SMED - Process Change Tool

By CHOOLS CONSULTING SERVICES

SMED

Quick tool or process change

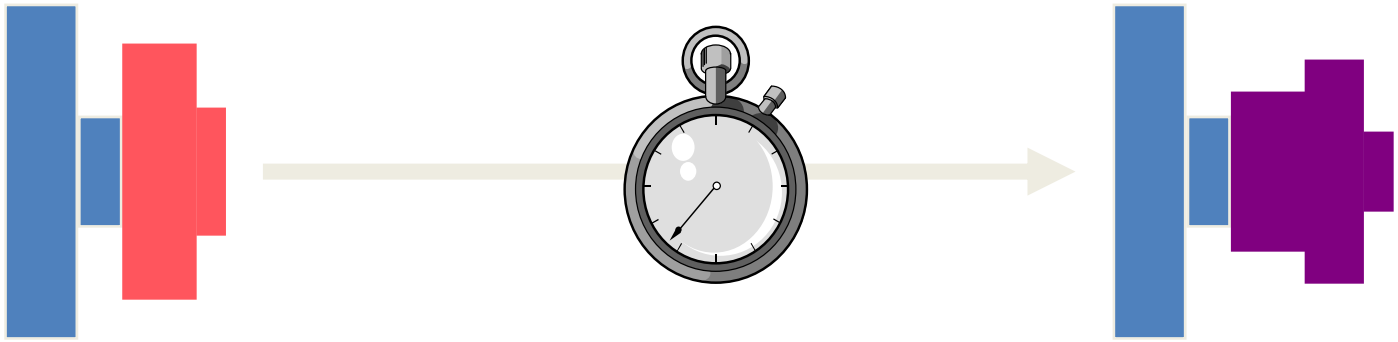
Objectives of SMED

1. Identification of internal and external set-up operations
2. Convert internal set-ups to external
3. Elimination of waste, optimisation of each operation
4. Tools and equipment check list and storage method
5. Procedural chart (standardised set-ups)
6. Reduction of set-up time
7. Improvements without big investments

"Only make what can be sold. Ideally produce only goods that have already been ordered."

Definition of a Set-up

Set-up is:

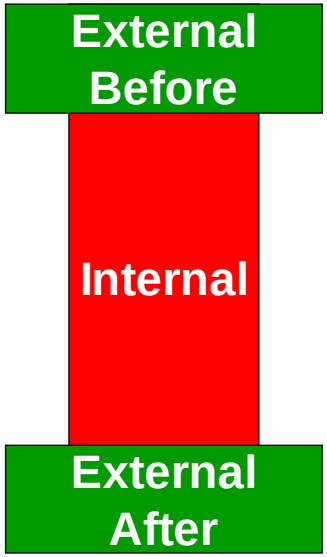


The time from the last good piece of Batch A to the first good piece of Batch B.

Definition of internal & external operations

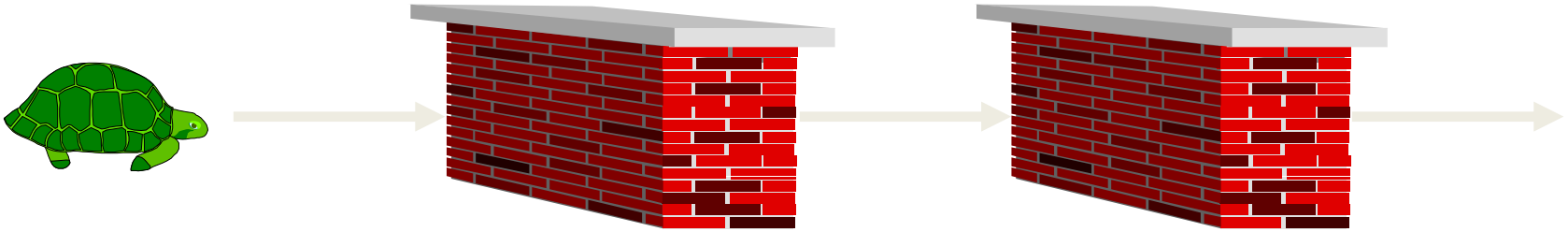
- INTERNAL – can only be carried out when the machine or process has stopped

- EXTERNAL – could be done whilst the machine or process is still running

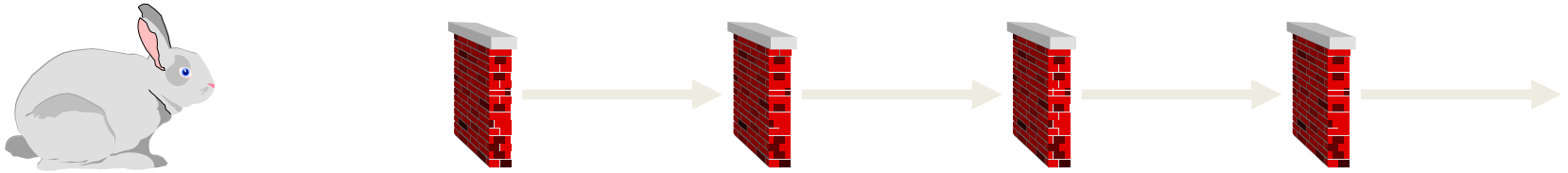


Key to Remember

Set-ups are roadblocks to flow...



