

NCODE



Manufacturing Executions Systems – OEE & Downtime Tracking

Services Brochure





Connecting your devices

NCODE applies the latest industry standard technologies to bring your devices connected

Overall Equipment Efficiency & Downtime Tracking

Overall equipment effectiveness (OEE) is a hierarchy of metrics that evaluates and indicates how effectively a manufacturing operation is utilized. The results are stated in a generic form that allows comparison between manufacturing units in differing industries. It is not however an absolute measure and is best used to identify scope for process performance improvement, and how to get the improvement. If for example the cycle time is reduced, the OEE can also reduce, even though more product is produced for less resources. Another example is if one enterprise serves a high volume, low variety market, and another enterprise serves a low volume, high variety market. More changeovers (set-ups) will lower the OEE in comparison, but if the product is sold at a premium, there could be more margin with a lower OEE.

Manufacturing Execution Systems (MES) are information technology systems that manage manufacturing operations in factories. Over the years, international standards and models have refined the scope of such systems in terms of activities, which typically include:

- Management of product definitions. This may include

storage, version control and exchange with other systems of master data like product production rules, bill of material, bill of resources, process set points and recipe data all focused on defining how to make a product. Management of product definitions can be part of Product lifecycle management

- Management of resources. This may include registration, exchange and analysis of resource information, aiming to prepare and execute production orders with resources of the right capabilities and availability.
- Scheduling (production processes). These activities determine the production schedule as a collection of work orders to meet the production requirements, typically received from Enterprise resource planning or specialized Advanced planning and scheduling systems, making optimal use of local resources.
- Dispatching production orders. Depending on the type of production processes this may include further distribution of batches, runs and work orders, issuing these to work centers and adjustment to unanticipated conditions.

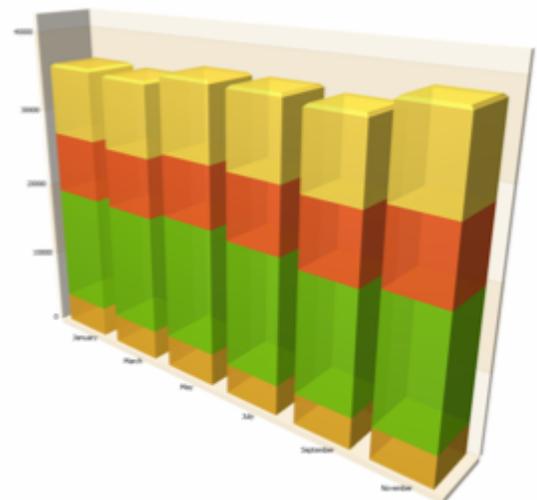
Providing tools from the plant floor integration hardware to the mainframe analysis and reporting software, NCODE is the ideal partner to develop your MES.

- Execution of production orders. Although actual execution is done by Process control systems, an MES may perform checks on resources and inform other systems about the progress of production processes.
- Collection of production data. This includes collection, storage and exchange of process data, equipment status, material lot information and production logs in either a data historian or relational database.
- Production performance analysis. Create useful information out of the raw collected data about the current status of production, like Work In Progress (WIP) overviews, and the production performance of the past period like the Overall Equipment Effectiveness or any other Performance indicator.
- Production Track & Trace. Registration and retrieval of related information in order to present a complete history of lots, orders or equipment (particularly important in health related productions, e.g. pharmaceuticals)

NCODE’s professionals are not only experienced in developing business intelligence solutions for your plant floor, but also in Efficiency & Maintenance industry standards. We can help you deploy and manage concepts like OEE, EE, MTBF, MTTR, MTTA and others.

We have the knowledge to help you integrate in an automated data flow process all the resources of your plant. From the operating personnel to the final product output, everything feeds the information system that drives you in the right way.

Total OEE Efficiency





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OEE measurement is also commonly used as a key performance indicator (KPI) in conjunction with lean manufacturing efforts to provide an indicator of success. OEE can be best illustrated by a brief discussion of the six metrics that comprise the system. The hierarchy consists of two top-level measures and four underlying measures.

Mean Time Between Failure (MTBF) is the predicted elapsed time between inherent failures of a system during operation. MTBF can be calculated as the arithmetic mean (average) time between failures of a system. The MTBF is typically part of a model that assumes the failed system is immediately repaired (MTTR), as a part of a renewal process. This is in contrast to the mean time to failure (MTTF), which measures average time to failures with the modeling assumption that the failed system is not repaired (infinite repair rate).



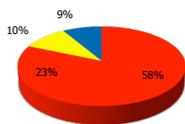
The definition of MTBF depends on the definition of what is considered a system failure. For complex, repairable systems, failures are considered to be those out of design conditions that place the system out of service and into a state for repair. Failures which occur that can be left or maintained in an unrepaired condition, and do not place the system out of service, are not considered failures under this definition. In addition, units that are taken down for routine scheduled maintenance or inventory control, are not considered within the definition of failure.

Seq#	Begin	End	Code	Equip	Shift	Reason
01	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
02	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
03	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
04	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
05	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
06	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
07	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
08	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
09	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned
10	08:00:00 AM	08:00:00 AM	Planned	1	08:00:00	Planned

Mean Time To Repair (MTTR) is a basic measure of the maintainability of repairable items. It represents the average time required to repair a failed component or device. Expressed mathematically, it is the total corrective maintenance time divided by the total number of corrective maintenance actions during a given period of time. It generally does not include lead time for parts not readily available, or other Administrative or Logistic Downtime (ALDT).

In fault-tolerant design MTTR is usually considered to also include the time the fault is latent (the time from when the failure occurs until it is detected). If a latent fault goes undetected until an independent failure occurs, the system may not be able to recover. MTTR is often part of a maintenance contract, where a system whose MTTR is 24 hours is generally more valuable than for one of 7 days if mean time between failures is equal, because its Operational Availability is higher.

- Good Production
- Repair
- Quality Losses
- Planned Shutdown



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