

# LEVELLING PRODUCTION (HEIJUNKA)



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## WHY LEVELLING?

Market situation we are facing:

- Customers have more choices (erratic demand)
- End users demand dynamic change (Bullwhip Effect)
- Demand in supply chain has amplification effect

Production situation we are facing:

- Up stream processes prepare excessive inventory, equipment and resource to deal with the peaks of variation in demand.
- The variation of required material will be increased along with upstream processes, which is called the Bullwhip Effect.

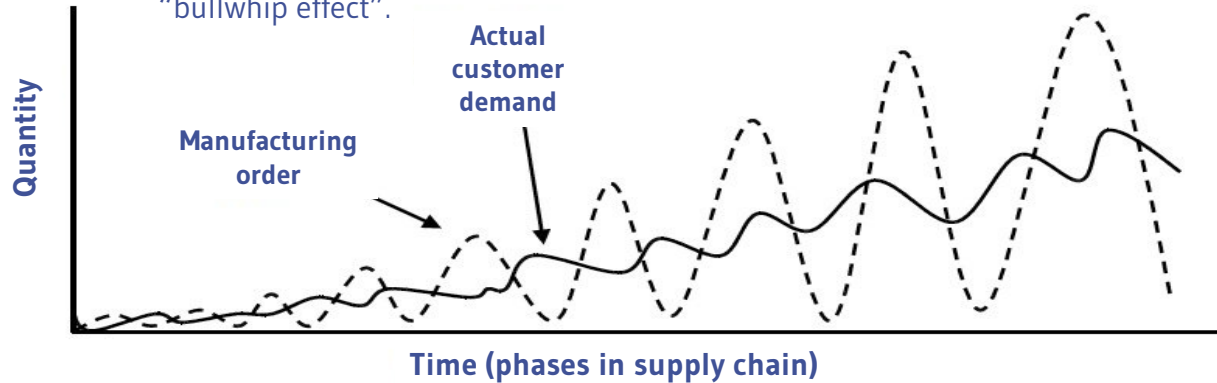
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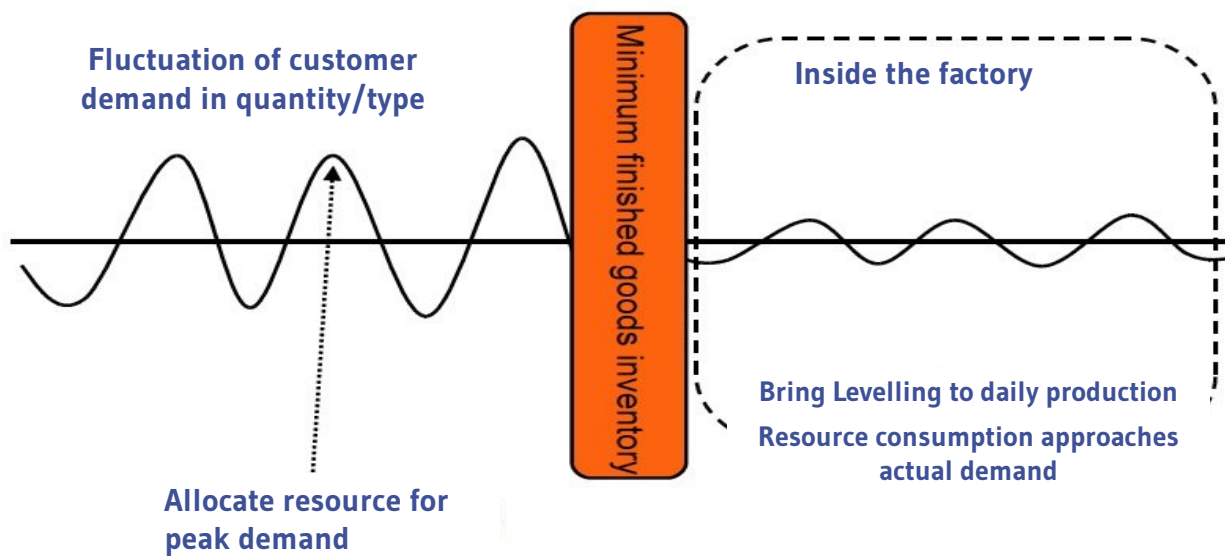
## BULLWHIP EFFECT

- Demand fluctuation reflected by Amplification of supply chain, is called “bullwhip effect”.



