



# Kanban Cards

Prepared for:

APICS San Gabriel Chapter

by

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# Overview

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## How to Implement a Kanban System

- What is Kanban?
- Symbology
- Basic Theory
- Several real life examples
- Planning before implementation
- Constructing Kanban Cards
- Training
- Seven Rules



# What is Kanban?

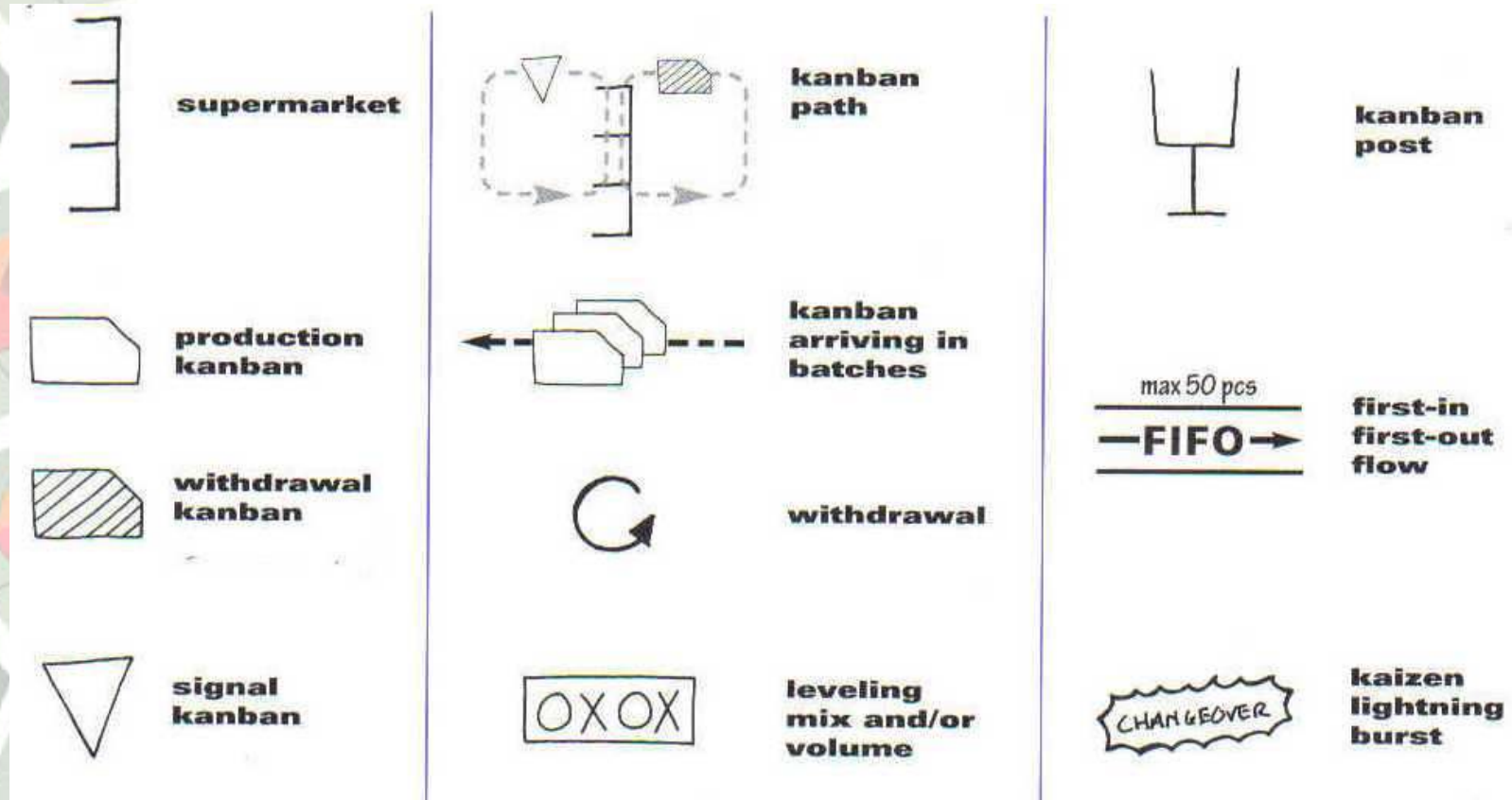
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## Essential to Lean Manufacturing

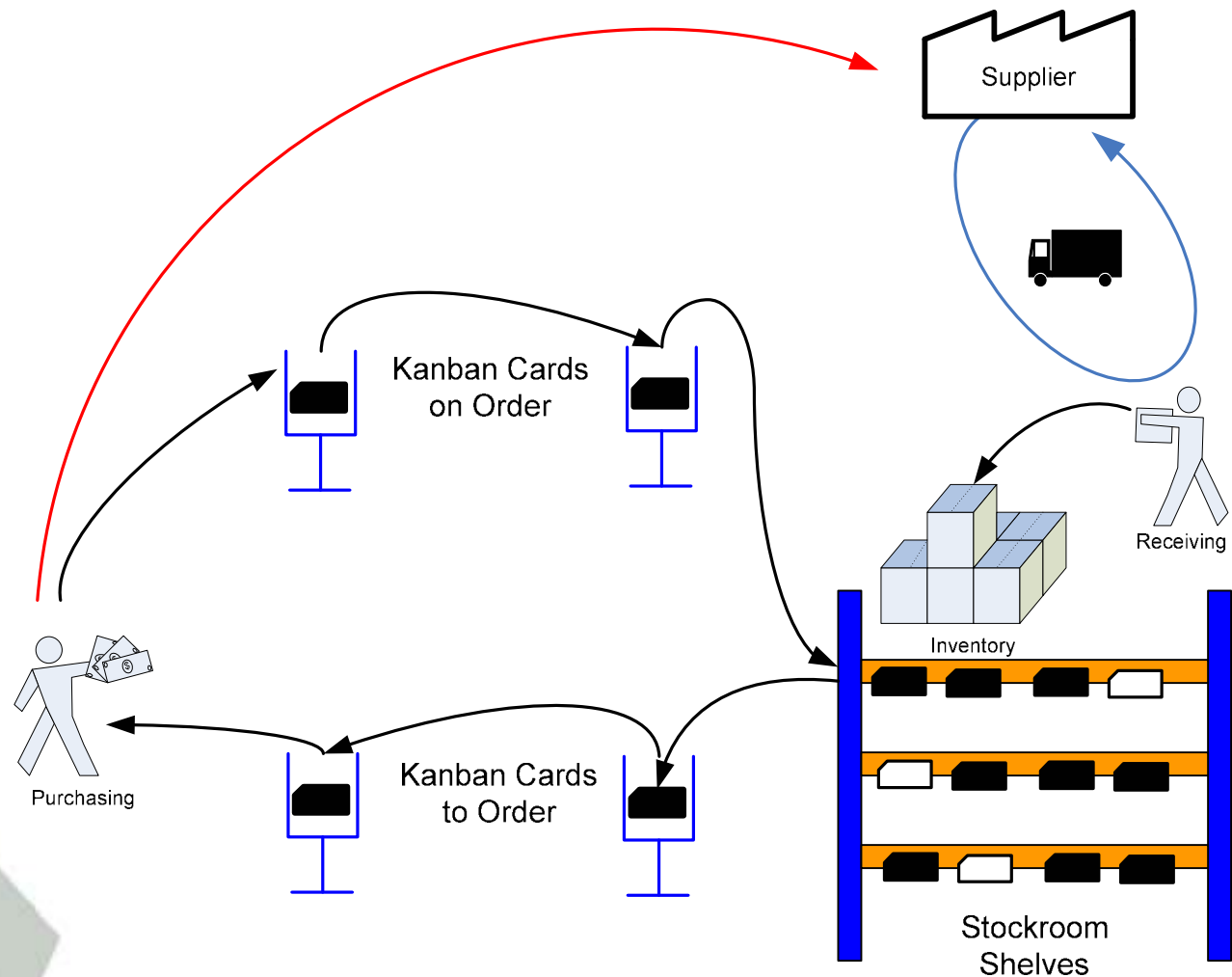
- Japanese for “sign” or “signboard”
- “A signaling device that gives authorization and instructions for the production or withdrawal (conveyance) of items in a pull system.”
- Two types of Kanban
  - Production Kanban (Make kanban)
  - Withdrawal Kanban (Move kanban)
- Paperless method to control material flow in a closed loop fashion.

