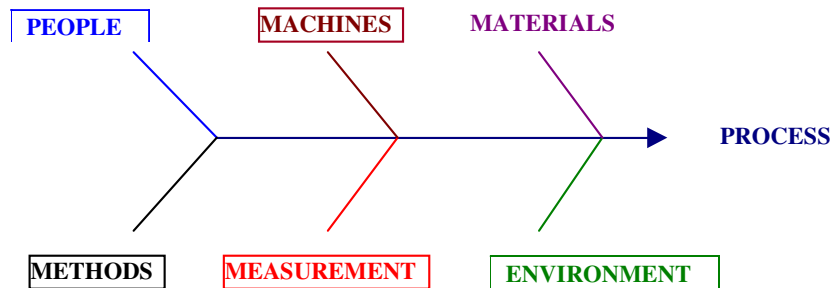


Efficiency – Changeovers

This month changeovers is the theme:



Changeovers have become a big topic over the past few years with diversification of products, globalisation and economic consumer response (ECR). ECR is all about fast response to consumer demand and taking inventory out of the supply chain. None of this helps the producer, and in fact there is very little over the last five years that has! Manufacturing has had to cope with reducing costs, which inevitably means less resource, shorter runs and more stock keeping units (SKUs). The manufacturer therefore needs all the help he can get. We have already discussed good maintenance; this is a vital ingredient to good line performance – especially after changeovers.

Most manufacturers are now faced with too many changeovers, and ridiculously short runs. The appeal is for sensible planning, rationalisation of product - in order to reduce the level of changeovers, and innovation that fits as closely as possible to manufacturing facilities already available. On many occasions I have found that planning schedules could be changed – this is especially important with a difficult product when longer runs are needed for the line to settle down. Planners can be adamant as their focus is demand, but after discussion it can often be found that a product can be produced fortnightly rather than weekly. Planners are measured on Customer Service not Production Efficiency! The message for production is to do everything possible to limit changeovers in the first place.

I know a company who recently installed a new bottling line. It was only at this moment that they looked at rationalising the different bottles used. Rationalisation need not mean every product going into the same bottle, it can also mean bottles produced with the same diameter. The project team worked with the glass manufacturers and marketing, and ended up saving significant sums on change parts and changeover times. Why wait for a new line?

An activity programme for this approach is shown in fig 1. This can take different forms according to the components used, but a similar interrogation and result is required.

