OEE 102

Availability

- Overview
- Availability benchmarks
- Unplanned downtime
- Improving availability
- Calculating availability

Overview

How can I measure and improve availability?

Availability is simply a way to quantify how much of the time your equipment or process is up and running as it should. The higher the availability, the more you can produce — and the greater your Return on Assets.

Your goal, therefore, is to minimize downtime — especially unplanned downtime — by improving process and equipment reliability. This course provides an overview of availability as a factor in OEE.

Hint: As you go through the topics in this course, watch for answers to these questions:

- *What availability level is reasonable for processes like yours?*
- *How does unplanned downtime affect revenue and profitability?*
- *How is equipment availability calculated?*

Availability benchmarks

Even the best operations have some downtime. What makes them the best is keeping availability as high as possible.

Here are some typical availability values to benchmark your own process against.

	Quartile			
Process Type	Worst	3rd	2nd	Top
Continuous	<78%	78 - 84%	85 - 91%	>91%
Batch	<72%	72 - 80%	81 - 90%	>90%
Chemical, Refining, Power	<85%	85 - 90%	91 - 95%	>95%
Paper	<83%	83 - 86%	87 - 94%	>94%

Source:
Fluor Global Services – Benchmark study - NA, AP, EU - 1996

For large complex assets or fleets of capital equipment, availability typically runs between 85%-95%.

The 5%-10% of non-availability is split between "planned downtime" (scheduled maintenance) and "unplanned downtime" (breakdowns).

Unplanned downtime

Equipment wear and tear can degrade performance and therefore production. Performing normal maintenance and repairs during scheduled shutdowns allows for proper planning and minimal lost time while restoring equipment performance.

The loss is greater, however, when a unit shuts down unexpectedly — especially because you often have to find the problem before you can fix it.

Not only do you lose production time; in many cases the problem also affects quality and production rate before and after the outage.

Unplanned downtime has high fixed and variable costs. One of the largest impacts is revenue loss resulting from demand exceeding supply. The cost is not just the loss of profit margin on the lost revenue, but also the value of the total revenue lost less the direct avoided costs of production such as materials or energy.

Another impact of unplanned downtime is environmental costs for off-spec or waste product. Safety and regulatory compliance could also be a large factor.

The costs of returning to normal operations also must be considered. These could include overtime for emergency repairs, airfreight for materials or spare parts, and loss of customer goodwill.

For these reasons, reducing or eliminating unscheduled outages offers the opportunity for dramatic improvements in profitability.

Improving availability

Understanding the failure rate of various pieces of equipment is key to preventing unscheduled downtime.

You can improve component availability through early detection of variances or irregularities in the equipment, and by providing condition-based real-time maintenance.

Adopting these predictive maintenance strategies — especially for high-priority equipment — can often help you identify problems before they affect production.

Benefits include significantly reducing downtime caused by equipment failure, as well as avoiding the higher repair costs of unexpected catastrophic failures.

Predictive maintenance also reduces the need to schedule downtime for preventive servicing, which guarantees increased availability.

You can learn more about this topic in the PlantWeb University course series on applying streamlined maintenance practices.

The PlantWeb advantage

Fault detection and monitoring capabilities available with PlantWeb architecture can not only help reduce the number of plant shutdowns, but also provide valuable data that can be used in pre-emptive maintenance and scheduling.

Our intelligent field devices have extensive diagnostics, including PV status, that integrate smoothly with our AMS Suite software. More information is available on true plant status, which leads to faster troubleshooting.

Calculating availability

Equipment availability isn't just assumed to be the length of the shift in which it is operated. Instead, it's based on *actual* operating time, as a percentage of the *possible* production time.

$$\text{\% Availability} = \frac{\text{Actual production time}}{\text{Possible production time}}$$

Here's an example:

A process line is operated 24 hours a day, 5 days a week (120 hours). Planned downtime for preventive maintenance is 1 hour each week. Unplanned downtime due to equipment failure and equipment adjustment is 7 hours.

$$\text{\% Availability} = \frac{(120 - 1 - 7)}{(120 - 1)} = \frac{112}{119} = 94\%$$