# Value Stream Mapping

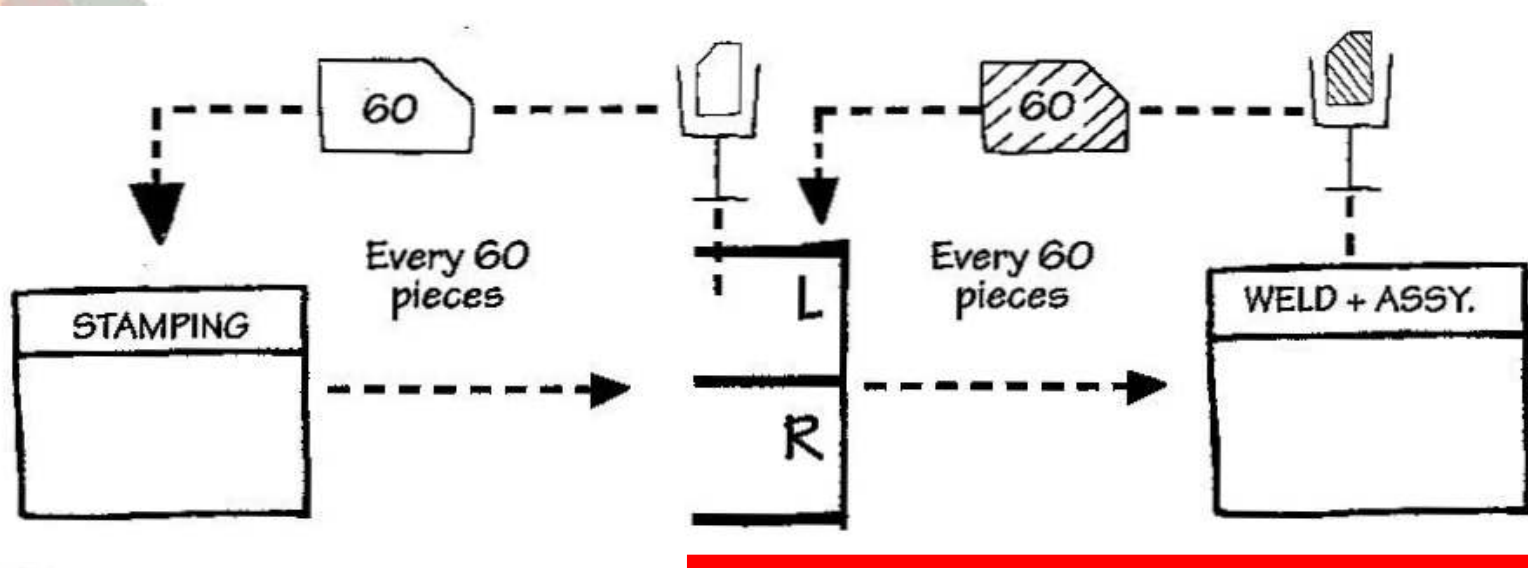
## Kanban Symbolology for VSM



# Example – Stockroom Kanban

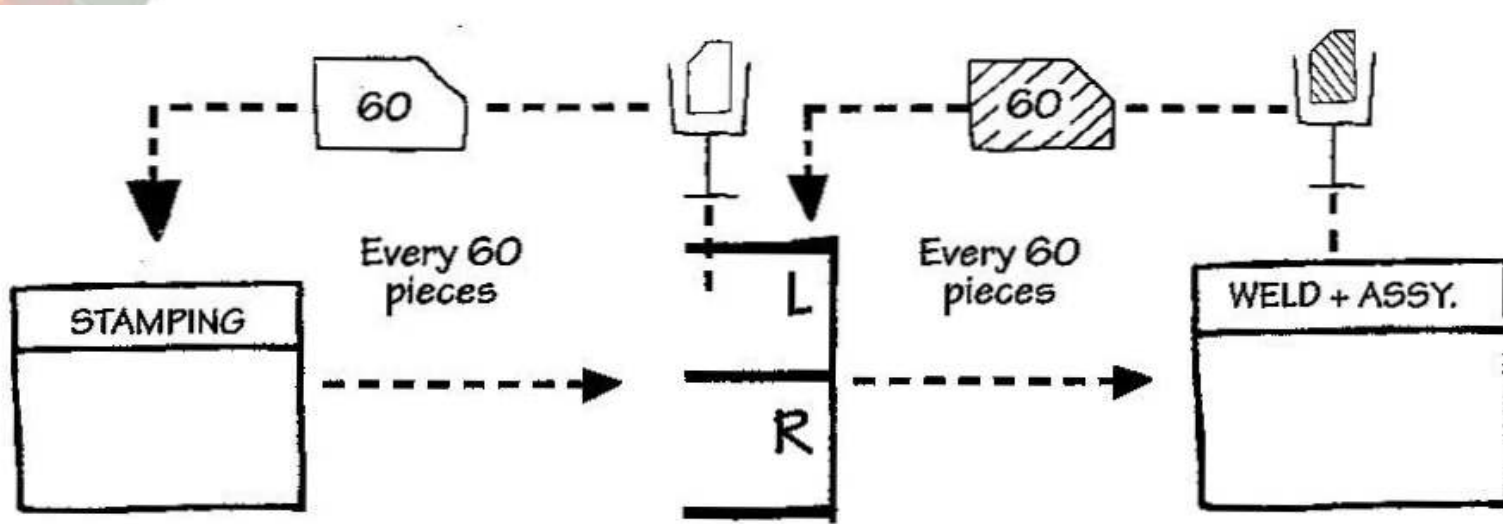


# Withdrawal Kanban aka Move Kanban



- Authorize the conveyance of parts to a downstream process.
- Two Forms: Interprocess & Supplier

# Production Kanban aka Make Kanban

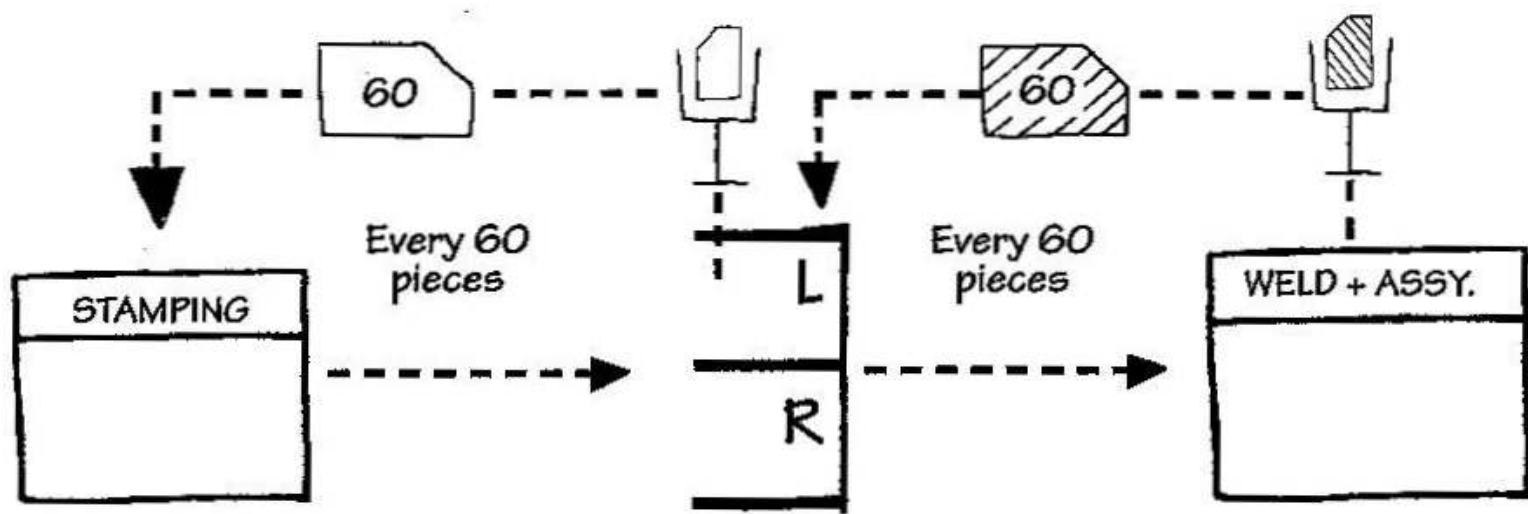


- Authorize the manufacture of parts for a downstream process.
- One card = one container of parts



