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OEE – Overall Equipment Effectiveness

Zenaca Consulting

Amarpreet Singh

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Agenda

- OEE Definition
- Calculations
- Benchmark
- Benefits
- Implementation Plan

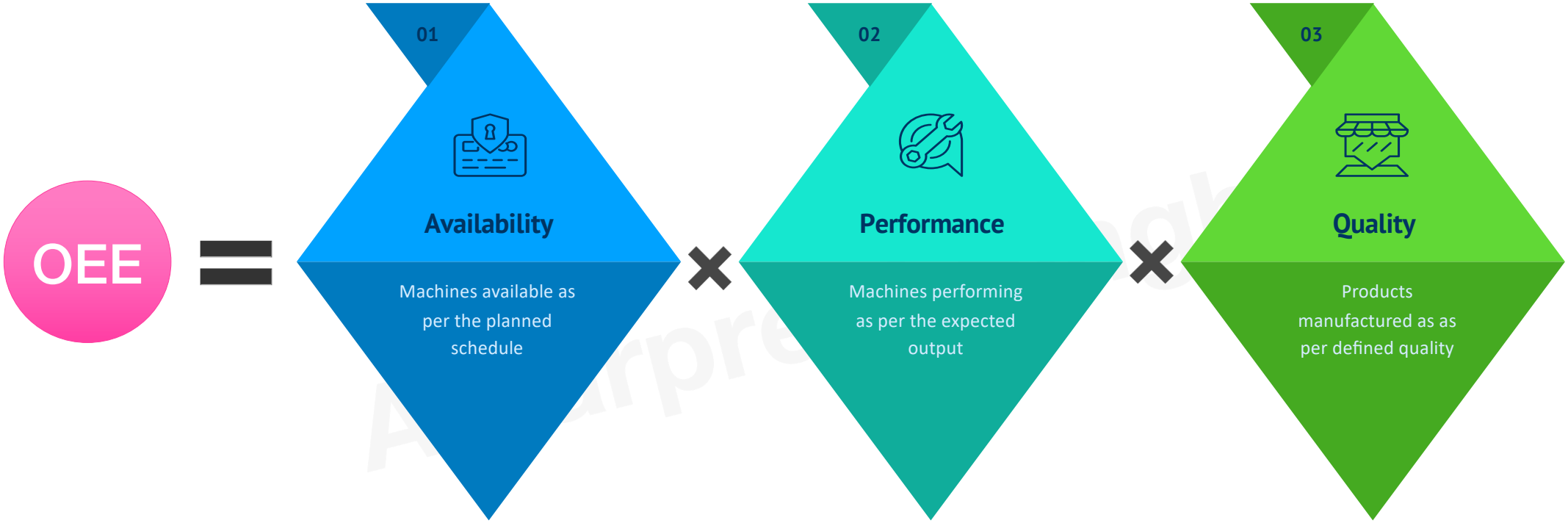
Definition

OEE (Overall Equipment Effectiveness) is a “best practices” metric that identifies the percentage of planned production time that is truly productive.

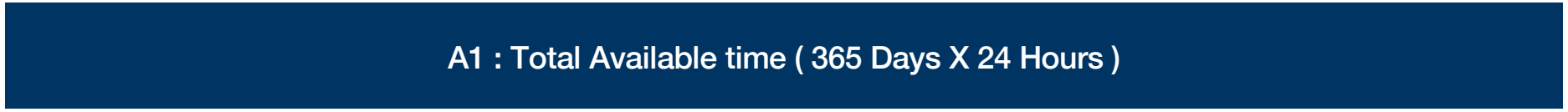
An OEE score of 100% represents

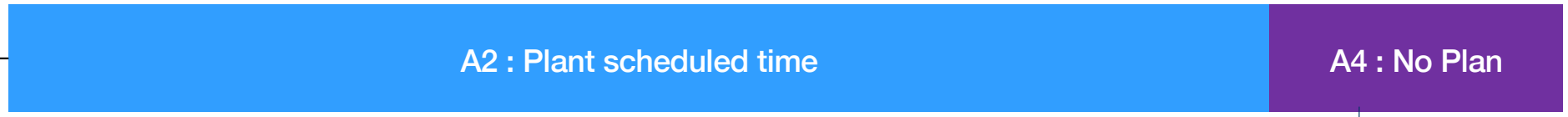
- ✓Perfect production
- ✓Manufacturing only good parts
- ✓As fast as possible
- ✓With no downtime.

