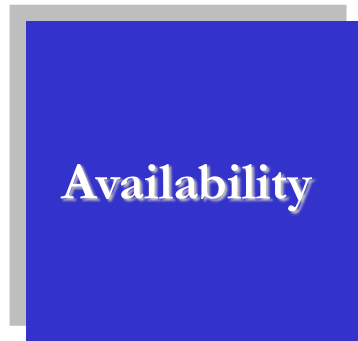


Overall Equipment Effectiveness (OEE) Overview



How can we get more output ?



More time

More production



More speed

More production



More quality

More production



OEE – Overall Equipment Effectiveness (Efficiency)

What is OEE ?

- **OEE** is a single measure which shows how much of a product has actually been produced as a percentage of how much could have been produced.
- It combines all the standard performance measures - including *availability, performance and quality*. It should be thought of as the top measure in a cascade of measures.



OEE – Overall Equipment Effectiveness (Efficiency)

Availability Definition

- **Availability** is the time the equipment is scheduled to run divided by the time the equipment is available to run, expressed as a percentage.

$$\text{Availability} = \frac{(\text{Total available time} - \text{Downtime})}{\text{Total Available time}}$$

- The goal should be at least 90%.

(To calculate availability, do not use only maintenance shutdowns, use all downtime.)



OEE – Overall Equipment Effectiveness (Efficiency)

Net & Gross Availability Definition(2)

- Some companies don't like to use the total time available to run, since the equipment might be capable of running on a 7 x 24 schedule, and they are only running it on a 5 x 24 schedule.
- **Gross Availability** should indicate when there is excess capacity in the equipment, in case it is needed. Knowing about excess capacity might keep a company from purchasing additional equipment and, thereby, needlessly increasing its investment in assets. Doing the latter negatively impacts corporate financial indicators such as return on net assets. It is best to understand the true availability of the equipment, rather than hiding it behind spurious calculations.
- **Net Availability** use the scheduled (**excluding external causes**) run time divided by the actual run time, realizing that the equipment has unused capacity. This allows personnel to concentrate on maximizing the equipment performance during the scheduled time, always realizing that there is additional capacity if it is ever needed.

OEE – Overall Equipment Effectiveness (Efficiency)

Performance Efficiency Definition

- ***Performance efficiency*** is the rate the equipment is operating divided by the design rate of operation (Best demonstrated practice), expressed as a percentage.

$$\text{Performance} = \frac{\text{Actual Machine Rate}}{\text{Best Demonstrated Practice}}$$

- The goal here should be at least **95%**.



OEE – Overall Equipment Effectiveness (Efficiency)

Performance Efficiency – common mistakes

- First, some companies will re-engineer the equipment or otherwise raise performance standards and not reflect this by changing the design rate of operation. This gives them a performance efficiency of more than 100%, which is misleading and subsequently could hide other areas of weakness in the OEE.
- The second mistake consists of not really understanding the design specifications of the equipment. This often is a problem with older equipment. No one remembers what the design performance specifications originally were. So, the equipment performance is accepted as the level at which someone remembers what it "used to do." Typically, this level is far below its design performance level and, again, the OEE calculation is affected. The lack of data hides the true potential of the equipment.

OEE – Overall Equipment Effectiveness (Efficiency)

Quality Rate Definition

- *Quality rate* is the product produced minus the off-spec product divided by the product produced.

$$\text{Quality rate} = (\text{Total Production} - \text{out of specs}) / \text{Total Production}$$

- This percentage should be above 99%.
- The most common mistake in calculating quality rate centres around defining what constitutes a defect. A defective item is one that is not first-pass quality. In other words, any item requiring rework, re-filtering, re-packaging, or re-formatting is not first-pass quality.



