ZenPower International Presentation.

TPM Implementation Blue-Print

www.tpmquality.com

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ZenPower International Introduction.

Who We Are:

ZenPower International was established in 1995 with its registered office in Singapore.

Our Vision.

To be the preferred regional provider of training, consultancy and sales services known for its integrity and excellence in business Quality, Reliability and Delivery.

Focus:

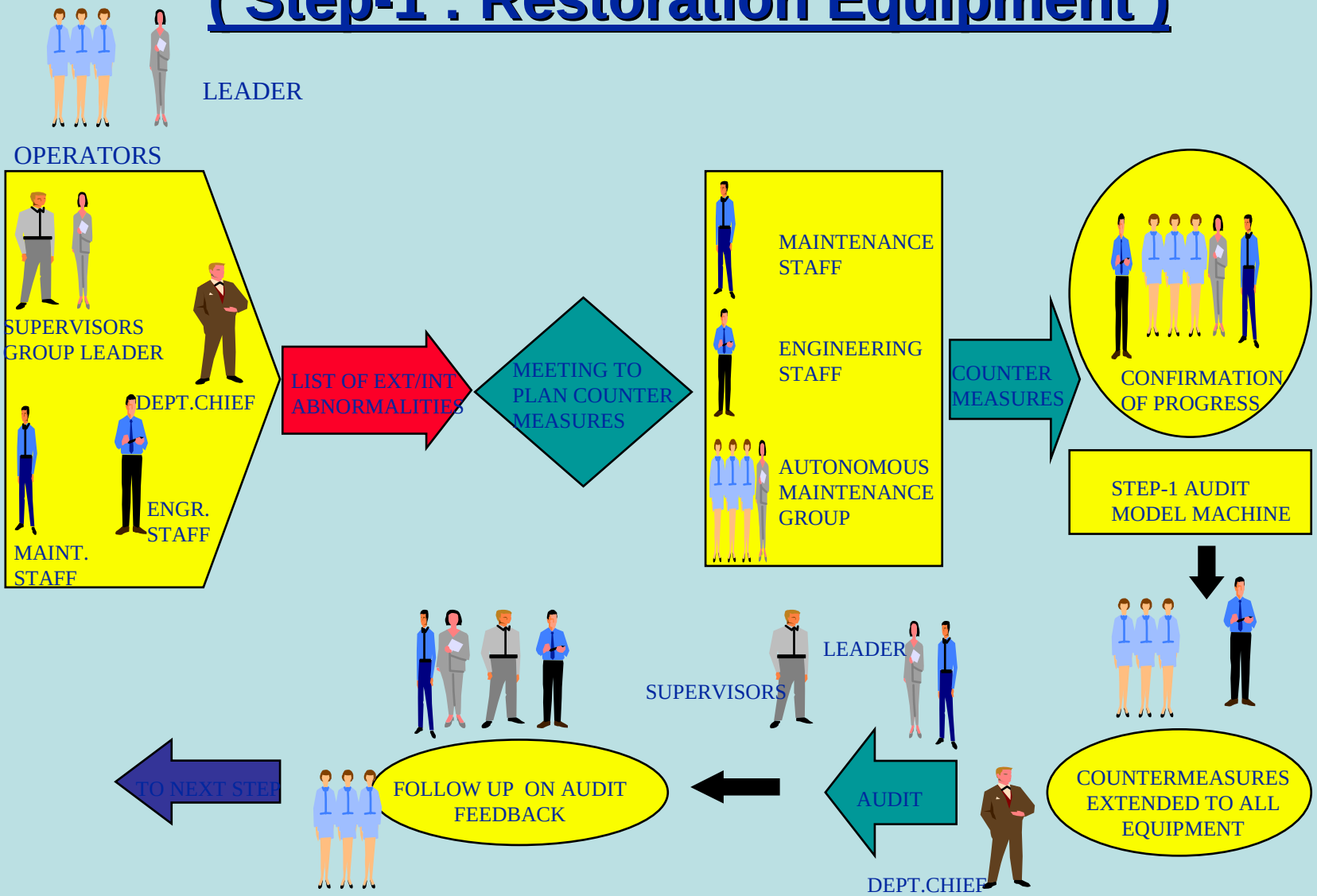
Understanding and Using Autonomous Maintenance and OEE concept for Continuous Improvement in manufacturing

