



HEIJUNKA-MANAGED WAY FOR NON-LEAN MANUFACTURER AND VIEWPOINT IN D365 FO

Abstract

“Heijunka” means leveling, is a very significant tool in manufacturing systems for stabilizing floor with effective production capacity first used by the Toyota Production System (TPS). This article describes effective use of “Heijunka” tool, in non-lean discrete and process manufacturing for analyzing quantity of waste, enabling businesses to minimize the throughput time and optimize average work in process for gaining access to more stabilized insights on floor.

Objective of this article is to present a viewpoint on potential utilization of this lean tool in non-lean organizations with multi product manufacturing for optimized inventory and operational control using manufacturing cloud on D365 Finance and Operations (to be referred to as ‘D365 FO’ through this article) as Manufacturing Execution System (to be referred to as MES through this article).

Background

In traditional manufacturing world, production is driven by sales forecast i.e., push system. However, there are multiple challenges associated with push systems for managing production quantities, which will impact stability and associated parameters preventing an optimized and cost-effective push system. The challenges mentioned below impact quantity of waste and also mitigate cost using lean tools

- In business, Work in process is just an activity but not as normalized activity considering its capacity.
- High cost for inventory owing to purchase of non-required raw inventory.
- Challenges are not standardized and treated merely as problems on the shop floor.

What if we were to use lean methodologies and tools in non-lean manufacturing and consider its possible process execution via D365 FO?

Introduction

“Heijunka” (pronounced hi-JUNE-kuh) is a

Japanese word which means “leveling”. When implemented correctly, “Heijunka” helps organizations meet demand while reducing wastes in production and interpersonal processes.

For a non-lean manufacturer, production levelling helps and protects from unpredictability and variability in sequence of job or product to be manufactured in the process. Such variability can be overcome by establishing harmonized production levelling process in periodic parameterized sequence i.e., cyclic scheduling on the shop floor. By applying the same, demand driven production is scheduled to manage sequential production of goods through a given period by alternating between demand and non-demand product.

“Heijunka” is a core concept that helps bring stability to the manufacturing process, converting uneven customer pull into an even and predictable manufacturing process to meet and optimize delivery time against demand.





“Leveling the type and quantity of production over a fixed period of time. This enables production to efficiently meet customer demands while avoiding batching and results in minimum inventories, capital costs, manpower, and production lead time through the whole value stream”.



Heijunka Definition
– by–
Lean Lexicon, 4th edition

The Process and Computational logic

“Heijunka” allows manufacturing companies to produce products at a steady pace in a repetitive manner which help businesses to respond to fluctuations based on your average demand.

“Heijunka” follows two ways to process the variation over demand.

1. “Leveling by volume”
2. “Leveling by type/product”

“Leveling by volume”: To optimize product variants in demand, business should level production by the average volume of the orders it receives. For example, if you get 500 orders of blue shirts each week, however the number of shirts fluctuates by day during the week, leveling production by volume gives you the best chance to control inventory.

For instance,

	Monday	Tuesday	Wednesday	Thursday	Friday
Demand by customer for shirts	200	100	50	50	100
Leveling demand using Heijunka	100	100	100	100	100

Demand and associated leveling by volume

“Leveling by type/product”: In an actual scenario, business would want to produce different variants of a product every day. The demand of the product not by volume but by the product type or category may vary from day to day.

For e.g., business receives multiple types of orders for colored T-shirts each week that is to be catered to with production capacity of 10/day.

	Week 1	Week 2	Week 3	Week 4	Week 5
Orange T shirt(color)	30				20
Red T shirt (color- R)		40			10
Green T shirt3 (color- G)			50		30
Blue T shirt (color- B)				50	20

Demand by type/product

A typical production company would want to minimize the production activity so that it can reduce and utilize optimal way for machine changeover. Using “Heijunka”, levelling by type/product would look like below.

How to improve engagement and alignment

	Week 1					Week 2					Week 3					Week 4					Week 5									
Product type	D1	D2	D3	D4	D5	D1	D2	D3	D4	D5	D1	D2	D3	D4	D5	D1	D2	D3	D4	D5	D1	D2	D3	D4	D5					
Orange T shirt (color- O)	O	O	O															O	O											
Red T shirt (color- R)				R	R	R	R	R													R									
Green T shirt (color- G)								G	G	G	G	G													G	G	G			
Blue T shirt (color- B)													B	B	B	B	B											B	B	
Levelling by type / category of product	O	O	O	R	R	R	R	G	G	G	G	G	B	B	B	B	B	O	O	R	G	G	G	B	B	B	B	B	B	B

Heijunka levelling by type/product

using D365 FO manufacturing cloud as MES

D365 FO has MES tool on cloud which caters to the Heijunka method for lean manufacturing using Kanban scheduling board. However as mentioned earlier, not all manufacturers are inclined to adopting a lean process in their organization.

The proposed concept of “Heijunka Box” over cloud based D365 FO MES capabilities, will allow manufacturers to use the above stated computational logic in their day-to-day production.

