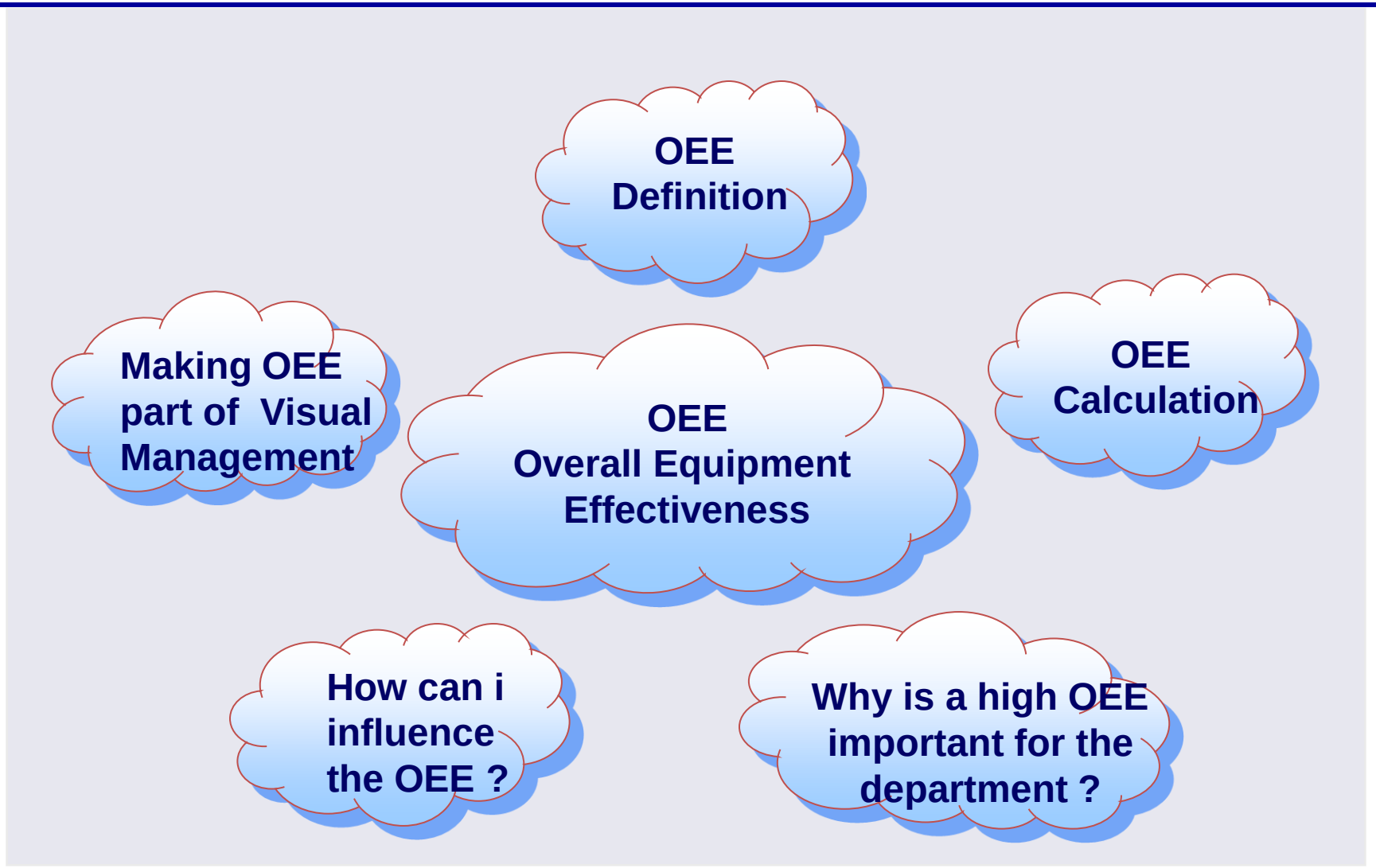
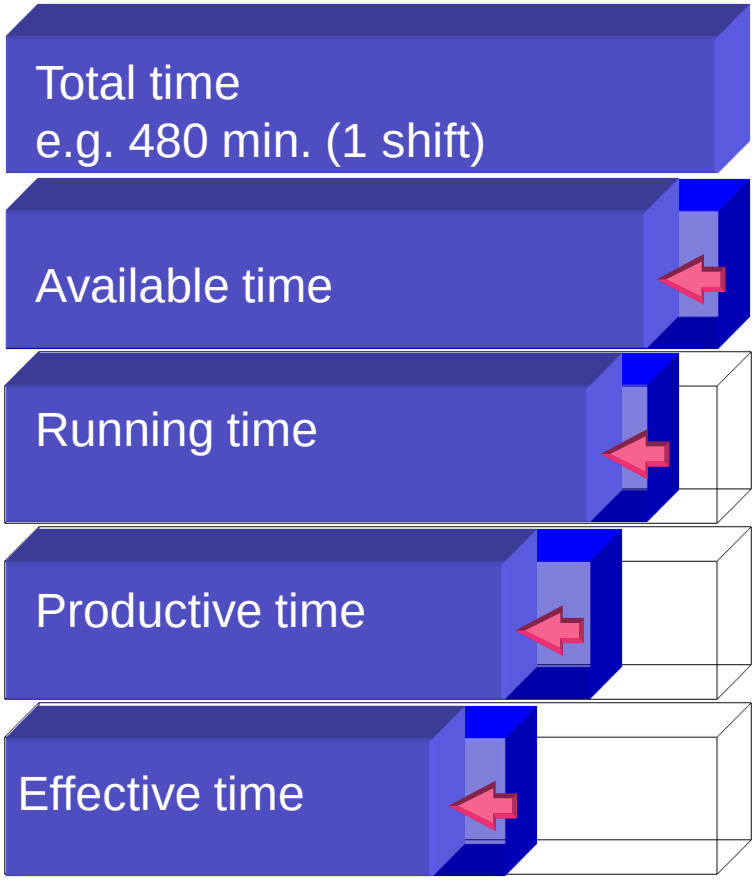
Overall Equipment Effectiveness (OEE)

