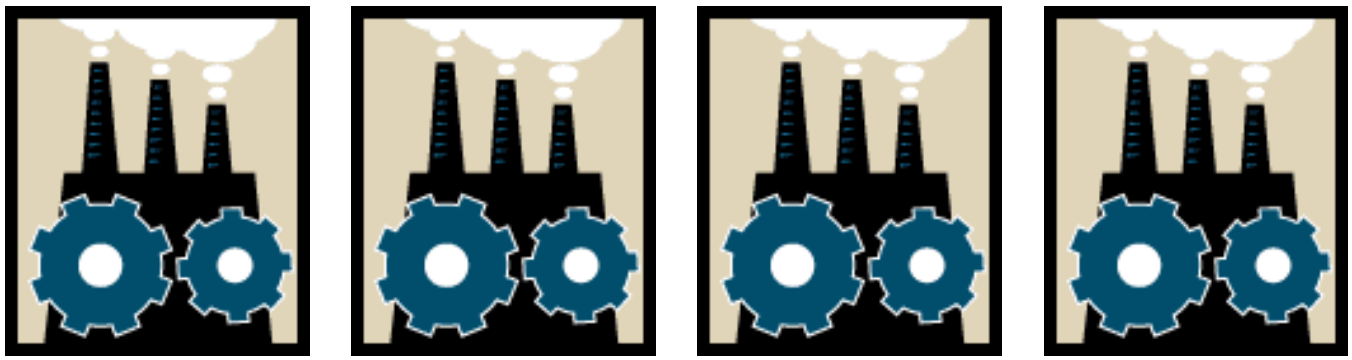
The Evil of Economies of Scale

- What is Economies of Scale?
  - Defined: *costs per unit falling as the speed and volume of output rise*
- Economies of Scale:
  - Demands speed and scale (The more produced the more costs decrease)
  - Ever demanding increase in volume mentality
  - Cost reduction at point locations, not system improvements
    - Drives increase volume through individual machines
    - Drive increased volume through departments
    - **Ties to Overhead allocation – the more produced, the more costs can be allocated or *absorbed***



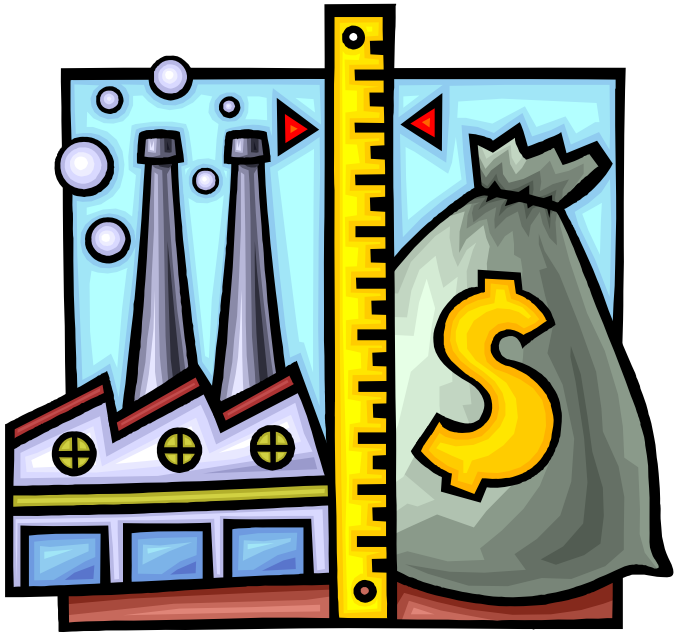
The Evil of Economies of Scale

- Batch production is the result of *Economies of Scale*
- Overproduction
  - One of the Seven Wastes and...
  - According to Taiichi Ohno, the worst of all Wastes
- *Overproduction is simply the manifestation of Economies of Scale*



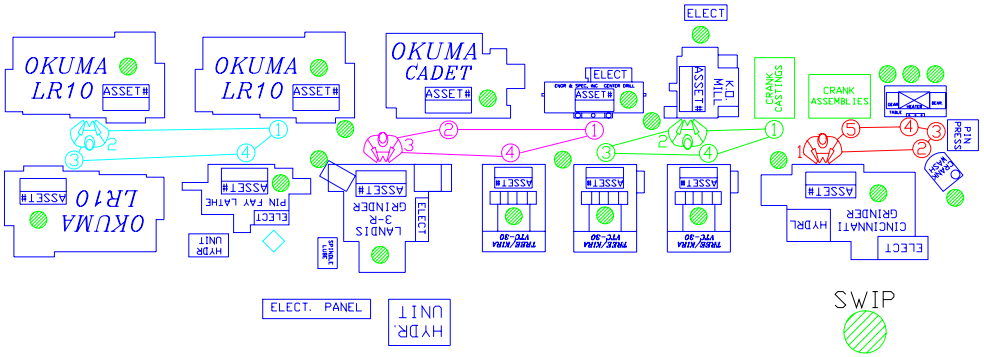
Limited Production vs. Economies of Scale

- Ohno's Limited Production System
  - What is Limited Production?
- Fujio Cho
  - Toyota's Chairman of the Board, Former President, and worked for Ohno
  - "minimum amount, absolutely essential"
- Ohno
  - Overproduction – "the result of pursuing quantity and speed"



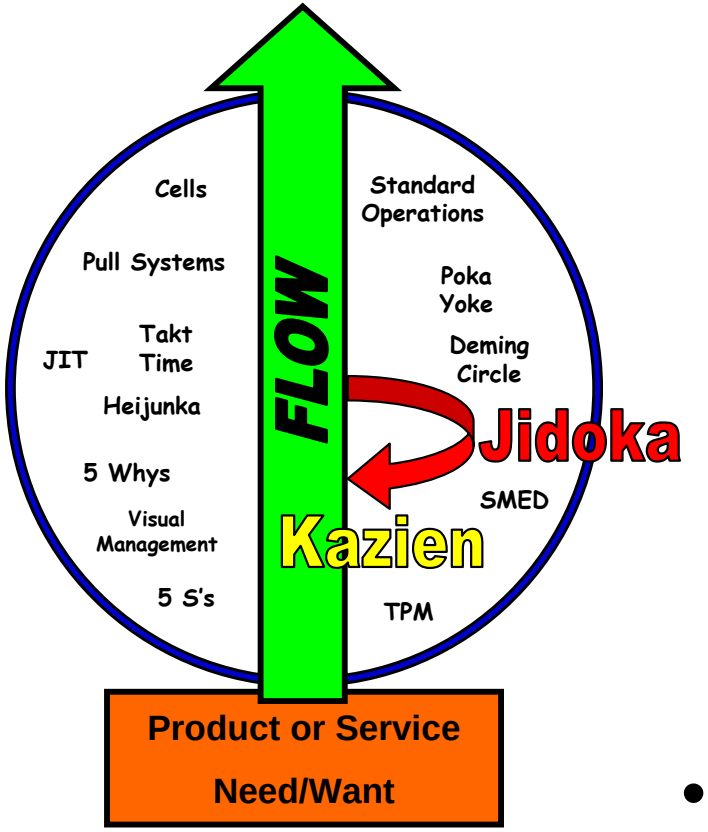
Economies of Scale is Dead!