We want to eliminate the hurdles

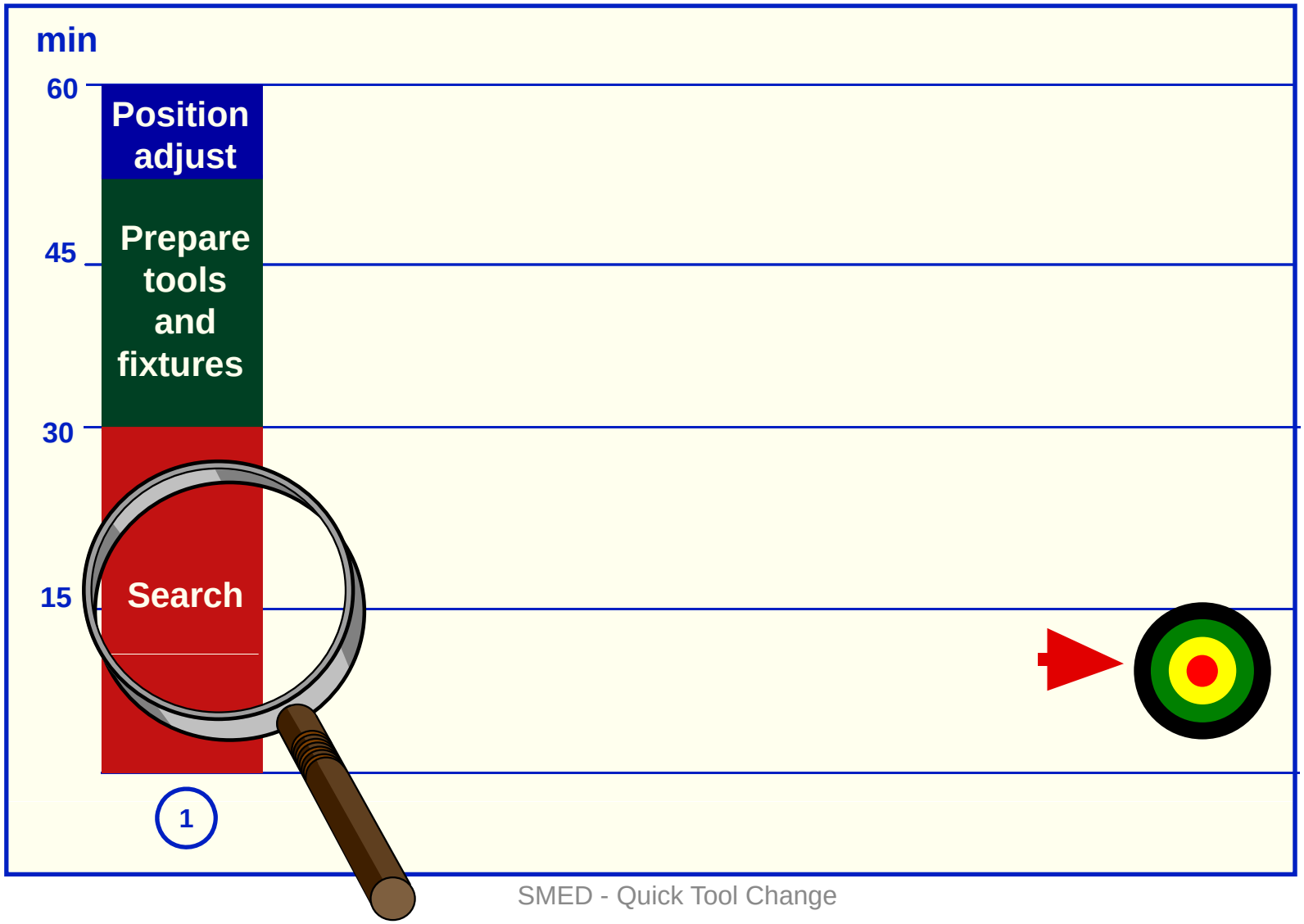


Establish Priorities

M/C No.	Set-up Time	M/C Time	1 piece	2 piece	5 piece
1	2.5	0.5	3.0	3.5	5.0
2	2.0	2.5	4.5	7.0	14.5
3	3.5	1.5	5.0	6.5	11.0
4	1.5	2.0	3.5	5.5	11.5
5	0.5	3.0	3.5	6.5	15.5

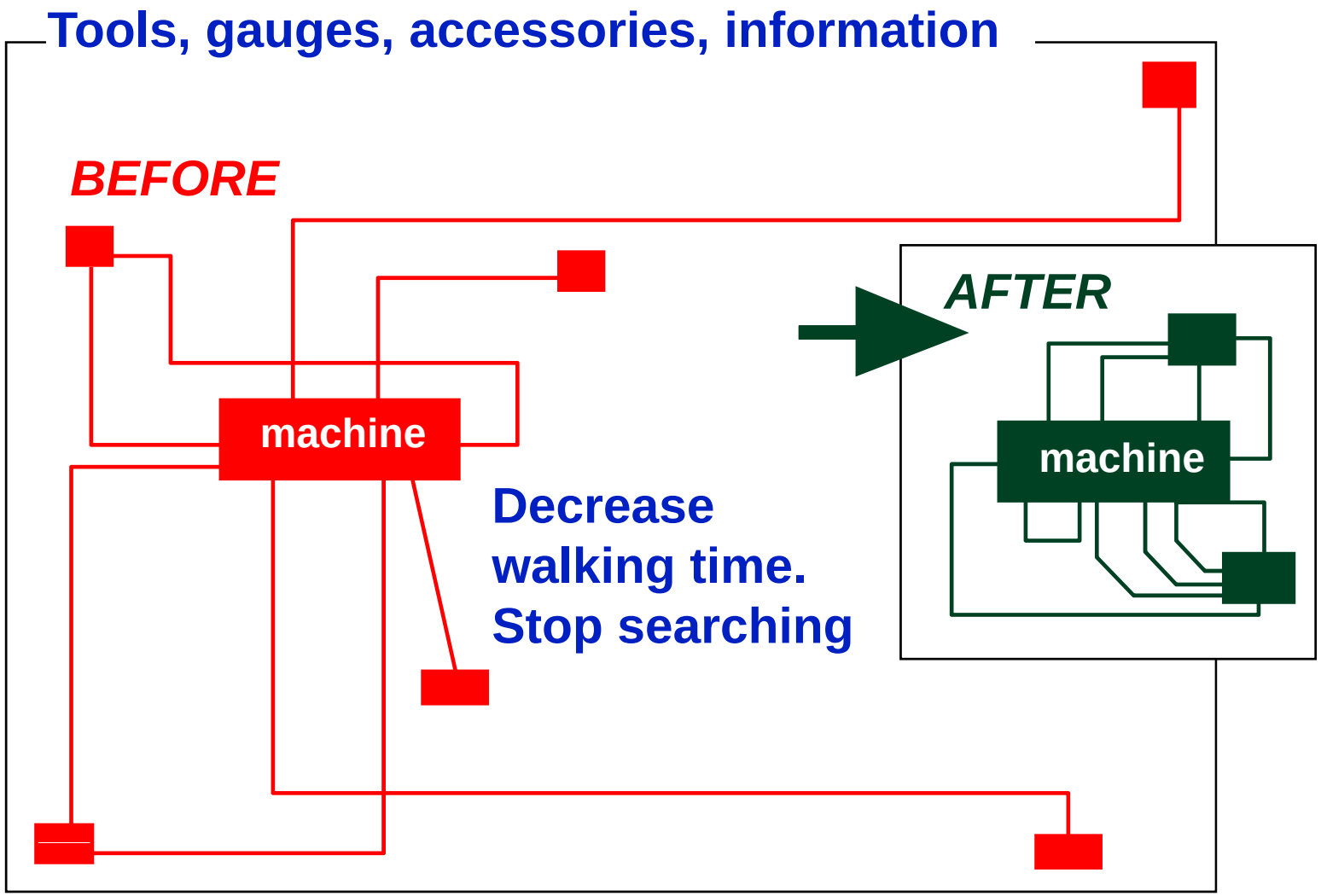
i.e. It depends on lot size & frequency of set-ups

