

KANBAN PRODUCTION CONTROL

Assoc. Prof. Dr. Muhamad Zameri
b. Mat Saman



Introduction

- The concept of a 'Pull System'
- A visual signal triggers material movement to a work centre only when that work centre is out of work or ready to begin the next job
- Effective eliminate queues at work centers



Pull Characteristics

- The signal governing material movement from the work center comes from the user of the material not from a planning source
- The output from a work center sits at that work center until demand by the downstream using work center



Necessary Condition

- Planning and control responsibility (everybody)
- Production to meet demand (no overproduction)
- Reduce in process inventories (remove unnecessary stock)
- Preventive Maintenance (eliminate breakdowns, since breakdowns will halt an operation and soon after entire process)



Necessary Condition

- Quality assurance (preventing defects from happening – carry minimal buffers and allow no defective items to proceed through the process, defects and quality problems will halt production flow)
- Set-up times must be small
- Plant layout must facilitate linking of all operations into the process (cell)
- Production plans and schedules must be somewhat uniform (line balancing)
- Developing cooperative work attitudes and teamwork



Kanban System

- Kanban is 'sign or signal'
- It ensures work is 'pulled' by the customer
- Ensures delivery of the right item at the right time in the right amount



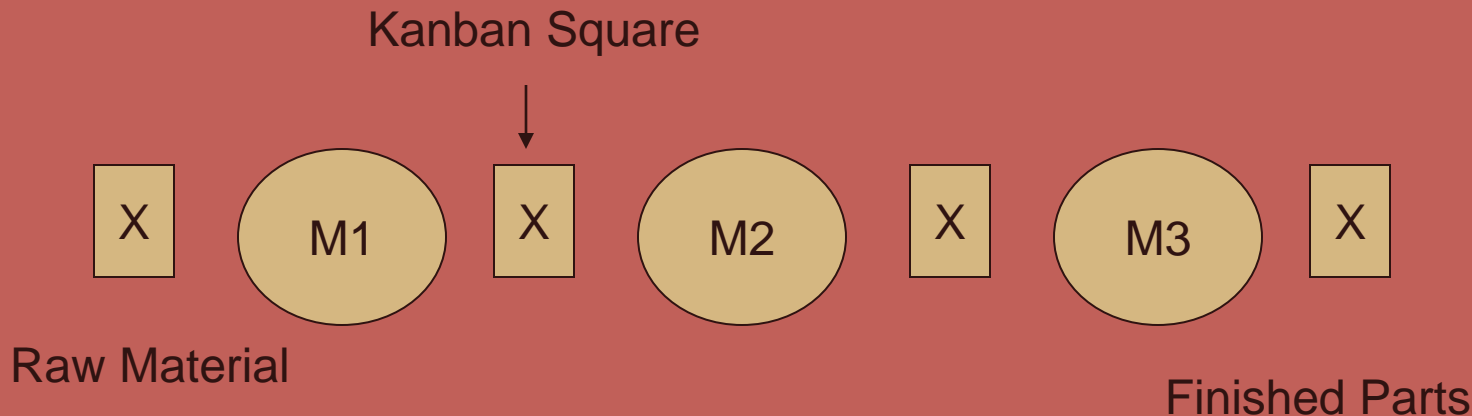
Kanban Help:

- To sequence production by clarifying how much of a specific item must be produced and transported
- Control the location of materials
- Control the user of labour
- Adjust to slight production fluctuations
- Identify areas for improvement (too many or too few Kanbans in an area suggest problems)



