VALUE STREAM MAPPING

Learning to see

FUTURE STATE

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ACME future state

KEY QUESTIONS FOR FUTURE-STATE DESIGN

1. **What is the takt time?**
2. Will you build to a finished goods supermarket, or directly to shipping?
3. Where can you use continuous flow processing?
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5. At what single point in the production chain (the “pacemaker process”) will you schedule production?
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Takt time

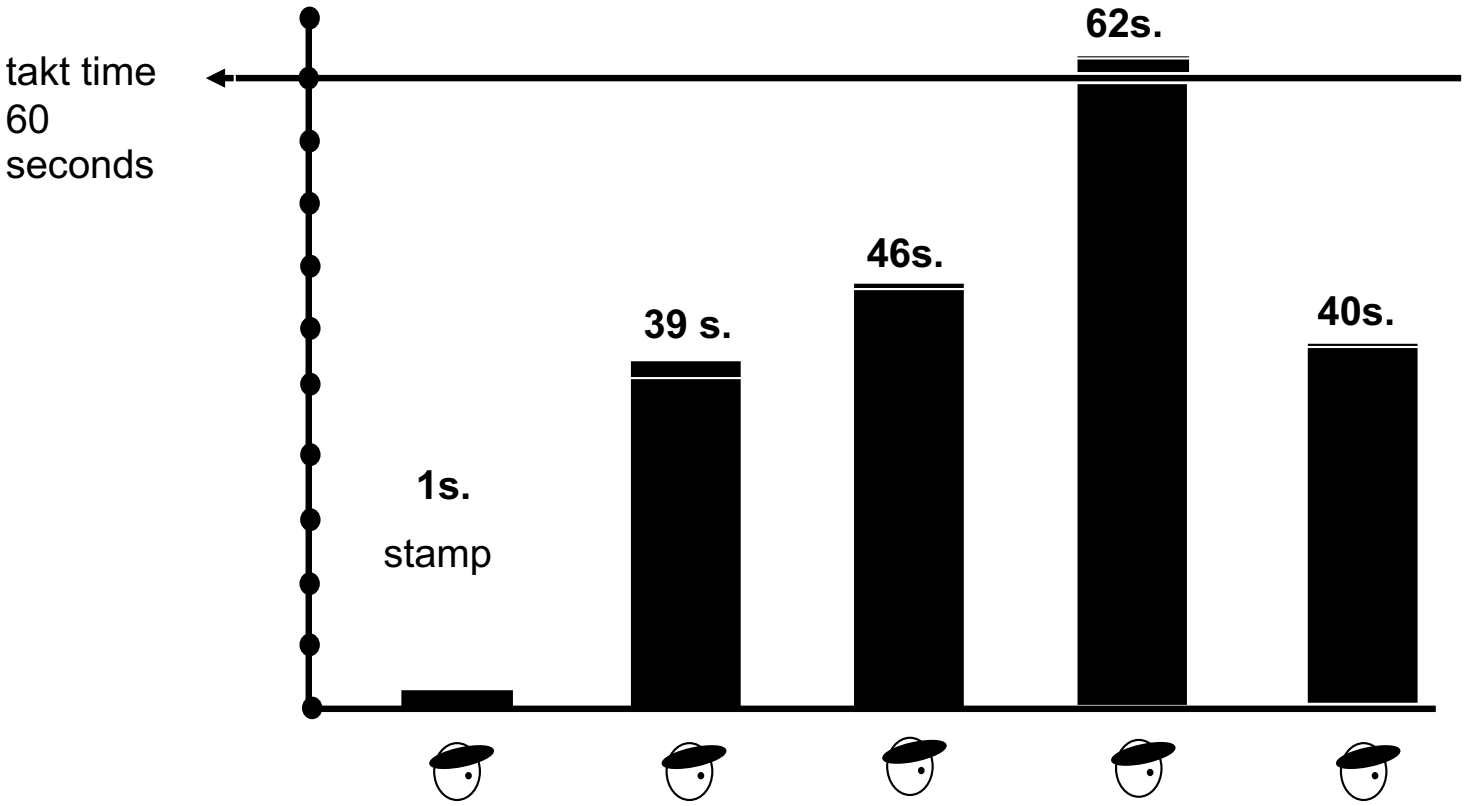
Available Working Time: 28,800 – 1200 = 27,600 seconds per shift

Available Working Time = 27,600 sec. / 460 units per shift

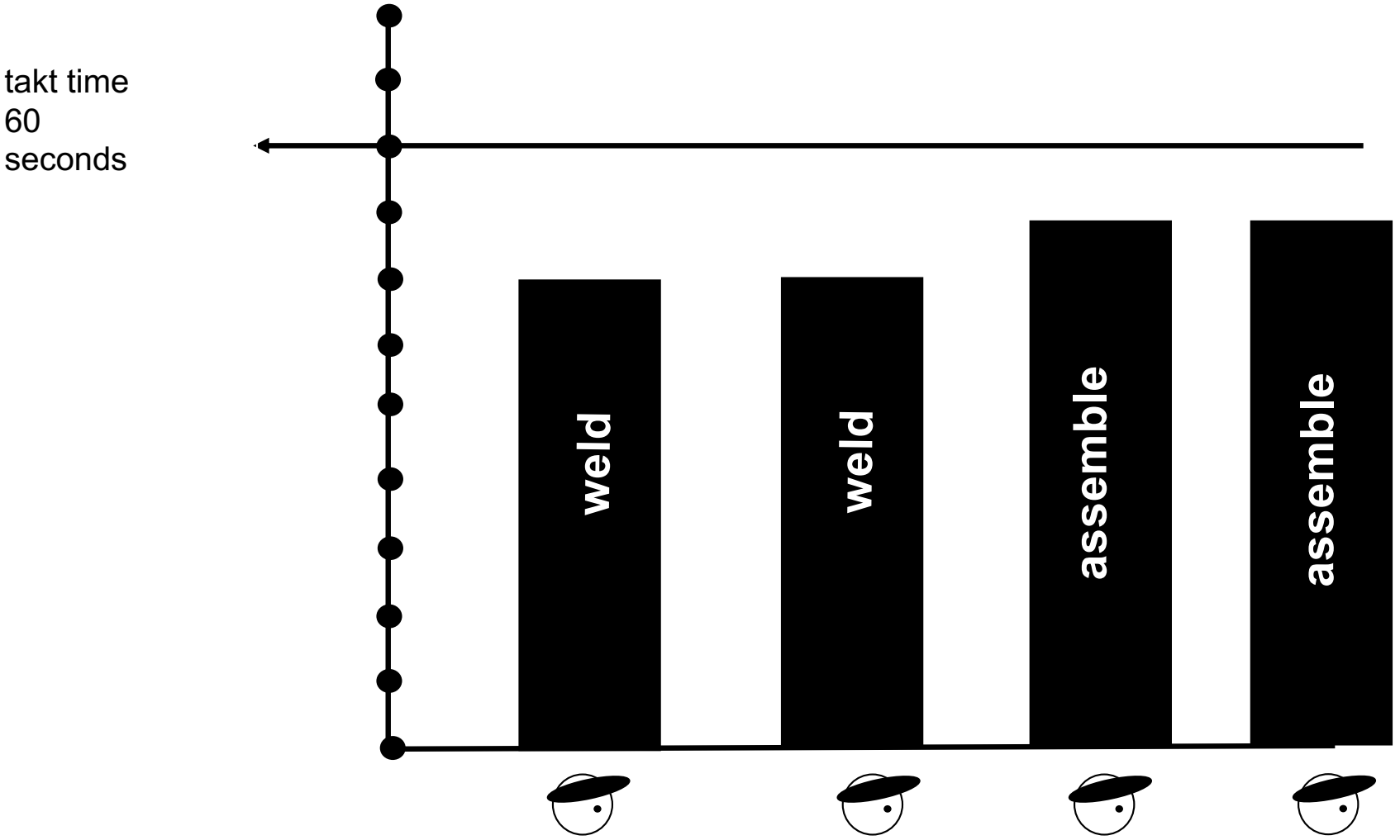
Customer Demand

Acme Steering Bracket Assembly Takt Time = 60 seconds

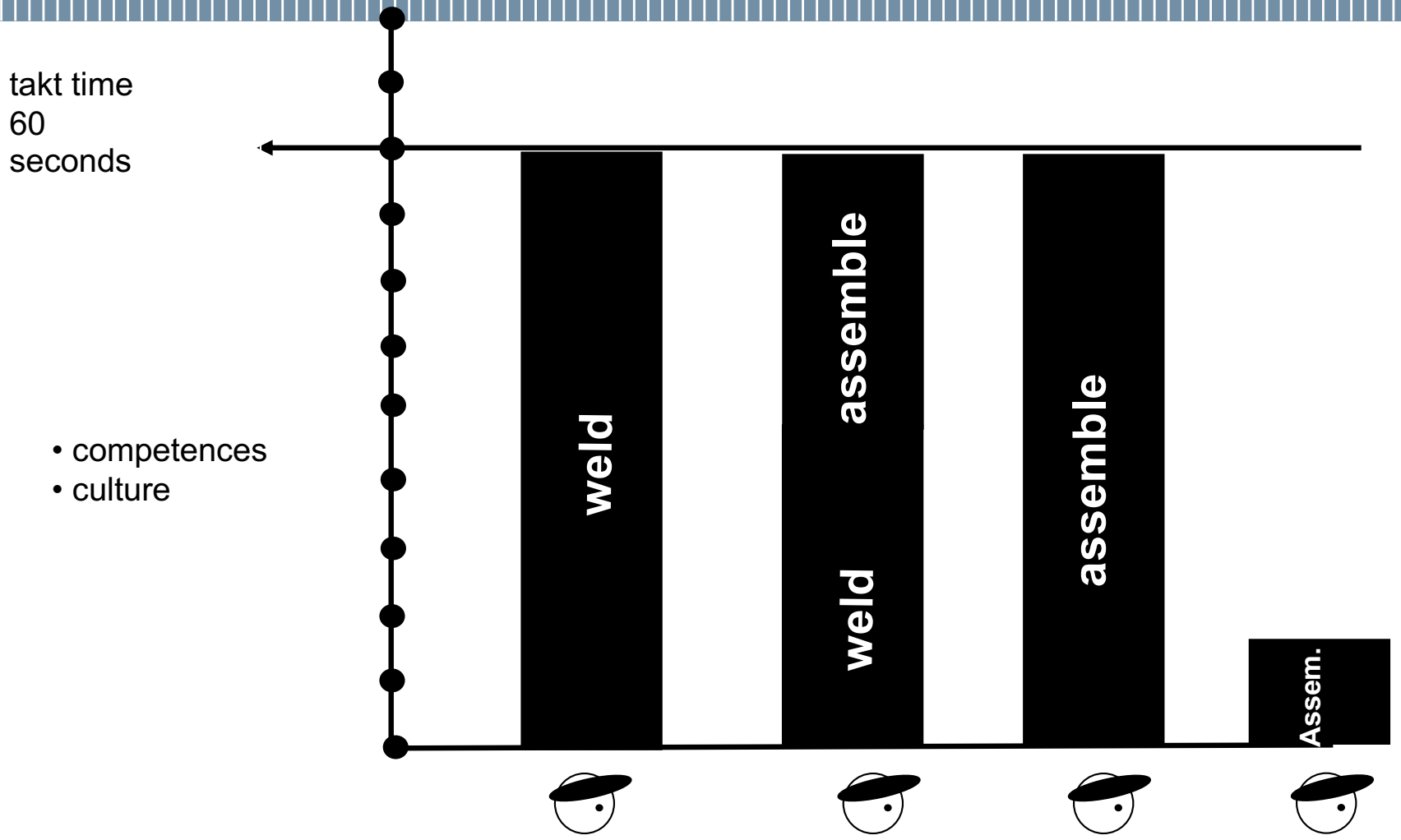
Acme stamping current cycle time



Line balancing

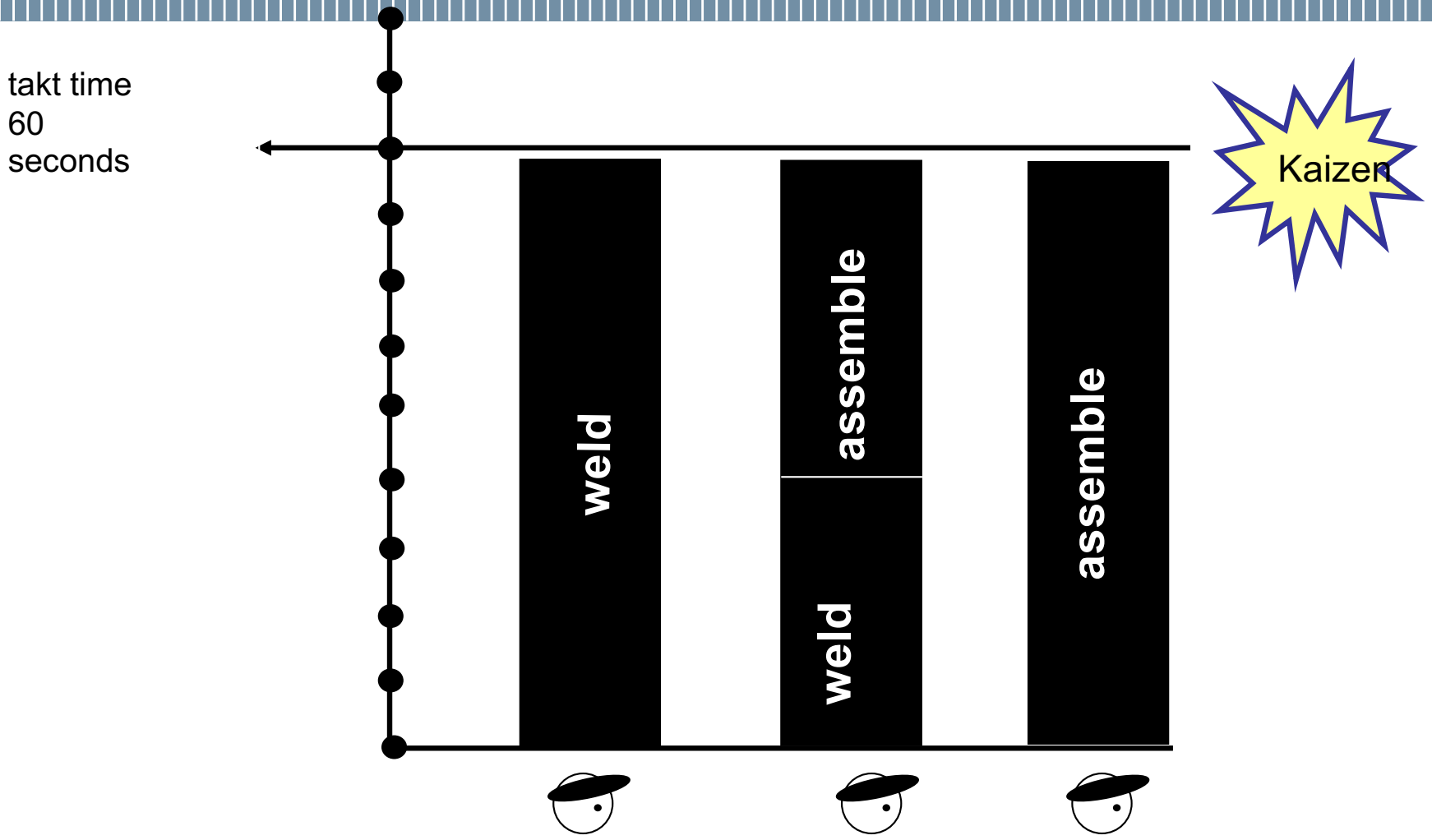


Takt time



Lean approach

Takt time



Ideal situation (pursue perfection)

