Tetra Pak Operating Manual

May 2025

OEE, Availability, Performance, Quality

Definition

The efficiency and productivity of a manufacturing equipment or process by considering the following factors:

- **Availability:** The actual time equipment is available for production compared to the available time, accounting for all planned and unplanned downtimes in the manufacturing lines.
- **Performance:** How efficient the line is running compared to its designed maximum speed, considering actual output versus theoretical maximum output.
- **Quality:** The percentage of good units produced at the filler without rework or rejection within the production hall. It measures immediate production quality and indicates the line's capability to produce within specs during the filling process.

Calculation

OEE (%) = Availability * Performance * Quality

- Availability = (Running Time / Available Time)
- Performance = (Actual Units Produced / Ideal Produced Units)
- Quality = (Good Units / Actual Units Produced)

Collection Period	Cadence	Data Source
Monthly: 1st day to last day of a month	Every 15th of the following month	Tetra Pak PLMS Center

Recommended Data Extraction Method:

1. Groups: check lines producing PNC products only; click on "Group" or “Compare” and “Machine” (fig 1)
2. Graph tab: click on “OEE”
3. Reports tab: click on “Report from current graph” (fig 2)
4. Time base of analysis: by month or days
5. Date range: adjust to Jan 2024 – latest completed month (fig 3)
6. Click on Refresh
7. Export to excel file → Output: OEE, Availability, Performance, Quality data columns
8. Convert columns to numbers
9. If clicked "Compare" in step 1, average lines for each month

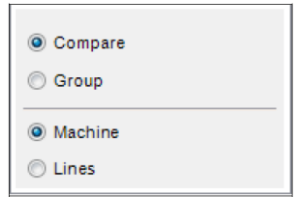

Figure 1: Analysis Focus features under the Performance Analysis Module in PLMS

4.5.1 Report from Current Graph

The Report from Current Graph shows the data from the current graph in numeric form.

Report From Current Graph - OEE

	A	B	C	D	E	F	G
1							
2	Date	Availability	Performance	Quality	OEE	Packages Out	
3	27/06/2012	52.12%	86.19%	97.61%	43.85%	173,835	
4	28/06/2012	39.39%	86.78%	97.68%	33.38%	184,365	
5	29/06/2012	5.70%	100.21%	102.24%	5.84%	29,670	
6							
7	Total	31.11%	87.37%	97.98%	26.63%	387,870	
8							

Figure 2: Report from current graph

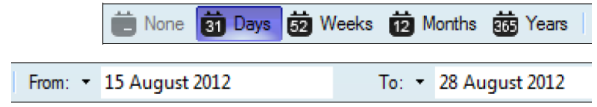

Figure 3: Time Period features under the Performance Analysis Module in PLMS

Tetra Pak's OEE Calculations sourced from PLMS

PLMS Centre — Performance Measurement Model

OEE
The OEE is measured by the Availability, Performance and Quality rates simultaneously.
Unit = %

Single Side Machine
OEE = [Availability] x [Performance] x [Quality]

Availability rate
The availability rate indicates how much of the available time the line is available for production (Running Time).
Unit = %

Single Side Machine
$Availability = \frac{[\text{Running Time}]}{[\text{Available Time}]}$

There are many activities, both planned and unplanned, that have impact on the running time:

Scheduled stop time	Maintenance	The time the line is scheduled not to run (e.g. routine maintenance, preventive maintenance)
	Set up	Time to perform product changes, volume-, try or pallet patterns- or other packages configuration changes.
	CIP	Planned cleaning in place.
	Start up & preparation	Time to prepare the packaging line for production and the start up time. Time to restore the packaging line after production.
Unplanned stop time	CIP	Unplanned cleaning in place
	Start up & preparation	Unplanned Time to perform product changes, volume-, try or pallet patterns- or other packages configuration changes.
	Major Stop	Unplanned Stops > 10 min or technical assistance needed
Customer initialled stop time	Waiting Time	Waiting for instruction, material, additional material, for personnel
	Breaks & meetings	Lunch break, weekly meetings where the line is stopped
	Missing Op. Input & error	Unknown stop reasons.

Performance rate
The performance rate indicates how much the line produces (Actual output) compared with what the line should produce in the running time based on the nominal line speed (Target output).
Unit = %

Single Side Machine
$Performance = \frac{[\text{Actual Output}]}{[\text{Target Output}]}$

The factors that have impact on the performance are:

Minor Stop	Unplanned Stops <= 10 min and operator can restore production.
Speed Losses	Reduction of nominal line speed.

Quality rate
The quality rate indicates how much of the produced output (Actual output) that is approved (Approved output).
Unit = %

Single Side Machine
$Quality = \frac{[\text{Good Output}]}{[\text{Actual Output}]}$

The factors that have impact on the quality rate are:

Total waste	Includes technological waste (waste generated to prepare the line for production, Waste generated to re-start production after stops), stop waste, Quality sampling, defective packages found within production hall. Note: Defective packages found outside production hall are not included.