Sistem Perawatan


OEE
Definition
Making OEE
part of Visual
Management
OEE
Overall Equipment
Effectiveness
OEE
Calculation
How can i
influence
the OEE ?
Why is a high OEE
important for the
department ?

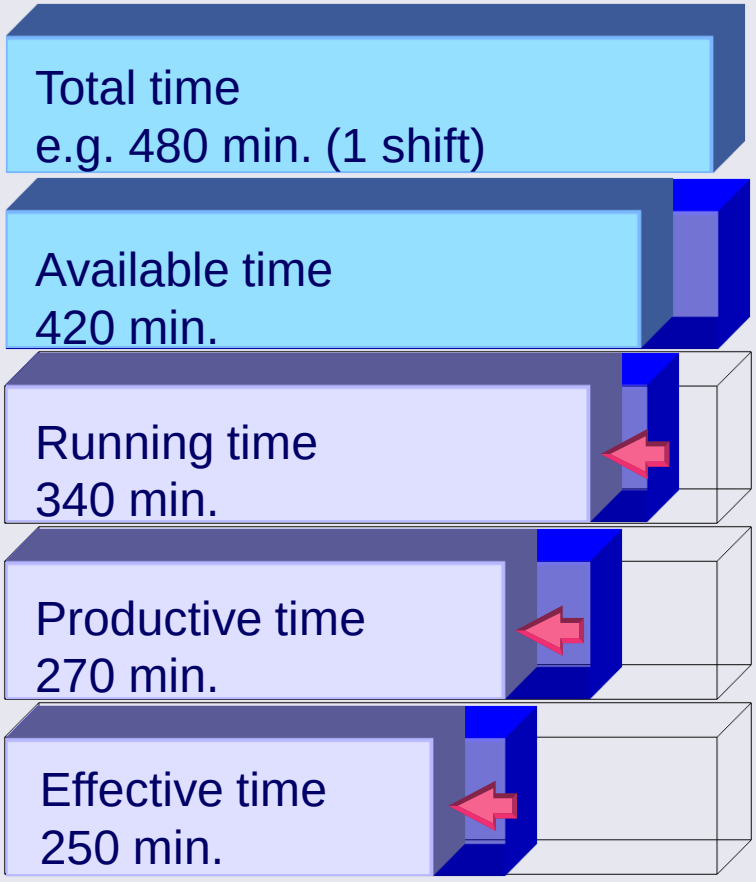
OEE is the way to measure how effectively machine / equipment hours are used (Value Adding)