Waste quantification

Minimum number of people

Work content / Takt Time

ACME future state

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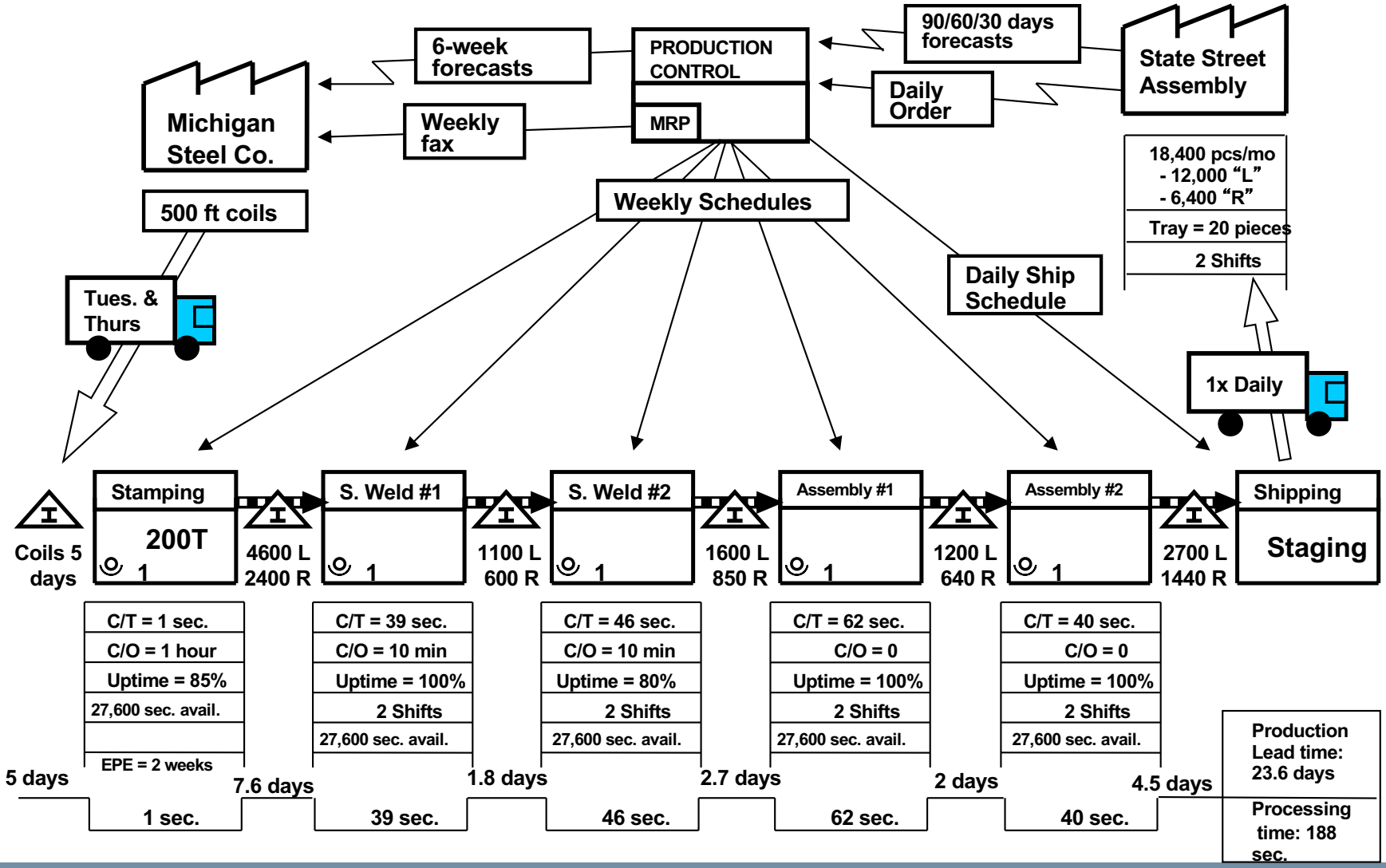
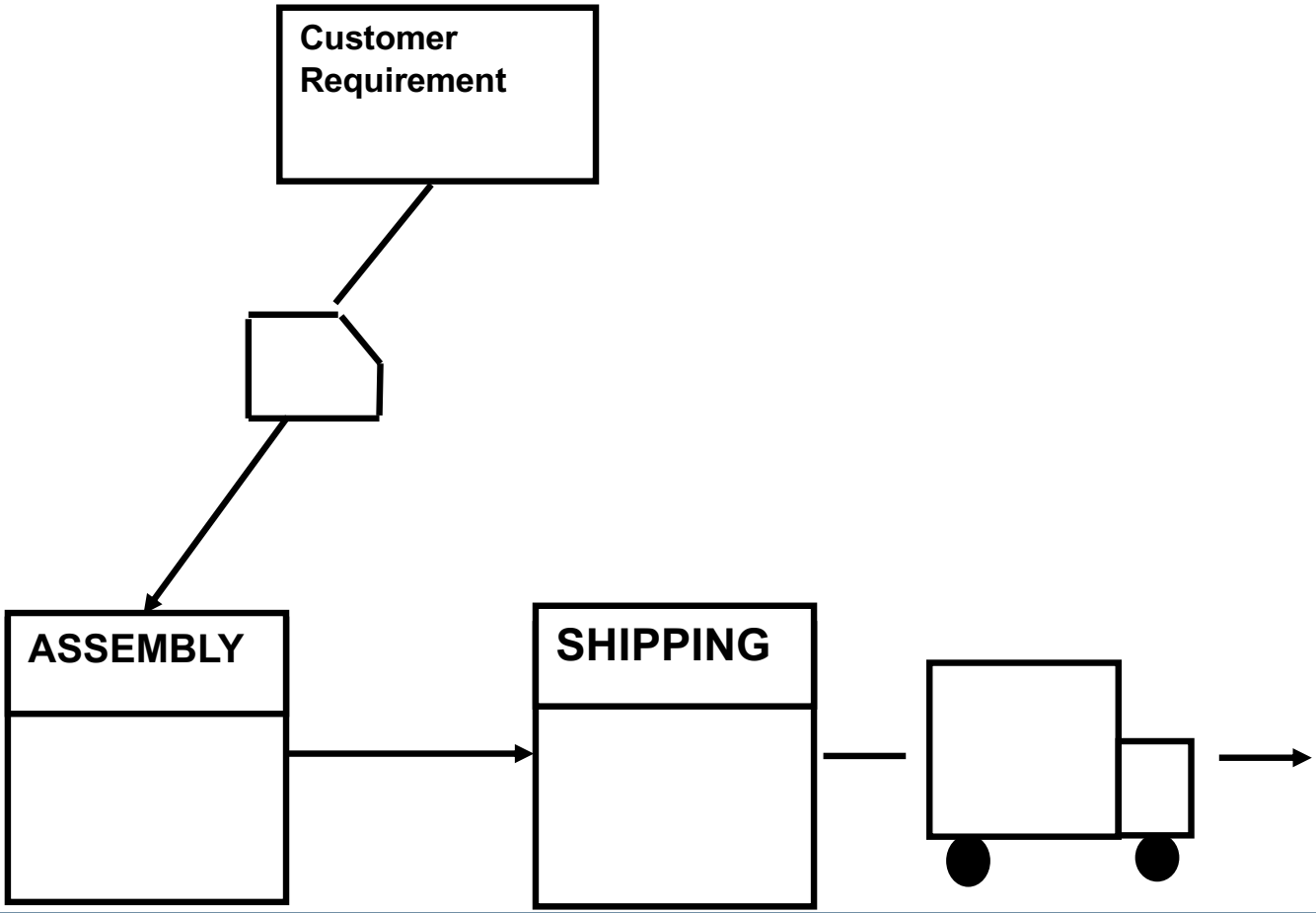
Present state



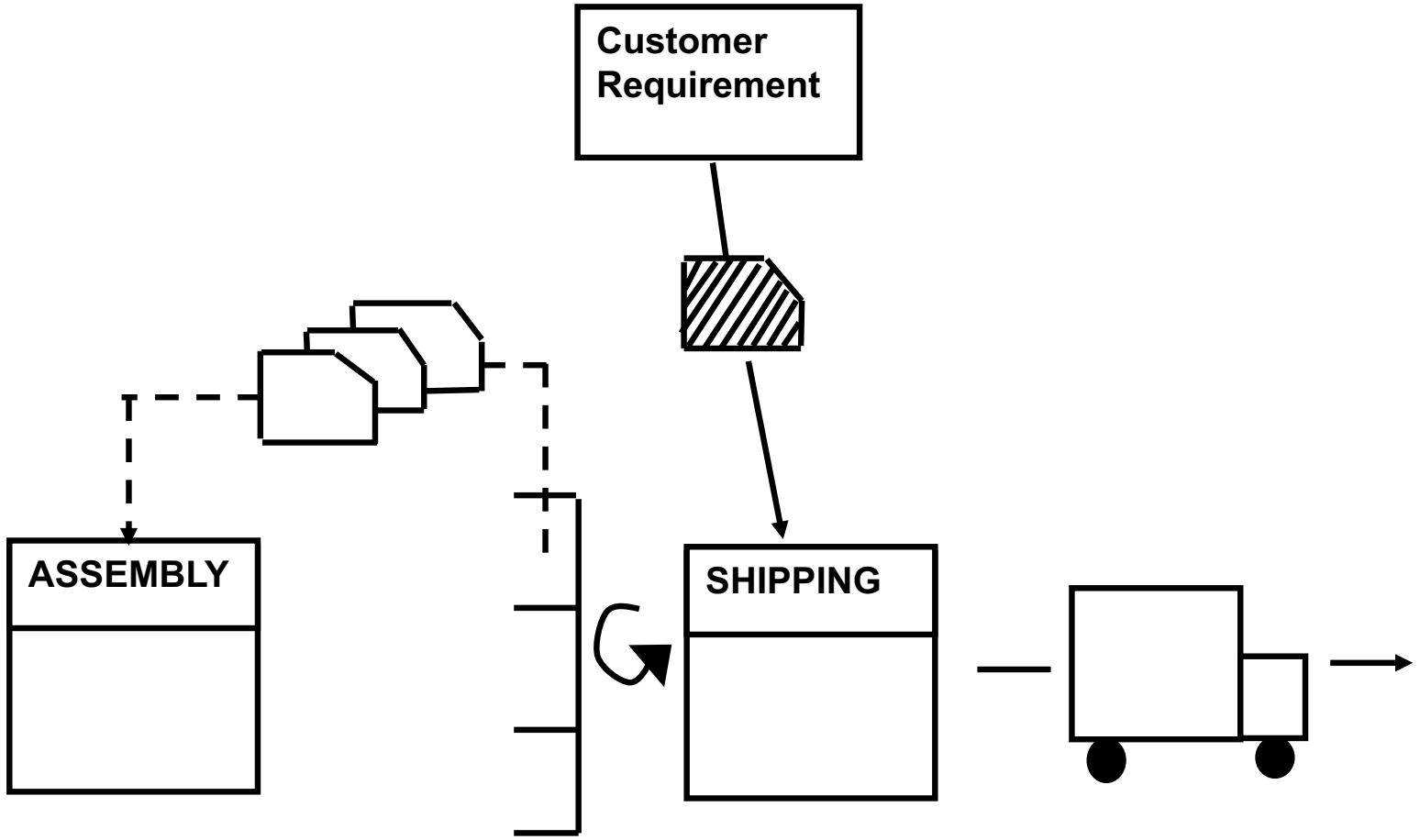
Example: Building Directly to Shipping

Production Control schedules assembly



Example: Building to a Supermarket

The supermarket pulls assembly (Acme's choice)



ACME future state

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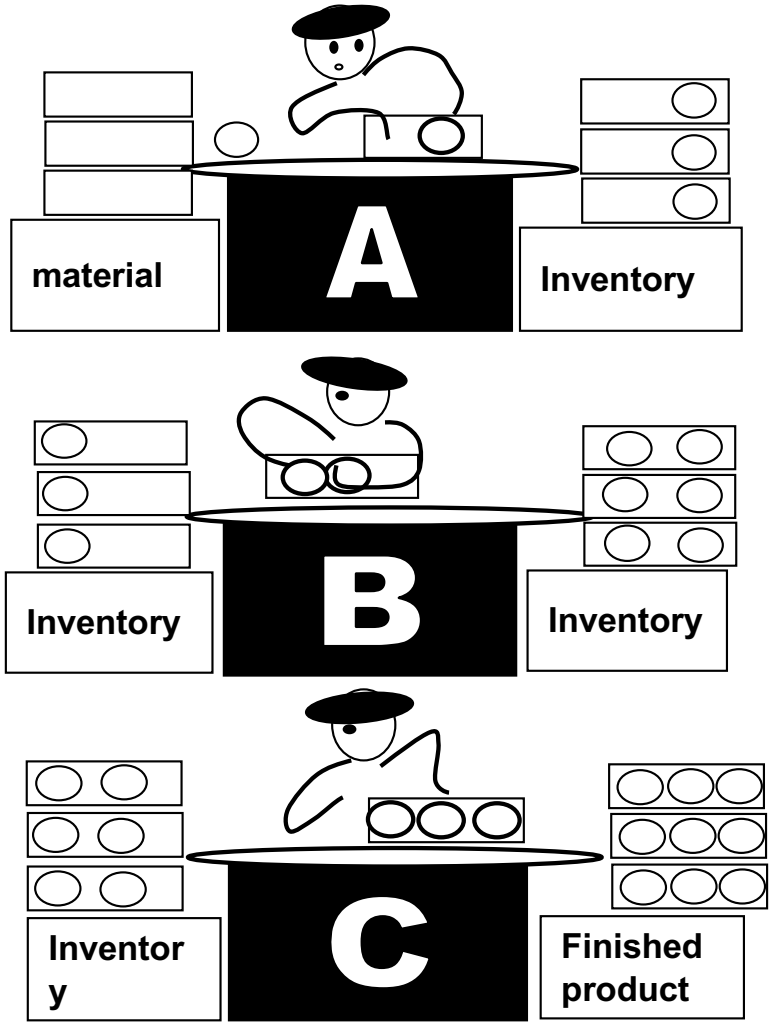
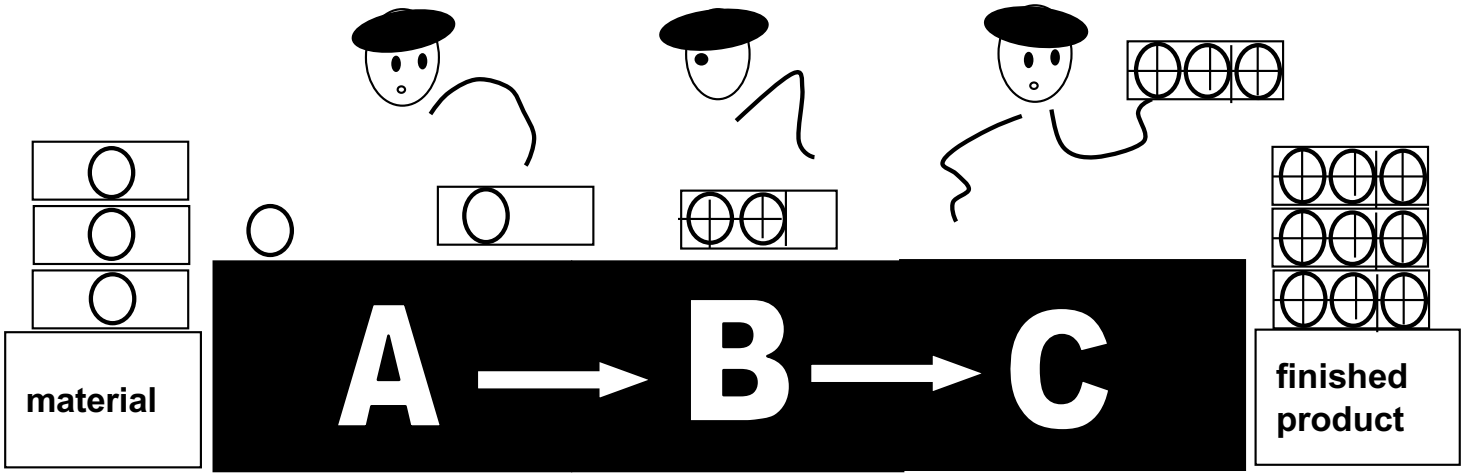
Separate workstation

