Balancing Cycle Time & Takt Time

Overview of Module

Once takt time and individual process cycle times are known it is important to study their relationship.

For example, if our takt time is 60 seconds per piece all process cycle times must be less than 60 seconds. If any process cycle time is greater than takt time we will not be able to meet customer requirements without overtime.

In order to understand the relationship between process cycle times and takt time a simple graph, as shown below can be created making it easy to interpret the situation.

Before Balancing

Once this graph is created any processes taking longer than takt time (weld above) must be addressed. Furthermore, any process or processes being severely underutilized (cut and drill above) must also be addressed.

In order to address the situation there are four steps that, if used correctly, will bring more balance to the situation.

- First, we must work to eliminate any unnecessary steps from the process. For example, if there is something being done that adds absolutely no value to the end product work to

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eliminate it. Ask yourself, does my customer care about this step or even better is my customer willing to pay me for this step? If the answer is no this is your cue to get rid of it.

- Second, whenever possible we want to combine tasks. In our example it's obvious that the first operator working in the cutting area has plenty of time to help the welding operator. So, by combining these two processes into one we will be able to bring more balance to the situation.
- Third, we want to rearrange the workplace in such a way as to reduce waste.
- Finally, whenever it makes sense we may look to implement some simple automation whenever applicable. This does not mean you must go out and buy expensive robots since simple automation is often “home made” from materials we already own.

An additional benefit of studying the relationship between cycle times and takt time is the fact we are able to calculate the optimal crew size. This figure helps the lean producer accurately man a production area. If it’s learned an area has too many operators the extra operators can be moved to other constrained areas in the plant or allowed to focus their energy on improving other areas (kaizen).

**Terms**

- **Cycle Time**: The measured time that explains how often a part is completed by a particular process.
- **Manual Cycle Time**: The cycle time an operator is actually needed to do a task (e.g. load part).
- **Bottleneck**: Any process that takes longer than takt time.
- **Optimal Crew Size**: The number of people needed in a particular work area. This value is calculated (see formula below).

**Formulas**

Takt Time: \( \frac{\text{Net Available Time per Day}}{\text{Customer Demand per Day}} \)

Optimal Crew Size \((P)\): \( \frac{\Sigma \text{Manual Cycle Times}}{\text{Takt Time}} \)