

Factory Efficiency . . . Creating Shareholder Value

- Jan Brons, President
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One of the biggest profit and positive cash flow opportunities today for manufacturing companies can be created through improved factory efficiency. OEE (overall equipment efficiency) is the common denominator that should be used to measure and benchmark performance.

There is a tremendous amount of funds tied up in factories, and this generally requires a constant capital investment flow in technology, machines, factory improvement, and buildings. Then there is the investments needed in people and education.

OEE is a key ingredient that determines shareholder value but unlike the normal balance sheet assets and financial ratios this is a component that does not appear on financial statements and hence is mostly lost to financial analysts. This need to change if the shareholders have an interest in how their assets are utilized (or underutilized). Because OEE is generally not a published financial ratio, it generally gets less focus by company management. At the same time with a management focus this is something that can be continuously improved adding significantly to the profitability and reducing the amount of capital expenditure.

It is known that overcapacity is a common problem in most factories. In Japan for instance, overcapacity is estimated at 25%. Due to the “unknowns” i.e. efficiency factors that are still hidden, this figure is likely 10% higher. This is certainly one of the factors contributing to the negative economic situation in Japan. Very little capital investment can logically occur until this situation is corrected. With negative to low growth this can take a very long time. Hence not paying attention to OEE can lead companies into the danger zone both in terms of profitability and cash flow. The upside is that there are potential “hidden factories” in many companies today, and exploiting this will bring tremendous opportunities to an enterprise.

How can this be executed ?

Firstly you need to benchmark performance. A good place to start is to look at total shareholder return of companies over a period of 5 –10 years. Whilst there can be exceptions it is almost certain that the top performers also have a high level of OEE. Take the forest industry companies as an example. Despite a cyclical demand and sluggish performance overall the best companies are good value creators. They do most things right, but due to the financial pressure in this industry the leaders in this industry had, and still have an intense focus in running very efficient factories, which in no small way contributed to the value creation.

For multiple factory enterprises, benchmark the various factories with each other. This can be done by paper machine in the paper industry, machine tool channel in the automotive industry, robot manufacturing cells, etc. What you will inevitably find is that there are

variations in efficiencies for the same type of factories with the same type of repetitive processes.

Whether single or multiple factories, benchmarks can be found. There is thus no reason to assume that for similar factories best in class OEE is indeed achievable.

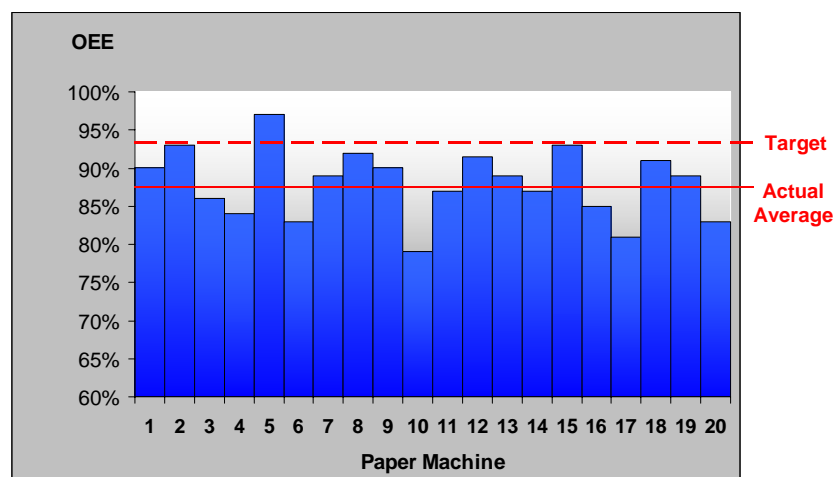
After benchmarking is completed the following steps are necessary:

1. Determine KPI" (key performance indicators) to achieve best in class. This can be just a few, say 5-10 or many more. The importance is to rank them in terms of priority and benefit. KPI 's can include changing maintenance practices, operator multi skills, machine setup etc.
2. Establish what processes, people, skills, culture etc are needed to implement the particular KPI. Determine investments necessary and ROI, taking into account both tangible and intangible benefits from improved OEE.
3. Priority/Benefit ranking may change due to the result of 2.
4. Proceed with implementing using the well-known TQM methods.
5. Continuously measure and publish results.

Whilst this is a simplification, the process is really not difficult, 70-80 % of the benefits can be reached by applying proper process and making sure that a culture change takes place where necessary. **Naturally this assumes that most necessary systems are in place to manage the enterprises assets, however a key factor is very much up to management to drive optimization of these systems (e.g., is the CMMS used as a work order system or is it effectively applied as a Enterprise Asset Management tool?).** Although many plants may need technology investments, most of the improvement opportunities are however, a function of effective process implementation.

