



How to Apply Set-up Time Reduction

Value Chain Competitiveness (VCC)

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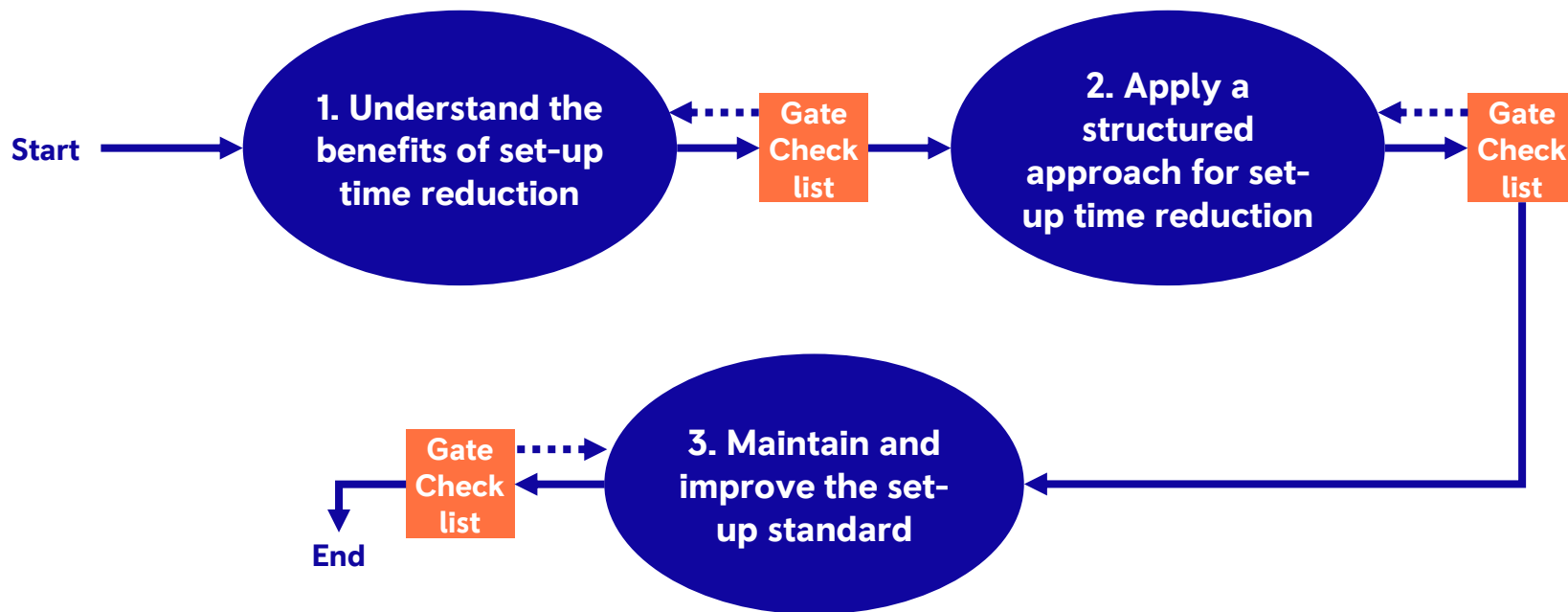
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How to Apply Set-up Time Reduction



Scope

Objectives & Principles





This 'How To' will enable you to:

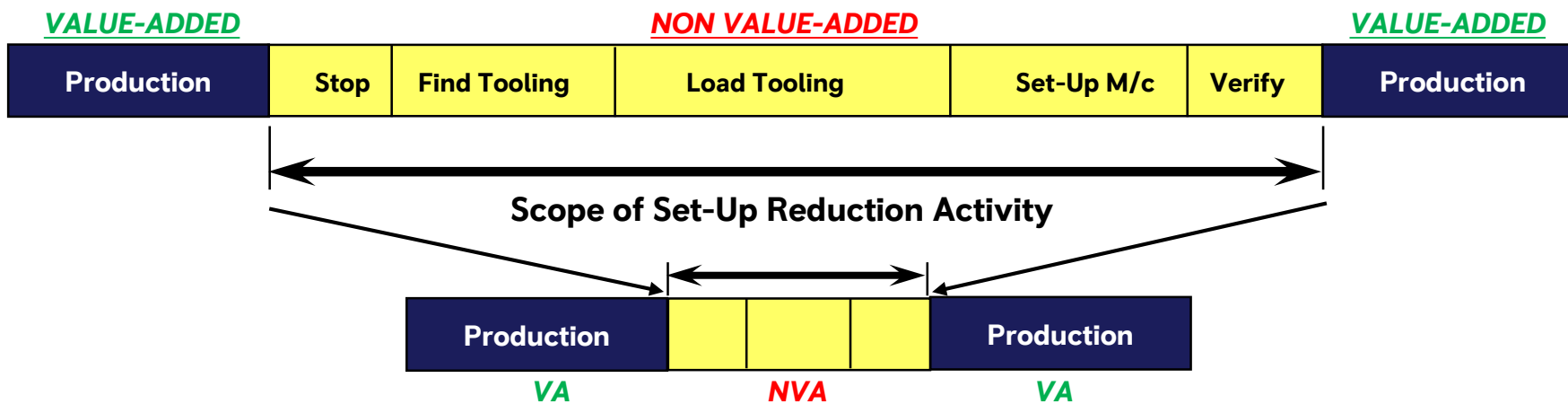
- Reduce lost time associated with setting up a machine or process
- To enable smaller batches of product to be produced
- To increase the re-visit frequency of products
- To reduce stock levels and lead-time
- To increase manufacturing responsiveness and improve customer service

