Idhammar Whitepaper – Implementing OEE Systems

Delivering on the promise: best practices for continuous improvement

ABSTRACT

THE LAST TEN YEARS have charted a steady rise in the level of interest that senior manufacturing managers pay to organisational asset management. This trend coincides with the increase in asset cost and complexity, especially of plant equipment, making it even more important to manage assets well. Not surprisingly, in response to these trends, top management has been demanding greater visibility of asset health, better control of costs, and improved asset effectiveness. As a consequence there has been a corresponding increase in the popularity of measuring Overall Equipment Effectiveness (OEE).

This whitepaper is intended for organisations that are considering the implementation of an OEE System. It explains some best practices for approaching an OEE system implementation and recommends ways to overcome potential objections and organisational resistance to such a project.

CONTENTS

Also available for download from www.idhammarsystems.com/resource library:

- What is OEE? - The concept and calculation of overall equipment effectiveness
- The Benefits of OEE Systems - making every second of production count
- The Business Case for OEE Systems - the operational and financial ROI
- OEE, the Great Energy Saver- reducing consumption with OEE Systems

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Beginning the journey

OEE SYSTEMS IDENTIFY PROBLEM AREAS and accurately report the symptoms of each problem. However, the real opportunity lies in the ability to determine the root causes for each loss, and to then implement effective corrective actions to eliminate them. OEE Systems can also be used to gather additional data, create and report against improvement plans/agendas, and verify or validate the actions taken to rectify the issues identified.

Implementing an OEE System can be likened to switching on the light in a darkened room. Nothing has changed, but you can now see things more clearly.

An OEE System is a powerful tool which is best used to illuminate our understanding of the production process and identify opportunities to drive improvements.

Deciding to put an OEE System into operation is a positive first step, but it's only part of the equation. As with anything, it can be implemented properly, or not applied well at all. To achieve a successful implementation and to optimise the success of an OEE System, organisations must focus on ensuring a commitment to using it as a fundamental, organisation-wide tool to drive continuous improvement in an effective manner.

Beginning the journey

Agree an "OEE Amnesty"

Lean proponents all agree that it is not the actual OEE score that is important, but how the data is used to discover, drive and measure improvements.

Therefore, if OEE is already being measured (for example by means of a spreadsheet), it is a good idea to enforce an "OEE Amnesty" during the first few months after implementation. When a new system is implemented, it is likely that more accurate data capture will alter the previous bench-mark. A dip in OEE score should not be viewed as a poor reflection on existing operations, but rather as a means to uncover and get to grips with new opportunities for improvement.

Determining how management intends to use the OEE score is another important consideration in the planning process for implementing an OEE System. Using the score as a means to penalise or reward undermines the potential benefits, as staff may be tempted to manipulate the data.

For more information on OEE as a concept, or on the benefits of OEE Systems, please refer to separate whitepapers available on: www.idhammarsystems.com/resource library

Critical Success Factors

1. Organising for success - gaining buy-in

NOT SURPRISINGLY all successful OEE System integrations take place when all levels of an organisation engage in the selection and implementation processes. It is imperative to have top-down sponsorship for the implementation of an OEE System, but it is equally vital to gain support from the shop floor. We therefore recommend the following actions:

Invest in training and education

Whether OEE is already measured and used by an organisation or not, it is essential to properly introduce OEE as both a concept and as a system tool to all levels of your organisation in order to make the metric meaningful and to overcome resistance to change. Understanding the role of OEE and its key benefit as part of a continuous improvement programme can help to dispel fear, uncertainty and doubt around its introduction.

Training also reinforces the need to accurately collect and record data, in order to drive continuous improvements that benefit the overall organisation.

Involve IT from the outset

The IT function is a key stakeholder in the success of implementing an OEE System, able to help define needs in terms of system integration (for example with ERP and MIS software), and also in assessing the relative merits of different suppliers.

Appoint cross-functional champions

To ensure engagement and buy-in from all areas of the plant, appointing cross-functional OEE champions to help train, monitor objections, evaluate system usage, and provide ongoing assistance, can be very effective. This also makes sure that function specific issues are recognised and addressed.