- Mass inventory in every phase
- Supply and demand brings waste of resource (overproduction)

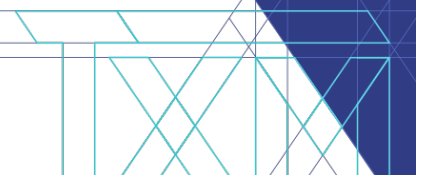
## LEVELLING REDUCES DEMAND FLUCTUATION



## BENEFITS OF LEVELLING

- Flexibility to make what the customer wants when they want it.
- Reduced risk of unsold goods.
- Balanced use of labour and machines.
- Smoothed demand on the upstream processes and suppliers.

## WHAT IS LEVELLING

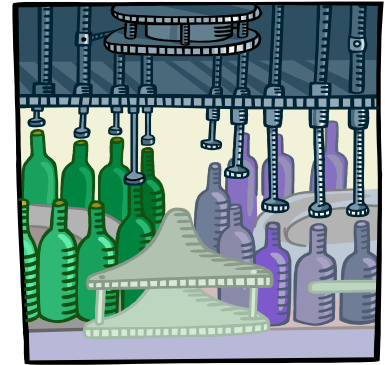


## WHAT IS LEVELLING?

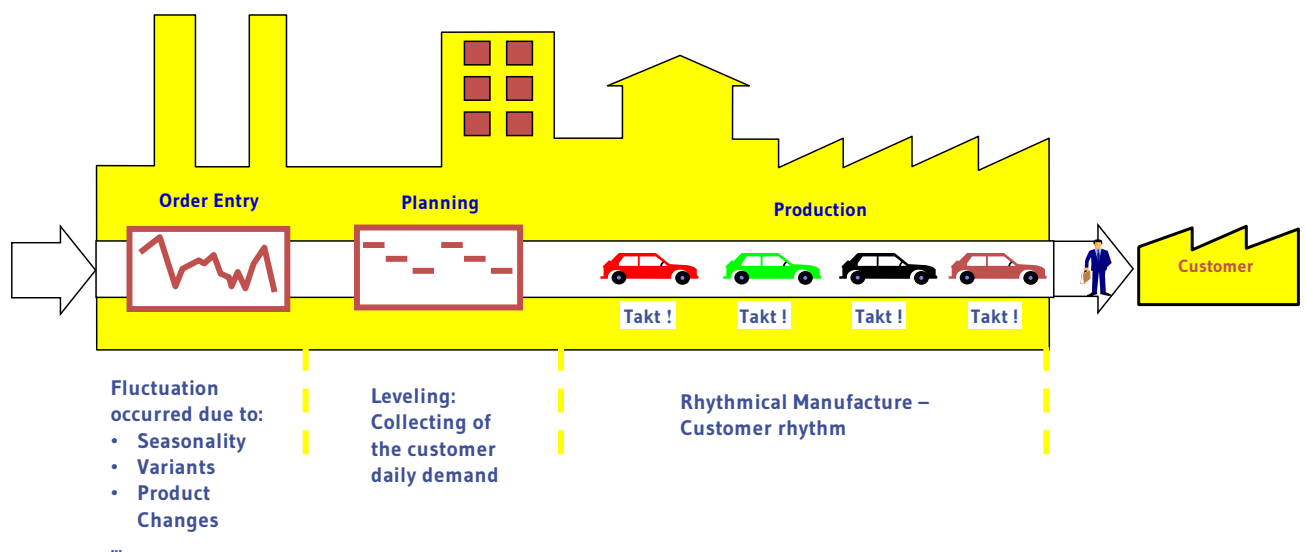
- Enable operators to stabilize work-load
- Makes the preceding process more efficient
- Makes it easy to find problems
- Reduces Lead time and inventory
- Allows quick response to changes in the market

