

## Case Study

### Production Performance Monitoring and Analysis

#### Background:

Overall Equipment Effectiveness (**OEE**) is a global standard for measuring and assessing manufacturing performance. It is a true measure of a manufacturing plant's capability to effectively and efficiently manufacture its products. It is a composite metric taking into account the availability of the production facilities, the performance of it when it is running and the quality of the product that it produces when running. The OEE for a facility or a workcentre in a facility is measured as

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

The three factors affecting OEE are measured as follows:

$$\text{Availability} = \frac{\text{Total Available time} - (\text{Planned Downtime} + \text{Equipment Downtime})}{\text{Total Available time} - \text{Planned Downtime}} / 100$$

$$\text{Performance} = \frac{\text{Output} \times \text{Actual Cycle time}}{\text{Total Available Time} - \text{Downtime}} \times \frac{\text{Ideal Cycle Time}}{\text{Actual Cycle Time}}$$

$$\text{Quality} = \frac{\text{Output}}{\text{Input}}$$

It was in the environment of striving for excellence that one of our clients requested a review of their manufacturing operations in terms of world-class standards. Part of this review was to assess the effectiveness of the current metrics as a means to achieving world-class performance.

#### Scope of Work:

The client's facility was a secondary Fill/Finish facility with several bulk manufacturing, filling and packing lines. The objective of our work was to

- Benchmark the current performance against best practice
- Assess the current metrics as means of monitoring and leveraging best practice
- To implement an appropriate set of metrics for the manufacturing operations
- To increase the performance of the facility by harnessing the manufacturing teams and getting them involved in the continuous improvement process.

## Process:

An initial assessment was made of the current metrics and the processes were benchmarked against best in industry and world class. As part of this process the production and maintenance teams were engaged in the assessment process. The output from this assessment was that:

1. There was substantial opportunities for improvement in all areas
2. The current metrics were focused on the monetary performance of the manufacturing operations and provided little feedback on a daily/weekly basis to the teams about actual performance and schedule adherence.

It was agreed that an **Overall Equipment Effectiveness, (OEE), Measurement System** should be adopted within the facility. It was also agreed that an objective of this system should be to minimise the amount of effort required by the teams to collect the raw data. This would provide them with more time to analyse performance and implement improvements. Based on this requirement the **MIST Measurement System** was developed over a period of six months. A detailed specification of the client's requirements was drawn up in collaboration with all personnel involved in utilising the systems capabilities. A decision was made for the system to be maintained by the teams in the workcentres. This meant that the system would be owned by operators and fitters. As such the system was designed from the bottom up, thus facilitating the requirements of the main block of users. The reporting functions were initially a secondary requirement.

The OEE project itself was carried out over 5 phases:

1. Development, modification and installation of the system.
2. Initial training for all users (approx. 150 in all, in 3 phases).
3. Ensuring accuracy of records.
4. Interpretation of information provided
5. Action issues affecting optimum performance.

## Result:

The **MIST** system, with the full collaboration of all users of the system, established the present OEE ratio and could then be compared with other departments and facilities thus establishing an accurate base from which to improve.

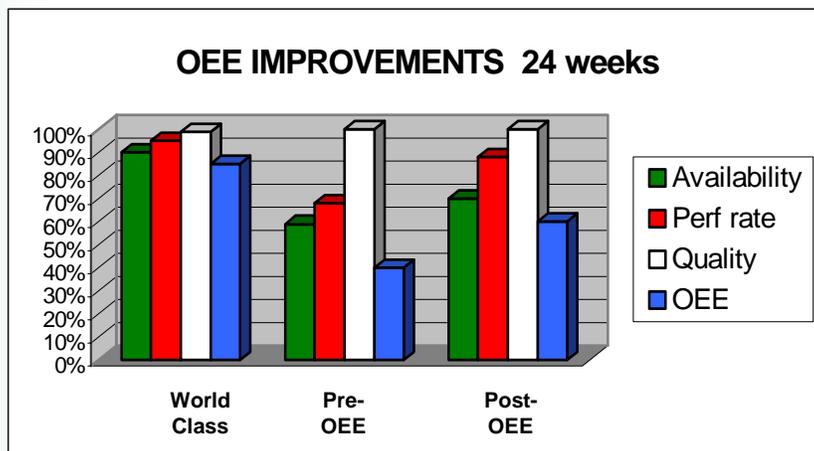
The individual workcentres are centres of excellence continuously developing expertise to ensure the highest levels of skills.

The **Overall Equipment Effectiveness Measurement System** was introduced to all the processes in the facility, including process, filling and packaging, and the improvement is shown in the charts below.

The striking feature in the success of the system is that the information is gathered and acted upon by the operators and fitters thus achieving continuous improvement, job enrichment, and huge savings on costs.

The current measurement system, commonly used world-wide in manufacturing sites, did not present an accurate picture of how effectively, or how ineffectively, the manufacturing and engineering resources are being utilised.

The system was introduced on a phased basis to a number of workcentres with a roll out over three months.



During this assignment the client achieved typical improvements in OEE in the region of 25% over a 6-month period.

The improvements were brought about by:

1. Establishing current performance levels using the OEE Performance Measurement.
2. Setting of internal targets to assist in achieving **World Class OEE**.

3. Establishing a '**critique**' review process whereby the teams could identify the good and bad events of the week.
4. Using this process to allow the teams to identify the events that caused the loss in performance.
5. Gathering the information to support the initial findings in 4 above.
6. Establishing continuous improvement teams to pursue performance issues.