A Typical Set-up

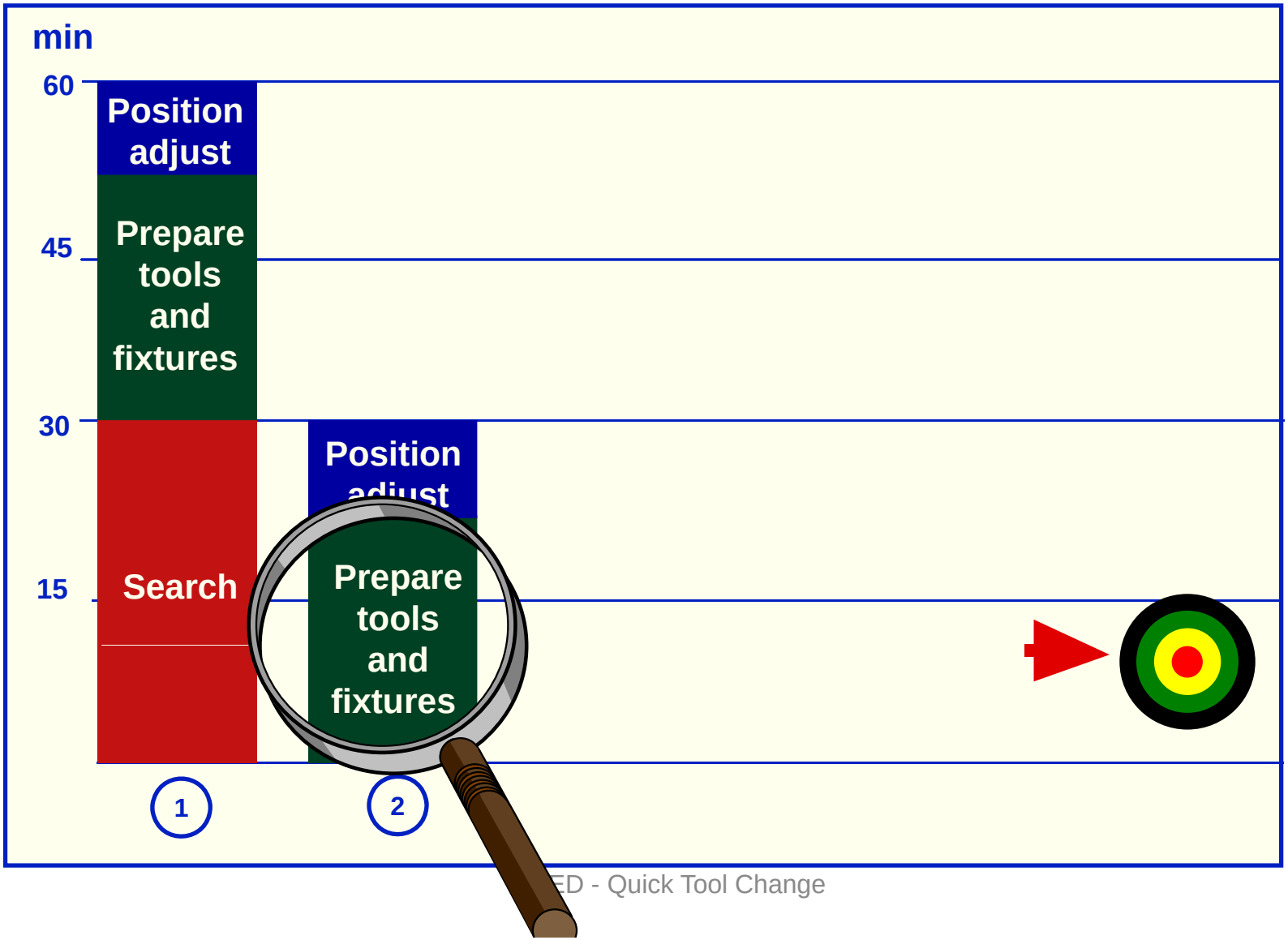


Set-up tricks

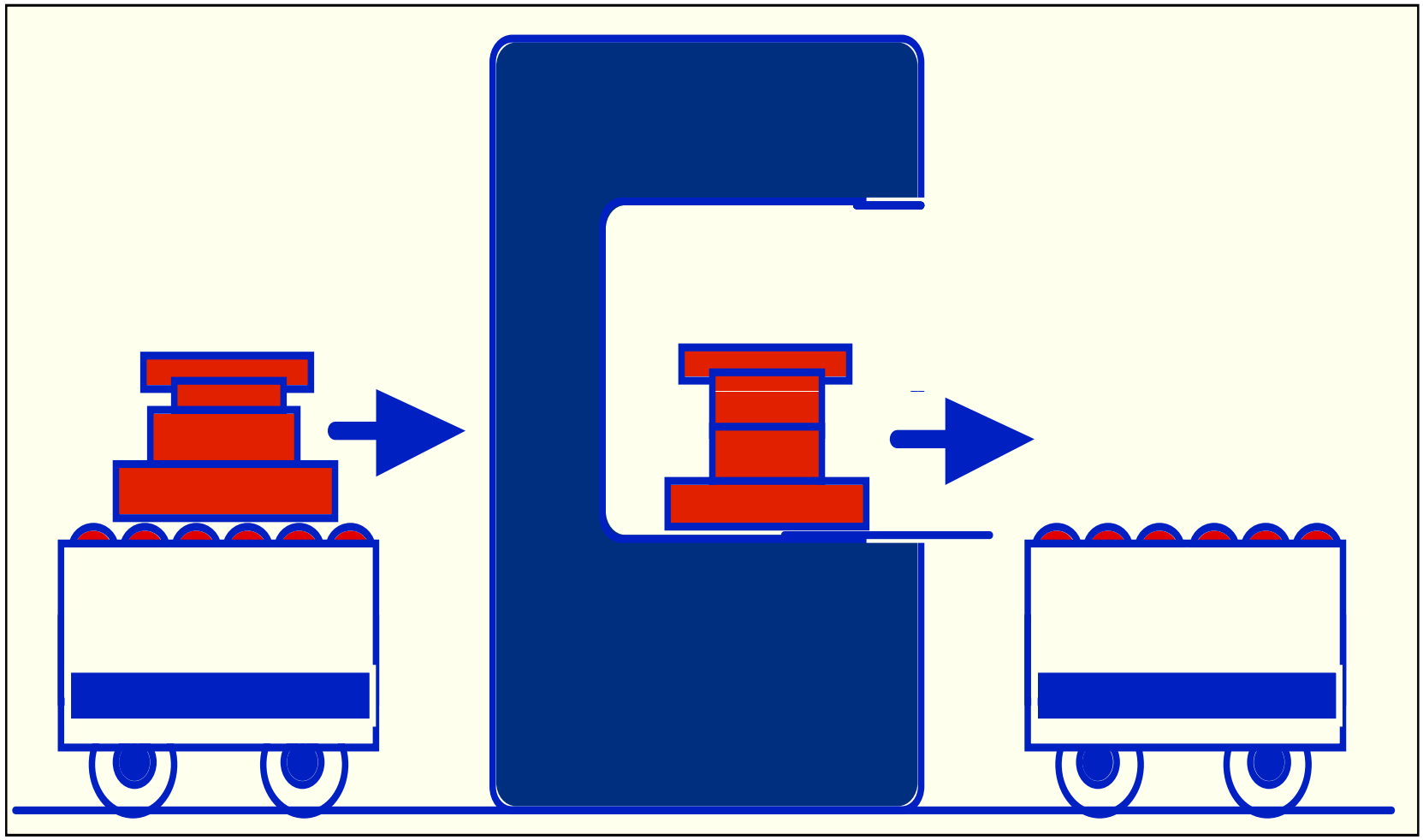
Bring together



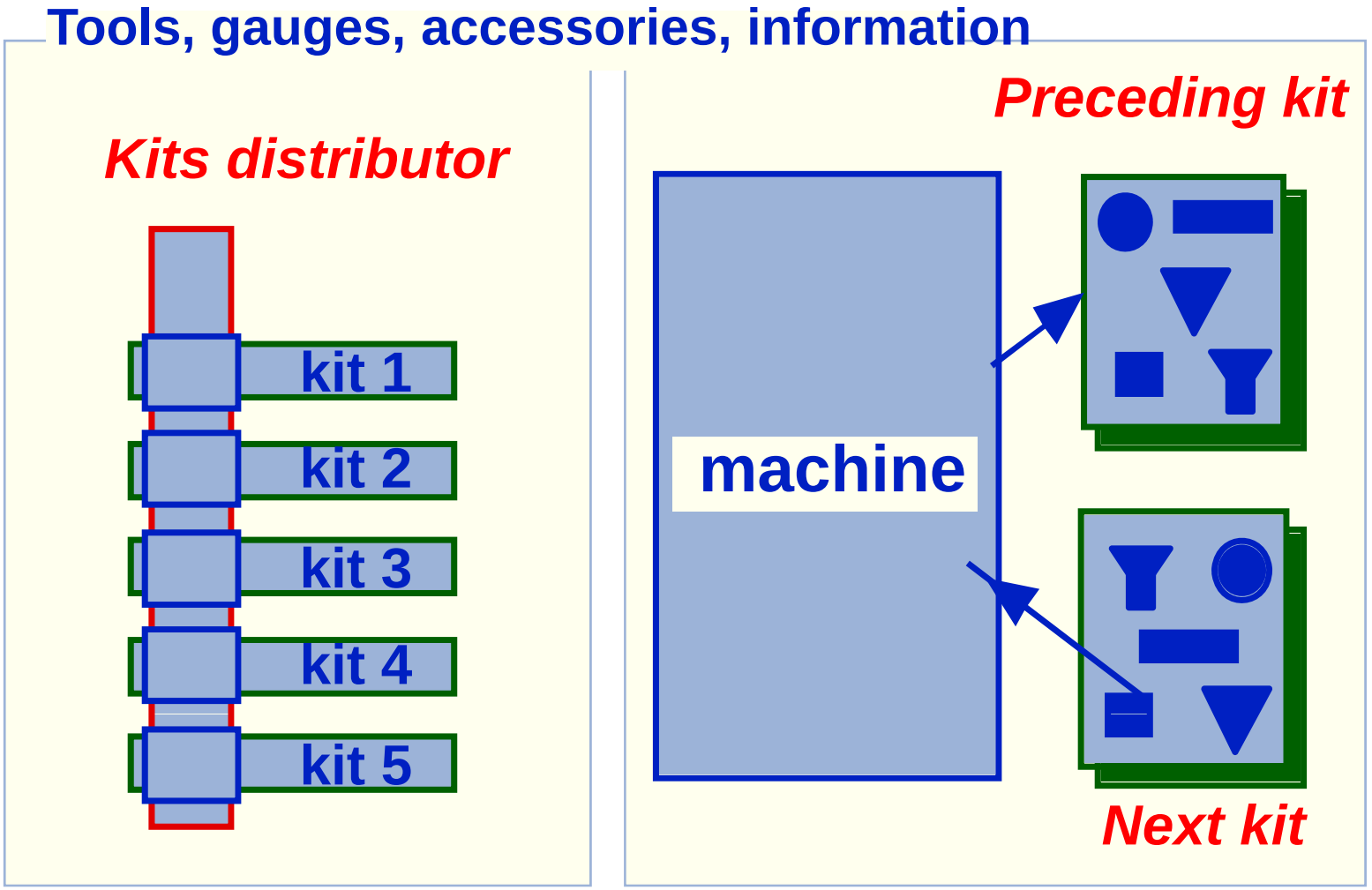