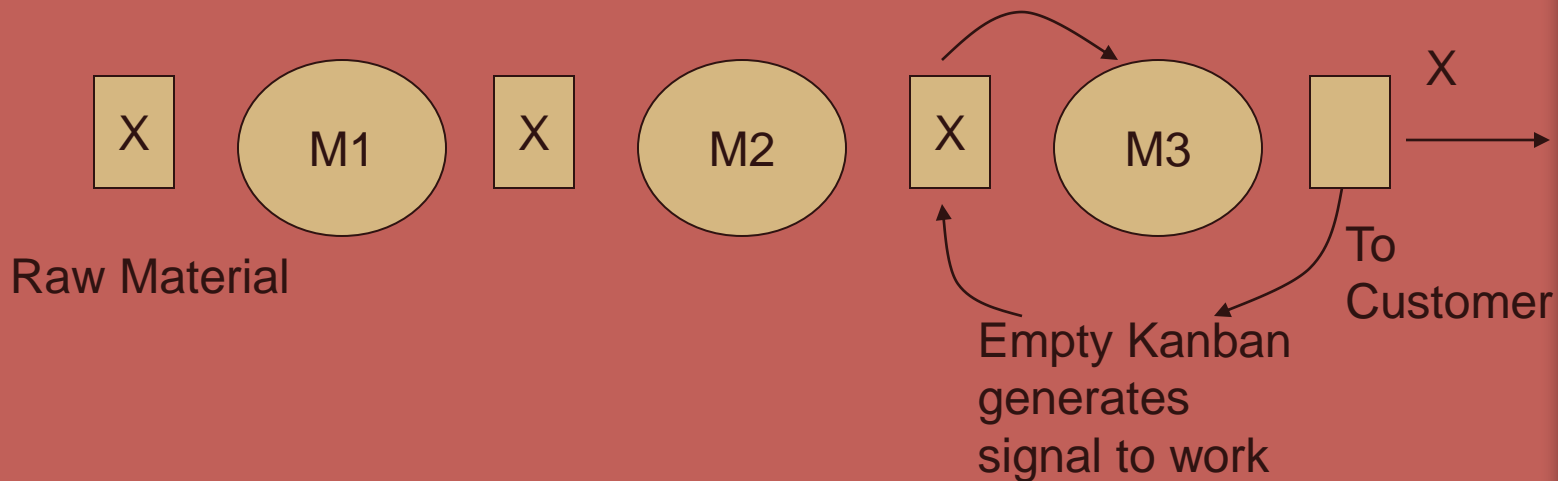
Kanban Control System

- Figure shows all the machines with finished work in the Kanban squares, therefore no machines can work at this present moment in time as no signal exists



