Improved single run - Round 1

4 août 2021 Finished.

Round 1/1 Rounds

Profit and Loss

	Unit Value	Qty	Value
Total Revenue *All products sold*	*+$100*	**74**	**+$7,400**
Cost of goods *per unit sold*	*-$10*	74	-$740
Labor cost *per number of stations*	*-$10*	7	-$70
Rework operations cost *per operation*	*-$10*	76	-$760
WIP Inventory cost *based on average stock*	*-$20*	17	-$330
FG Inventory cost *based on average stock in the warehouse*	*-$50*	2	-$100
Late delivery to customer penalty *per unit*	*-$30*	74	-$2,220
Deffective delivery to customer penalty *per unit*	*-$50*	15	-$750
Total Expenses			**-$4,970**
Net Profit			**+$2,430**
OTIF Products Delivered *On-time, in-full and conform* :			**0 units** ***(0%)***

Customer Orders and Deliveries

From our customer's perspective, the most important is to receive the goods on-time and with the required level of quality. See below if you managed to meet customers expectations !
Note that producing too fast/early and with over-quality is also considered waste.

74/120 pcs → 62%
Units sold

0/120 pcs → 0%
Sold on-time and conform

74 pcs delivered late, 15 pcs delivered with defects

See orders detail

Resource efficiency

Looking at the workstations, what was the proportion of their capacity put to use ? Here we are assessing if the team was busy during the game session.

17:20
Total game duration

11:20.1 - *65%*
Average station active time

Detail per station

For how long during the game was each station actually processing products, vs. the total game duration **(17:20)**.

Station	Tot. Proc. Time	%Utilization
Warehouse	*00:00*	
Painting Green	13:07	76%
Painting Red Circle	14:22.1	83%
Painting Red Square	13:56.7	80%
Painting Blue	08:22	48%
Painting Yellow Circle	10:43.4	62%
Painting Yellow Square	07:29.6	43%

Flow efficiency

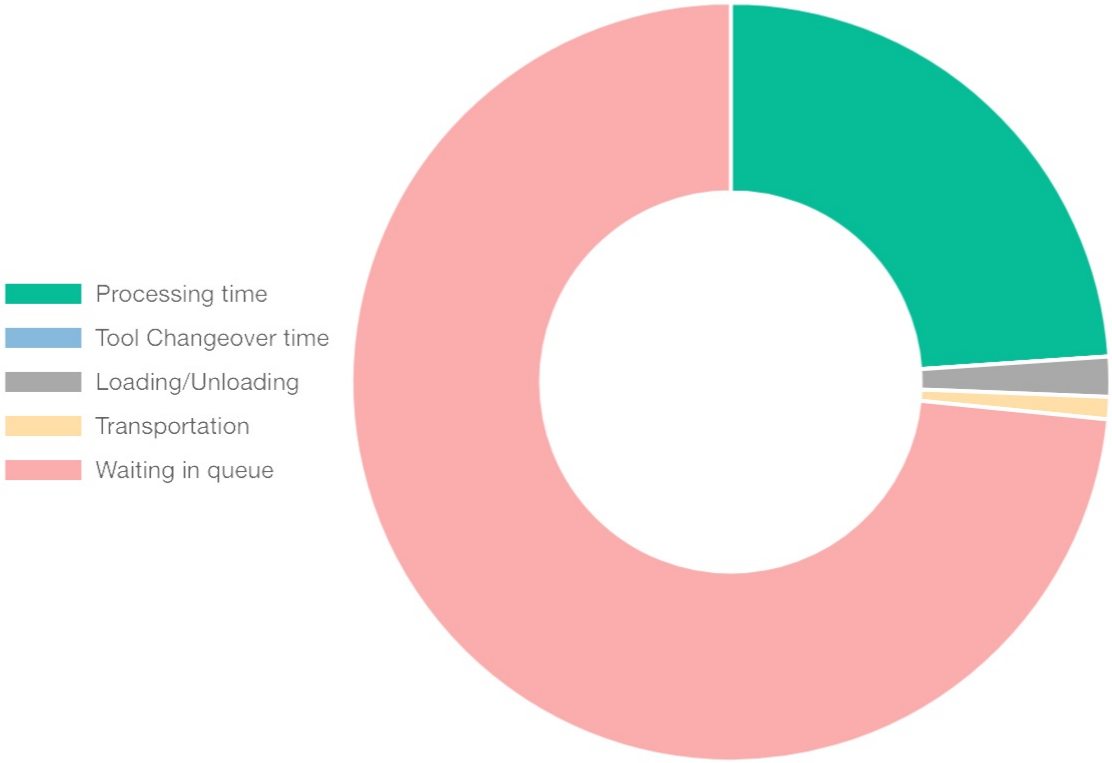
Looking at an individual unit, how long did it take to go through the entire process, and which proportion was actually adding value ? Here we are assessing if the products went through the process as quickly as possible.