TPM-AM STANDARDS

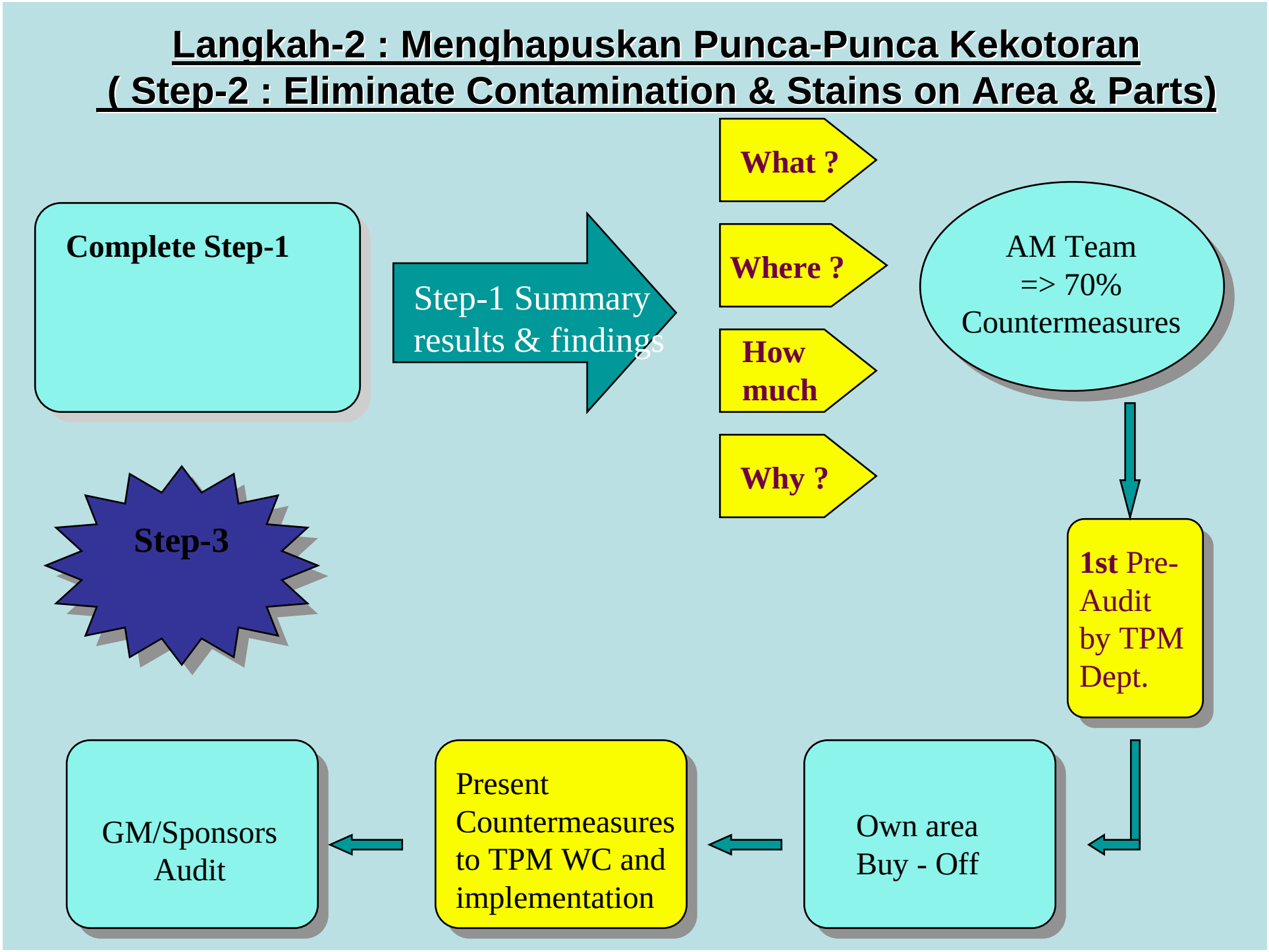
Step #	Step Goal	Standards
Step 1	Restoration	=> 85% **repair rate**
Step 2	Eliminate Sources of Contamination	=> 70% **successful effort**
Step 3	Improve Equipment Accessibility	=> 70% **successful effort**
Step 4	Initial Maintenance Standards	> 50% **sudden b/d reduction**
Step 5	General Inspection Skills	> 90% **sudden b/d reduction**
Step 6	Autonomous Inspection	> 95% **sudden b/d reduction**
Step 7	Organise and manage workplace	**TBD by management**

Langkah-1 : Mengembalikan Peralatan Seperti Asal

(Step-1 : Restoration Equipment)



Langkah-2 : Menghapuskan Punca-Punca Kekotoran
(Step-2 : Eliminate Contamination & Stains on Area & Parts)



Langkah-3 : Memudahkan Kerja-Kerja Pembersihan, Pemeriksaan Dan Pelinciran
(Step 3 : Improve Equipment Accessibility).

Model m/c Passed Step 2

Areas difficult or inaccessible for cleaning checking & lubricating

- Inaccessible
- No Place To Stand
- Wiring or piping obstruct
- Cannot see easily
- Time Consuming to clean

Product Manager

AM Leader

Operator Leader/ Operators

Supervisor

Model Machine Goes To Step 4

GM Audit

W/C Buy Off

Own Area Buy Off

Pre-Audit by TPM Dept.

Langkah-4 : Piawaian Penyelenggaraan Awal
(Step 4 : Initial Maintenance Standards)

