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Rapid Implementation for Lean Success

Kanban – Application of Visual Production Control

Many world-class companies use kanban to reduce and control inventory while ensuring customer order fulfillment. Kanban supports visual production control using returnable containers, cards or spaces to pull products from the producing workstation or supplier into the consuming workstation or business. Value Stream Mapping incorporates various kanban options to support Lean Manufacturing. Kanban is relatively straightforward in principle, but may seem daunting to apply. This presentation will include implementation guidelines and examples from practical applications.

Abstract

Kanban is an application of visual production control using returnable containers, cards or spaces to pull products from the producing workstation or supplier into the consuming workstation or business. The process controls inventory buffers with buffer and lot sizing rules and manages queue sizes through defined First-In-First-Out (FIFO) squares or lanes. Value Stream Mapping incorporates various kanban options to support Lean Manufacturing. The system is very disciplined, with well-defined rules.

A further goal is to continually reduce kanban / buffer sizes to lower inventory levels, improve quality and reduce lead-times. Information and services as well as products can be pulled. McDonald's method of keeping burger lanes full during peak periods is a recognizable example of a pull system in a service application.

Apply other visual methods such as scheduling boards to supplement kanban and when traditional lean methods don't fit the situation. Queues controlled via pull systems result in lower inventories and shorter, more predictable lead-times to improve customer service.

Kanban is relatively straightforward in principle, but may seem daunting to apply. This presentation will introduce concepts of visual production control with emphasis on kanban and pull systems. It will include several real-world examples to demonstrate practical applications.

Participants Will Learn:

- Basic principles of Visual Production Control and Kanban
- Specific steps used in planning and implementing a kanban pull system
- Value Stream Mapping kanban choices: build to shipping kanban or supermarkets
- Creative approaches to designing and implementing kanban
- Lean manufacturing techniques to apply to their situation

Greg Hart, IE, MBA - President, Hart Innovative Solutions, Inc.

Greg Hart is president of Hart Innovative Solutions, Inc. (www.HartInnovations.com), a management consulting firm based in Rochester, NY, which guides client employee teams to quickly and effectively streamline their manufacturing or business processes resulting in increased quality, productivity and profitability. Greg has over 30 years of experience in industrial engineering and operations management. Some of his clients include AIM, Angiotech BioCoatings, Helen Hayes Hospital, OhmCraft, Optimax, Pierce Industries, Simcona, TargetVision, TRW, and Wilson Greatbatch. Previously, he was an industrial engineer for Eastman Kodak and a manager in retail distribution for Associated Dry Goods.

Some highlights of Greg's lean thinking solutions include:

- Led value stream mapping workshops and kaizen workplace breakthrough events, delivering rapid implementation for lean success.
- Applied lean techniques in applications ranging from hospitals to manufacturing and distribution.
- Planned and implemented major facilities layout transformations to achieve continuous, cellular flow.
- Facilitated team application of 5S and Visual Systems including standard work reinforcement, workplace organization, kanban card pull systems, FIFO queues and other visual production controls.

Mr. Hart earned an MBA from the University of Rochester Simon School and a Bachelor of Science degree in Industrial Engineering from Rochester Institute of Technology - both with honors. Greg has extensive background in lean manufacturing and quality improvement from consulting, research, seminars, conferences and tours. Greg is a Certified Black Belt in Lean – Six Sigma.

Greg has held many positions in the Institute of Industrial Engineers (IIE) including Senior VP of Continuing Education, President and Conference Chairman for the Rochester Chapter and Regional VP for NY and PA. Greg is one of the Experts in IIE's popular "Ask the Expert" program, often responding to Lean and process improvement questions. He is active in American Production and Inventory Control Society (APICS), the Association for Manufacturing Excellence (AME), Rochester Professional Consultants Network, and Rotary International.

