JACO | ADVISORY GROUP

Business Advisory Services

Overall Equipment Effectiveness (OEE)

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What is Overall Equipment Effectiveness (OEE)?

Overall Equipment Effectiveness (OEE) = **Availability (A)** x **Performance (P)** x **Quality (Q)**

OEE

Availability	$A = \frac{\text{Run Time}}{\text{Planned Production Time}}$
Performance	$P = \frac{\text{Ideal Cycle Time x Total Count}}{\text{Run Time}}$
Quality	$Q = \frac{(\text{Units Produced} - \text{Defects})}{\text{Units Produced}}$

Overall Equipment Effectiveness is a measure of how well lines or equipment are utilized in relation to their full potential.

How to calculate Overall Equipment Effectiveness (OEE), and what is included and excluded from the calculation.

OEE

$$A = \frac{\text{Run Time}}{\text{Planned Production Time}}$$

$$P = \frac{\text{Ideal Cycle Time x Total Count}}{\text{Run Time}}$$

$$Q = \frac{\text{(Units Produced – Defects)}}{\text{Units Produced}}$$

	Average OEE	World-class OEE
Planned Downtime (excluded)		
Unplanned Downtime	79%	90%
	x	x
Reduced Speed	80%	95%
	x	x
Reduced Rejects	95%	99%
Cost of Poor Quality (excluded)		
OEE:	**60%**	**85%**

How, Why, and When to Utilize Overall Equipment Effectiveness (OEE)

OEE Objectives

1. Understand the true available capacity of a process or piece of equipment.
2. Identify the causes of productivity losses.
3. Continuous improvement activities / prioritize corrective actions.
4. Utilize a standard way of measuring the results.

Examples of Environments OEE can help

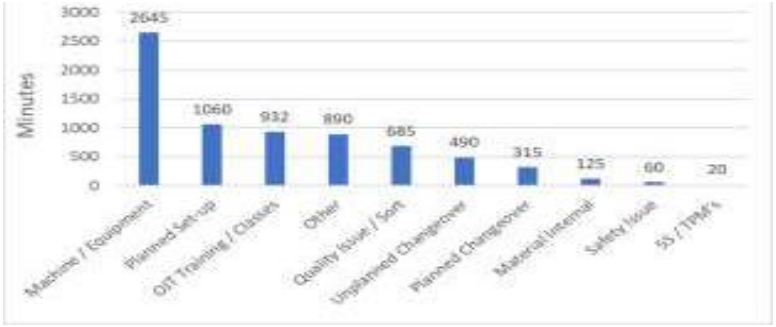
1. Output varies by day or shift.
2. Distinct work centers with different challenges.
3. Varied opinions on continuous improvement priorities.
4. Unsure whether capital investment is warranted.

6 Big Losses

1. Breakdown
    - Tooling failure, unplanned maintenance, general breakdown, machine failure.
2. Setup & Adjustments
    - Setup & changeover, material, manpower, major adjustment, warm-up time.
3. Small Stops
    - Obstructed product flow, component jams, sensor failure, WIP cleaning.
4. Reduced Speeds
    - Under design capacity, rough running, wear & tear, inefficient manpower, lengthening cycle times.
5. Startup Rejections
    - Scrap, rework/repair, incorrect assembly.
6. Production Rejections
    - Scrap, rework, in process rejection, expired material.

As OEE analysis takes shape over time, it will enable leadership to prioritize targeted improvements to increase OEE

Availability



Potential Remedies:

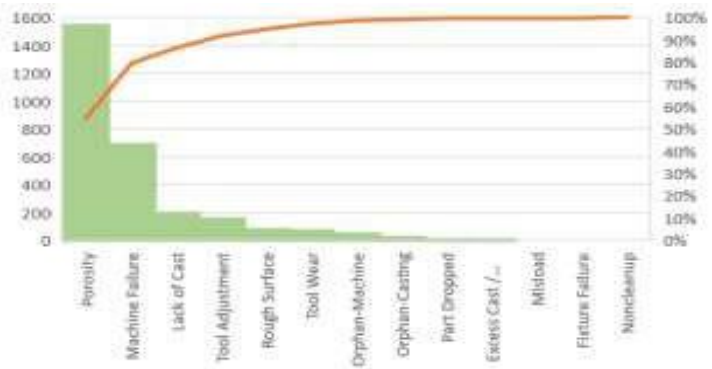
- Preventative Maintenance
- Setup Reduction
- Cleanliness / 5S
- Backup staffing

Performance

Potential Remedies:

- Training
- Performance-based compensation
- Monitor / reduce cycle time

Quality



Potential Remedies:

- Built-in gauges
- Tolerance evaluation
- Training
- Scrap reduction activity

Pareto the root causes for each element of OEE to identify the largest levers of improvement.

Alternatives to Implement OEE

Recommendation: Start manually (spreadsheet)

1. OEE Calculation, 3 factors, and time breakdown
2. Downtime Analysis & Pareto of top issues
3. Cycle Time Study (with stopwatch at line)
   - Observe associates, equipment, overall process
   - Observe cycle time gaps, short stops & unrecorded downtime
4. Observe / study change over (model change)
5. Understand data and systems that relate to OEE (including down time, cycle time, scrap, etc.).
6. Most recent 2 full months of production data. Includes daily parts produced (good & scrap), work time, break time, cycle time.

Longer-term: Automate with software

1. Software will automate operating rate collection, but it will not provide reason codes … operators must enter these.
2. Performance (units manufactured) and quality are manually entered into software.
3. Software examples:
   - Amper: Link

   - Machine Metrics: Link