- As companies move toward becoming lean:
  - The economies of scale mentality is shed
  - The need for overhead and standard cost methods is destroyed
- Systems are designed for *flow, not scale* (speed & volume)
- ***Flow***
  - Ties directly to customer demand/needs
  - Aligns EVERYTHING to meet *only* what the customer requires
  - Change in *Thinking* of how Manufacturing Systems are Designed (machines, process, systems, function, people)



It's All about *FLOW*

It is all about....



Flow!

- **Flow Production**
  - ***Producing one piece at a time to the demand of Takt Time***
  - Place machines in the process sequence.
  - Train workers to handle more than one process.
  - Design the cell in a U-shape.
  - Make one piece at a time within the cell.
  - Continuous flow of the product *and* the components used to make the product.
- ***1 x 1 Mindset***

A Change in Thinking

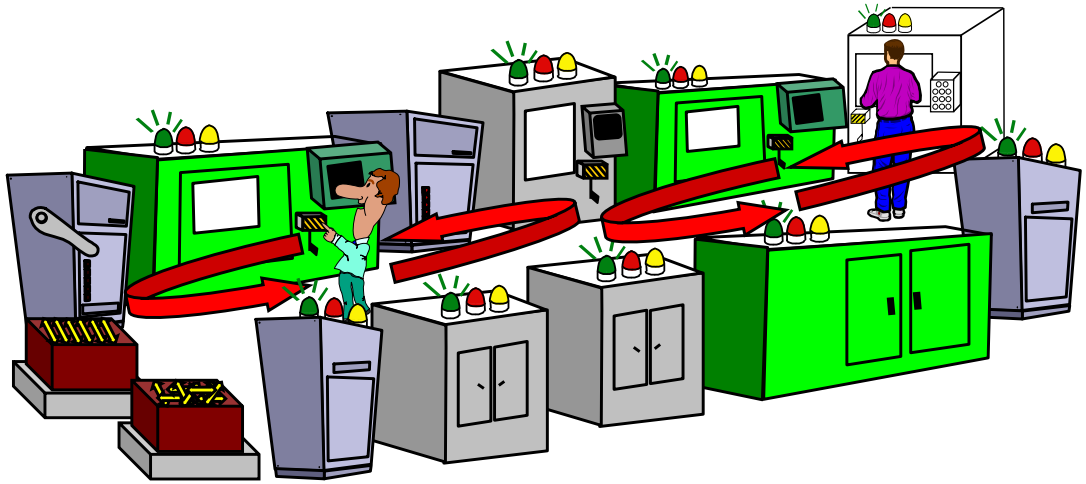
FLOW

What is the 1 x 1 Mindset?

- More than just applying some different tools!
  - Just like truly changing your health is a life style/philosophy change
  - You don't become healthy by just eating something different for breakfast for a while
  - *You must change **every** aspect of your life!*
- Change in Thinking (Book title: *Lean Thinking*)
- Change in Life Style
- Change in Business Life Philosophy
- Change in Action
- Change in Habits
- Change in What you Do Each and Every Day!

What is FLOW?

- **A “1 x 1” Mindset**
- Flow
- One-Piece Flow
- 1 x 1 manufacturing
- Flow manufacturing
- Continuous Flow
- Batch Size of 1
- Kaizen (LEARN BY DOING!)
  - **Implementing flow where it currently does not exist**
  - **Implementing *countermeasures* where flow breaks down via *Scientific Method* (PDCA / Problem Solving)**
  - **It MUST be learned via action; making changes in the Gemba; with “Thinking / Mindset” ever present**



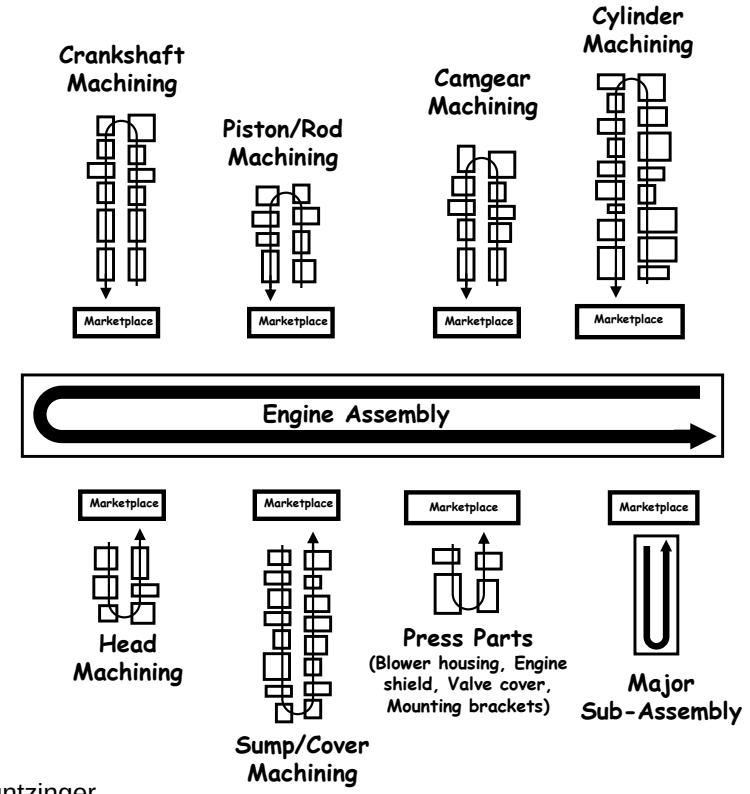
Design for FLOW

- System Design
  - W. Edwards Deming

"A system can only deliver what a system is designed to achieve."

  - Glenn Uminger, Toyota

"The best way to eliminate muda is not create it in the first place."



What is Right-Designed/Sized?

"A design, scheduling, or production device that can be fitted directly into the flow of products within a product family so that production no longer requires unnecessary transport and waiting."

James P. Womack and Daniel T. Jones, 1996. *Lean Thinking* (New York, NY: Simon & Schuster).

What to do?

"……lean accounting for the manufacturing enterprise, i.e., cost management, is about design, function (execution) and continuous improvement, *not about accounting*."

A Change in Thinking

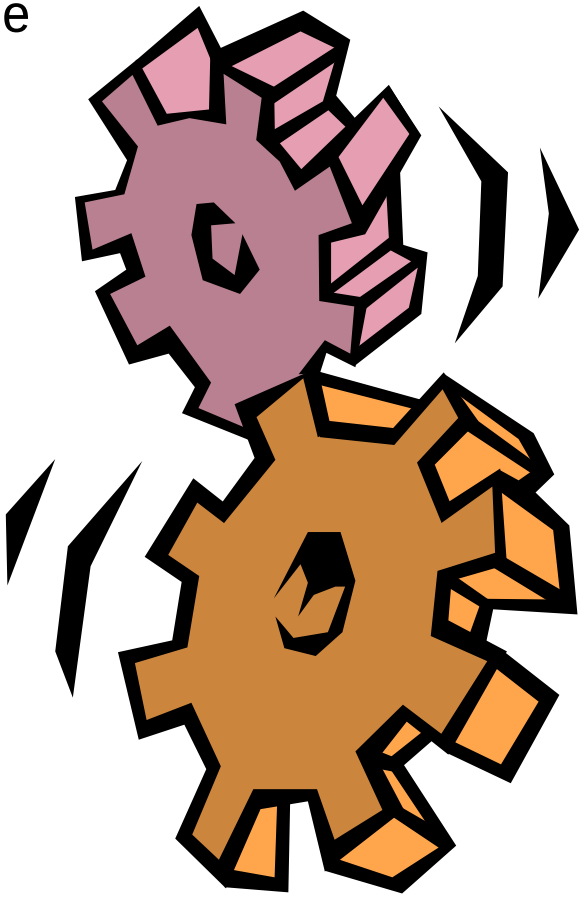
Right-Designing Facilitates….