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Greg Hart – President
 Hart Innovative Solutions, Inc.
May 16, 2005
 IIE Annual Solutions Conference
 Atlanta, GA



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Rapid Implementation for Lean Success

- Hands-on project support – emphasis on getting the job done – plan, train JIT, involve, direct, do
- Customers: Angiotech BioCoatings, OhmCraft, Pierce Ind., Simcona, TargetVision, TRW, WGT,...
- Process done or closely directed by senior consultant: Greg Hart, IE, MBA.
- Market Niche: Lean Thinking with a clear focus on planning and implementation, with attention to detail, over simply providing recommendations



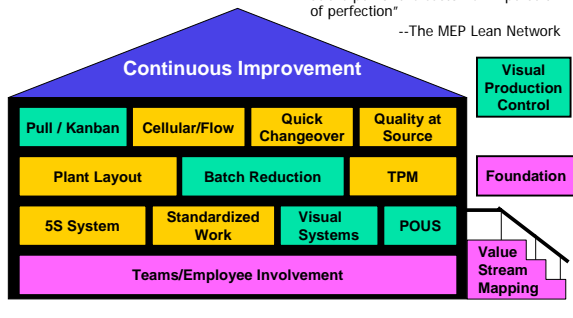
Greg Hart President

- Independent Management Consultant since 1998
- 13 years – Kodak internal productivity consultant
- Lean Manufacturing - Process Improvement Expert
- 30+ years manufacturing & operations experience
- MBA - Simon School of Business - U of R - honors
- BS - Industrial Engineering – RIT - honors
- Senior VP Continuing Education – IIE – 2003-05
- Past President & Conf. Chairman for Rochester IIE

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Lean Building Blocks

"A systematic approach to identifying and eliminating waste (non-value-added activities) through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection"
 --The MEP Lean Network




Lean Implementation


- **Value Stream Mapping – Kaizen Events**
 - Visualize current & future material & info flow
 - Identify waste - plan to eliminate – kaizen events
- **Flow – Cellular Manufacturing**
 - First choice - where possible
 - Line balance – one-piece flow
- **Pull – Visual Production Control**
 - Rate-based – level load – customer triggered
 - Point of use storage – kanban – schedule boards
- **Perfection - Continuous improvement**
 - Standard Work – Process Control – Error-Proofing
 - 5S & Visual Systems
 - Quick Changeover - Preventive Maintenance

Value Stream Mapping

All the actions (both value and non-value added) required to bring product through the main flows essential to schedule, manufacture and ship products to customers

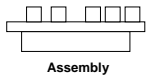


Welding




Stamping

Start with the "current state" map showing the existing process with its inherent wastes.



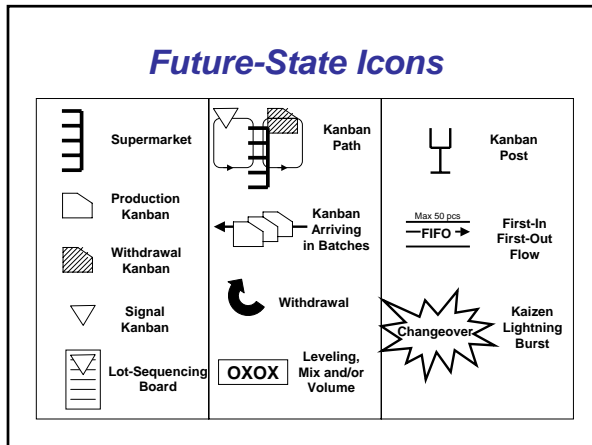
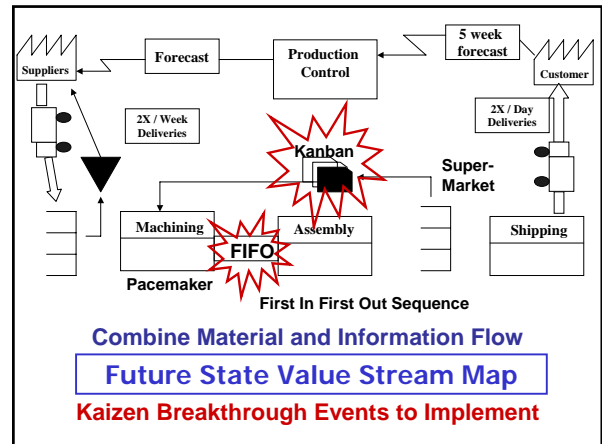
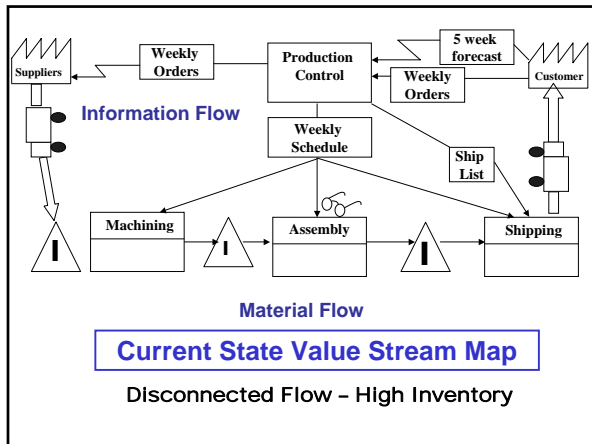
Assembly

Then draw (using icons) a "future state" map of how value should flow.



