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Tools for lean re-engineering

Production leveling

Co funded by the Erasmus+ Programme of the European Union

Production Leveling

Heijunka is "The distribution of production volume and mix evenly over time"
The goals are **Volume Levelling** (constant quantities over the period) and **Mix Levelling** (balanced in varieties)

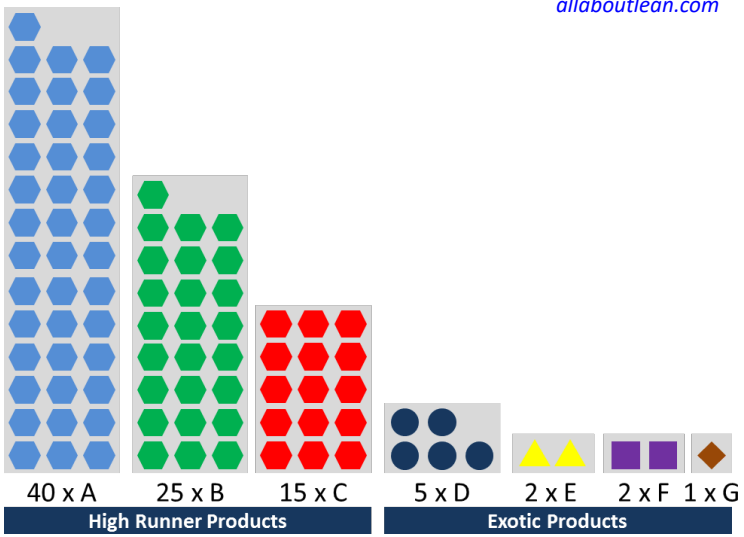
- The prerequisites for a **continuous flow** process is a balanced and leveled production, i.e. a sequence of synchronised processes operating at the same frequency (almost impossible to achieve!)
- In **traditional production systems**, production rhythm derives from the need to maximise the plant's production capacity and not from variations in demand
- The main consequence is the creation of **stocks**: a choice implemented in the logic of economies of scale, typical of mass production
- The main objective of levelled production is to achieve a daily production level that is as **constant** as possible, starting from **demand quantification**

Production Leveling: planning

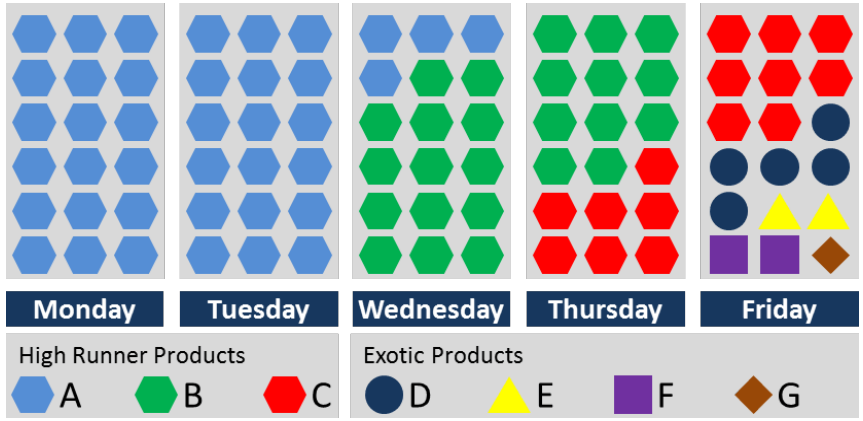
- In traditional management, production is based on a centralised scheduling system (e.g. MPS and MRP) that communicates production schedules to each department
- In the JIT system, production scheduling occurs only on the last process in the value chain (the peacemaker - usually the assembly of the finished product)
- Production is triggered to replenish what has been taken from the inter-operational buffer (the supermarket) between the two production stations for all other upstream processes
- Thus, demand is propagated "backwards" through the entire value chain, activating production in a "pull" logic from the final demand
- The result is a flexible production system, which can adapt to slight variations in daily demand regarding quantity and mix (of the order of 5%, generally not exceeding 10%)

Weekly demand

allaboutlean.com

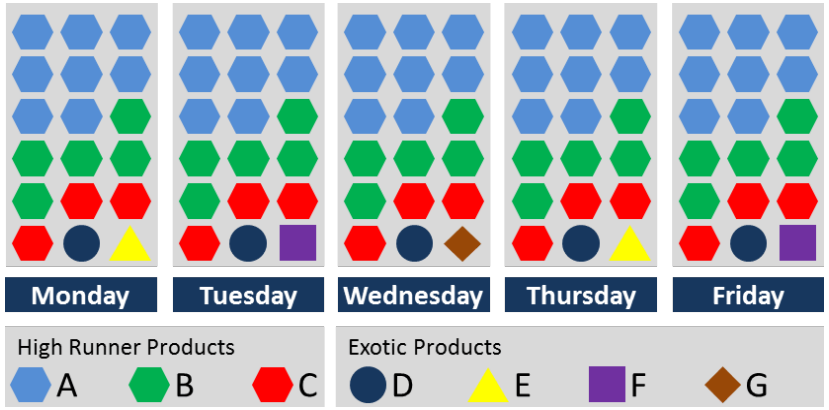


Minimizing the changeovers



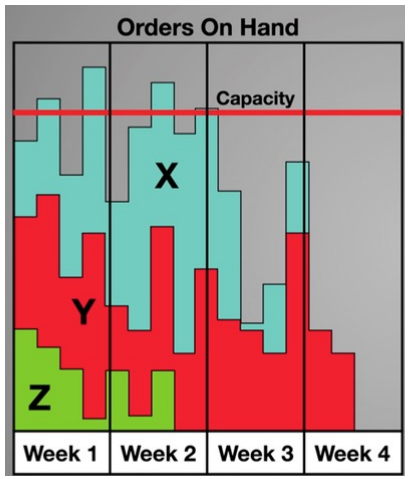
This will lead to an even bigger waste: excess inventory!
Additionally, it will work against smoothing the production and all its associated benefits

