TPM

Total Productive Maintenance

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Maintenance Management

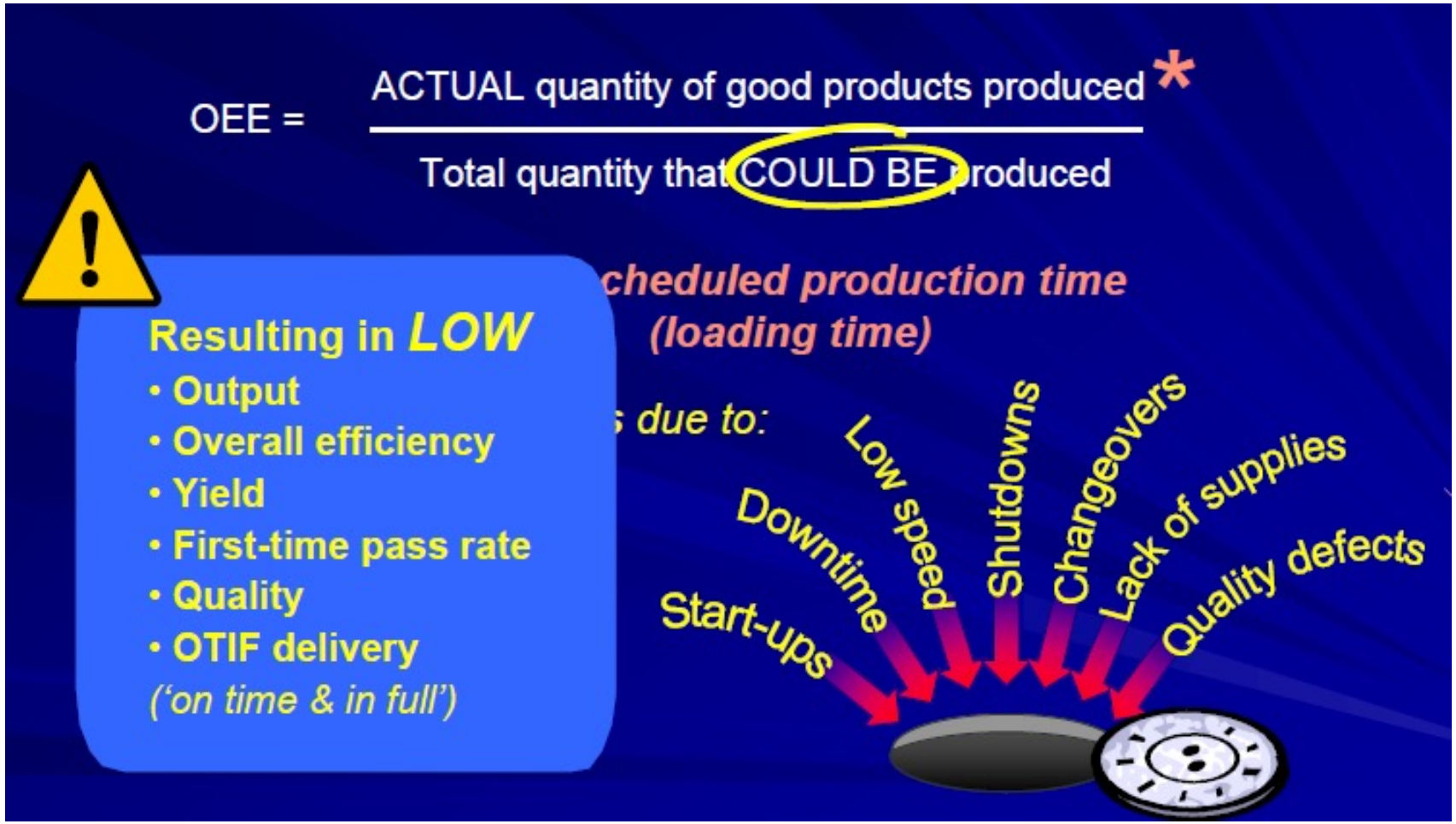
2023/2024

TPM – Why?