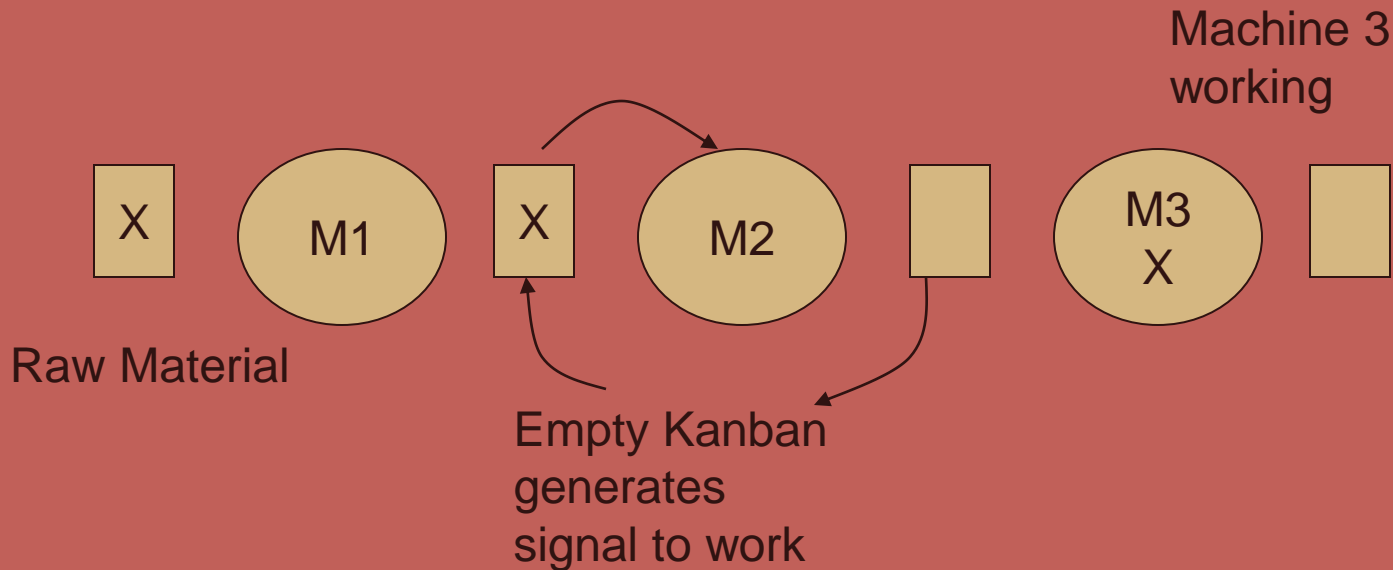
Kanban Control System

- A finished part taken from the end of the line
- This generates an empty Kanban (a visible system) on front of Machine 3
- Machine 3 takes work from the Kanban feeding his machine and starts work



Kanban Control System

- An empty Kanban in front of Machine 2
- With this signal Machine 2 takes work from the Kanban feeding his machine
- This will then generate a signal for Machine 1 to start work and so on

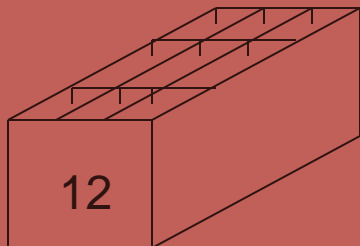


Kanban Control System

