

PathStone Group



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Quick Changeover

Agenda

1. Quick Changeover: What is it ?
2. Quick Changeover purpose and benefits
3. Quick Changeover Stages
4. Quick Changeover Techniques
5. The 8 Steps of SMED
6. Takeaways



Introduction

What is it ?

Quick Changeover, also known as **Single Minute Exchange of Die (SMED)** aims to reduce costly inventories and improve efficiency.

As lean production depends on small lot sizes, small lot sizes **depend on quick changeovers**.



Introduction

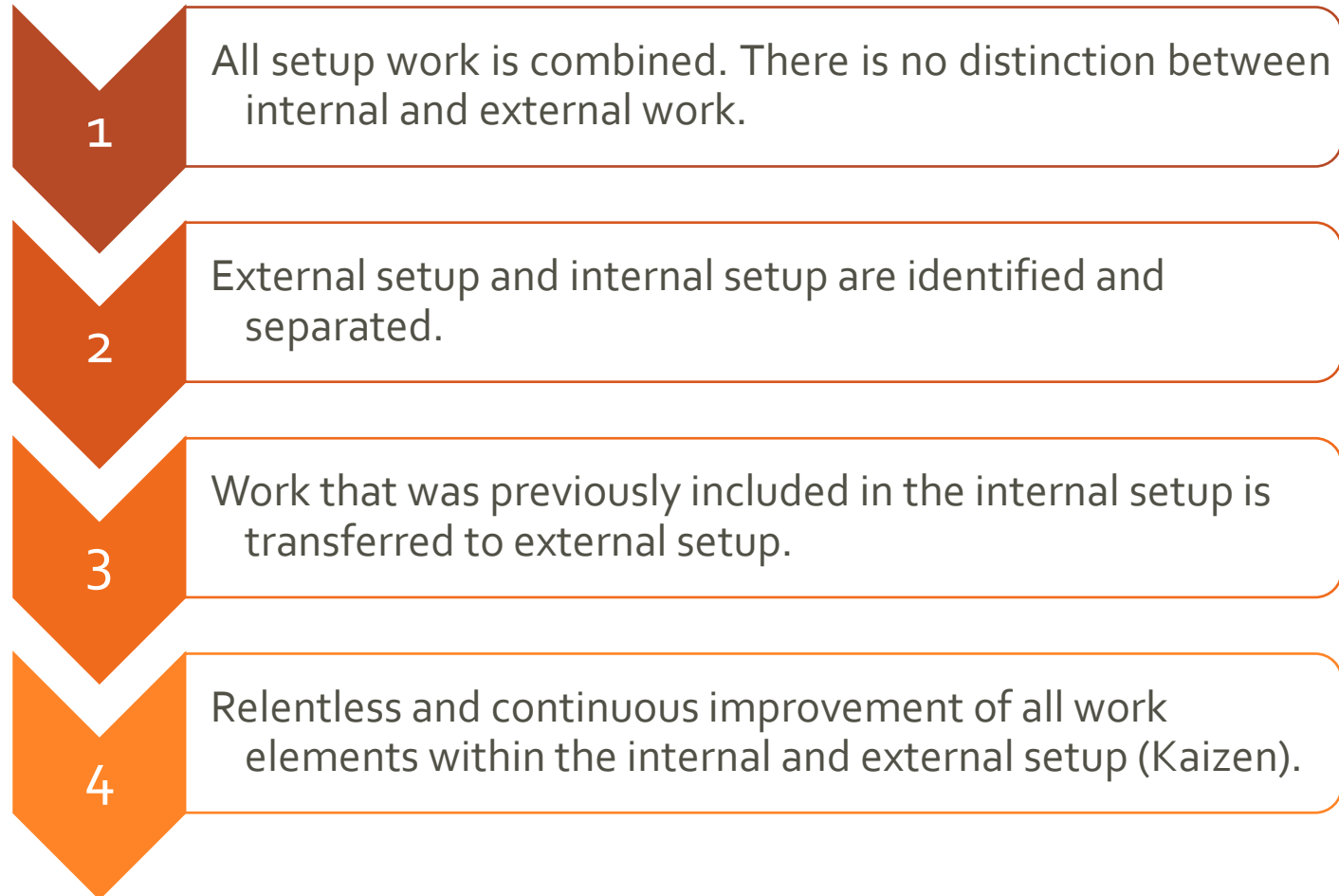
Purpose and Benefits

If set-ups or changeovers are lengthy, it is mathematically **impossible to run small lots of parts with low inventory** because large in-process inventories must be maintained to feed production during changeovers.