03:31.2
Average product throughput time

00:50.5 - *24%*
Average value-adding time

Detail

For the products delivered to the customers, see below the average time spent on the different value-adding/non-value-adding activities :



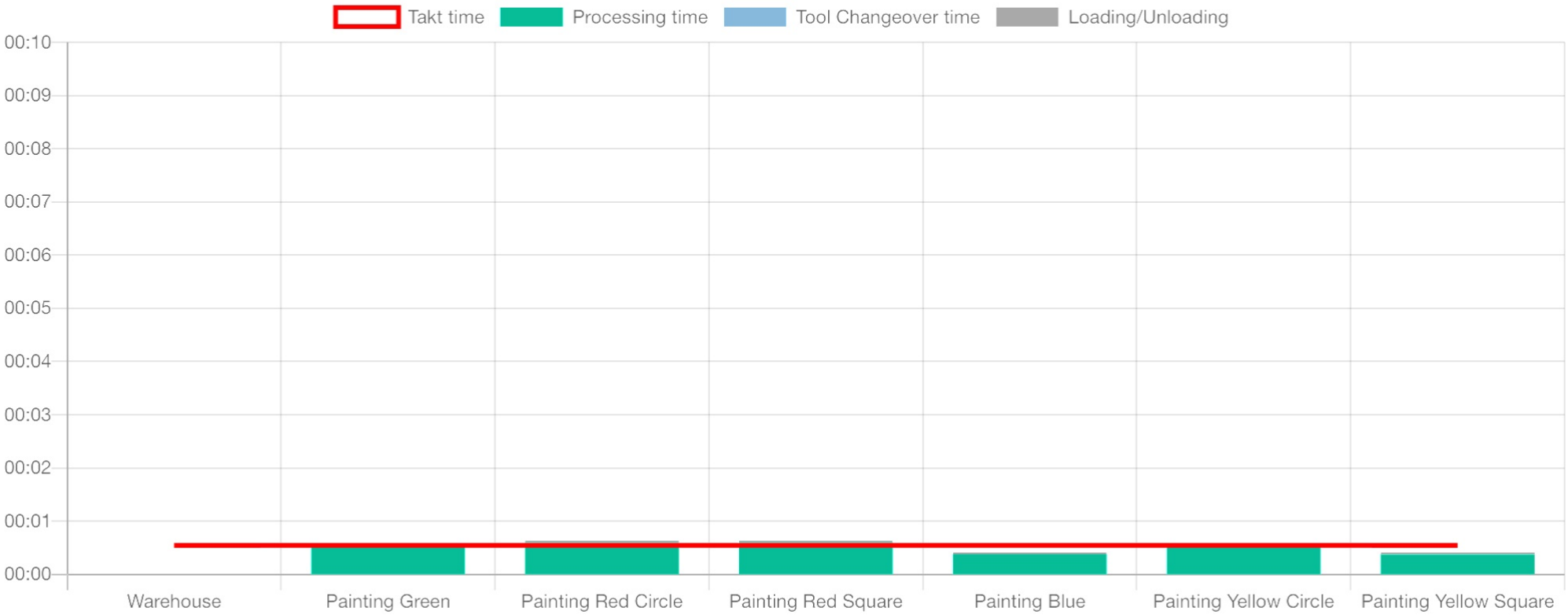
Cycle times vs. Takt time:

The takt time refers to the average rate at which units are ordered by your customers. Its calculation is as follows :

Takt time = Available time / Total Demand in our case: *Takt time = 16:45 / 120 units =* ***00:08.3*** *sec per unit*