- Card also can be used as Kanban signals

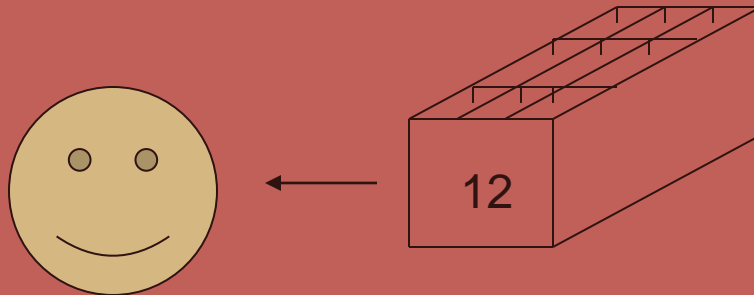
Quantity: 12
Part no: 6789
From: Moulding
To: Polishing

- The Kanban card is often fixed in a container that is just large enough to carry the items, the container itself can be regarded as a Kanban



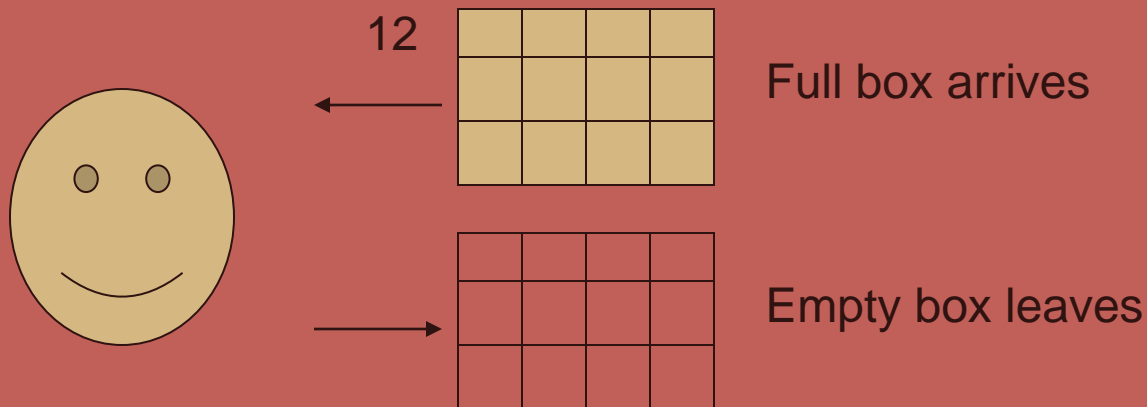
Kanban Control System

When a Kanban arrives it tells the operator to make 12 units



Kanban Control System

Usually empty containers are exchanged for full ones – the container is a re-circulating order, no paperwork is needed