# Withdrawal & Production Kanban

## Make & Move Kanban Create Pull

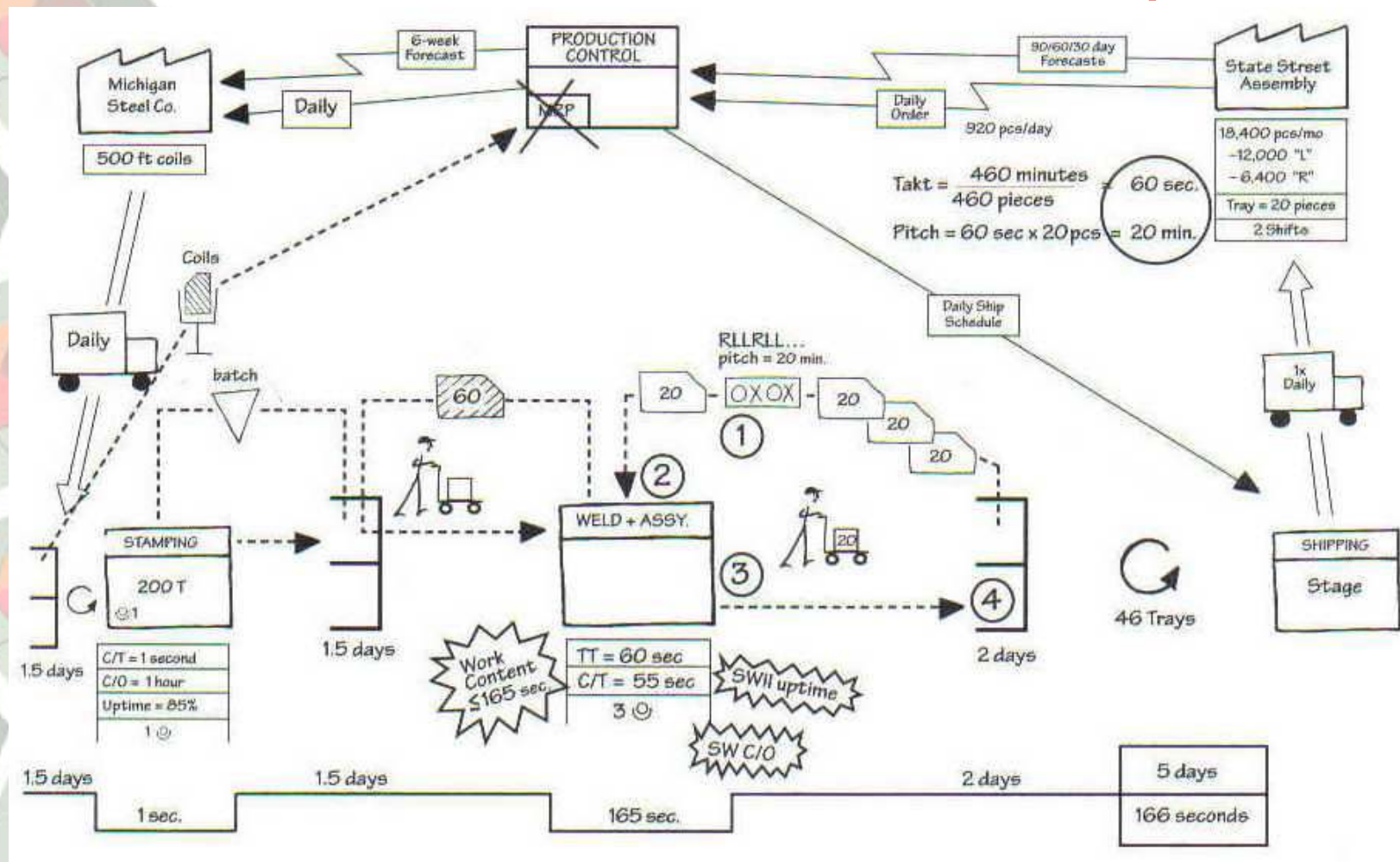


- Move Kanban pulls material from a very small in-process stock (supermarket).
- Supermarket is depleted, causing the release of a Make Kanban card.
- The Make Kanban triggers the manufacture of additional components to replenish the supermarket



# Systems Planning for Kanban Cards

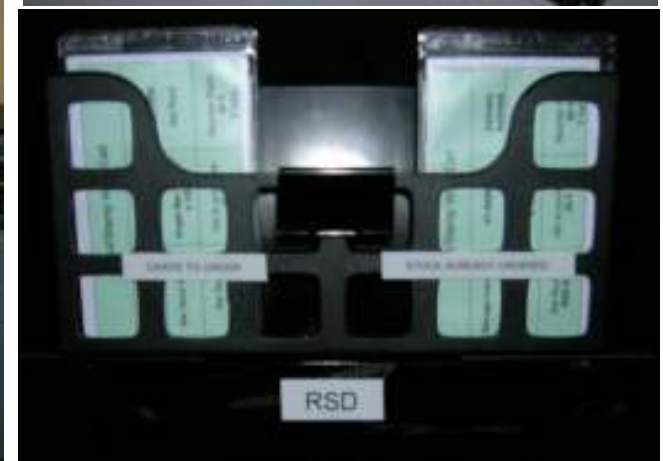
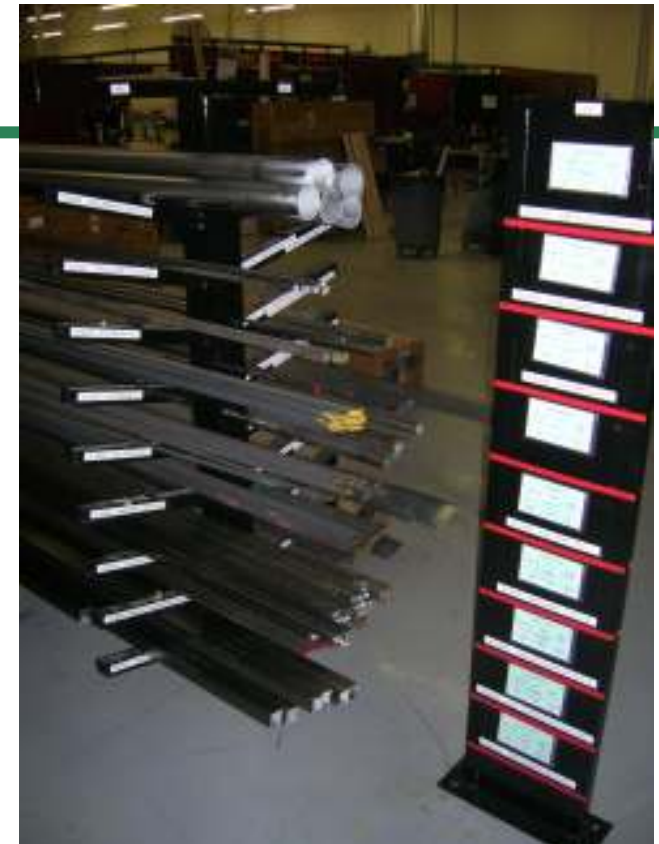
## Future State Value Stream Map



