



**WHITEPAPER**

# Learn About OEE and Minimize Losses

# OEE stands for Overall Equipment Effectiveness and is a way to measure how efficiently a production plant is utilized.

OEE (Overall Equipment Effectiveness) is a globally accepted standard for measuring manufacturing productivity. In short terms – it identifies share of the total manufacturing time that is truly productive. An OEE value of 100 means you are manufacturing 100% Availability (no stop time), 100% Performance (as fast as possible) and 100% Quality (only good parts)

## Availability

**Availability (A)**, is a measurement of how much of the planned production time the machines really are in operation. Unplanned downtime, such as tool change, staff shortages, lack of materials, machine failure, etc. are losses that affect the availability.

Equipment failures and disruption as well as setup and adjustments together make up the machine downtime losses, this is described in the section of the Six Big Losses below.

## Performance

**Performance (P)**, also known as speed loss, shows the loss of each machine. Loss such as reduced production rate, incorrectly set speed, not tuned machine or deliberately chosen a lower rate because of quality issues and the like, affecting performance. Even loss where the machine is not running at maximum speed and has been further reduced in speed, generates performance loss.

There are several methods to determine the maximum performance rate, it may well be a value from the machine manufacturer, or the theoretically fastest possible speed, or the highest rate ever achieved in production. Idling and minor stops, together with reduced speed on machine's performance, this is described in the section of the Six Big Losses.

## Quality Yield

**Quality Yield (Q)**, shows how many of the produced units that can be sold at full price. The losses are divided up into two categories: those of pure scrap that have no value at all, and those who that does not have top quality can, but can still be sold at a reduced price.

The difference between the units that can be sold at full price and those that sell at a reduced price can be seen as a loss and should be mapped out. Defects in the process and reduced yield reflects the machine's quality losses. This is described in the section of the Six Big Losses.

## Three Reasons Why OEE Numbers are Important

1

Overall Equipment Effectiveness, OEE, is an effective metric that continuously reveals how well your machines are being used

2

OEE measurement helps you find bottlenecks in your production, leading to better profitability and competitiveness

3

Monitoring OEE is a good method to set goals, and to accurately measure the result of the daily improvement work



## OEE Can Be Divided Into Six Major Losses

A high OEE value means that the equipment's full capacity is utilized to a large extent. To optimize the OEE value eliminating all kinds of losses that may arise in production is a necessity. Historically, it's mainly the visible losses such as breakdowns, scrap and downtime that companies have focused on to minimize.

Most companies have been ineffective in visualizing and resolving less visible losses, such as shorter stops and speed loss. A "short stop" is short, but frequent stops, which are difficult to identify, and therefore sometimes seen as a part of the production flow. There is often a big unused potential with these short stops, by resolving these recurring stops your OEE numbers will increase.

Speed loss means that the machine does not manufacture products at the rate that it is designed for. More about these losses below.

### 1. Equipment failure and interruptions

Any downtime that occurs in the machine is covered in this category. When stops like these occur losses such as lower production volumes and increased process time will develop. The cause of machine disturbances and interruptions can be both temporary and recurring in nature.

Temporary disturbances are commonly known as breakdown and can for example mean that the control system or central components of the machine breaks down and needs to be repaired or replaced. These events often mean that the machine must be stationary for a long time. Recurring disturbances may include problems with the software, or that the pressure suddenly falls in the lubrication system. This means that the machine must be temporarily turned off. To reduce these losses, it is important to break the problem down into small pieces, especially when it comes to recurring problems.

When coding stop causes manually in logbooks, you usually only record the larger obvious stops. This leads to smaller, recurrent disturbances being left out without a permanent solution.

### 2. Set-up and adjustments

Set-up time and adjustments cause loss of production and at the same time is often the cause for defective products being manufactured before the change and adjustment has taken place. Set-up time is the time it takes to prepare the machine from producing one product to another. You may have also have to do some adjustments after the set time, and in some cases it takes time for adjustments beyond the actual change. To reduce losses, it is important to take into account the disturbance of different parts; the mechanical adjustment and alignment of the machine separately.

### 3. Idling and short stops

The loss during short stops occur for example when a product is caught in a feeding machine or debris get stuck or gets in the way. The problems are easily solved but the time loss may be significant in the long run if it occurs often, and if the errors are not noticed by the operator quickly enough.

The difference between these short stops and chronic disruptions is that the short stops do not depend on the machine itself, but the material or other equipment. However, they are equally difficult to detect and analyze because the operator usually does not record these small disturbances. Idling losses means that the machine is not operating even though could, due to lack of material.