Kanban Control System

It is important to follow five rules for Kanban to work:

- No defective parts must be sent to the next step in the process
- Parts must be pulled by the next step in the process using a Kanban
- Only the number of parts shown on the Kanban must be produced and in the other given
- Fluctuation in production must be kept to a minimum by using leveled scheduling, quick changeovers and preventive maintenance
- The movement of full and empty Kanbans must be synchronised so only one journey is made

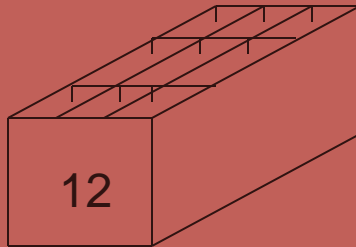


Different Forms of Kanban

Cards

Quantity: 12
Part no: 6789
From: Moulding
To: Polishing

Containers

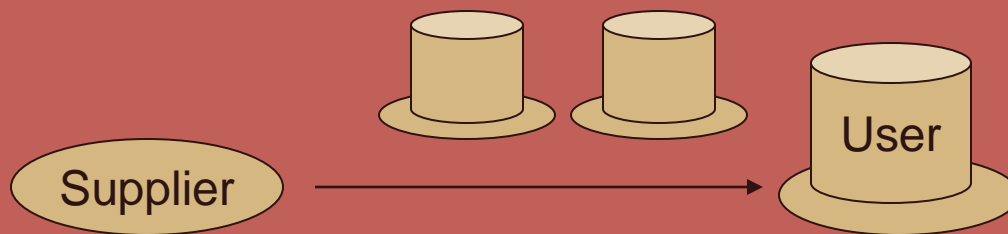


Different Forms of Kanban

Light signals

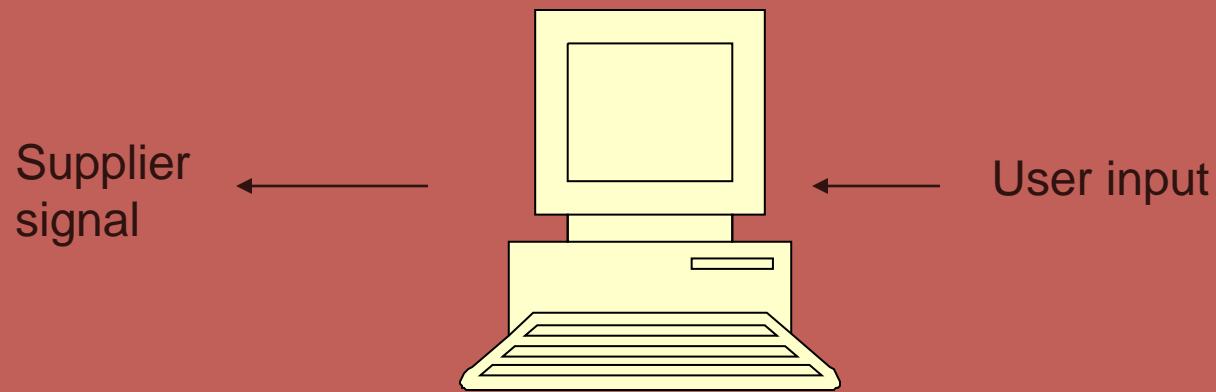


Floor markings




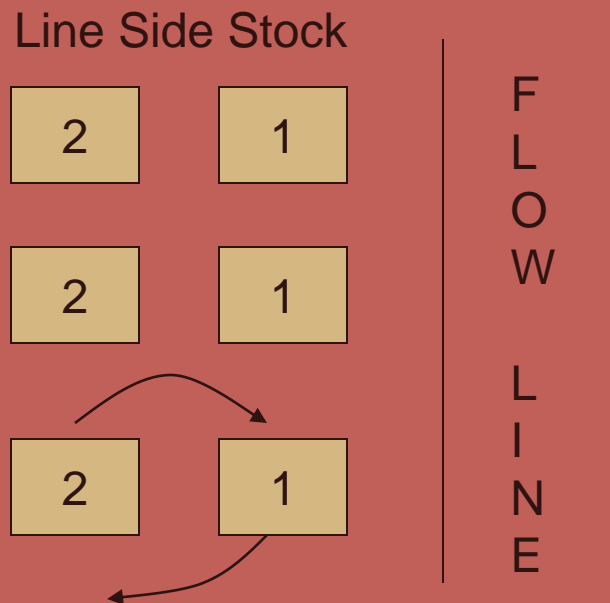
Different Forms of Kanban

Computer signals



Kanban (Two Bin) System

 To control high volume, low value stock on a flow line



When empty **Container 1** signals for replenishment via empty container or Kanban card

Container 2 is used immediately



Single Card Kanban System

1. Conveyance Kanbans

- C-kanban or move or withdrawal kanban
- To move a container
- No container can be withdrawn unless a C-Kanban has been issued