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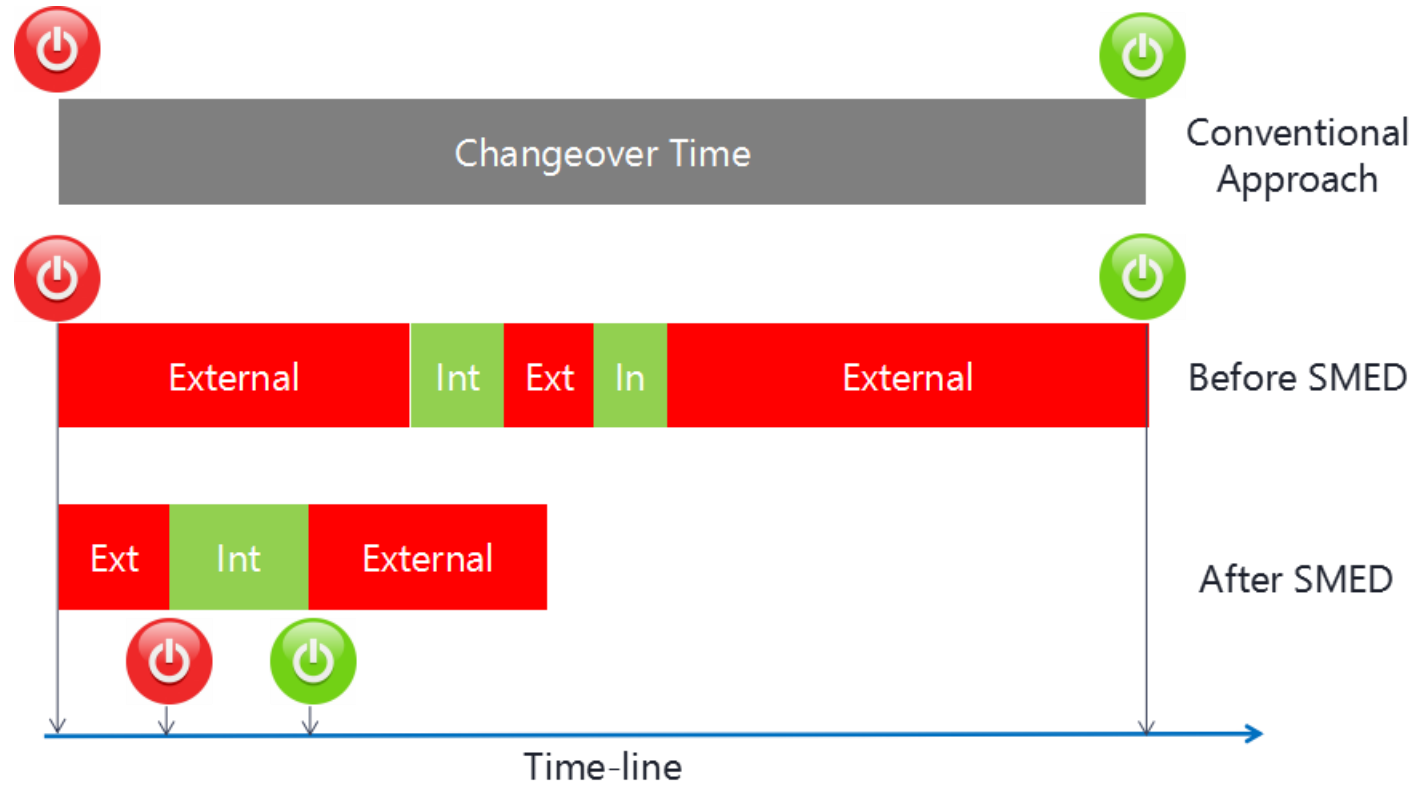
Stages:



Quick Changeover

SMED break down for improvement

Stages:



Quick Changeover

Changeover Time Reduction Techniques:



A Mindset Shift

Increase batch size,, maximize runs, reduce changeovers to optimize productivity. This thinking is flawed.



Parallel Operations

Simultaneous tasks to minimize setup times. Consider the F1 pit crew when changing tires.



Standardization

Same size tools, same attachments, same storage order.

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Changeover Time Reduction Techniques:



Quick Attachments

Clamps, cams, fasteners, washers, quick-release hubs



Duplicate Tooling

Consider the F1 pit crew when changing tires.