An Improved Set-up



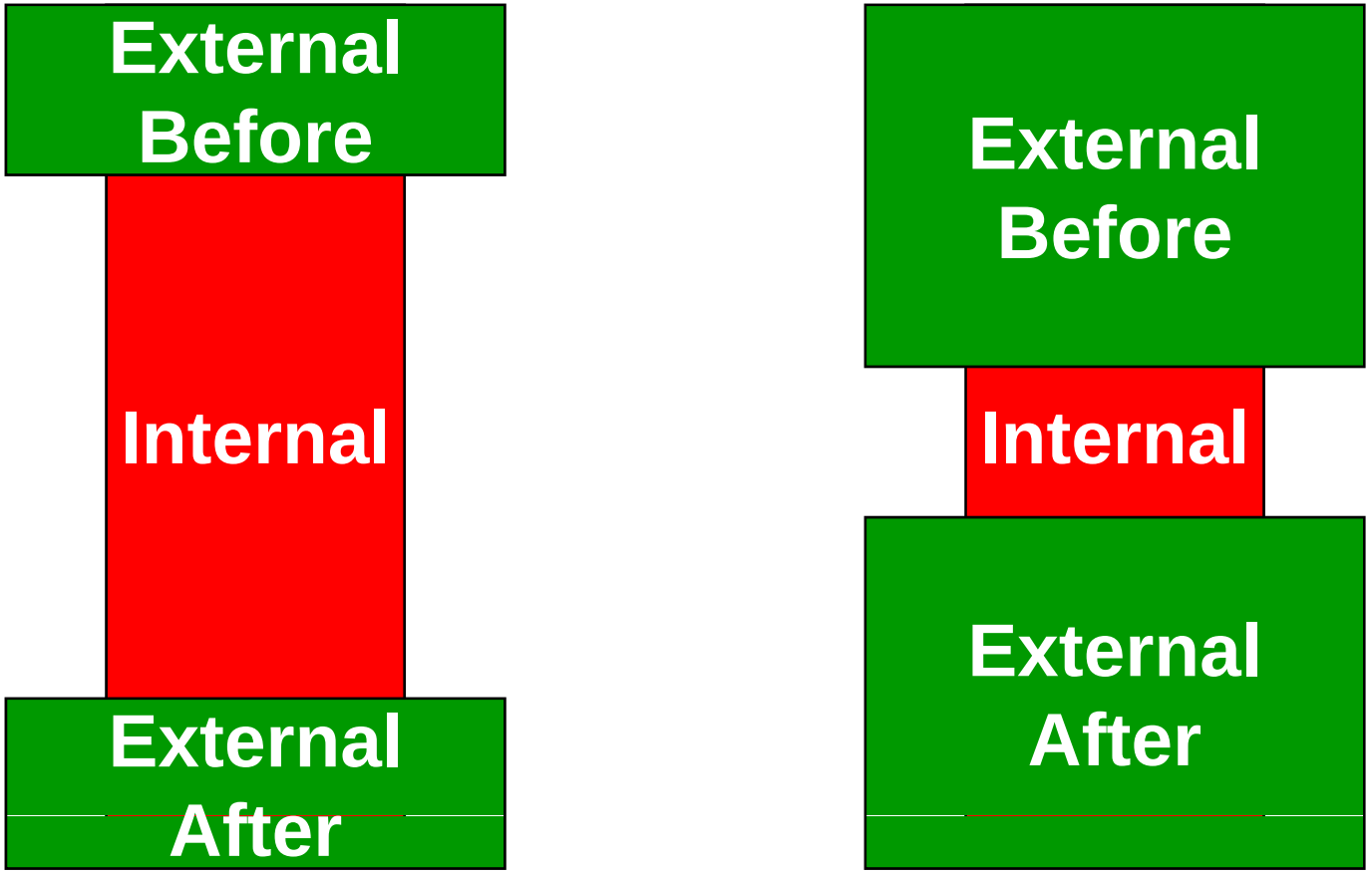
Set-up tricks Prepare tools ahead of time



Set-up tricks Reassemble (kits)