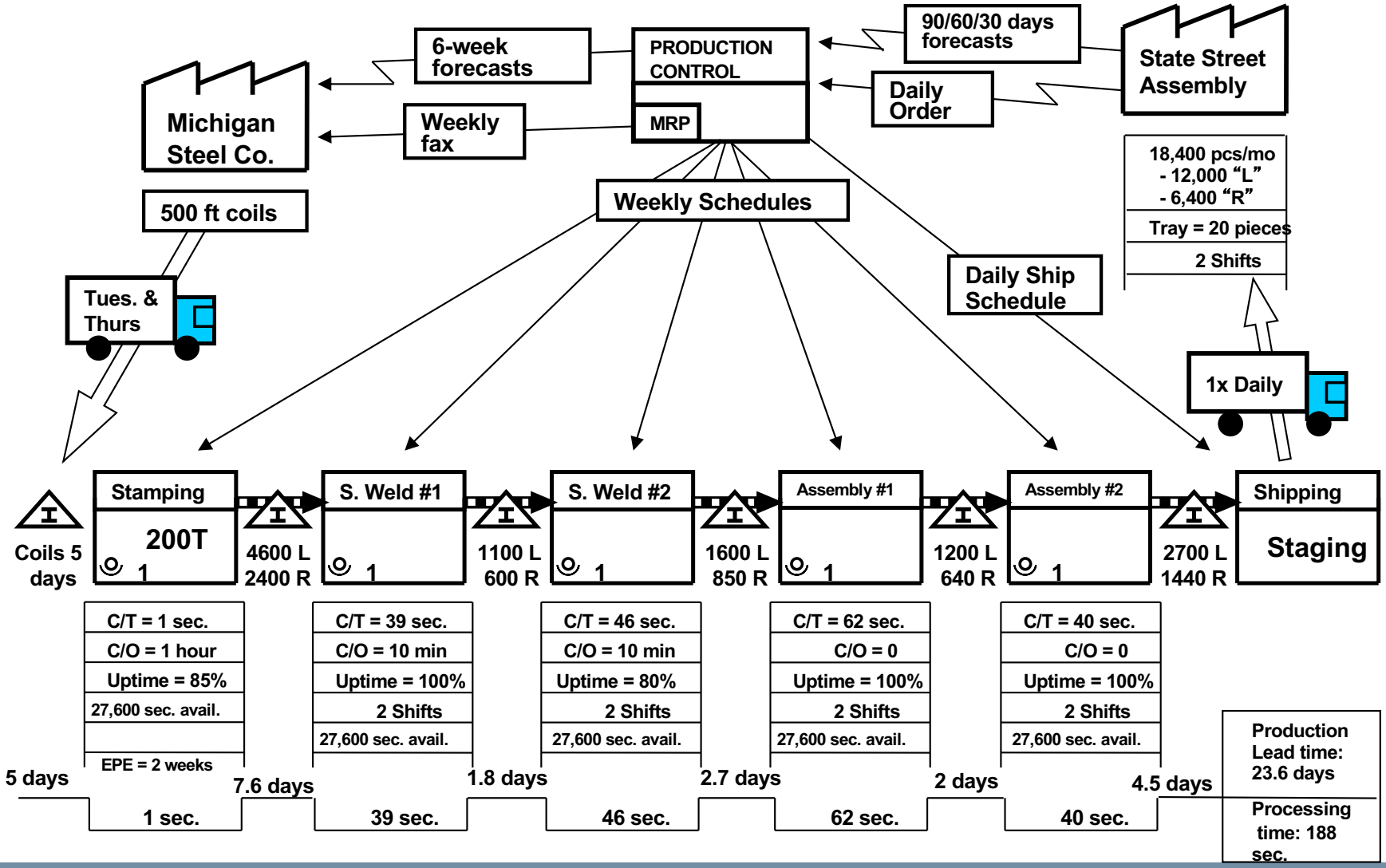


Continous flow

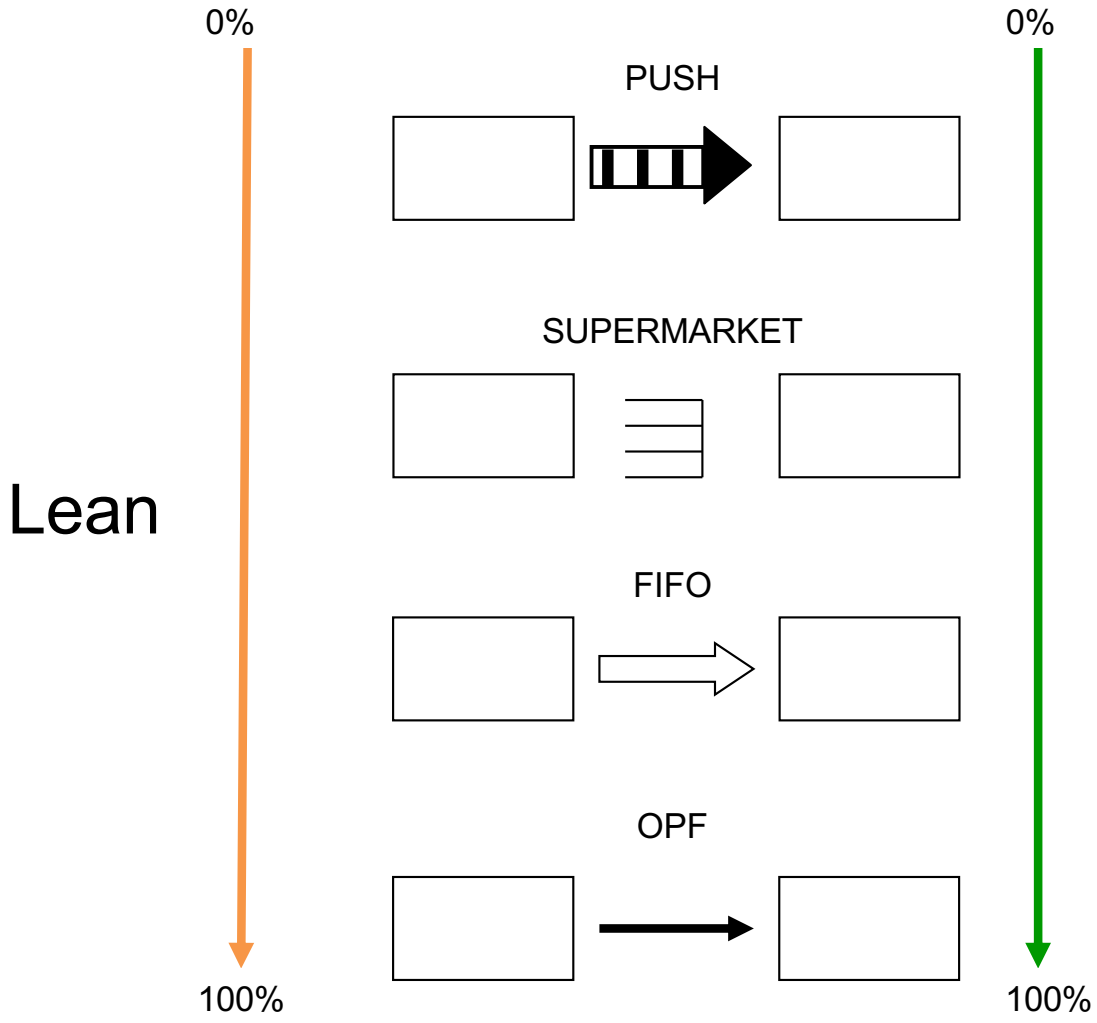
Continuous flow



Present state



Linking processes



Conditions of processes: DeCAF

Dedicated

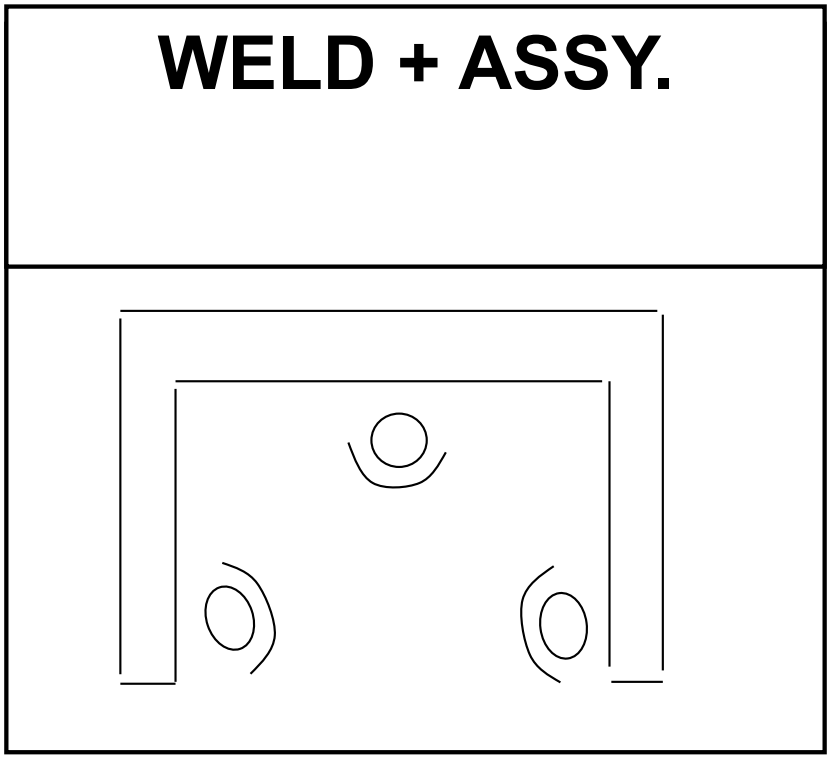
Capable (quality, quantity)