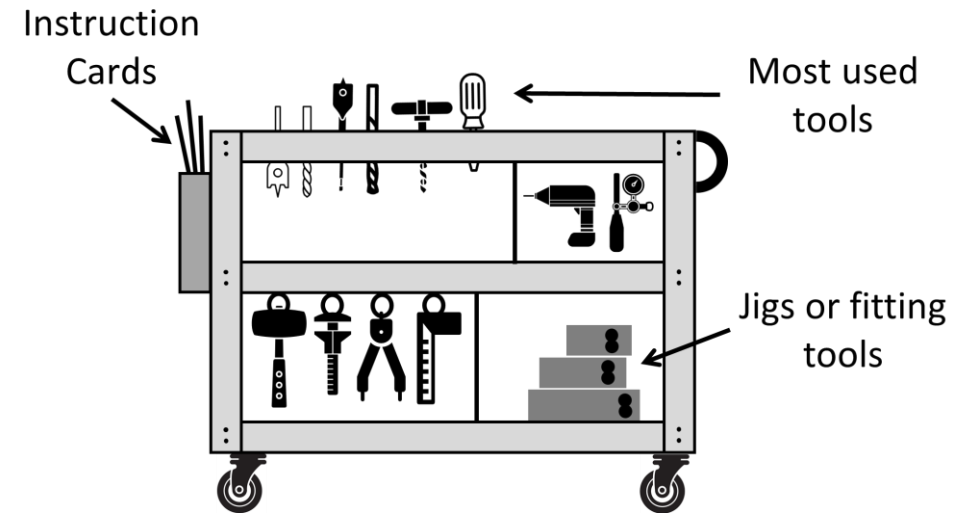
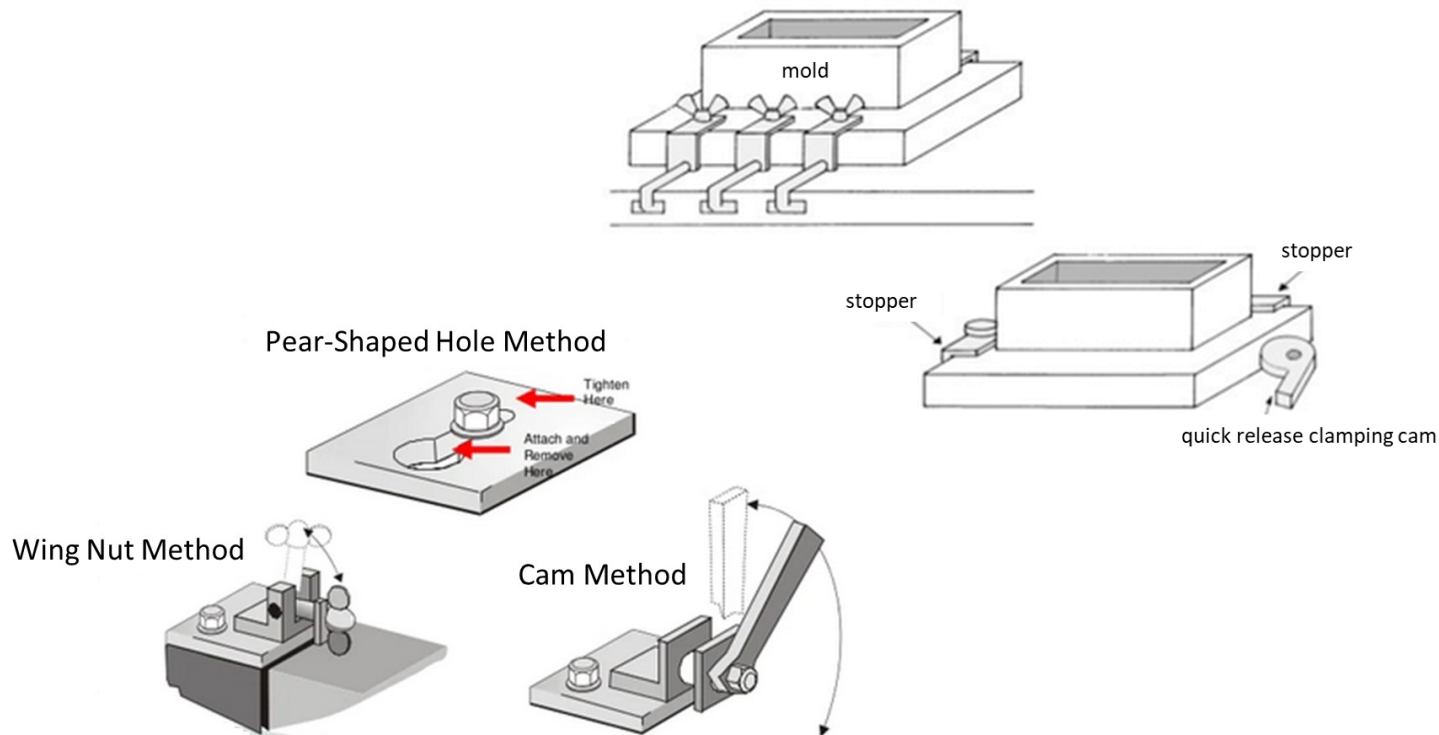


Assisted Tool Movement

Dedicated die carts, roller tables, conveyors, mechanized tool change, pre-staging.

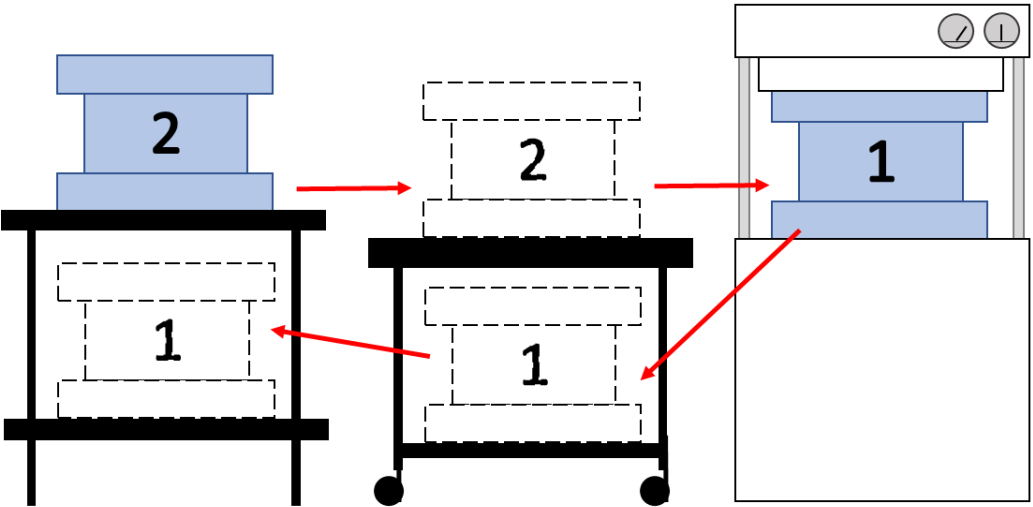
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Changeover Time Reduction Techniques:

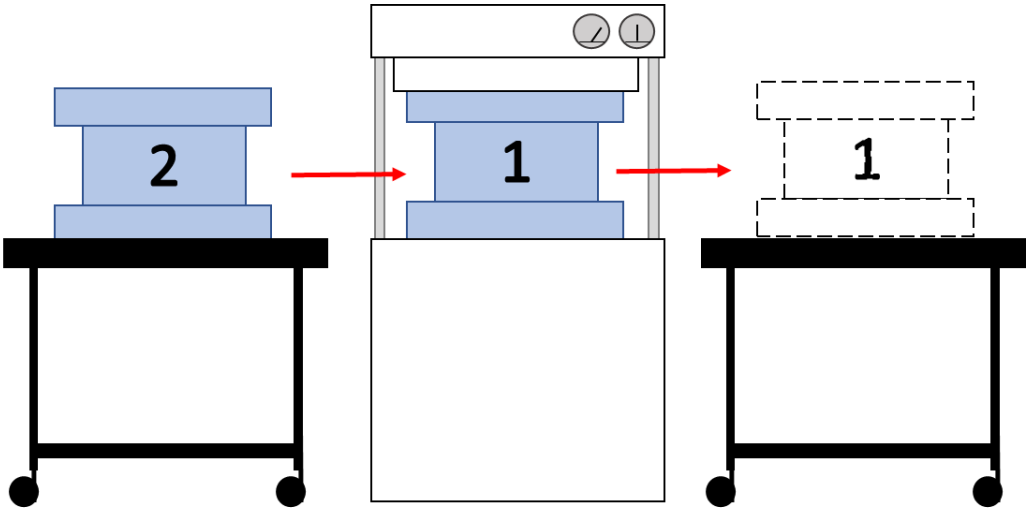


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Changeover Time Reduction Techniques:



Slow dies changeover due to poor positioning of dies



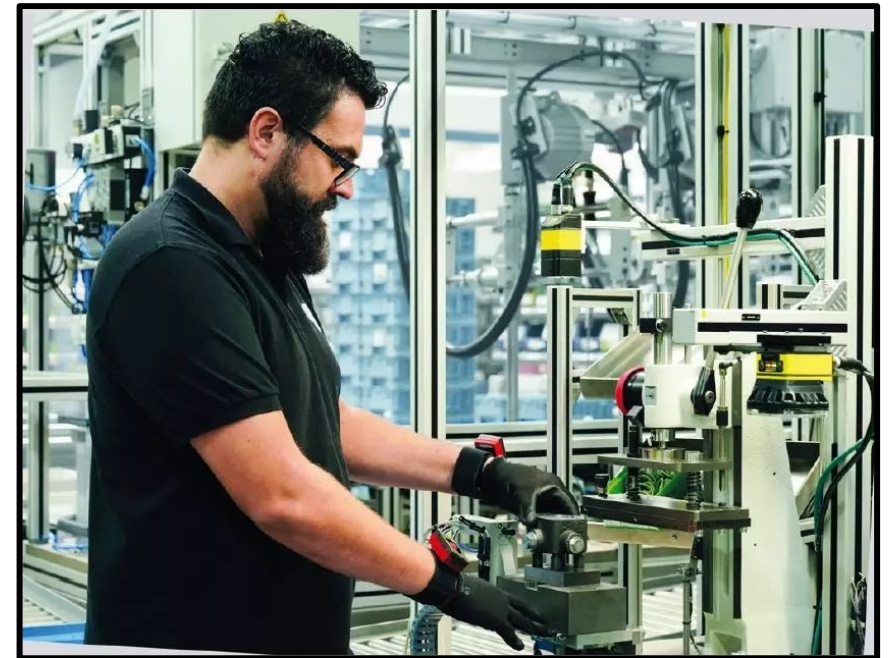
Quick dies changeover

Quick Changeover

The 8 Steps of SMED:

1. Observe the current Setup

- **Preparation:** After-process adjustments, checking equipment and tools, cleaning up.
- **Mounting and removing:** Removing tools and replacing equipment and parts for the next run.
- **Measurements:** Conducting measurements and adjustments, as well as calibrating.
- **Trial runs and adjustments:** Run first-off runs and then conducting adjustments until satisfied and the first good part is achieved.



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The 8 Steps of SMED:

2. Review and Map the Process

- **An internal activity:** One that is conducted whilst the machine is stopped.
- **An external activity:** One that is conducted whilst the machine is running.



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The 8 Steps of SMED:

3. Convert as Many Internal Activities to External

- **An internal activity:** One that is conducted whilst the machine is stopped.
- **An external activity:** One that is conducted whilst the machine is running.



