

UNDERSTANDING

Total Productive Maintenance

JIPM APPROACH



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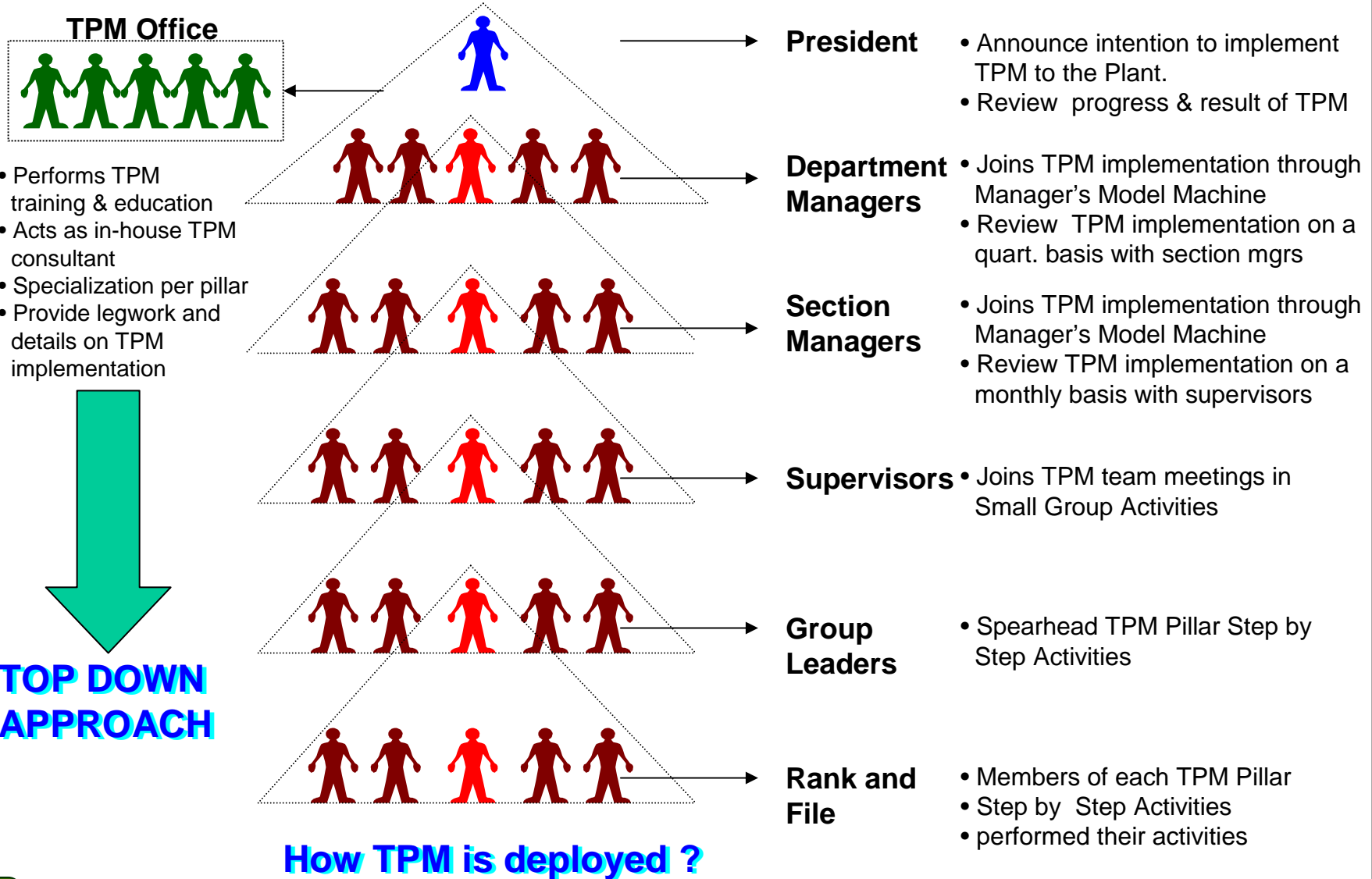
TPM Defined :

Implementing TPM by Robinson and Ginder

- **TPM is a plant improvement methodology which enables continuous & rapid improvement of the manufacturing process through the use of employee involvement, employee empowerment and closed-loop measurement of results**
- **It is a production driven improvement methodology that is designed to optimize equipment reliability and ensure efficient management of Plant assets**