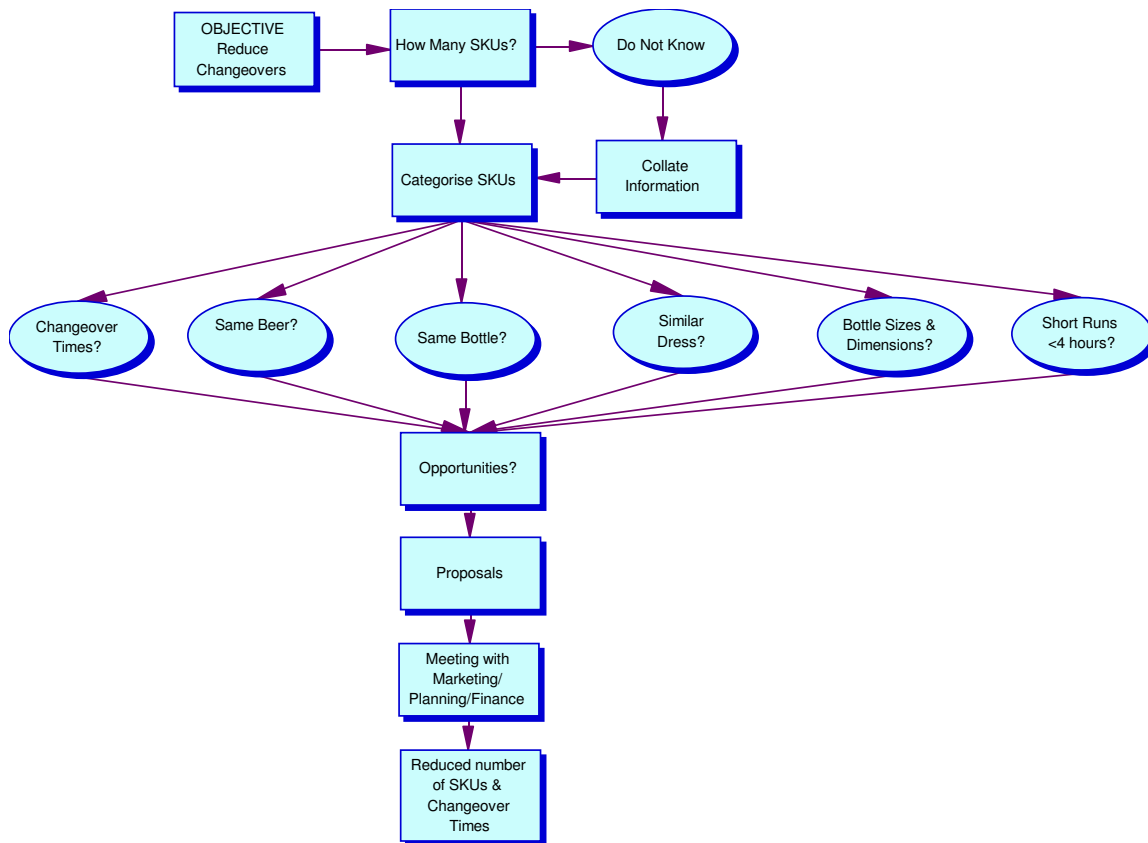


Fig 1 Flow diagram showing approach to changeover reduction

Having carried out this exercise and being sure that you have the best you can get, work now needs to be carried out on the shop floor so as to ensure that the best situation for changeovers exist. What approach is therefore necessary to ensure that changeovers are carried out? One cliché that sticks in my mind is ‘A place for everything and everything in its place’. At Guinness we had a person who championed this and it went well. Coloured boxes were painted on the floor for components etc and cupboards were made to tidy away cleaning materials close to their point of use. This is certainly a good place to start. Today, you will hear more about the 5’S’s which have been central to the Japanese methods that have evolved since the end of the Second World War. The objective is similar but there are clearer messages enveloped in this approach. There are many translations of the Japanese words but the interpretations are similar no matter what you read! The 5’S’s are as follows:

- *Seiri* – Sort – the first important thing is to sort out what is and what is not needed. If an item is not going to be used during the next 30 days, take it away and store it in a separate location where it can be easily located at a later date. Other components or parts can be stored close by. The only items that should be directly visible in the workplace are those items directly associated with current production. The important issue here is that ‘the workplace is left uncluttered’

- *Seiton* – Straighten out or Orderliness – items that have been sorted out after *Seiri* need to be arranged in an orderly manner. Racks need to be made and these should be properly labelled. All parts must be easily accessed.
- *Seiso* – Scrub or Cleaning – this means clean everything – tools, machines, change-parts, floor, ceiling – it should all be impeccably clean.
- *Seiketsu* – Standard of Cleaning or Cleanliness – this extends the concept of cleaning to making it normal work practice that becomes a checking and active routine. It emphasises that it needs to be done daily, and that it is not a ‘one off’ exercise!
- *Shitsuke* – Sustain or Discipline – the four ‘S’s above need to be engaged within a standard for the plant so as to ensure that it is maintained. It should be constantly audited – more frequently after it has been introduced.

The above, when adopted, clearly assists in achieving smarter changeovers and prevents the panic when looking for parts that you were sure were there last time. Indeed, in my experience, it was probably another shift that did the changeover anyway making it easy to blame someone else!

In the October edition of *Canning and Filling* the subject was ‘Maintenance’. Total Productive Maintenance (TPM) was discussed and it is through this that machines can be improved to give quicker changeovers by, for example, good settings and parts that fit properly, or even modifications to give faster setting up and settling down times. One simple thing that really helped us was having colour coded change parts. These are made tailor made to suit specific component sizes, e.g. 275ml, 330ml and 500ml bottles. Many manufacturers are now adopting this principle. The important thing is to ensure that a reputable company makes the parts, as they must be a good fit. I have dealt with one such company, Zepf Technologies. Apart from making change parts for existing machinery, they have agreements with filler and labeller manufacturers to make change parts on their behalf.