### 4. Reduced speed

Losses arise if a machine runs at a slower speed than it is designed for. It can be difficult to see with the naked eye and therefore that loss is rarely perceived as a loss, because the machine actually still produces articles.

It is extra difficult to discover the loss if the machine produces multiple types of articles, where there is a large variation of the target cycle time for each article. In these cases it is particularly important to use a Production Monitoring System that can handle the stop times on order and article level.

### 5. Defects in the process

This definition covers losses like scrap and lost production. Defects can arise, for example due to incorrect processing, which might be due to temporary and intermittent interference.

When a part has to be discarded it is not only the raw material that is a loss, but also the wasted production time. The parts that can be revised should also be considered a loss. Partly because they take up time for the operator, but mainly because of the machine time used for a value-adding process.

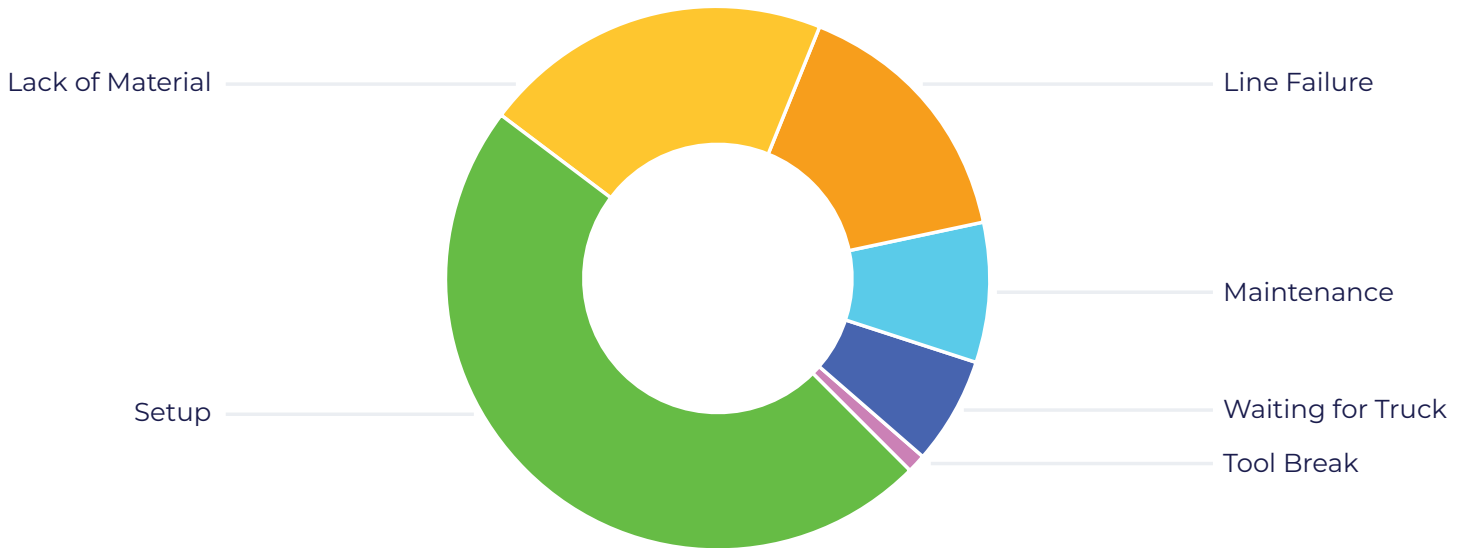
### 6. Reduced yield and startup losses

This is a quality loss that arises while starting up a machine that is unstable which leads to a number of faulty articles being produced before the process becomes stable. Such loss occurs mainly after a new set up, or if the machine has been turned off.



## Keeping Track of OEE?

It is essential to follow up on your stop times, stop causes, downtime, scrap and other key performance indicators in production. It's hard to improve and streamline unless you continually measure your production. To measure is to know!



## OEE Monitoring, the key to improvement

In order to effectively improve your OEE value it requires that you know your current situation. By installing a system that automatically records the OEE value in your production it will record how well your production is optimized.

Aptean OEE is a Production Monitoring System that simplifies the operators' work. Forget all the handwritten logbooks and Excel files. It is easy, quick and reliable to collect OEE data from the machines with Aptean OEE.

## Learn more

Aptean OEE is a state-of-the-art production monitoring solution for single- and multi-plant manufacturers. Designed to provide a complete picture of your production effectiveness, this solution helps you identify the sources of loss, as well as areas for improvement. With a strong focus on production follow-up and optimization, Aptean OEE builds a solid foundation for your continuous improvement process. [Visit our website to find out more.](#)



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