TPM Overlapping Organizational Structure:



TPM Composed of 8 Pillars



Goals of Each TPM Pillar

Planned Maintenance

- Attain Predictive Mtce Stage
- Increase MTBF Reduce BDO to Zero
- Improve reliability & lower costs



Quality Maintenance

- Elimination of defects
- Elimination of chronic problems

Autonomous Maintenance

- Establish Basic Equipment Condition
- Perform basic repairs and set-up
- Reduce Idling and Minor Stoppages
- Empowered Operators



Admin/Office TPM

- Reduce of Product inventory and Work-In-Process
- Speed of Information transmission

Focused Improvement

- Attain 85% OEE on critical machines
- Elimination of 6 Equipment Losses
- Improve indices on PQCDSM



Initial Flow Control Activities (IFCA)

- Well develop system of MP Design
- Improvement in Vertical Start-up time of equipment being purchase

Environmental, Health and Safety (EHS)




- Zero accidents and plant disasters
- Compliance to environmental stds.

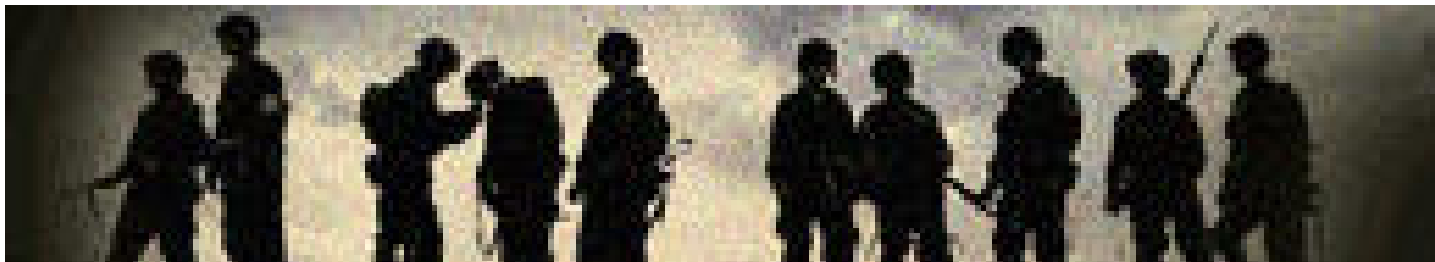
Zero Breakdowns
Zero Adjustments
Zero Rejects/Defects
Zero Accidents
Zero Short Stops

Training and Education

- Effective training skills assessment
- Systematic training programs
- Training's are used religiously

TPM pillars aim to eliminate 16 Big Losses

8 Equipment Losses	5 Manpower Losses	3 Other Losses
<ul style="list-style-type: none"> • Breakdown Loss • Set-Up and Adjustment Loss • Cutting Blade Loss • Start-Up Loss • Idling and Minor Stoppage Loss • Speed Loss • Defect and Rework Loss • Shutdown Loss 	<ul style="list-style-type: none"> • Management Loss • Operating motion Loss • Line Organization Loss • Logistic Loss • Measurement and Adjustment Loss 	<ul style="list-style-type: none"> • Energy Loss • Yield Loss • Die Tool and Jig Loss
		



