

Efficient setting up

Small lots and quick setup by SMED

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The food industry is characterized by an increasing diversity of product variants in many areas. Consumers expect a wide range of different tastes, ingredients (such as organic, fair trade, allergen-free, various fat levels, etc.) and packaging sizes. For manufacturers, customer requirements tend to reduce the lot sizes from year to year. In addition, retail chains have been the most important customers, especially for fresh produce, for some time now. This is a particular challenge for manufacturers as they often work with raw materials, semi-finished products as well as finished products with very short shelf lives. From these points of view, there is a growing need to continuously reduce the throughput times. Closely related to this is the reduction of downtimes as well as the optimization of production planning.



As a rule, 30-40% of the time required for each set-up process can be saved (photo: A+F Packaging Solutions)

SMED (Single Minute Exchange of Die) means tool change in a single-digit minute range, relative to the setup process of machines. With SMED as a method, a systematic reduction of set-up times/product changes is achieved. It was created in the 1950s by Shigeo Shingō, who wanted to make it clear through the naming that minimizing set-up times is possible in a single-digit minute range, provided the status quo is questioned and not assumed to be fixed. The analysis should consider not only the sole standstill time, but also the "exit process" (possibly reduced cycle number) as well as problems at the start-up until the line capacity is up again.

Advantages through efficient setup:

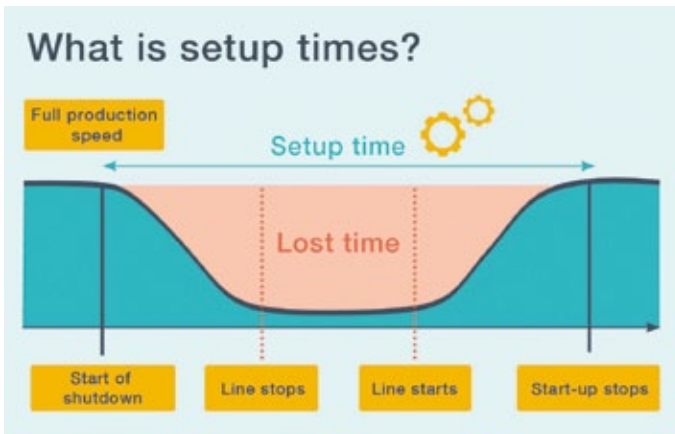
- capacity increase: eg with ten minutes less set-up time per shift and plant, increase your capacity by 16 shifts per year!
- lower stock and thus working capital
- increased freshness - the more you produce, the fresher your products are
- avoid overproduction
- increased flexibility
- increased line capacity through standardized start-up.

Method

»Selection of line, team & training

The selected line should be either a bottleneck line (a line that is at the capacity limit) or a line that has many conversions / product changes and/or needs many employees. In practice, a ratio of "planned downtime" to "running hours" from 30: 70 to 40: 60 is not a rarity.

For the implementation of the SMED workshop, one or two experienced plant operators, e.g. external SMED specialists are required. The knowledge should go into the internal organization, for each operator who is involved in the setup process one needs a "pickup". At the beginning of the SMED workshop there will be a brief training on the usefulness and the approach of SMED, including a small practical example on



(Source: Bausch)

setting up. As a result, the plant operators are sensitized to the topic and prepared for the upcoming setup analysis.

»Recording of the setup process

All individual work steps per employee are documented in written. If the setup process is carried out by two employees, one needs at least two "sensors". Whether the process is filmed in order to be able to analyze it later is a matter of taste. The more people involved in a setup process, the more complicated is the recording by video. If you want, you can also create a spaghetti diagram by showing the paths of the individual operator.

»Analysis of the setup process

- Separation of internal and external setup parts: The classification into internal or external set-up procedures is an essential element in the setup time optimization with SMED. Internal setup procedures can only be carried out when machines are at a standstill, while external activities are possible during production. As a result of the analysis, all activities, according to the definition, are divided into internal and external setup procedures.
- Conversion from "internal" to "external": This step considers how each internal activity can be converted to an external one. The goal is to achieve as little internal setup as possible. Activities which in practice can always be shifted from internal to external are e.g. fill form sheets, sweep the floor or pick up tools. There are usually various brainstorming techniques used to consider all possibilities.

ECRS Analysis

ECRS stands for the consideration whether each individual activity:

- eliminates, for example, the use of nuts and bolts. Where this is not possible adjustments with clamping devices or reduce the number of nuts and bolts.
- combines, eg avoidance of routes and times through combination of activities
- reduces, for example, the number of tools needed to fix screws
- simplify, for example, by means of devices which can be adjusted without tools.

»Execution of actions

All improvement measures are included in an action plan and are processed as quickly as possible. Ideally, initial measures are implemented immediately.

»Standardization of the solution

Lastly, all improvements made by the team are transferred into a new standard. The system operators who have carried out the analysis now train the other colleagues about the new order. It is shown that the definition of standards is also elementary in setup procedures to allow the same (optimal) approach, even across all layers. In addition, of course, they also make it easier to train new employees. In order to achieve an optimal set-up sequence, the SMED steps have to be repeated in regular cycles (eg annually). The best approach can usually not be achieved in just one process. This is often referred to as the four maturation phases of the SMED process. The ultimate goal is that the employees themselves adapt / improve the standard if you recognize improvements in your daily practice.

Conclusion

In practice, 30-40% of the time required for each set-up process can be saved as a rule. Since the trend towards smaller lots is unbroken, a permanent set-up optimization of all main lines, in my opinion, is essential.