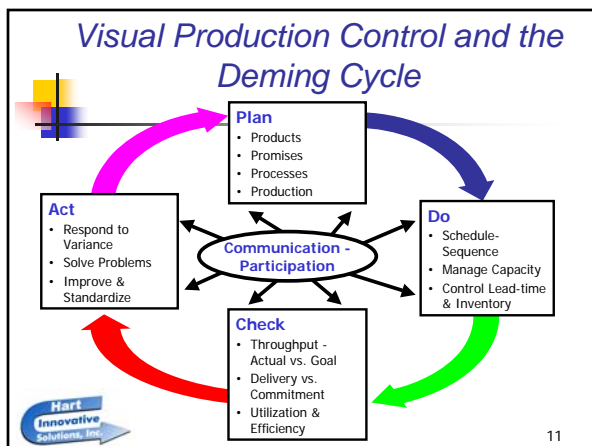
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Kanban / Pull Systems – Visual Production Control

Where you Can't Flow – Pull based on Customer Demand - Point of use storage, kanban, supermarkets, and batch size reduction



Scheduling constraints


- Long lead time
- Late vendor deliveries
- Lack of flexibility
- Inaccurate forecasts
- Equipment breakdowns
- Quality problems
- Long set-ups
- Complex paperwork
- Customer changes
- Mix changes

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Simplifying Production Scheduling

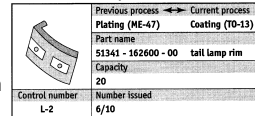
- Point of use storage
- Material when needed
- Shorter production cycle
- Tooling at work area
- Line stop for quality
- Preventive maintenance
- Flexibility for mix changes
- Rapid design changes



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Kanban Pull System

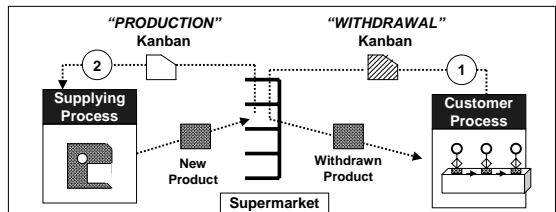
- A Kanban Pull System is a production control system driven by consumption and controlled by synchronized replenishment signs
 - Eliminates waste of handling, storage, expediting, obsolescence, space, equipment & excess inventory
- Pull System consists of:
 - Production based on actual consumption
 - Small Lots
 - Low Inventories
 - Management by Sight
 - Better Communication



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Supermarket Pull System

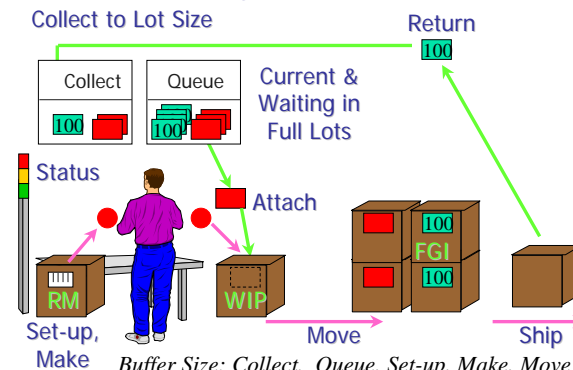
- A way to control production *between* flows
- Small and conveniently located to customers
- Organized by product line, not by commodity
- Loaded from the back, Unloaded from the front



- 1) Customer process goes to supermarket and withdraws what it needs when it needs it - First In, First Out (FIFO)
- 2) Supplying process produces to replenish what is withdrawn

Build to Shipping - Kanban Example

Collect to Lot Size Return




Attach Move Ship

Buffer Size: Collect, Queue, Set-up, Make, Move

Production Information

- Kanban Replaces:
 - Material Labels
 - Material Transactions
 - Routing
- Visual System, Clear Status - Andon Lights, Queue Boards, Kanban Cards or Squares
- Barcode used for any Necessary Transactions