Available

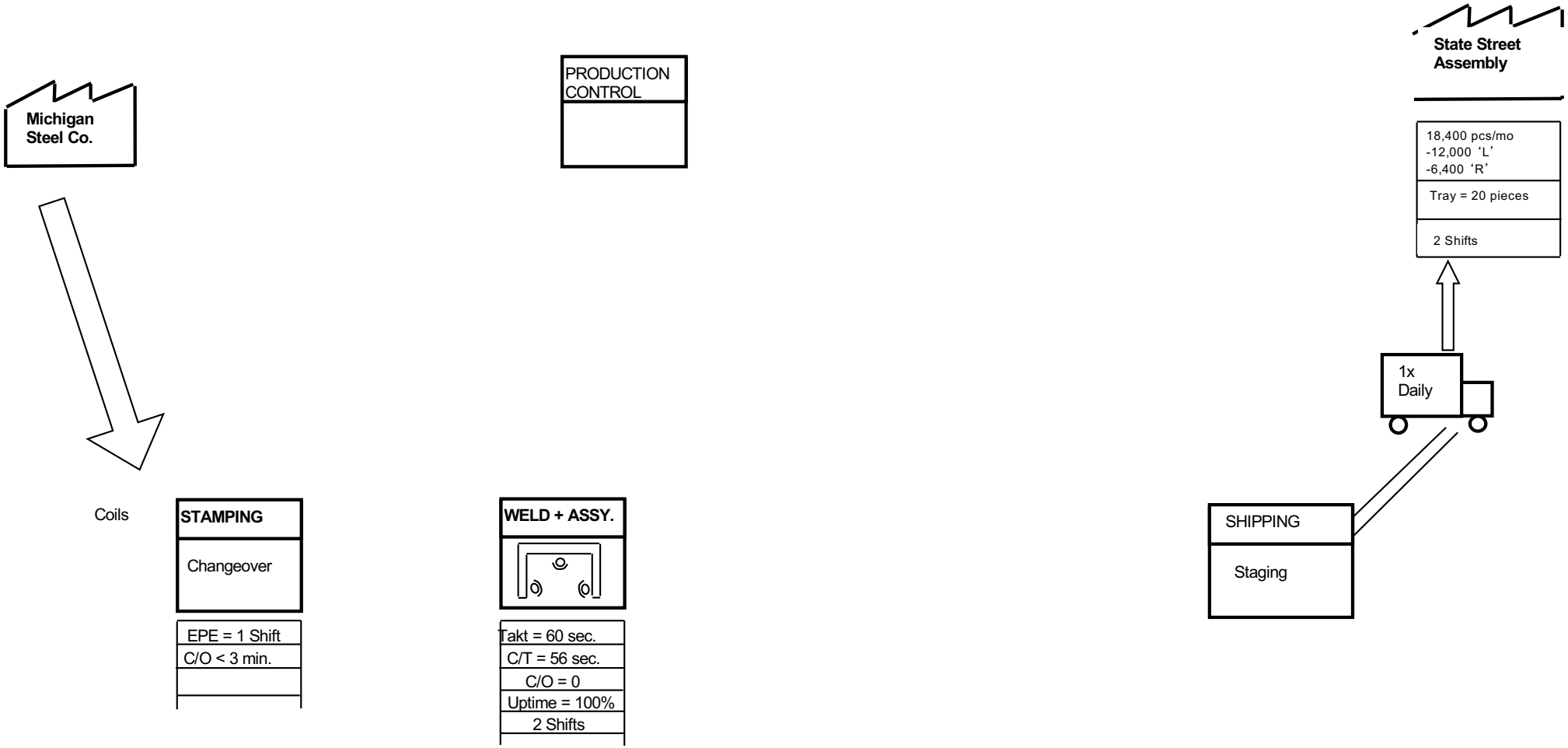
Flexible

Continous flow
Welding + assembly cell

- setup time
- machine availability



ACME future state



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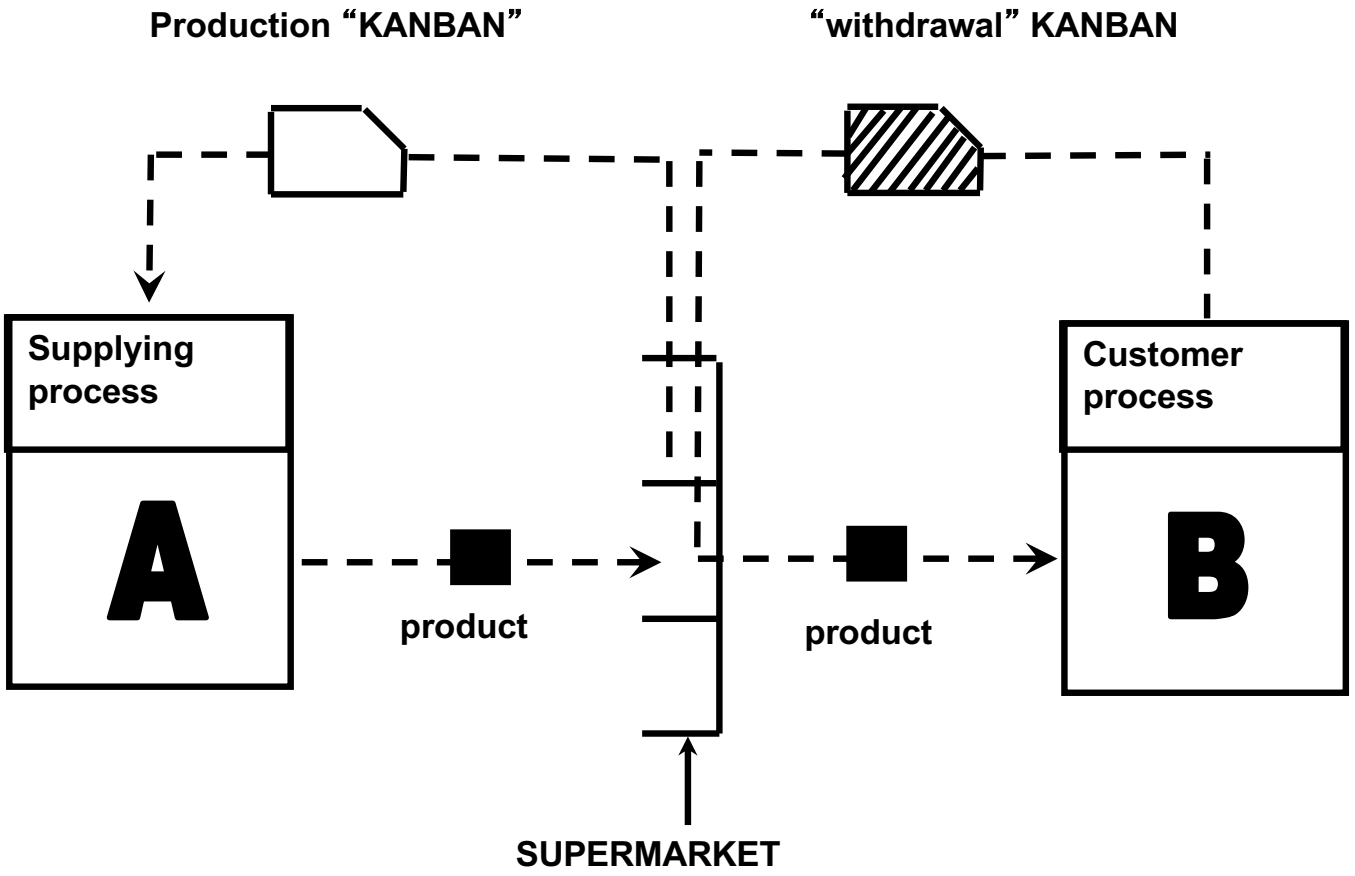
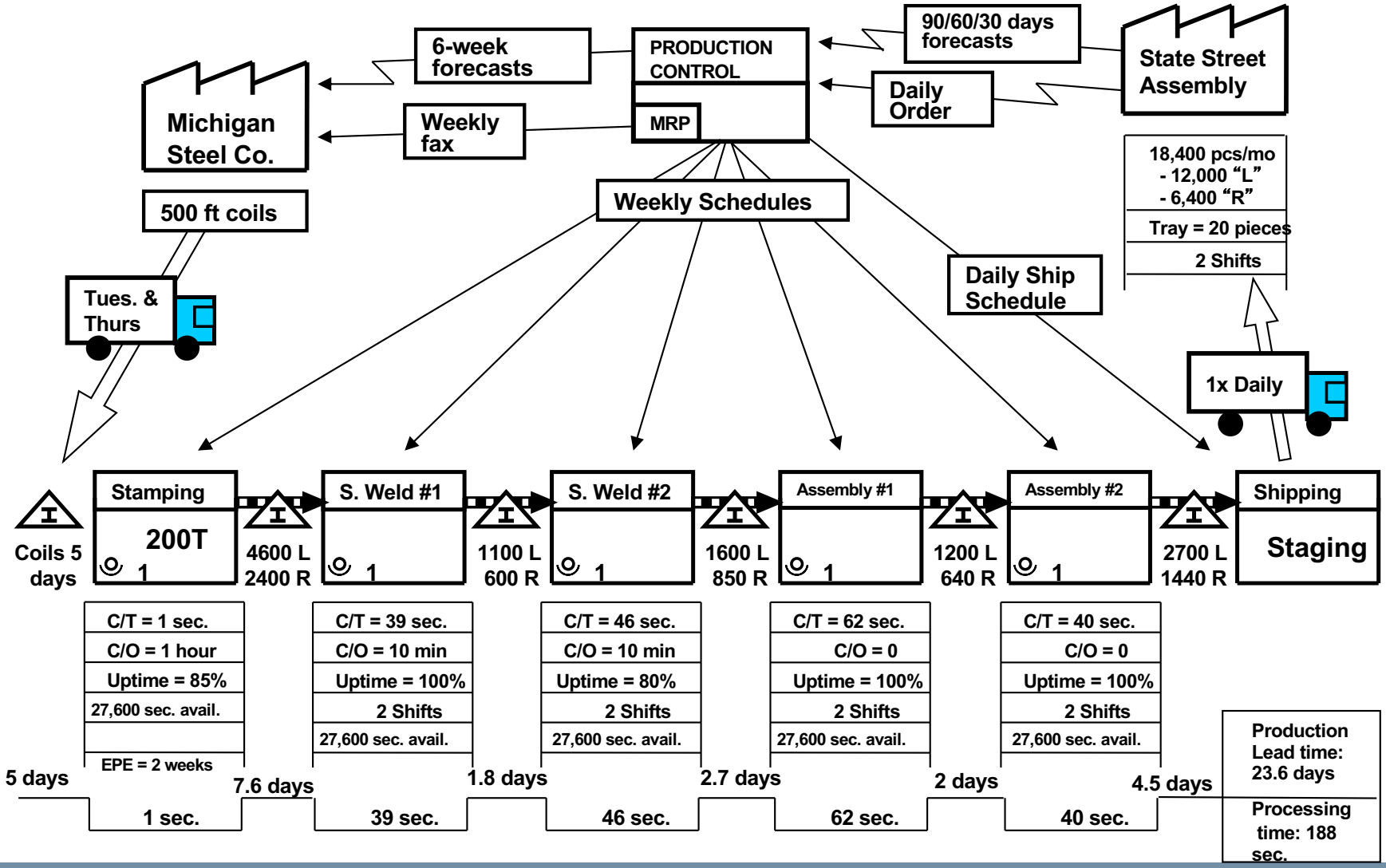
Supermarket



Present state



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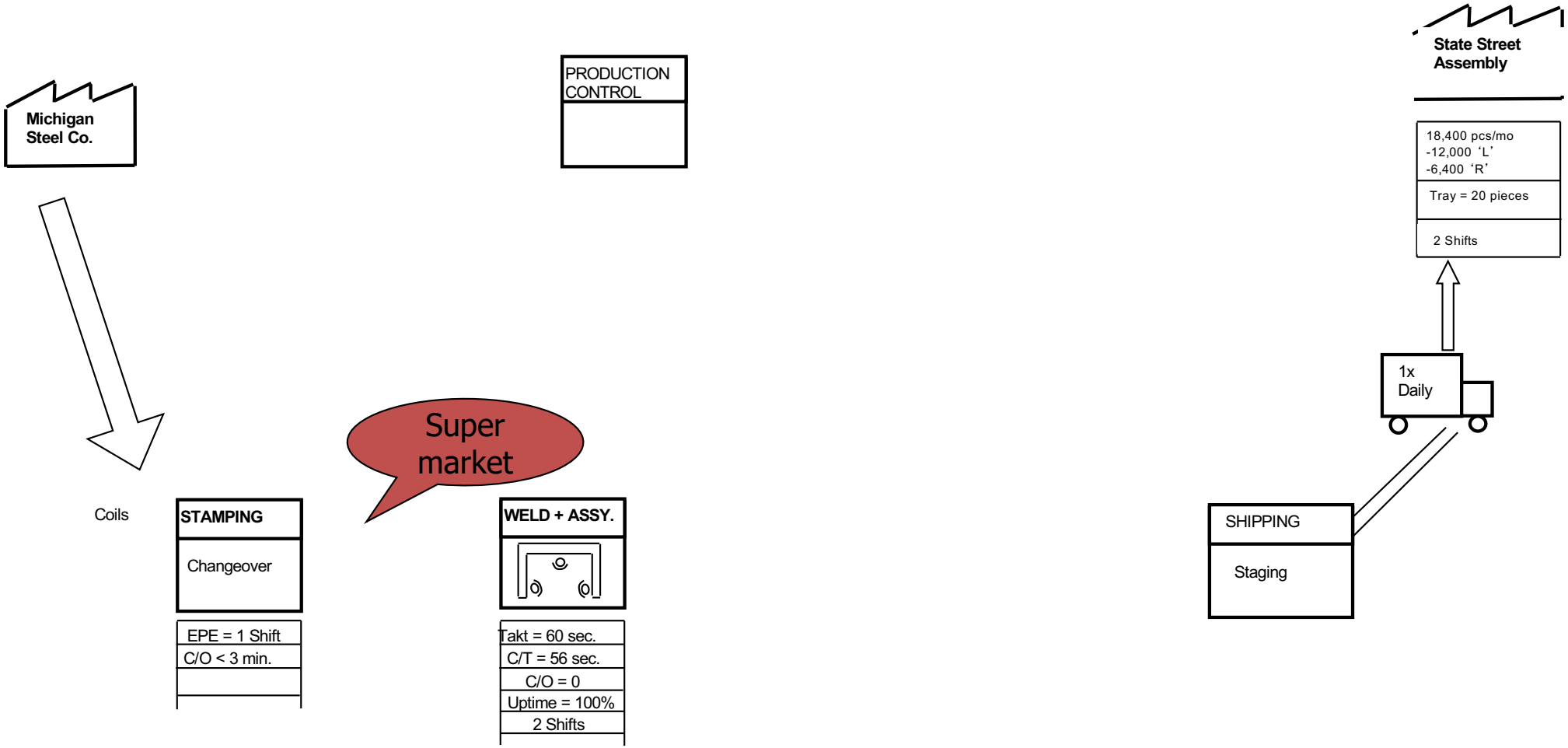
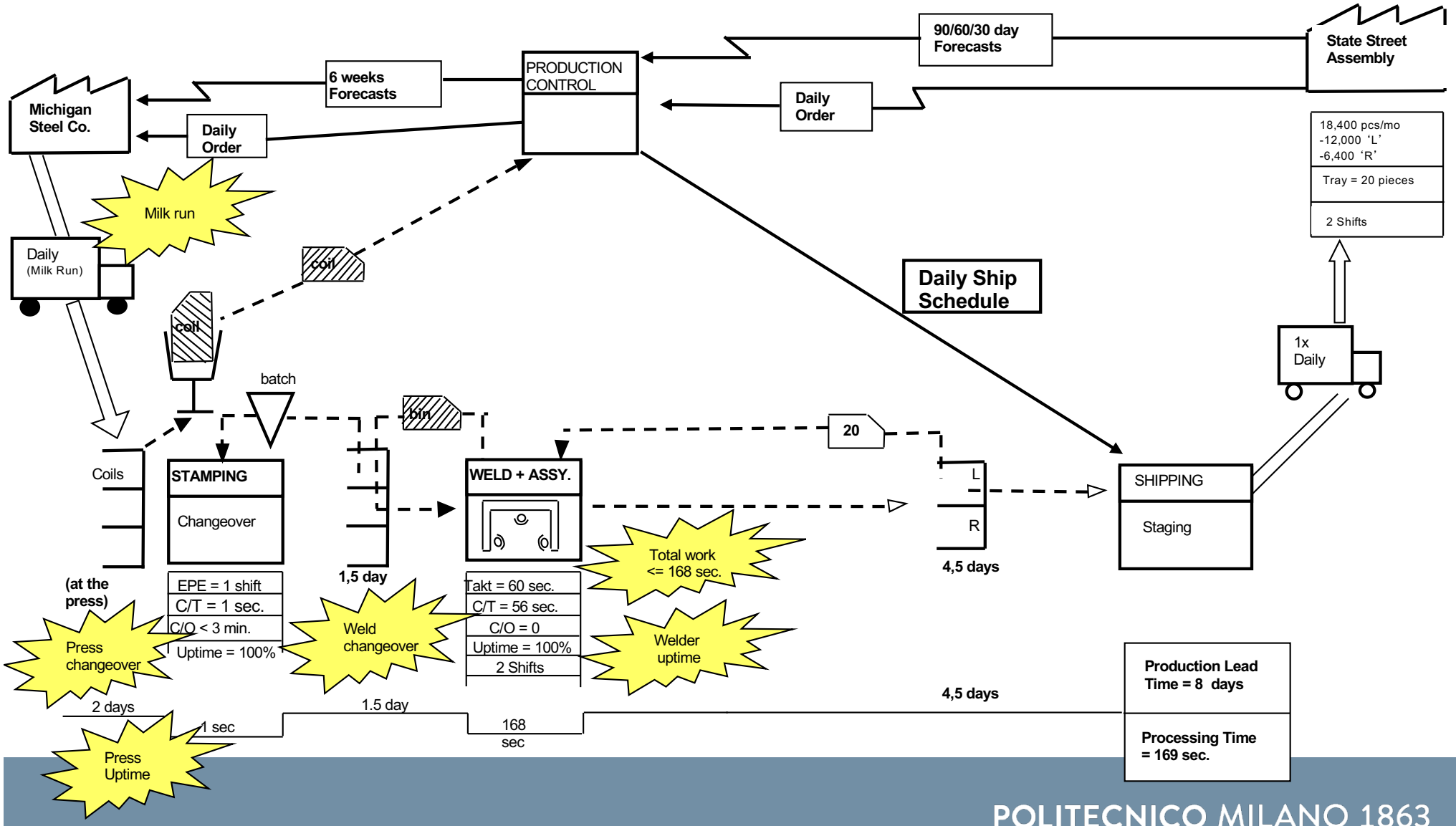