Operation : Destruct and Destroy Equipment's 16 Big Losses

Cross-functional Focused-Improvement Team - Kobetsu-Kaizen

TPM Involves Total Employee Participation

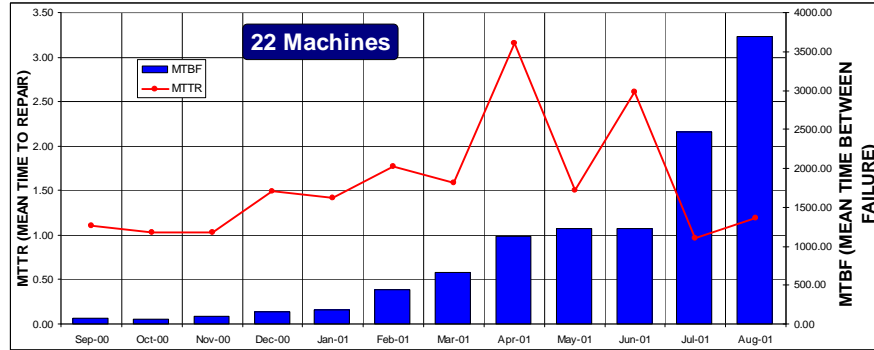


Company's Departments →	Operations Department	Maintenance Department	Environment, Health, Safety	HRD-Training Department	Finance Department	Facilities Department	Accounting Department	Purchasing Department	Quality Control	Warehouse Department	Research & Development	Offices, Legal, MISD
TPM Pillars ↓												
1. Autonomous Maintenance	▲	▲										
2. Planned Maintenance	▲	▲	▲			▲						
3. Focused-Improvement	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
4. Quality Maintenance		▲							▲			
5. Initial Flow Control Activities	▲	▲						▲		▲	▲	
6. Admin/Office TPM	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
7. Environmental, Health and Safety	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
8. Training and Skill Development	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

Sample TPM Effects : Planned Maintenance at Amkor

MTBF / MTTR GRAPH FOR 1st PILOT MACHINE

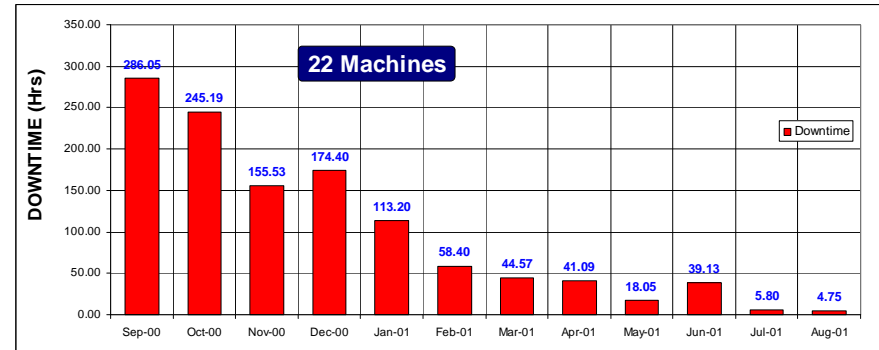
Sa Planned Maintenance, Isang Misyon, Isang Direksyon pa rin



	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	TOTAL
MTBF	70.25	61.35	96.88	156.46	183.39	446.23	658.41	1134.07	1230.50	1229.39	2463.03	3694.81	11424.75
MTTR	1.10	1.03	1.03	1.49	1.42	1.77	1.59	3.16	1.50	2.61	0.97	1.19	18.86

DOWNTIME TREND FOR 1st PILOT MACHINE

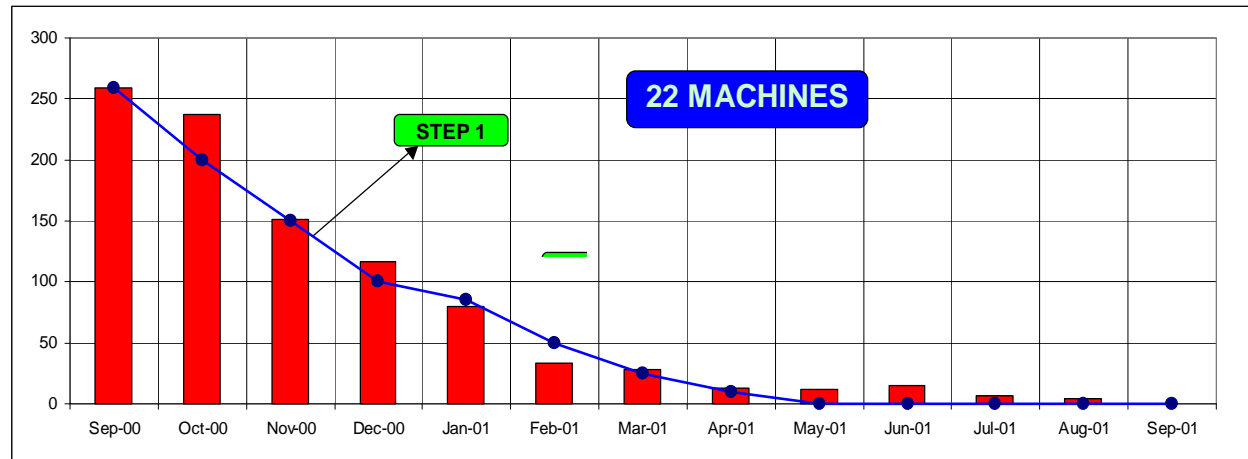
Sa Planned Maintenance, Isang Misyon, Isang Direksyon pa rin