OEE – Overall Equipment Effectiveness (Efficiency)

Putting all together

- A sample calculation of equipment efficiency might look like this:

Availability = 85%,

Performance efficiency = 90%,

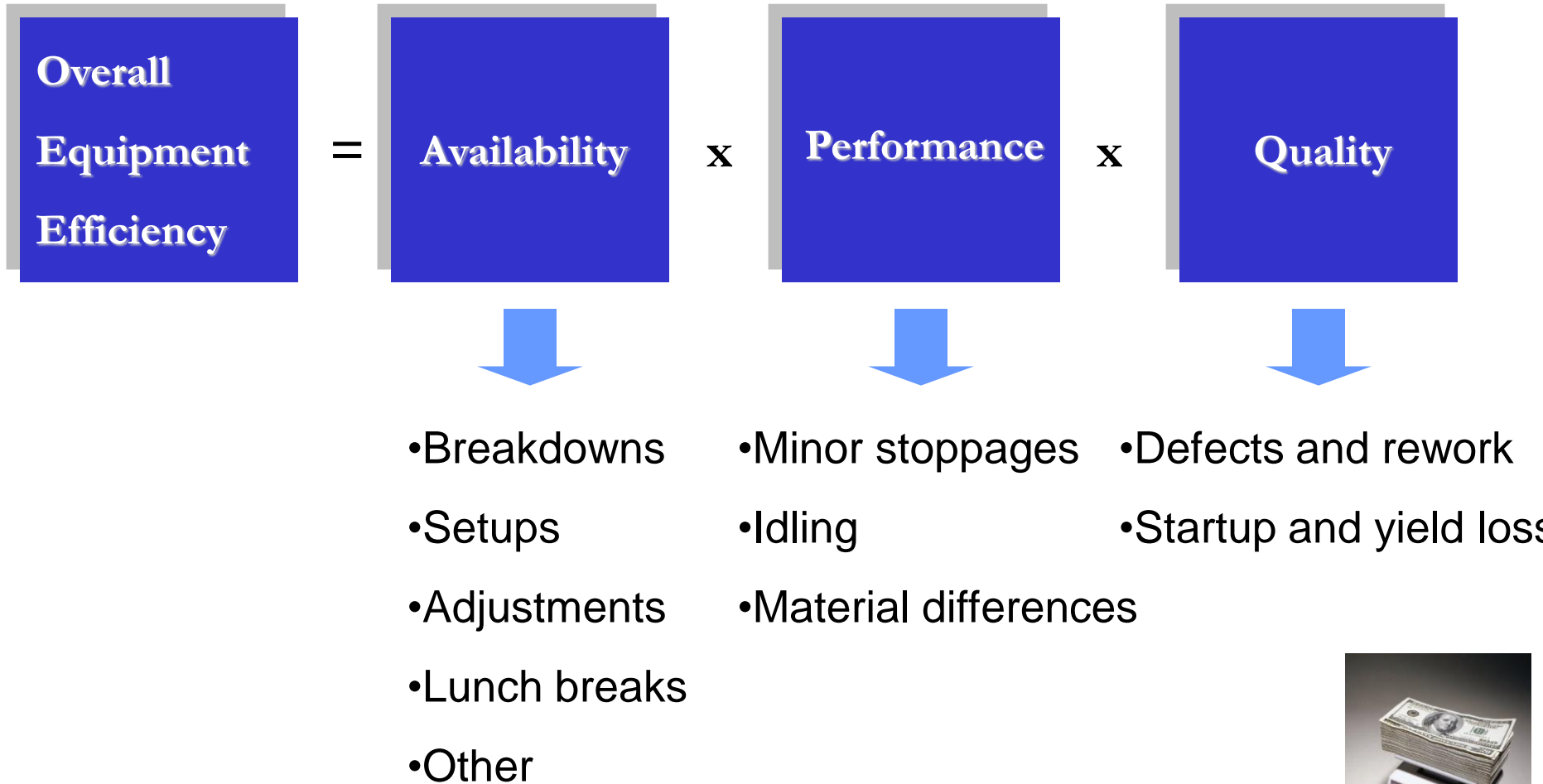
Quality rate = 95%.