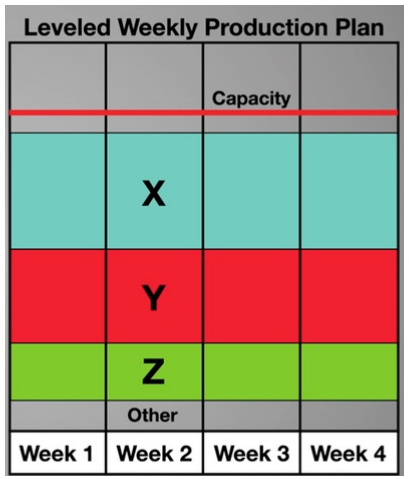
Production Leveling- Heijunka



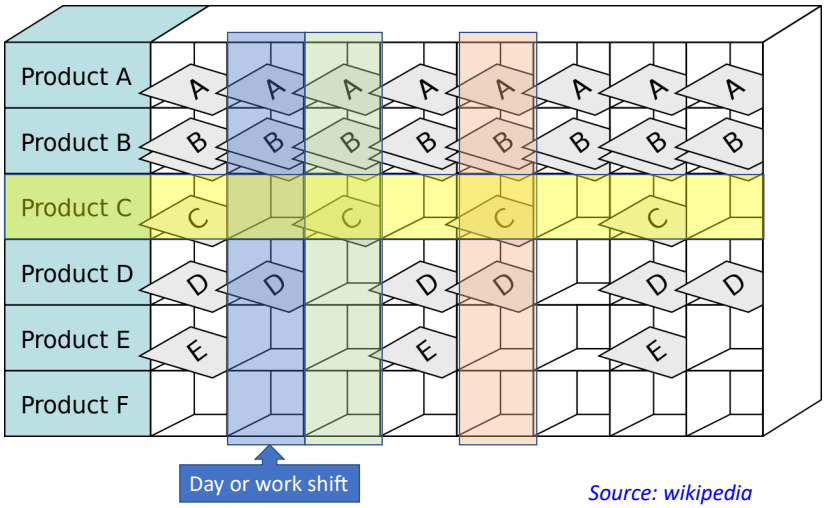
It is also the basis for the one-piece flow!

Production Leveling- Heijunka



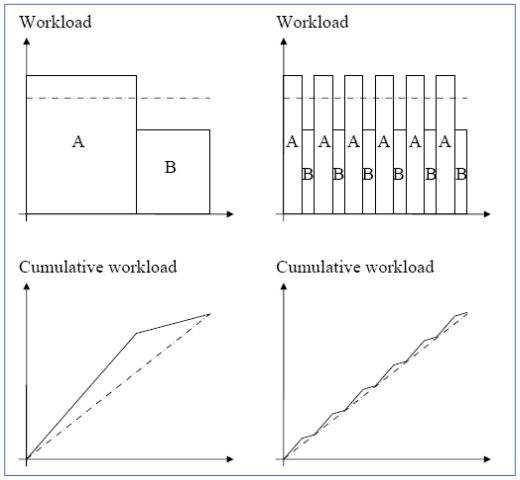


Heijunka board



Source: wikipedia

Leveling

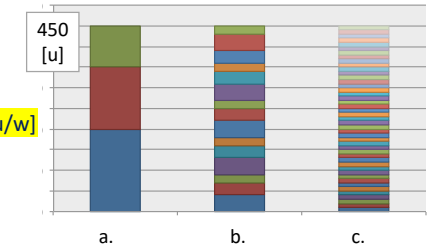


If a station draws parts from the upstream station in a way that fluctuates in terms of quantity and time (variable demand), the upstream station would have to be sized according to the maximum peak demand, resulting in a considerable waste of unsaturated production capacity and immobilised material

Toyota Case

- Products: Camry (C), Avalon (A), Sienna (S)
- Demand: 4500 [minivan/week]
- D(C)= 2000 [u/w], D(A)= 1500 [u/w], D(S)= 1000 [u/w]
- 2 work shift per day → 10 wks. per week
- POT: (8*60) = 480 [min/work shift]

TT = POT/PR = 480/(4500/10) = 1,07 [min/u]



a. **LEVELING-Max Lot Size** Prod. per w.shift → [200 (C), 150 (A), 100 (S)]

b. **LEVELING-Small Lot Size** Prod. per w.shift → [4 (C), 3 (A), 2 (S)] repeated 50 times per wks.

c. **ONE PIECE FLOW** Prod. per w.shift → [(C), (A), (C), (S), (C), (A), (C), (S), (A)] * 50 times