

Understanding opportunities for improving OEE in Packaging Operations

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What are key challenges in operations ?

1. Safety
2. Quality
3. Compliance to regulatory (FDA) /statutory and internal QA procedures

Above 3 constitute “ License to Operate”

For profitable operations we additionally need the following:

4. Productivity : Both machine and people
5. Right cost
6. Ability to make variety of products as per order commitment coupled with demand uncertainty
7. Ability to produce new products with higher uncertain demand pattern

What Role Automation plays in meeting these challenges ?

It is expected that many of these requirements are factored at design phase of machine building and automation design.

Even though machine may be supplied after satisfactory FAT , does that assure consistent performance in actual operation ? Say after one year ?

One key machine performance measure in actual operation mode adopted by many leading organizations is OEE.

OEE stands for Overall Equipment Effectiveness.

Elements of OEE

OEE analysis starts with Plant Operating Time; the amount of time your facility is open and available for equipment operation.

From Plant Operating Time, you subtract a category of time called Planned Shut Down, which includes all events that should be excluded from efficiency analysis because there was no intention of running production (e.g. breaks, lunch, scheduled maintenance, or periods where there is nothing to produce). The remaining available time is your Planned Production Time.

Planned Production Time

Planned Shut Down

Elements of OEE

OEE begins with Planned Production Time and scrutinizes efficiency and productivity losses that occur, with the goal of reducing or eliminating these losses.

There are three general categories of loss to consider - Down Time Loss, Speed Loss and Quality Loss.

Availability

Availability takes into account **Down Time Loss**, which includes any Events that stop planned production for an appreciable length of time (usually several minutes – long enough to log as a track able Event). Examples include equipment failures, material shortages, and changeover time. Changeover time is included in OEE analysis, since it is a form of down time. While it may not be possible to eliminate changeover time, in most cases it can be reduced. The remaining available time is called **Operating Time**.

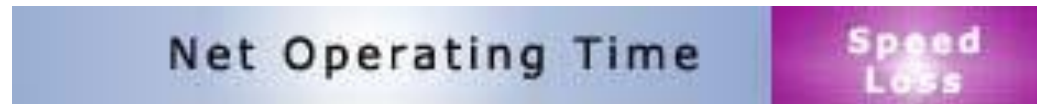
Operating Time

Down Time
Loss

Elements of OEE

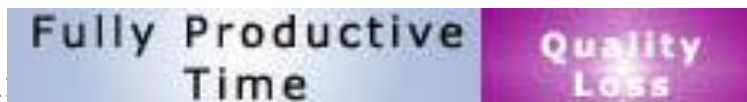
Performance

Performance takes into account **Speed Loss**, which includes any factors that cause the process to operate at less than the maximum possible speed, when running. Examples include machine wear, substandard materials, misfeeds, and operator inefficiency. The remaining available time is called Net Operating Time.



Quality

Quality takes into account **Quality Loss**, which accounts for produced pieces that do not meet quality standards, including pieces that require rework. The remaining time is called Fully Productive Time. Our goal is to maximize Fully Productive Time.