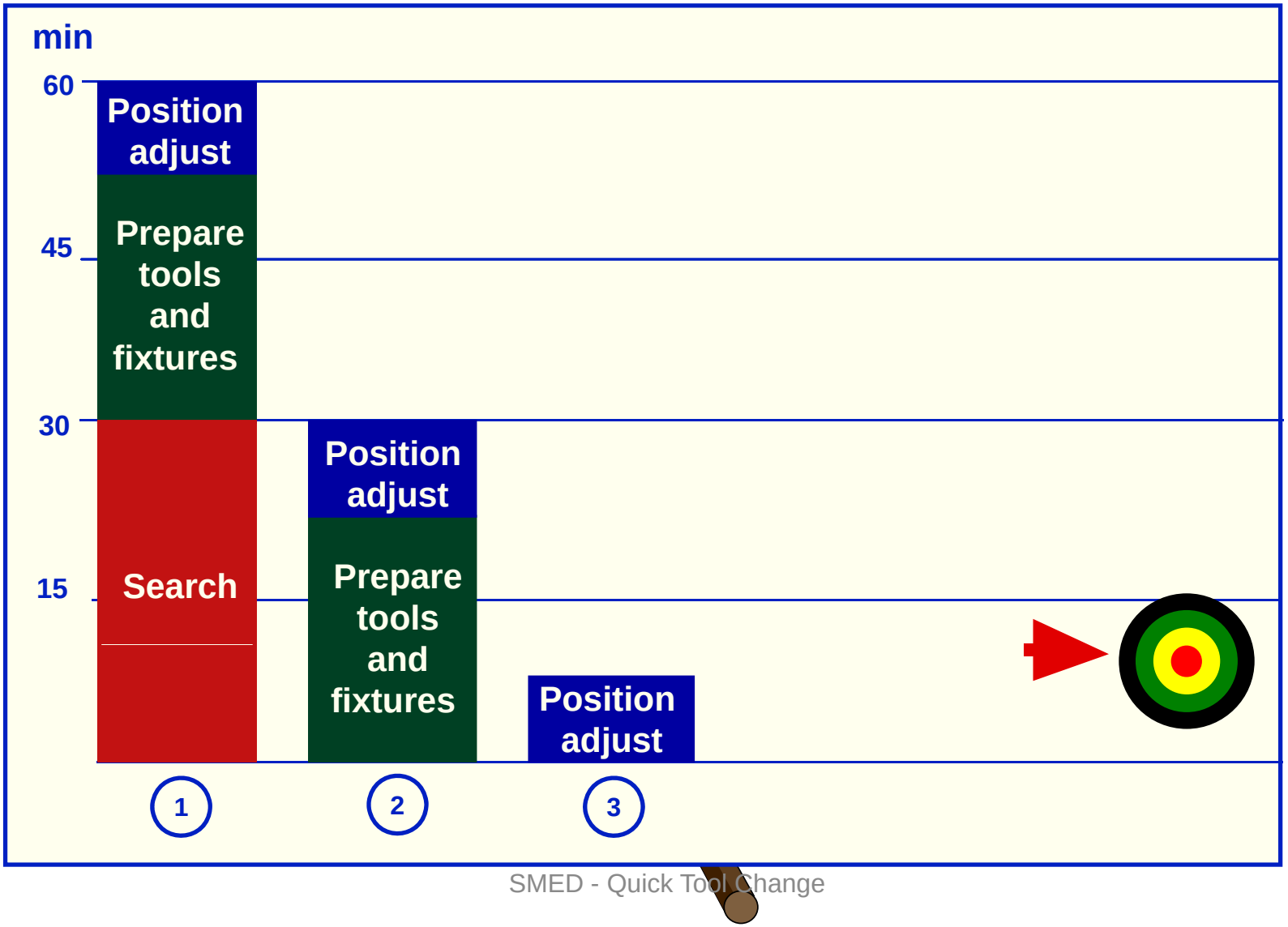


Internal vs External

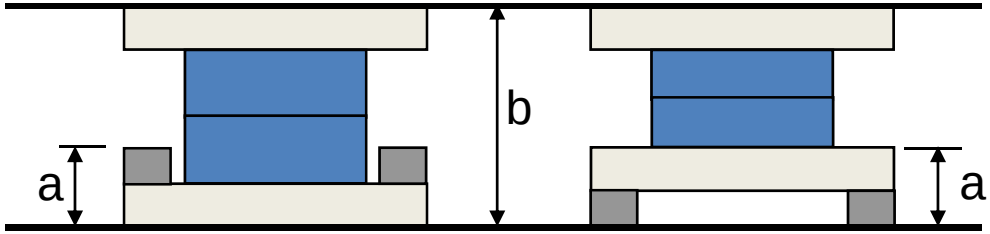


Convert as much internal work as possible to external Work

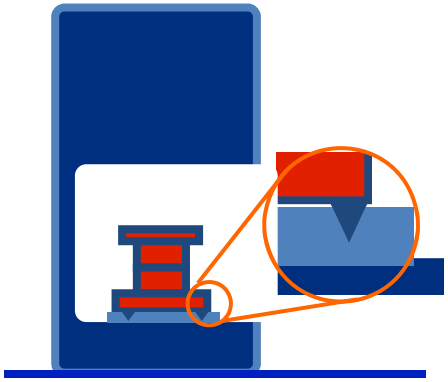
A Further Improved Set-up



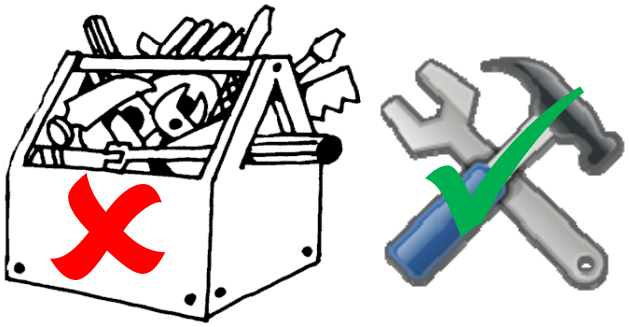
Set-up tricks Standardise



Shimming for standard heights



Use stops or centering grooves set positions

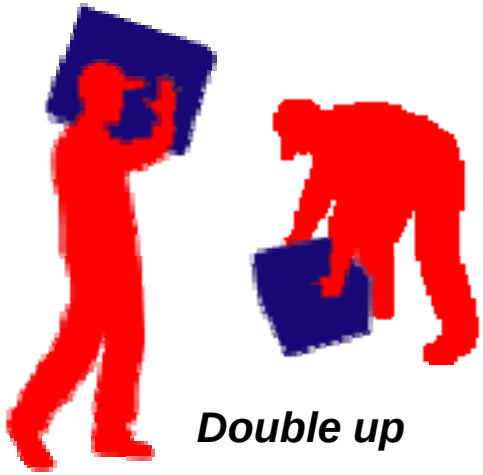


Select only the tools you need

Use checklist or standard operating procedure

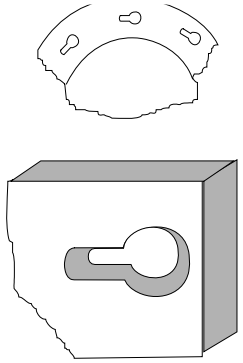
Use equipment readout for setting – avoid human 'feel'