OEE is loss due to:

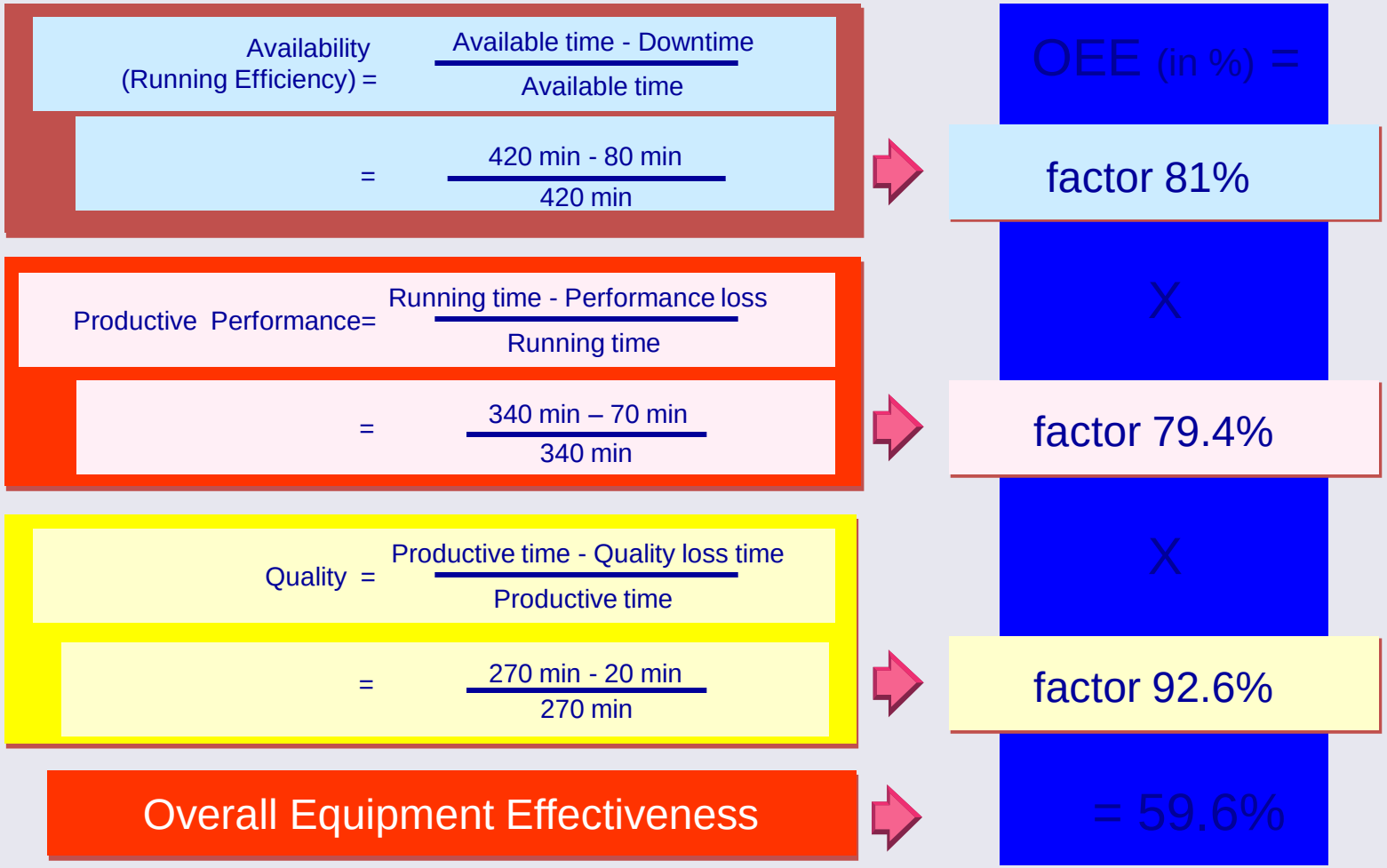
Depending on definition TPM® knows 6-16 different losses

