


## Heijunka Walkthrough



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This article is written as a walkthrough for the understanding of what is Heijunka and its use in production.


### Basics of HEIJUNKA in Lean



#### Heijunka's Definition: The leveling of Workflow or Production Leveling.

**Two types of Heijunka:**

- **The Leveling Of Production By Volume**
- **The Leveling Of Production By Product Type**



Monday: 50 Orders  
Tuesday: 80 Orders  
Wednesday: 35 Orders  
Thursday: 50 Orders  
Friday: 135 Orders

Traditional Manufacturing

Monday: A A A A A A A A A A  
Tuesday: A A A A A A A A A A  
Wednesday: A A A A A A A B B  
Thursday: B B B B B B B B C  
Friday: C C C C D D D D D

Traditional Manufacturing Schedule

Both Types Must Work Together For Heijunka To Be Effective.

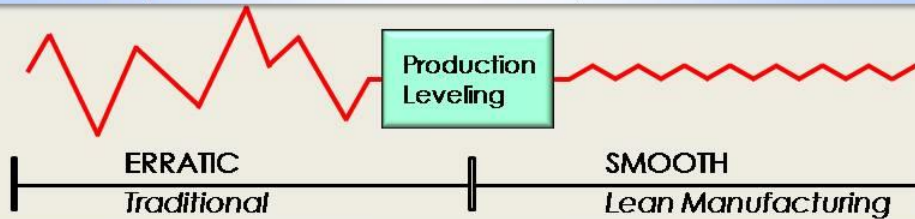
The slide above shows that Heijunka is defined as the levelling of workflow or production levelling. Toyota Production System (TPS) has defined Heijunka as levelling the types and the volume of produced goods and it is a prerequisite for "just-in-time" production. Both types of levelling (i.e. by volume and by product type) must work together for Heijunka to be effective. Traditionally, production volumes and product types can vary according to customer demands, poor planning or just because it is easy for the production to produce the goods in a sequence. The methods and goals of Heijunka are explained below:

# Production Leveling (HEIJUNKA)



## METHODS:

- Balance the work load among manufacturing lines
- Add planned buffers to improve raw material availability
- Add planned buffers to level demand spikes



## GOALS:

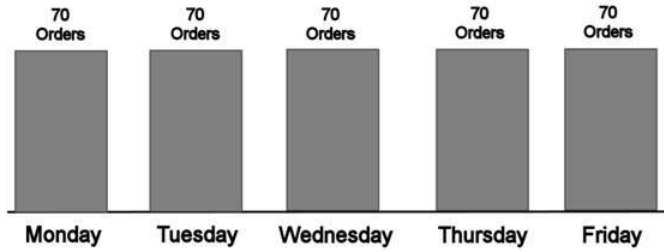
- Create process stability
- Improve delivery performance to customers
- Minimize fluctuations in supply chain
- Align production rate with customer demand

The method is to balance the work load among manufacturing lines and it is essential to add planned buffers to improve raw material availability and to level demand spikes. The traditional erratic production demand must be smoothed out using Heijunka when applying Lean Manufacturing. The ultimate goals are to create a process that is stable, to improve delivery performance, to minimise fluctuations and to align production rate with demand.

# HEIJUNKA on Shop Floor



## Leveling Production By Volume + Product Type



Heijunka Manufacturing – Leveled Workflow

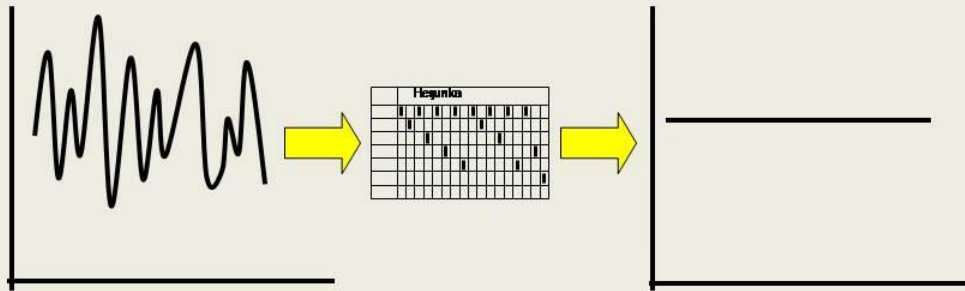
Monday: A A A A A B B C D  
Tuesday: A A A A A B B C D  
Wednesday: A A A A A B B C D  
Thursday: A A A A A B B C D  
Friday: A A A A A B B C D  
Leveled Manufacturing Schedule

The slide above shows the ultimate production levelling achieved through the levelling of production by volume and by product type. It shows that for a weekly orders of 350, the daily smoothed orders are 70 in which, each four types of products (namely Product A, B, C and D) are manufactured on a daily basis.