$$\underline{\underline{\text{OEE} = .85 \times .90 \times .95 = 72.6\%}}$$



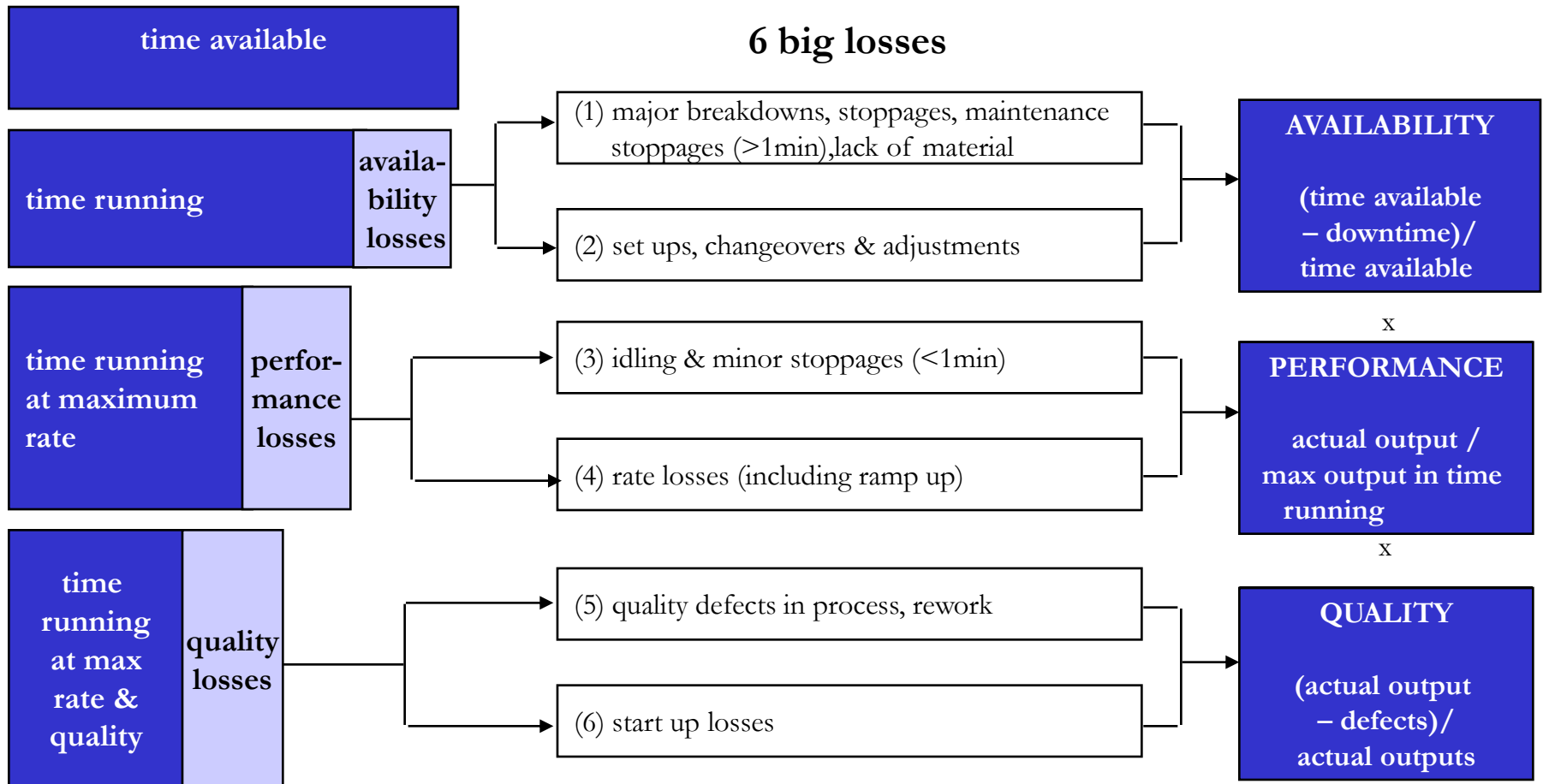
OEE overview

What are Production Most Common Losses ?