- Designing an operation for Flow
- Which improves the environment for the execution toward the objective (True North) of Flow
- Enables improved ability to quickly Problem-Solving (Kaizen)
- Right-Designing is a Critical form of Cost Management! (85% Cost Improvement accomplished during product/process development/deployment)

A Change in Thinking

Attributes of Right-Design

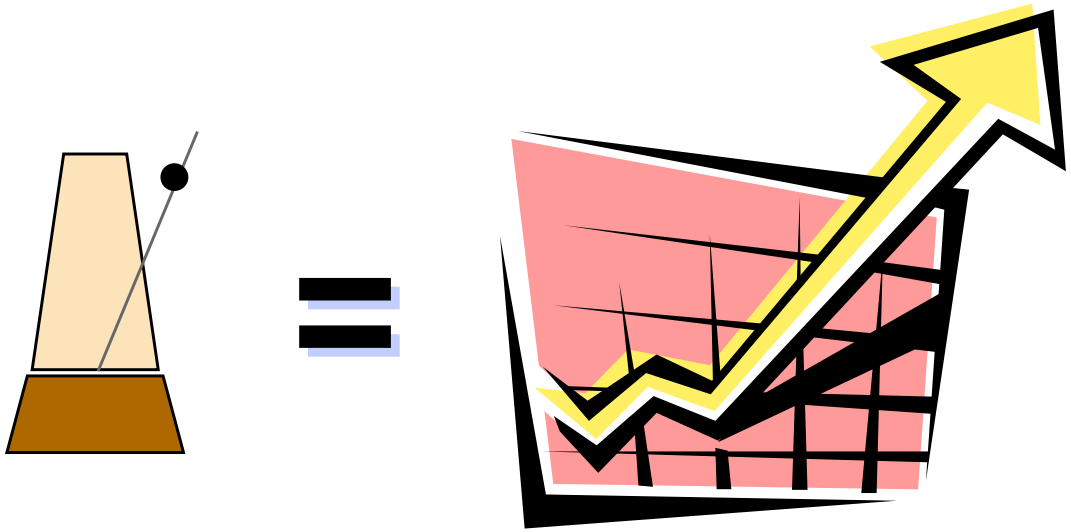
- Operates to the Takt Time
- Dedicated to One Product or Product Family
- Make Equipment as Inexpensive as Possible
- Physically Compact (Box concept)
- One-Touch Start
- Chaku-Chaku
- Loaded and Unloaded at the Same Point
  - At the front of the machine
- Quick change Capabilities
  - SMED concepts
  - Under ten minutes
  - Mixed model – No changeover
- Jidoka is Built into It
  - Detect and stop
- Exemplifies the 5 S's
- Simple to Repair, Maintain and Operate
- Processes One-Piece at a Time (Right-Fit)
  - One-piece flow



Takt Time

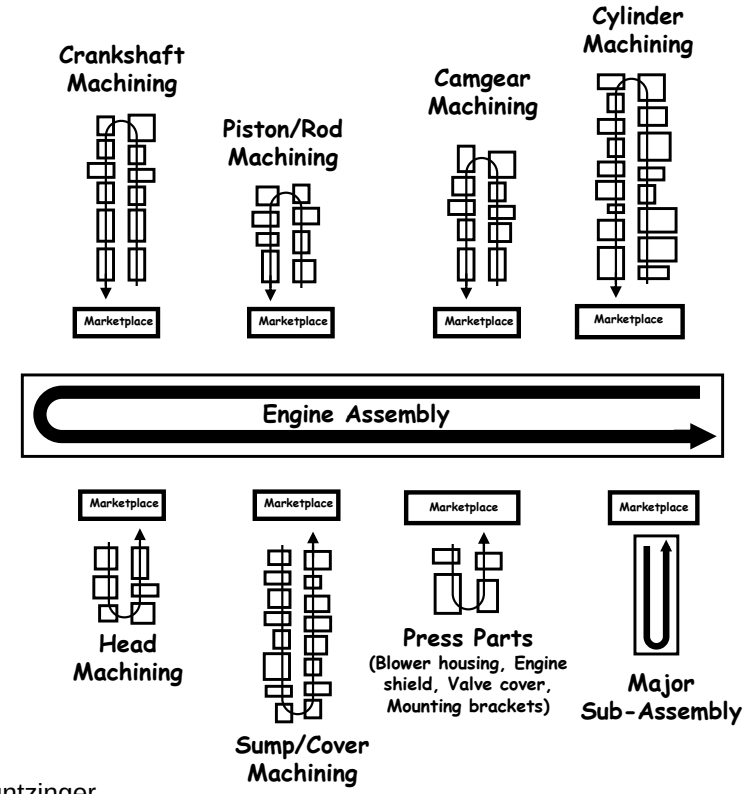
- Guiding Star to Achieve Flow
- Takt Time is:
  - ***Is the Time in which a Component Must be Produced to Meet Customer Demand.***
  - **Total Available Operating Time per Shift**

    Customer Requirement per Shift
- *Sets the Pace of Production to Match the Pace of the Market*



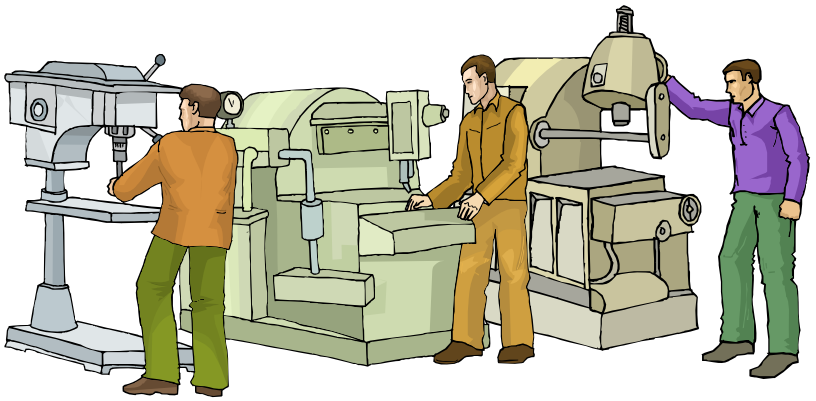
Dedicated to One Product or Product Family

- What does this mean??
- Focus on a Value Stream
- Many sources describe procedures for developing your product families
  - Learning to See
  - Creating Continuous Flow
  - See the Whole
  - Making Materials Flow
- Some are obvious



As Inexpensive as Possible

- What does this mean??
- Rebuilds verses...
- High-Tech Machining Center



Rebuilds vs. High-Speed Machining Center

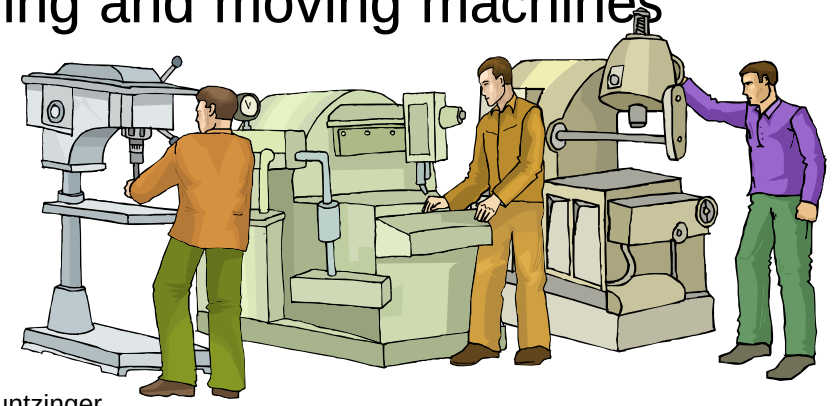
- Part Feature requirements
  - Drilling, milling and reaming
  - Variety of critical surfaces and holes in a variety of orientations
- Customer demand requirements
  - 4 minutes