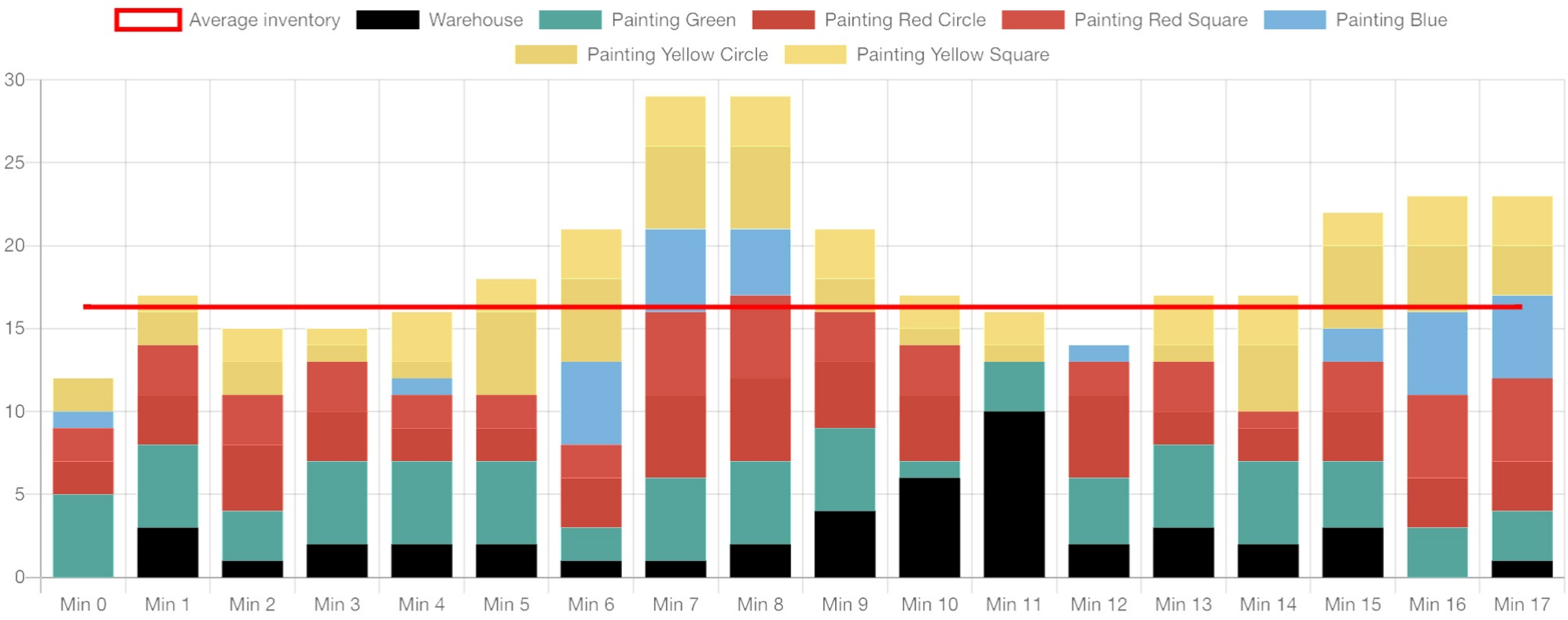
The workshop needs to produce units with the same rate in order to meet customer demand.
To achieve this, the cycle time of each station (average time required to process a single unit) should meet the takt time.

Think of ways the workload could be balanced between stations to ensure a continuous flow of products at the correct rate.



Work-in-Progress Inventory

You'll find below the evolution of the inventory on the various stations. Can you identify one or several stations where stock is pilling up ?



Inventory Lead Time

In queuing theory, the average waiting time can be found by looking at the length of the queue divided by the time to process one unit. This is know as ***Little's law***.

In our case, we can estimate the waiting time in front of each station with the following formula :

*Waiting time = Average Inventory * Takt time*

By minimizing the work-in-progress in the system, we reduce the queuing/waiting time, and improve the reactivity of the workshop.

Average inventory per station

Station	Avg. Inventory	Inventory time
Warehouse	2.3	00:19.2
Painting Green	3.6	00:30.1
Painting Red Circle	2.9	00:24.2
Painting Red Square	2.5	00:20.9
Painting Blue	1.4	00:11.7
Painting Yellow Circle	1.9	00:15.9
Painting Yellow Square	1.8	00:15
All Workshop	**16.3**	**02:16.5**

Quality Performance

A common source of waste in a production system is scrap and rework. Here are some ways to minimize them:

- Add in-process quality inspection, this concept is called ***Jidoka***. Each worker will control and make sure the part is conform before it goes to the next station.
- Standardize work and add ***Poka-Yoke*** mechanisms (japanese term meaning "mistake-proofing") to prevent, correct, or draw attention on errors as they occur.

Operations status

Which station generated the most internal defects ? Note that some rework may have been made to correct these before products were delivered to the customer.

Station	Success	Failed	%Success
Warehouse	*0*	*0*	
Painting Green	165	5	97%
Painting Red Circle	235	28	89%
Painting Red Square	242	28	90%
Painting Blue	117	14	89%
Painting Yellow Circle	133	7	95%
Painting Yellow Square	100	4	96%
Total	**992**	**86**	**92%**

Defects at the customer

15 deffective products were delivered, concerned by a total of **22** issues.
Detail by product type :

- Product B : **5** deffective products delivered (**8** issues)
- Product A : **10** deffective products delivered (**14** issues)