# Barstock Kanban

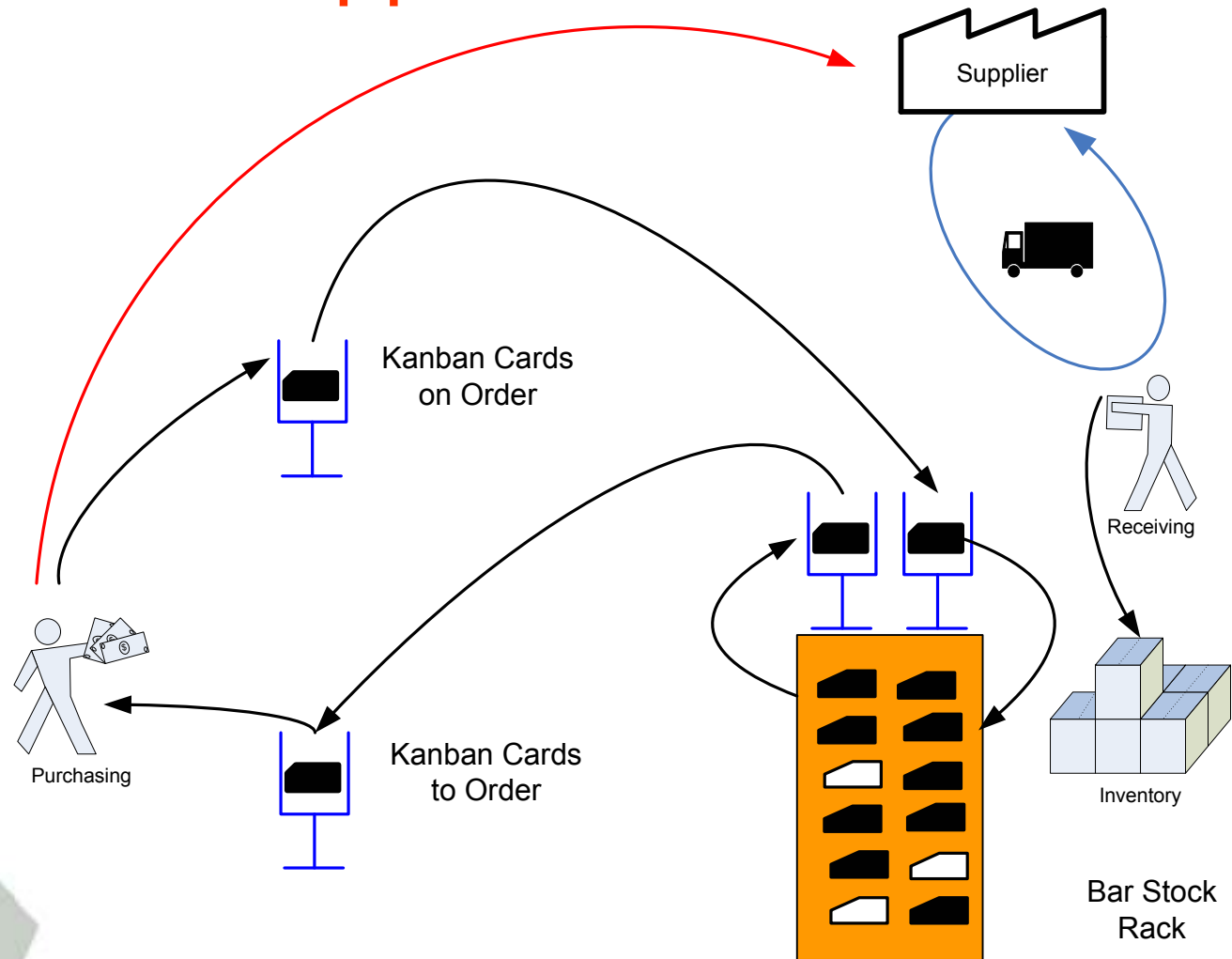
## Pull – From Supplier

- Milk Run - Daily Reorder
- Ergonomic Handling
- Plan for Every Part – 2 Bin



# Barstock Kanban

## Pull – From Supplier





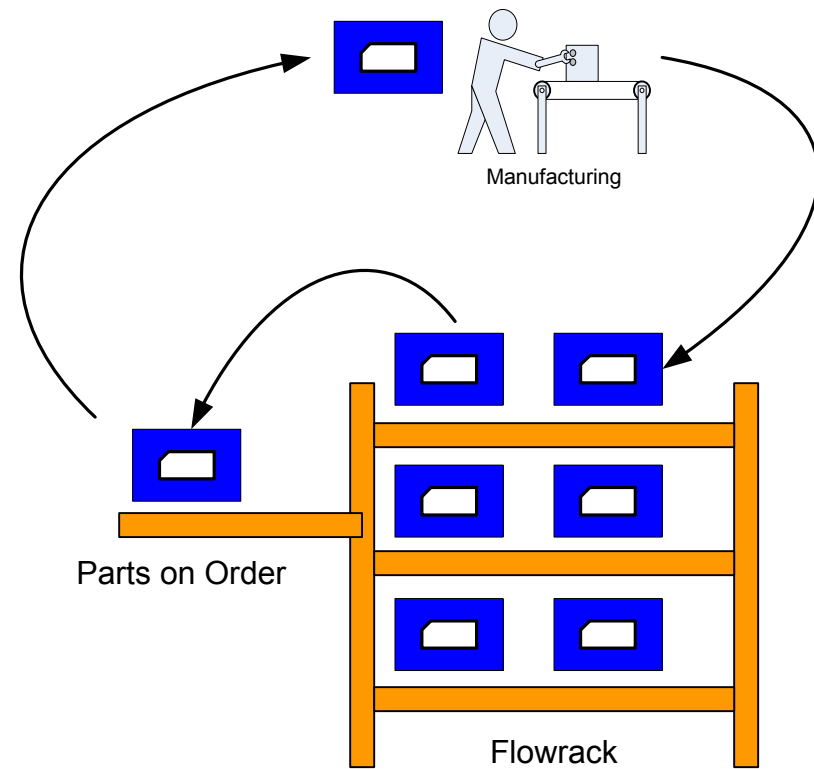
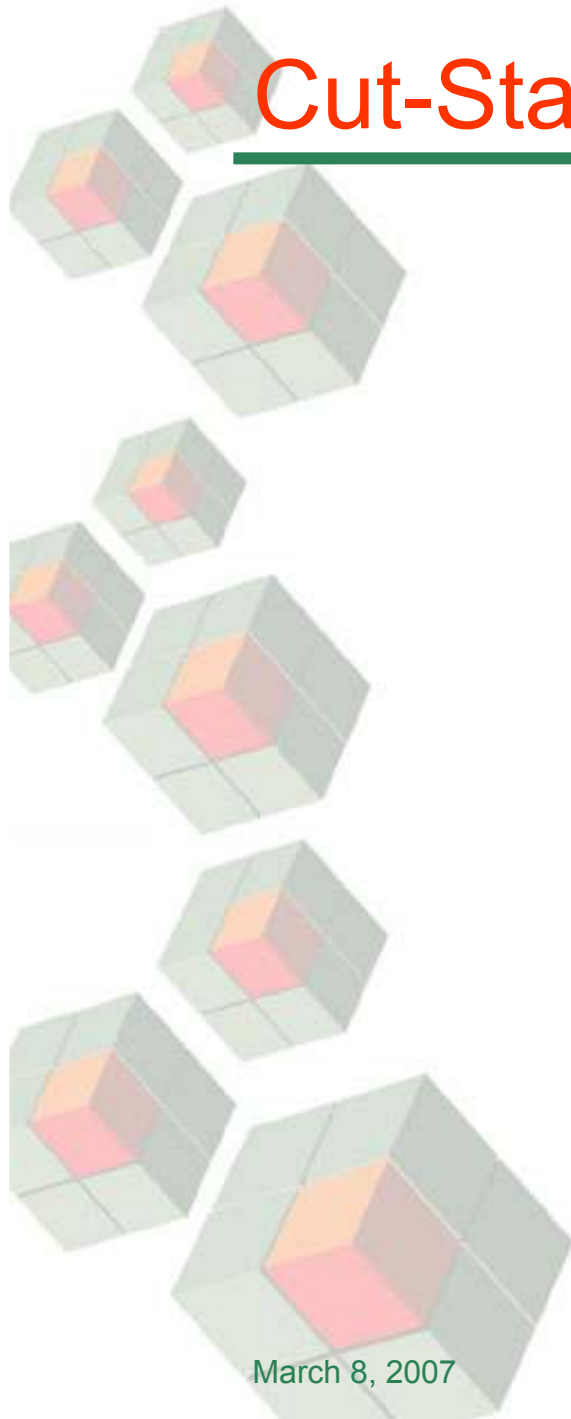
# Cut-stamp Flowrack

- 2-bin System
- No need for entry and tracking in MRP/Accounting



- Manufactured Parts
- Easy for Worker
- Fill the Bin
- Example Part
- Approx. Quantity

# Cut-Stamp Flowrack



# Stockroom Kanban

## Pull – From Supplier

- All locations have a name, used on:
  - PFEP
  - Kanban Cards
  - In computerized inventory control system.

