



The Line of Sight to
Manufacturing Excellence

Overall Equipment Effectiveness (OEE)

A General Discussion on Acquiring Data



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The OEE Information Model

In order to reliably and comprehensively make Overall Equipment Effectiveness (OEE) data available to users throughout the organization, a carefully planned framework of data must exist.

Standard Performance Rates

Neither OEE nor Total Effective Equipment Performance (TEEP) may be measured without clear performance standards for each combination of Part Number and Work Center. There must exist a table of standards that represent the best-case production rates, generally stated in *units per hour*. These rates should be based on engineered or designed capabilities. Engineering design information, when available, should provide the standard rate. Where engineered data does not exist, or is obsolete due to process changes, a time study is called for.

Within the framework of Lean Manufacturing and Six Sigma there may sometimes be resistance to establishment of specific numerical standards. It is important to acknowledge that every machine or process has a true engineered standard which is based on actual equipment characteristics. While lean practices might, at times, be justified in striving to improve rather than meet a defined standard, measurement of OEE must be built on a defined numerical capacity.

When establishing rates for work centers using several sequential steps, it is important that the standard reflects the bottleneck step. The bottleneck step is that which has the slowest rate and restricts the overall line rate.

A word of caution on standard rates: in the case where any work center posts a Performance metric greater than 100%, there is reason to go back and review its standard rate. Allowing use of an inflated Standard Rate hides real capacity that might otherwise be utilized. The Standard Rate, therefore, becomes the critical number to identify and understand for each combination of part number and work center.

Capture of Specific Losses (Downtime & Quality)

As mentioned earlier, OEE measurements, in and of themselves, offer little value without visibility to the underlying detail. Knowledge that equipment availability is draining 22% of capacity does nothing to facilitate improvement. With this in mind, a comprehensive OEE management strategy must include the tools to understand and address the specific problem areas and deficiencies.

Specific causes for Quality and Downtime loss events must be captured and reported in a format that will lead to their improvement. Additionally a level of cause classification should exist such that analysis will conveniently indicate which general classifications are most significant.

A typical manufacturing operation should identify 20 – 30 specific causes for defect losses and a similar amount for downtime causes. In addition, it is helpful for each of the common causes to fit into specific categories. This type of structure allows for the statement: “37% of our quality loss is in the “Start-Up Scrap” category and the top three issues are...” or “We are experiencing only 78% Availability, with the number one category being “Equipment” and here’s the trended pareto of the specific issues...”. This level of detailed loss data and the ability to stratify is a key

concern. A high level of detail is essential in order that the data can provide the information needed to drive and support Six Sigma or Lean Manufacturing initiatives.

In conclusion, it is essential that a defined set of causes and general cause classifications exist and that they form the basis for all analysis. In the case of multi-plant OEE management, the opportunity to standardize this set of causes across the organization may exist. There are several benefits to using the standardized approach, most significant being the opportunity to compare operations, and also the impetus for better collaboration between operations.

Entity Hierarchy

To provide complete capability for precise targeting of problem areas, a rational hierarchical structure must be in place. For a given manufacturing facility an optimal structure might be similar to:

1. Facility
2. Department
3. Work Cell or other rational grouping
4. Work Center
5. Part Number
6. Work Order Number, Lot Number, etc

With the above structure in place, the continuous improvement process is jump-started since careful targeting of opportunities for improvement can be done quickly and easily.

A well-designed OEE Management system will go a step further by making the opportunities jump off the page!

OEE Information Challenges

Data Capture and Storage

Successful implementation of an OEE measurement system relies heavily on existence of a complete and timely dataset. When contemplating effective use of an OEE management strategy, some thought needs to be directed at data availability and its sources.

The methods used by organizations for collecting performance data cover a wide range of options. There is a continuum of strategies ranging from manual paper reporting to automated interfacing to the production machinery. There is no right approach to this challenge; it is largely a matter of what best fits a particular business.

Businesses vary widely as to what information is collected and where it can be found. In general, the information availability will fall into some combination of the following categories.

1. Currently Doesn't Exist

In this case there is no formal data collection structure in place. This is a very common situation particularly as applied to downtime and quality information.

2. Exists in Informal Systems

Production data and losses are collected manually and entered into some sort of homegrown information system. Normally this is accomplished using spreadsheets and or databases. Information from these systems is then used to produce charts and reports for the organization.

3. Resides in MES (Manufacturing Execution) System

An MES (commonly referred to as Manufacturing Execution System or Manufacturing Enterprise System) is a data collection network that focuses on specific manufacturing parameters and results. These systems may or may not comply with ANSI/ISA-95 but may well contain all of the data needed to execute OEE measurement.

4. Resides in Legacy ERP (Enterprise Resource Planning) System

Many businesses use a central business system, or ERP, that integrates all facets of the business, including planning, manufacturing, sales, and marketing. The capability of an ERP to collect and process OEE-relevant information varies greatly depending on its vintage and implementation.

In conclusion, the data picture for any given organization can be expressed as a two-axis matrix of data locations and capture methods. In reality, most businesses would represent a hybrid with several points on the chart.

Tailoring OEE Management to the Existing Data Model

At first glance the data challenge can appear daunting, and in fact, has deterred many businesses from properly implementing OEE Management. This concern over data issues and implementation is generally unfounded as is discussed below.

OEE Management software which is properly designed, can dovetail into nearly any existing data scenario. The required characteristics for this type of flexible and adaptable design include:

- Network deployed to allow for access anywhere in the organization
- Capability for direct data entry, on shop floor or by clerical support
- Capability to import existing data from ERP, MES, shop floor, or other sources
- Capability to export data for use by ERP or MES for analysis
- ODBC Compliant making data accessible to other database applications

In summary, the system design should provide a very flexible information system that can easily receive external data as well as making its data available for other uses.

The functionality listed above insures that an OEE Management application can be implemented with the following advantages:

- Low cost of installation and start-up, requires no additional hardware
- Extremely fast launch, typically a just few days
- Negligible installation or maintenance workload for IT Department
- Requires no redundant data entry, and is likely to reduce data entry cost
- Completely table driven insuring consistent and relevant data

OEE Management Software from Capstone Metrics LLC is an example of an OEE application that delivers all of the above functionality and benefits with a low cost purchase and fast track launch capability.



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About Capstone Metrics LLC...

Capstone Metrics LLC has been providing **OEE Management Software** to outstanding manufacturers since 2001.

OEE Management Software is the premier product for companies that desire to optimize their Overall Equipment Effectiveness (OEE) results. The software is designed to integrate with Lean Manufacturing and Six Sigma efforts and has a 10 year history of continuing upgrades and improvements. Key features include: flexible and powerful reporting; ease of use; fast implementation; excellent adaptability; and low cost.

For more information on Capstone Metrics and **OEE Management Software** please visit us at www.capstonemetrics.com