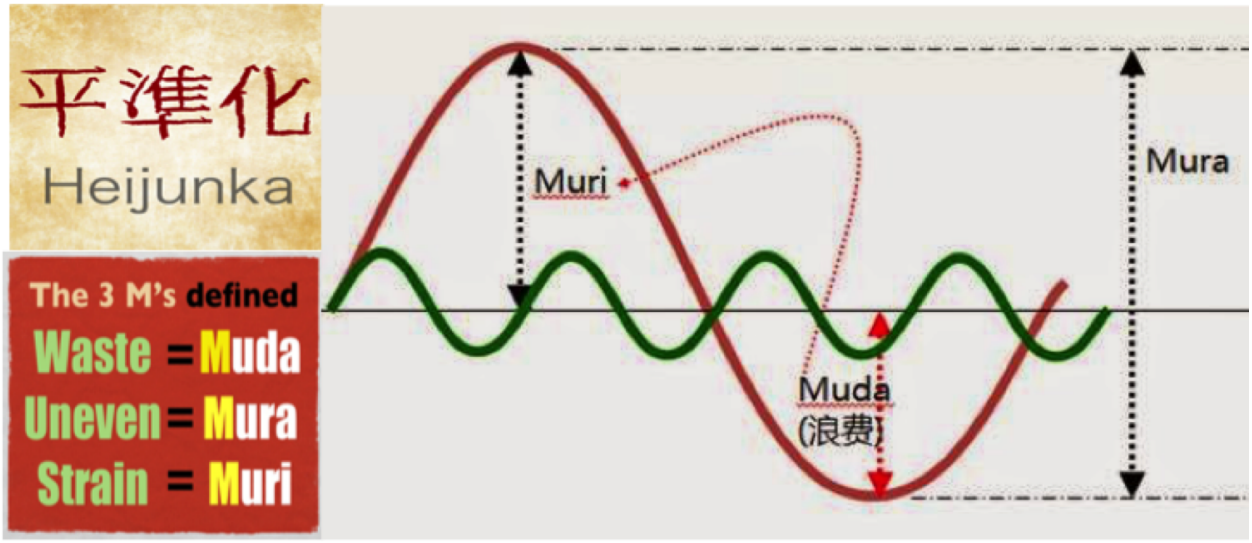
Heijunka



What is Heijunka? 0:42

Heijunka is the Japanese word for production leveling, a scheduling technique for repetitive, multi-product production.

Instead of trying to deal with varying demand or running long production series, leveling seeks to establish periodic demand patterns for scheduling repetitive small production runs.

Heijunka is also known as **production smoothing** and it is a technique for reducing the *mura* (unevenness) which in turn reduces *muda* (waste). It was vital to the development of production efficiency in the Toyota Production System and lean manufacturing.

You can approach Heijunka one of two ways:

Production Leveling by Volume:

This approach involves smoothing production based on the overall demand volume. The goal is to avoid sharp fluctuations in production levels and prevent overproduction during periods of low demand or underproduction during peak demand periods.

Key Features:

- Analyzing historical demand data to identify average demand volume.
- Creating a production schedule that aligns with the average demand, spreading production evenly over time.
- Adjusting the production schedule periodically to adapt to changes in demand.

Benefits:

- Smoother production flow: Avoiding abrupt changes in production helps maintain a stable and predictable workflow.
- Reduced inventory holding costs: Keeping production aligned with demand prevents excessive stockpiling.
- Better resource utilization: Resources, including labor and equipment, can be efficiently allocated based on steady production requirements.
- Improved capacity planning and scheduling: The company can plan production capacity more effectively, avoiding overburdening or underutilizing resources.

Production Leveling by Product Type or Mix:

This approach involves leveling production based on specific product types or mix to address variations in demand for different product variants. It aims to optimize production sequences and reduce changeover times between different products.

Key Features:

- Categorizing products into groups based on similarities in production processes or demand patterns.
- Analyzing demand patterns for each product group to understand demand fluctuations.
- Creating a production schedule for each product group, ensuring a balanced production flow for each category.

Benefits:

- Faster changeovers and setup times: By producing similar products in sequence, changeover times between production runs can be minimized.
- Improved productivity and efficiency: Streamlining production processes for specific product groups enhances overall efficiency.
- Enhanced customer responsiveness: The ability to adjust production quickly to changing customer demands for specific products increases customer satisfaction.
- Reduced WIP and lead times: Smoother production flow and reduced changeover times lead to decreased work in progress (WIP) and shorter lead times.

Choosing the Right Approach:

The selection of the appropriate production leveling approach depends on various factors, such as the nature of the industry and products, market demand patterns, available production capacity, and the level of supply chain integration. In some cases, a combination of both approaches might be utilized to optimize production and enhance overall performance.

A Heijunka case study

The Case:

The production facility works 7h/day 5 days/week, 20 days/moth
The facility manufactures a widget available in 6 colors
Each unit requires an hour to be manufactured
Changeover time equals zero (performed in masked time)

Red	Blue	Green	Orange	Yellow	Pink	TOTAL
R	B	G	O	Y	P	
28	60	18	18	10	6	140

This workload is compatible with available work time of the facility of 140 hours a month (7h x 20 days)

The customer orders come in randomly and the customers do not provide order forecasts.
The customer requests short delivery times.