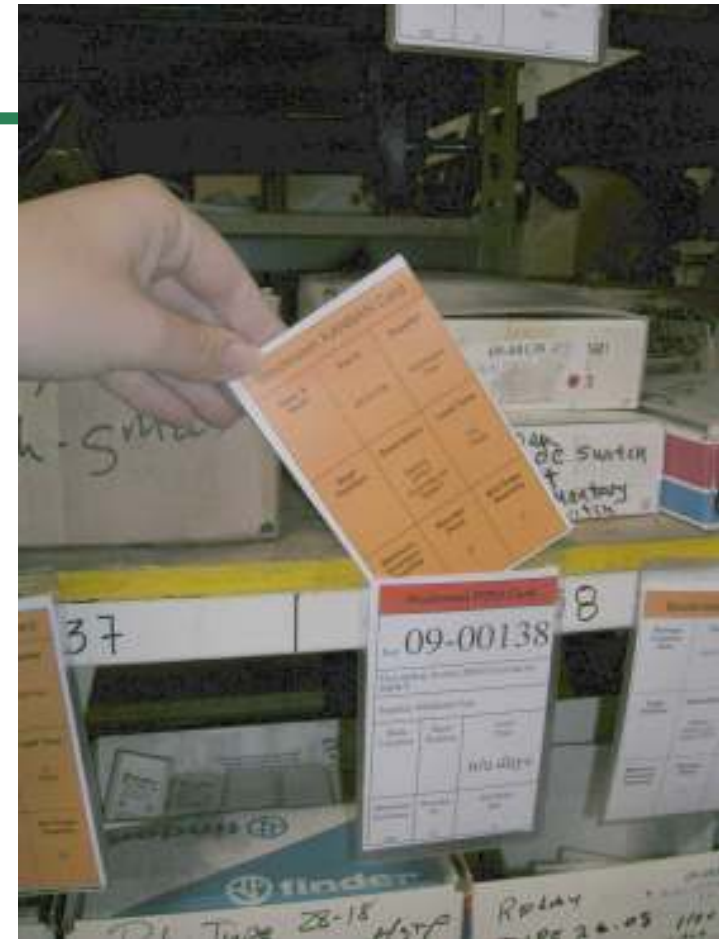




# Information Flow

## Kanban Cards

- Paperless system
- No MRP required
- Automatic reorder



- Plan for every part
- Color coded by type
- Easy to maintain

# Kanban for Small Parts

## How to “attach” card to part

- Kanban cards are in the side pocket in numerical order
- Boxes labeled with essential information
- Numbered shelves and bin positions



# Stockroom Kanban

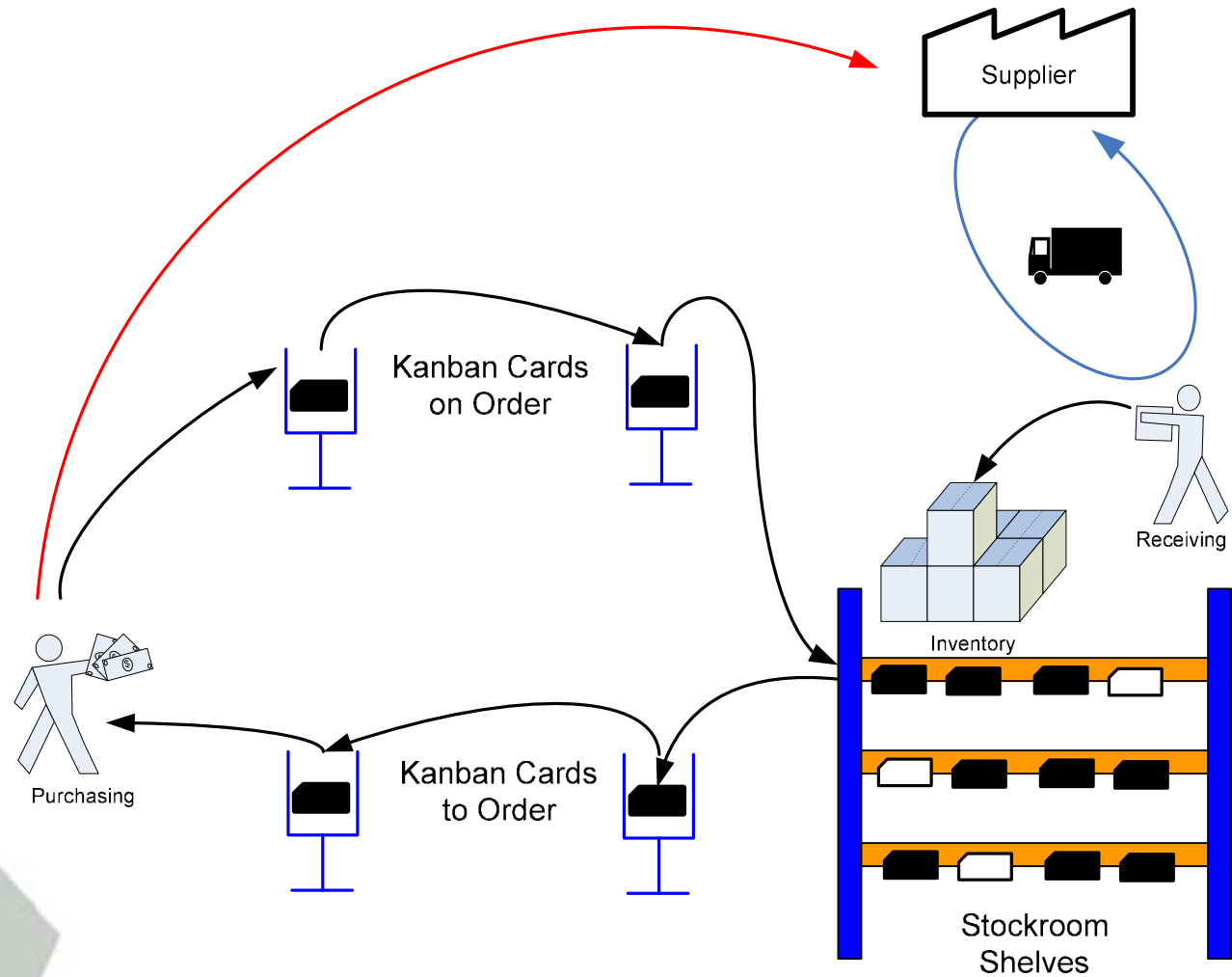
## Kanban Posts – Flow & Status

A Plan for Every  
Kanban Card



# Stockroom Kanban

## Pull – From Supplier





# Supermarket - Pull System Production (Make) Kanban



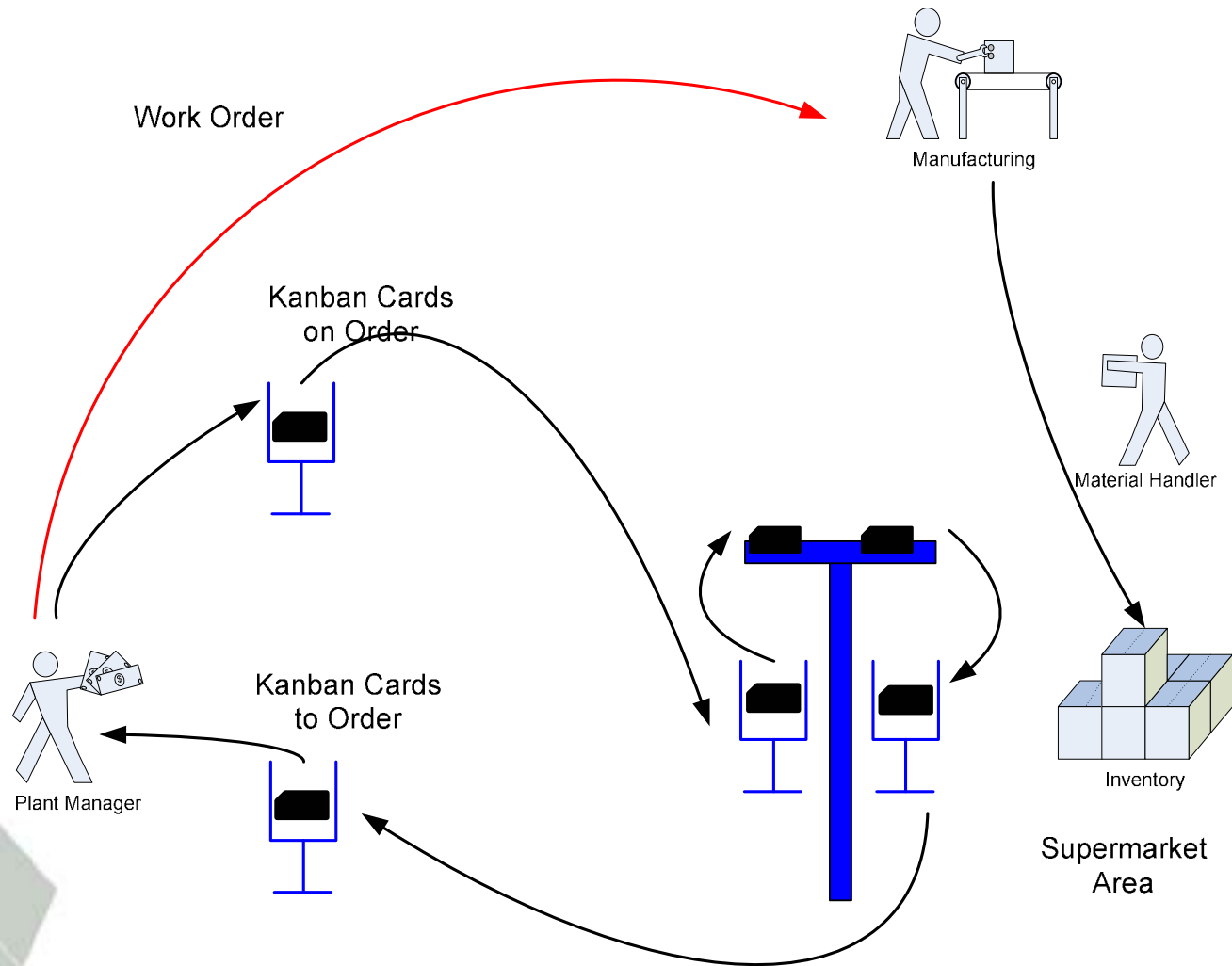
# Supermarket Kanban Cards

- Paperless Reorder
- Visual Information Status
- Auto Reorder Trigger
- Simple Rules for Flow





