

Fig 7-1 OAE Definition – Batch Manufacturing

Overall Asset Effectiveness = Efficiency x Utilisation

$$\frac{\text{no of good units produced}}{\text{max validated rate/hr x hrs available}} = \frac{\text{no of good units produced}}{\text{max validated rate/hr x running time (hrs)}} \times \frac{\text{running time (hrs)}}{\text{hours available}}$$

hours available

What's In

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • Production Schedule based on scheduled shift pattern <ul style="list-style-type: none"> • Overtime • All Meetings • All Training • Meals / Breaks <ul style="list-style-type: none"> • Showers | <ul style="list-style-type: none"> • Unscheduled Stoppages due to: <ul style="list-style-type: none"> - Labour - Materials - Breakdowns – Utility - Deviation – Logistics - Any Other Incident | <ul style="list-style-type: none"> • Scheduled Stoppages due to: <ul style="list-style-type: none"> - Set Up – Cleaning - Changeovers - Maintenance - Validation - Everything else not covered by What's Out |
|---|--|---|

What's Out

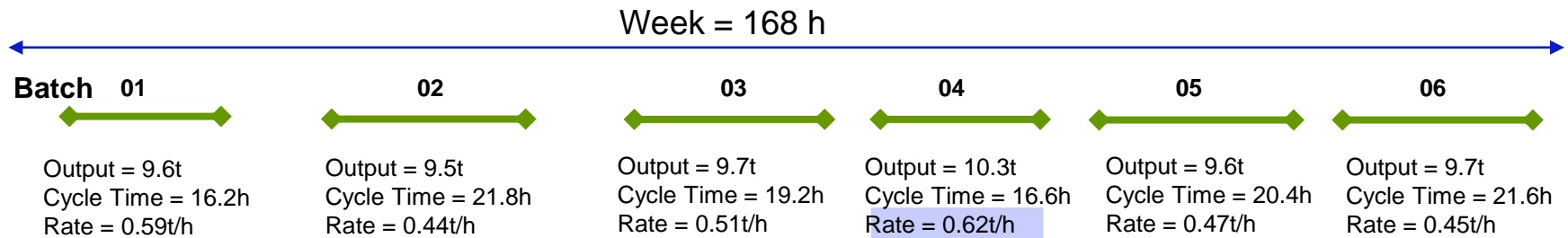
- Off shifts based on scheduled shift pattern
 - Holiday
- Annual shutdown

OAE Targets – Single Machine >80% - Multiple Machines (eg Packaging Line) >60%

Fig 7-2 OAE Definition – Process Industry

Overall Asset Effectiveness = Efficiency x Utilisation

$$\frac{\text{no of good units produced}}{\text{Golden batch rate/hr x hrs available}} = \frac{\text{no of good units produced}}{\text{Golden batch rate/hr x running time (hrs)}} \times \frac{\text{running time (hrs)}}{\text{hours available}}$$



Total output	= 58.4 t
'Golden' rate	= 0.62t/h
Total Run time	= 116.0h
Available time	= 168h

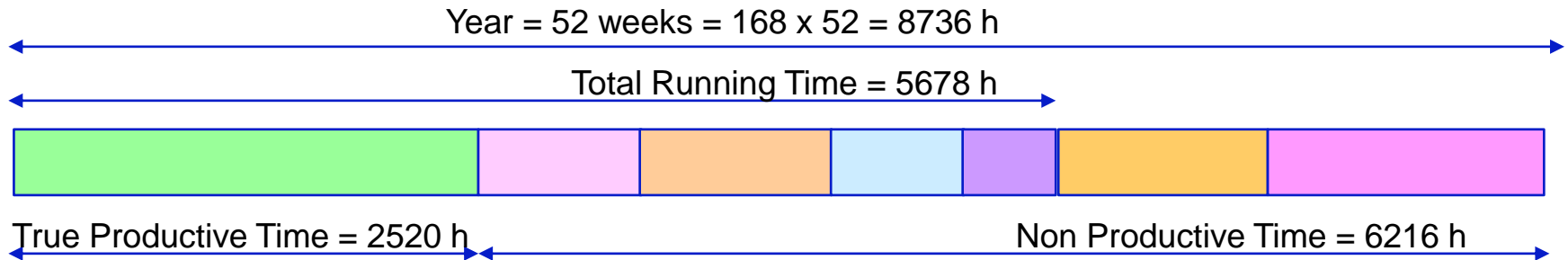
$$\text{OAE} = \frac{58.4}{0.62 \times 116} \times \frac{116}{168} = 56.1\%$$