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The 8 Steps of SMED:

EXTERNAL

Tasks that can be done as the process run on the previous job

- Fetching tools and materials
- Moving handling equipment
- Preparing bolts, clamps, tools
- Clearing up
- Organizing and planning
- Heating/colling of dies

**Prepare
Organize
Transfer**

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The 8 Steps of SMED:

INTERNAL

Tasks that required to stop the machine

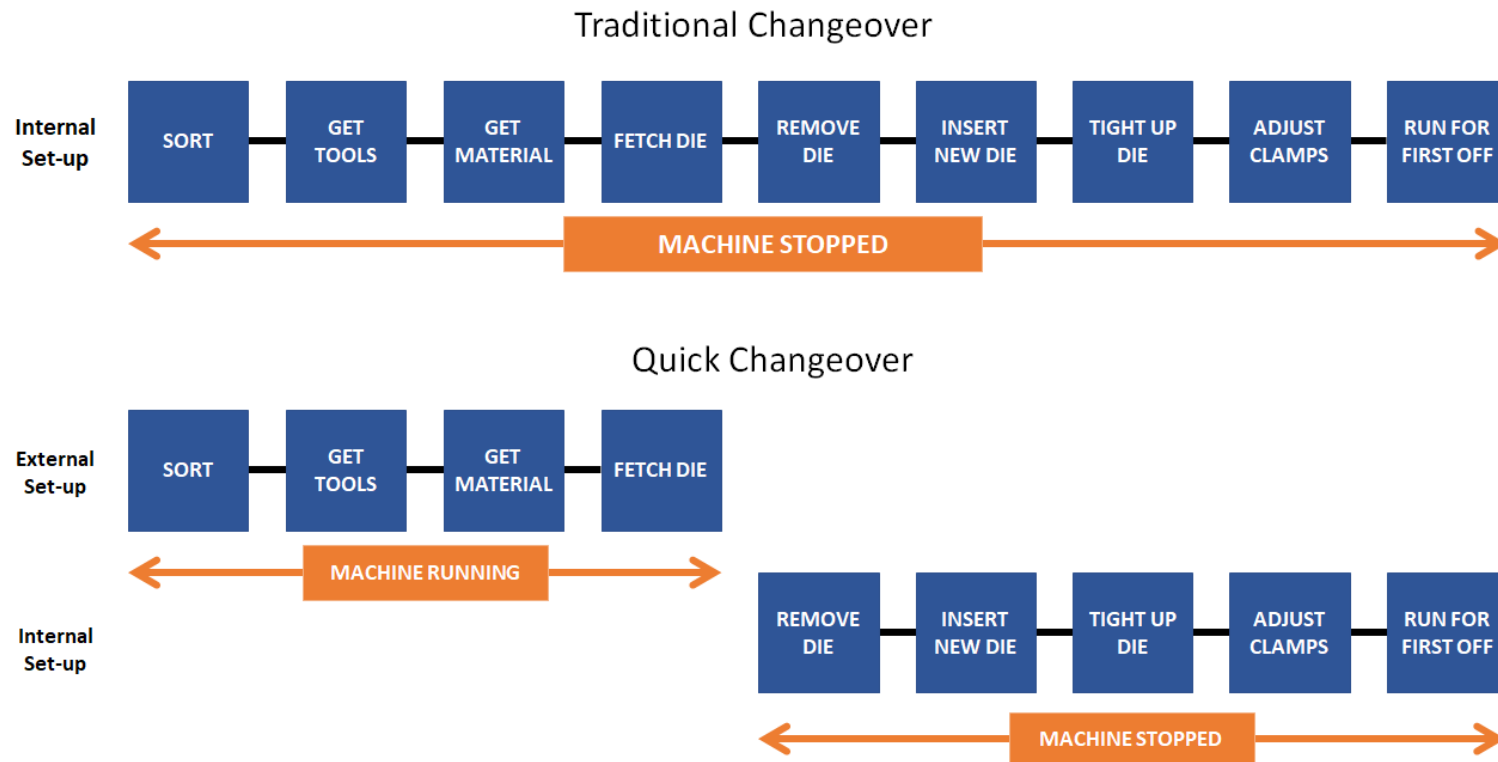
- Removing guarding
- Removing tools
- Removing work-piece
- Adjust locations
- Test workplace

Attach
Detach
Adjust
Test

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Before and after turning internal activities into external activities.

The 8 Steps of SMED:



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The 8 Steps of SMED:

4. Create parallel Tasks

- Go and get the jig for the next job
- Measure the machine's position
- Go get the material and test prior to production



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The 8 Steps of SMED:

5. Optimize Internal Remaining Activities

- Many current internals have now been converted to external tasks.
- Several parallel tasks have been defined to speed up even more time.
- transfer these internal tasks to another template: **Cause and Effect Diagram** (Fishbone diagram).