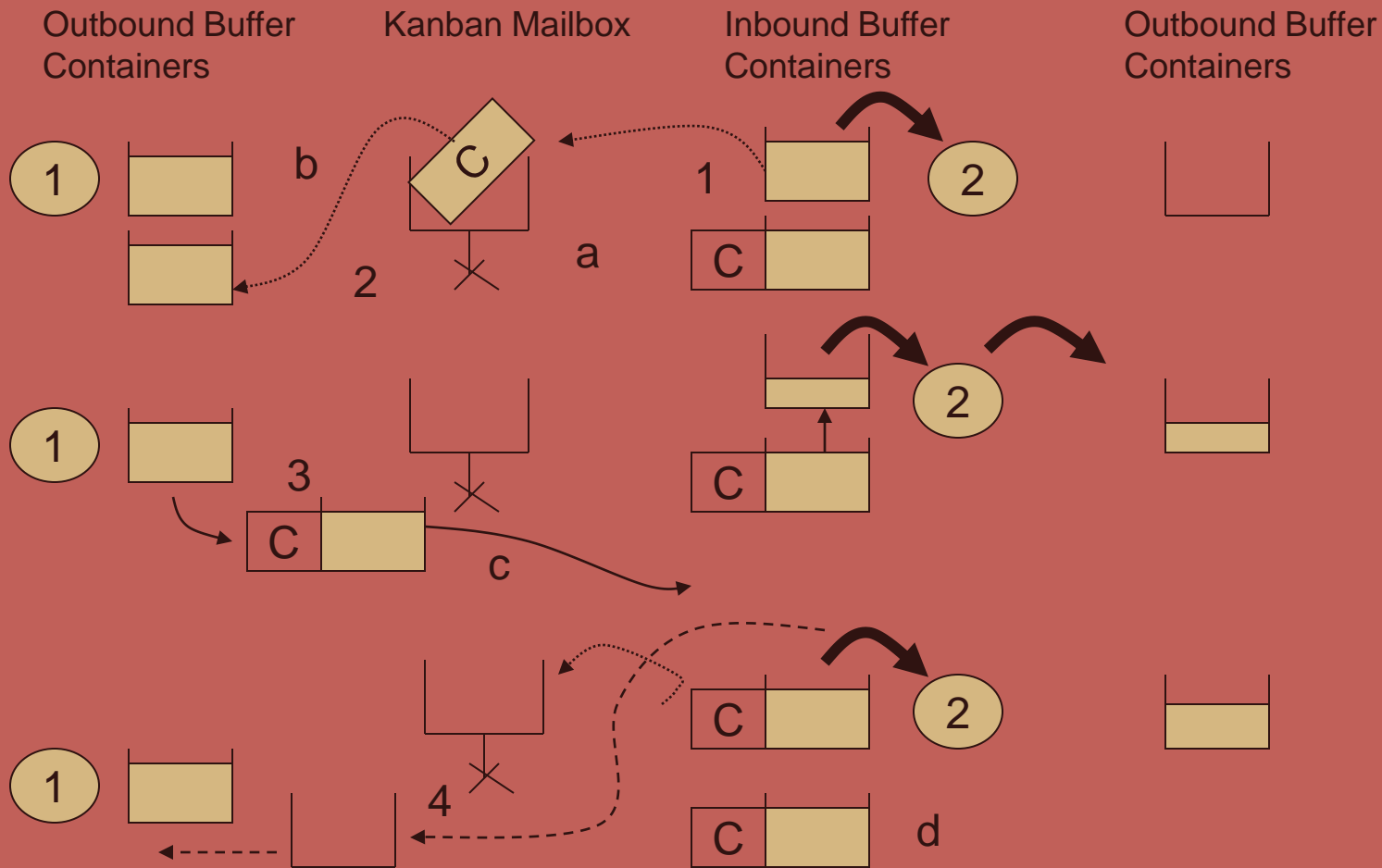


Conveyance Kanbans

- STEP 1: When operator at station 2 first access a full container, they take the C-Kanban from it and place it in a kanban mailbox. The mailbox is the place where cards are kept or posted. The C-Kanban specifies the kind material needed and the upstream station from which to get it
- STEP 2: A material handler reads the C-Kanban and takes it to the specified upstream station (Station 1)
- STEP 3: The material handler affixed the C-Kanban to a full container (Station 1), then takes the container back to Station 2
- STEP 4: Whenever Station 2 empties a container, the material handler takes the container upstream to Station 1. Often Steps 2 and 4 are combined so that the material handler takes the card and empty container in a single trip. The process then repeats







Conveyance Kanbans



Conveyance Kanbans

Legend

Process (From) No. 1		Process (To)	
Machining		No. 2	
Part No.	M-187		
Name of Part	Rim	Assembly	
Container Type	8		
Container Capacity	3	7/16	

-  Material
-  Card
-  Full container and card
-  Empty container



Two Card Kanban System

2. Production Kanban (P-Kanban)

- Which is used to authorise production of parts or assemblies
- No production is allowed without it
- Except at the final station in the process, there are no production schedules, just P-Kanban authorisations
- A system that uses both C-Kanban and P-Kanban is called a two-card pull system