Set realistic goals

Before implementing an OEE System, it is important to fully understand the ROI opportunity for your organisation, and many systems manufacturers will help you do this. From this baseline understanding, it will be possible to set realistic goals and targets, so that you can identify "what success will look like". This should be far more than an end-point exercise, as its good practice to celebrate interim targets reached along the way.

Another aspect of this is to recognise and acknowledge from the outset that it may be necessary to run the new OEE System in parallel with existing processes initially in order to gain confidence and conduct benchmarks. Establishing goals for how quickly the transition will be completed can also help to alleviate any frustration caused by the initial workload during set-up.

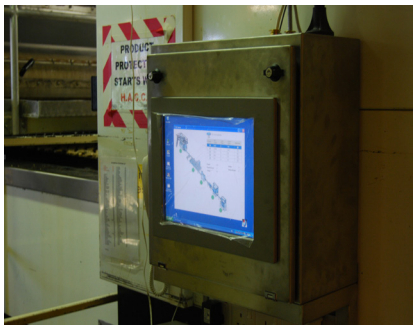
2. Defining needs - the importance of scope

BEFORE SELECTING AND IMPLEMENTING an OEE System, there are a number of key factors that need to be discussed and agreed:

Take an iterative approach

Start with an assessment of some of your key processes to determine which one(s) may be good candidates for deeper OEE review and analysis then collect some baseline data and perform an initial assessment. Working closely with your OEE

Critical Success Factors



System supplier, you should be able to evaluate the data available and start to identify gaps or issues.

Implementing an OEE system on a sub-set of the plant will make it easier to perform a broader roll-out at a later date. The early pilot can iron out any issues and provide useful training and experience for staff members.

Determine how the OEE System integrates with existing IT infrastructure

Involving the IT function from the outset of the project is a critical success factor, particularly when it comes to setting up automatic data capture, where the OEE data can also serve as an important feed to existing systems. Deciding to integrate systems from the beginning can prevent the duplication of effort caused by repetitive data entry.

Consider data capture - where, when, and how

The OEE factors (Availability, Performance and Quality) are process output results. The accuracy and effectiveness of this data has an enormous bearing on the efficacy of any improvements made. There are a number of decisions to be made around the capture of this data, namely: where, when and how to capture?

Availability may be calculated during the run, Performance can only be measured after each machine cycle has been completed, and Quality can only be determined after the unit is produced. Therefore, it typically makes sense to measure OEE at the end (output) of the asset, line or process. However, for organisations where production cells are impacted by upstream or downstream operations, or bottlenecks, it may be preferable to measure the OEE in real-time at the bottleneck process. In this way any variations in OEE will correlate directly to upstream or downstream process performance and cause the OEE to act as a trigger or control point for corrective action.

The when and the how to capture this data is very much dependent on whether an organisation is looking to invest in real-time, automated data capture or more manual data capture methods. While manual data capture generally provides sufficient insight to improve OEE scores to a certain extent, once they reach 65% or more the losses experienced are likely to be as a result of more subtle performance issues. Discovering these issues requires highly accurate, real-time data acquisition. For example, while 240 x 15 second stops in an 8 hour shift are almost impossible to record manually, collectively they still account for an hour of lost production.

Moving to automated data capture increases accuracy by measuring every second of production, enables deeper analysis into hidden issues, and reduces paperwork on the factory floor. Automatic time recording also provides a further benefit and the ability to manage plant start-ups.

There is then the choice of data capture methods available to you, either using a process control system or using touch-screen systems.

Whilst fully automatic process control systems, where the time and failure reason is pulled from the PLC (Programmable Logic Controller) to provide accurate time-based information, they fail to accurately obtain the full causal information behind the stoppage. For example, an operator seeing a fault at the end of the line chooses to stop the line by opening the nearest machine guard. As a consequence the alarm list records 'guard open', when in reality this had nothing to do with the true cause of the failure. The key to accurate, meaningful OEE information is the continued involvement of the operator in the process as automated data gathering exercises result in little buy-in/ownership on the shop-floor.