Rebuilds vs. High-Speed Machining Center – Process Solution 1

- High-Speed Machining Center
  - Can machine part completely
  - Can machine at twice the speed of the rebuilds
  - Needs 1 operator
  - Tombstone dual pallet fixture system
  - Machines 6 parts at a time (2 sets of 6 on each side of the tombstone with 2 tombstones with pallet exchanger)
  - 1.9 minutes machining time per part – or **23 minutes throughput time**
  - Cost = $900,000

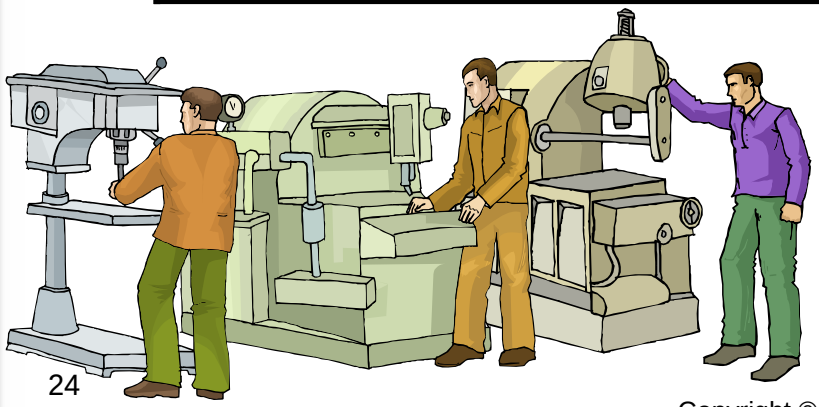
Rebuilds vs. High-Speed Machining Center – Process Solution 2

- Rebuilds – Cell Layout for Flow
  - One-piece flow cell – U-shaped line
  - 6 Rebuilt Machines (existing machines)
    - 3 milling machines, 2 drilling machines, 1 reaming machine
    - Takt Time = 4 minutes
    - Parts need to be re-orientated for correct machining angles
  - Needs 1 operator for current Takt Time walking from machine to machine manually loading/unloading each part
  - **Just under 4 minutes throughput time**
  - Cost = $100,000 (for rebuilding and moving machines



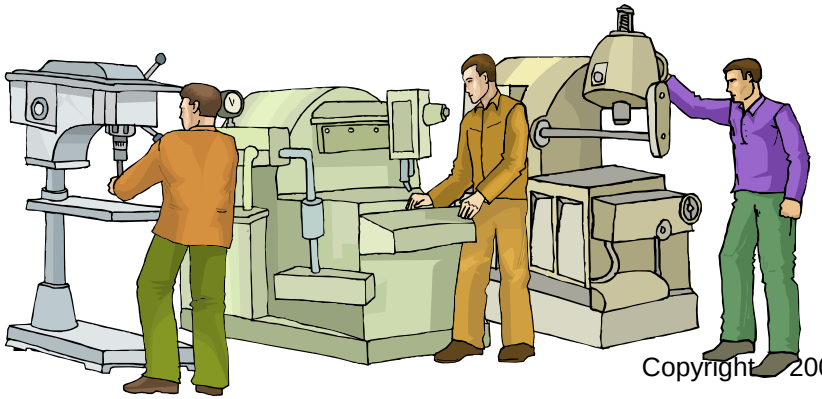
Rebuilds vs. High-Speed Machining Center – Summary

	Machining Center	Machining Cell
Cost	$900,000	$100,000
Throughput Time	23 minutes	< 4 minutes
Machine Efficiency	2x	1x
No. of Operators	1	1



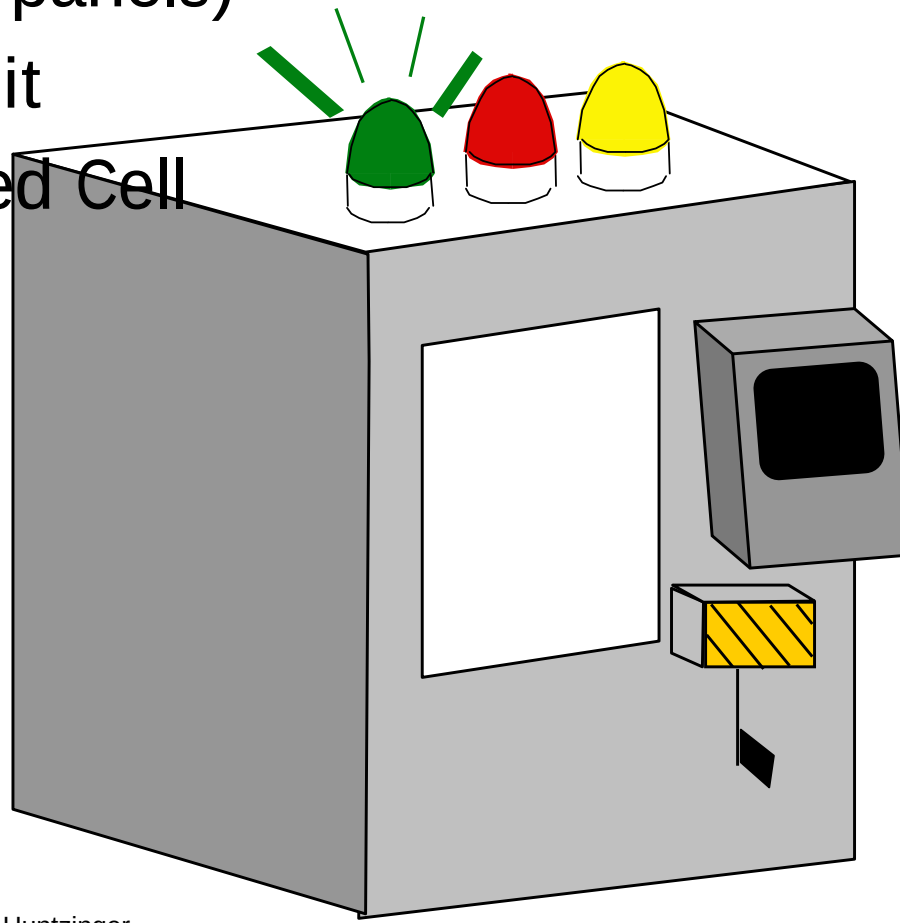
Rebuilds vs. High-Speed Machining Center – Other Issues

- **Machining Center** can continue to take on capacity
  - Up to 24 hours a day – assuming demand is available to put on it
  - If market shrinks – limited options
  - Costs appear to rise – less absorption
- Stuck with $900,000 on books if demand drops
- **Machining Cell** can continue to take on capacity
- Operators added as need – incremental costs
  - Up to cycle time of bottle neck machine
  - At bottle neck – just add another machine (approx. 20K for rebuild)
- More flexibility to increment up or down