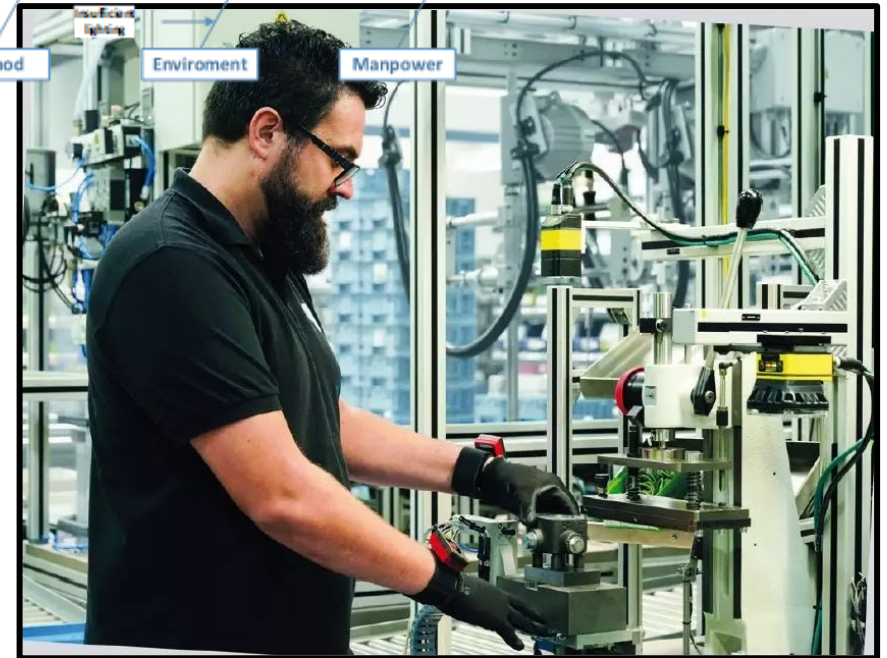
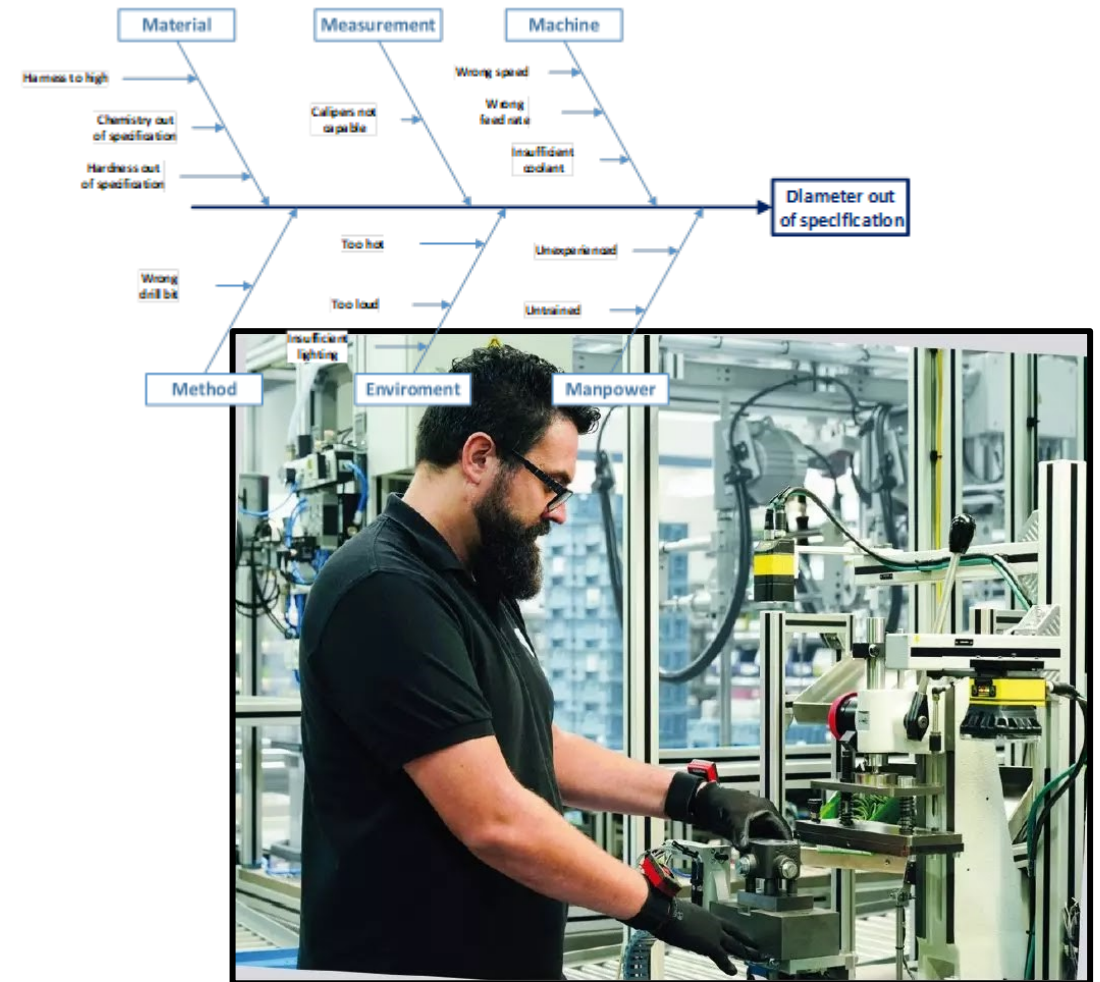


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The 8 Steps of SMED:

5. Optimize Internal Remaining Activities: Problem Solving.

1. Define the step
2. Agree why it happens
3. Challenge how it can be improved – Think of quick release mechanisms, faster tooling, and challenge legacy processes
4. Agree an action(s) to reduce the time it takes
5. Capture the estimated **new time** it would take to complete the task and **add it to your new map**.