Calculation



Availability





- Actual production time, for which machine is running.

- Plant schedule time, for which production is scheduled.

- Holiday
- Weekend
- Break time
- No demand

Downtime due to -
- Machine
- Material
- Quality
- Manpower
- Other factors

$$Availability\ Rate\ (A) = \frac{Actual\ production\ time\ (A3)}{Plant\ scheduled\ time\ (A2)}$$

Example

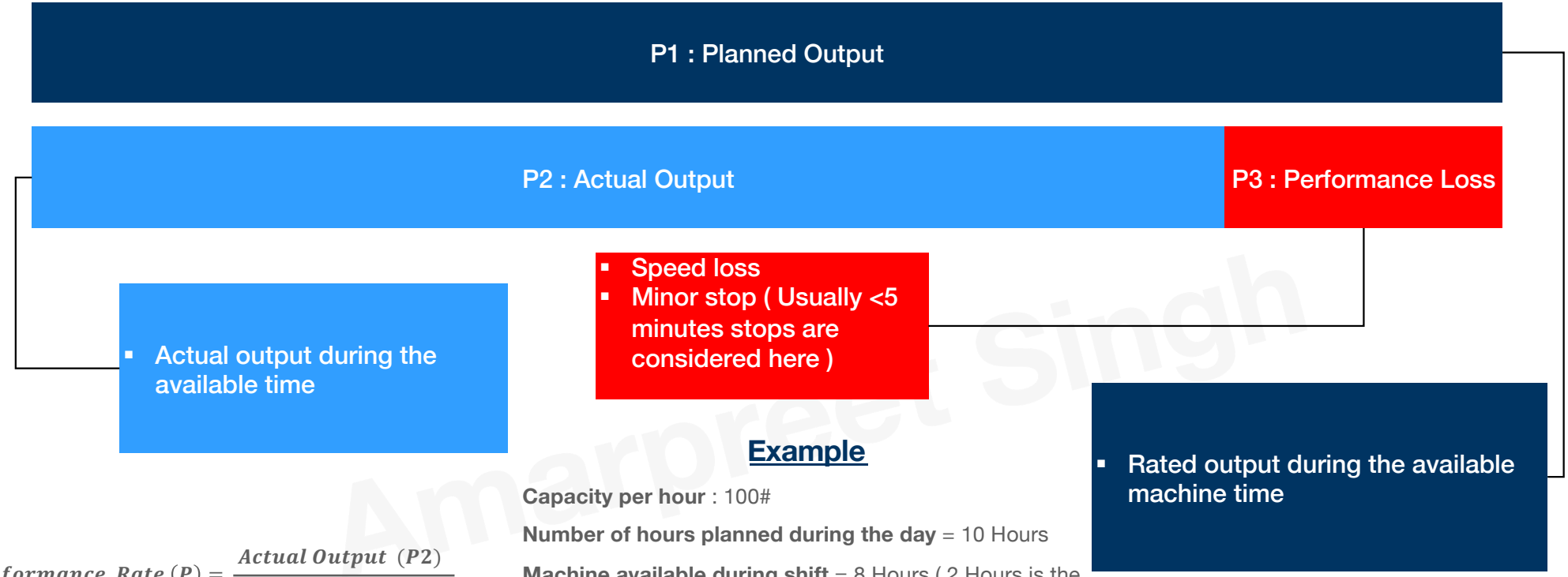
Plant schedule : 10 Hours (600 Minutes)

Down Time = One Hour (45 minutes due to material shortage, 15 minute due to quality issues)

Actual production time : 9 Hours

Availability Rate (A) = 90% (9/10)

Performance



$$Performance\ Rate\ (P) = \frac{Actual\ Output\ (P2)}{Planned\ Output\ (P1)}$$

Example

Capacity per hour : 100#

Number of hours planned during the day = 10 Hours

Machine available during shift = 8 Hours (2 Hours is the downtime due to various issues)

Expected output (P1) = 800 (100 X 8)

Actual output (P2) = 750

Performance rate = 94% (750 / 800)

Quality

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Q1 : Total quantity produced

Q2 : First time pass quantity

Q3 : Rework or scrap quantity

- Total number of products passed first time during the inspection process.