Usual production scheduling

- Long production runs
- Runners or class A products (most wanted) are manufactured first
- Simple
- Rejects the many small runs or C class to the month's end

hour	Month																			
7	R	R	R	R	B	B	B	B	B	B	B	B	G	G	G	O	O	Y	Y	P
6	R	R	R	R	B	B	B	B	B	B	B	B	G	G	G	O	O	Y	Y	P
5	R	R	R	R	B	B	B	B	B	B	B	B	G	G	G	O	O	O	Y	P
4	R	R	R	R	B	B	B	B	B	B	B	B	B	G	G	O	O	O	Y	P
3	R	R	R	R	B	B	B	B	B	B	B	B	B	G	G	O	O	O	Y	P
2	R	R	R	R	B	B	B	B	B	B	B	B	B	G	G	O	O	O	Y	P
1	R	R	R	R	B	B	B	B	B	B	B	B	B	G	G	G	O	O	Y	Y
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Avail.	R				B								G			O		Y		P

Lead time 20 days. Ratio Added Value time / Total Lead time = 6h / 20d x 7h = 4%

Production Leveling with Heijunka 3:06

- Manufacture more frequently some quantity of every model

- Find a better basic pattern that you could use in repetition
    - Consider the week as a basic time frame
    -

hour					
7	O	R	B	B	B
6	O	P	R	B	B
5	G	Y	R	B	B
4	G	Y	R	B	B
3	G	O	R	B	B
2	G	O	R	B	B
1	G	O	R	B	B
Day	1	2	3	4	5

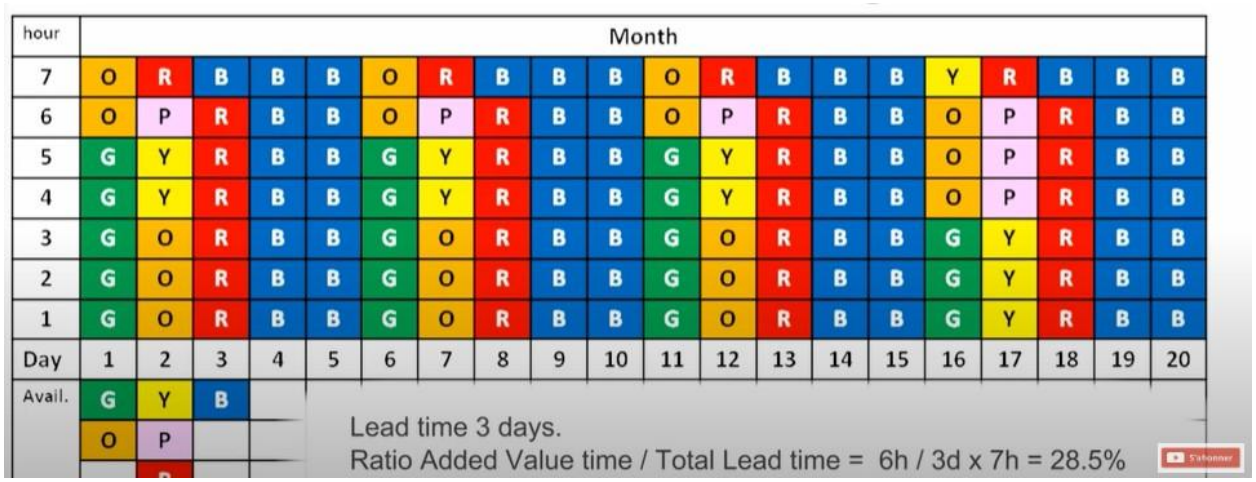
A	B	C	D	E	F	G	H
Model	Monthly need	Weekly need	Rounding	**Adjust**	Monthly	Check	Balance
Red R	28	7	7	**7**	28	0	0
Blue B	60	15	15	**15**	60	0	0
Green G	18	4.5	4	**5**	20	+2	-2
Orange O	18	4.5	4	**5**	20	+2	-2
Yellow Y	10	2.5	2	**2**	8	-2	+2
Pink P	6	1.5	1	**1**	4	-2	+2
TOTAL	**140**	35	**33**	**35**	**140**	**0**	**0**

Balance Adjustments

Production Levelling

A	B	C	D	E	F	G	H
Model	Monthly need	Weekly need	Rounding	Adjust	Monthly	Check	Balance
Red R	28	7	7	7	28	0	0
Blue B	60	15	15	15	60	0	0
Green G	18	4.5	4	5	20	+2	-2
Orange O	18	4.5	4	5	20	+2	-2
Yellow Y	10	2.5	2	2	8	-2	
Pink P	6	1.5	1	1	4		+2
TOTAL	140	35	33	35	40	0	0

Leveled production schedule



hour	Month																			
7	O	R	B	B	B	O	R	B	B	B	O	R	B	B	B	Y	R	B	B	B
6	O	P	R	B	B	O	P	R	B	B	O	P	R	B	B	O	P	R	B	B
5	G	Y	R	B	B	G	Y	R	B	B	G	Y	R	B	B	O	P	R	B	B
4	G	Y	R	B	B	G	Y	R	B	B	G	Y	R	B	B	O	P	R	B	B
3	G	O	R	B	B	G	O	R	B	B	G	O	R	B	B	G	Y	R	B	B
2	G	O	R	B	B	G	O	R	B	B	G	O	R	B	B	G	Y	R	B	B
1	G	O	R	B	B	G	O	R	B	B	G	O	R	B	B	G	Y	R	B	B
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Avail.	G	Y	B																	
	O	P																		

Lead time 3 days.
Ratio Added Value time / Total Lead time = 6h / 3d x 7h = 28.5%

Benefits of production Leveling or Heijunka

- Having a repeating pattern
- Keeping a familiar production schedule
- Reducing wait time and stock out for customers
- Reducing time to market and time to cash
- Scheduling with ease with minor adjustments