ACME future state



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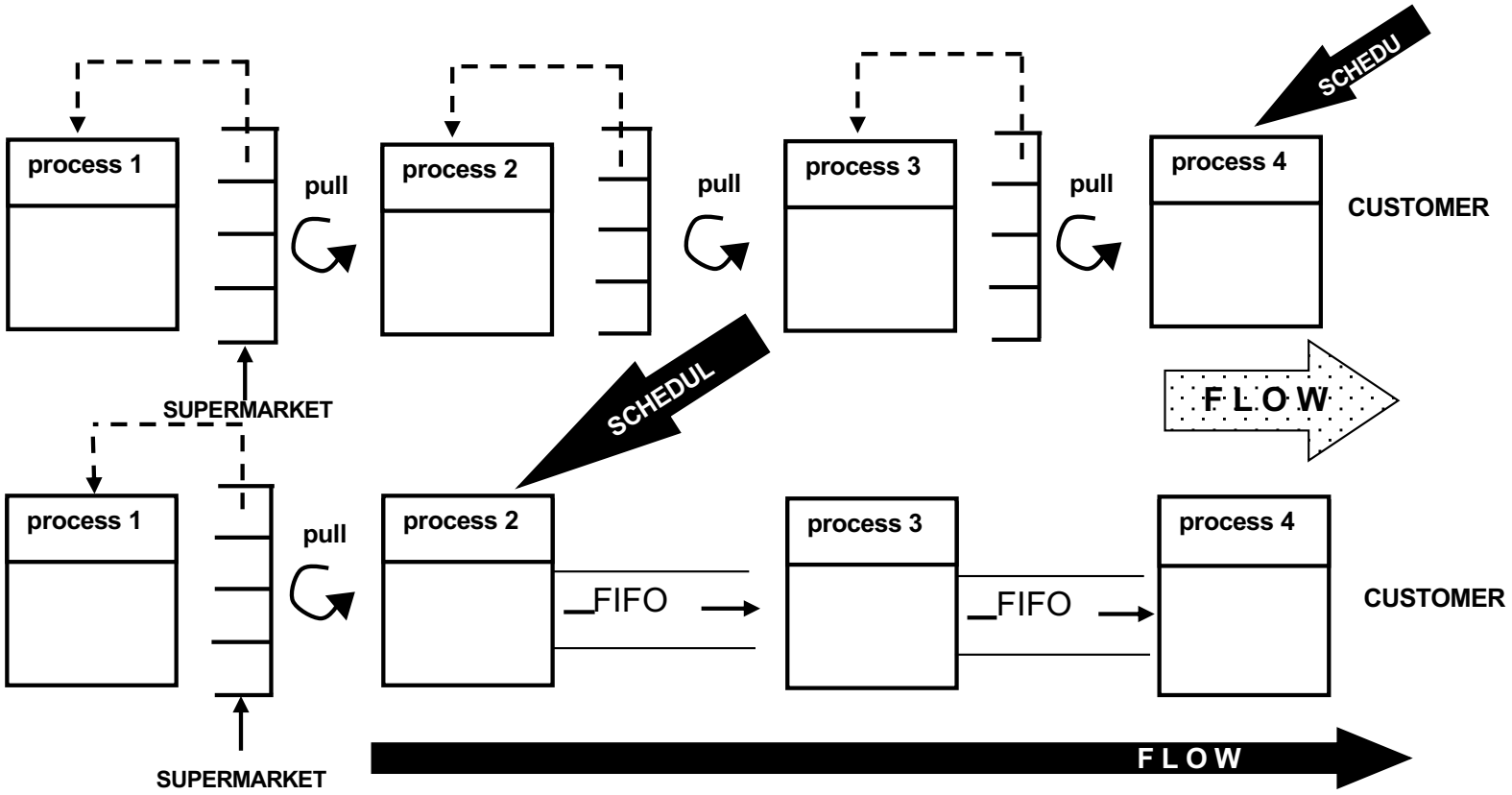
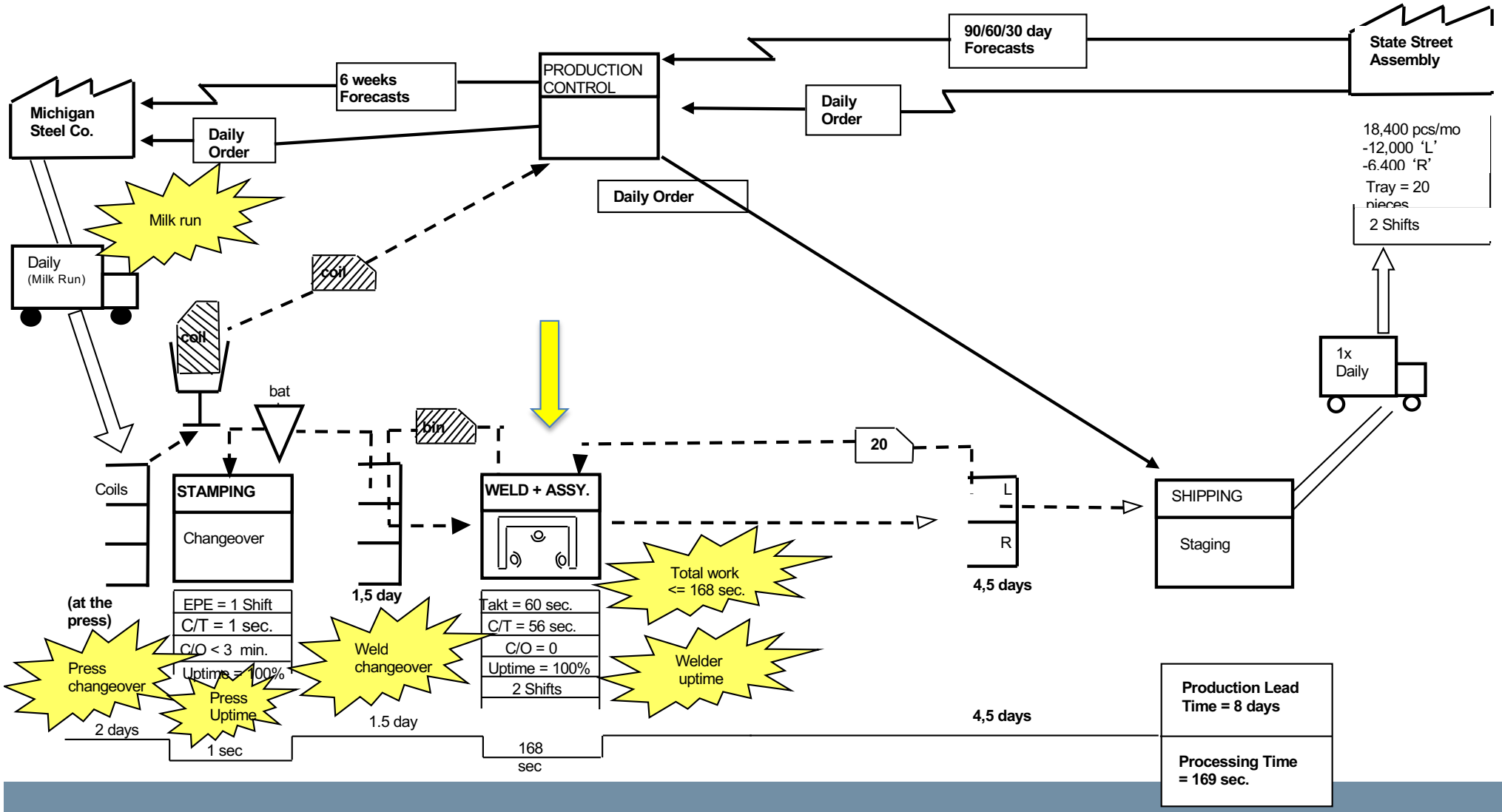
Scheduling point



Schedule production at a single point in the production chain (the “pacemaker process”)

FIFO line downstream of scheduling point

ACME future state



Acme Stamping Lead-Time Improvement

	Coils	Stamped Parts	Weld/Assy WIP	Finished Goods	Production Lead Time	Total Inventory Turns
Before	5 Days	7.6 Days	6.5 Days	4.5 Days	23.6 Days	10
So Far	2 Days	1.5 Days	0	4.5 Days	8 Days	30

- Welding and Assembly U cell
- Press setup reduction
- “Milk run” coils delivery

ACME future state

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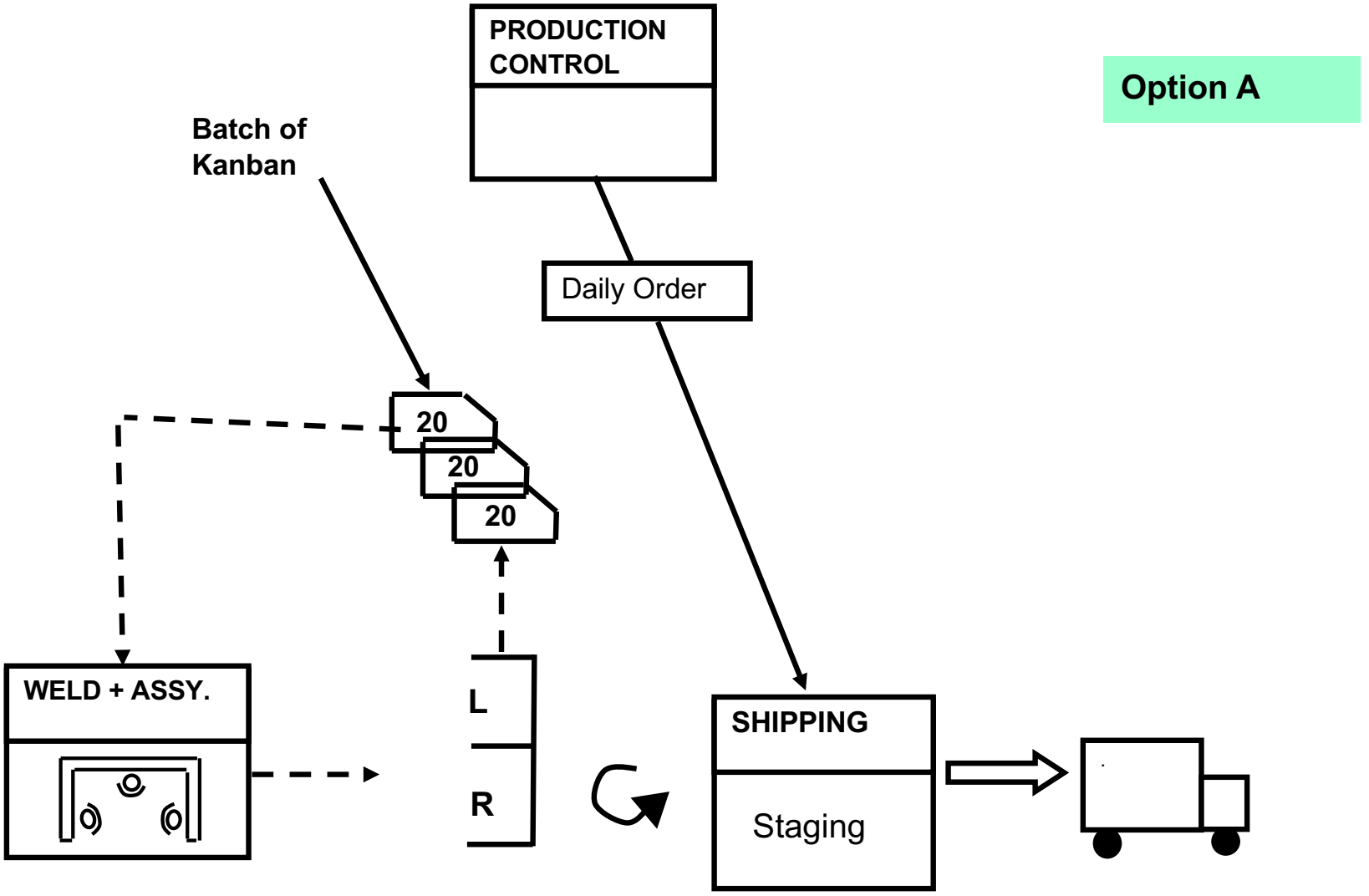
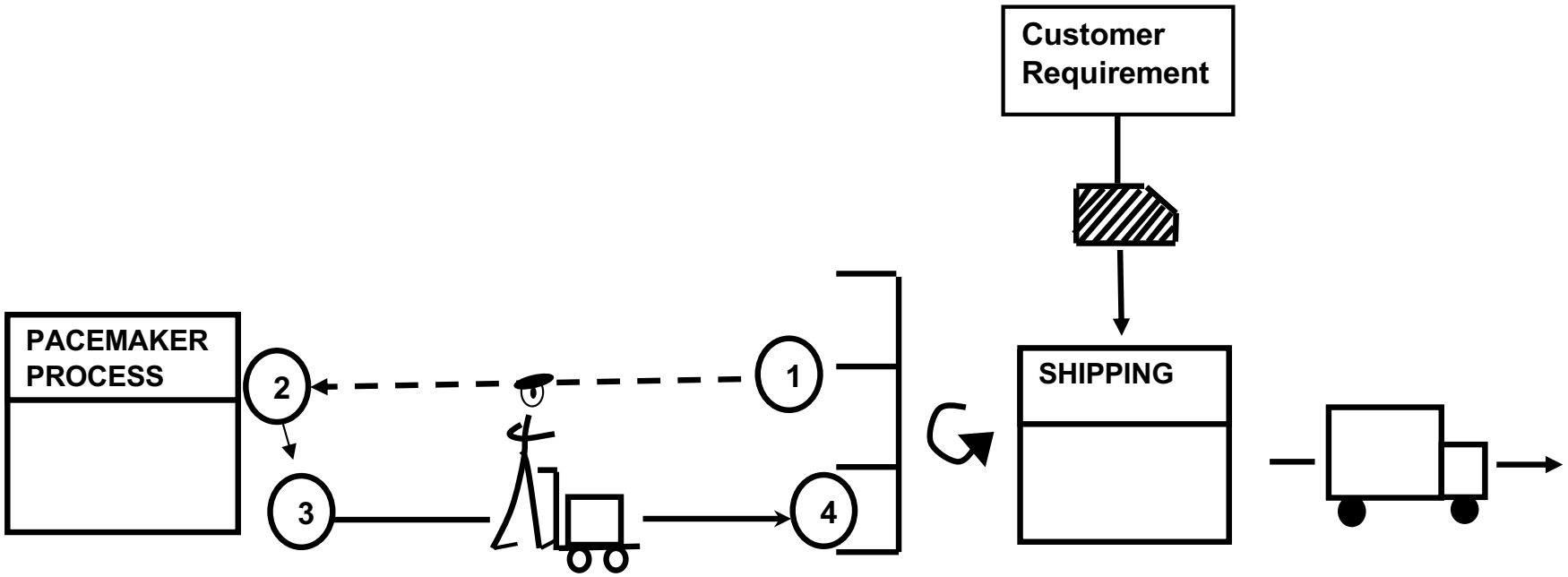
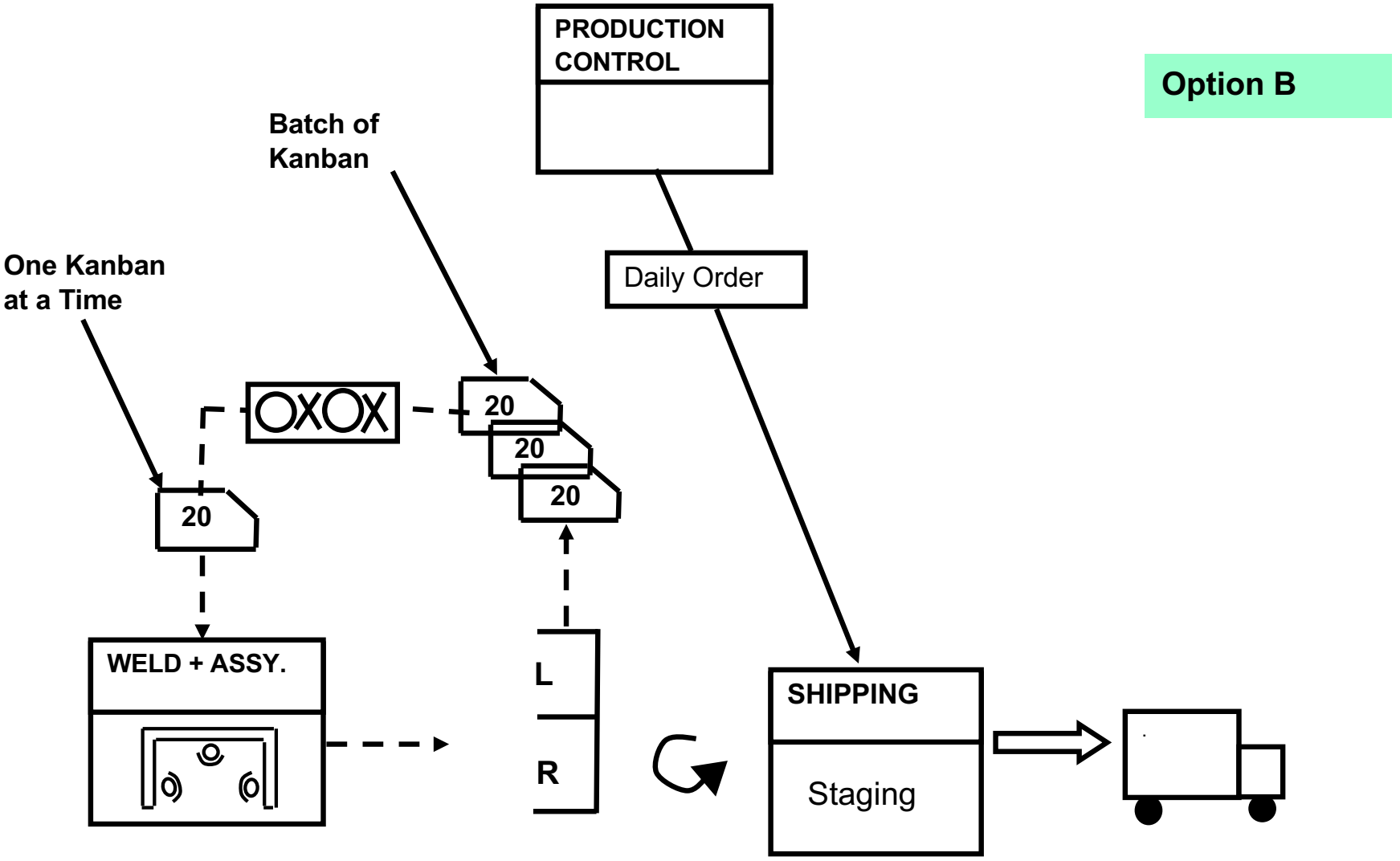
Level production
- Opt A