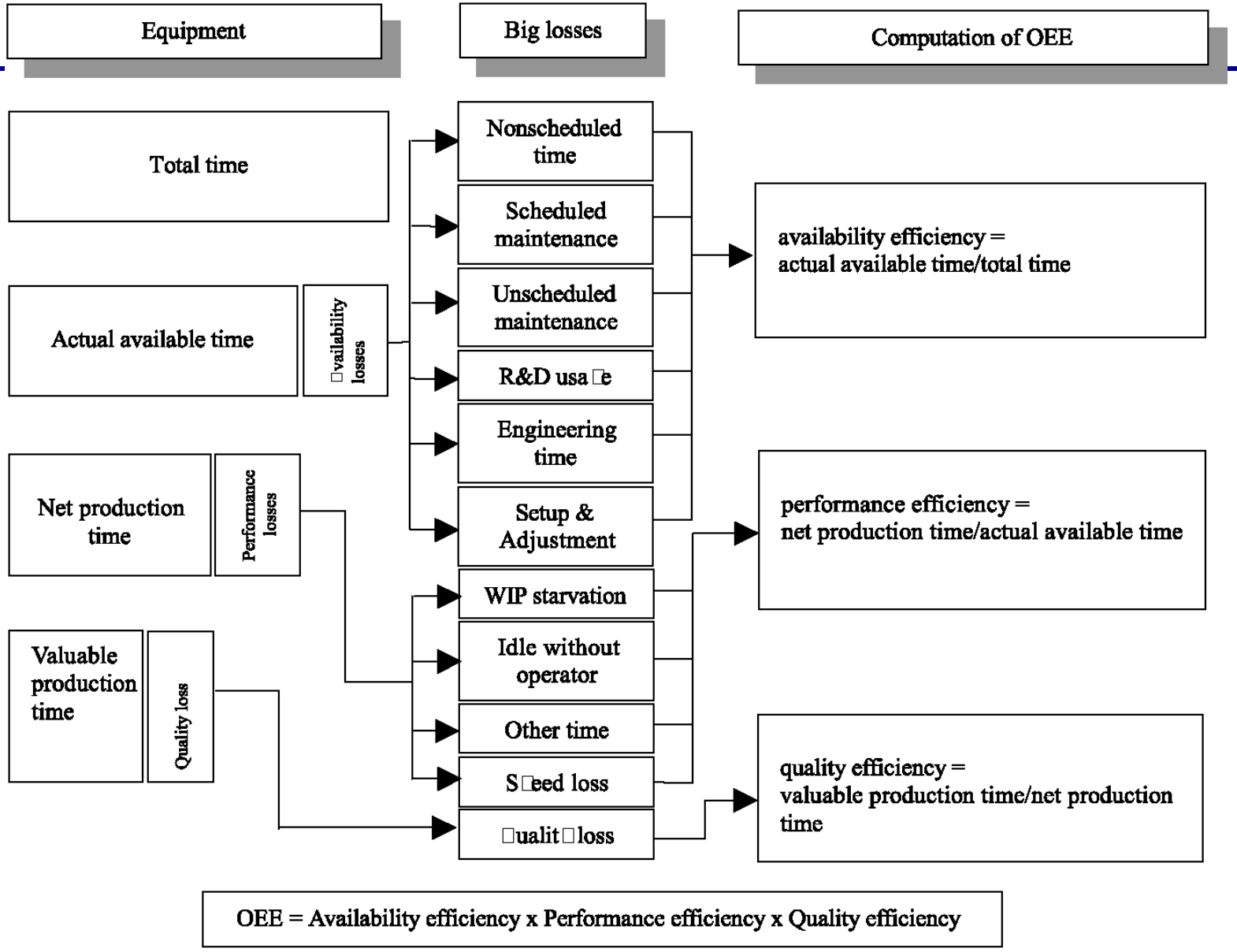
Planned Downtime	- breaks, planned maintenance, training
Downtime	- breakdowns, repairs - changeover - adjustment - start up
Performance Losses	- machine speed - short stoppages - lower yield
Quality Losses	- scrap - reject - rework

