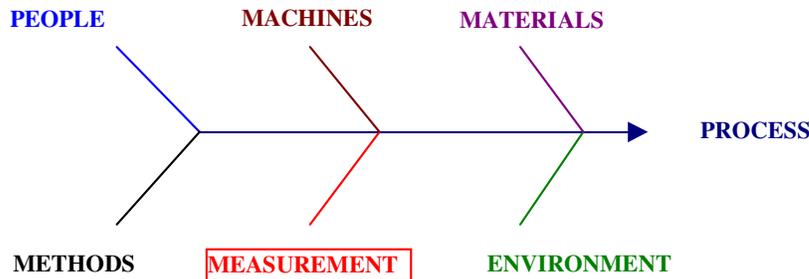


Efficiency – Line Measurement



Line efficiency is one of the most emotional topics in a packaging plant. As a result it is important that figures are on time, calculated correctly and that they portray the correct message. Initially efficiency was measured over the time that was available for production. Take as an example a 2 x 8 hour shift operation running for 16 hours per day. If it takes one hour to start up the operation and two hours to close down, with half an hour per shift allowed for breaks, the efficiency would be measured over 12 hours. This can result in the manipulation of the efficiency figures, thereby creating a false picture.

Today, there is a much greater emphasis on yield, which is measured over the full period. Therefore, using the above example, it would be calculated over the full 16 hours. Terms like ‘sweating the assets’ have entered the vocabulary, and benchmarking has become the norm. It is therefore very important that there is no ambiguity, and when comparisons are made, it is like for like.

The working day often starts with the question ‘What efficiency did we get yesterday?’ The yield figure is fine as a reply, but alongside this should be two other figures, operation efficiency and utilisation. If the yield figure is the only one that is given, it is open to too much interpretation and innuendo. Hours can be wasted discussing irrelevant information. I have actually seen figures over the years become less and less relevant to those that specifically require them, and senior management being overloaded with information through management systems such as SAP. This is not healthy, as it can be responsible for creating a blame culture. Investment in a real time measurement system would improve this, but again, only if it is done properly. It must be geared for use by the shop floor in order to allow improvement initiatives to be carried out at that level. So what is yield? This is the good production in the warehouse divided by the rated output of the line to give standard hours. This is then divided by the number of paid hours. So for a three shift x 8-hour operation, this would be 24 hours.

Standard Hours = $\frac{\text{Production in the Warehouse}}{\text{Rated Output /Hour of the Line}}$

$$\text{Yield} = \frac{\text{Standard Hours}}{\text{Paid Hours}}$$

So, if a line produces 1000 cans per minute for 44cl cans, output is 26,400 litres. In the warehouse after 24 hours we have 45,000 trays x 24 x 44cl cans = 475,200 litres. So Standard Hours = 475,200/27,400 = 18 hours. Yield therefore = 18*100/24 = 75%. Depending on the activity, this figure could be really depressed. It is important therefore, to also show the Operation Efficiency. For this figure, the Operating Hours are used. The paid hours are adjusted for the number of planned hours that the line is down for.

Planned Hours = Time allowed for changeovers (from measurement!), maintenance, meetings etc

Operating Hours = Paid Time – Planned Time

So if planned time is 2 hours, the Operation Efficiency is 18*100/(24-2) = 82%

To keep a check on planned hours taken it is a good idea to record line utilisation during paid hours.

$$\text{Utilisation} = \frac{\text{Operating Hours}}{\text{Paid Hours}}$$

So for this example, Utilisation = 22*100/24 = 92%

The yield, operation and utilisation figures will provide useful data. For example, changeovers, an extra long meeting and maintenance time can be easily identified. However, there will be days when there are other reasons such as machinery breakdowns, component problems/shortages, shortage of labour, skill shortages and so on. This is where the controversy becomes an issue, and when good information pays dividends. To make matters worse, you are potentially discussing someone else's shift, and they are not represented or involved in the discussion. For this reason, I advocate a good line monitoring system (LMS), something that not many companies have, either because they have had a bad experience with one, or they do not wish to spend the money.

The good thing about a system today, is that the management information (MIS) can be fed into any management package such as SAP that is already in place, and at the same time the shop floor are motivated by receiving the information they need. I have recently come across one such system that provides the solution to these needs. This is produced by a Spanish company in Barcelona called Adbrantage. It is not cheap, but it is definitely worth the investment. The system will tell you where the problems have been, and also whether the line is working in balance or not. It is designed to be operator friendly and the information report is well laid out. (See figs 1&2)

Figs 1&2 Examples: Adbrantage Screen Display??

So many systems only go half way and that is why they are often not used; or they can go to the other extreme and be far too complex.

A correctly designed system ensures that managers spend the minimum amount of time in the office, thereby maximising their focus on line issues. Measurement in real time gives many other advantages as well; this would include informing component suppliers of the status of the production line; this ensures that components do not run out or become over stocked. The same goes for finished goods. A much more efficient form of communication can be set up with warehousing and transport as they will have ready access to production information. Another benefit is providing the finance department with ready data that allows, for example, a more accurate costing of individual products. This is especially important for products with short runs and long changeovers.

The accuracy of information is important for many reasons. Preventative Planned Maintenance (PPM) relies on it – see November Issue of Canning & Filling. This information will also support Total Productive Maintenance (TPM) activities discussed in the same article. For TPM to be successful the correct machines need to be targeted for improvement, so that full analysis can be carried out. Furthermore, this accurate and easily accessible data allows properly informed decisions to be made on machinery and plant.

This article would not be complete without mentioning financial measurement. Accountants can be perceived as being supportive or as a threat. They will always be there, so it is wise to keep them on your side. This is especially important today as data is not as visible as it once was. We need to know how the business is performing against the challenging targets that are set for us, and help the operation to keep them on track. Two measures, which I am familiar with, are PMDO (Costs of People, Maintenance, Depreciation and Others) and TDEC (Total Delivered Economic Cost). ‘Others’ would include items like site maintenance, canteen etc. TDEC would include the cost of materials and waste – the variable costs. These costs, and certainly the PMDO element, are often used for benchmarking and would be expressed against a unit of production; this could be, for example, per litre or hectolitre (100 litres) or per case. Where a good accountant can be extremely helpful, is in pinpointing where the variances are, making it much easier to find the source of a problem.

Measurement is a wide-ranging subject and I hope the points made above will give some food for thought. The key is to ensure that complexity is kept to minimum, and that figures are on time, even in real time. If figures are not understood fully or they are late, continuous improvement will be hindered significantly