Asset Efficiency Optimization (AEO) must be a key and measurable responsibility for every plant manager and CEO. There are many facets to AEO and it is not the intent of this article to go into these details, however a key component or lack thereof that can influence OEE is effective knowledge management. In our second example comparing the efficiency of paper machines, it is apparent that the company has not paid attention to what makes paper machine number 5 runs much more efficient than machine number 10.

Paper Machine Efficiency Within 1 Company



It seems obvious that this is a good place to start , but it is surprising how few companies use the knowledge already existing within their group to improve performance. Again it requires a discipline, management focus and ownership to execute the improvement. Today new technology in Decision Support Systems are available to actively create knowledge sharing and automated decision algorithms between similar factories or product lines. This is also a great tool for management to ensure that the best practices are shared and applied.

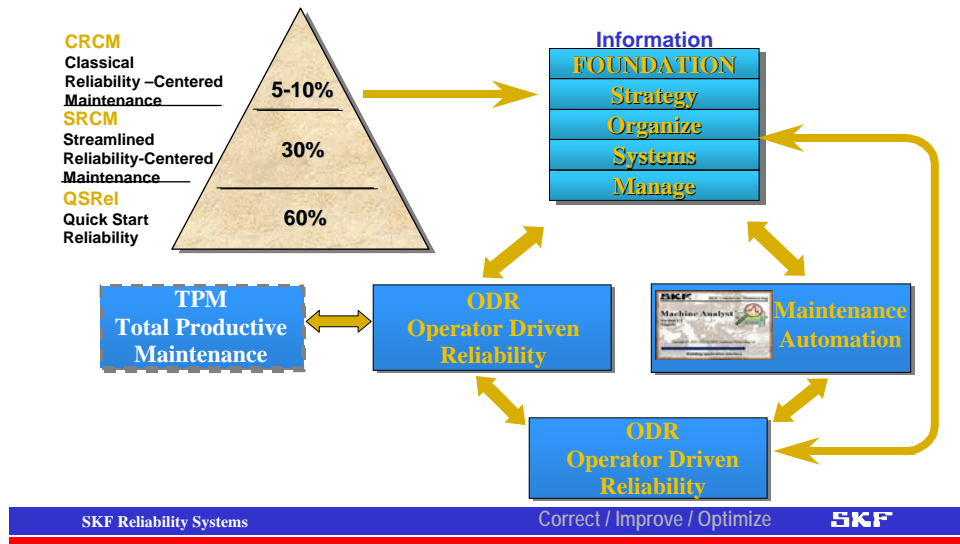
In today’s economic environment managing OEE and being accountable for this must be demanded by shareholders everywhere.

SKF Reliability System Offering . . . Positioning AEO in the Factory of the Future

The section following should be read in conjunction with the SKF publication “The Guide to asset efficiency optimization for improved profitability”.

AEO Strategy in Your Plant

Planning Your Enterprise Asset Management Program



The Schematic above is a one page asset management strategy. For most manufacturing/ Process companies one of the main KPI’s to increase profitability is the effective management of the enterprise assets (including a company like SKF).

One of the fundamental issues we see with most of our customers is the fact that they do not have a effective maintenance and asset management **strategy**. This does not imply a philosophy document but in detail a plan (which we call the living plan) on the effective implementation of the various maintenance process (e.g Reactive, Preventive, Predictive) and how the production lines and each machine (in terms of criticality . . .Production, Safety, Environment) should be managed. Criticality, will determine which maintenance philosophies must be applied, and will determine what technology/process is optimum to execute this. SKF offers a number of processes to assist with establishing a proper strategy.

1) QSR (Quick Start reliability) determines if the various maintenance philosophies (Preventive, Predictive, Operator Based) are operating effectively and how this can be improved if required. Some basic fundamentals are reviewed, such as:

- Is a functional asset register in place and is it regularly reviewed and updated.
- Are standard job plans and procedures properly structured, updated, regularly reviewed and properly stored for shared access.
- How is planning done. (Is there a good understanding of which jobs needs to be prioritized and why)
- How is scheduling done. (Good planning does not necessarily mean good scheduling and vice versa)
- Does the Predictive program deliver results and how is this reported.
- Is the Maintenance Management System more than just a work order generator and is this set up according to a maintenance strategy
- How should maintenance department be organized for a more effective execution
- Etc

2) SRCM (streamlined reliability centered maintenance) is one of the criticality techniques used by SKF. With a criticality study we look at the cost/profit impact of plant equipment failure on production, safety and environment. FMEA studies are executed.Assets are then ranked based on this criticality study and maintenance processes recommended accordingly. This also provide the basis for prioritizing work orders in the maintenance management system (CMMS).

3) CRCM (Classical RCM) is similar to the above, but analyzes every component of a plant and the failure impact. This study takes a long time to complete and is generally recommended where there are real integrity issues with a entire system. (Aircraft as an example).

We find that for many of our customers the basics are not in place and hence we apply the QSR process. Criticality is a necessary process to complete for most larger manufacturing/process plants and can be done in tandem with or after the QSR process.