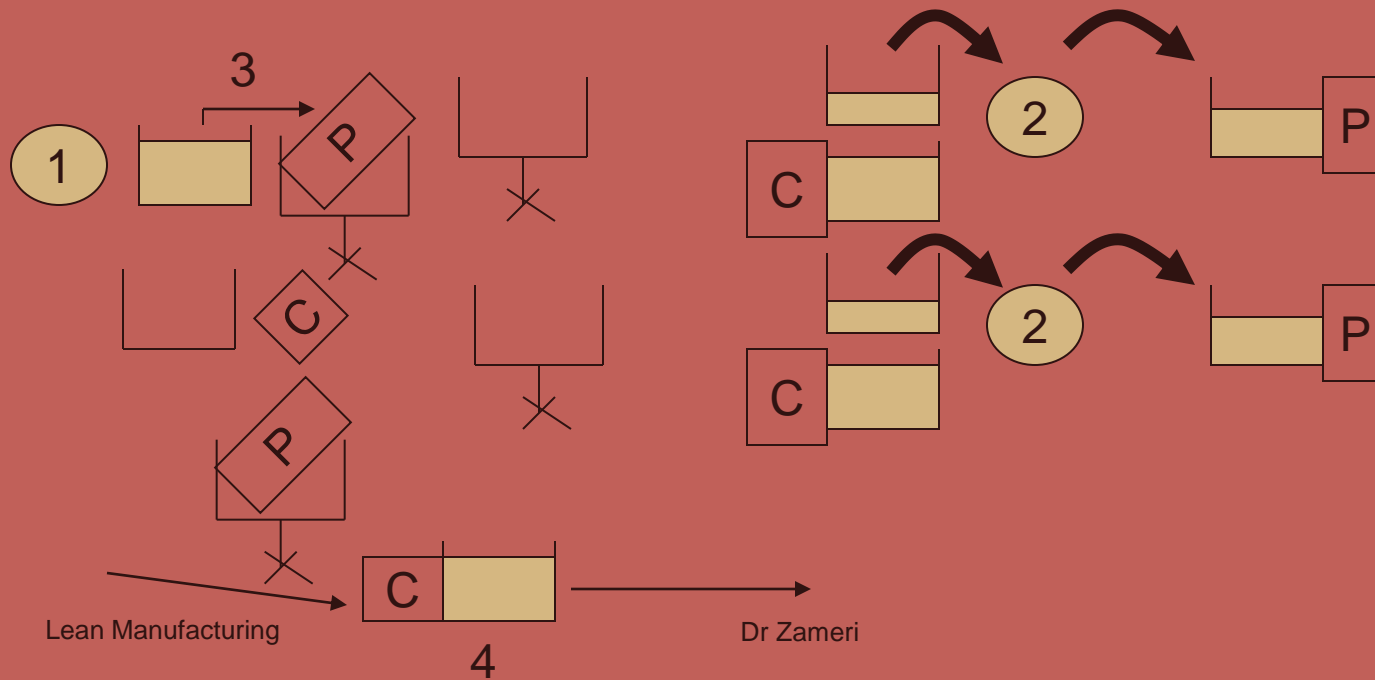
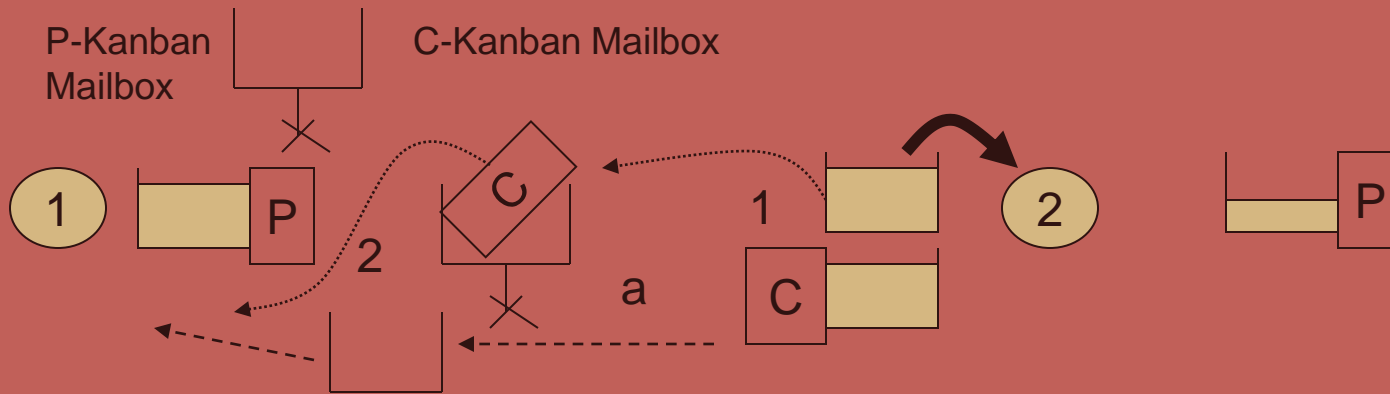


Production Kanban (P-Kanban)

