

# Understanding OEE



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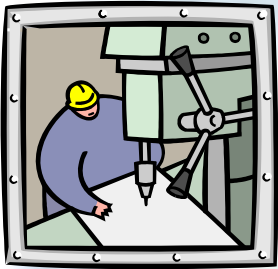
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# **Overall Equipment Effectiveness**

# OEE

## OVERALL EQUIPMENT EFFECTIVENESS



How effectively does your equipment run? When you plan to run it?

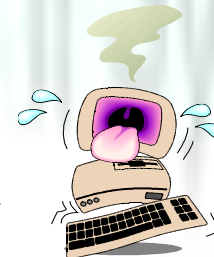
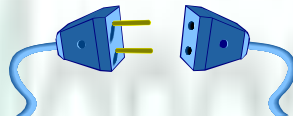
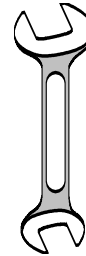
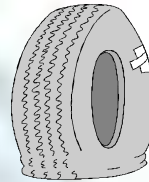
OEE =  
Availability X Performance Efficiency X Rate of Quality



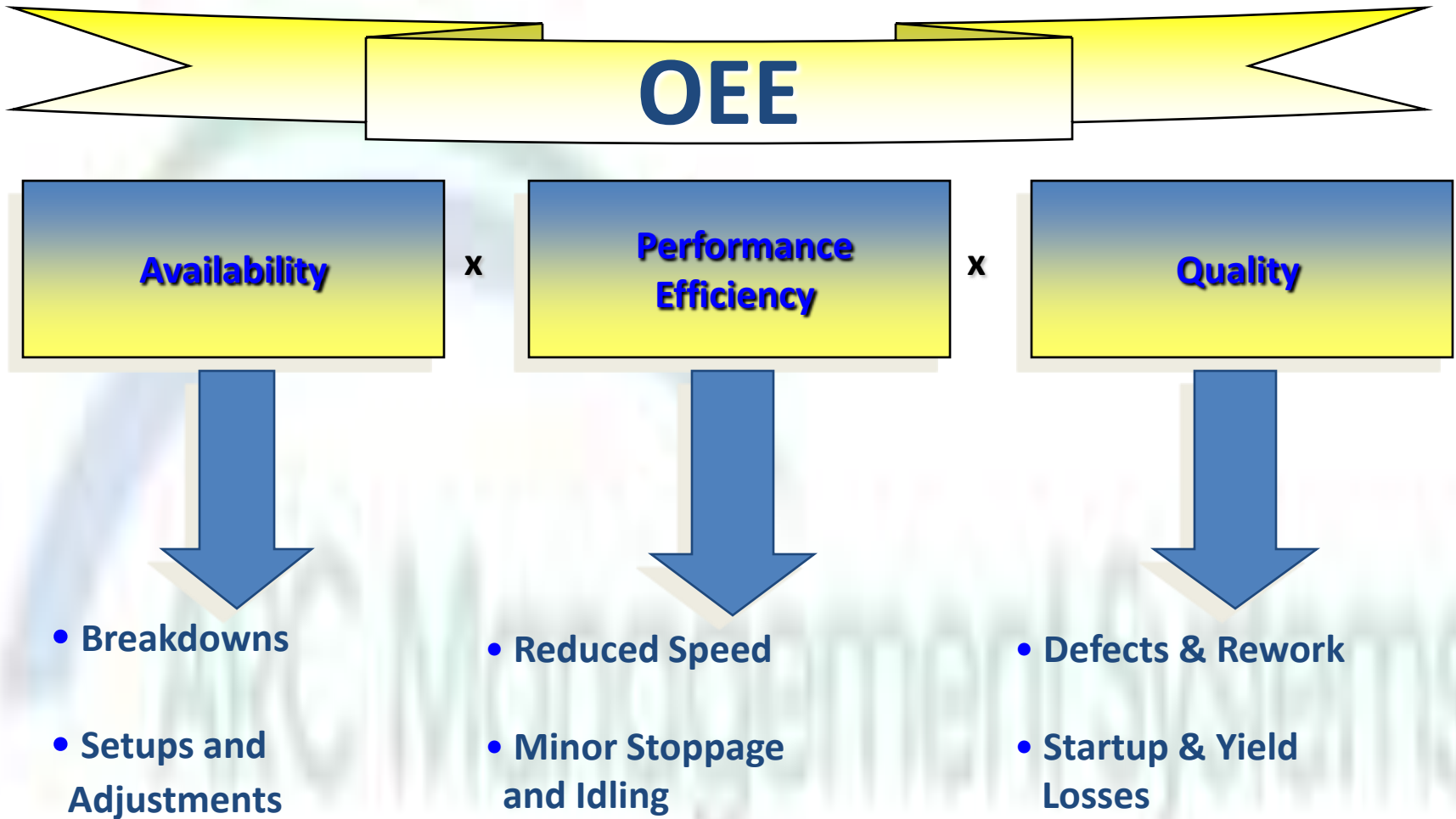
**SIX**

# MAJOR LOSSES

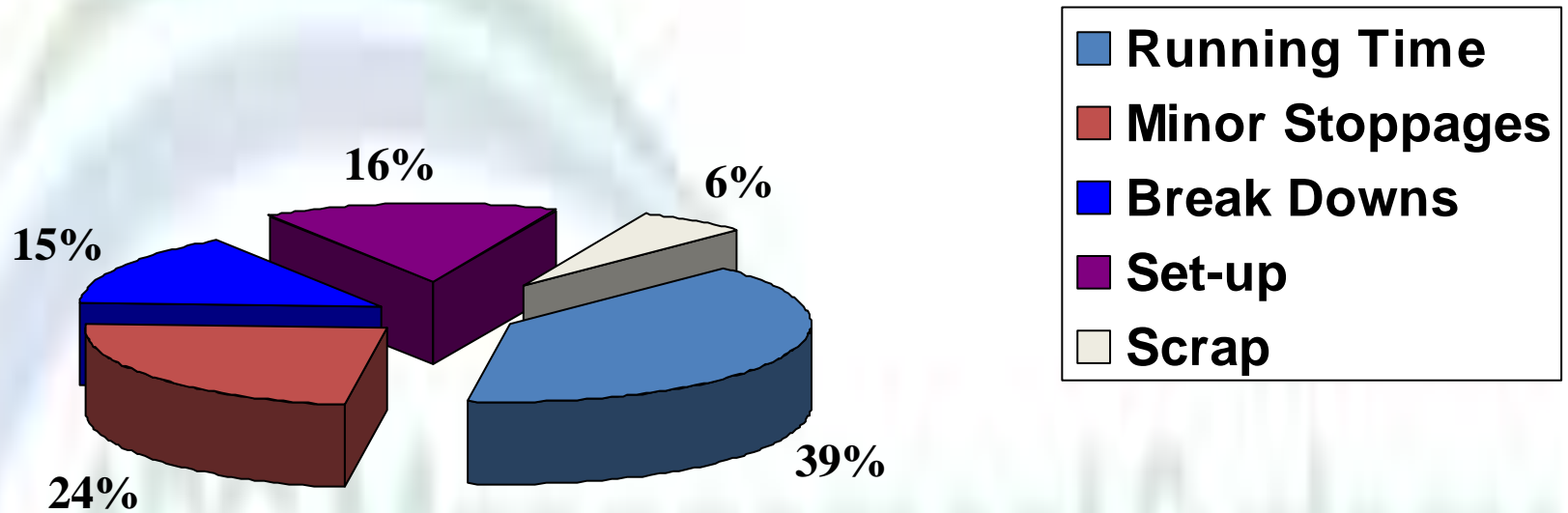
- ▶ Breakdowns
- ▶ Setup & Adjustment
- ▶ Idling & Minor Stoppages
- ▶ Startup
- ▶ Reduced Speed
- ▶ Quality Defects & Rework



# OEE : An Index of Efficiency



## Typical Overall Equipment Effectiveness



**Lost Capacity - 60%**



**OEE  
EXAMPLE**



# OEE OBSERVATION FORM



Equipment # \_\_\_\_\_ Description Vertical Turret Lathe Dept. \_\_\_\_\_ Observer \_\_\_\_\_