Set-up tricks Reduce

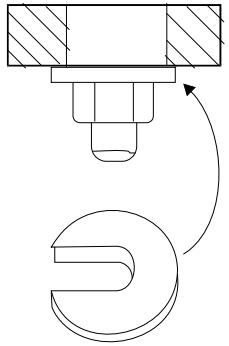


Double up

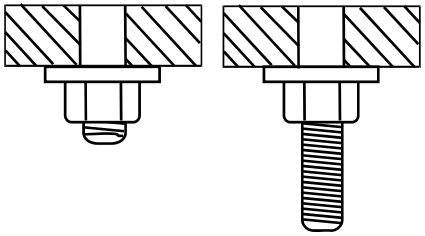
Don't use adjustable tools



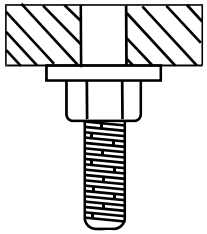
Pear shape holes quick bold release



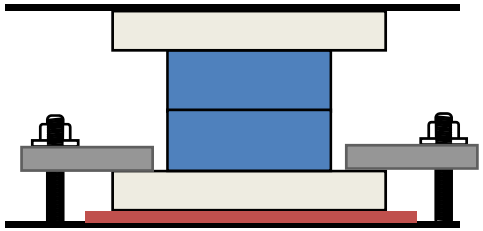
'C' Washers for quick release



Minimise bolt lengths

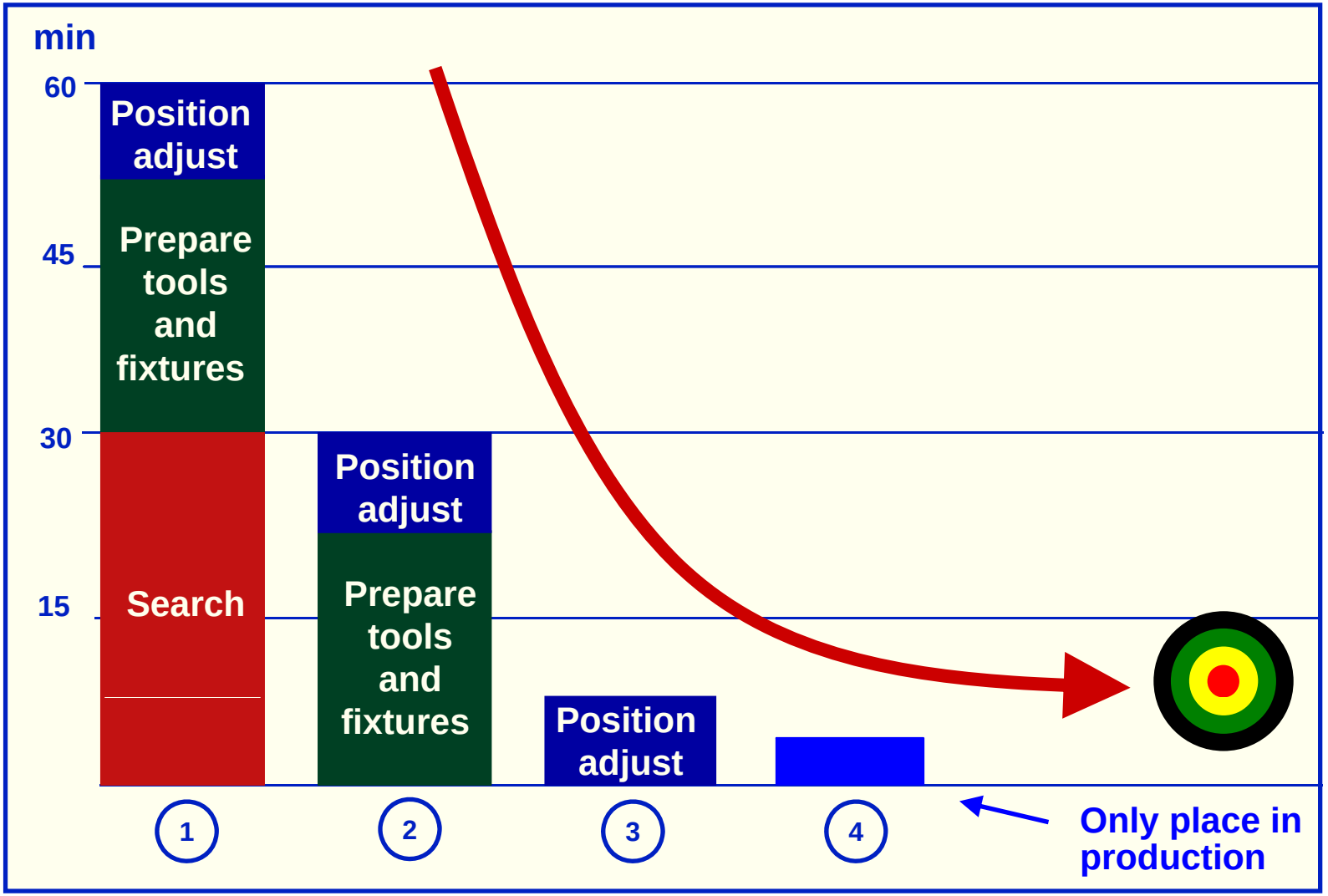


Split threads
(1/3 turn locking)