Objective and Principles



'Set-up time' is defined as:

The time required to change a process from producing one part to produce the first good new part, or, "from VA to VA"



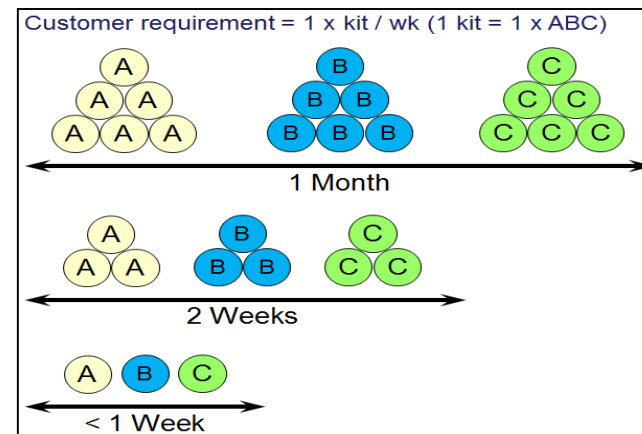
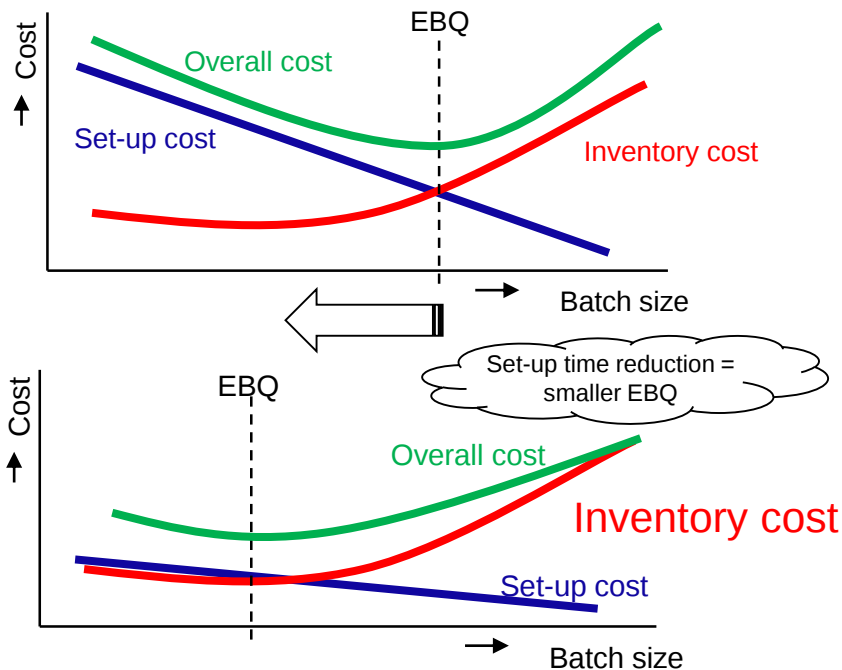
The objective is to:

minimise or eliminate the non value-added (NVA) set-up activity

1. Understand the benefits of set-up time reduction



Set-up time reduction enables smaller economic batch quantities (EBQ)