Start	End	Run	Idling & Minor Loss				Breakdowns			Setup	Speed	Reject	Comments
From	To		Chips	Jam	Insert	Other	Lube		Other	Adj.	Loss		
12:48	1:15	27											
1:15	1:30				15								
1:30	1:55	25											
1:55	2:05			10									
2:05	2:20	15											
2:20	2:30				10								
2:30	3:20	50											
3:20	3:30												Department Meeting
3:30	3:40												Department Meeting
3:40	3:55	15											
3:55	4:45						50						
4:45	5:30	45											
5:30	5:45		15										
5:45	5:57	12											
5:57	6:25											28	
6:25	6:50					25							

# OEE OBSERVATION FORM



Equipment # \_\_\_\_\_ Description Vertical Turret Lathe Dept. \_\_\_\_\_ Observer \_\_\_\_\_

Start	End	Run	Idling & Minor Loss				Breakdowns			Setup	Speed	Reject	Comments
From	To		Chips	Jam	Insert	Other	Lube		Other	Adj.	Loss		
6:50	7:20												Lunch
7:20	8:50						90						
8:50	9:00	10											
9:00	9:10												
9:10	9:30			20									
9:30	9:40	10											
9:40	10:55								75				
10:55	11:05	10											
11:05	11:35			30									
11:35	11:45	10											
11:45	12:00					15							
<b>Totals</b>		<b>369</b>	<b>225</b>				<b>140</b>			<b>150</b>		<b>56</b>	

# EQUIPMENT UTILIZATION

Equipment Availability = 1440 minutes (24 hours)

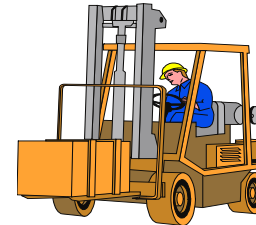
## Planned Downtime

No 3rd shift = 420 Min.

Lunch (2 shifts) = 60 Min.

Dept. Meetings = 20 Min.

Total = **500 Min.**



1440 Min. - 500 Min. = **940 Min. (Net Operating Time)**

$\frac{940}{1440} = 65.3\%$  **Equipment Utilization**



*This is where OEE Starts!*

## PLANNED AVAILABILITY

940 Min. (Net Operating Time)  
- 150 Min. (Set-Ups)

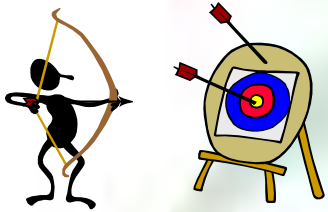
**790 Min.** (*Planned Uptime*)

790 Min. (Operating Time)  
- 140 Min. (Breakdowns/ Losses)

**650 Min.** (*Running Time*)

$$\frac{650}{940} = 69.14\% \text{ Availability}$$

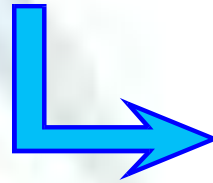




## Performance Efficiency

650 Min. (Running Time)  
- 225 Min. (Minor Stoppages)

425 Min.



Jams  
Chips  
Inserts  
Speed Losses

$$\frac{425}{650} = 65.4\% \text{ (Performance Efficiency)}$$

425 Min. is also called Usable Operating Time



## Rate of Quality

425 Min. (Usable Operating Time)

- 56 Min. (Time Used Manufacturing

**369 Min.** a Defective Part)



$$\frac{369}{425} = 86.8\% \text{ (Rate of Quality)}$$



# OEE

## Overall Equipment Effectiveness

$$69.1\% \times 65.4\% \times 86.8\% =$$

Availability X Performance X Rate of Quality =  
Efficiency

**39.2% OEE**

**Total Operating Time**

**A Net Operating Time**

Scheduled  
downtime

**B Running Time**

Downtime  
losses

**C Target Output**

**D Actual Output**

Speed  
losses

**E Actual Output**

**Visualizing OEE & Losses**

**F Good Output**

Defect  
losses

$$\text{OEE} = \underbrace{\text{B} / \text{A}}_{\text{Availability}} \times \underbrace{\text{D} / \text{C}}_{\text{Performance}} \times \underbrace{\text{F} / \text{E}}_{\text{Quality}} \times 100$$

# What Can You Accomplish with OEE

- /// **Identify Major Losses**
  - A Road map to find problems & Enhance Your Capacity
  
- /// **Determine Current Output**
  - Baseline Your Equipment