Model m/c passed Step 3

Initial maintenance standard

Hard to lubricate

Hard to check oil level

Abnormality in lubrication equipment

Abnormality in circulation of lubrication

Equipment gets dirty during oiling

Engineer & Maintenance

Draft standards for cleaning, inspection & lubrication

Product Manager

AM Leader

Operator

Leader/operator

Counter measure for cleaning and checking

Supervisor

Trial Period

Attach identification label

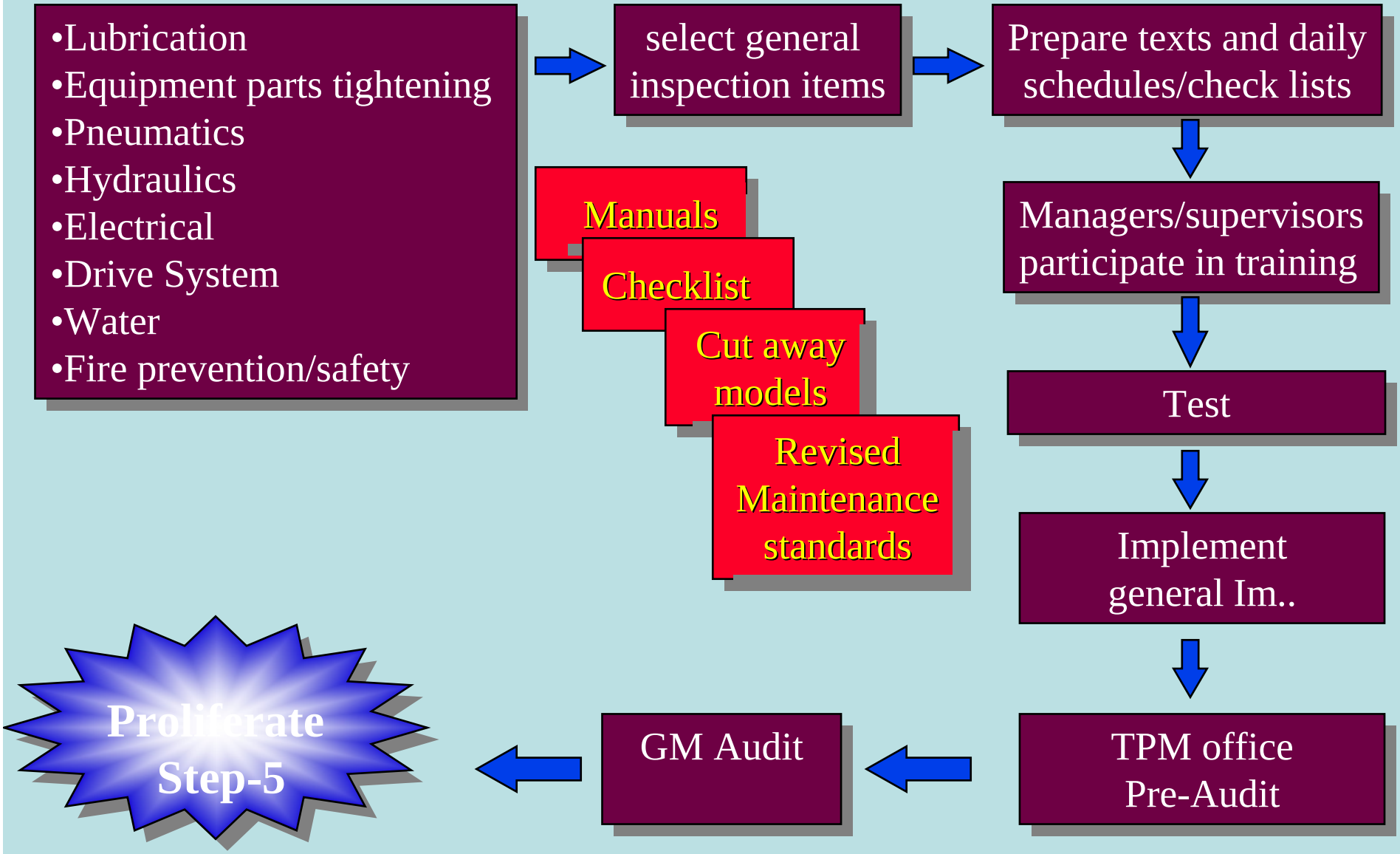
Confirm standard for cleaning, inspect & lubrication

TPM dept. Pre-audit

GM audit

Proliferation of Step 4

Langkah-5 : Skil Pemeriksaan Am
(Step 5 : General Inspection skills)



(Step 5 : General Process Inspection)

- Process Flow
- Process knowledge.
- Adjustment skills
- Abnormalities in Process.
- Process flowchart.

Select General Process items

Prepare texts and daily schedules/check lists

Managers/supervisors participate in training

Test

Implement general Im..

TPM office Pre-Audit

GM Audit

Proliferate Step-5

Manuals

Checklists

Cleaning standards

Process Inspections schedules

Langkah-6 : Pemeriksaan Autonomi
(Step-6 : Autonomous Inspection)

Maintenance	Inspection standards,breakdown analysis

Inspection skill check p

Step 5 Revise provisional standards

Step1 to 3:	Step 4
Establish basic conditions (cleaning and lubrication)	Daily checking, adjustment,and improvement of conditions for correct operation

Operators who understand their equipment (able to maintain inspection standards)

Finalise standards for cleaning and lubricat

Langkah-7 : Mengatur Dan Menguruskan Tempat Kerja
Step-7 : Organise and Manage Workplace

Organise and set standards for :