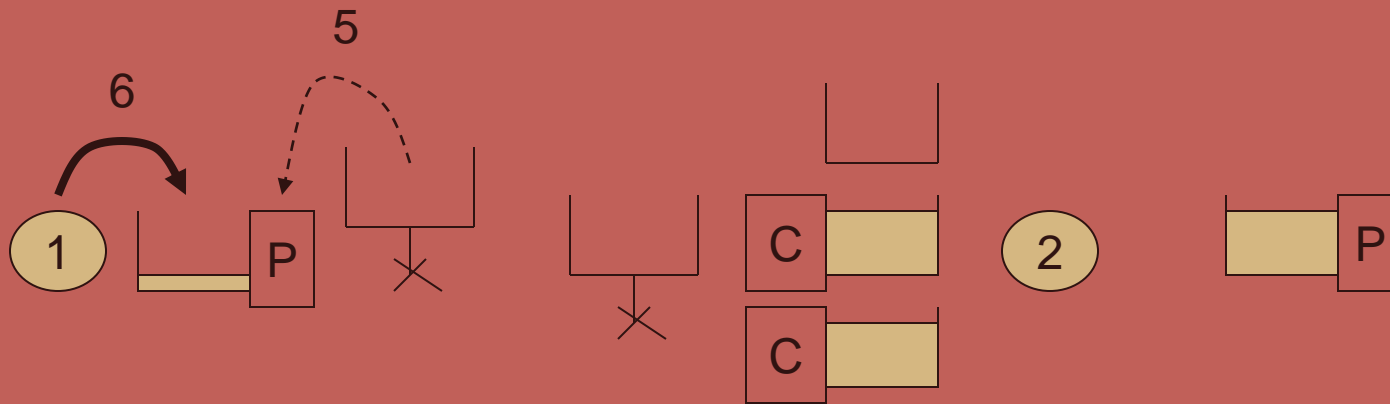
- STEP 1: When operators at Station 2 access a full container, they remove the C-Kanban and place it in the C-Kanban mailbox. The C-Kanban specifies the material needed and the upstream station that produces it
- STEP 2: A material handler takes the C-Kanban and an empty container to the specified upstream location (Station 1)
- STEP 3: The material handler removes the P-Kanban from a full container at Station 1, puts it in the P-Kanban mailbox, then affixes the C-Kanban to that container
- STEP 4: The material handler leaves the empty the empty container at Station 1 and takes the full container downstream to Station 2
- STEP 5: The P-Kanban in the mailbox authorises Station 1 to product enough material ti fill an empty container. An operator removes the P-Kanban from the mailbox and affixes it to an empty container
- STEP 6: Station 1 produces just enough material to fill the empty container



Production Kanban (P-Kanban)







Production Kanban (P-Kanban)



Production Kanban (P-Kanban)

Legend

Part No.	M-187		Part No.
Name of Product	Rim		Machining
Container Type	8	No. Issued	
Container Capacity	3	7/16	
			No. 1

-  Material
-  Card
-  Full container and card
-  Empty container



Production Kanban (P-Kanban)

- The same procedure happens at Station 2, that is, production will not begin until a P-card is posted in its own P-Kanban mailbox
- When the card is posted, Station 2 then begins producing, which requires that it access a full inbound container
- The C-Kanban from that container is posted and then process repeats



Production Kanban (P-Kanban)

- The two card system gives tight control over buffer inventories
- No container can be moved or filled unless there is a C-Kanban or P-Kanban, respectively, authorising it
- Standard sized containers (buffer) is the transfer and production capacity



Implementation of Kanban System

- Identify the inputs needed for each step in the process
- Work backwards from the final step in the process and use the Takt Time and cycle time of each step to calculate the optimum size and number of Kanbans required
- Identify suitable containers (size, shape, strength) to use, ensure they are the right size for the number of units (neither too large nor too small). Label them clearly
- Prepare Kanban cards to go in the containers if necessary. Keep them small, clear and simple



Implementation of Kanban System

- Mark places on the floor/work surface for the full and empty Kanbans to go. Ensure they are just the right size
- Ensure the Kanbans are easy and safe to move, add handles/wheels/finger holes etc. as appropriate
- Train everyone to use the Kanbans
- Implement the system
- Closely monitor progress and quickly sort out imbalances