	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	TOTAL
Downtime	286.05	245.19	155.53	174.40	113.20	58.40	44.57	41.09	18.05	39.13	5.80	4.75	1186.16



1st PILOT BDO TRENDING FOR PM PILOT MACHINES

Sa Planned Maintenance, Isang Misyon, Isang Direksyon pa rin



		Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
BDO	PLAN	259	200	150	100	85	50	25	10	0	0	0	0	0
	ACTUAL	259	237	151	117	80	33	28	13	12	15	6	4	0

TPM 12 Developmental Step by Step Approach

Stage	Step
<p>Preparatory</p> 	<ol style="list-style-type: none"> 1. Declaration of Top Management to introduce TPM 2. Conduct TPM Educational Campaign 3. Create a TPM promotional organization 4. Establish TPM Basic Policy and Goals 5. Create a Master Plan of Implementing TPM
<p>Introduction</p>	<ol style="list-style-type: none"> 6. Kick-off TPM
<p>Implementation</p> 	<ol style="list-style-type: none"> 7. Establish system to improve Production Efficiency <ol style="list-style-type: none"> 7.1 Implement Kobetsu-Kaizen Pillar 7.2 Implement Autonomous Maintenance Pillar 7.3 Implement Planned Maintenance Pillar 7.4 Training & education for operation and mtce 8. Build an Initial Flow Control Activities 9. Build a Quality Maintenance System 10. Implement Admin./Office TPM for support system 11. Establish a system for effective EHS
<p>Stabilization</p>	<ol style="list-style-type: none"> 12. Total TPM implementation and raise level

ROLES OF THE TPM OFFICE:

- 1 person - TPM Manager**
- 1 person - Planned Maintenance and Initial Flow Control**
- 1 person - Autonomous Maintenance**
- 1 person - Office TPM**
- 1 person - Focused Improvement**



- **Develops details of each step/phase implementation for specific pillar**
- **Conducts initial education and training for specific pillar steps/phase**
- **Coordinate all TPM pillar activities in all areas**
- **Oversees TPM implementation on his specific pillar expertise and implement activities to fastract it's implementation**
- **Acts as a consultant on his/her pillar expertise**
- **Performs initial TPM audit which later on be transferred to managers**
- **Consolidate all accomplishments and improvements of the teams in their respective pillar assigned**
- **Find ways to promote his pillar and provides recognition packages to teams on higher steps/phases**

KEY POINTS IN TPM IMPLEMENTATION

- Company and TPM goals must be always aligned & in the same direction
- Allot a permanent Advocate for each pillar and one of the responsibilities will be to review the progress of his TPM pillar
- Management must identify the need for TPM as a long term policy and as one of the focal strategy in their business plans
- Performing TPM in a company without a TPM Office will be short lived.
- Allow TPM teams to present to Top Management regarding the progress & results of their TPM activities. This is one way of sustaining enthusiasm
- Get management to commit to TPM activities, convince them to be involve and own TPM. ***If all of these is done, then there is no reason for TPM activities to fail and success is guaranteed***



WHAT TPM WILL ACHIEVE ?

- **MRC Bearings** reduced unplanned downtime by 98% in one cell and 99% in another -all within one year.
- **Monsanto** runs their three-year old TPM start-up plant at 97% on-stream time while most other units run between 85% and 90.
- **3M** reduced their maintenance cost by 60% within three years.
- **DuPont** reduced off-quality by 69% and improved capacity by 29% in three years.
- **Texas Instruments** reduced their off-quality by 50% in their Philippines plant.
- **Harley-Davidson** estimates that the ROI from TPM has been ten-fold their cost of implementation.
- **Whirlpool** improved OEE by 21%.