Quick Changeover

Fixings and screws	➔	Power tools Standardized “functions” dimensions
Tool locations and adjustment “Single action location” “Adjustment elimination”	➔	Location lines/gauges Fool proofed too orientation Roller bearing machine beds
Tool clamping “One turn attachment”	➔	Minimized clamping points Standardized lamping devices Split threads, U-washers, hollow sleeves
Machine setting “Adjustment reduction/ Elimination”	➔	Standardized “functional” tool dimensions Positive location to auges Marked dials/levelers
Guarding	➔	Minimized/standardized securing

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The 8 Steps of SMED:

6. Develop the New Setup Standard Work

- All external tasks are done at the **right time**.
- All the **parallel tasks** are completed at the same time and with the right number of people.
- All **internal tasks** are followed based on the improvements we have identified.
- We define the **new total setup time**.



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The 8 Steps of SMED:

6. Develop the New Setup Standard Work

We will need a standard document here. This **SOP** (standard operating procedure) will define the following:

- Which operator does what **activity** and when it should be done.
- An **image** of each activity.
- the **time** it takes to do each task.
- The **target time** for the entire set-up process.



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The 8 Steps of SMED:

7. Trial the New Procedure

- **Communicate** this new procedure to the teams and train them to ensure they have full buy-in and understanding when it comes to the next changeover.
- Is time to **identify potential concerns** or issues we may not have heard.
- **Trial the method in real time** and document any issues.
- **Be prepared to change and amend** the process where needed and based on what is observed.



Quick Changeover

The 8 Steps of SMED:

8. Validate the Results and Lock in the New Standard

- **Discuss** and **verify** these time savings with the accounts team, so they can quantify and **confirm the improvements**.
- Add this to the continuous improvement project log where the **savings can be tracked**, and improvements made over the year.



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The 8 Steps of SMED:

8. Validate the Results and Lock in the New Standard

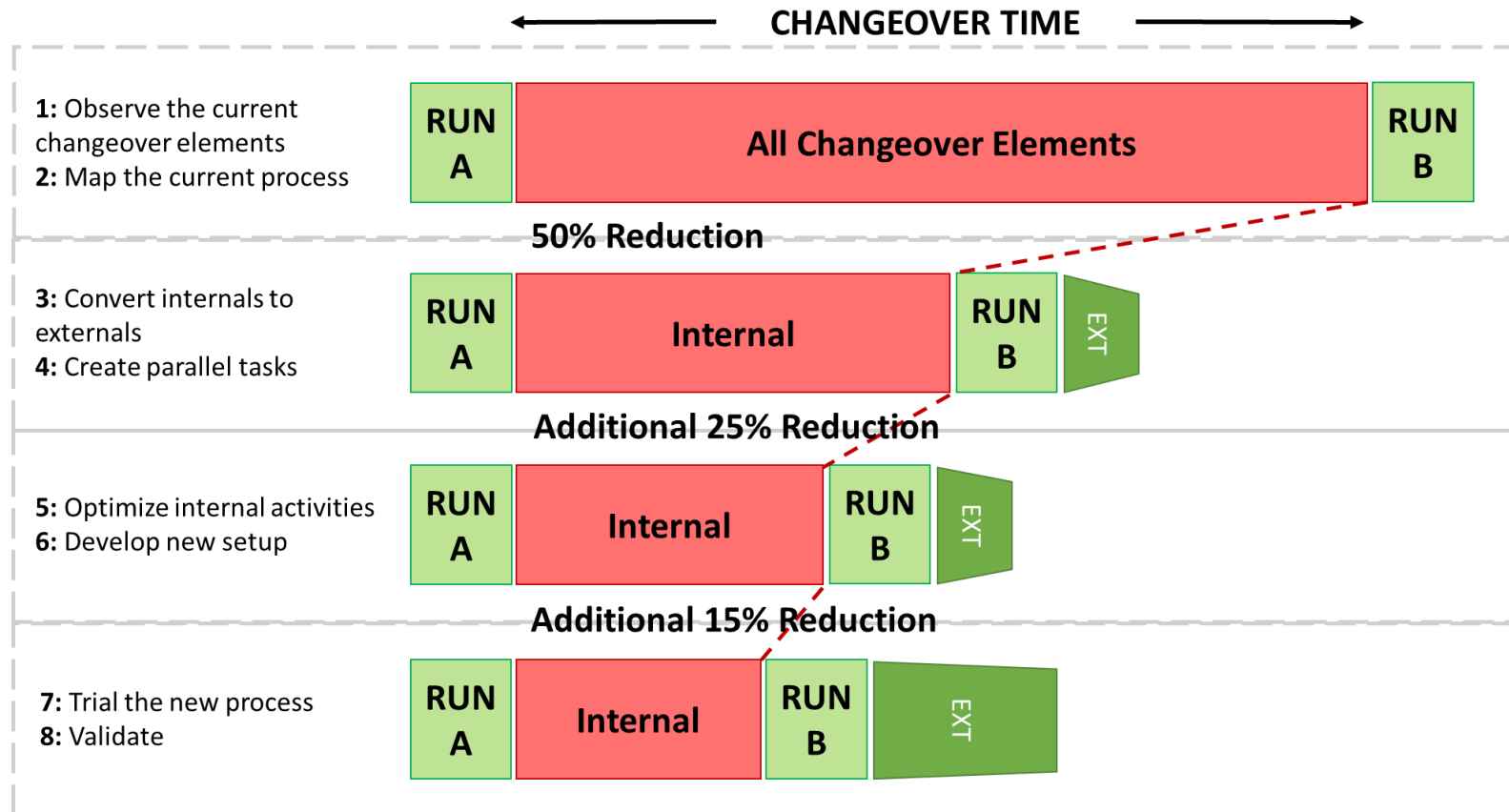
- **Track the changeover times**, so it can monitor the actual time to the target (the standard work targeted time).
- Use this to constantly **challenge the changeover times**, so the continuously improvement influence the cultural change as well.