Errors and Defects
Unnecessary Transportation
Repair costs
High cost Maintenance
Overproduction
Waiting periods
Stoppages of machines
To stop cash being thrown straight into the rubbish bin

TPM – Continuous Improvement

Overall Equipment Efficiency: The metric



TPM – Continuous Improvement
Loss Categories

- **Main Goal:** eliminate failures, defects and other forms of waste and *muda*, in order to maximize OEE

- TPM eliminates losses due to:

Loss Categories	The Six Big Losses
Downtime (lost availability)	Equipment failures Setup and adjustments
Speed losses (lost performance)	Idling and minor stoppages Reduced speed operation
Defect losses (lost quality)	Scrap and rework Startup losses

TPM – Continuous Improvement
Overall Equipment Efficiency

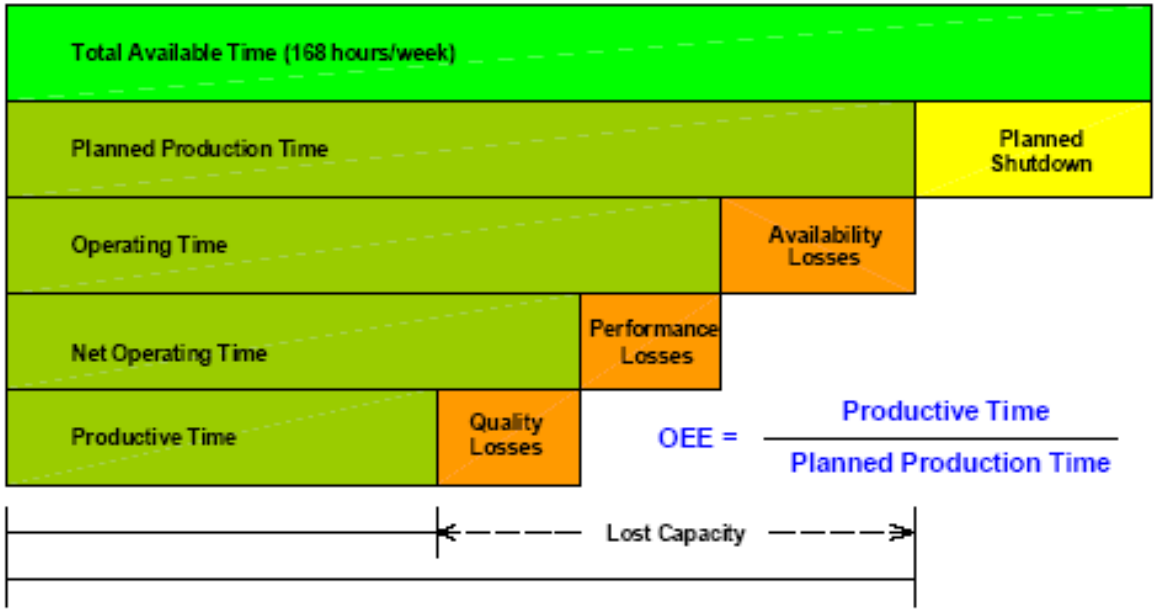
Overall Equipment Efficiency = Availability Index x Performance rate x Quality Rate