With Levelled

- Production quantity
- Type
- Time required

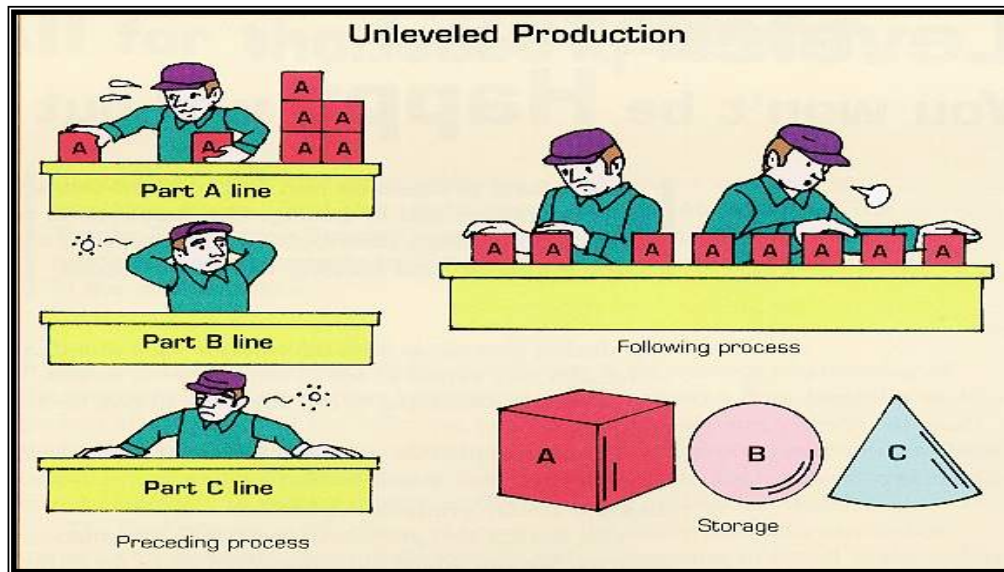


## PLANNING FOR LEVELLING



## UNLEVELLED PRODUCTION

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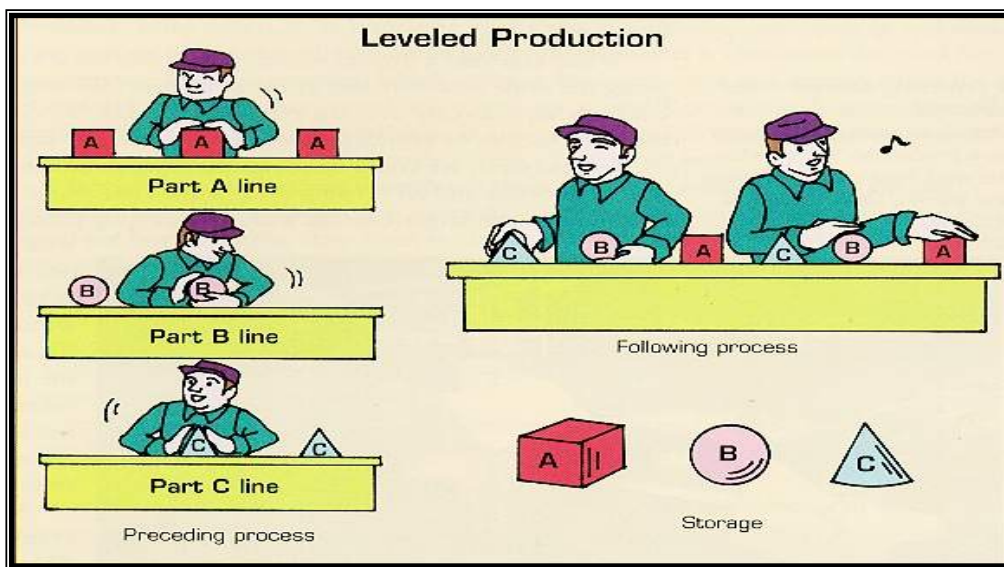