- Number of products, those has quality issues (Can be reworked or to be scrapped).

- Total quantity produced during the time.

$$Quality\ Rate\ (P) = \frac{First\ time\ pass\ quantity\ (Q2)}{Total\ quantity\ produced\ (Q1)}$$

Example

Total products produced during the day = 1000

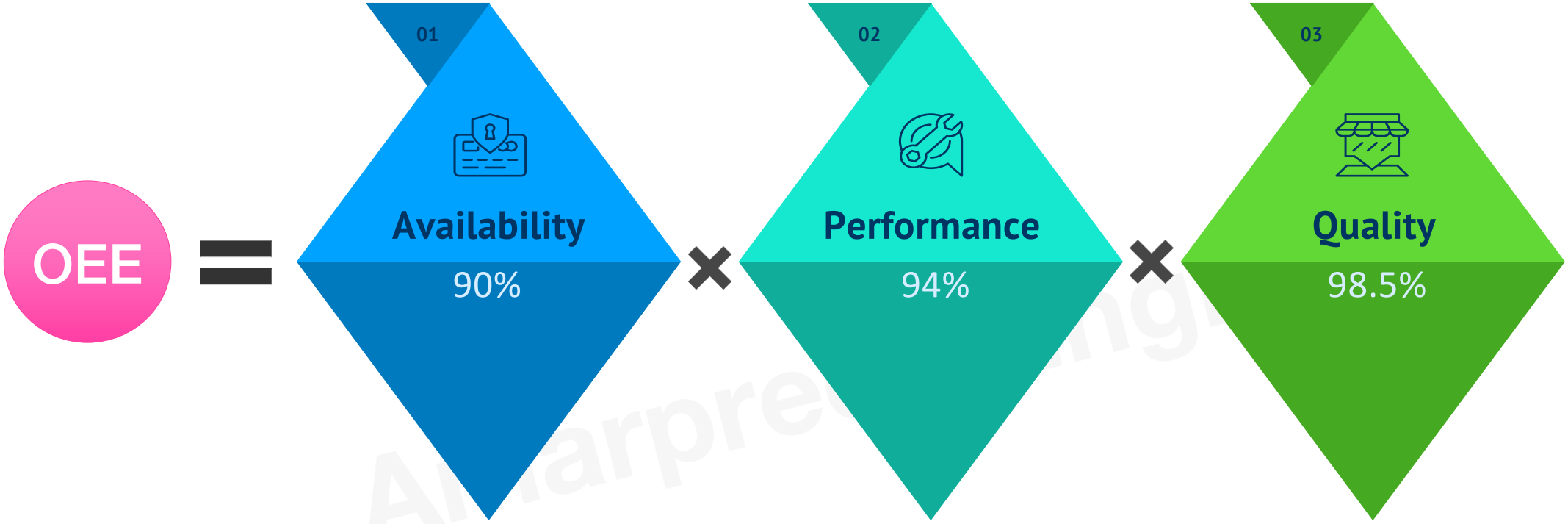
First time pass = 985

Pass after rework = 12

Scrap cannot be reworked = 3

Performance rate = 98.5% (985 / 1000)

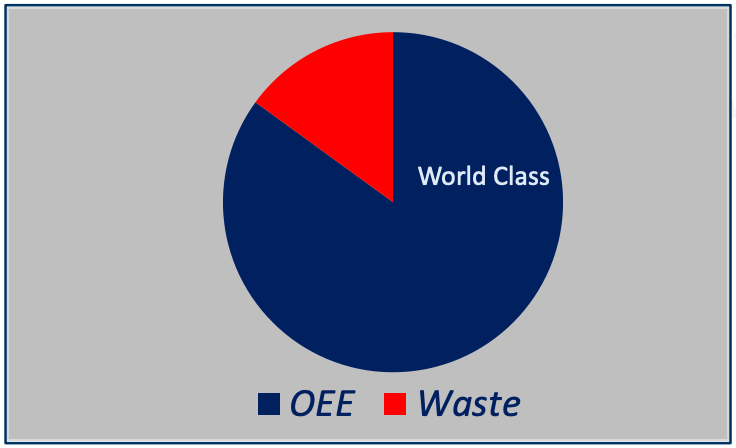
Calculation



OEE = 83.11 (90% X 94% X 98.5%)