Quick Changeover

The 8 Step approach benefits from SMED.






The 8 Steps of SMED:



TOOLBOX



SMED
Standard
Work
Instructions

Part Number		xxx	Part Name	Bolster		Line	EQ Bolster	Workstation	Woodstock	Page No.	1/1	
No.		Operation		+	= SAFETY	+	= QUALITY	●	= TIP	Time	30 Sec	Sketches / Photo's / etc.
1	Remove parts from tool		Remove cavities 3 & 4 from the mould tool. Place parts onto left side of bench (Fig 1)									
2	Remove the spiking frame from the upper tool		Remove the waste then place the frame onto the bench. Ensure frame handle is pointing away from you and spikes are pointing upwards.									
3	Fold waste and place onto to stand.		Fold the waste from the frame and place onto the granulator cooling stand, using it to push the existing waste into the granulator (Fig 2).									
4	Remove the spiked frame from the underneath bench		Remove the spiked frame from underneath the bench place it into the guides on the upper mould tool (Fig 1). Ensure that the handle is pointing towards you is fully located against the sensor									
5	Place one white & green clip into cavities 3&4		Take one white & green LH clip from the dispenser. Place the green clip into the center clip position and the white into the bottom location on cavity 4. Take one white & green RH clip from the dispenser. Place the green clip into the center of									
Issued		Checked		Approved		SKILLED OPERATOR		Not Controlling Assets				
Name		Name		Name		Name		Please report in report booklet. Record on Process Monitor Sheet. If 3 consecutive rejects found with same fault call Dept Leader				
Signature		Signature		Signature		Signature						

Takeaways

- Quick Changeover requires a shift of **mindset**.
- The bigger the runs, the **more space** we need. Products are **waiting** in the queue for their turn on the lines.
- The bigger the batches, the **slower the production system**.
- With SMED we develop the ability to **process many set-ups and changeovers**. And by doing this, we can cycle through much more work, faster, and only then make to customer demand.



Thank You



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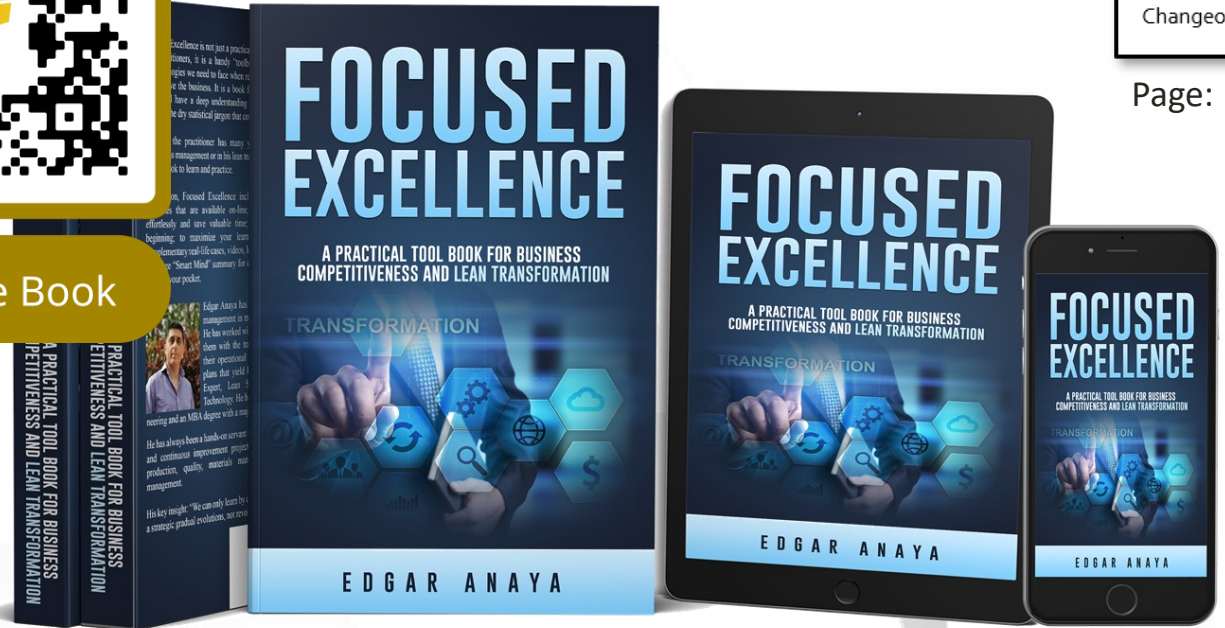
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