Key advantages of smaller batch sizes after set-up reduction

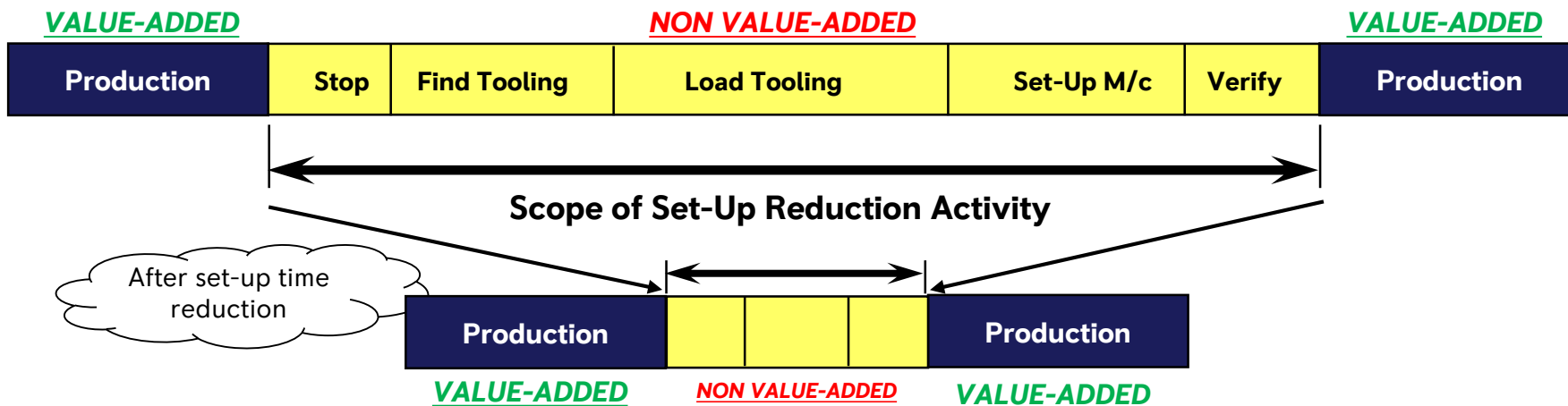
- reduced stock levels
- shorter lead-times
- better response to customer demands
- higher flexibility in planning – easier to manage production
- lower overall cost



1. Understand the benefits of set-up time reduction



Following set-up time reduction there is more time available (capacity) for value-added work (hence more productivity and throughput)





Gate checklist 1: Understand the benefits of set-up time reduction



The benefits of set-up time reduction on batch size and operating cost is understood

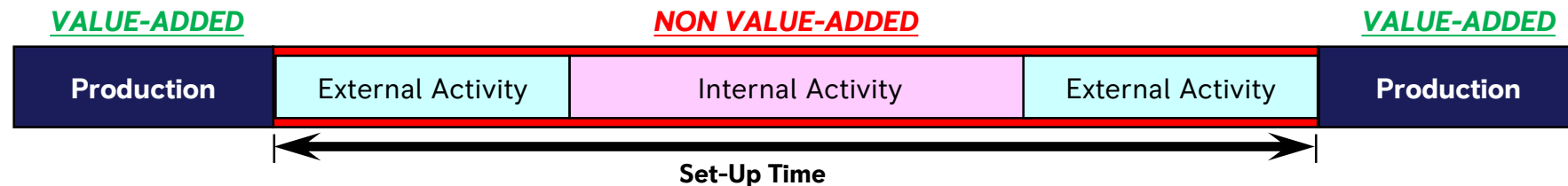


The benefits of set-up time reduction on minimising non value-added work is understood

2. Apply a structured approach for set-up time reduction

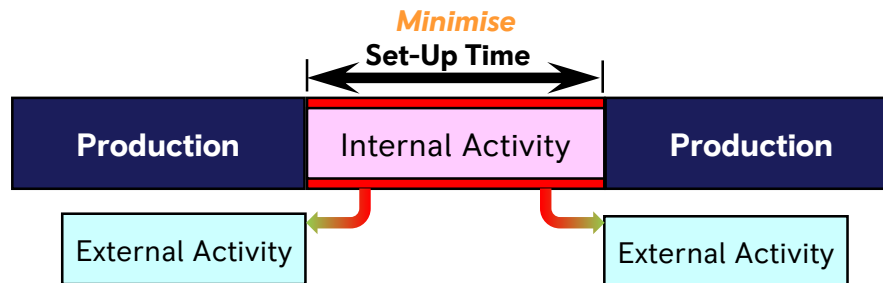


The set-up can be categorised into *internal* and *external* activities



Internal Activity = Activities that can only be done whilst the process is stopped

External Activity = Activities that could be done whilst the process is running



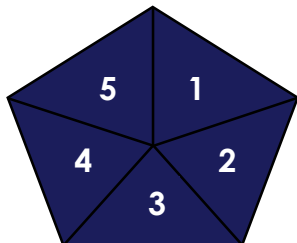
Target:

Minimise process stop time through external set-up activity and streamlining all activity

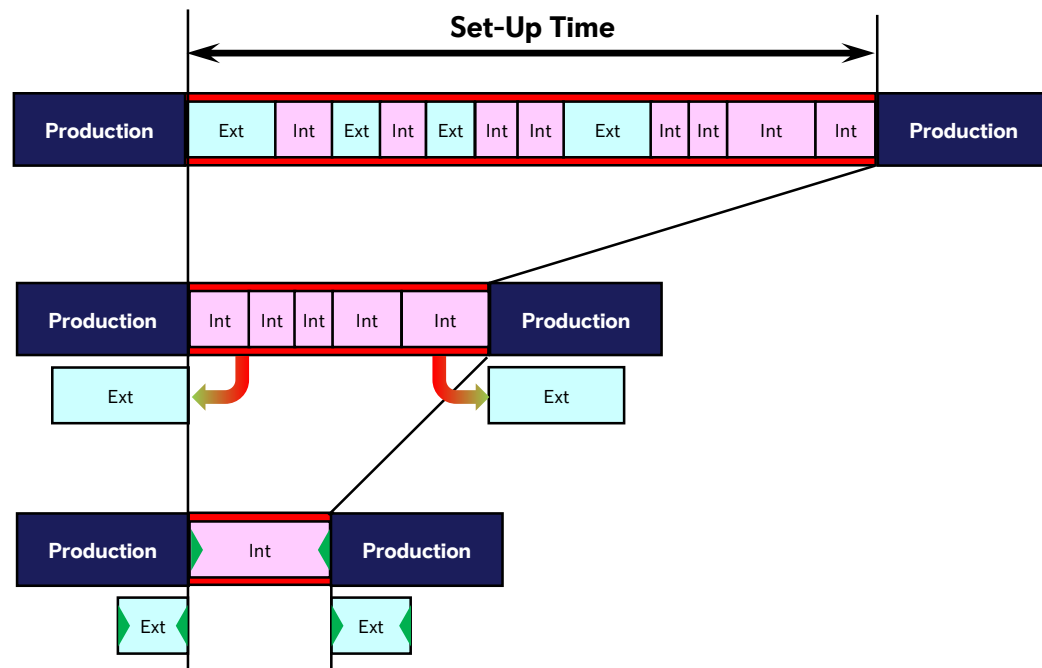
2. Apply a structured approach for set-up time reduction



Five steps to a successful set-up reduction

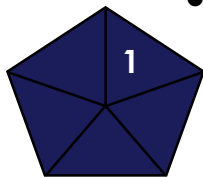


1. Observe and document the current process
2. Differentiate between internal and external activities
3. Convert internal activities into external activities
4. Streamline internal operations
5. Streamline external operations