Example

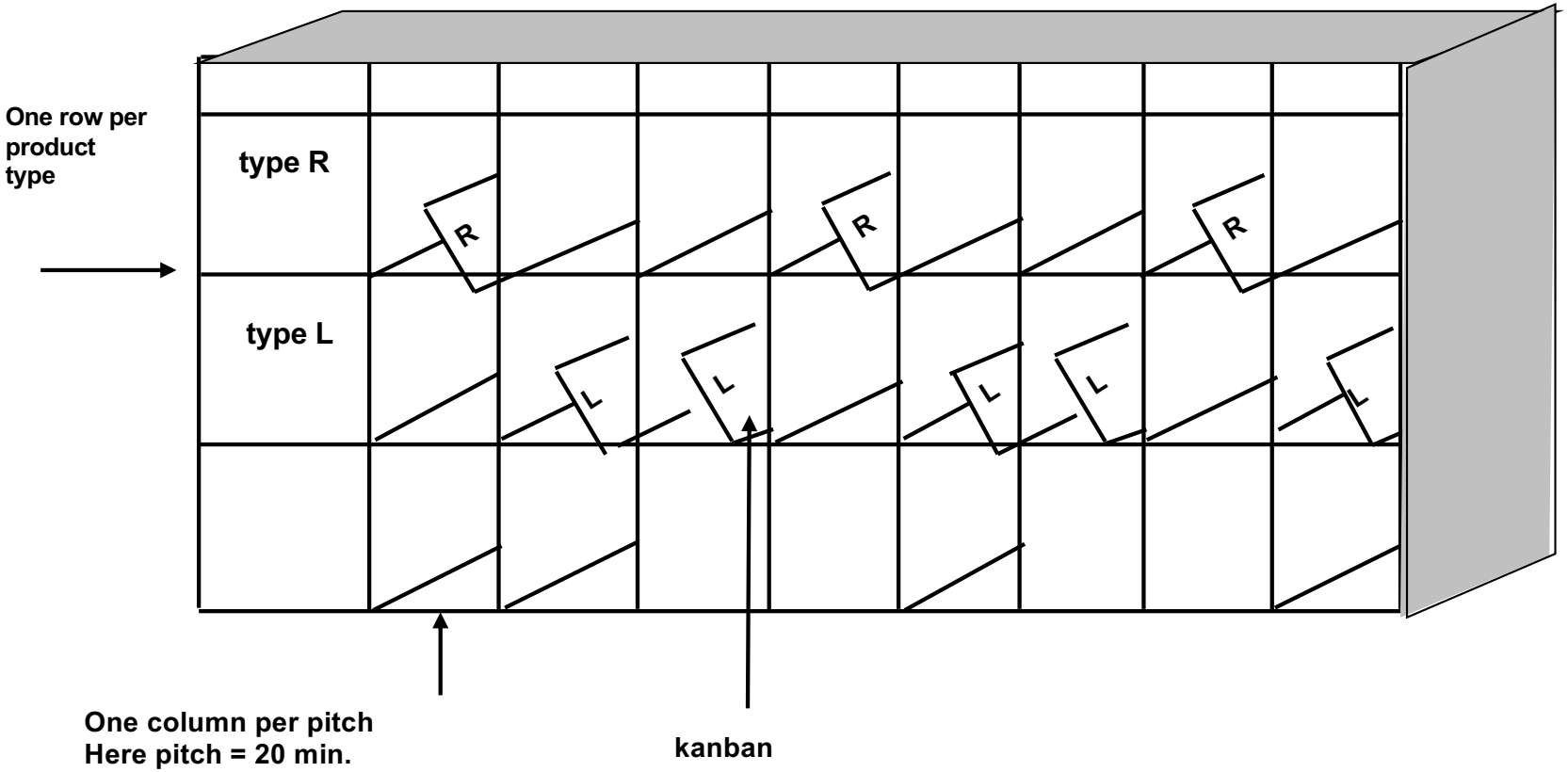


Level production
- Opt B

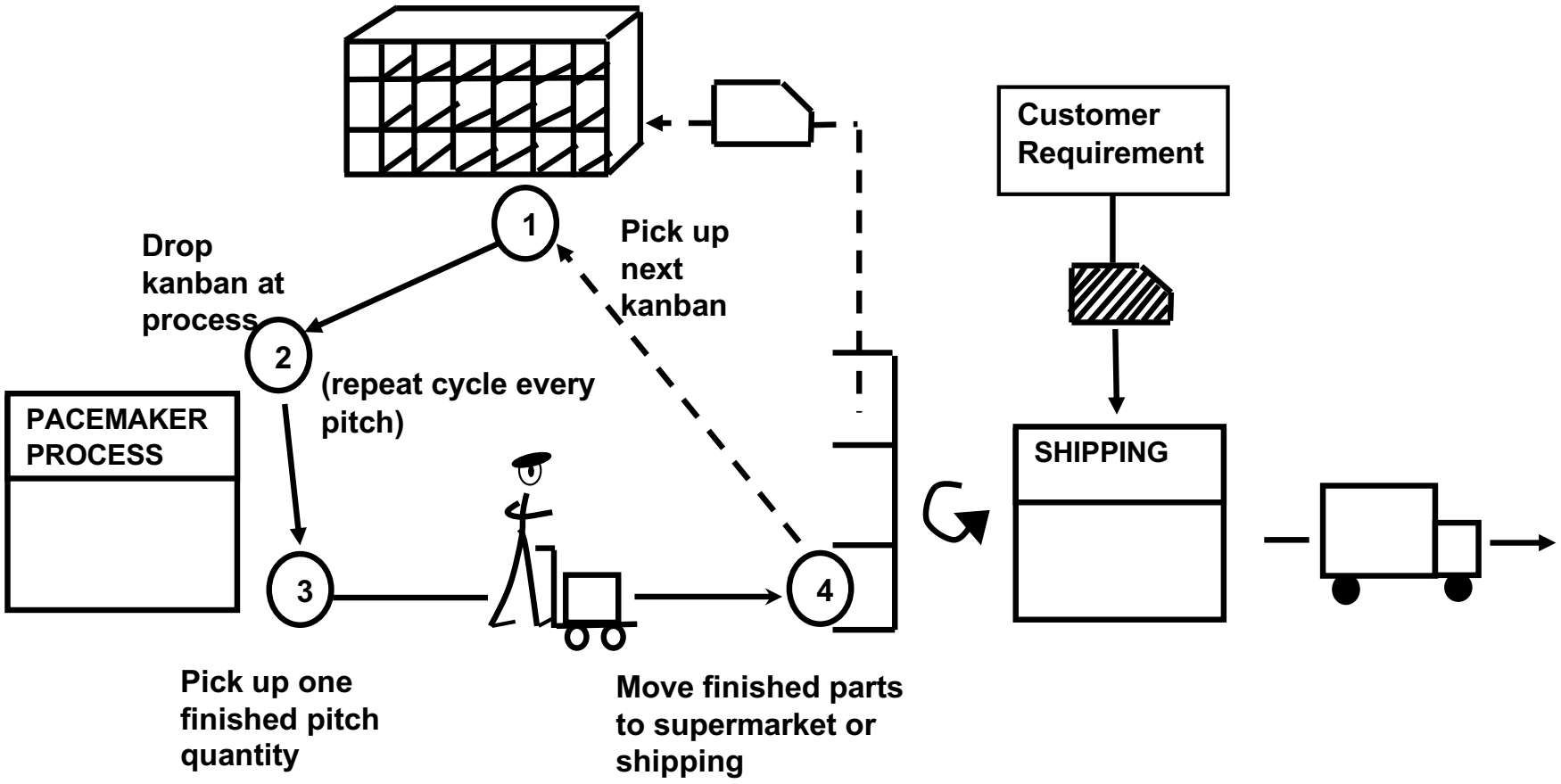


Load-leveling box (Heijunka)