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## LEVELLED PRODUCTION

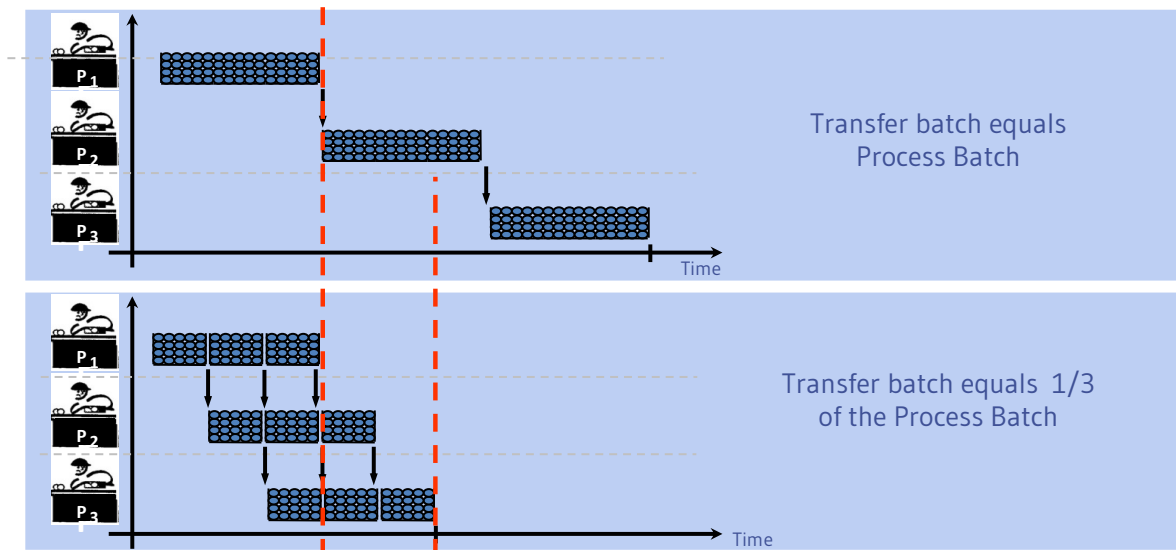


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## BATCH VS LEAD TIME



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## LEVELLING VS BATCH PRODUCTION

Project	Batch production	Levelling
Focus	Production oriented, produce based on productivity of plant	Market oriented, produce according to customer's demand
Production system	Mass production, minimize changeover times to improve outputs	According to Takt time, SMED to reach One piece flow
Measurement	Efficiency of independent process	Effectiveness of overall system
Equipment	Large, high speed, multifunctional equipment is used in mass production	Small, Takt time rate, low cost, exclusive equipment
Response to customer	Slow: High WIP, long lead time	Quick: Minimal WIP and one-piece flow used to shorten lead time

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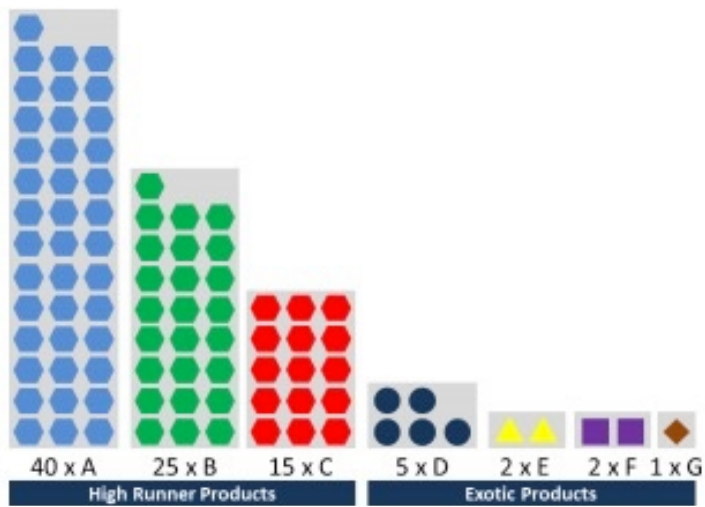


