

Overall Equipment Efficiency (OEE)

Overall Equipment Effectiveness - OEE at Solvay



Enhancing Performance in manufacturing sites

As we are ONE Solvay, we aim to have ONE OEE with common rules and guidelines to better monitor our performance and challenge our process limitations to better serve our customers' needs and improve our competitiveness.

Purpose & main focus

Purpose

OEE is the best way to monitor your asset performance on production assets.

From your strategic supplies to quality performance or annual shutdown strategy.

Where OEE is low, once gaps identified, gains & improvement can be achieved.

Why OEE tracking?

OEE is one of the main KPI used to follow performance of production assets. Coupled with a strong performance management process, it will allow to:

- Increase production rates
- Improve the reliability of the assets
- Reduce maintenance costs (planned versus unplanned breakdowns)
- Identify real production limits/bottlenecks
- Optimize safety stocks
- Have an efficient dialogue between Production and Supply Chain

OEE follow-up through performance management allows to bond people by aligning:

- Mostly between Production & Maintenance team
- But also Supply chain - Quality control - Purchasing - Site & GBU management in some cases

Principles, Definitions & Prerequisites

What is OEE tracking?

OEE - Overall Equipment Effectiveness measures the perf. of the asset (and not the product!) at the bottleneck.

It is commonly defined as:

OEE (%) = Production (ton/period) / MDC (ton/period)

Where Production is the observed produced quantity of the desired product within a defined period.

Where MDC - Maximum Demonstrated Capacity shows the maximum sustainable production ever achieved from historic data applied to the defined period.

OEE can be measured in all production areas. And OEE losses tracked at :

- The day or shift level for continuous process
- The batch or sub-batch level for batch process

And even though there are different tools and template to do it, all of them follow the same logical sequence.

Maximum Demonstrated Capacity - MDC

MDC (in ton/day, under the collective agreement) is key to calculate OEE and here is the Solvay guideline on how it should be done, depending on the process.

CONTINUOUS PROCESS

- Input data: online totalizer (MES), daily production report, packed quantity.
- Be careful with the packed quantity since it can suffer from distortion. Emptying a silo is definitely not producing quantities accounting for the MDC.
- Calculation: usually the best 3 rolling days.

BATCH PROCESS

- Input data: batch report (duration, quantity produced, grade), batch information (sequence, quality).
- Calculation: the quickest batch or the 3 quickest batches (considering the same produced quantity).

UPDATE YOUR MDC

- Every time a progress is made and, at least, once a year during the annual performance review.
- When an ongoing initiative related to debottlenecking is implemented.

Bottleneck

Identifying the bottleneck is crucial for OEE measurement and future improvements:

The actual bottleneck is the limiting step/equipment. Any gain you will identify and implement will surely free up quantities.

If you miss the actual bottleneck, any gain you will identify and implement will be like feeding a black hole : you won't see any result.

Pre-requisites

You will now start or dust off your OEE journey, so in the data collection you should collect documents and data available that supports you in this initiative, always investigating walking down the production unit and involving key people to get their inputs in order to have a good understanding about the current situation.

Some examples: Flowchart, P&ID, Historical data (OEE reports from previous years), KPI and main process variables, Control Charts, Best performance - historical or benchmark, Diagnosis reports

How to & best practices

What is an OEE loss ?

The "dream" would be to produce all the time at the MDC level. Practically it rarely happens.

Each time you observe a production rate that is lower than the MDC, you have an OEE loss.

OEE losses: the 6 categories

Each loss needs to be identified and categorized according to the Solvay guidelines (see below).

The different categories and subcategories will be of great help to identify on which area to focus in priority in order to improve the OEE. Then, some specific Problem Solving Sessions (PSS) will have to be organized to understand the WHY of the losses and identify concrete actions to implement.

The 6 different categories are the following:

- Category 1: External causes (all losses out of the responsibility of the production department)
- Category 2: Planned maintenance & shutdown
- Category 3: Inter-campaign & changeover
- Category 4: Breakdown
- Category 5: Performance
- Category 6: Quality

OEE losses prioritization

OEE losses should be tracked starting from:

- Internal to external
- Unplanned to planned
- Specific to generic

Tools & Performance management

Tools

Within Solvay you will find some tools for OEE tracking as Rhodia legacy Excel file, Perform OEE, Ekho, Eschbach and custom made spreadsheets (both in Excel and Google Sheets).

The preferred tool is **ESCHBACH**. It uses advanced features through AspenTech or OSIsoft PI data utilization, including Artificial Intelligence. Moreover, internal experts & key users can customize the tool to better fit with their way of working onsite.

Performance management

Performance management is fundamental to monitor the OEE performance and once improvements are found it is also instrumental to follow the related action plan and TIP (Tactical Implementation Plan).

As part of the Manufacturing Excellence methodology, the meeting cascade is also there to help you to make OEE review & cross functional OEE review. OEE review can be done by the production department, the maintenance department (Categories 2 and 4) or both during a shared meeting.

To better organize regular OEE review, an OEE meeting card is available with a proposition for the content, KPIs and participants. It can be freely adapted to better served the needs of the stakeholders.

To align all departments and operators, foremen, shift team leaders, engineers and managers, we need leading KPIs (Key Performance Indicators) that are usually related to inputs. Lagging KPIs (and OEE is one of them) are usually related to outputs and are often demanded from the management, to be followed up on site/GBU dashboards.

When it comes to OEE analysis, some simple tools will help to guide you through this evaluation process:

- OEE waterfall: it is a nice visual tool to see where the focus should be among the 6 categories and the balance between categories
- Pareto chart: To identify what are the main contributors of OEE losses with a 80/20 approach is fundamental to better tackle production losses. When resources on the field are limited, it allows to focus on quick wins and what will bring impact.
- Control chart: it will help you to find any special cause. It means out of control conditions that you might have missed during your day to day activities. A minimum of 20 data values and control limits defined will be sufficient to go through this analysis.

Minimum requirements

- Production asset
- OEE (awareness) training

Navigation tree

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Playbooks and documents

- [Playbook OEE](#)

Key Trainings:

Key contacts

- [Johan Bidange - EMEA](#)
- [Thomas Shenot - NAM](#)
- [Nathan Britton - NAM](#)

Linked pages:

- [Eschbach communication kit](#)
- [Eschbah wiki \(upcoming\)](#)