OAE Targets – Dedicated Plant >85% - Multi-Purpose Plant >77%

Fig 7-3 OAE Definition – Extended Process Industries - Original

Overall Asset Effectiveness = Efficiency x Utilisation

$$\frac{\text{no of good batches produced}}{\text{'Elite' batch rate / hr x hrs available}} = \frac{\text{no of good batches produced}}{\text{'Elite' batch rate / hr x running hrs}} \times \frac{\text{running hrs}}{\text{hours available}}$$



$$\begin{aligned} \text{OAE} &= \frac{45}{1/56 \times 5678} \times \frac{5678}{8736} \\ &= 44.4\% \times 65\% = 28.9\% \end{aligned}$$

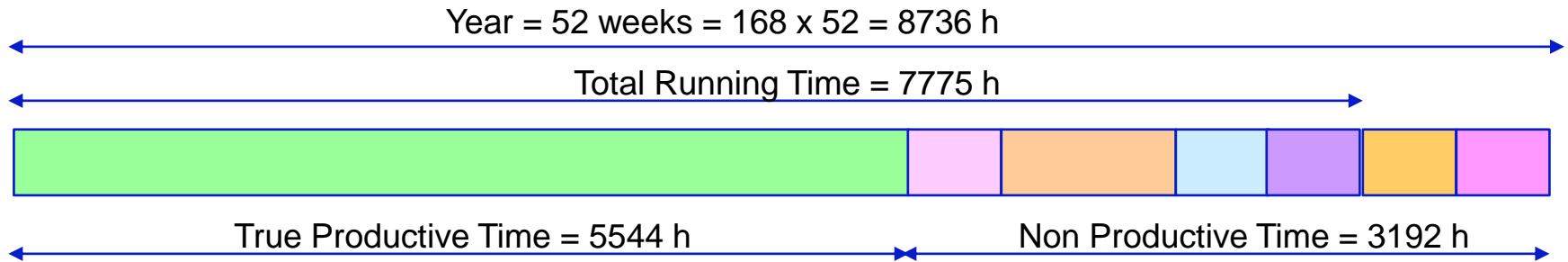
Slow Running	= 9%	
Start / Stop	= 14%	
Breakdowns	= 8%	
Batch Failure	= 5%	
Changeovers	= 16%	
Shutdown and PM	= 19%	

OAE Targets – Dedicated Plant >60% - Multi-Purpose Plant >54%

Fig 7-4 OAE Definition – Extended Process Industries - 'Elite'

Overall Asset Effectiveness = Efficiency x Utilisation

$$\frac{\text{no of good batches produced}}{\text{'Elite' batch rate / hr x hrs available}} = \frac{\text{no of good batches produced}}{\text{'Elite' batch rate / hr x running hrs}} \times \frac{\text{running hrs}}{\text{hours available}}$$



$$\begin{aligned} \text{OAE} &= \frac{99}{1/56 \times 7775} \times \frac{7775}{8736} \\ &= 71.3\% \times 89\% = 63.5\% \end{aligned}$$

Slow Running	= 5%	
Start / Stop	= 11%	
Breakdowns	= 4%	
Batch Failure	= 5%	
Changeovers	= 5%	
Shutdown and PM	= 6%	

OAE Targets – Dedicated Plant >60% - Multi-Purpose Plant >54%

Fig 7-5 Reducing Changeover Times

- Video tape the changeover – one camera per person involved
- From the tape(s) identify each step – duration from 15 sec to 3 mins approx
- Challenge each step in turn as follows –
 - ▶ Can this step be done in any way before the machine stops running? If so, eliminate it from the changeover
 - ▶ Does this step require the use of tools? If so, how do we eliminate the need for tools?
 - ▶ Does this step have anything to do with adjustment after set-up? If so how can we calibrate the equipment so that we get the set-up right first time and don't have to do test runs?
 - ▶ Can this step be minimised or eliminated by changing the design of the process or of the product?
- Develop and agree new procedure
- Choreograph procedure and train operators / technicians

Fig 7-6 Reducing Changeover Times

- Video tape the changeover – one camera per person involved
- From the tape(s) identify each step – duration from 15 sec to 3 mins approx
- Challenge each step in turn as follow –
 - ▶ Can this step be done in any way before the machine stops running? If so, eliminate it from the changeover
 - ▶ Does this step require the use of tools? If so, how do we eliminate the need for tools?
 - ▶ Does this step have anything to do with adjustment after set-up? If so how can we calibrate our equipment so that we get the set-up right first time and don't have to do test runs?
 - ▶ Can this step be minimised or eliminated by changing the design of the process or of the product?
- Develop and agree new procedure
- Choreograph procedure and train operators / technicians