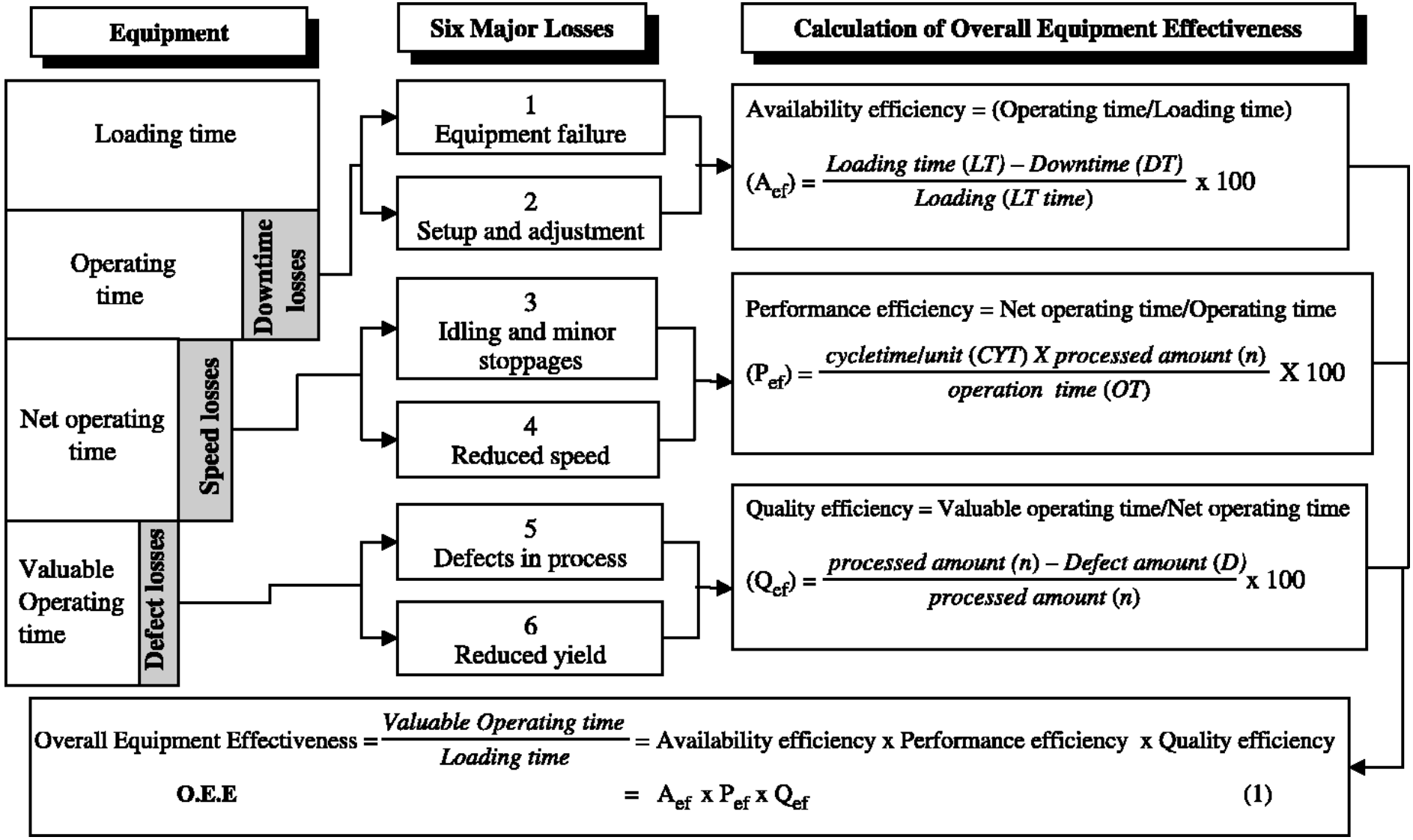


Planned Downtime	- breaks, planned maintenance, training
Downtime	- breakdowns, repairs - changeover - adjustment - start up
Performance Losses	- long cycle time - minor stoppages - reduced yield
Quality Losses	- scrap - rework - rejects