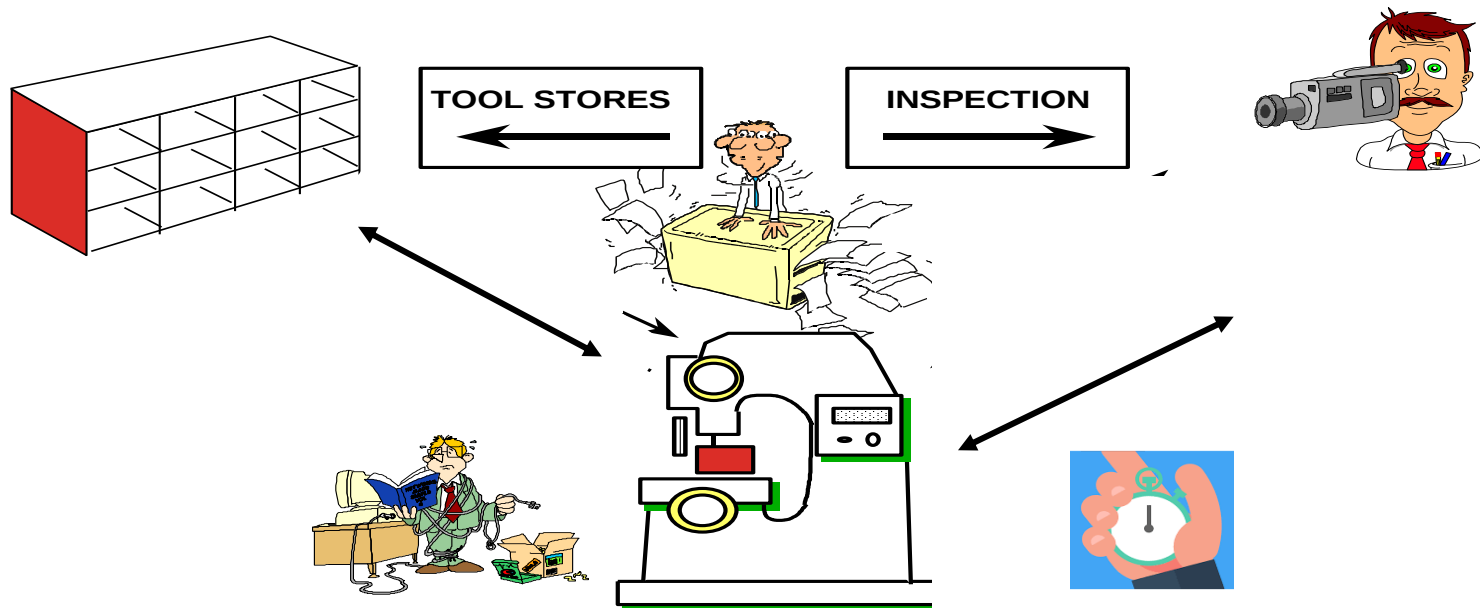




2. Apply a structured approach for set-up time reduction

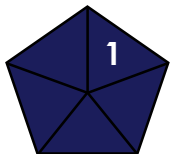


- Observe and document the process (timings etc.)
 - ensuring that all elements are captured and recorded up until the first good 'new' component is produced