Intermediate surface to avoid movement during clamping

An Ideal Set-up



The Three Tricks of Set-ups

1. Eliminate

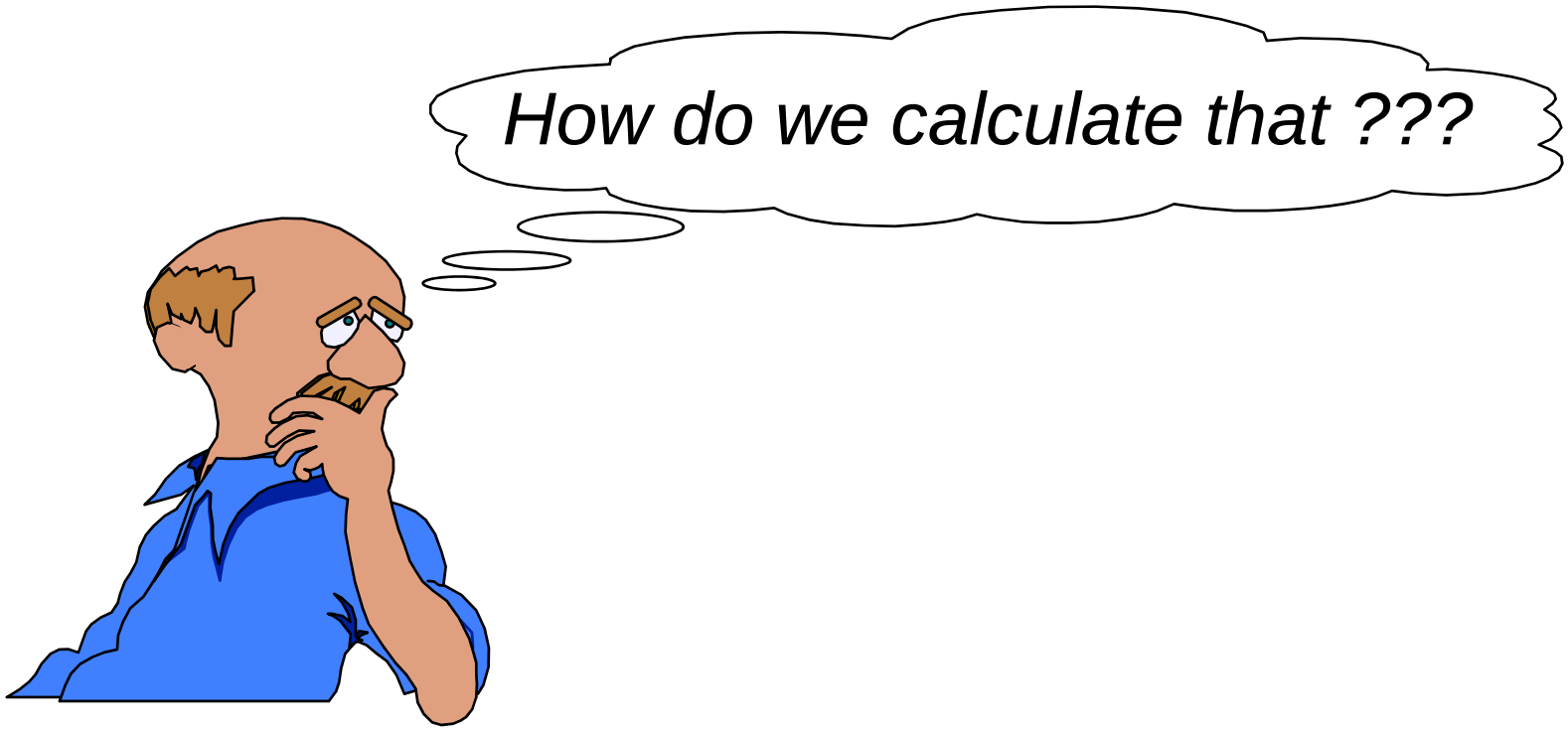
2. Combine

3. Simplify

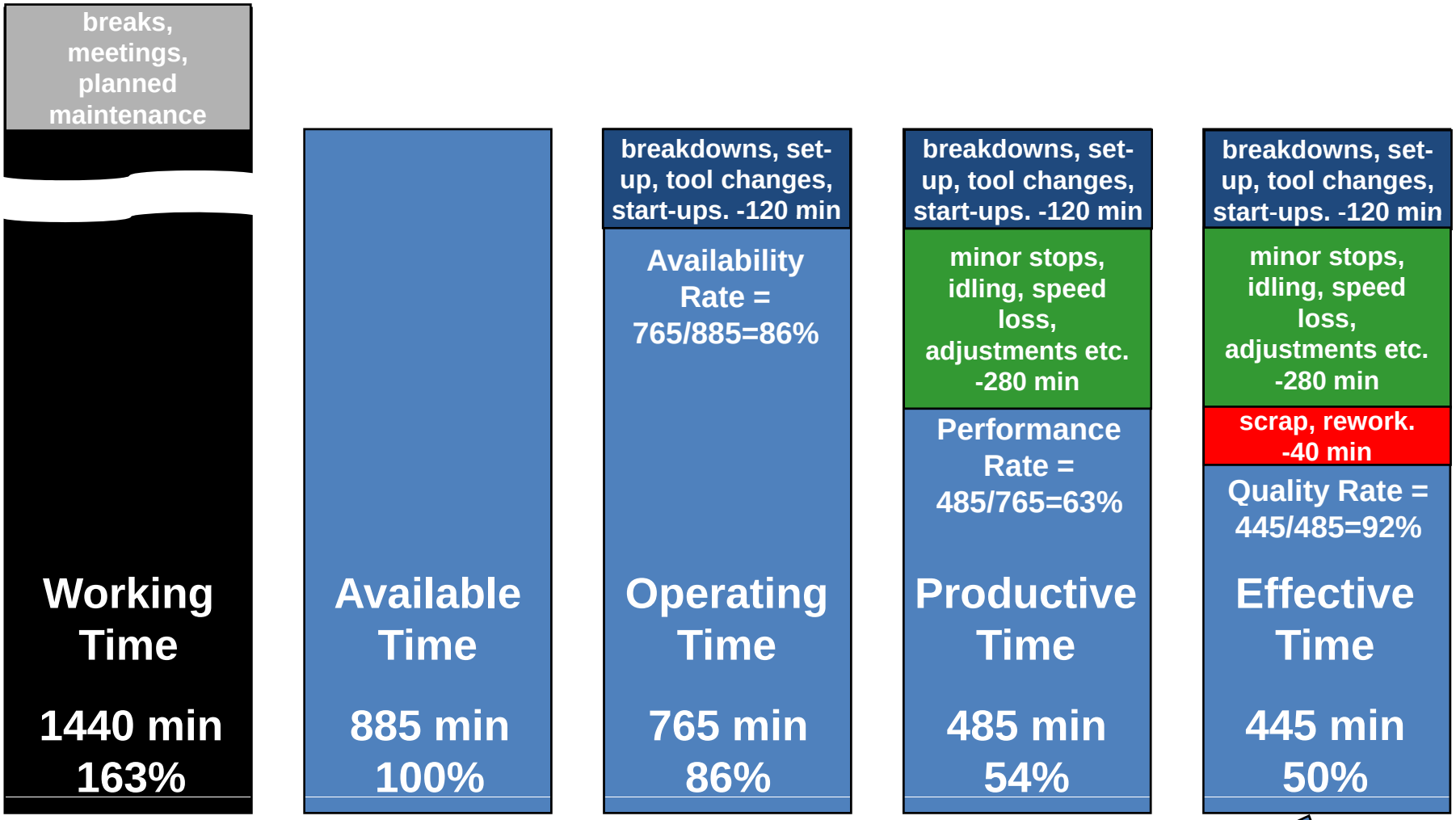
What is TPE?

Total Productive Effectiveness (%) =

Availability Rate x Performance Rate x Quality Rate

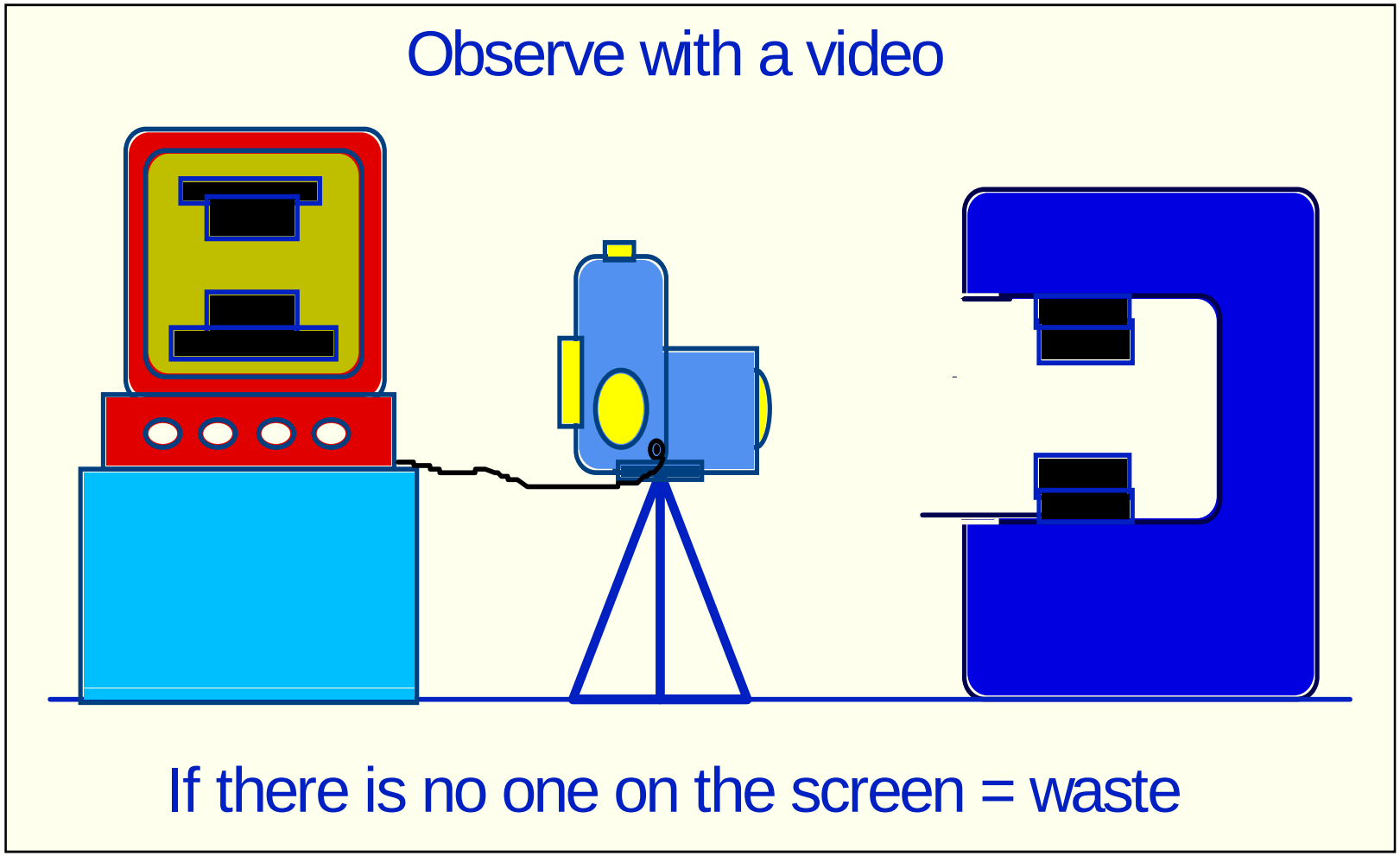


Total Productive Effectiveness (TPE)



TPE is 50%

Observation and Analysis Method



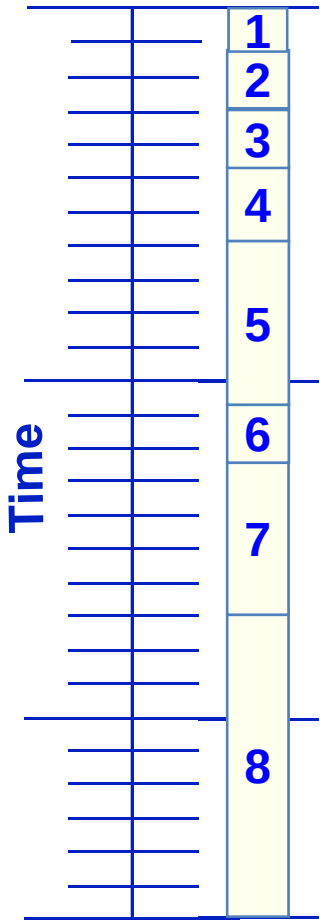
Four Stages of Set-up Reduction

Preliminary Stage (CURRENT)	**Internal and External are not Distinguished**	**External is done as internal (long set-up)**
Stage 2	**Separating Internal and External Set-up**	**Set-up are reduced by 30% to 50%**
Stage 3	**Converting Internal to External Set-up**	**Simplify positioning, centring, fixing, adjusting. Use team to perform internal activities in parallel; Set-ups are reduced by 30% to 50% more.**
Stage 4	**Improving each element of the Set-up**	**Analyse each element in detail and improve it. Less than 10 minutes.**

Analysis steps

1. Identify the set-up
2. List every step
3. Measure the time required for every step
4. Distinguish between internal and external steps
5. Plot the current graph set-up time
6. Convert as many internal steps to external steps
7. Reduce the internal steps time
8. Reduce the external steps time
9. Plot the improved graph set-up time
10. Define the ideal set-up
11. Plot the ideal graph and strive toward it.