EQUIPMENT PRECISION INSPECTION ITEMS

STANDARDS FOR INDIVIDUAL WORK RESPONSIBILITIES

TOOLS AND MATERIALS FLOW AND STORAGE

OEE

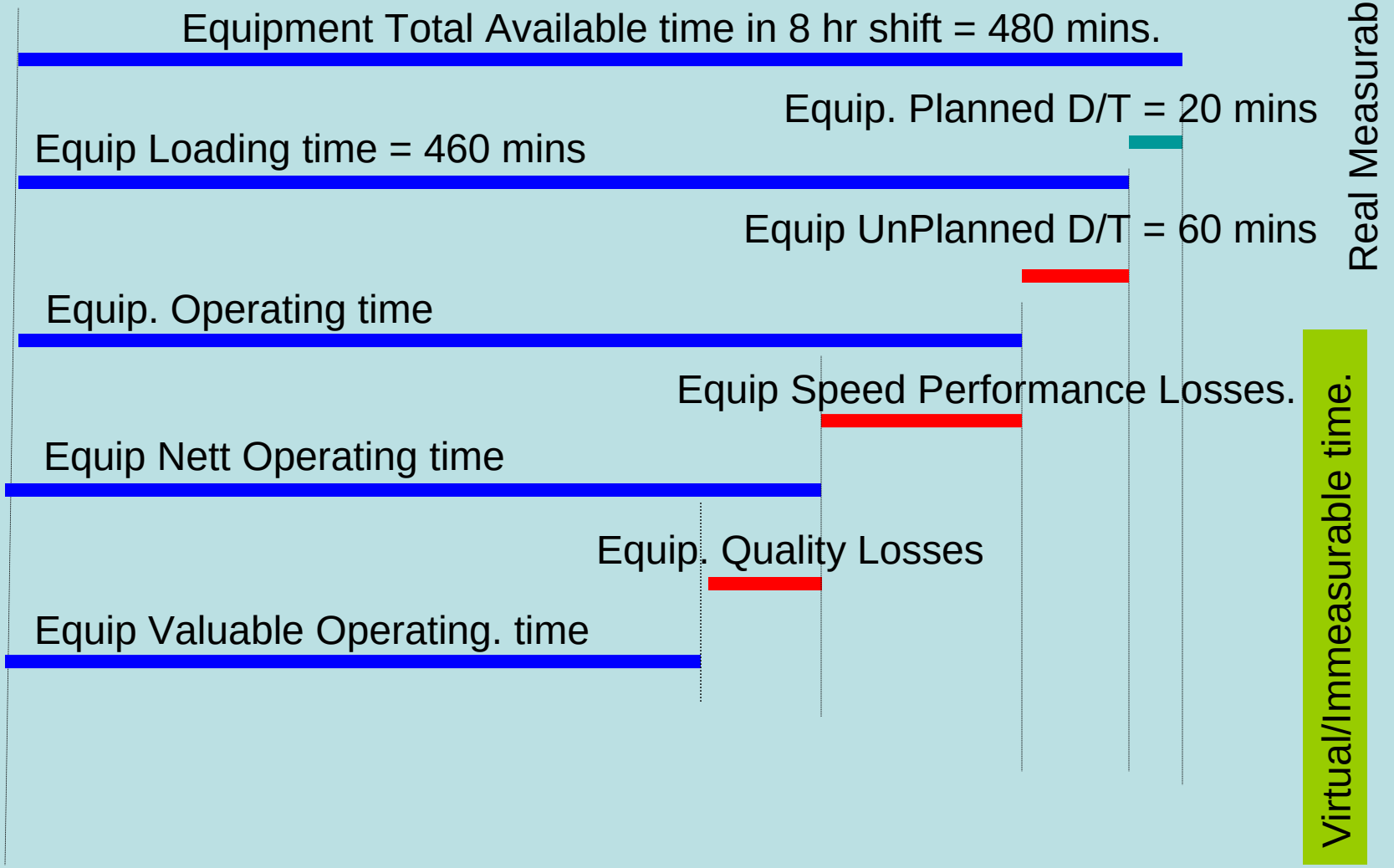
= Availability * Performance Rate * Quality Rate

= Maximum 100%

Under Actual Manufacturing conditions, some losses are inevitable. Hence the Best Practices have adopted

85% as a realistic monthly target.