The above processes are **the foundation** of our strategy work in a plant, and forms the basis on how a maintenance department is **organized** and how the Maintenance Management **system** should be structured. Without this work, more often than not, a maintenance management system becomes very much a work order generating system , rather than a asset

management system. A correctly structured system will prioritize work orders according to criticality, ensure proper planning and scheduling of preventive tasks and help in prioritizing KPI's (among other).

Today we see that most companies do not have these fundamentals in place and this does establish the **foundation** for what has to happen in an effective asset management and maintenance operation.

Maintenance Automation

We recommend the automation of maintenance processes where possible. For example, this can apply to Condition Monitoring and Lubrication Systems/Management. Where economically viable we recommend online monitoring and installing lubrication systems. The latter can be from basic tools to advanced multipoint systems. This is not only for cost savings, but more automation **ensures consistency** in executing a specific program.

ODR (Operator Driven Reliability)

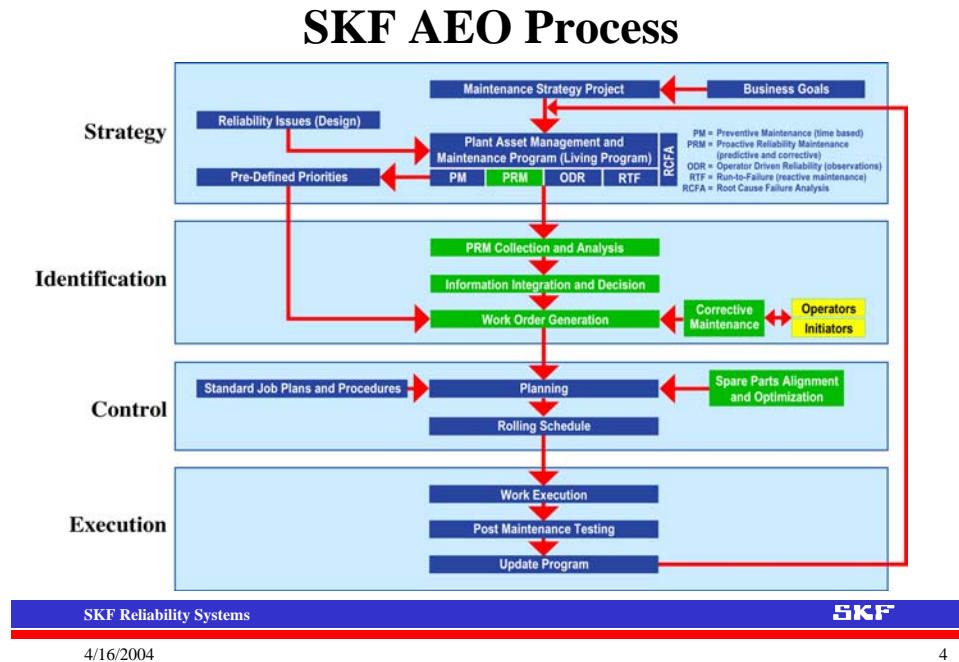
The operator can play a major role in equipment reliability, as they are the first line of defense for machine protection, maintenance and monitoring. This does imply a process and toolset where the normal operator functions (process, flows, lubrication, gauge readings) are incorporated in a smart device which also provides basic red light/green light warnings on impending failures and provides instructions (from a decision support system) on what actions to take. This also releases the Predictive Maintenance people from data collection tasks, which are now executed by the operators. The ODR program is linked with the TPM program of a plant. A ODR program may change the maintenance strategy ,e.g some machines/components that were previously classified as run to failure can now be monitored, by operators as part of their normal inspection routine without incurring more costs.

DSS (Decision Support System)

The DSS becomes the key process/tool to link all the processes (including production) together. Decision algorithms for machinery management are stored in the DSS as a example, and these decisions can be relayed to the appropriate owners via a online monitoring system, operator systems, PLC, pagers, mobile phones etc. The DSS captures all critical knowledge and can share process/machine improvements between similar assets on multiple sites. The DSS can also be used to manage/monitor determined KPI's for a plant or multiple plants.

This strategy combines a number of processes and technologies for effective enterprise asset management execution. It is all about generating higher profits. It provides structured information to all who need to know, facilitates management of company KPI's, and determines what machines/components/processes can be improved and optimized.

The AEO (Asset Efficiency Optimization) process below is what we apply and is self-explanatory.



Conclusion

- Factory efficiency improvement has large profit generating potential
- Depending on the industry and current status, every 1% increase in OEE = 5% increase in operating profits
- Naturally impacts investment decision, e.g., build new plants or run existing capacity more effectively?

That is why managing Asset Efficiency Optimization is critical for managers of manufacturing/process operations - - starting with the CEO!

The good news. . . .

- 1) It is not hard
- 2) The right technology helps
- 3) But it is predominantly about effective management of Process and Culture.