World Class OEE

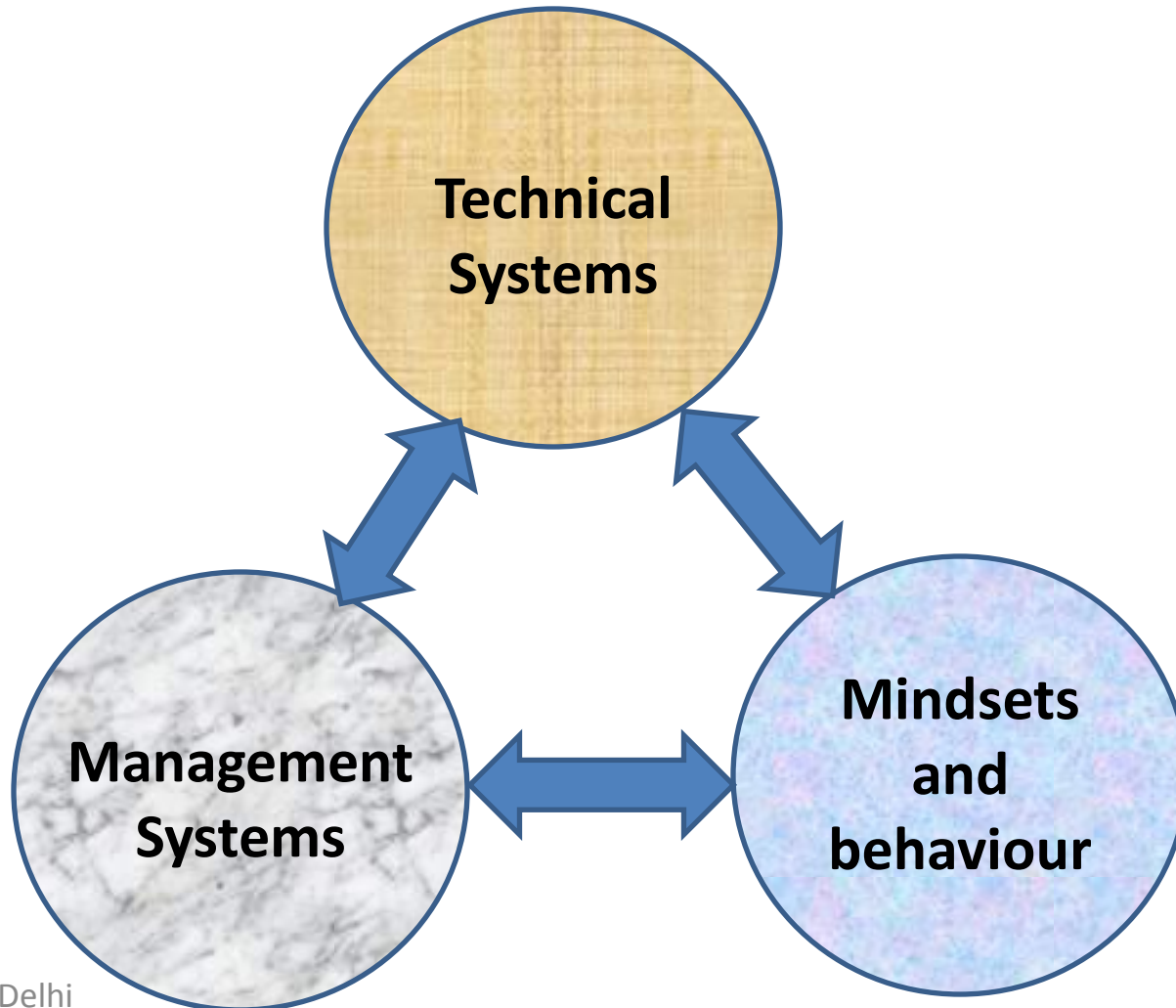
OEE is essentially the ratio of Fully Productive Time to Planned Production Time . **In practice, however, OEE is calculated as the product of its three contributing factors:**

$$\text{OEE} = \text{Availability} \times \text{Performance} \times \text{Quality}$$

This type of calculation makes OEE a severe test. For example, if all three contributing factors are 90.0%, the OEE would be 72.9%. In practice, the generally accepted World-Class goals for each factor are quite different from each other, as is shown in the table below.

OEE Factor	World Class
Availability	90.0%
Performance	95.0%
Quality	99.9%
OEE	85.0%

What influences OEE ?



Opportunities for improving OEE in Packaging Operations

By tracking OEE elements and losses in as much real time as possible we can improve OEE. Key improvement areas to cover six big losses:

- 1. Breakdowns .**
- 2. Setup and Adjustments**
- 3. Small Stops**
- 4. Reduced Speed**
- 5. Startup Rejects**
- 6. Production Rejects**

Machine supplier and automation vendor should work along with plant management to find solution which are in his domain. Remember three circles in previous slide !

Thank You