## HOW TO DO LEVELLING

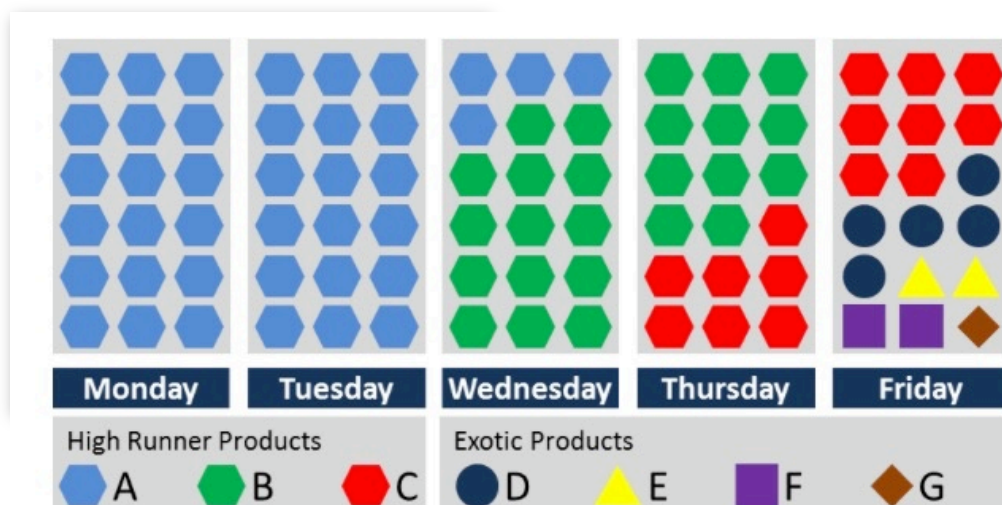
## EPEI (EVERY PART EVERY INTERVAL)

- EPEI, represents the frequency that different parts are produced or services provided within a fixed repeating schedule
  - Bigger number, lower rate, larger batch, less changeover times
  - Smaller number, higher rate, smaller batch, more changeover times