Equipment OEE Losses

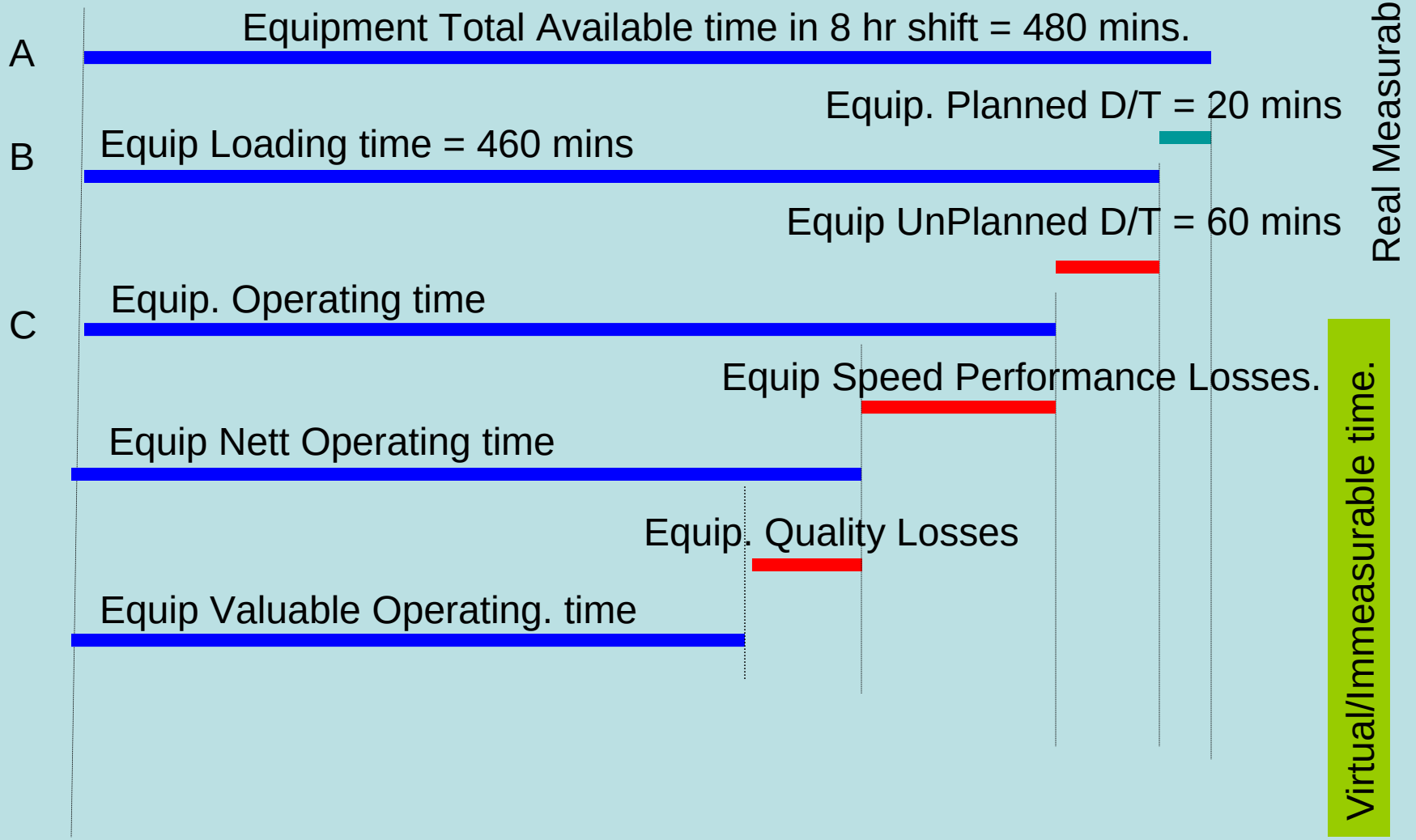


Calculating

Availability

in **OEE .**

Equipment OEE Losses



Availability & Utilization

- Losses due to unplanned downtime only.
- The unplanned events are Machine Breakdown and Setups.
- Small fluctuations.

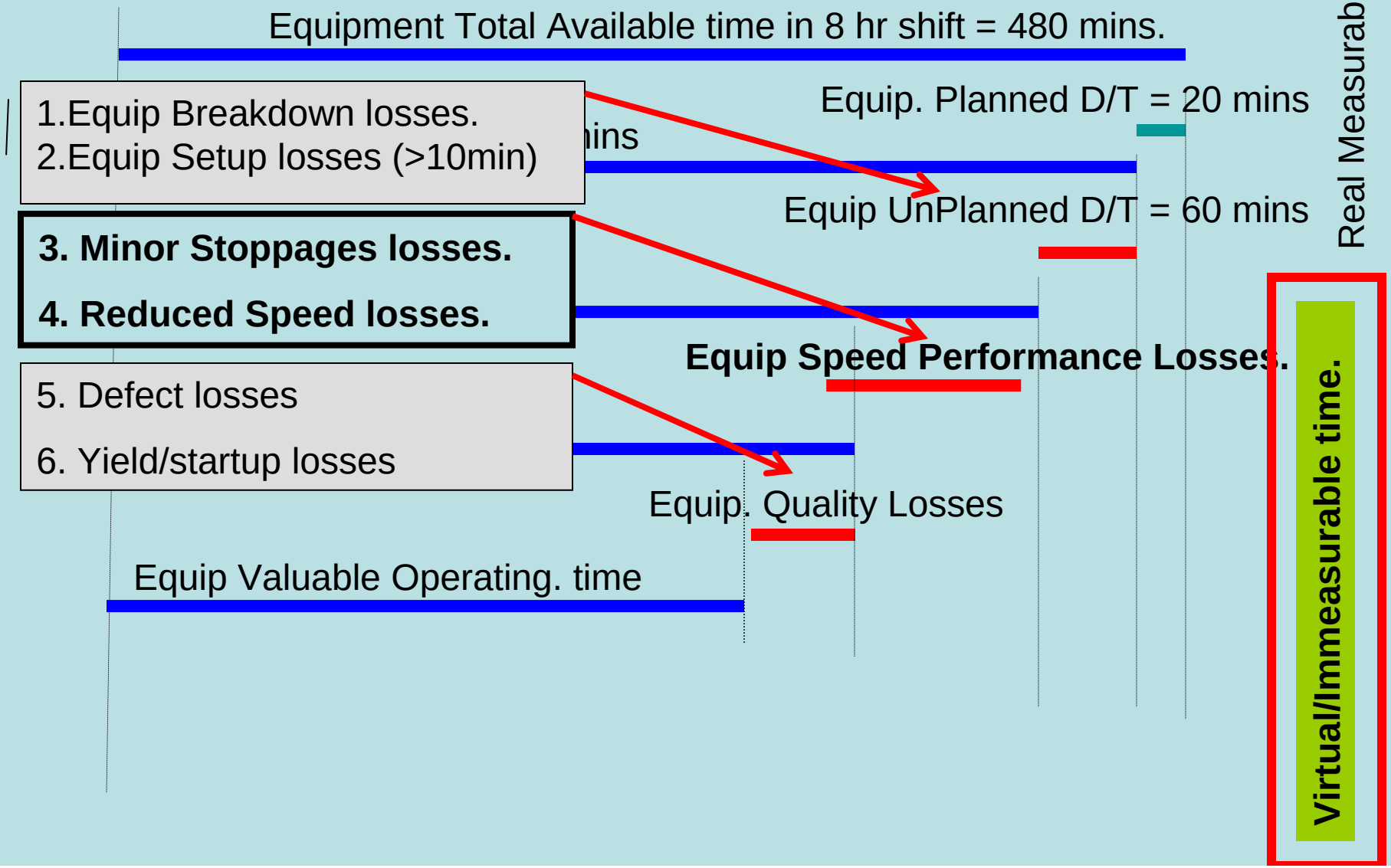
- Losses due to the …same reasons plus
- Planned downtime …mainly due to ‘no …schedule’ during …poor business …conditions or …holidays, PM shuts