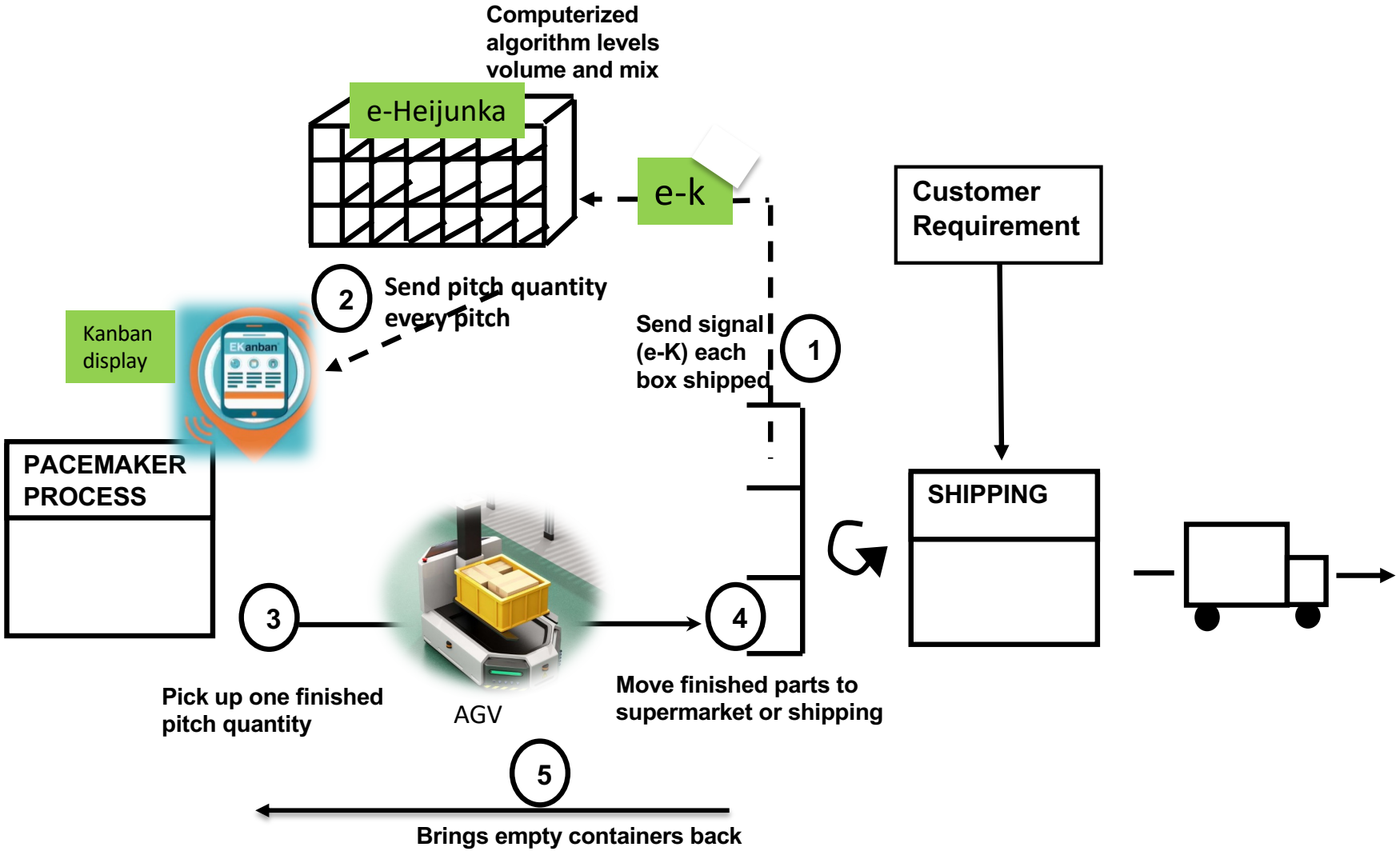
Kanban are responded to from left to right at pitch increment



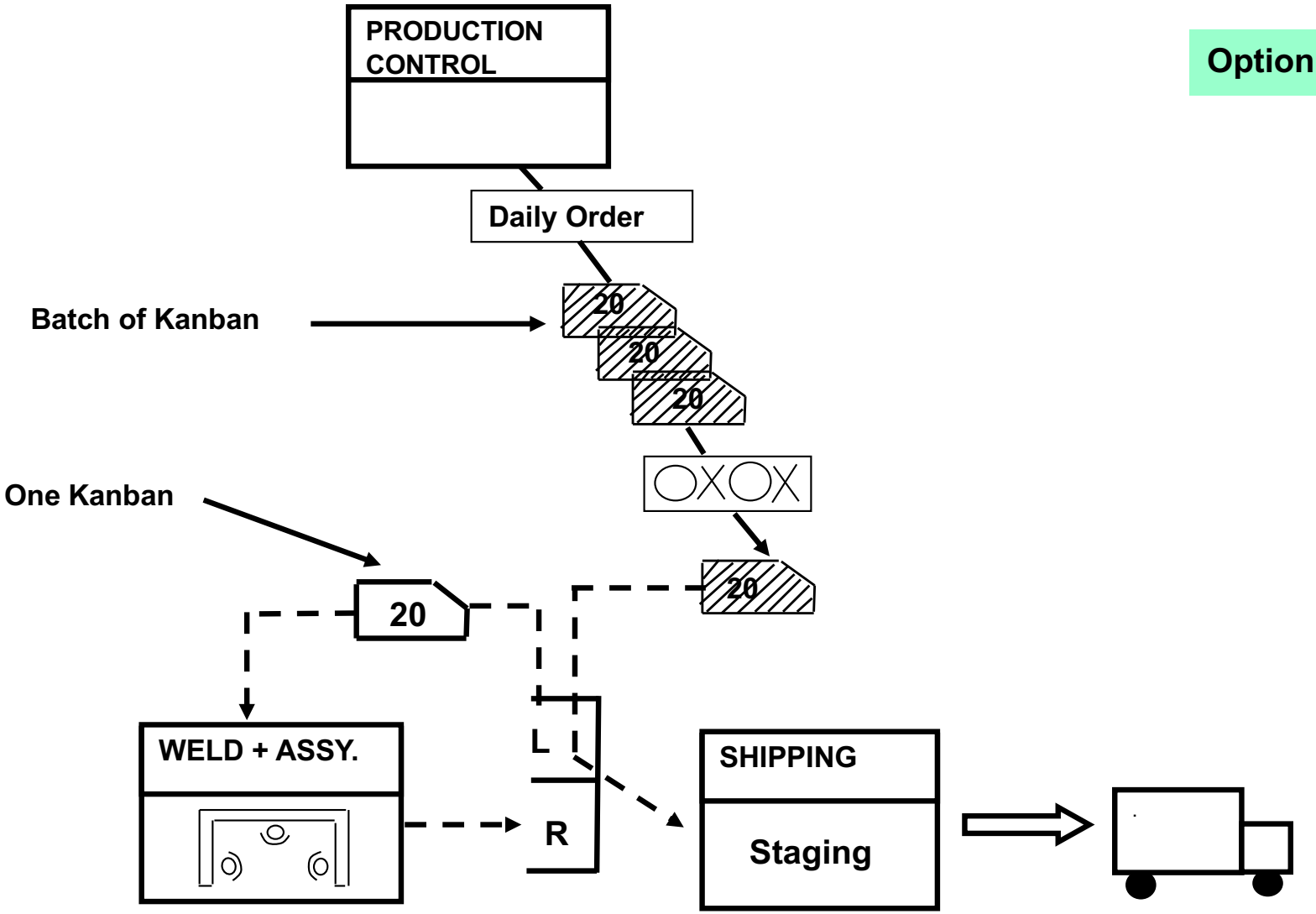
Example-Non digital



Example-Digital



Level production - Opt C



Option C

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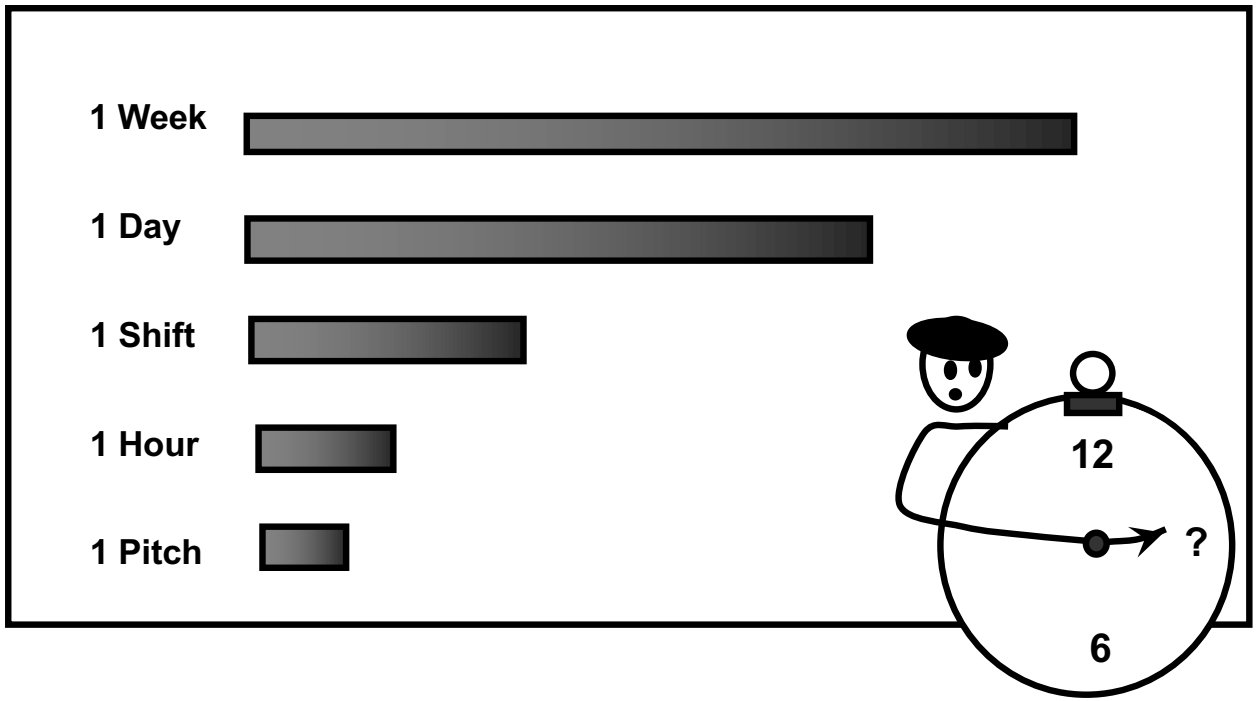
What is your management interval ?



Pitch: lot of information

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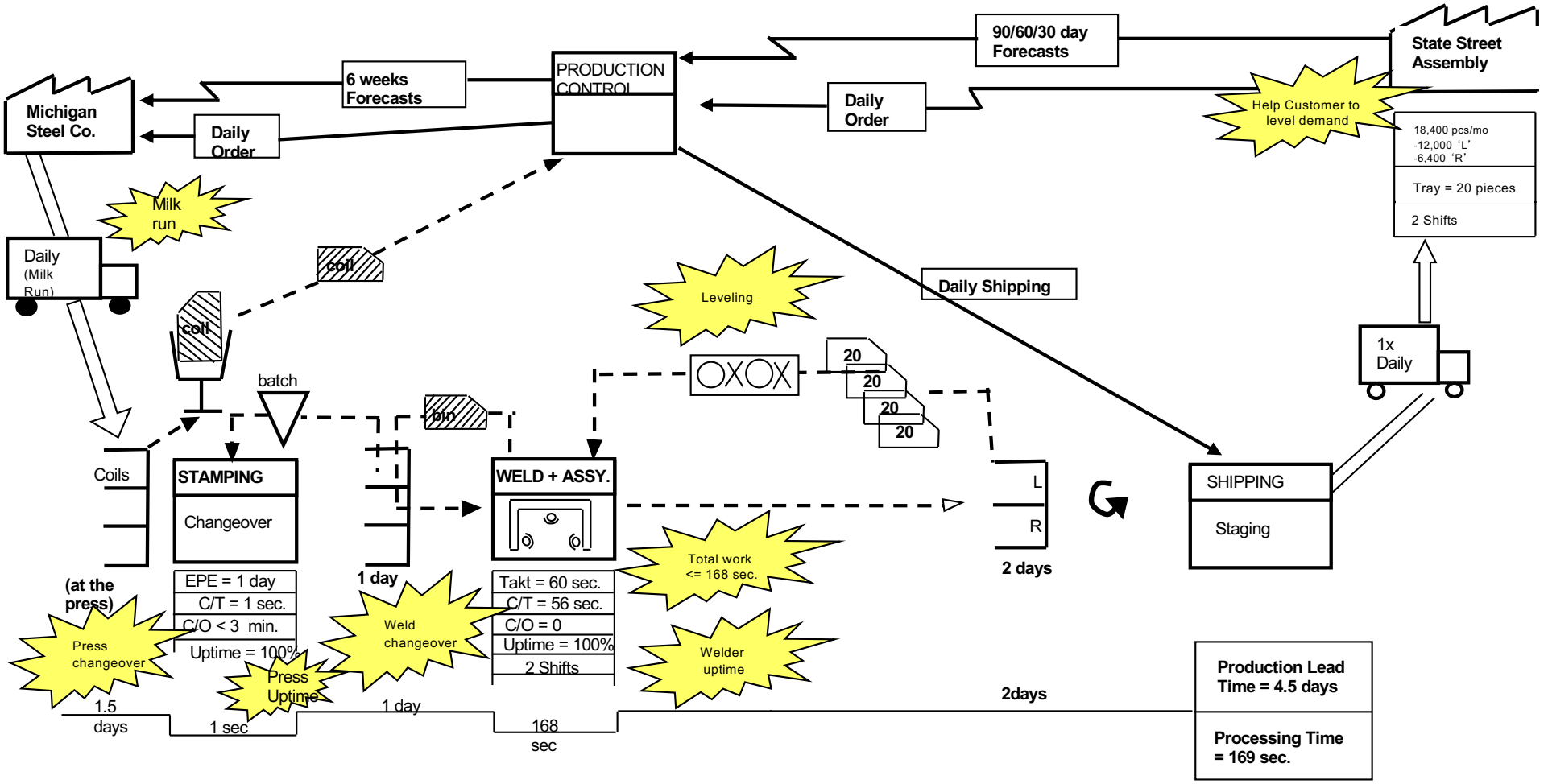
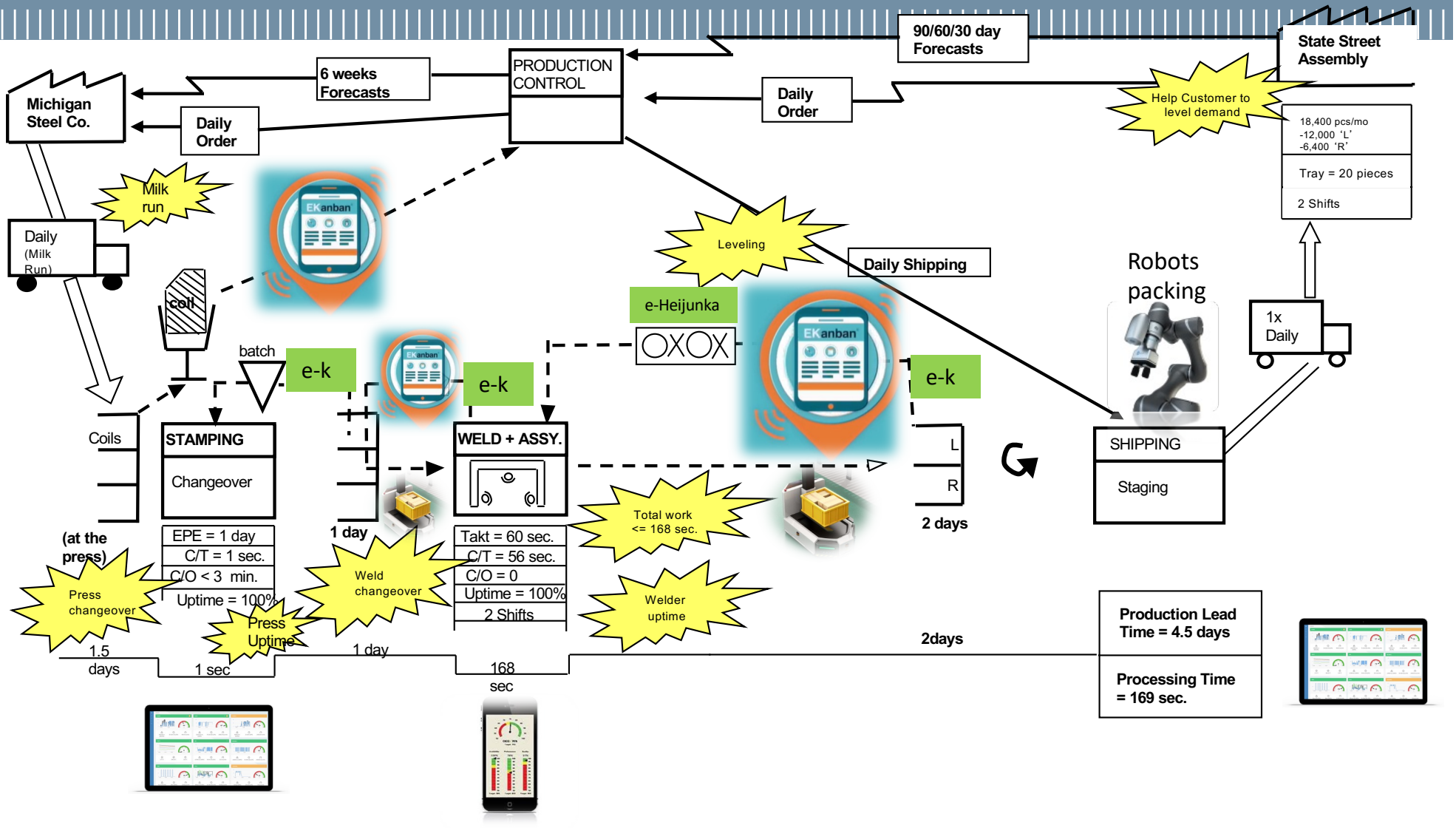