## ASSUME THIS IS OUR WEEKLY DEMAND

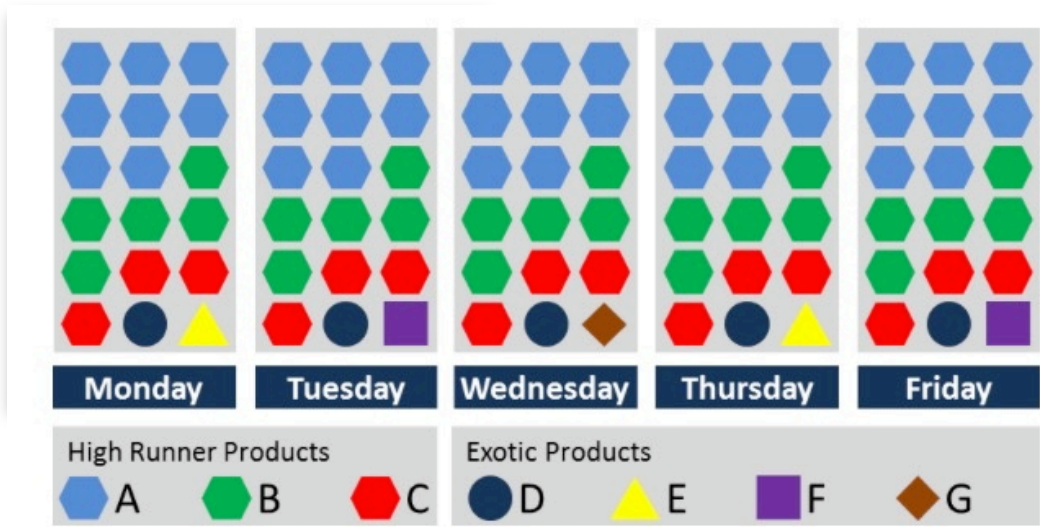


## BATCH PRODUCTION WITH LARGE LOT SIZES

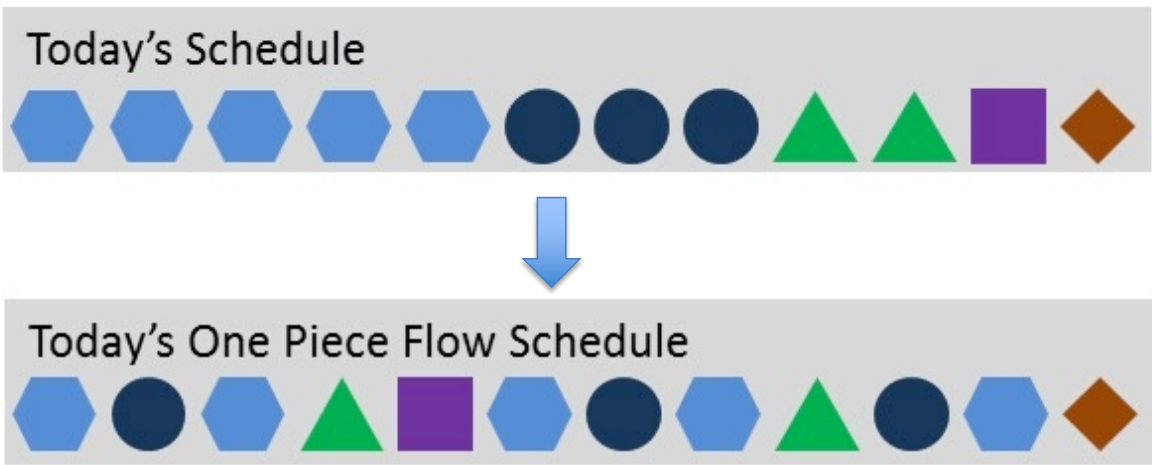




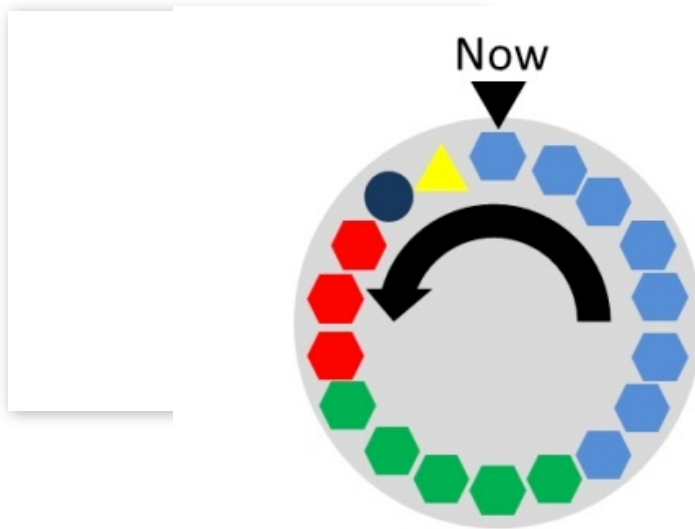
# EPEI FIXED SEQUENCE LEVELING



# EPEI IN A DAY

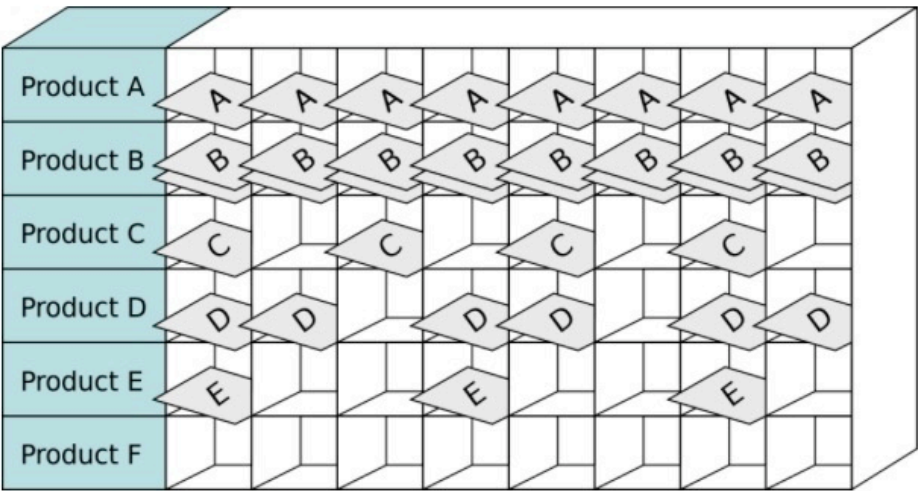


## THE REPEATING SEQUENCE AS A WHEEL



## HEIJUNKA BOX – VISUAL MANAGEMENT TOOL

# SCHEMATIC OF A HEIJUNKA BOX



# EXAMPLE: LOAD HEIJUNKA BOX



# EXAMPLE: HEIJUNKA BOX



# EXAMPLE: LOAD HEIJUNKA BOX



Production Release  
