

5S Training - Lean Manufacturing Housekeeping

5S Training - The 5s Housekeeping Approach within Lean Manufacturing

What Is 5S?

5S is a set of techniques providing a standard approach to housekeeping within Lean Manufacturing.

It is often promoted as being far more than simply housekeeping and some of the elements described below certainly have broader implications.

It originated, as did most of the elements of JIT, within Toyota.

A cornerstone of 5S is that untidy, cluttered work areas are not productive.

As well as the physical implications of junk getting in everybody's way and dirt compromising quality, we are all happier in a clean and tidy environment and hence more inclined to work hard and with due care and attention.

Naturally enough, the elements of 5S are all Japanese words beginning with the letter S. Since their adoption within Western implementations of JIT, or Lean Manufacturing, various anglicised versions of the terms have been adopted by different writers and educators. These are listed below against the individual elements and it can be seen that none are entirely satisfactory.

Lean Manufacturing Housekeeping 5S Training "pillars"

The individual items within 5S are known as the "pillars" and are:

1. 5s Seiri (Sort)

Seiri is the identification of the best physical Organisation of the workplace.

It has been variously anglicised as Sort, Systematisation or Simplify by those wishing to retain the S as the initial letter of each element.

It is the series of steps by which we identify things which are being held in the workplace when they shouldn't, or are being held in the wrong place.

5S Training - Lean Manufacturing Housekeeping

Put simply, we may identify a large area devoted to tools or gauges, some of which are needed regularly and some used infrequently. This brings all sorts of problems, including:

- Operators unable to find the item they need, being unable to see wood for trees. The time spent searching is a waste (or in Japanese speak a muda) and if we only held the items needed regularly in a prominent position we would save time.
- Quality issues when gauges are not calibrated on time because too many are held.
- Safety issues when people fall over things.
- Lockers and racking cluttering the workplace making it hard to move around or to see each other and communicate.

Some of the standard texts also talk about the elimination of excess materials and WIP. This is a complete restatement of all the JIT goals of releasing capital, reduced movement, shorter cycle times and so on. The question may be asked: should we then see inventory and WIP reduction as part of the implementation of the lean approach or as an element of 5S? The answer, as ever, is that keeping inventory and WIP to a minimum is simple best practice. Whether we view it as JIT, or lean, or 5S or assign any other term is quite frankly irrelevant.

The major element of Seiri is simply a critical look at the area. Involving cross-functional teams, or looking at each other's areas, is an obvious first step. People tend to be blind to failings in their own work place and a fresh pair of eyes can be useful.

Another element of the standard approach is 'red tagging' where items are given a tag which says what the item is, which location it is in and when it was identified in this location. We then leave the area for a while and anybody using the item notes this. We go back some time later and can readily identify things that haven't moved, or been used. Items which have not been used can then potentially be disposed of. As a first pass we should perhaps create a quarantine area before throwing items away, selling them or reworking them into something else. Other items may be deemed necessary but used infrequently and so an alternative location can be found. If the operator needs a particular tool only once or twice a month then a 20-yard walk is not a problem - especially if the space thus saved on the workbench helps to make the workplace more productive, or helps address quality issues.

5S Training - Lean Manufacturing Housekeeping

5s Housekeeping Training

2. 5s Seiton (Set)

Seiton is the series of steps by which the optimum organisation identified in the first pillar are put into place.

The standard translation is Orderliness but again some wish to keep the initial S and use Sort (yes, that is also one of the translations of Seiri), Set in order, Straighten and Standardisation.

The sorting out process is essentially a continuation of that described in the Seiri phase. Removing items to be discarded or held in an alternative location will create space. This space will be visible and facilitate the alternative layout of the area.

In some cases, of course, we are talking about what a fitter will have on his bench, or in racks alongside the bench. In other cases we may be considering where we should locate a piece of plant - for example we may relocate a coin press to enable items to be completed in one work area rather than requiring a significant movement down the shop.

This is something which we also undertake when adopting cellular manufacturing. We then look at how we can restructure the work content so that certain operations can be carried out within the cycle of others - for example we may carry out a trimming operation on a steel component while the press which produced it is busy creating the next one. Again, is this a 5S initiative, or part of a kaizen programme, or something else? Again, who cares, as long as we get on and achieve an improvement in business performance?

Standardisation includes all the elements of setting out a consistent way of doing things. This includes standard manufacturing methodologies, standard equipment and tooling, component rationalisation, drawing standardisation, consistency in the documentation which accompanies work, design for manufacture (or concurrent engineering) and standardisation in the clerical processes which deliver work to the shop floor and track its progress.

All of this could be said to be part of a basic Total Quality approach. The standard ways of doing things should include poka-yoke or error-proofing. Again it might be asked whether this is part of 5S or one aspect of a broader programme.

5S Training - Lean Manufacturing Housekeeping

5s Training

3. 5s Seiso (Shine)

Anglicised as Cleanliness but again the initial S can be retained in Shine, or Sweeping.

The principle here is that we are all happier and hence more productive in clean, bright environments.

There is a more practical element in that if everything is clean it is immediately ready for use.

We would not want a precision product to be adjusted by a spanner that is covered in grease which may get into some pneumatic or hydraulic fittings. We would not wish to compromise a PCB assembly by metallic dust picked up from an unclean work surface. Other issues are health and safety (perhaps slipping in a puddle of oil, shavings blowing into people's eyes) and machine tools damaged by coolant contaminated by grease and dust.

The task is to establish the maintenance of a clean environment as an ongoing, continuous programme.

Some time should be set aside for cleaning each day, or each shift. (We may have cleaners who come in a sweep office floors, and even clean the floor in a production area, but they do not clean the production equipment. Even if they did, this would miss one of the opportunities available - an operator cleaning and lubricating his machine tool will spot worn or damaged components.)

