OEE Calculation for parallel production

Machine with carousel: There are several machine, they have a carousel (see picture). All these machine do in normal case one order. But there are cases (regurarly!) that on one part is product A (takt time sample 25sec) and on the other product B (takt time sample 15sec)! Do you have a solution for two orders at the same time on the same machine?

In this case we have 2 problems to solve:

1. informing NIS that more than one WO are active on the same machine. Based on these information NIS can generate the right number of items produced (and related WO) for each end of cycle detected by machine
2. assigning the right takt time for producing items in this situation. In fact in this case we have 1 machine that produces different WO with different takt time. The problem is that each takt time refers to production of each single WO as the WO is produced singularly, but in this situation the machine produces more then one WO at the same time, so the machine (if works with expected performance) will have a takt time greater then the minimum takt time of WOs active.

Using touch panel the worker could select more than one WO when changing production; for each WO the worker should select the number of items will be produced at each production beat (a production beat corresponds to the "end of cycle" (eoc) signal switch on).

NIS take into memory (database) this production configuration (SET) for the specific machine.

For each "end of cycle" NIS counts the number of items indicated for each WO in the SET.

For example:

- WO A ⇒ 2 items / eoc
- WO B ⇒ 4 items / eoc
- WO C ⇒ 3 items / eoc

when signal eoc is detected by NIS it automatically implies:

- 2 items produced of WO A
- 4 items produced of WO B
- 3 items produced of WO C

total 9 items produced of different WO into the same machine.

Regarding the second problem we solved.

Each WO is related to a specific takt time, for example:

- WO A ⇒ 20s
- WO B ⇒ 10s
- WO B ⇒ 13s

It implies that the machine has a production beat (eoc) of about 40 sec. But NIS doesn't consider this. NIS consider each cycle time singularly.

NIS calculates OEE as below:

Availability = ∑ Run Time / ∑ Planned Production Time Performance = ∑ (Takt time × Total Parts) / ∑ Run Time Quality = ∑ Good Parts / ∑ Total Parts OEE = Availability × Performance × Quality

Note that each sum is performed across the full set of products. For example, with two products: ∑ (Takt Time × Total Parts) = (Takt Time1 × Total Parts1) + (Takt Time2 × Total Parts2)

This is enough to solve this problem and it's a best practice for OEE calculation in these situations.

From users point of view this implementation will be sheer.

How do I calculate OEE when I run products with different cycle times?

This is a difficult problem, especially when batch sizes are very small, and when calculations are being performed manually. Unfortunately, there are not any shortcuts if the goal is to generate an accurate OEE score.

A simple average of individual OEE scores is insufficient, as it does into take into account the production time of each product. A weighted average, where the weighting is the actual production time, is better, but it does not provide the detailed loss information that comes from Availability, Performance, and Quality.

The best option requires having the full set of underlying data for each product run: Run Time, Planned Production Time, Ideal Cycle Time, Total Parts, and Good Parts. In that case you can use the following calculations:

Availability = ∑ Run Time / ∑ Planned Production Time

Performance = ∑ (Ideal Cycle Time × Total Parts) / ∑ Run Time

Quality = ∑ Good Parts / ∑ Total Parts

OEE = Availability × Performance × Quality

Note that each sum is performed across the full set of products. For example, with two products:

∑ (Ideal Cycle Time × Total Parts) = (Ideal Cycle Time1 × Total Parts1) + (Ideal Cycle Time2 × Total Parts2)