every 20 minutes



## LEVELLING STRATEGY



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## PRECONDITIONS OF LEVELLING

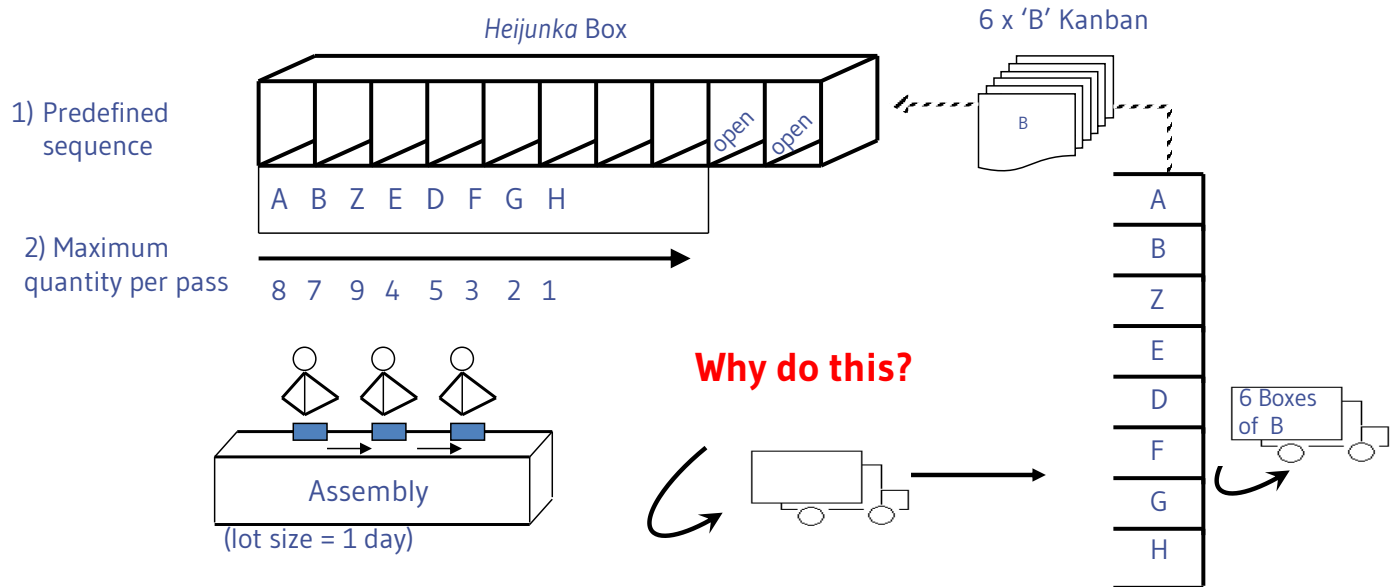
- Reliability/ Stability
  - Machine and people
  - Multi skilled team
- Continuous flow / pull production
  - One piece flow
  - Smooth communication
- Balanced cycle time between processes
  - No defects
  - Strict manufacturing discipline

