

SMED



SMED DEFINITION

- Single Minute Exchange of Die
- Also known as quick changeover and process time reduction, SMED is a process of reducing and standardizing changeovers to under 10 minutes
- The time between the last good piece from one production run and the first good piece off the next run

Created by Shigeo Shingo in 1950, the SMED system, ("Single Minute Exchange of Die"), refers to the amount of time it should take to change over a piece of equipment. Shingo believed changeovers should be completed in a single digit minute (>10 minutes). Changeovers are inherently non-value activities so to dramatically reduce waste, downtime, and lead time, it's critical that each changeover be as efficient as possible.

SMED attacks all 3 forms of waste within a system (Muda – non-value-adding, Muri – overburden, and Mura – unevenness). By reducing changeovers and batch sizes, process flow becomes stabilized, predictable, and standardized, allowing for greater customer responsiveness.

INTERNAL AND EXTERNAL ACTIVITIES

Shifting work performed from while the machine is down, to while it is running, is the basic tenant of implementing SMED/ process time reduction.

To accomplish this, the SMED system breaks down changeover tasks into internal and external activities...

- Internal – those that must be performed while the machine is shut down or idle (i.e., removing, replacing, adjusting, etc. dies, tools, fixtures, function checks, etc.)
- External – those that can be performed while the machine is running or producing (i.e., gathering tools and parts, documentation, prepping the work area, etc.)

...and advocates that as many tasks as possible be done in advance of shutting down equipment.

Changeover teams begin by studying the current changeover process to determine which processes need to be done while the machine is still running vs. those that *can* be done while the machine is idle. The goal is to convert as many activities as possible from internal to external. [The 5 Why's](#) is a useful problem-solving technique that can be used to facilitate this process.

SMED

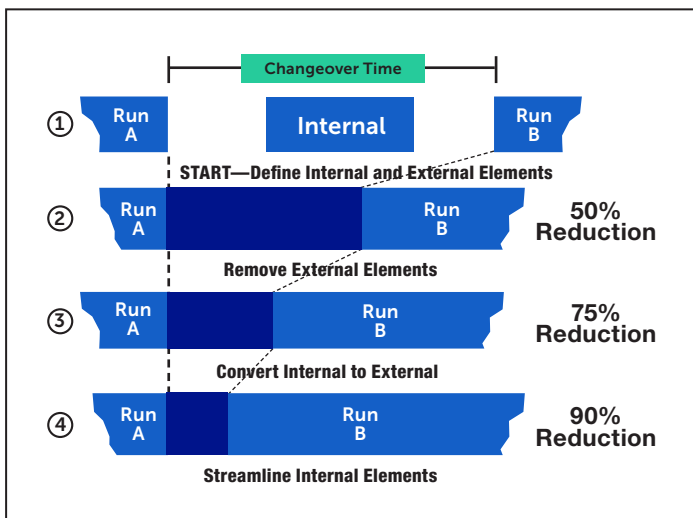
INTERNAL AND EXTERNAL ACTIVITIES cont.

Streamlining activities

What waste exists in the internal processes that can be eliminated to reduce lead time? I.e., use one-turn or spring-loaded clamps and wing bolts vs. allen bolts. How much time are you currently spending on searching for tools, transportation, and wait times?

How can external (non-value-added) activities be minimized? I.e., put tools needed for changeover at point of use, adjusting temperatures, establishing proper settings, etc. Modify parts, tooling, SOP's, etc. to standardize them to machines wherever possible.

What We Can Expect



THE 8-STEP SMED PROCESS

The 8-step process below outlines the specific steps necessary to apply these principles. Videotaping changeovers is recommended to aid in breaking down and timing of each element of the process.

1. Observe/document/analyze the changeover process
2. Distinguish internal from external activities
3. Convert internal to external activities
4. Streamline internal activities
5. Streamline/optimize external activities
6. Select ideas to test/adopt
7. Test/practice new ideas
8. Document the new process — create new SOP

RESULTS / BENEFITS OF SMED IMPLEMENTATION

The main objective of SMED is to reduce the amount of time equipment is idle in order to maximize run time to achieve:

- Improved cycle time and reduced lead time
- More frequent product changes and improved scheduling flexibility
- Increased on-time delivery and customer responsiveness and satisfaction
- Reduced inventory/WIP, and freed up space
- Reduced carrying/manufacturing costs
- Less adjustments, fewer defects and scrap, less waste/rework, increased quality
- Less equipment downtime
- Smaller batches and production lot sizes, and drastically improved output and flow
- Simplified set up process, improved worker utilization and morale

EXAMPLES OF SMED IN AND OUT OF THE WORKPLACE

Opportunities for applying SMED can successfully be applied all around us — in both manufacturing and non-manufacturing environments. Ideal areas are those with frequent changeovers, a lot of variation, high cost, waste, and bottlenecks, and that cause disruption in getting the end product to the customer.

Take a look at the sectors below. When observed from a SMED perspective, it's easy to see how shifting internals to externals can make impactful improvements in driving out waste, significantly reducing lead time, and improving value add to the customer. As you read, consider where you can apply SMED to reduce waste in your own professional and personal environments.

- In Transitioning Spaces — sports/concert arenas, operating rooms*, airplane cabins, wedding and banquet hall venues, etc. Tight turnovers in these spaces can be made easier by having cleaning, maintenance, and service crews in place, and materials prepped, kitted, and queued up, ready to go.

*Read how SMED principles were applied to improve OR capacity at metropolitan hospital:

<https://www.productivityinc.com/operating-room-capacity-increase-using-quick-changeover/>



SMED

EXAMPLES OF SMED IN AND OUT OF THE WORKPLACE cont.

- In Manufacturing — changing over tooling and dies, from making part A to part B (have part B tooling ready at point of use), or replacing parts i.e., A/C compressors, motors, etc.
- In Admin/Service — reducing the time it takes to release funds for a bank loan, refinance a mortgage, write a last will and testament (ensuring all files, original documentation, and authorized signatures have been transmitted/are available), and access office files and instructions quickly and easily, etc.

Nowhere are the principles of SMED more evident than in racing pit crews. The entire process is SMED in action: lug nuts prefixed to the wheel; multiple wind screens pre-applied and peeled off during stops; standardized processes; pit crew team members each assigned a specific task, all materials queued up and ready to go while the car is still on the track, etc.



SMED – RHYMES WITH (AND A CAUSE FOR SIBLING RIVALRY)?

BREAD. In the Guero household, life was a constant competition between twins Dodge and Nodge. Today's challenge: who could prep and bake blueberry muffins the fastest. Before Mom Guero hit "go" on the timer, Dodge decided to review the instructions on the box, gather up all the necessary ingredients, measuring spoons and cups, and pre-grease the muffin pans. At "go," Dodge measured, mixed, poured, and his muffins were in the oven in no time. Nodge; however, began by reading, then searching and prepping...needless to say, Dodge and Mom were drinking milk and enjoying warm muffins long before Nodge's were out of the oven. Nodge remains, blue in Brooklyn.

INSIGHTFUL QUOTE

"Only the last turn of the bolt actually tightens it; the rest is just movement (waste)."

Shigeo Shingo