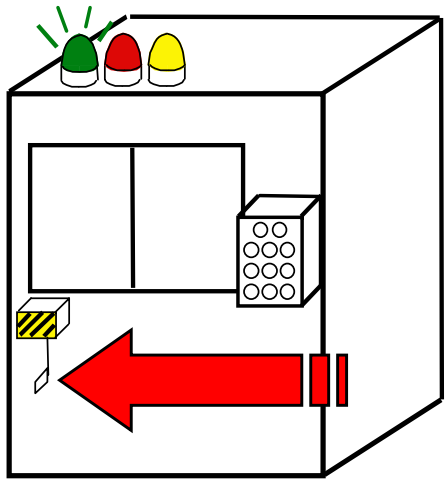
Physically Compact (Box concept)

- Small in Size
- Self-Contained (no separate hydraulic units, coolant units, or electric panels)
- Easy to Move as One Unit
- Fits into a Tight U-Shaped Cell



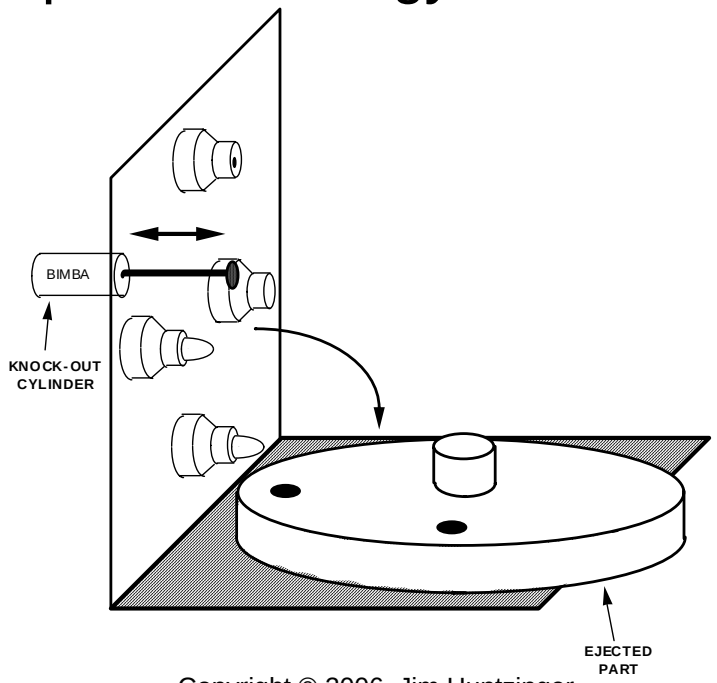
One-Touch Start

- Needs only One Hand to Start Machine
- Other Hand Free to Carry Part
- Less Time Used to Start Machine Cycle
- Operator Manual Time becomes Consistent
- No Back-Tracking of the Operator

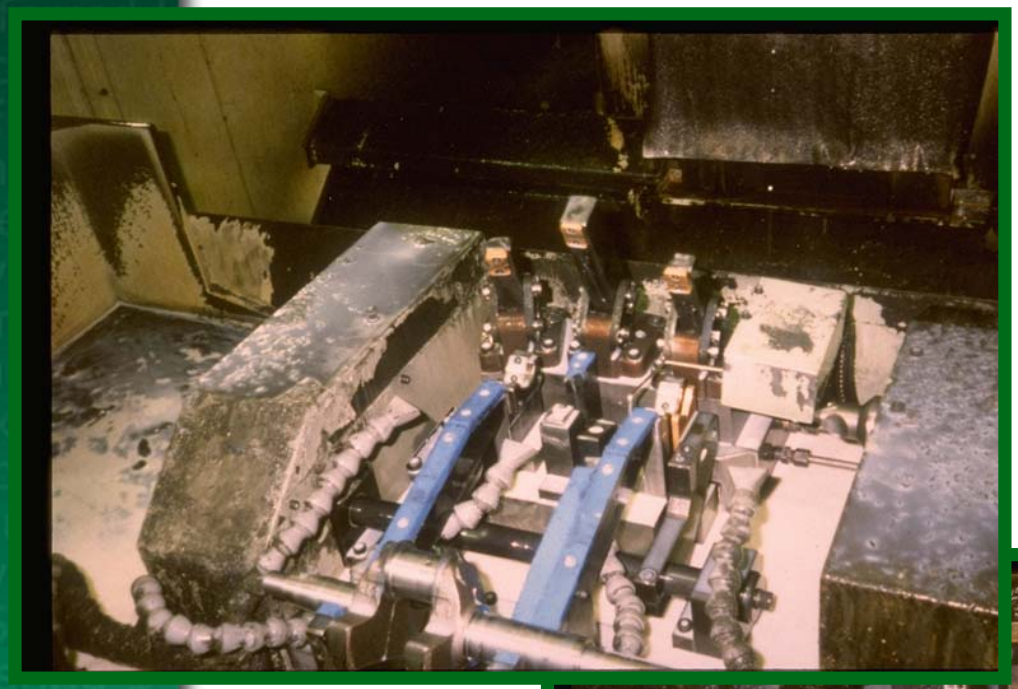


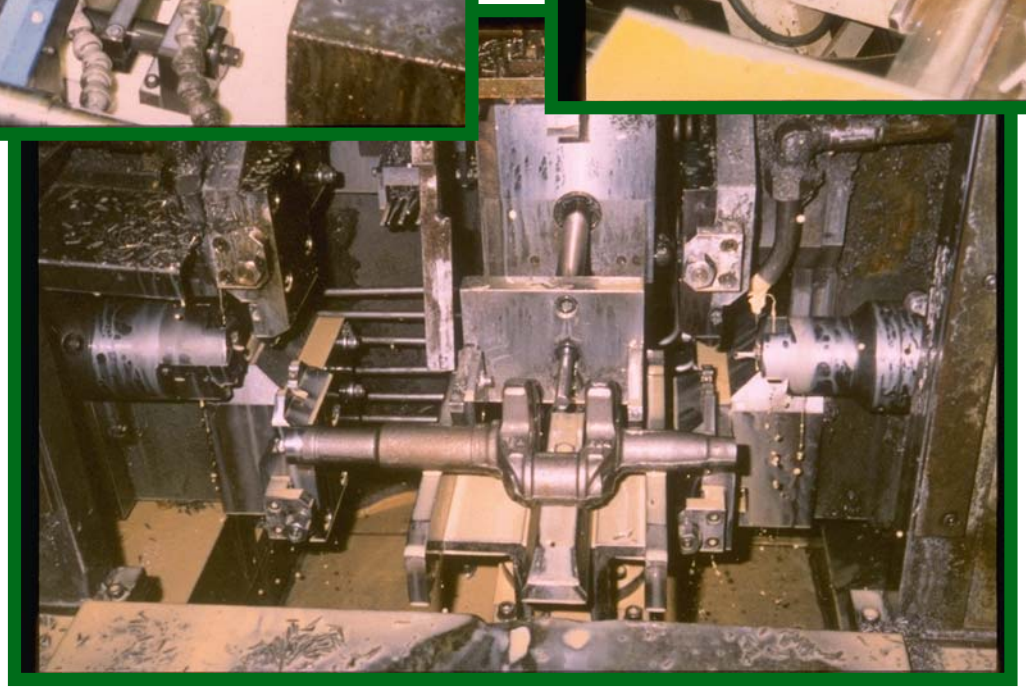
Single-Hand Loading and Automatic Unloading (Chaku-Chaku / Load-Load)