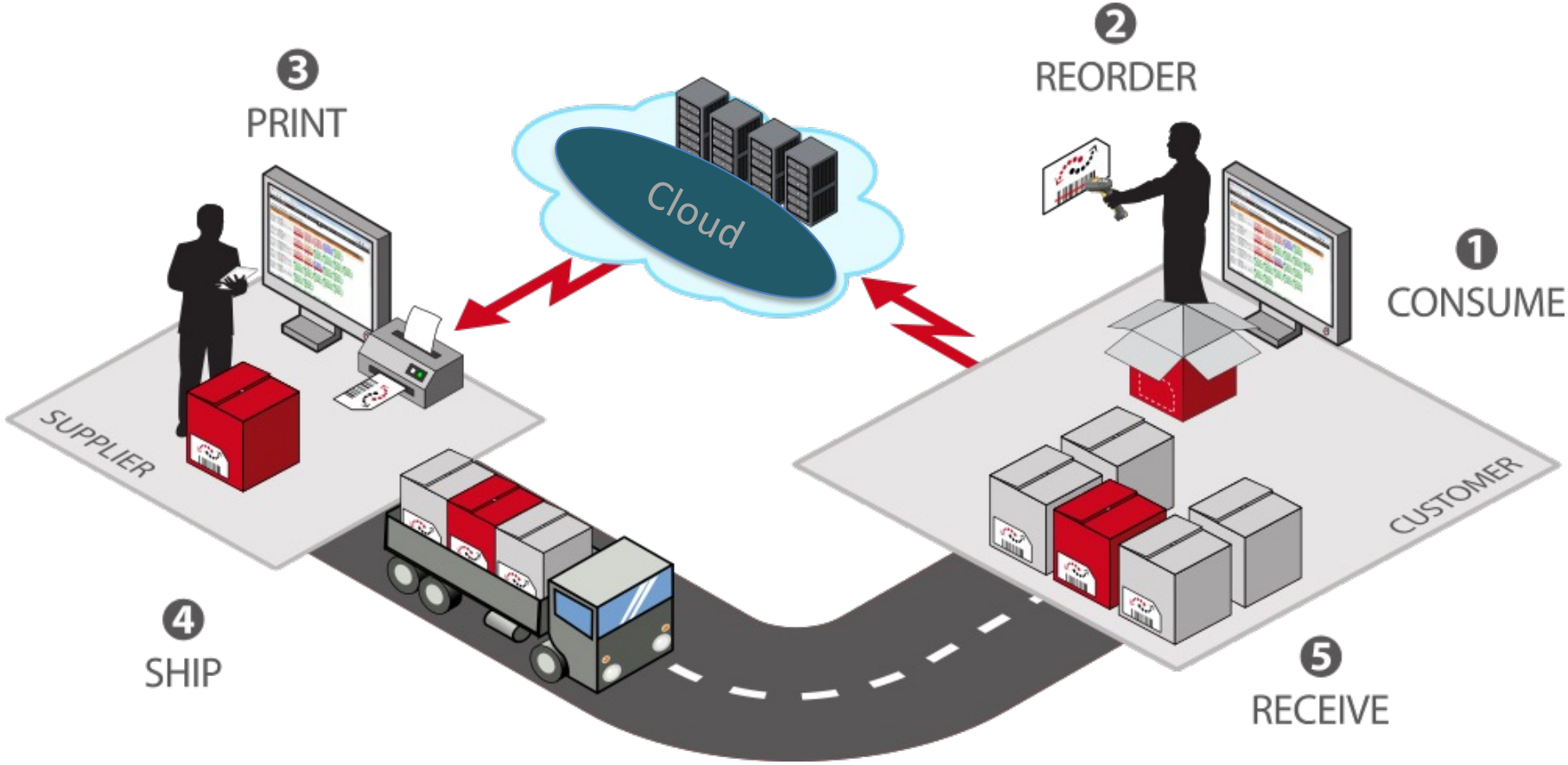
ACME future state-Digital



Collaborative robots: https://www.youtube.com/watch?v=ArBxq3mOt2s

AGV: https://www.youtube.com/watch?v=jwu9SX3YPSk

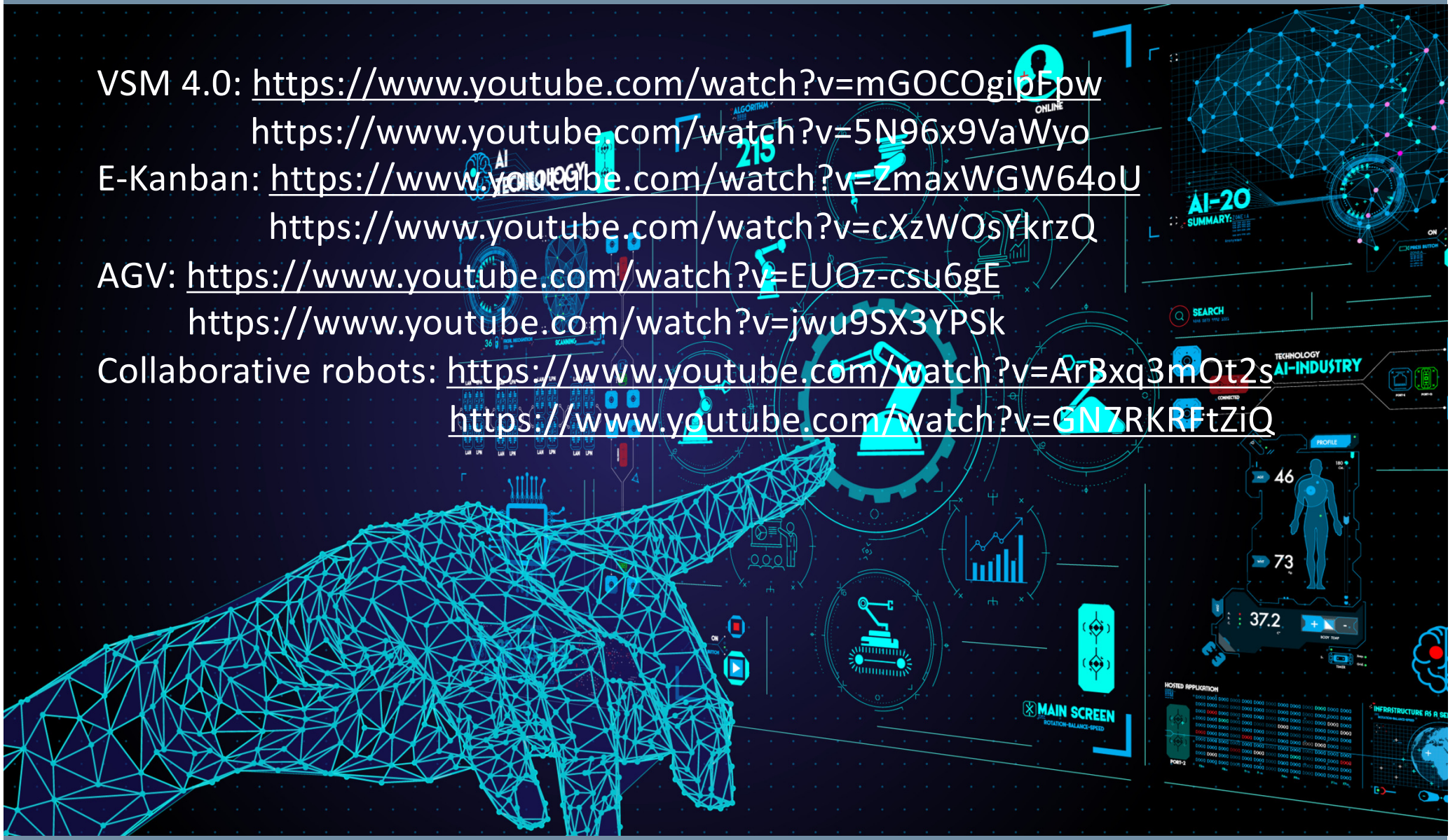
Example-Digital



In manufacturing,
Also in service: https://www.youtube.com/watch?v=Ti0cRYFjHqg

Further links to digital tools

VSM 4.0: https://www.youtube.com/watch?v=mGOCOgipFpw
https://www.youtube.com/watch?v=5N96x9VaWyo
E-Kanban: https://www.youtube.com/watch?v=ZmaxWGW64oU
https://www.youtube.com/watch?v=cXzWOsYkrzQ
AGV: https://www.youtube.com/watch?v=EUOz-csu6gE
https://www.youtube.com/watch?v=jwu9SX3YPSk
Collaborative robots: https://www.youtube.com/watch?v=ArBxq3mOt2s
https://www.youtube.com/watch?v=GN7RKRFtZiQ



Further links to digital tools

OEE software: https://www.youtube.com/watch?v=EGjKSFXzNc4

E-Andon: https://www.youtube.com/watch?v=6RxFHICfcZo
https://www.youtube.com/watch?v=c4gU3lWYErI

Augmented reality: https://www.youtube.com/watch?v=0m67O1Em7dY
https://www.youtube.com/watch?v=UhW12bILH7U
https://www.youtube.com/watch?v=cfdBgJdFC6Q

Smart Factory: https://www.youtube.com/watch?v=qCgRSJZiloE

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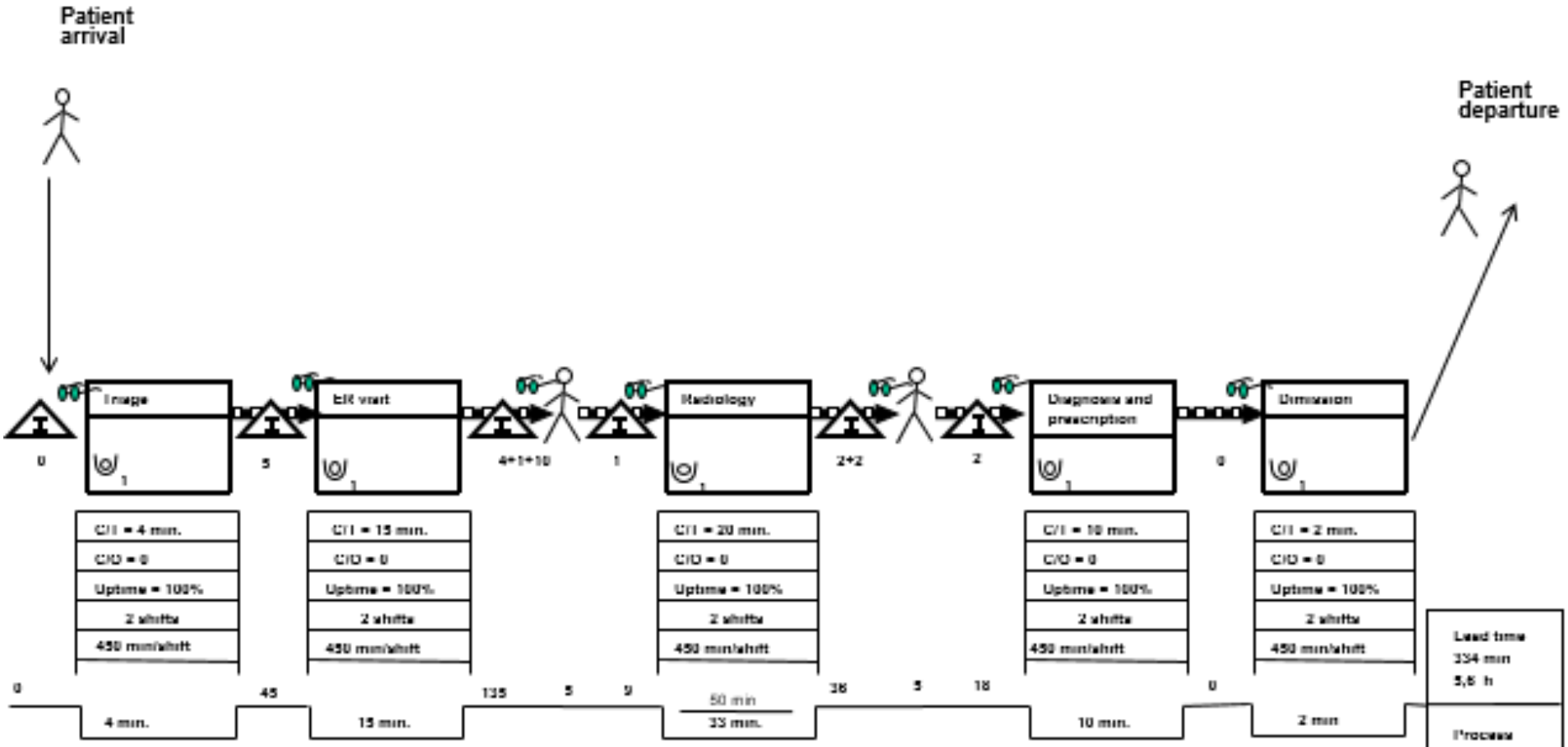
Before	5 Days	7.6 Days	6.5 Days	4.5 Days	23.6 Days	10
Continuous Flow & Pull	2 Days	1.5 Days	0	4.5 Days	8 Days	30
With Leveling	1.5 Days	1 Day	0	2 Days	4.5 Days	53

Present state in a hospital



Lead time = queue/0,11
= 5/0,11
= 45

Lead time = queue/0,11
= 15/0,11
= 135

POLITECNICO
MILANO 1863