Decide who needs to know what and when - Visual Reports & Alerts

The sharing and dissemination of information is another critical success factor. It influences the overall "ownership" felt across the organisation for the OEE data and improvement programme, and also enables management to respond in a timely and appropriate manner to keep improvements on track.

Determine what kind of communication you require from your OEE System. As well as user-configured and automated reporting formats, it is possible to add in:

- Andon Displays situated at line end show the current status of production
- Dashboards provide an at- a-glance- view of site-wide production
- SMS or email alerts can be triggered and sent to defined individuals/groups

Further discussion of data acquisition and reporting methods, and the associated benefits, is available at http://www.idhammarsystems.com/oee

Is it a single site or group-wide implementation?

OEE Systems can also be used as group-wide tools for driving continuous improvement across a number of sites. This can help identify weaker organisational areas and help to widen the use of best practices. If you are considering a group-wide implementation, it is essential to spend time determining a common standard for capturing and measuring OEE. Small differences in implementation from one site to another can create large discrepancies that mislead the decision making processes. Care should always be taken when comparing OEE scores between lines, plants or sites.

3. Committing to continuous improvement

THE FINAL REQUIREMENT FOR SUCCESS is an ongoing commitment to continuous improvement. OEE is the single metric that can be used to identify where significant losses are being incurred, and OEE Systems can provide the data, and drill down capabilities to support root cause analysis and solution evaluation. OEE Systems provide an excellent tool to help you to focus your improvement efforts, supported by data capture systems that provide real time intelligence and valuable insight into your processes.

However, these tools need to be used in collaboration with an ongoing problem solving strategy and CI programme to result in performance improvement.

A well implemented OEE strategy should become evident on the balance sheet through improved material utilisation, reduced labour variance (straight and overtime reductions), reduced scrap costs, reduced rework costs, and other burden account reductions.

OEE Systems - handling questions and objections

AS WITH ALL TOOLS there are opportunities for OEE and OEE Systems to be applied and used incorrectly. As a result, this can cause a legacy of misinformation about its real use and benefit. The following section discusses ways to overcome five of the most common objections and questions:

Scores can be manipulated, so why bother measuring OEE?

Clearly, as with any metric, the OEE score can be manipulated to achieve an end. Too much focus on OEE to evaluate the performance of an asset, plant or person, as opposed to using OEE as a change management tool, can place undue pressure on people to manipulate the results. However, by recognising this fact from the outset, many organisations have been able to avoid this pitfall through sound management practice, careful implementation and robust set up of the OEE System in their environment.

The most common approaches to OEE manipulation include:

- Basing one or more ratios on plan versus theoretical maximum, working the numbers in your favour, such as running the asset for an additional shift, or cranking the speed temporarily to 11 units/hour, or reducing the scrap rate by holding off on unnecessary setups and changeovers.
- Influencing the 'available time' figure used for a piece of equipment when calculating utilisation. Hard-liners argue that every available hour in the year should be considered, as only when a machine runs 24hours, 365 days per year is it being 'fully utilised'. Others argue that it should only be the hours which are 'scheduled' as the former calculation would result in a very low number for a plant only working 8 hour shifts. .
- 'Cheating' when OEE data is collected manually at the end of a shift, without the appropriate level of supervision and accountability.

There are a number of ways to avoid this manipulation and to ensure the successful implementation of an OEE System:

1 Firstly, by helping operators and managers to understand the reason for the implementation, and ensuring that there is full buy-in to its use.

2 By providing appropriate training that shows how the metric is made up and how the system can be used to drive the improvement agenda cross-functionally.

3 Then by reinforcing the need for accurate data capture and by providing appropriate data capture techniques, checks and balances.

4 Finally by ensuring that the OEE metric is never used to reward or penalise employees.

The real measure of the success of an OEE System implementation, lies less in the actual rise of the OEE score, but in the organisational capability to either produce more in the same time, or achieve the same levels of production in less time.

It's not just OEE that's important, what about other business measures?