- Machine Ejects Part from Fixture
- Reduces Manual Work for Operator
- Manual Time becomes Consistent
- Allows Operator to run Increased Number of Machine
- Allows Free Movement within the Line
- One-Armed Operator Analogy

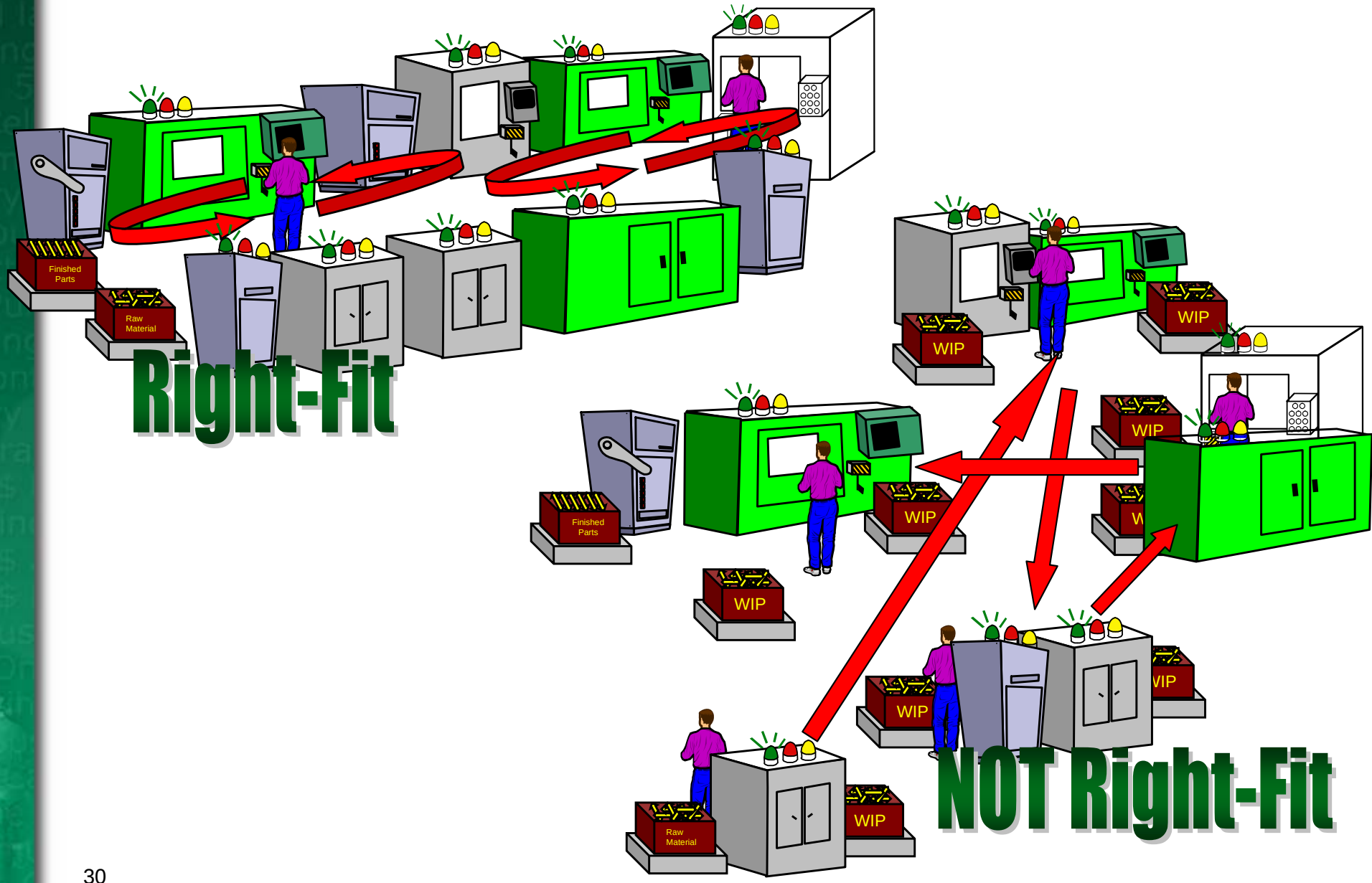


Chaku-Chaku Examples



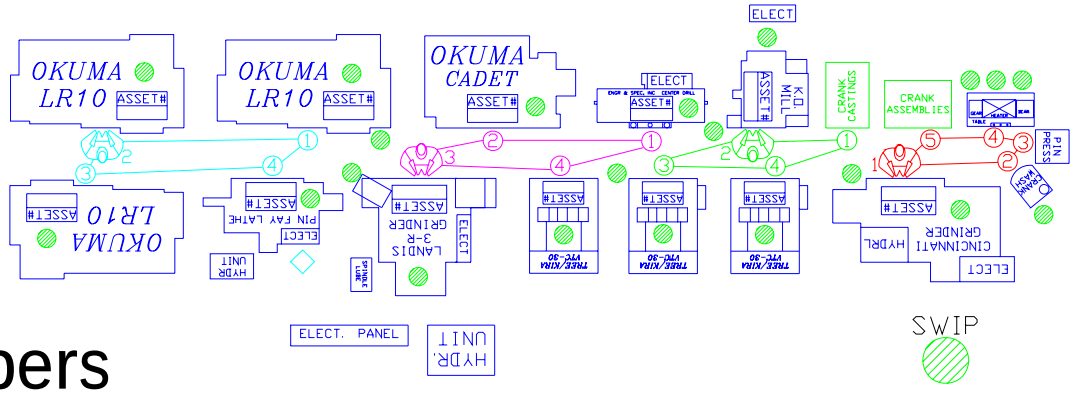


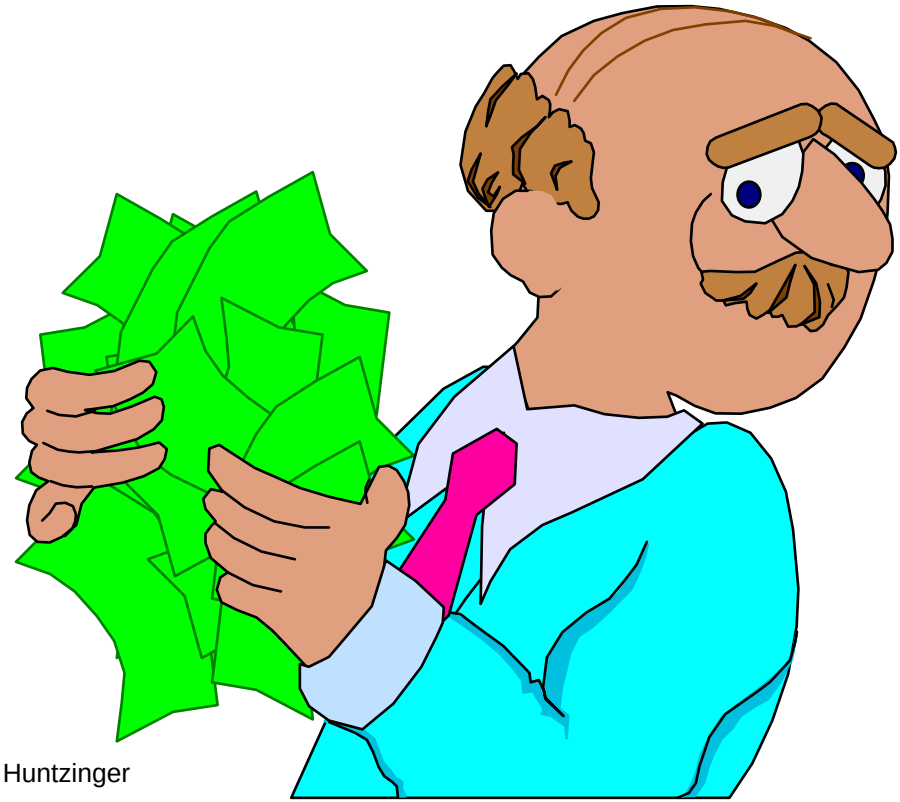
Right-Fit: Processing One-Piece at a Time



Why Right-Design?