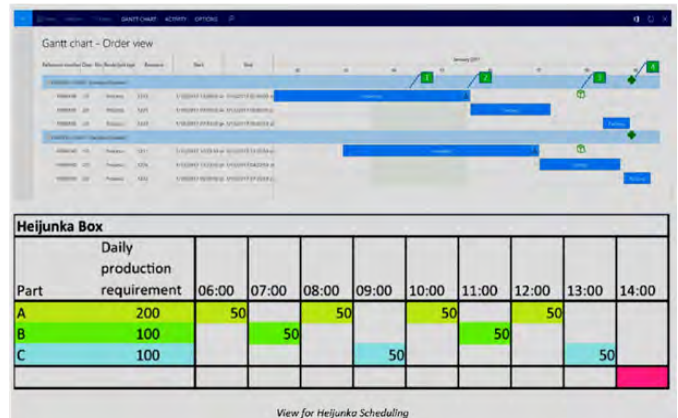
“Heijunka Box” in D365 FO: “Heijunka” (i.e., Leveling) is based on a statistical parameter as input, which derives demand for optimized production scheduling. The scheduling can be viewed using scheduling board. Below are the considerations packed up in “Heijunka Box” to achieve production levelling in D365 FO for non-lean manufacturers.

The “Heijunka” parameters:-

- “Takt Time”:- the rate at which manufacturer needs to complete a product to meet customer demand.
- Number of “Heijunka pitch time” (i.e., NH). (For example, if the pack-out quantity is 35, and the “takt time” is 1 minute, then 1 minute x 35 units = a pitch of 35 minutes.)

- Per day volumetric capacity of production unit
- Per day run time
- “Levelling” by :- Volume levelling or Type levelling or both
- “Time periods”:- in how many days from today, we want to drive levelling Buffer inventory percentages

The “Heijunka output” is visualized in a form of inquiry and action board, to manage the various slots that denote which type and in what quantity products will be produced per a specified period.





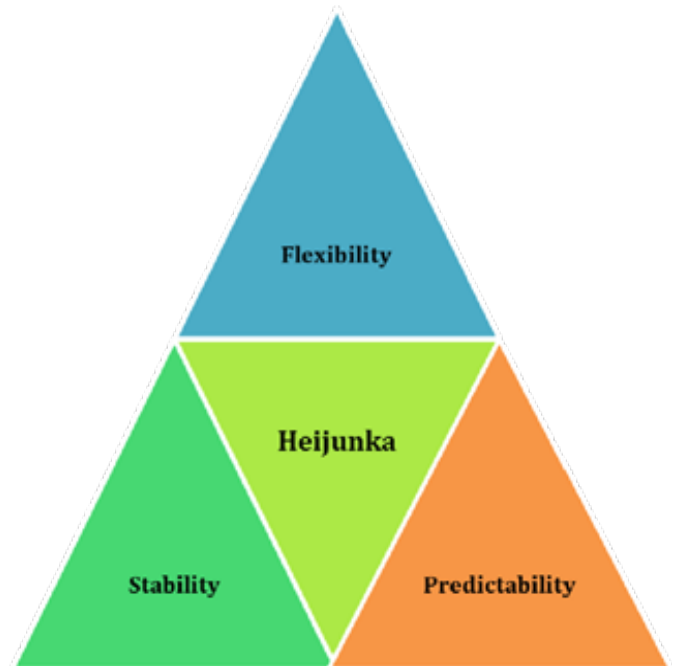
Result

To establish an improved production engagement, production person must align on statistics based on proposed “Heijunka Box” in D365 FO along with considerations below:

1. Executive sieve/ filter analysis to identify these products and put them on a repetitive production schedule.
2. Need to break the myth that it’s impossible to get away from constant short-term plan changes.
3. Acceptance of tech-oriented production schedule and execution path.

With active involvement of production person in “Heijunka” engagement, business will get benefited along the way to meet customers’ unpredictable demand as efficiently and optimally as possible. “Heijunka” offers multiple benefits to a non- lean manufacturer to manage and handle the inventory aspect in the business.

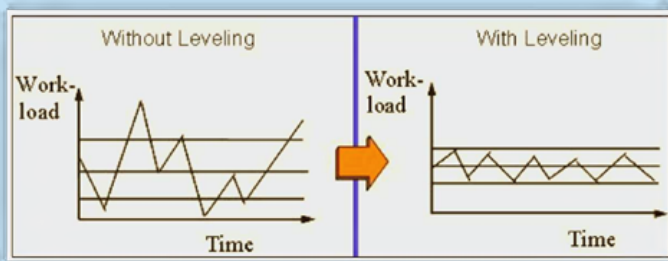
- **Surplus items:** “Heijunka” strives to eliminate overproduction, which increases the inventory carrying cost.
- **Small batches:** In addition to surplus inventory, batching large amounts of products without considering customer demand or fluctuation has negative cost effects on a business along with addition to the cost of finished goods and its associated inventory carrying cost. “Heijunka” reduces the same by executing the process in small batches instead of large production batches.
- **Pull systems:** “Heijunka” helps minimize waste through a pull system, which requires materials to be replaced only when they are used, which results in reduction of moving cost and keeping items at minimum level.
- **Customer satisfaction:** Satisfied customers who will receive the products on time with optimized delivery
- **Demand Levelling:** Levelled demand for upstream processes and suppliers
- **Load Levelling:** Higher reliability of machines due to levelled load
- **Happy Manpower:** Happier and productive employees due to removal or prevention of overburden and idle time



Conclusion

“Heijunka” is a key ingredient to any Lean implementation. It enables companies to achieve predictability by leveling product demand, flexibility by being able to respond to changing customer preferences, and stability by averaging production volume and type in the long term. “Heijunka” will then amplify those improvements by leveling out the production schedule.

Leveling the activity and producing goods to meet an unpredictable demand is a key factor to optimize the performance on production floor which in turn, helps reduce cost and increase the effectiveness in delivery. “Heijunka Box” is a proposed tool on D365 FO based MES to mitigate and optimize production challenges on the shop floor.



References

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2. Trout, J. (n.d.). 2. Heijunka: An In-depth Look. RELIABLEPLANT. <https://www.reliableplant.com/Read/14245/heijunka>

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