Graph



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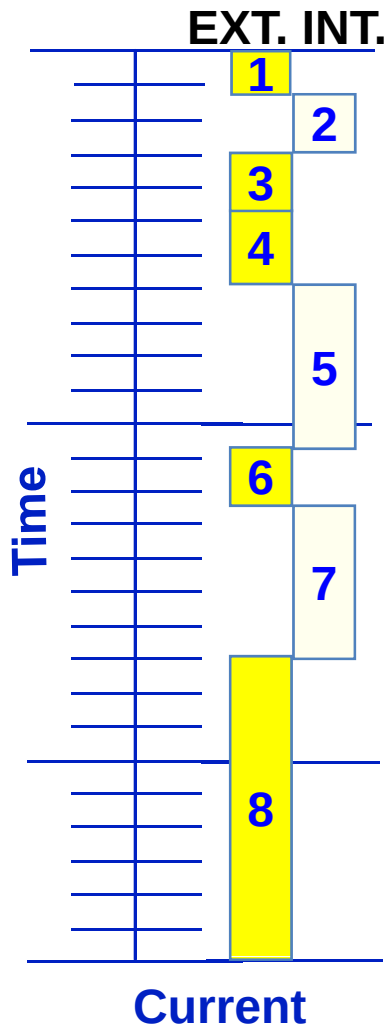

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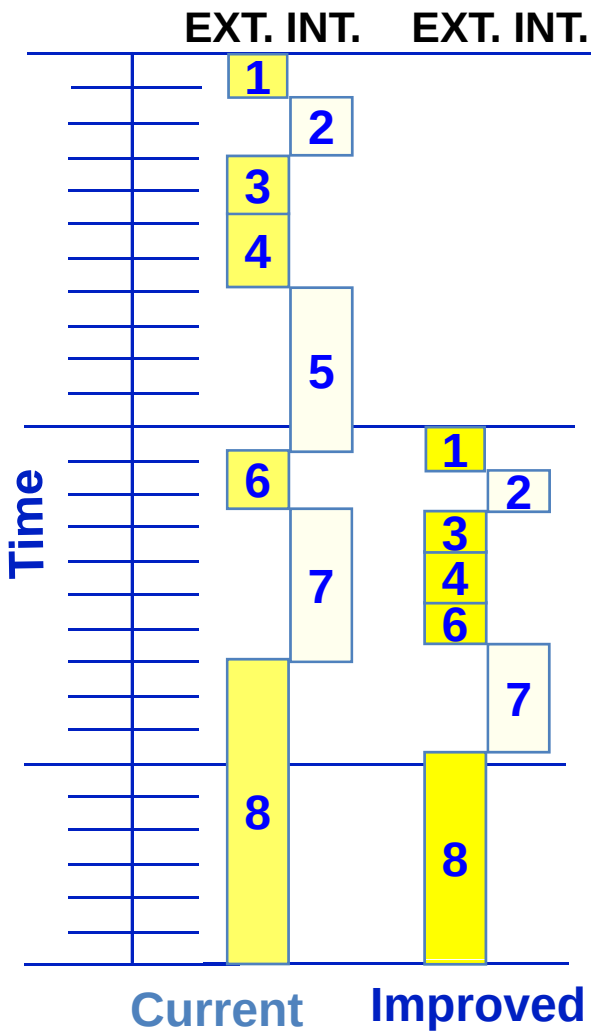

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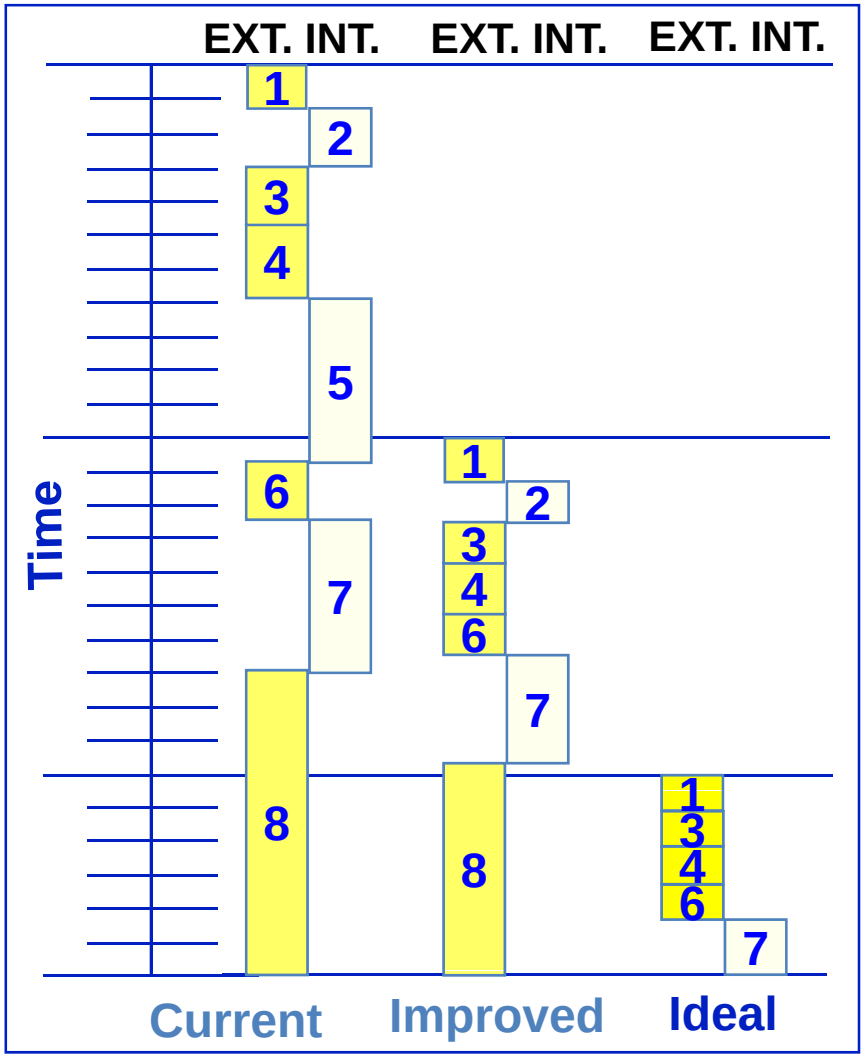

SET-UP Checklist

- Is everything set-up & on hand?
- Have tools been identified & organised/stored?
- Has unnecessary handling been eliminated?
- Have slots/grooves replaced bolting?
- Have new set-up procedures been written?
- Have setting standards & instructions been written?
- Has optimum run time to set-up time been determined?
- Has optimum number of set-up operators been determined?

Can tools be changed in less than 10 mins?