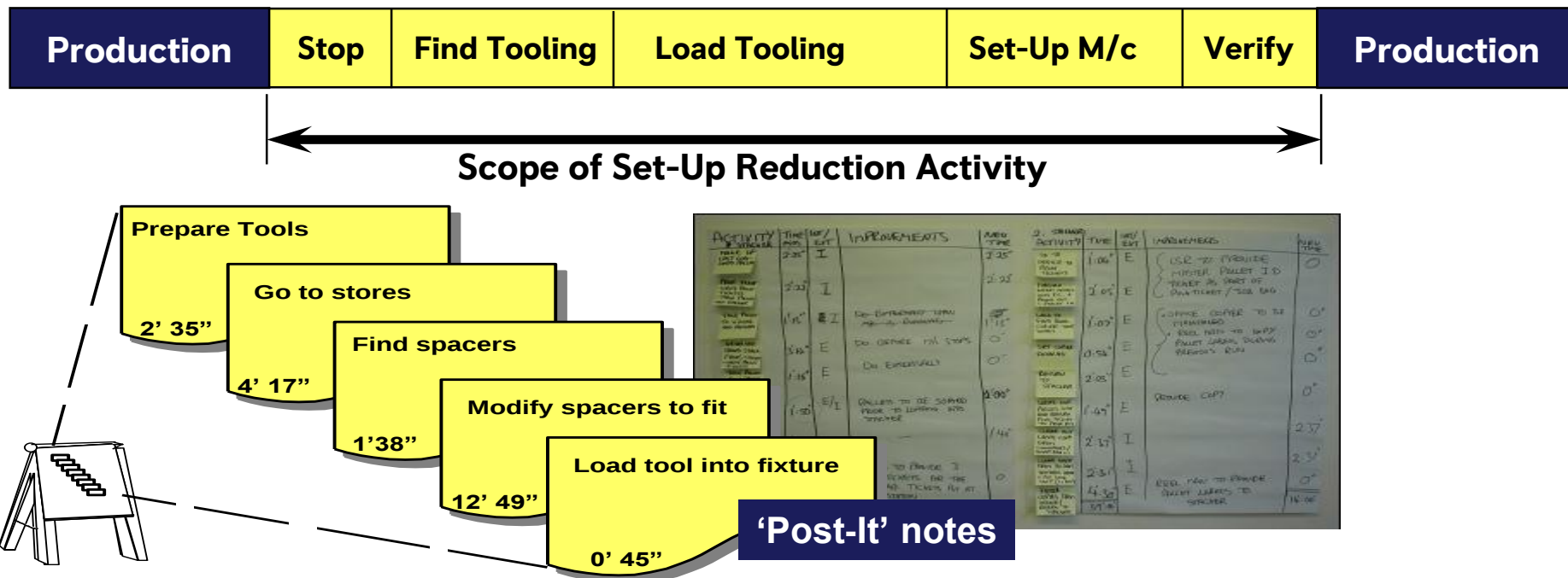




2. Apply a structured approach for set-up time reduction



- Map out the separate activities of the observed set-up

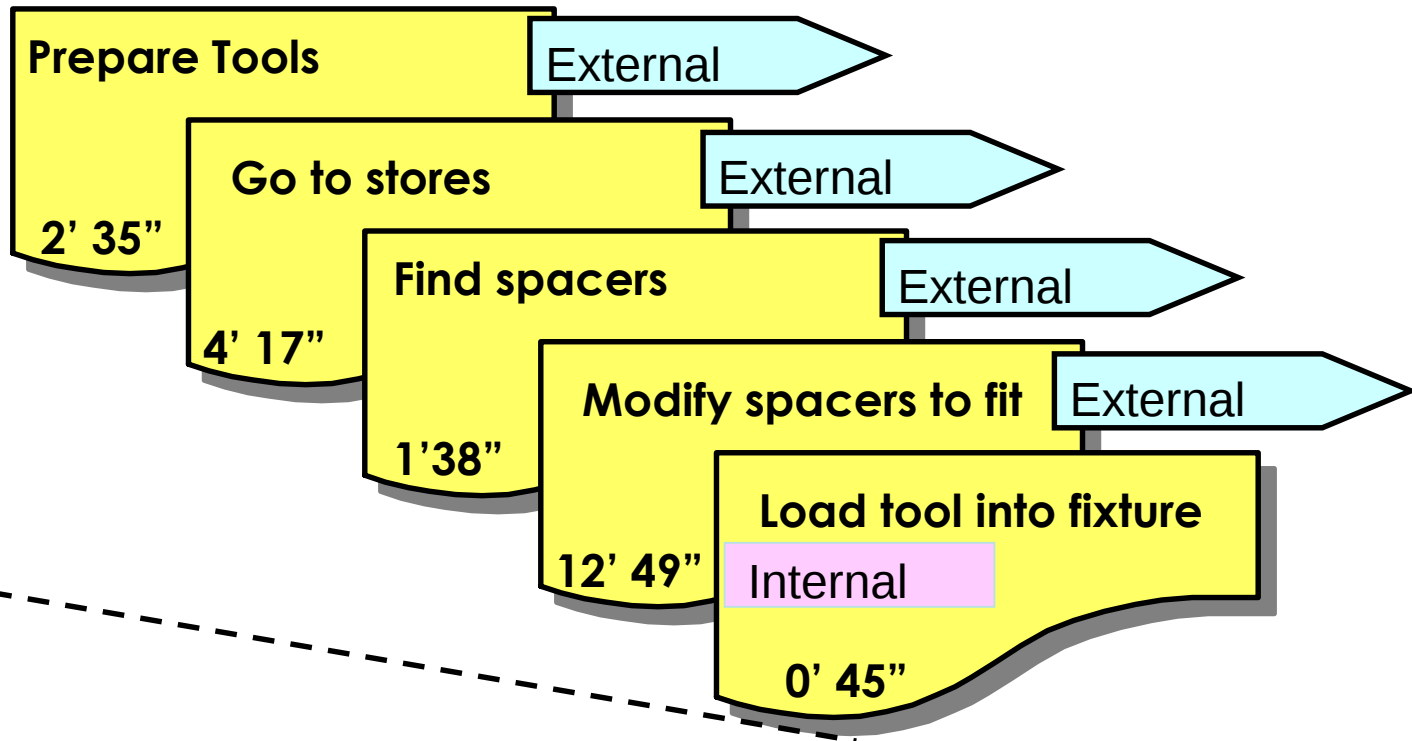
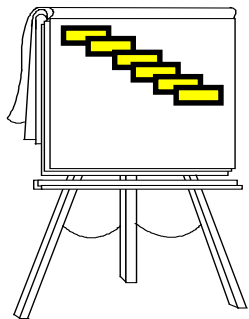
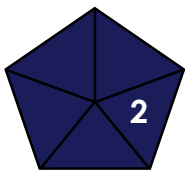




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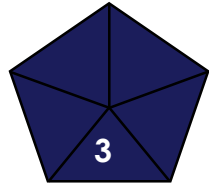


- Determine activity step type (Internal / External) and identify on the process step sequence



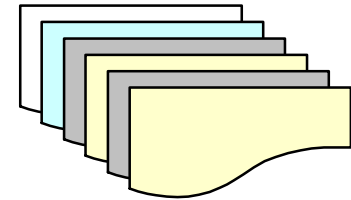


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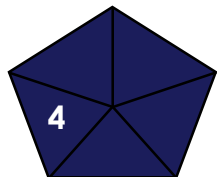
Convert internal activities into external activities wherever possible

- All tooling and equipment required to set-up the process must be prepared and available before the set-up starts – use shadow boards etc.
- Checklist of all tools and equipment necessary
 - Description, specification, method of use, setting methods, measurement of product, key dimensional characteristics and processing parameters
- All equipment for use should be in good working order
- Ensure all necessary personnel are available when required (the 'F1 Pit Crew' mentality)
- Visual management of production plan and system for calling resources to the set-up process defined
- Ensure all information is available when needed
 - Drawings, Setting sheets, Check lists, Material Specifications etc.