# Supermarket Production (Make) Kanban





# Preparation for Kanban

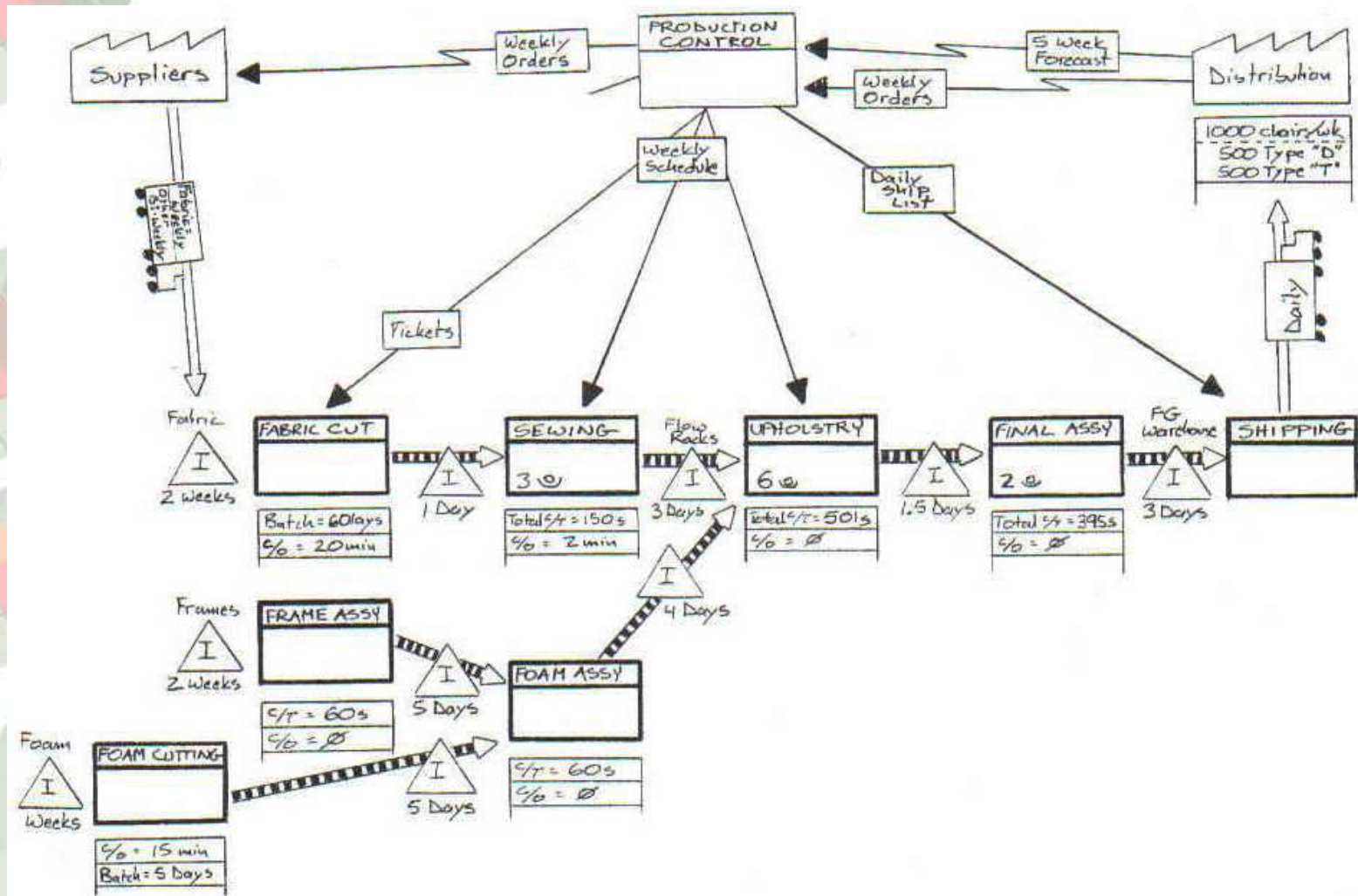
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## Design Work Precedes Cards

- Value Stream Mapping
  - Current State
  - Future State
- Planning both material flow and information flow
- PFEP – Plan for Every Part
- Racks & Bins – Place for Every Part
- Kanban is like the tip of the iceberg: it is the highly visible portion