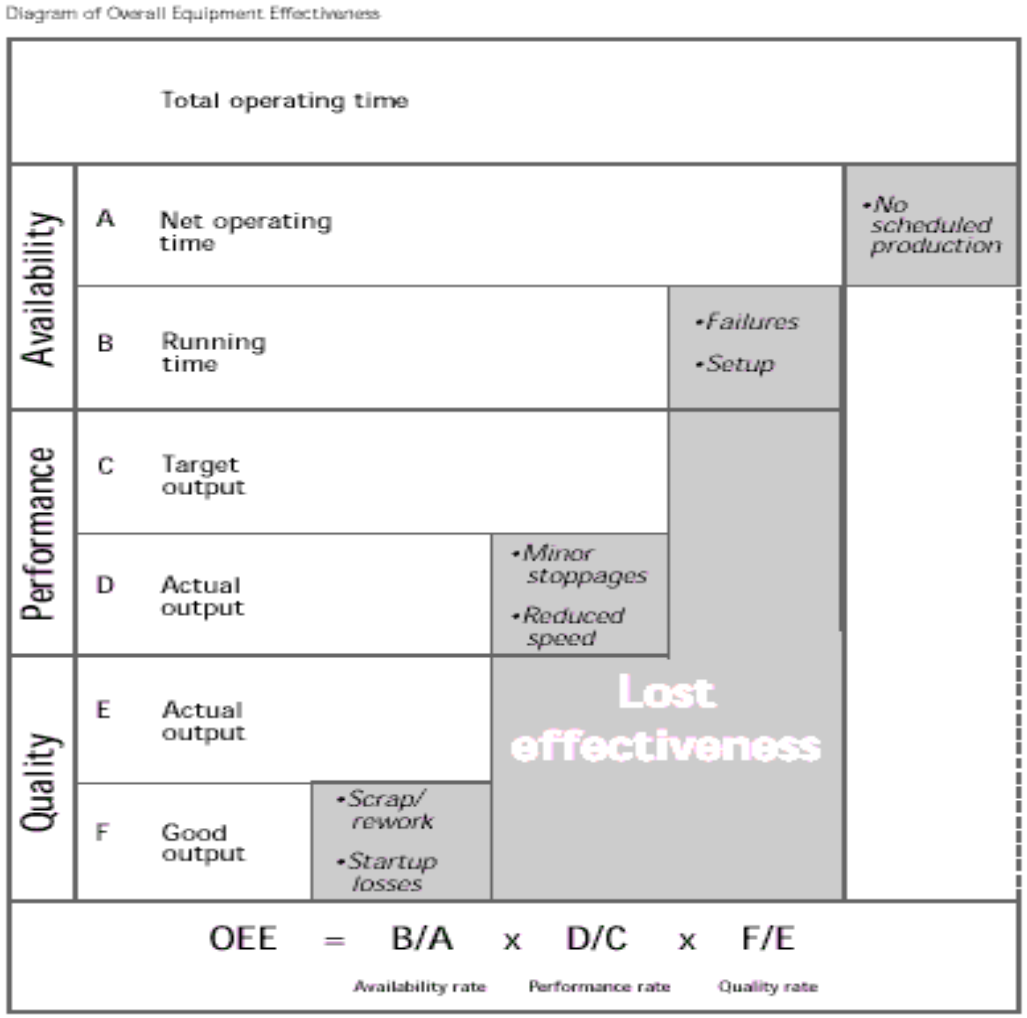
Availability = $\frac{\text{time available for production - downtime}}{\text{time available for production}}$

Performance = $\frac{\text{actual production or capacity (performance testing)}}{\text{ideal production or capacity (engineering)}}$