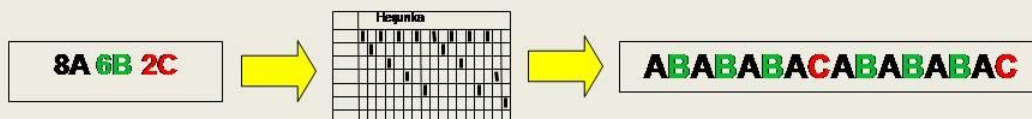
# HEIJUNKA on Shop Floor



## LEVELING THE VOLUMES :



## MIXING PART NUMBERS :



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However, levelling the production volumes and mixing the part numbers requires careful planning and management. For this a Heijunka Box is used to assist in the planning.

# HEIJUNKA on Shop Floor

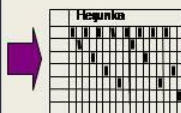


## Leveling the Volumes: Example

### Daily Shipping :

Customer Demand

Monday	180
Tuesday	100
Wednesday	50
Thursday	100
Friday	70
<b>Total</b>	<b>500</b>



Production leveled by Heijunka

Monday	100
Tuesday	100
Wednesday	100
Thursday	100
Friday	100
<b>Total</b>	<b>500</b>

Absorption of Fluctuations

<b>BUFFER STOCK</b>
<b>(80)</b>

**FLUCTUATION (50-180)**

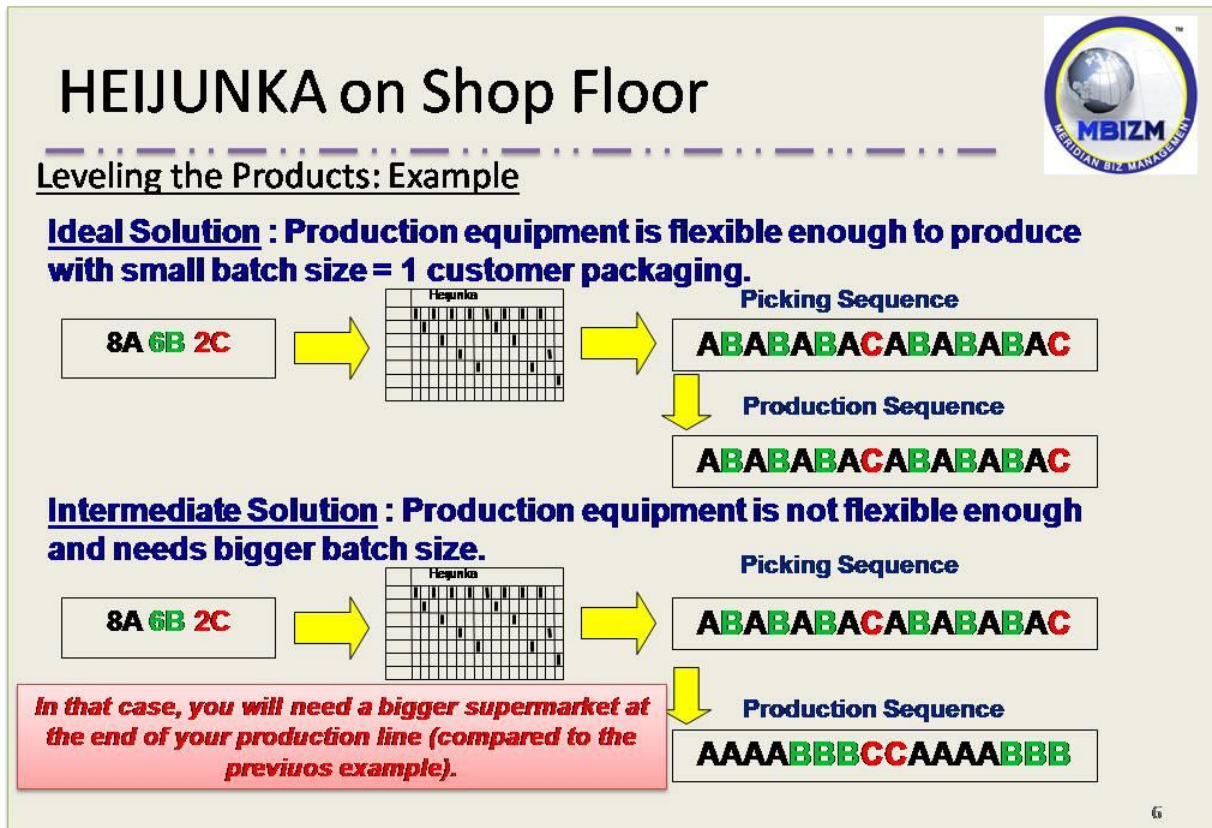
**REGULARITY (100)**

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Consider another example as above for levelling by volumes:

For an erratic production demand from Monday to Friday which consists of 180, 100, 50, 100 and 70 units respectively, the fluctuation is seen to be between 50-180 units for the entire week. This would mean that the production operators would be very busy on certain days and during the low production demand days, they would be looking for work to do.

Therefore, with the production levelling technique, the production demand can be regulated so that only 100 units are produced on a daily basis. However, it is important to keep a minimal buffer stock just in case there is a spike or fluctuation in production demands from customers. The example below shows the levelling by product types.



The ideal solution for producing the units is in a batch size of 1. However, most production equipment is not flexible enough and therefore requires bigger batch size. In the example shown in the slide above for levelling by product types, the daily production demands are 8 units of A, 6 units of B and 2 units of C. Therefore, the picking sequence remains the same for the ideal and intermediate solutions but the production sequence differs to minimise changeover times.

To enable a smooth flowing of product volumes and product types, the Heijunka Box is used as shown in the slide below. A Heijunka box has horizontal rows for each product type and has vertical columns for identical time intervals of production. Production control Kanban are placed in the slots created, in proportion to the number of unit to be produced of a given product type during a time interval. A cursor is used to indicate the current time slot on the Heijunka Box and there should not be any Kanban cards left unprocessed preceding the cursor.