Calculating

Performance Rate

in **OEE .**

Equipment OEE Losses



USEFULNESS OF OEE

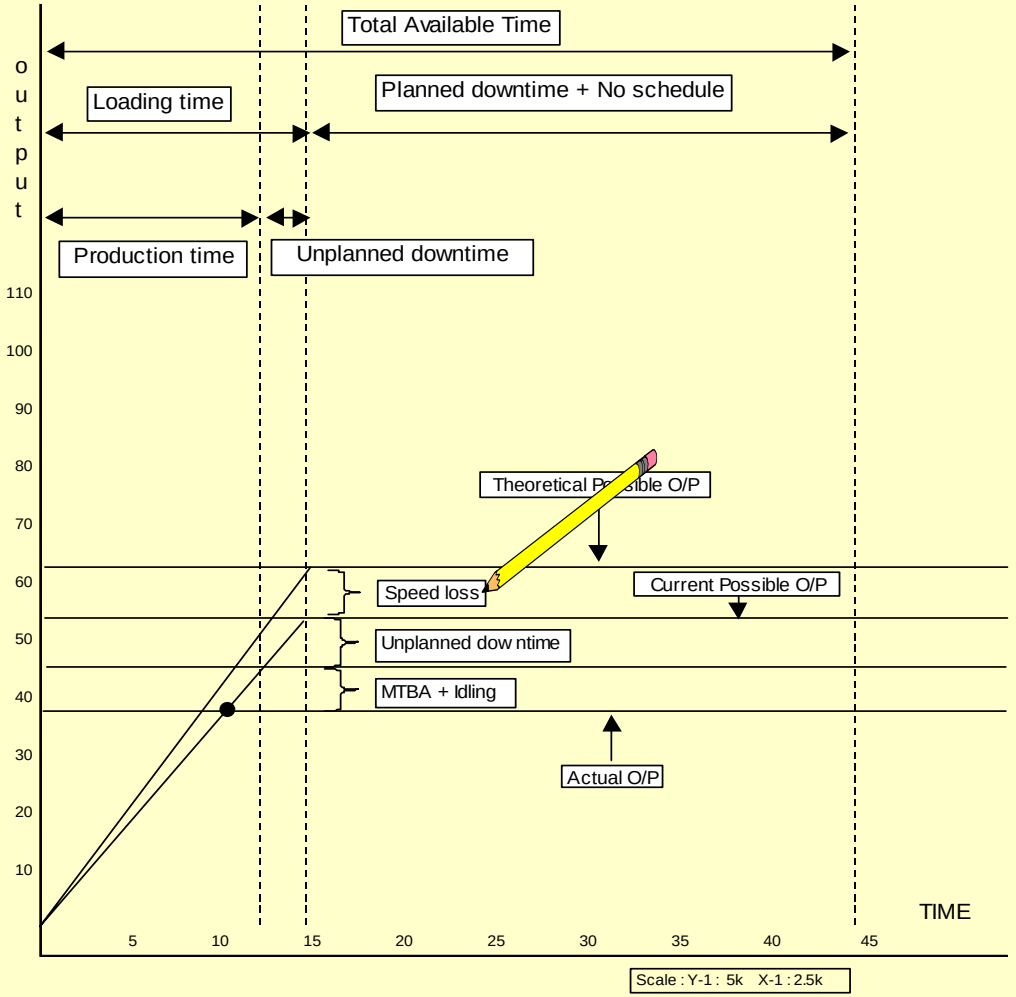
- Provides a long-term baseline of equipment condition for improvement measurement.
- When an OEE analysis chart is plotted, the exact reasons in terms of the 6 Big Losses are clearly understood.
- Suitable tools can be used to address specific selected Losses.

IDENTIFY THE MAJOR LOSSES THROUGH THE OEE ANALYSIS

Before

OEE-Analysis Format

1-Month Summarized Data in Minutes		
1. Total available time	=	44640 min
2. No schedule time	=	26870 min
3. Planned downtime	=	3655 min
3a. PM time	=	0 min
3b. Meeting time	=	0 min
3c. Housekeeping / TPM	=	3655 min
4. Loading time = 1 - 2 - 3	=	14115 min
	=	846900 sec
5. Unplanned downtime	=	2941 min
5a. Machine breakdown	=	2168 min
5b. Engineering time	=	0 min
5c. QC / QA time	=	193 min
5d. P.Parts shortage	=	580 min
5e. No material (Lot waiting)	=	0 min
5f. Facility stoppages	=	0 min
5g. Break time / No operator	=	0 min
5h. Rework / Retest	=	0 min
5i. Conv. / Setup	=	0 min
6. Production time = 4 - 5	=	11174 min
7. Total quantity processed (Actual O/P)	=	33877 frame
8. TCT (theoretical cycle time)	=	109.86 sec
8a. Theoretical possible O/P = 4/8	=	61671 frame
9. MCT (machine cycle time)	=	128.32 sec
9a. Currently possible O/P = 4/9	=	52799 frame
Other remarks:		
10. Availability rate	=	79.16 %
Performance rate	=	69.39 %
Quality rate	=	99.80 %
11. OEE	=	54.82 %



Remarks: TSSOP 14 / 16 ld = 50 unit / frame.