External / Internal

Tool-less

Adjustment

Harmonisation

Fig 7-7 FMCG Packaging Line Changeover

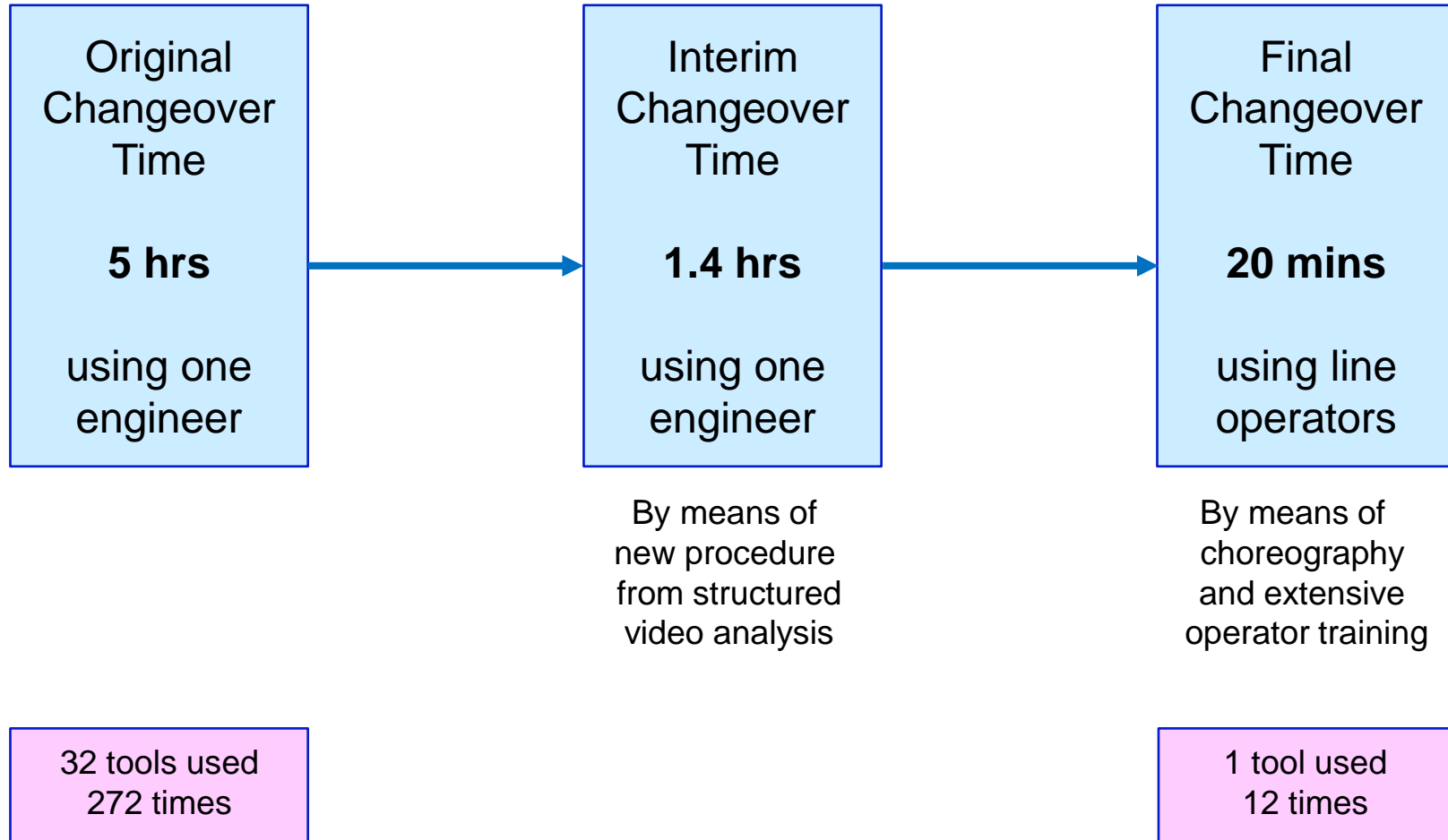


Fig 7-8 Blister Line Cleaning

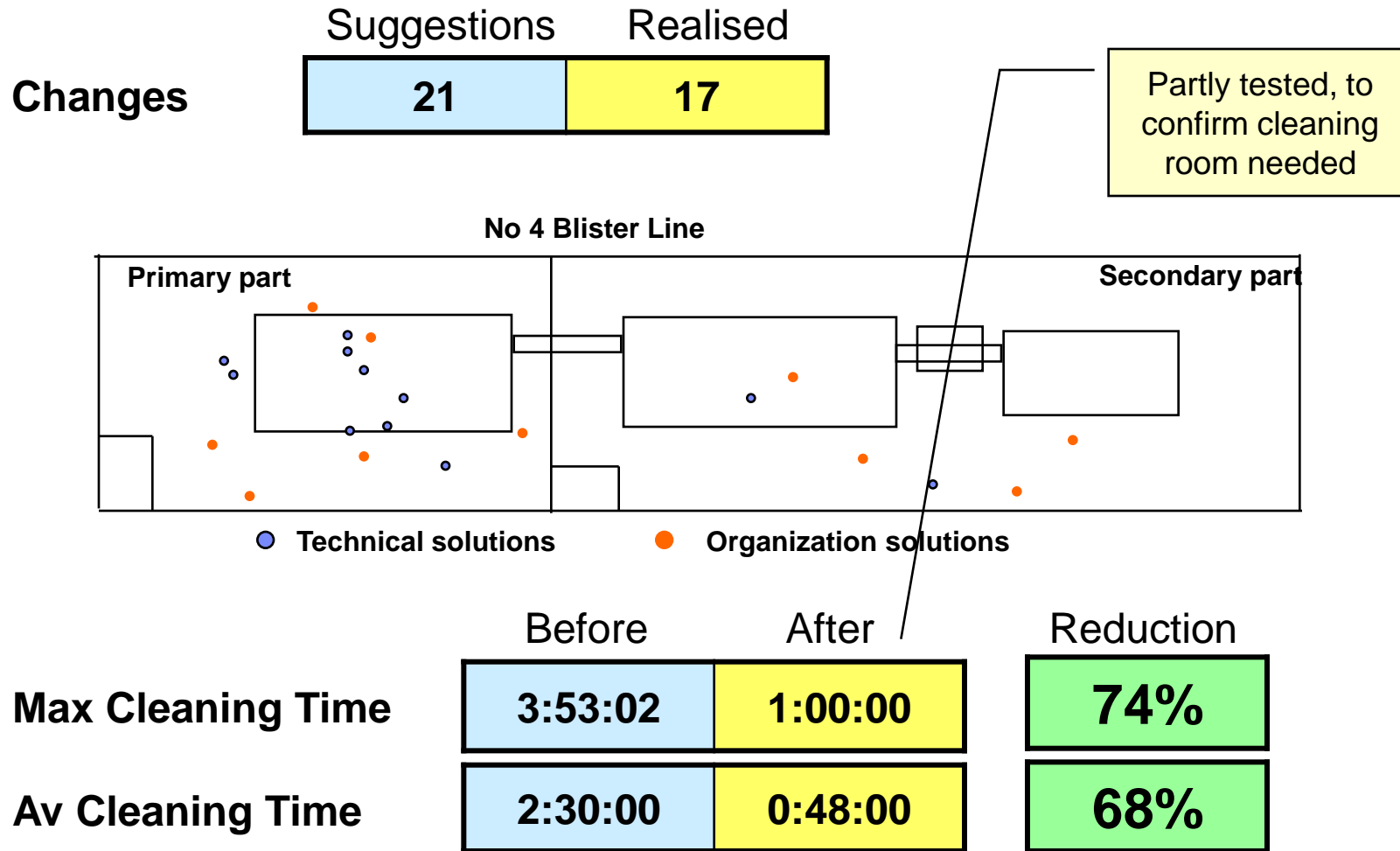


Fig 7-9 Blister Line Set-Up

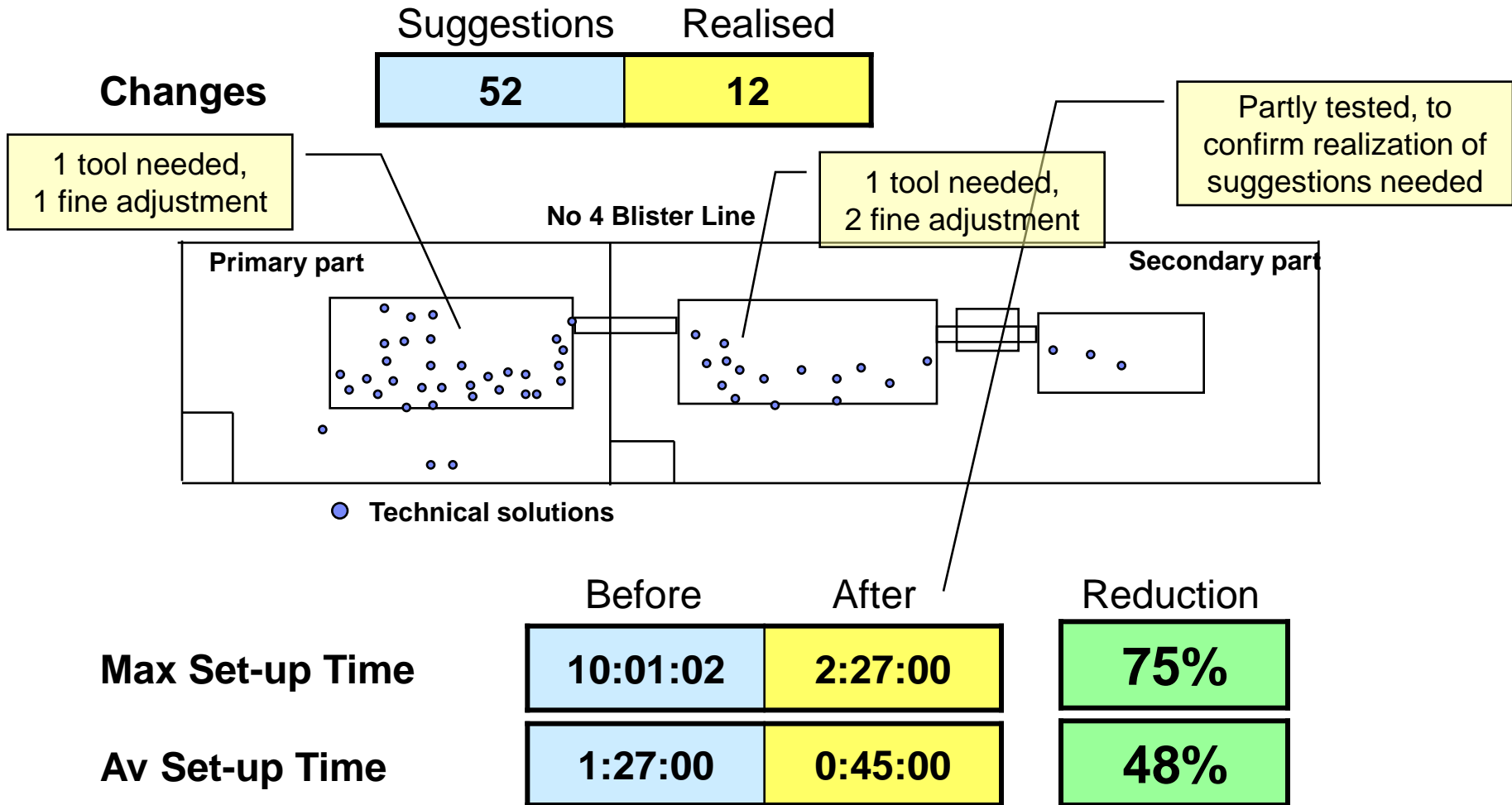


Fig 7-10 Blister Line Harmonisation

	Before	After
Blister dimensions	6	3
Leaflet dimensions	4	1
Folding box dimensions	13	8
Wrapping shapes	13	0
Case dimensions	5	1

- Testing of proposals in progress
- Confidence level high
- Proposals for change in preparation

Fig 7-11 Tablet Press Clean & Set-Up

	Before	After	Reduction
Max Set-up Time	8:00:00	2:30:00	68%
Lot Set-up Time	1:17:00	0:30:00	61%

- Change parts cleaned and prepared off line
- Dedicated operator in cleaning room
- New procedure choreographed in detail
- Clear definition of roles for operator and mechanic
- Can achieve further reductions by repeating analysis

Fig 7-13 Milestone 4. OAE – Briefing Document

SCOPE: To achieve OAE targets for tableting and packaging of ACD

KEY CHANGE ISSUES:

- Reduce changeover times
- Reduce stoppage times
- Run consistently at max validated speed

CRITERIA FOR SUCCESS:

- Tableting 70% and Packaging 40% by month 6
- Sustained for two weeks

Fig 7-14 Milestone 4. OAE – Activity Plan