Cleaning then begins to impinge upon what we already know as preventive maintenance. Cleaning critical components of a piece of equipment is already one element of the activities carried out under the PM banner.

The implementation of Seiso revolves around two main elements.

The first is the assignment map which identifies who is responsible for which areas. The second is the schedule which says who does what at which times and on which days.

Some of these happen before a shift begins, some during the shift and some at the end. Again, this is very reminiscent of what we do when adopting PM.

The standard texts such as that of Hiroyuki Hirano then go on to talk about establishing the shine method for each item / area. This includes such elements as agreeing an inspection step at the beginning of each shift, establishing exactly how each activity within the programme is to be carried out. A key aspect is very much akin to set-up reduction (or SMED) in that we should be aiming as much as possible to internalise the activities - in other words, to minimise the downtime needed to keep the facilities clean.

5S Training - Lean Manufacturing Housekeeping

Finally the standard texts talk about preparation - making sure the equipment needed to clean is always available, always ready for use. The best parallel to this is, again, with set-up reduction, which itself is often compared to Grand Prix teams preparing to change tyres. As with many such topics, we are talking about here is to a large extent simply common sense. We do not wish to allocate 5 minutes for a bed to be swept on a piece of grinding equipment if the operator is going to spend 4 minutes finding his brush.

Housekeeping

4. 5s Seiketsu (Standardisation)

This is best described as Standardised cleanup, but other names adopted include Standardisation (not to be confused with the second pillar), Systematisation and Sanitation.

Seiketsu can be thought of as the means by which we maintain the first three pillars. There is, obviously, a danger in any improvement activity that once the focus is removed and another 'hot button' grabs management attention, things go back to the way they were before. Seiketsu is the set of techniques adopted to prevent this happening. Basically this involves setting a schedule by which all the elements are revisited on a regular basis - usually referred to as the '5S Job Cycle.'

The first step in the cycle is a periodic review of the area, perhaps involving red tagging but certainly involving people from other areas of the business. This will identify where standards have slipped - for example where pieces of tooling or fixtures which are used infrequently are no longer being put in the remote location agreed at the outset and consequently a bench is now cluttered with the regular items buried under a pile of irregular. (In other words, the Seiri phase is undertaken periodically - usually monthly, perhaps quarterly.)

The second step is to undertake Seiton activities as required - that is, as prompted by the first step.

Finally within Seiketsu people from other areas visit and cast a critical eye over the state of the area.

Again, an external assessor may notice degradation that is not clear to the people who work in the area. Hirano talks of a checklist within Seiketsu whereby the external visitors mark the area on a number of key criteria defined at the outset of the programme. For example, are the storage areas still clearly defined? Does the tool rack still have clear outlines or profiles for each tool to be stored in it? Does the area meet the general standards of cleanliness?

5S Training - Lean Manufacturing Housekeeping

5. 5s Shitsuke (Sustain)

The final stage is that of Discipline. For those who wish to retain the use of initial S's in English this is often listed as Sustain or Self-discipline.

There is a fundamental difference between Seiketsu and Shitsuke.

The fourth pillar is the introduction of a formal, rigorous review programme to ensure that the benefits of the approach are maintained.

The fifth pillar is more than this; it is not simply the mechanical means by which we continue to monitor and refine, it is the set of approaches we use to win hearts and minds, to make people want to keep applying best practice in shop organisation and housekeeping. In this sense, discipline is perhaps an unfortunate term as it implies people forced to do something, with consequent penalties if they do not.

The way in which management achieves this establishment of ongoing commitment within the workforce depends, of course, on the culture already in place. As with the adoption of kaizen (continuous improvement) or quality circles we have to press the right buttons to stimulate people. If the business has a history of treating people like cattle, giving no credence to their suggestions and simply trying to improve performance by driving the workers ever harder, then enthusiasm for any sort of initiative aimed at building a better environment is going to be hard to generate.

There are a number of elements to any ongoing improvement activity in any business. Which take pre-eminence in a particular organisation varies with the history and culture of that organisation. Suffice to say that key points are:

- Communication. We need people to be aware of what we are trying to achieve, and why.
- Education. They need to understand the concepts and the individual techniques.
- Rewards and Recognition. People need to feel that their efforts are recognised. Whether the reward is a senior manager walking past and saying "that's very good, well done" or some form of award (financial gain, prize or formal presentation of a certificate) depends on the organisation.
- Time. If we want people to spend five minutes every four hours removing swarf from the floor around their machine we have to make sure that we allow them this time. We cannot give this as an instruction yet at the same time push for more time spent achieving productivity targets.
- Structure. We need to identify what is to be done, by whom, and ensure that schedules are updated and clearly visible.

5S Training - Lean Manufacturing Housekeeping

Implementing 5S

Would we want to launch 5S as a stand-alone project, as a complete entity?

The elements of 5S are all valuable in their own right but they simply form part of the bigger picture of establishing best practice. They sit alongside the other elements of Lean Manufacturing, or Just in Time, or World Class and some of the elements in, for example, Seiton (standardisation) are in fact straight lifts from textbooks on other forms of improvement activity. There is nothing in any 5S material, for example, to give guidance on improving the clerical processes for generating production paperwork following receipt of a sales order!

The answer, surely, is to understand 5S as we understand all aspects of other types of improvement and problem-solving activity and then to agree a change programme for our own business. This is not to say that we must not launch a project which we call "5S" - some businesses have more success if improvement initiatives are launched with a generic, well-publicised term as project name. Equally, this is not the best solution in other organisations. Again, the history and culture of the company or the specific plant have to be taken into account when this decision is taken.

~ Ian Henderson ~