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## LEVELLING EXAMPLE

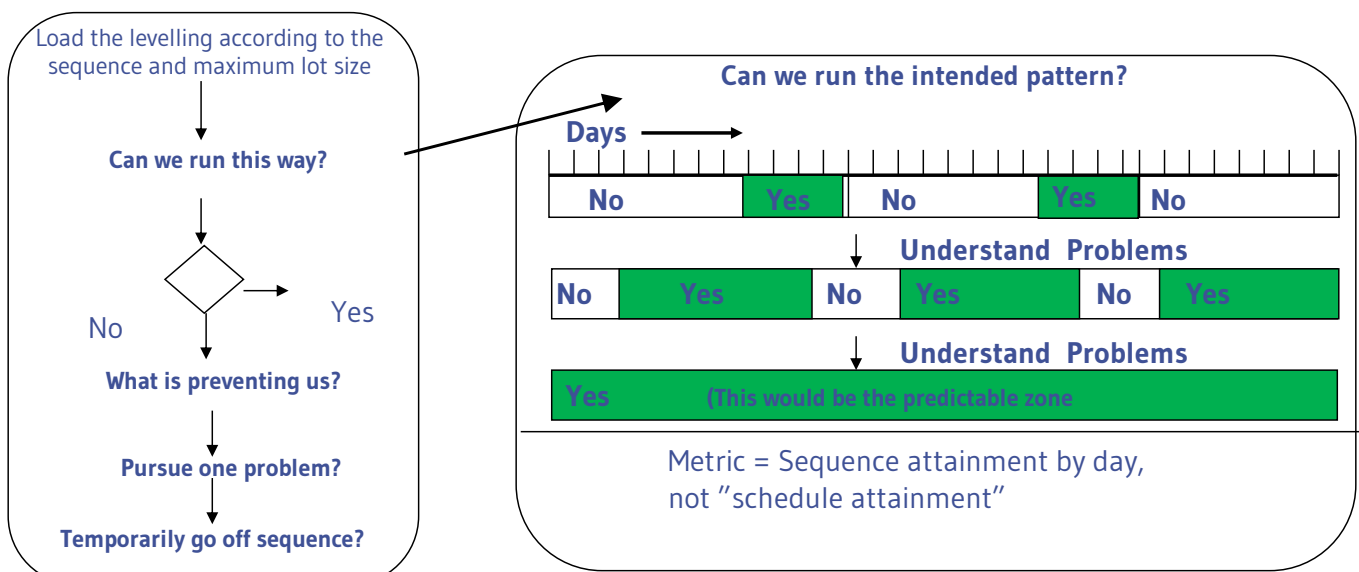


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## LEVELLING PROVIDES A TARGET CONDITION

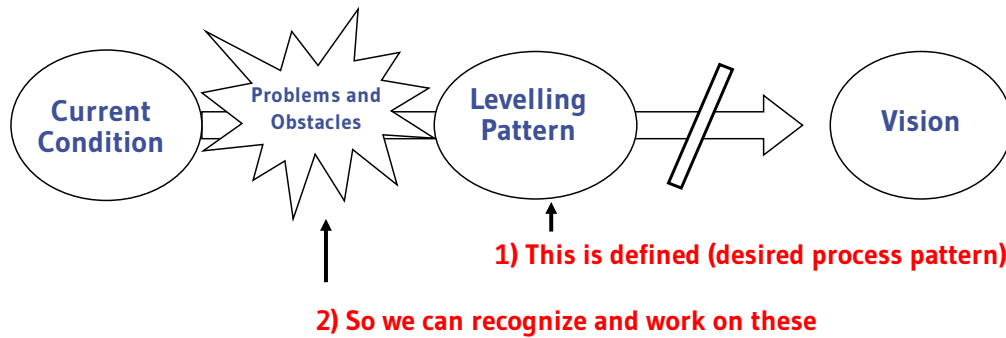


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## WHAT IS THE INTENTION BEHIND LEVELLING?



We can now see that it is not actually the levelling pattern, Kanban routine, etc. by itself that generates improvement but the step-by-step pursuit of conditions required to make those techniques work as intended.



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