Total losses = 170 min / shift


Availability
(Running Efficiency) =
Available time - Downtime
Available time
=
420 min - 80 min
420 min
Productive Performance=
Running time - Performance loss
Running time
=
340 min – 70 min
340 min
Quality =
Productive time - Quality loss time
Productive time
=
270 min - 20 min
270 min
Overall Equipment Effectiveness
OEE (in %) =
factor 81%
X
factor 79.4%
X
factor 92.6%
= 59.6%


Equipment
Big losses
Computation of OEE
Total time
Actual available time
Availability losses
Net production time
Performance losses
Valuable production time
Quality loss
Nonscheduled time
Scheduled maintenance
Unscheduled maintenance
R&D usage
Engineering time
Setup & Adjustment
WIP starvation
Idle without operator
Other time
Speed loss
Quality loss
availability efficiency = actual available time/total time
performance efficiency = net production time/actual available time
quality efficiency = valuable production time/net production time
OEE = Availability efficiency x Performance efficiency x Quality efficiency

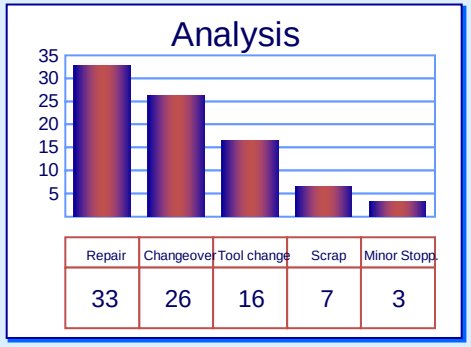

Equipment
Six Major Losses
Calculation of Overall Equipment Effectiveness
Loading time
Operating time
Downtime losses
Net operating time
Speed losses
Valuable Operating time
Defect losses
1 Equipment failure
2 Setup and adjustment
3 Idling and minor stoppages
4 Reduced speed
5 Defects in process
6 Reduced yield
Availability efficiency = (Operating time/Loading time)
$(A_{ef}) = \frac{Loading\ time\ (LT) - Downtime\ (DT)}{Loading\ (LT\ time)} \times 100$
Performance efficiency = Net operating time/Operating time
$(P_{ef}) = \frac{cycletime/unit\ (CYT)\ X\ processed\ amount\ (n)}{operation\ \ time\ (OT)} X\ 100$
Quality efficiency = Valuable operating time/Net operating time
$(Q_{ef}) = \frac{processed\ amount\ (n) - Defect\ amount\ (D)}{processed\ amount\ (n)} \times 100$
Overall Equipment Effectiveness $= \frac{Valuable\ Operating\ time}{Loading\ time}$ = Availability efficiency x Performance efficiency x Quality efficiency
O.E.E $= A_{ef} \times P_{ef} \times Q_{ef}$ (1)

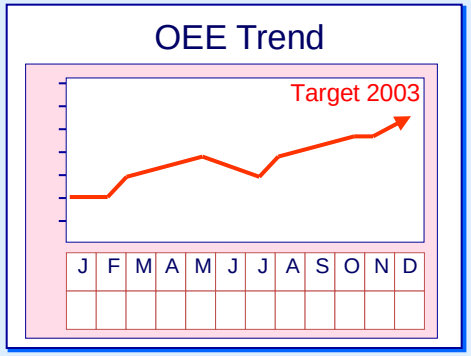
Data collection is the very important basis to increase OEE

Collect data for all downtime and losses on the machine

- Repairs
- Change over, Adjustm.
- Tool change
- Minor stoppages
- Scrap, rework