Information is the foundation of intelligent business decisions, including making trade-offs, and OEE Systems are capable of providing a high proportion of the information needed to make decisions but the metric is not designed to be, and should not be used in isolation

While it can be assessed and reviewed independently, it is important to understand the effect on the system and organisation as a whole. OEE can, and should, be used in conjunction with other lean tools and techniques (for example, 5S, Six Sigma and TPM), to determine and drive improvements. Together with OEE, these tools

provide the framework for decision making with additional pieces of information such as asset utilisation, productivity, reliability (MTBF), and total cost of ownership.

Moreover, it has been shown that there is a direct correlation between improvements in OEE and improvements in wider business concerns such as energy consumption and maintenance costs. A number of case studies exist to illustrate this phenomenon, including the use of an OEE System at the British Bakeries Division of Premier Foods available at www.idhammarsystems.com/case studies

OEE is an aggregate measure, what about root cause analysis?

Some people will argue that, due to its aggregate nature, OEE metrics fail to assist diagnosis of the underlying problem. However, authorities on lean manufacturing would argue that by taking three different manufacturing elements into account, OEE is actually a more balanced metric that highlights the interplay of different factors. Furthermore, with an OEE System such as the one from Idhammar, powerful drill-down capabilities enable greater analysis of the data and easier identification of the root causes.

Who is accountable for the OEE score?

In fact, measuring OEE can really help with eliminating the finger pointing between maintenance and operations functions. While the maintenance function may have a bearing on availability and performance through planned maintenance, breakdowns and failures, often these two major losses are also impacted by operations staff. Maintenance alone cannot address all of the major losses captured for OEE. This is also why OEE is used as part of Total Productive Maintenance (TPM) framework, where the entire organisation focuses on eliminating the major losses.

Measurement systems are valuable tools to identify problems and opportunities. The measurement system itself is not the answer - it is the resulting data and information that helps to discover and quantify the problem, and validate the effectiveness of the solution identified. A well integrated OEE system should provide the data to answer the questions on everyone's mind -"What do we need to do to improve?" or "Why aren't we improving?"

85% OEE is world-class, so should we chase that score?

Over the years the idea of an 85% world-class OEE score has been incorrectly disseminated. The idea of measuring against a world-class performance benchmark is a misconception as scores vary greatly between organisations and assets and depend entirely on your processes, industry, equipment and operational requirements.

Whilst comparing the OEE score between assets, departments, divisions, or even companies can be very misleading, the trend of improvement is a valuable pointer to show the health of a process.

Next steps

FULFILLING THE PROMISE OF OEE is no easy task. It takes a focused approach, the backing of senior management, the dedication of cross-functional staff and the right combination of technology and best practices to unleash the full potential of your manufacturing operation.

The first steps:

1 Evaluate your current position - realistically assessing your organisation as it stands today. For example, what are your biggest business challenges? What do you need OEE to help you to do - identify ways to product more in the same time (MIST) or the same amount of production in less time (SILT)? Where is your greatest opportunity to improve and where are the barriers to success?

2 Launch this new phase of the continuous improvement programme - no matter what system you choose, OEE is a fundamental tool that fits in, and helps to drive this programme.

3 Determine the project sponsor from a management level, in our experience a hands-on approach is required for success.

4 At frequent intervals ensure the project sponsor asks first line managers to explain the current top 5 losses, and to describe what has been done, in recent weeks, to resolve them, and the progress made.

5 Appoint a cross-functional team, empowered to determine OEE System require ments and establish organisational needs, including training etc. This team must include a member of the IT function.

6 Set realistic goals, targets and objectives to measure the return-on-investment of your system implementation

7 Choose the right OEE Systems supplier to partner with you in order to meet your specific requirements

With a focussed approach, careful planning and the right technology partner, many companies have quickly and measurably improved the performance of their operations.

For a wide range of OEE System implementation case studies, and more information on the Concept of OEE, and OEE System Benefits, please refer to our other white-papers available on our website at www.idhammarsystems.com/resource library.

Alternatively, to discuss your specific requirements, or to arrange a convenient on-site demonstration:

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