- Cost of Simplified Tracking
- Cost of Logistics
- Cost of Part Numbers and Containers
- Cost of Large Batch Processes
- Cost of Maintenance
- Cost of Incremental Investments

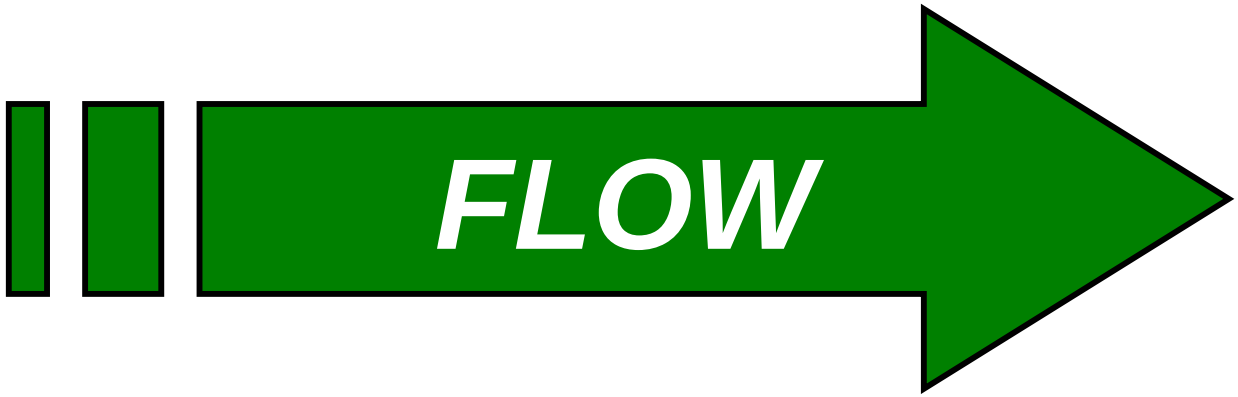




Right-Sized Equals Just-In-Time

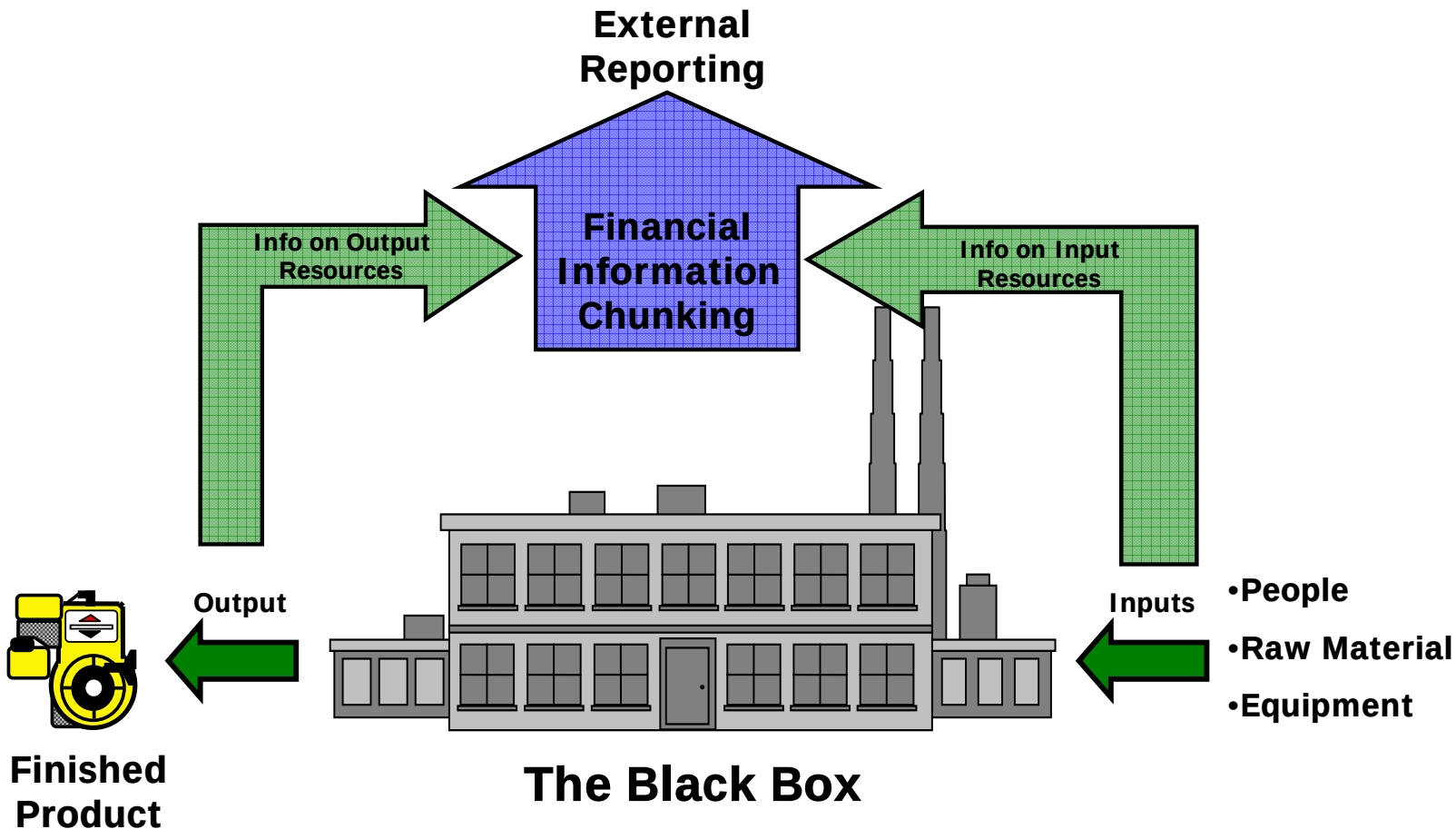
- What Is Needed
- When It Is Needed
- In the Amount Needed

(with the minimum Materials, Equipment, Labor and Space)



The Black Box

- Financial Information does NOT enter the Operation
- The Operation is controlled by the Design of the System with adherence to Takt Time (the customer) and Standard Work
- This analogy was explained to me by Glenn Uminger of Toyota