Data analysis and visible measure

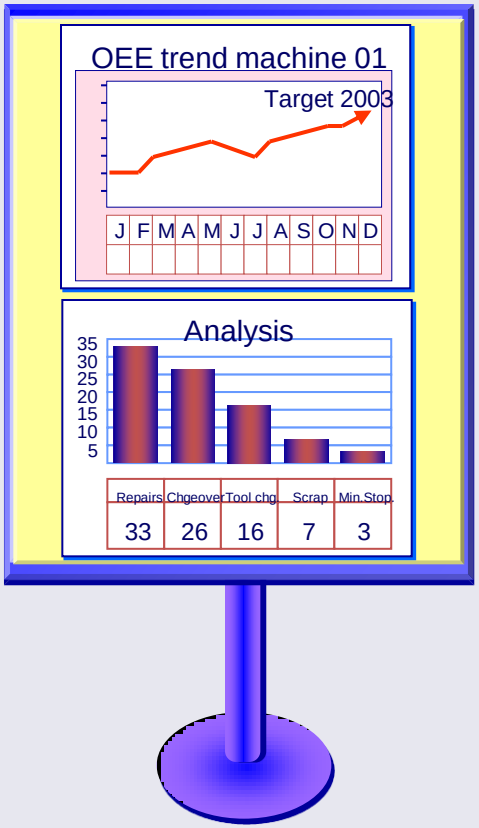




Make improvements visible and implement

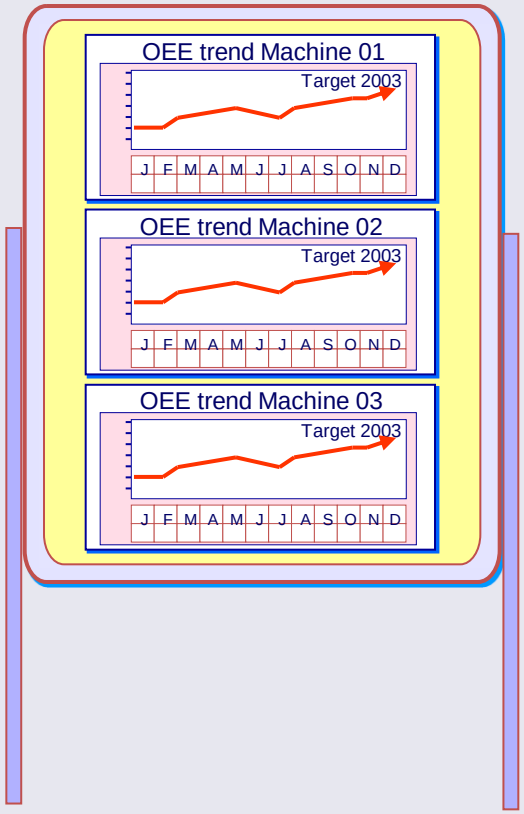
- Autonomous Mainten.
- Preventive Maintenance
- Changeover reduction
- Standardize tooling
- Improved machine reliability
- Standardisation
- Kaizen

Machine Information



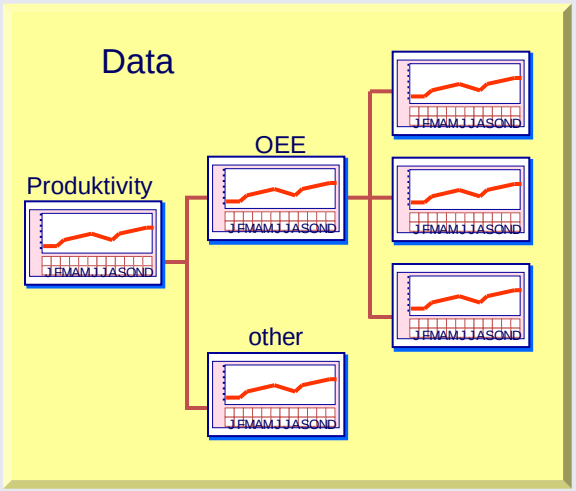
shows the current situation of the machine or plant