IMPROVEMENT DONE CAN BE OBSERVED THROUGH THE OEE ANALYSIS

After

OEE-Analysis Format

1-Month Summarized Data in Minutes			
1. Total available time	=	44640	min
2. No schedule time	=	26870	min
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3b. Meeting time	=	0	min
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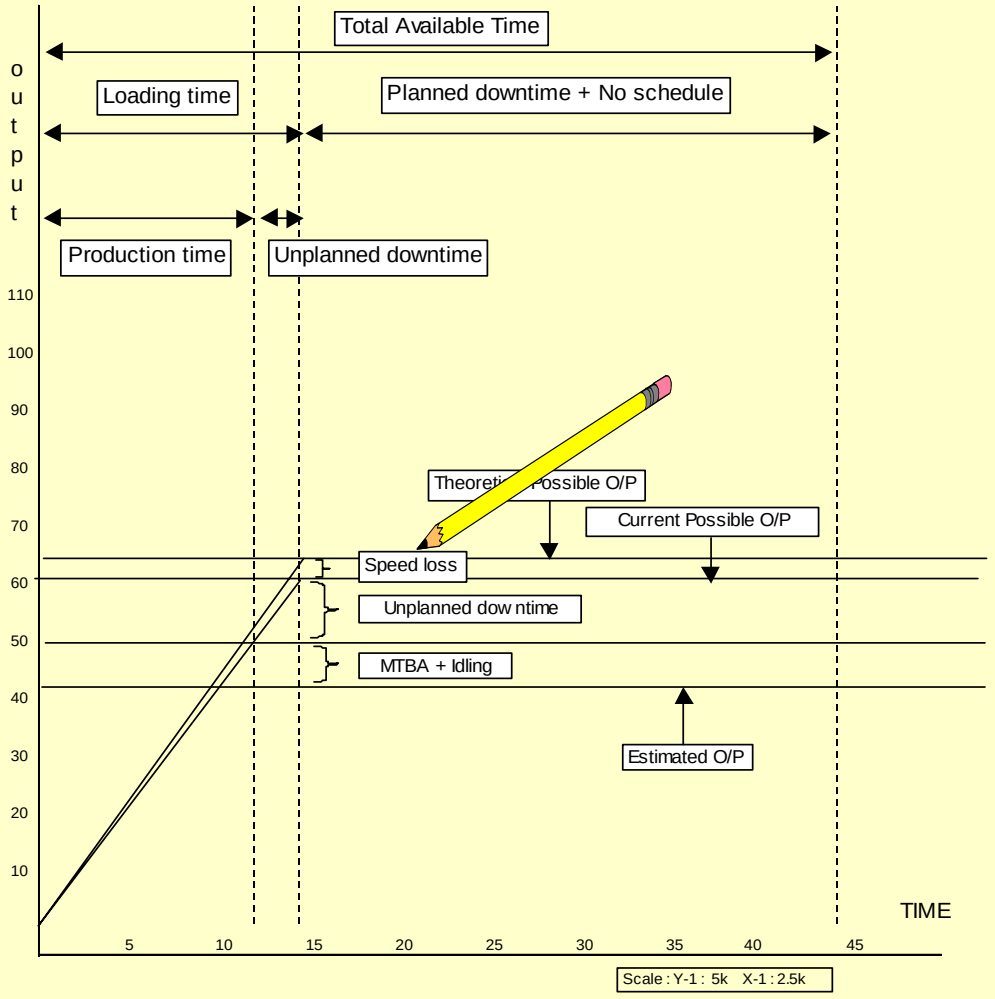
5f. Facility stoppages	=	0	min
5g. Break time / No operator	=	0	min
5h. Rework / Retest	=	0	min
5i. Conv. / Setup	=	0	min
6. Production time = 4 - 5	=	11174	min
7. Total quantity processed (Actual O/P)	=	(estimated)	frame
8. TCT (theoretical cycle time)	=	106.79	sec
8a. Theoretical possible O/P = 4/8	=	63444	frame
9. MCT (machine cycle time)	=	112.64	sec
9a. Currently possible O/P = 4/9	=	60149	frame
Other remarks:			
10. Availability rate	=	79.16	%
Performance rate	=	81.63	% (etd)
Quality rate	=	99.80	%
11. OEE	=	64.48	% (estimated)



Remarks: TSSOP 14 / 16 ld = 50 unit / frame.

Various Examples Of Improving OEE.

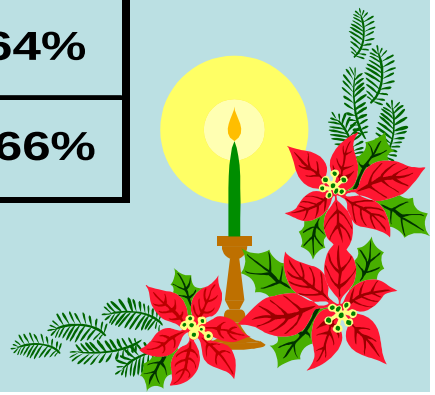
Speed Improvement

Achievement !!