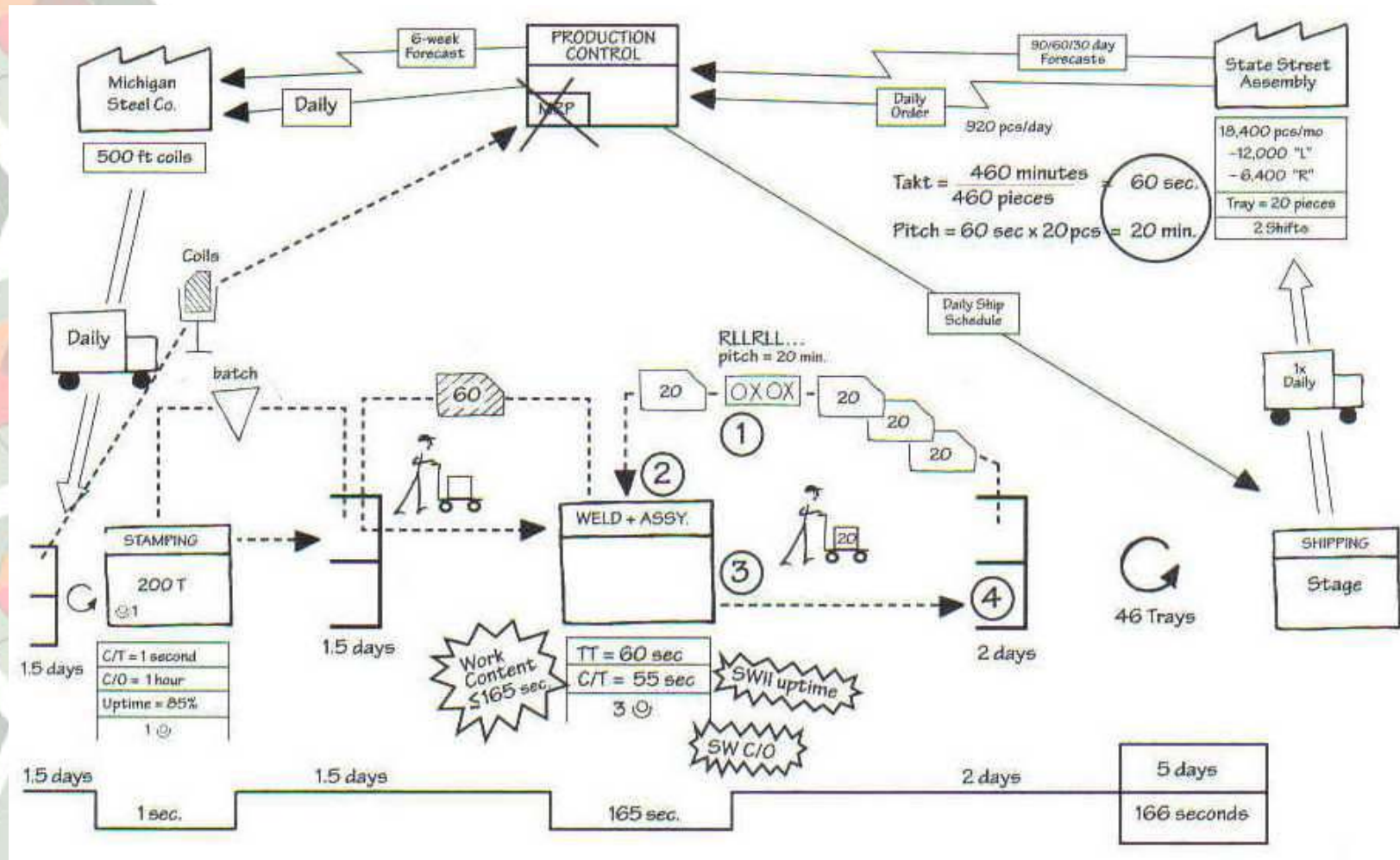
# Value Stream Map

## Current State



# Value Stream Map

## Future State





# PFEP – Plan For Every Part

## Internally Manufactured Parts

Part #	Description	Annual Usage	Daily Usage	Supplier	Length	Width	Height Depth Thick	Qty from 20' bar	Cube	Container Type	Container Wt. (lb.)	1 Part Wt. (lb.)	Container Quantity	Total Pkg. Wt. (lb.)	Required Container Volume	Container Length (in.)	Container Width (in.)	Container Height (in.)	Standard Container Quantity	# Cards in Loop	# Cont.
05-00056	Rail Strap 1001-P	6,290	26	Cut/Stamp	2.5	2	0.125	91,200	0.625	AK-30230	1	0.25	120	31.0	75.0	10.9	5.5	5.0	120	2	2
05-00070	Bearing Shaft 100	3,781	16	Cut/Stamp	0.88		0.500	250,000	0.173	AK-30230	1	0.06	500	31.0	86.4	10.9	5.5	5.0	500	2	2
05-00071	Spacer, Bearing 1	3,763	16	Cut/Stamp	0.375		0.625	500,000	0.115	AK-30230	1	0.02	1000	21.0	115.0	10.9	5.5	5.0	1000	2	2
05-00013	Gear Cover, Lift	2,729	11	Cut/Stamp	1		2.475	200,000	4.000	AK-30255	1	0.094	100	10.4	400.0	10.9	16.5	8.25	100	2	2
05-00057	Rail Strap Lower	2,389	10	Cut/Stamp	7	3	0.125	30,000	2.625	AK-30230	1	0.75	40	31.0	105.0	10.9	5.5	5.0	40	2	2
05-00299	Gear Cover Small	2,331	10	Cut/Stamp	1		1.750	200,000	2.000	AK-30255	1	0.07	200	15.0	400.0	10.9	16.5	8.25	200	2	2
05-00525	Plate, Bearing Mo	1,785	7	Cut/Stamp	4	1	0.125	50,000	0.500	AK-30230	1	0.17	176	31.0	88.2	10.9	5.5	5.0	176	2	2
05-00628	Axle, follower 4	1,548	6	Cut/Stamp	1.25		0.625	175,000	0.383	AK-30235	1	0.063	350	23.1	134.2	10.9	11.0	5.0	350	2	2
05-00629	Spacer, Axle 4 ge	1,536	6	Cut/Stamp	0.625		0.375	350,000	0.069	AK-30230	1	0.02	1400	29.0	96.6	10.9	5.5	5.0	1400	2	2
05-00631	Strap Middle, 4 g	1,312	5	Cut/Stamp	5	1	0.125	45,000	0.625	AK-30230	1	0.18	180	33.4	112.5	10.9	5.5	5.0	180	2	2
05-00111	Drive Chain Assy	1,031	4	Cut/Stamp	9	0.75	0.500	160,000	3.375	AK-30235	1	0.33	91	31.0	306.8	10.9	11.0	5.0	91	2	2
05-00618	Bracket, Pillowl	1,016	4	Cut/Stamp	4	2	0.125	57,000	1.000	AK-30230	1	0.25	120	31.0	120.0	10.9	5.5	5.0	120	2	2
05-00065	Rail Cross Strap	745	3	Cut/Stamp	7.125	1	0.188	32,000	1.336	AK-30230	1	0.37	81	31.0	108.3	10.9	5.5	5.0	81	2	2
05-00011	Spacer, Lift 1000	629	3	Cut/Stamp	2.625	0.5	0.500	86,857	0.656	AK-30230	1	0.09	172	16.5	112.9	10.9	5.5	5.0	172	2	2
05-00098	Spacer, Lift	530	2	Cut/Stamp	3.1	0.5	0.500	73,548	0.775	AK-30230	1	0.094	146	14.7	113.2	10.9	5.5	5.0	146	2	2
05-00108	Rail Cross Strap	497	2	Cut/Stamp	10.5	1	0.188	21,714	1.969	AK-30230	1	0.54	66	36.6	129.9	10.9	5.5	5.0	66	2	2
05-00627	Drive Chain 4 gea	481	2	Cut/Stamp	9.25	0.75	0.500	166,667	0.375	AK-30230	1	0.35	86	31.0	32.1	10.9	5.5	5.0	86	2	2
05-00015	Motor Drive Axle	433	2	Cut/Stamp	3		0.500	76,000	0.589	AK-30230	1	0.18	152	28.4	89.5	10.9	5.5	5.0	152	2	2
05-00004	Rail, Angle Top	412	2	Cut/Stamp	9.187	1	0.750	24,000	4.057	AK-30230	1	0.44	40	18.6	162.3	10.9	5.5	5.0	40	2	2
05-00633	Angle, Top 4 gear	394	2	Cut/Stamp	7	0.75	0.750	32,000	1.313	AK-30230	1	0.33	91	31.0	119.3	10.9	5.5	5.0	91	2	2
05-00614	Bracket, Motor mt	390	2	Cut/Stamp	4	1.5	0.188	57,000	1.128	AK-30230	1	0.07	114	9.0	128.6	10.9	5.5	5.0	114	2	2
05-00613	Bracket, Motor mo	385	2	Cut/Stamp	3	3	1.250	76,000	5.625	AK-30235	1	0.438	50	22.9	281.3	10.9	11.0	5.0	50	2	2
05-00008	End Cap 16x2 7/8	373	2	Cut/Stamp	16	2.875	1.200	1,000	55.200	AK-30265	1	3	8	25.0	441.6	18	8.25	9	9	2	6
05-00061	Rail Cross Strap	371	2	Cut/Stamp	7.156	1	0.188	31,000	1.342	AK-30230	1	0.35	93	33.6	124.8	10.9	5.5	5.0	93	2	2
05-00028	Motor Mount Plate	367	2	Cut/Stamp	2.625	3	0.125	86,000	0.984	AK-30230	1	0.29	86	25.9	84.7	10.9	5.5	5.0	86	2	2
05-00632	Axle, Drive 4 gea	320	1	Cut/Stamp	7		0.500	32,000	1.374	AK-30230	1	0.37	81	31.0	111.4	10.9	5.5	5.0	81	2	2
05-00607	Base Angle w/o nu	318	1	Cut/Stamp	7	0.75	0.750	32,000	1.313	AK-30230	1	0.34	88	31.0	115.8	10.9	5.5	5.0	88	2	2
05-00544	Plate, Mtr Mt Swv	317	1	Cut/Stamp	3.19	3.082	0.780	1,000	3.834	AK-30235	1	0.22	75	17.5	287.6	10.9	11.0	5.0	75	2	2
05-00064	Strap, Lift 1000,	254	1	Cut/Stamp	14.625	3	0.125	15,000	5.484	AK-30255	1	1.55	19	31.0	105.8	10.9	16.5	8.25	19	2	2
05-00017	Chain Shaft, Pill	240	1	Cut/Stamp	2.025	2	0.125	112,000	0.506	AK-30230	1	0.11	112	13.3	56.7	10.9	5.5	5.0	112	2	2
05-00611	End Cap Plasma 1	240	1	Cut/Stamp	9	4.5	1.500	1,000	30.375	AK-30265	1	1.675	18	31.0	544.0	18	8.25	9	18	2	2
05-00612	End Cap Plasma 1	240	1	Cut/Stamp	9	4.5	1.500	1,000	30.375	AK-30265	1	1.675	18	31.0	544.0	18	8.25	9	18	2	2
05-00634	Angle, Bottom 4 g	236	1	Cut/Stamp	8	0.75	0.750	28,000	1.500	AK-30230	1	0.33	91	31.0	136.4	10.9	5.5	5.0	91	2	2
05-00060	Drive Chain Assy	220	1	Cut/Stamp	11.675	0.75	0.500	9,000	4.378	AK-30255	1	0.46	65	31.0	285.5	10.9	16.25	8.25	65	2	2
05-00096	End Cap 20x3.5 1	197	1	Cut/Stamp	20	3.5	1.200	11,000	42.000	AK-30265	1	4.14	7	31.0	304.3	18	8.25	9	7	2	2
05-00640	Rail, Bottom KD p	185	1	Cut/Stamp	5	1	0.125	45,000	0.625	AK-30230	1	0.24	125	31.0	78.1	10.9	5.5	5.0	125	2	2
05-00639	Angle, Bottom KD p	181	1	Cut/Stamp	5	0.75	0.750	45,000	0.938	AK-30230	1	0.24	125	31.0	117.2	10.9	5.5	5.0	125	2	2
05-00637	End Cap KD Plasma	86	29	Cut/Stamp	9	4.5	1.500	1,000	30.375	AK-30265	1	1.9	16	31.0	479.6	18	8.25	9	16	2	2
05-00638	End Cap KD Plasma	86	29	Cut/Stamp	9	4.5	1.500	1,000	30.375	AK-30265	1	1.9	16	31.0	479.6	18	8.25	9	16	2	2