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Kanban Guidelines

- The next process (customer) goes to get material (Pull) in the previous process (supplier)
- The previous process (supplier) produces in standard lot sizes and delivers in standard containers
- No pull signal, no production, no delivery
- A signal card doubles as a label for each container
- Production/delivery: 100% quality and quantity
- Minimum inventory and maximum turnover
- Drive system with smooth schedule
- Store material for visual control
- Improve flow & reduce number of signals
- Revise system as conditions change

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Implementing Kanban Pull Signals


- Organize & train teams
- Define parts & their demands
 - Repetitive vs. non-repetitive
 - Demand rates & variability
 - Level-load requirements
- Locate buffers
 - Product/process flow diagrams
 - Identify critical resources
- Size buffers
 - Triggers-demand lead time
 - Lot sizes-replenishment frequency
- Logistics to link buffers
 - Space, containers?
 - Cards, boards?
 - Rate schedules, takt times?
 - Electronic?
- Structure interfaces
 - MRP
 - Costing
 - Tooling & gauging
 - Point of use
- Develop performance metrics
 - Required vs. actual output
 - Output per person
 - On-time delivery
 - Weeks of inventory
- Shop floor training: why, what & how
- Phased implementation
 - Start with pilot
 - Rollout plan
- Monitor & fine tune
 - Buffer locations
 - Bottleneck to flow



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Pull System / Kanban Design Considerations


- What? – Type of signal / kanban / card design
- Where? – Process – placement of buffers, point of use storage – consider all handling stages
- When? – Rhythm, pace, triggers, load leveling
- Who? – Roles of participants, training
- How? – Mechanics – schedule boards, kanban circulation – visual aids - communications
- How many? – Buffer size, lot size, container size



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Types of Signals


- Card
- Light signal
- Exchange of containers
- Empty space
- Shelves
- Barcode label
- Computer – reorder point



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Signal Selection Considerations

- **Space:** producer can see users point of use buffer
- **Containers:** producer & user close, but not in visual range – ability and space to dedicate containers
- **Kanban cards:** producer & user in same facility, but distant – variety of product types
- **Trigger boards:** where producer lot size > one card
- **Electronic:** producer & user in different facilities
- **Rate schedule:** for buffers closest to customer
- **Takt time:** for flow lines with little or no set-up




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Color Coding




- Shortcut method to convey meaning or direction
- A form of failsafe / mistake proof
- Consider colors for kanban cards
 - Kanban type
 - Product
 - Producer
 - Storage locations
 - Special instructions




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Kanban Card Example

- Kanban Database - Excel
- Product, Description
- Container Type & Quantity
- Lot: Cards, Size
- Maximum Buffer: Cards, Size
- Barcode – Data Collection


123456		Molded Part		 MOVE & PRODUCTION KANBAN CARD Company Name
PROD: BLN		FROM: Clean Rm		
CONTAINER QTY: 10		TO: FGI		
TYPE: Box				
LOT # CARDS: 10	LOT SIZE: 100			
BUFFER # CARDS: 20	MAX BUFFER: 200			

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Lean Thinking Summary

- Start with Value Stream Mapping
- Find the Waste in the Process
- Focus on Improving Value Delivery
- Apply the tools of Lean Manufacturing and Kaizen Breakthrough
- Flow first where you can – Cellular
- Pull where you can't Flow
- Use 5S and Visual Systems




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For More Information

- Hart Innovative Solutions, Inc. – Greg Hart (585) 671-5090 GregHart@HartInnovations.com
- Visit www.HartInnovations.com for Lean Resources: Definitions, Processes, Links and Examples

Textbooks


- Kanban Made Simple – Demystifying and Applying Toyota's Legendary Manufacturing Process by John Gross & Kenneth McInnis, Amacom
- Kanban for the Shopfloor by The Productivity Press Development Team, Productivity Press
- Learning to See: value stream mapping to add value and eliminate muda by Mike Rother & John Shook - The Lean Enterprise Institute




For More Information (Cont'd)

Textbooks (continued)

- Just In Time – Making it Happen by William A. Sandras, Jr., Oliver Wight Limited Publications, Inc.
- Just In Time for America – A Common Sense Production Strategy, Kenneth A. Wantuck, KWA Media
- Toyota Production System by Taiichi Ohno
- The Visual Factory by Michel Greif, Productivity Press
- Visual Systems by Gwendolyn Galsworth, PhD, Amacom



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Thank-you for your interest!

Questions or Comments?
Feel free to approach me afterward!

*Drop off a business card or send email
- Get a copy of ACME Value Stream
Map in Excel to use as a template*