No	Description	Improvement		Delta (%)
		Before	After	
1	TCT	109.86	106.79	**2.79%**
2	MCT	128.32	112.64	**12.22%**
3	UPH	2579	2905	**12.64%**
4	OEE	54.82%	64.48%	* **9.66%**

Note: Item 1, 2 & 3 are calculated by IE department

* item 4 is base on no loss from lot-waiting



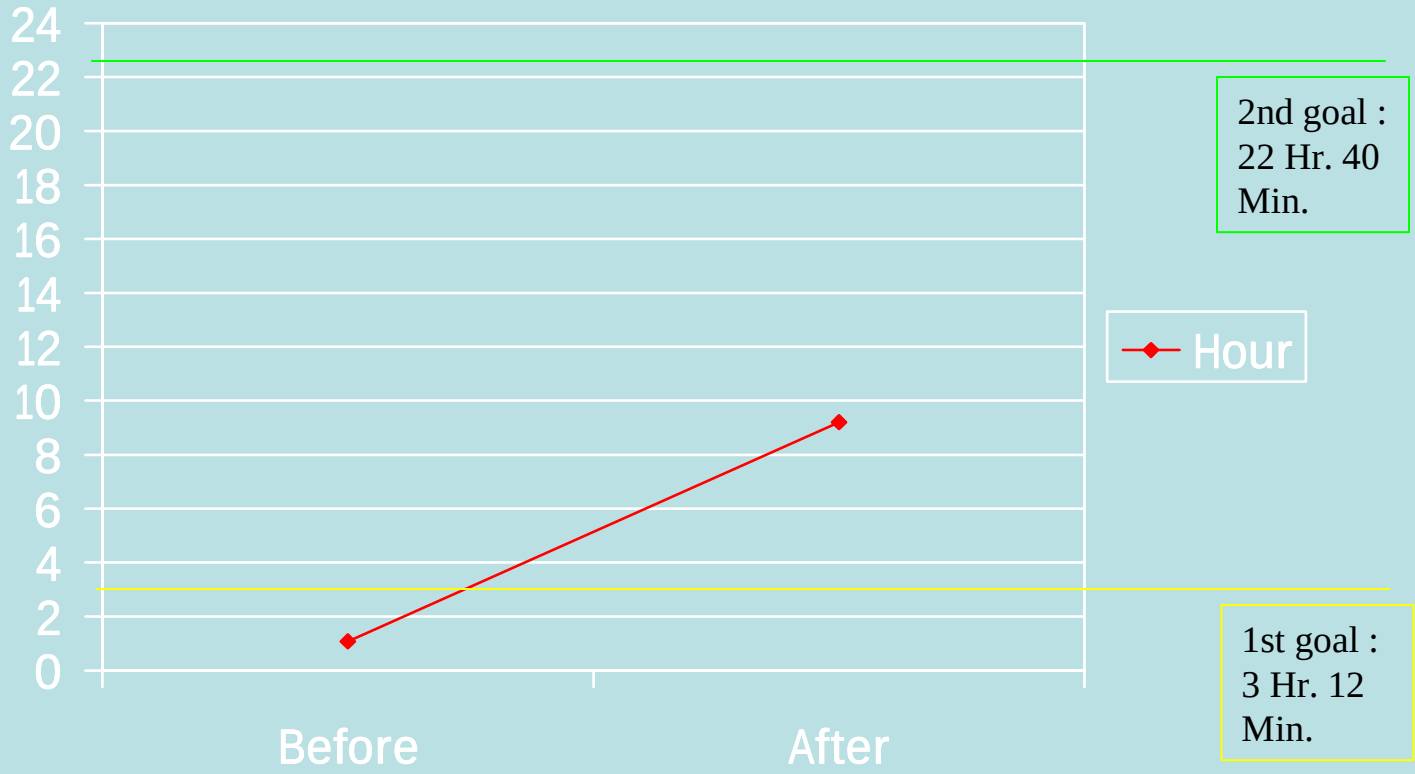
Example Of Improving Performance Rate through Improving the Equipment MTBA Losses.

Summary of “Static” Restoration Activities (1st Part]

- Six standards “static” conditions were checked and identified areas need to be restored.

- Indexer clamp’s parallelism was out.
- The index clamper and back rail gap were out of the required spec.
- Output index clamper position not parallel when a lead-frame is clamped.
- One hot plate screw was missing.

‘Before’ and ‘After’ Restoration MTBA



* MTBA based only on Alignment Error stoppages.

Equipment
Quality Rate
Losses.

P-M Analysis Chart

No 1/1

Checked by	Prepared by	Phenomenon				Physical view (Logical reasoning)							
		1				2							
Contributing Condition	Investigation Result			4 M Correlation,	Investigation Result			4M Correlation, Second Item (3rd, 4th, 5th and 6th Items)	Investigation/ Measuring Method	Investigation Result			If NG, why NG?	Countermeasure	Result	
Investigation Measuring Method	Temporary Decision Criterion	Measurement Value	Decision	Investigation/ Measuring Method	Temporary Decision Criterion	Measurement Value	Decision			Temporary Decision Criterion	Measure - ment Value	Decision		Restoration, Replace - ment, Improvement, Remodeling	Measurement Value	Decision
3				4				5						6		8

7

The 8-Steps in the P-M Analysis Format

Standardization and link to TPM Maintenance System