# Making a Kanban Card System

## Bill of Materials

- Color Printer
- Template: Word
- PFEP: Excel

### Multi-Card Holders



Made of 1/8" thick polystyrene plastic. **Key-slot mount holders** have two keyhole mounting slots and 5/32" dia. mounting holes. Style A has five mounting holes; Style B has three mounting holes. Fasteners not included.

Style	Holder			Key-Slot Mount (Black)		Self-Adhesive (Black)		Self-Adhesive (White)	
	Ht. x Wd.	Dp.		Each	Each	Each	Each		
A	7 1/4" x 3 3/8"	1/8"		4648T3	\$2.25	4648T21	\$2.30		
B	3 1/2" x 8"	5/8"		4648T2	2.47	4648T12	2.52		
C	5 1/2" x 4 1/4"	1 1/4"				4648T34	3.73	4648T23	\$3.73
C	5 1/2" x 4 1/4"	2"				4648T35	4.38	4648T24	4.38

### Multi-Mount Card and Tag Holder



Store multiple cards, tags, ties, and marking pens in this clear acrylic holder. It includes screws, magnetic strips, and adhesive pads for mounting versatility.  
Holder is 7 1/8" Ht. x 4 1/2" Wd. and 1 1/2" Dp. Mounting holes are 1/8" dia.

1259T3 ..... Each \$10.31

### Hang-Up Tag Protectors



Made of tough, 0.009" thick clear vinyl, these protectors have a 3/16" reinforced brass grommetted hole at the top for hanging.

Max. Tag Size Ht. x Wd.	Standard Industry No.	Pkg. Qty.	Per Pkg.
4" x 1 3/4"	2	10	1715T11 ..... \$6.12
4 1/4" x 3"	5	10	1715T12 ..... 7.40
5 1/2" x 3"	6	10	1715T13 ..... 7.63
6 1/4" x 3 3/8"	8	10	1715T14 ..... 8.16
7 1/8" x 3 3/8"	9	10	1715T15 ..... 8.55
7 1/2" x 4"	10	10	1715T16 ..... 8.91

### Tag Protectors with Inserts



Ready to use, these clear plastic protectors come with blank white cardstock inserts. Protectors are 0.010" thick and have a matte finish that reduces glare—great for bar codes.

Max. Tag Size	Holders		Repl. Cards	
	Pkg. Qty.	Per Pkg.	Pkg. Qty.	Per Pkg.
<b>Self-Adhesive</b>				
3" x 5"	10	9696T1 ..... \$6.48	52	9696T5 ..... \$9.71
4" x 6"	10	9696T3 ..... 7.80	50	9696T6 ..... 12.50
<b>Magnetic</b>				
3" x 5"	10	9696T2 ..... 9.00	52	9696T5 ..... 9.71
4" x 6"	10	9696T4 ..... 11.43	50	9696T6 ..... 12.50

### Two-Pouch Hang-Up Tag Protectors



Display two different size tags in one protector. Made of 0.008" thick clear vinyl, they have a 1/4" hole for hanging.

Max. Tag Size Top	Max. Tag Size Bottom	Pkg. Qty.	Per Pkg.
2 1/2" x 3 3/4"	4 1/4" x 3 3/4"	10	4430T4 ..... 6.34
6 1/2" x 5 1/2"	2" x 5 1/2"	10	4430T5 ..... 7.13

1808

McMASTER-CARR

Material	Supplier	Part Number	Pkg Qty	Pkg Cost	Order Qty	Total Cost
Replacement Cards, 3"x5"	McMaster-Carr	9696T5	52	\$9.71	5	\$48.55
Tag Protectors with Inserts, 3"x5", Self-Adhesive	McMaster-Carr	9696T1	10	\$6.48	50	\$324.00
Tag Protectors with Inserts, 3"x5", Magnetic	McMaster-Carr	9696T2	10	\$9.00	10	\$90.00
Multi-Card Holder, Style A Black	McMaster-Carr	4648T3	1	\$2.25	10	\$22.50
Multi-Card Holder, Style B Black	McMaster-Carr	4648T2	1	\$2.37	10	\$23.70

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# Design of the Kanban Card

Stockroom KANBAN Card		
Part #	Rack Location	Shelf Position
<b>XX-XXXXX</b>	<i>A1</i>	<i>a</i>
Supplier	Description	Lead Time
G&S Sheet Metal	Table Leg Inner 48	40 Days
Minimum Inventory Quantity	Reorder Point	Std Order Quantity
1	5	20

*Italics – data to be handwritten*

Stockroom INFO Card		
Part: <b>XX-XXXXX</b>		
Description: Spacer Bearing K-D Plasma		
Supplier:		
Rack Location	Shelf Position	Lead Time
<i>A1</i>	<i>A</i>	<b>10 days</b>
Minimum Inventory	Reorder Pt.	Std Order Qty.
18	68	100

*Italics – data to be handwritten*

# Training

## Kanban Cards are easy!

- Put the first system out onto the floor.
- Walk people through the path of the material and the cards
- Takes 10 minutes
- Workers will remember it
- No remedial training needed





# Kanban in the electronic age

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## Don't computerize unless necessary

- Electronic Kanban can be used for interfacing with suppliers
- Supplier sets up a 2-bin system and standard shipment size according to usage rate (quantity vs. time)
- Simple – send a picture of the Kanban as an attachment to the e-mail
- Sophisticated – the 2 MRP systems talk to each other, sending kanbans.
- The key to success is the PFEP



# Why do a Kanban implementation?

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- Eliminate counting and tracking of:
  - Very low value parts. Counting can cost more than the value of the part!
  - Internally manufactured parts. Why track it in the MRP system if you don't have to?
- Support a Lean Manufacturing initiative
  - Just in time manufacturing
  - Avoid stock outs
  - Improve quality
- Reduce paperwork
- Plant floor “runs itself”



# Does Kanban Replace MRP?

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## What about the computer?

- Kanban can replace MRP system
- Partial replacement is more common
- Pick one or the other
- Ask the question: what is the control loop, and how will replenishment work?
- Remember
  - MRP is push (requires forecasting)
  - Kanban (and Lean) are pull





# Seven Rules

## For Using Kanban Effectively

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- **Start with a Plan.** The PFEP (Plan for Every Part) is the cornerstone of the Kanban Card Implementation.
- **Order Only What You Need.** Customer processes order goods in the precise amounts specified on the Kanban.
- **Make Only What is Ordered.** Supplier processes produce goods in the precise amounts and sequence specified by the Kanban.
- **Kanban is Official.** No items are made or moved without a Kanban.
- **Material w/o Info is Trouble.** All parts and materials always have a Kanban attached.
- **Quality is #1.** Defective parts and incorrect amounts are never sent to the next process.
- **Goal is EOQ=1.** The number of kanban is reduced carefully to lower inventories and reveal problems.

# References

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## Books describing Kanban Systems

- Chapter 11 - Krajewski & Ritzman  
*Operations Management: Strategy and Analysis, Seventh Edition* © 2004  
Prentice Hall, Inc.
- The Lean Pocket Guide, MCS Media,  
<http://theleanstore.com>
- Lean Lexicon, 2<sup>nd</sup> Ed., [www.lean.org](http://www.lean.org)
- NavSup\_529.pdf, [www.strategos.com](http://www.strategos.com)
- Making Materials Flow, [www.lean.org](http://www.lean.org)