2. Apply a structured approach for set-up time reduction



Streamline internal operations; challenge everything!

Pre-assemble tool

Re-Align

Get Special Drill

Prepare Clamps

Insert & Tighten Screw

Design out /
Use a standard

Develop

Develop

Design standard
clamps

Eliminate the need for
clamps

Develop quick
release and clamp
fixing

Eliminate the need
Re-design the screw

1' 34"

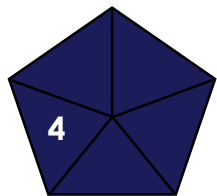
4' 57"

3' 38"

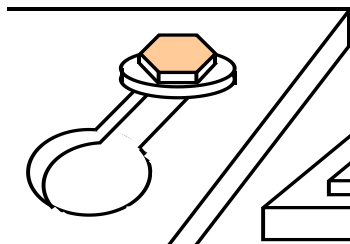
2' 19"

1' 25"

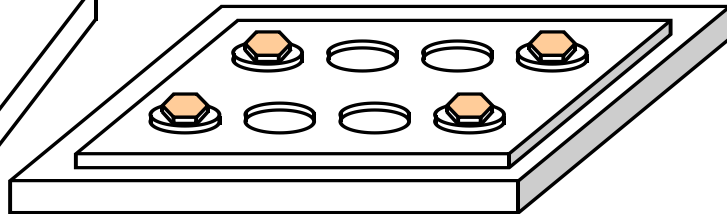
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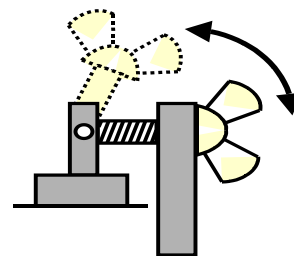
- Standardise functional operations
 - Clamping height
 - Fixing sizes and dimensions
- Use common sizes of bolt, screw, nut, etc.
- Use methods or equipment to simplify operations
 - Centering jigs
 - Intermediary jigs (to bring piece up to standard size or to fit a standard fixture)
 - Use simple clamping methods - quick release / pneumatic / hydraulic / other as appropriate



Pear shaped hole



Reduce the number of bolts / screws



Wing nut quick-release clamp



Toggle clamp



C - washers



2. Apply a structured approach for set-up time reduction



5

Streamline external operations

- Equipment available, organised and maintained in good working order

Pre-assemble tool

Organise

Re-Align

Organise

1' 34"

4' 57"

Get Special Drill

Organise

3' 38"

Prepare Clamps

Organise

2' 19"

Insert & Tighten Screw

1' 25"



Shadow board close to machine

Prepare off line - store at point of use



2. Apply a structured approach for set-up time reduction



Machine set-up procedures need to be visually simple and located in the workplace

MILL CHANGE PROCEDURE										
Machine / Line:		Widespan 4		Type:	Mill change		Date:	Issue		1
COMPUTER MAN		COIL MAN		BANDER MAN		CRANE MAN		FIFTH MAN		VISUALS
Activity	Time	Activity	Time	Activity	Time	Activity	Time	Activity	Time	
1		Guillotine the strip & raise tread table	00:30							
2	Empty the mill	Rewind the coil	01:50							
3	Select decoiler	00:15						Move mill beds across	02:00	
4	Unload old die-set	00:45	Feed new strip through rollers	00:20				Set stacker side walls		
5	Move die-set table across	00:15								
6	Load new die-set	00:30								
7	Prepare die-set for use	00:45								
8	Select decoiler	00:15								
9		Feed strip through prep unit	00:40							
10		Feed strip into mill & measurement checks	00:50							
11		Feed strip into mill until shaft grips strip & tape mark lead-in	00:30							
12	Feed strip into die-set	00:45								
13	Crop cut & clear scrap	00:20								
14	Start line	00:10								
Activity time 04:00		Activity time 04:40		Activity time 02:00						
TOTAL CHANGE TIME		Equipment		Activities done before the mill change						
08:20		decoilers #1 and #2 coil cars #1 and #2 rollformer die-set die-set table crane stacker		Locate coil Load coil car Load mandrel Book coil number into system			Load die-set with required tooling Set table to receive tooling			
Safety instructions				Activities done after the mill change						
Wear safety glasses Wear protective gloves when handling strip				Tape down coil & unload Place coil back in stock yard						