We have now covered three activities:

1. Reduction in the number of changeovers
2. Sorting out change parts through the 5 ‘S’ philosophy
3. Making machines easier to changeover

This leaves one outstanding activity, and that is the methodology. Enter the Japanese once more! Shigeo Shingo started carrying out some productivity improvement work at Toyota in the early 1950s. It was here, when trying to improve ways to improve the utilisation of large body presses, that he first had the idea of separating the changeover operations into two fundamentally different types, ‘Internal’ and ‘External’.

Internal Set Up – such as mounting and removing dies that can only be carried out when the press is stopped

External Set Up – such as transporting the old dies to storage or conveying new dies to the press, which can be carried out while the press is in operation.

Shingo had immediate success and it took a further 19 years to really develop it. The final target was to reduce changeover times to less than ten minutes, hence the name given to the method – Single Minute Exchange of Dies (SMED). The objective is to convert as much of the internal time as possible to external set up time. Although the work was carried out in the automotive industry, its concepts are as equally applicable to any production process.

One way to start this process is by recording each element of the changeover on a camera. This, however, can cause great consternation, as we found out! Many people do not like having their actions recorded on camera. Could it be used as evidence?! If you can do this or indeed persuade the team to film themselves doing it, it is worthwhile for analysis purposes. Here are two very useful exercises that will complement this activity:

1. Carry out a changeover study on a sheet that gives:
 - Event order
 - Description of Event
 - Event Time (plus box for ‘total time’)
 - Elapsed or Cumulative Time (plus box for ‘total time’)
 - Bar Graph for Event Time against each activity
 - Box marking activity as Internal (I) or External (E)

See fig 2

CHANGEOVER STUDY – OBSERVATION SHEET

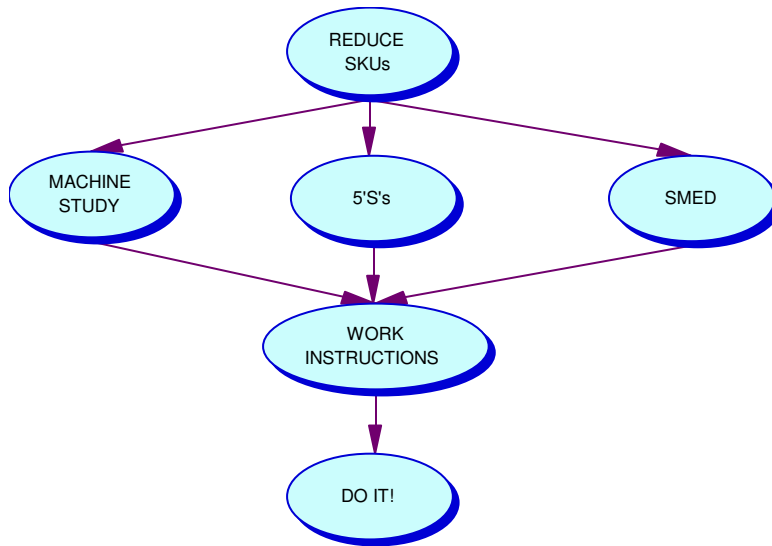
Event No	Event	Event Time	Cum Time													‘I’ or ‘E’		
				20	40	60	80	100	120	140	160	180	200	220	240			
	Total																	

Fig 2 Sample Sheet

2. A brainstorming session that involves everybody, or a good cross-section of those who takes part in the changeover. Each person is given two differently coloured blocks of post-its, and they write one activity on each post-it – one colour for internal, the other for external. These are then stuck onto a large sheet divided into two boxes, ‘Internal’ and ‘External’. There is then a debate as to what can be moved from internal to external and how much time can be saved with the combination of activities.

From these studies, together with what has been learnt from the 5 'S's and TPM, work instructions are prepared. This in my experience is so often not done, or if it is, it is not done properly. An individual needs to be nominated to take 'ownership' of the whole process, which includes the work instructions and the final and most important bit – the installation across all shifts, training, and the review! Then, once satisfied, hand it over for audit at an agreed frequency. It is important that this is done, otherwise the hard work put in will be wasted, and old ways will slip back! There is no doubt that it is difficult to put all this in place and sustain it, but the rewards are there. Figure 3 shows a summary of the above approach.

Activity Summary



In next month's issue the subject is line philosophy.