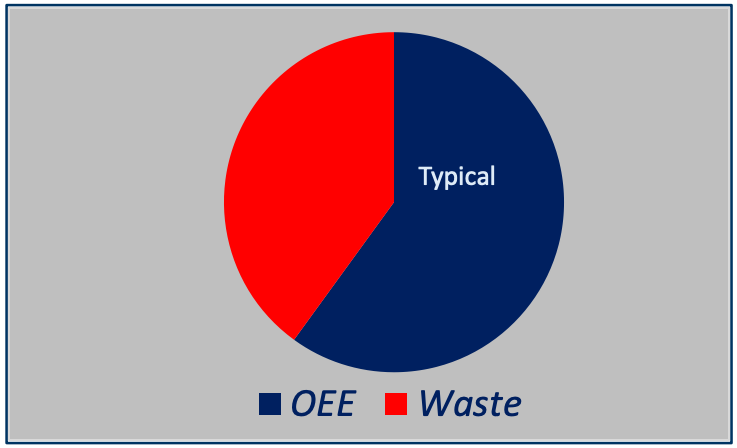
This is considering all the examples on the previous slides

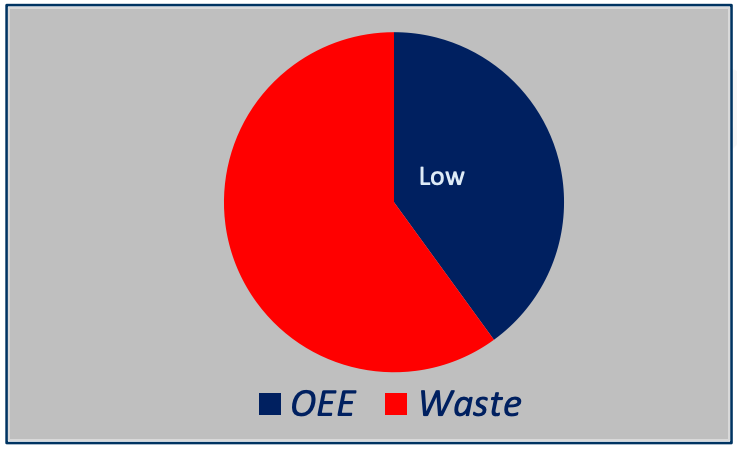
OEE Benchmark



- ✓ 100% OEE is perfect production: manufacturing only good parts, as fast as possible, with no stop time
- ✓ 85% OEE is considered world class for discrete manufacturers. It is a “Good Target” for world class manufacturing operations

OEE Benchmark





- 60% OEE is “Typical” for discrete manufacturers but indicates there is substantial room for improvement.
- 40% OEE is “Common” for manufacturing companies that are just starting to track and improve their manufacturing performance.

Benefits of OEE

01 OEE Directly tie productions efficiencies to financial reporting.

02 Reduce investigation time for root cause analysis and corrective actions

03 Shorten equipment ROI interval through increased utilization

04 Decreases production costs through waste elimination

05 Increase customer satisfaction through quality improvements

On Ground Implementation

The first step for Implementing OEE program is effective data collection on the shop floor. The basic data collection on the shop floor can be as below

- **Target :** A real-time production target driven by the planned rate of production and must be defined by Industrial engineering and approved by the management.
- **Actual :** The actual production is accounted against the target defined. The actual production to be measured every hour, which is rolled over to the shift and then for the day.
- **Efficiency** : the ratio of Target to Actual; how far ahead or behind production is running in terms of a percentage.

On Ground Implementation

Downtime : Accumulated unplanned stop time for the shift updated in real-time; this keeps a strong focus on a key actionable improvement area. The loss of production needs to be allocated to various categories of downtime so that the improvement actions can be defined accordingly.

Quality : The real time information on the overall quantity produced and first pass quantity to be captured by shop floor team. The same information is to be used for defining the actions to eliminate defects and improve the quality performance of the products.

Frequency : In a manual driven system, the OEE calculations can be done every week. However, an automated shopfloor where all the machines are connected to IT infrastructure OEE can be published in real time basis.

Do you have more questions on topic ?

Please reach me at

Email : amar@singhamarpreet.com

Contact : +91 96866 83783

www.singhamarpreet.com

Thank You