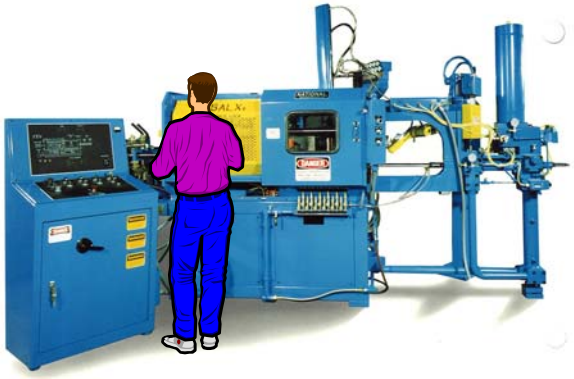


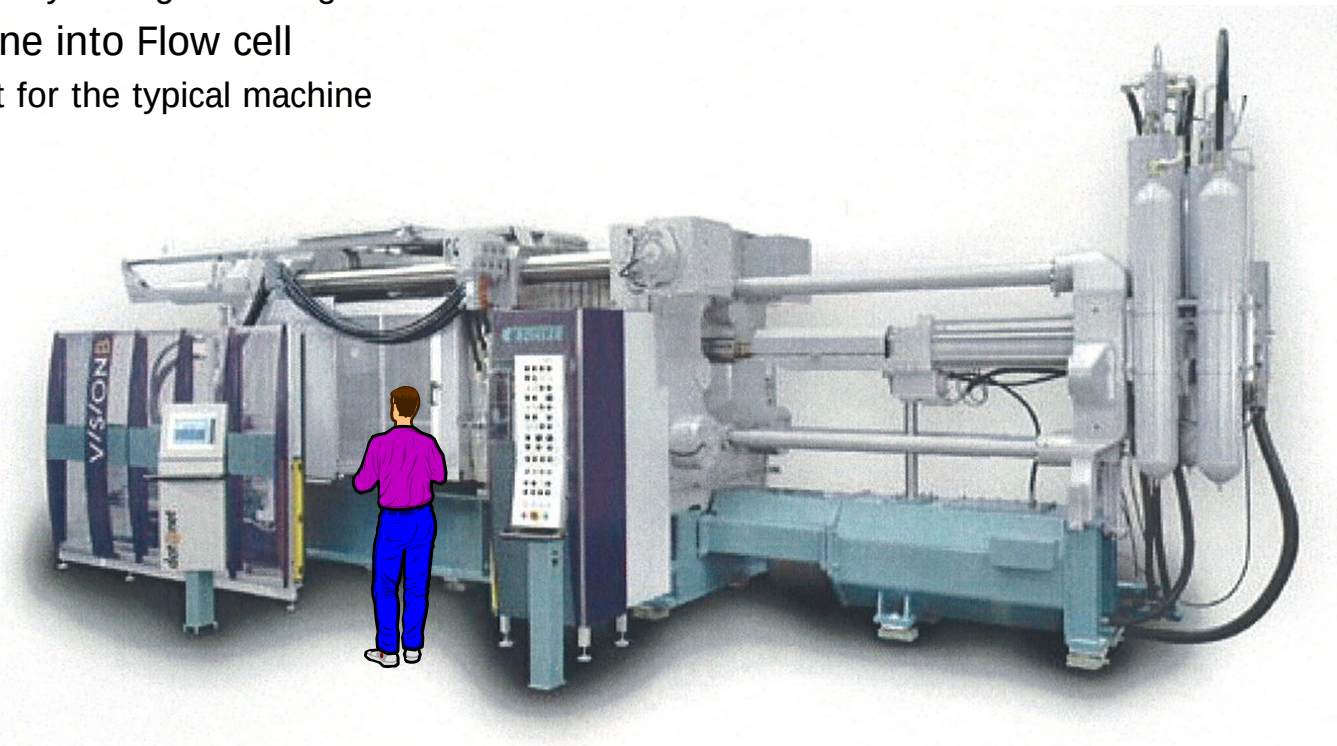
Right-Designing Facilitates Lean Thinking and Practice

- Evolving equipment to become *Right-Designed, Sized* & *Fit* drives the fundamental philosophy of lean
  - Learning By Doing – experimenting with designs of machines, equipment, and process
  - It evokes the *learning* process which, in turn, drives and evolves the *thinking* process
  - Step-by-Step experimenting is key to learning (recall from the beginning of this presentation about learning over time)
  - CONTINUOUS IMPROVEMENT (KAIZEN!)

Right-Designed Example – Die Cast Machine

- $1,000K vs. $110K
- Easier to troubleshoot
- Difficult/expensive movability vs. Easy/Inexpensive movability
- Large Die vs. Small Die
  - Multi-cavity vs. Single cavity
  - Sorting cavities vs. no sorting
  - Quality (no investigating multiple cavities)
  - Investment (Cost!)
  - Ease of developing SMED changeover capabilities
  - Increase ease of safety during die change
- Can “Right-Fit” machine into Flow cell
  - Kaizens are difficult for the typical machine



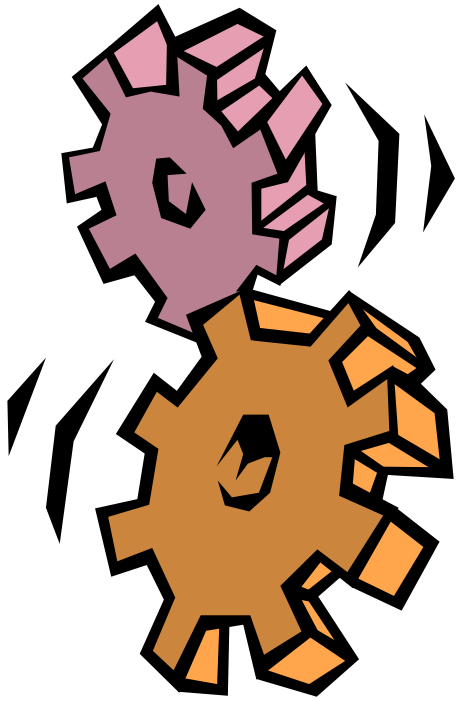


What the CFO Needs to Do?

- Right-Designing and Right-Fit as methods of cost management
- Right-Designing as an attribute for Flow Implementation
- Apply Limited Production vs. Economies of Scale
- Right-Design thinking and application reduces costs
- Accountants as leaders in Right-Design deployment

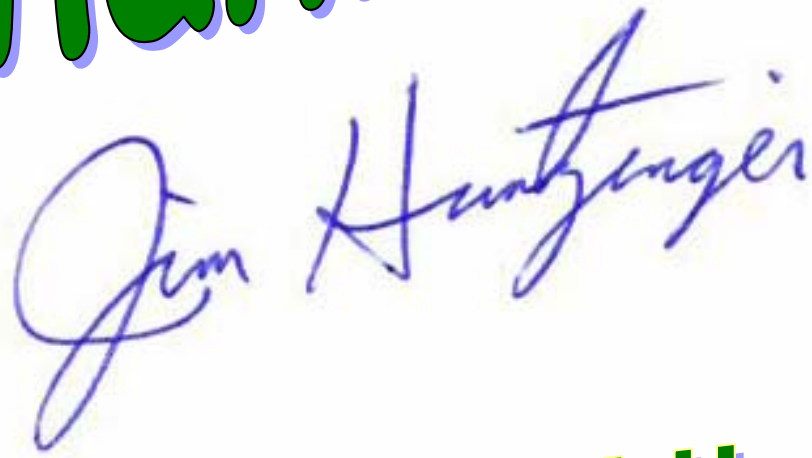
"Remember, Nothing That's Good Works By Itself, Just To Please You. You've Got To *Make* The Damn Thing Work."

Thomas Edison, Inventor



Economies of Scale Are Dead:
Right-sizing for Effective Cost Management and Operations

Thank You!



Change Your Thinking!

Recommended Reading

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