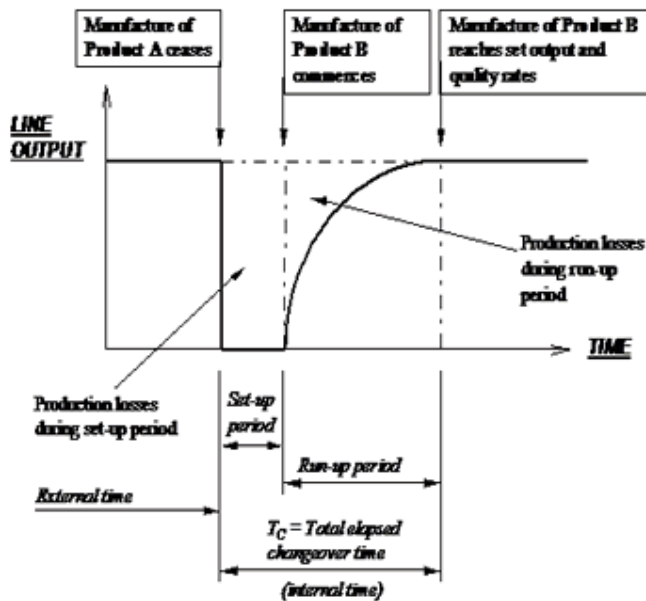


Set-up or changeover reduction has been an important element of lean thinking for a number of years. However Changeover and Setup are actually different things, Changeover is the time between good product and good product at the right speed, this includes Set-up time and Run-up time (see diagram source “Improving changeover performance” by McIntosh et al).



Set-up time refers to the time taken to physically make the changes to the line in order to run the new product, Run-up time is the time taken to make adjustments to the line in order to produce products of the specified quality at the specified production speed. Changeover reduction simply refers to attempts to reduce the time taken to carry out the changeover process.

There are a number of potential advantages to reducing the time taken to changeover a production line. These include:

1. Increased efficiency.
2. Reduced stock requirement.
3. Increased capacity.
4. Reduced work in progress.
5. Increased flexibility.

When talking about Changeover reduction and techniques that can be employed to achieve it, many people would have heard of “SMED” (Single Minute Exchange of Dies). This approach was first put forward in a book by Shigeo Shingo in 1985 called “A revolution in manufacturing: the SMED system”.

It is not the only book on the subject but it is widely regarded as a seminal work in this area. Shigeo would not claim that all changeovers should be done in one minute but rather they should not take longer than 10 minutes i.e. minutes measured in single figures and his book (and others on the subject) lay out techniques to enable this to be achieved.

These can be summed up as;

Measure

Measure the current changeover times and record them in order to monitor improvement (Often simply measuring the changeover time can improve things.)

Separate “External” and “Internal” activities

“External” activities are simply the jobs that can be carried out while the machine is running (e.g. fetching new tooling and tools required for changeover). “Internal” activities are those jobs which cannot be carried out while the line is running (e.g. changing moulds). By separating the two activities it is intended that as much as possible is carried while the line is running in preparation of the next product changeover.

Convert “Internal” to “External” activities

The next step is to try and convert some of the internal tasks into external tasks; this might mean having extra tooling to allow equipment to be prepared prior to the line stopping.

Reduce the time to carry out internal tasks

Of the tasks remaining that cannot be converted to external tasks then efforts should be made to reduce the time taken to carry out these tasks often these require design changes and engineering. Shingo puts forward lots of ideas (such as quick release fastenings, keyhole slots and setting jigs and using a single head size on bolts) in his book to enable this to happen.

There are other important suggestions to do with changeover reduction which include:

- Video a changeover then get the team of operators and technicians which carryout the changeover to watch and analyse it see where operations can be improved.
- Practice changeovers like a formula 1 pit stop crew would.
- Using 2 or more people during a changeover can more than proportionally reduce the time taken to carry it out.
- Maintain pressure on shorter changeover times and monitor / publish the times.

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- Move whatever resource is available to a bottleneck machine in order to speed up the changeover.
- Do maintenance offline when possible.
- Put scales on all parts of the production line that have to be adjusted or moved to a different position for different products / sizes and keep a record of the required settings for the different products.

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