MEASUREMENT OF TIME



AVAILABLE TIME

UPTIME

DOWNTIME

OPERATING TIME

UTILIZATION TIME

RUNNING TIME

PRODUCTIVE TIME

ENGINEERING RUNS

MACHINE RELATED UNPLANNED DOWNTIME

NON-MACHINE RELATED PLANNED DOWNTIME

BREAKDOWN

SET-UP

CUTTING TOOL

START-UP

MINOR STOPS

SPEED LOSS

REJECT LOSS

PM SCHEDULE

CALIBRATION

MEETINGS

LUNCHBREAK

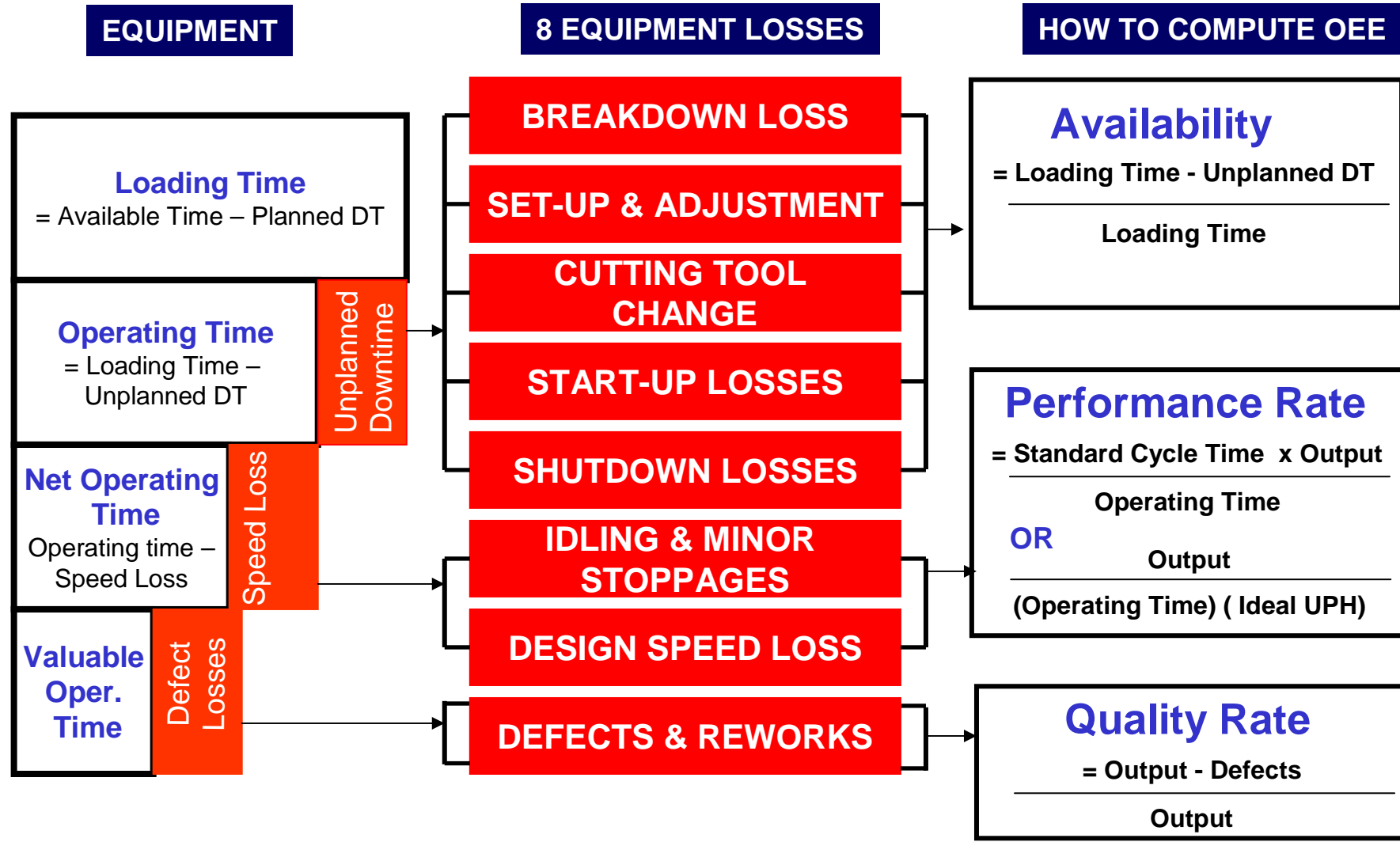
ENGINEERING

NO OPERATOR

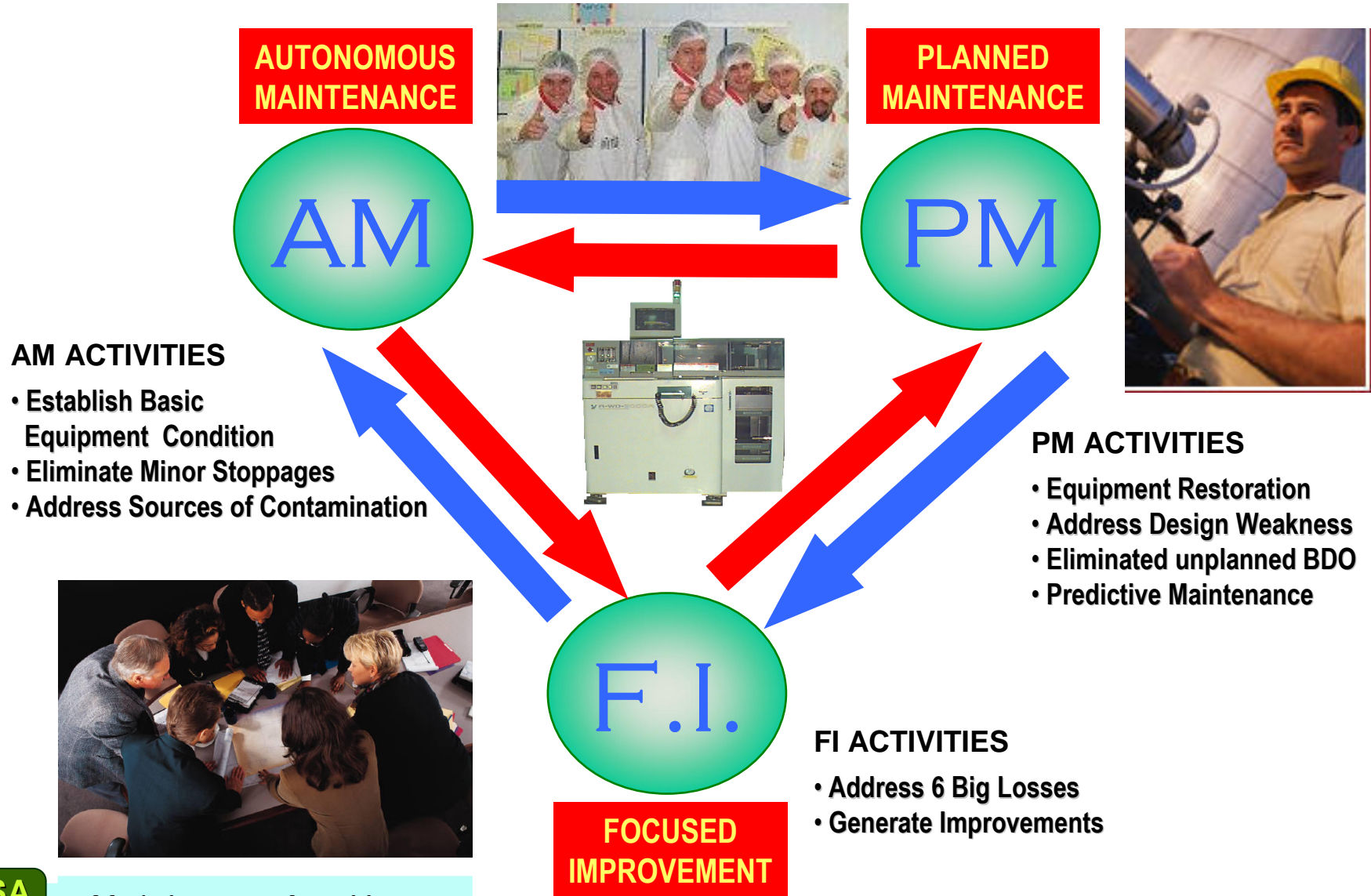
NO INVENTORY

Before we can start to use the Indices we need to clarify ourselves the distinction between Uptime and Downtime

RELATIONSHIP BETWEEN OEE and EQUIPMENT LOSSES



TPM GOAL IS TO ACHIEVE 85 % OEE



QUOTE FOR THE DAY :

- The biggest barrier in implementing TPM is cultural in nature
- Success in TPM comes from the synergy of all people working together towards a common goal
- While it is true that TPM is more on the hardware or equipment side many failed because focus is given on the equipment, remember that TPM is 80% people and 20% equipment, focus on the people and the people will focus on the equipment and its not the other way around

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