Departement Information

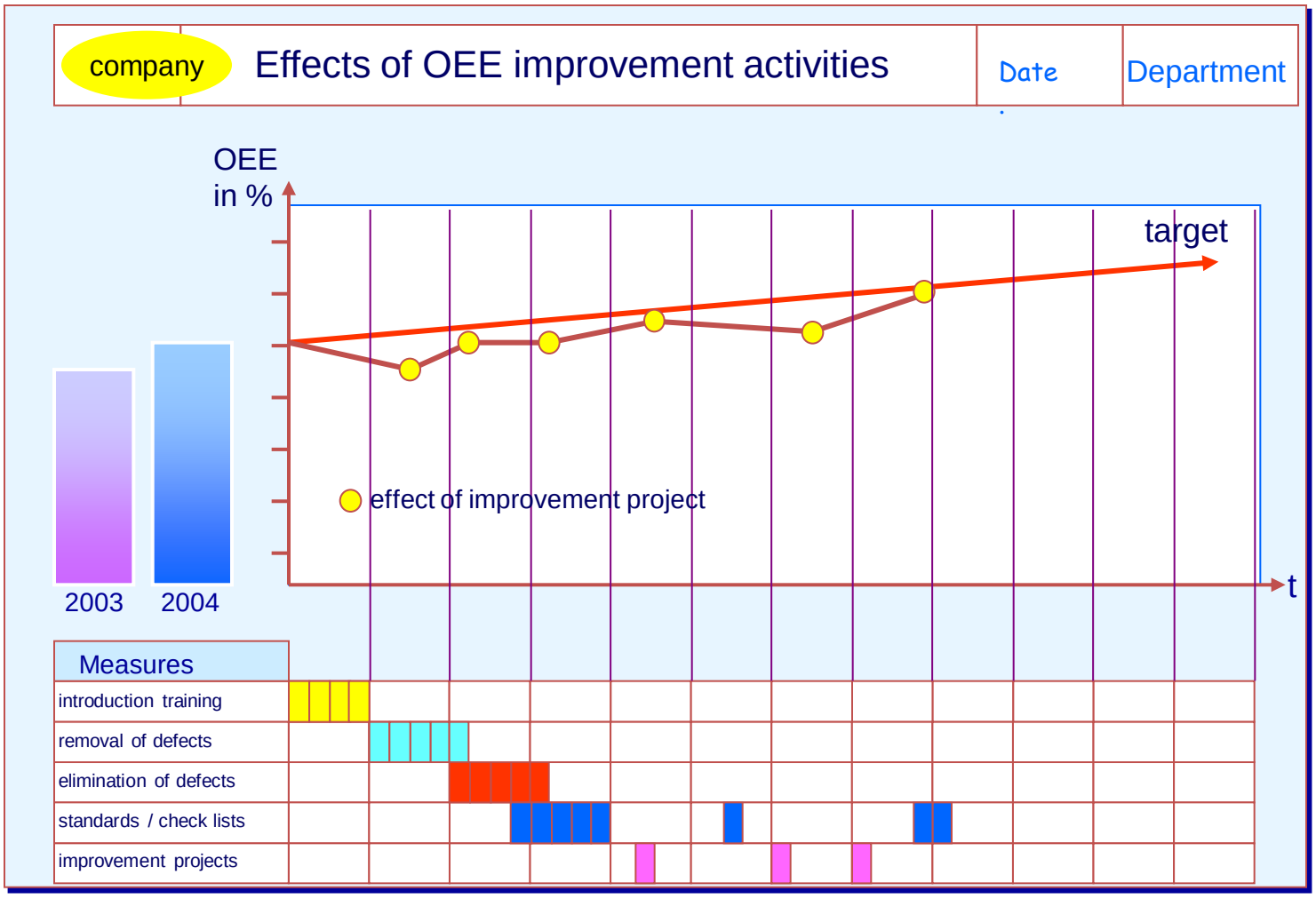


shows the machine in the area

Company Information



shows developement, trends and links beween targets and achievements


company
Effects of OEE improvement activities
Date
Department
OEE
in %
target
effect of improvement project
t
2003
2004
Measures
introduction training
removal of defects
elimination of defects
standards / check lists
improvement projects


16 Kinds of loss
8 availability losses
Machine failure
Set up & adjustments
Tool changes
Start-up losses
Minor stoppages
Speed Losses
Defects and Rework
Shutdown
5 productivity losses
Management losses
Motion
Line organization
Logistics
Adjustments
3 production/ cost losses – not part of OEE -
Loss of energy
Die, Jig and tool losses
Yield losses