The production planners need to take an active role in making sure that the Heijunka works by planning and regulating the production on a daily basis. They need to keep the Heijunka box updated especially with production demands and be the liaisons between the manufacturers and customers. Heijunka works well with pull manufacturing systems where customer requirements have already been pre-determined for production. This enables the production sequencing to be smoothed out. Takt Time synchronizes the rate of production to the rate of customer demands by taking into consideration the amount of available production time. Takt time calculation is important to enable the design of time slots in the Heijunka box.

The explanations of Heijunka so far did not take into considerations for the changeover / setup and maintenance times. It is essential that adequate time slots are allocated for the Heijunka box to accommodate changeover and maintenance times. One of the biggest issues when designing the Heijunka is the requirements for buffer or inventory. This seems to be going on the opposite direction of lean principles that is to reduce inventory levels. However, to enable an efficient Heijunka production levelling, buffer is required to maintain demand stability but this should be kept to a minimum size.

Other aspect of production using Heijunka is the one piece flow or batch production. Heijunka can work in both situations but the batch production would then need a higher buffer size. Manufacturers have the option of turning their production into cellular manufacturing due to shortage of manpower and to reduce operating costs. Generally Heijunka can help to sequence the production for cellular manufacturing especially in assembly lines. Finally, the challenges for implementing Heijunka are summarised as below:

## Summary: Challenges for HEIJUNKA



- ✓ There is a need for a safety buffer. This can be seen as an opposite direction to Lean mission. Design of a suitable buffer is essential.
- ✓ Heijunka depends on direct customer contact and accurate information about projected or forecasted customer orders.
- ✓ Need to explain why it is important to do standardized work before implementing Heijunka.
- ✓ Reduces operator flexibility which may draw resistance. Change management is essential.
- ✓ Requirements for discipline and proper planning on a daily basis.