- Procedure details the steps required to complete the set-up
 - preparation activities
 - safety instructions
 - equipment required
 - activities after the machine is running
- The team required are identified with allocated tasks
 - activities carry a standard time
- Practice is key to effective team-working and reducing the set-up time
- A target time for the set-up is stated



Gate checklist 2: Apply a structured approach for set-up time reduction



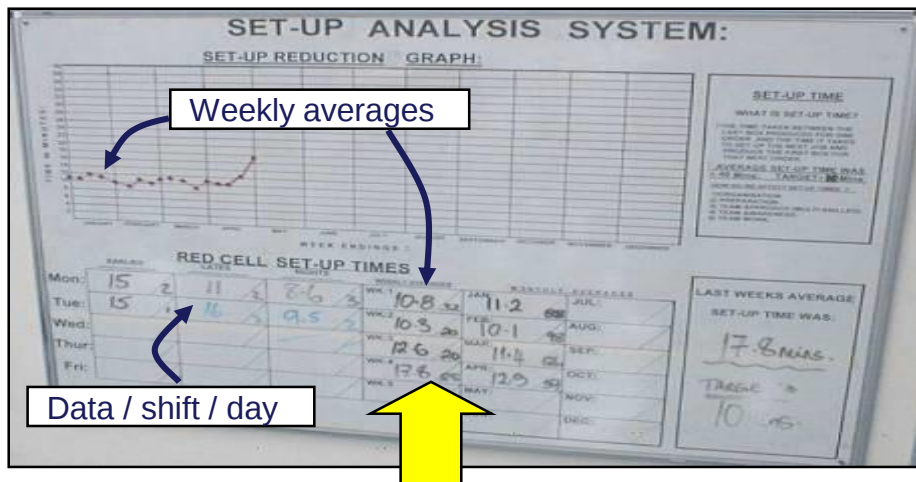
- ☒ Definition of Internal and External activity is understood
- ☒ Existing set-up process has been observed and documented
- ☒ The set-up process steps have been categorised as Internal or External
- ☒ The team have converted any identified Internal activity into External activity wherever possible
- ☒ Remaining Internal activity has been streamlined / optimised
- ☒ External activity has been streamlined / optimised

3. Maintain and improve the set-up standard

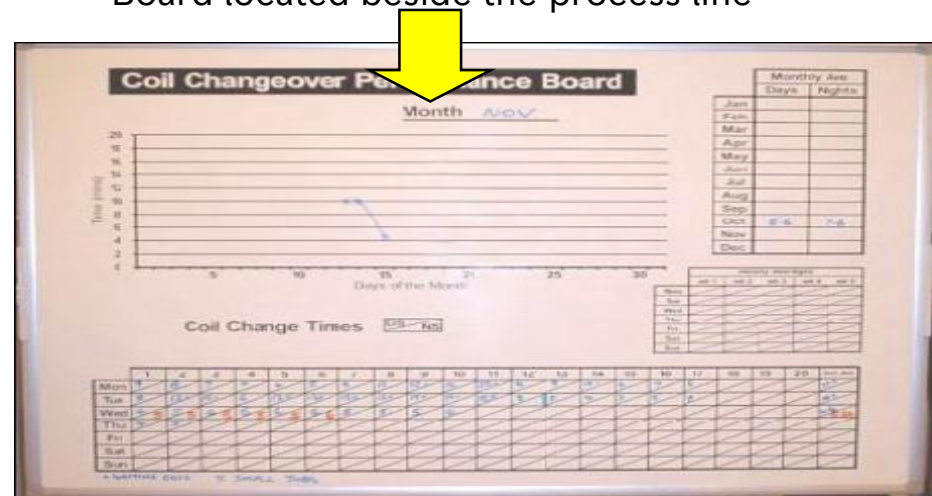


Machine set-up metrics must track the performance of the activity to maintain the standard and identify improvement opportunities

- Board shows monthly performance
- Average set-up time calculated and tracked
- Board located beside the process line



- Team complete the board every shift / other
- Target time stated
- Board shows 12 months performance (typically)





Gate checklist 3: Maintain and improve the set-up standard



- ☒ Metrics and visual management are in place to track and manage / drive set-up time reduction activity