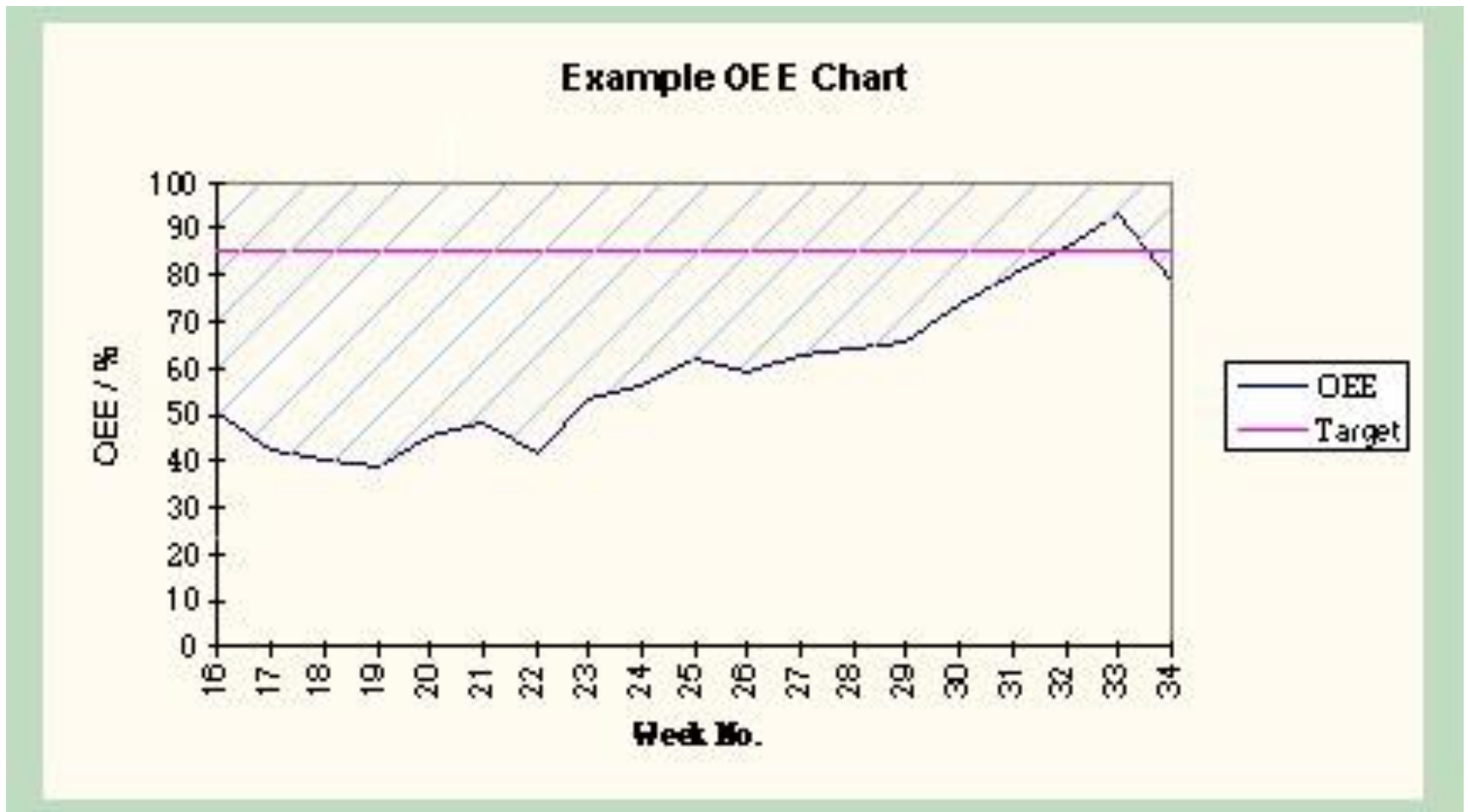
OEE – Overall Equipment Effectiveness

Quick review

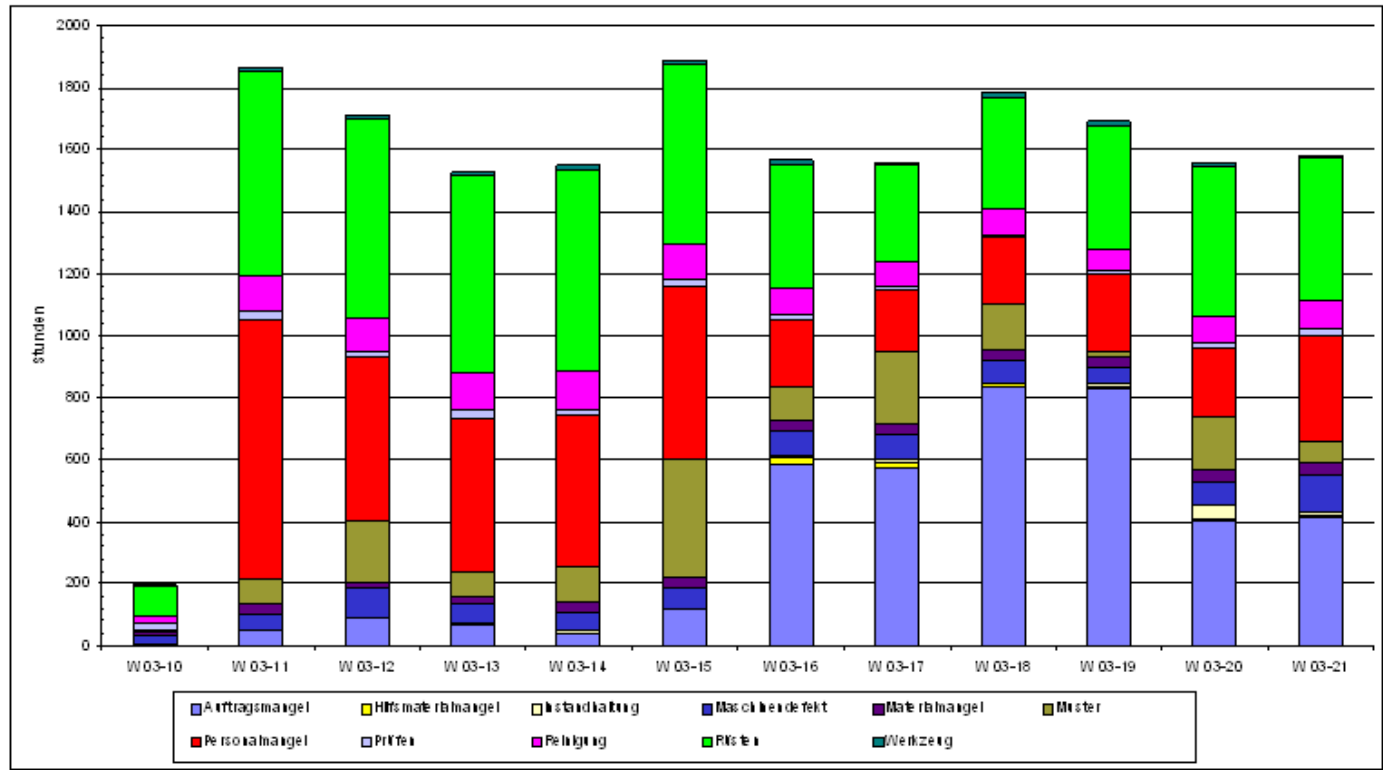


World class manufacturers = or > 85% OEE

OEE – Overall Equipment Effectiveness (Efficiency) Chart Example



Bereich: Schneidmaschinen
Werk: LAS



Montag, 26. Mai 2003

5 / 5

Establishing the maximum machine rate (BDP*)

*** Best Demonstrated Practice**

Key performance criteria

- what is the manufacturers rated maximum speed of the bottleneck machine (per product if possible)?
- what is the accepted maximum / target ?
- what is best demonstrated performance over the last 3 months / 6 months (running hours) per product

If there are big discrepancies

- why are there differences between accepted maximum / best demonstrated and manufacturers maximum ?
- What are the BDP differences between the main products selected ?
- Are the issues solvable in the short / medium term or do they rely on major capital expenditure to relieve physical or technical constraints ?

Result

Agreed maximum performance rate for machine / asset

The maximum rate will be

- Probably higher than planned rate currently used
- Possibly higher than best reported performance (as it may includes minor stops)
- May differ depending of the discrepancies