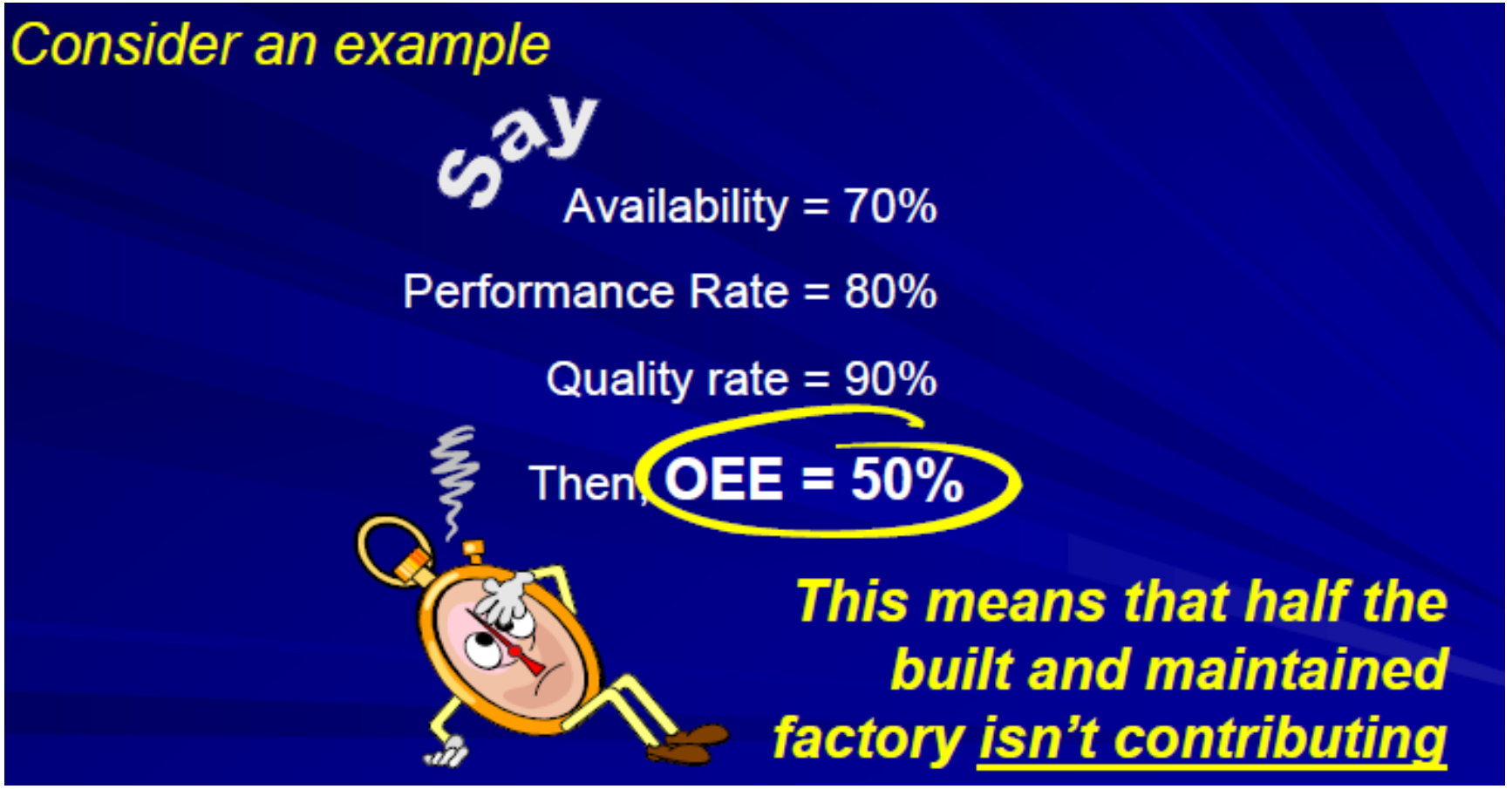
Quality Yield = $\frac{\text{total quantity produced – quantity out of spec}}{\text{total quantity produced}}$

TPM – Continuous Improvement
Overall Equipment Efficiency





TPM – Continuous Improvement
Overall Equipment Efficiency



TPM – Continuous Improvement
Overall Equipment Efficiency

TPM – Continuous Improvement

Overall Equipment Efficiency - Exercise

Item	Data
Shift Length	8 hours = 480 min.
Short Breaks	2 @ 15 min. = 30 min.
Meal Break	1 @ 30 min. = 30 min.
Down Time	47 minutes
Ideal Run Rate	60 pieces per minute
Total Pieces	19,271 pieces
Reject Pieces	423 pieces

Availability	=	*Operating Time / Planned Production Time*
	=	373 minutes / 420 minutes
	=	0.8881 (88.81%)

Performance	=	*(Total Pieces / Operating Time) / Ideal Run Rate*
	=	(19,271 pieces / 373 minutes) / 60 pieces per minute
	=	0.8611 (86.11%)

Quality	=	*Good Pieces / Total Pieces*
	=	18,848 / 19,271 pieces
	=	0.9780 (97.80%)

OEE	=	*Availability x Performance x Quality*
	=	0.8881 x 0.8611 x 0.9780
	=	0.7479 (74.79%)