



PDHonline Course G302 (1 PDH)

Lean Series - 5S

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2020

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Introduction:

5S represents a simple "good housekeeping" approach to improving the work environment consistent with the tenets of Lean Manufacturing philosophies. The 5S framework was originally developed by just-in-time expert and consultant Hiroyuki Hirano. He based the 5S framework on his earlier work in implementing lean production systems with the name '5S' originating from the names that Mr Hirano gave each step. (Figure 1 shows correlated the steps, Japanese name, English equivalent, and purpose.)

Step	Japanese Name ¹	English Equivalent	Purpose
1	Seiri	Sort	Organization
2	Seiton	Set in Order (or Straighten)	Orderliness
3	Seiso	Shine (and Inspect)	Cleanliness
4	Seiketsu	Standardize	Standardized Cleanup
5	Shitsuke	Systematize	Discipline

Figure 1 – 5S Correlation

While 5S is a housekeeping approach, it is so much more than ‘just another housekeeping program’. 5S does create a new level of cleanliness in factories and offices. However, it also:

- Increases productivity by eliminating the travel and wasted motion associated with searching for materials and tools.
- Improves safety by eliminating clutter and repairing unsafe conditions
- Improves quality by reducing the potential for incorrect installations or the installation of incorrect parts.
- Frees up space and material/equipment by identifying what is needed and eliminating the rest.
- Creates the process stability necessary for implementing the elements of lean.²
- Creates the discipline work habits that are also crucial to the implementation of the elements of lean.³

Beyond these hard benefits, 5S also boosts morale and serves as a sales aide. Employees are happier when they work in a clean, maintained workplace and have the parts and tools at hand to properly perform their work. Additionally, customers recognize that a clean, well-organized, visually managed factory will produce a higher quality part with more reliable delivery times.

5S implementation also can serve as a starting point for the lean journey. It does not require a lot of complex training and can demonstrate to all employees that they can make a difference in their work environment. 5S can also help stabilize operations by

removing the variability associated with poor housekeeping. Finally, it gets everyone involved in making improvements vs. the focus activities associated with most of the other lean tools.

5S Overview:

5S is termed an approach because it is a sequenced process for first raising the bar, then sustaining the gains and finally incrementally raising the bar over and over again. The process of raising the bar starts with the first '3Ss' (Sort, Straighten, and Shine) -- sorting, setting in order, and shining. The gains are sustained by the fourth S (Standardize) -- creating standard work for maintaining and inspecting the first '3Ss'. The bar is incrementally raised by the last 'S' (systemize) when everyone in the organization demonstrates a commitment to keep the program going and the organization starts to develop new ways to prevent dirt, dust, and debris.

5S is not an event or one time project—you will always be conducting 5S!!

Preparing for a 5S Program:

A successful 5S program starts with a commitment from management. While a 5S program requires everyone's participation to be successful--it is management that provides the focus and resources for it's execution. Management must also hold the organization accountable for continuing and growing the program. Finally, managers must be ready to demonstrate their commitment by implementing 5S in their work areas, participating in other areas, and auditing for compliance.

Once management is committed, then some basic planning and scheduling must take place:

- What are the goals of our program—free up floor space, increase through put, reduce accidents resulting from trips, falls and cuts?
- Who will lead the effort in the various areas of the factory and office?
- When will 5S activities take place? (Translation—How will we implement 5S and still make our customer commitments?)
- Who needs training and what will be the training?
- Where will excess items be stored for later disposition?
- Who will make the disposition decisions?

While not monumental decisions, they are all elements of a well thought out 5S program. The roll-out plan should also include steps for kicking off the program, documenting the current state with pictures, periodically updating everyone periodically on progress and celebrating completion of the initial implementation phase as well as on-going sustainment.

The program should ideally be introduced (or kicked off) by the top manager on site. It can be in the form of a memo or during employee meetings-- just so a consistent message is sent about plans and expectations.

Sort

Sort is the first S in the 5S process. It corresponds closely to the Just-In-Time (JIT) principle of ‘only what is needed, only in the amounts needed, and only when needed’.⁴ In the Sort step, we acknowledge that every operation (factory or office) has unnecessary clutter that we must sort through, move around, store, etc to do our jobs.

In the sort step, you are taking a look at your work area and asking 2 questions:

1. What is needed to do my job and should be kept?
2. What is not needed and should be removed?

The answers to these questions should guide your actions. If you don’t need something, then get it out of your area. The proper way to remove items is not however to just throw them out—instead put a tag (‘Red Tag’) on the item and move it to a common area for disposition (commonly called red tag areas). (Note that in lean literature, the sort step is sometimes referred to as a ‘Red Tag Campaign’.) The red tag provides information on what the item is, why it isn’t needed and who made that decision. The red tag will later serve as a way to document disposition of the material. (Figure 2 shows an example of a red tag.)

Tag No: _____

Red Tags for 5S

Category:

RM	Item Name
WIP	_____
FG	_____
Equip.	
Tools	\$ Value
MRO	_____
Other	Date

Reason:

- Defective
- Not Needed
- Wrong Location
- Other (specify)

Evaluator: _____

Disposition:

Trash: _____

Sell: _____

Keep but move: _____

Comments: _____

Figure 2 – Example Red Tag

As you move through the sort step, remember the phrase: ‘When in doubt, throw it out!’ (Or move it to the red tag area.) Once everyone has had a chance to apply their tags and all the red tagged items are removed, then it is time to disposition the items in the red tag area.

The red tag area is essentially a temporary storage area for people to visit and look at what has been removed. Ideally, people find items that can be used elsewhere to avoid purchases. Any items that are broke and cannot be repaired should be thrown away immediately to avoid injury or liability. The remaining items should be dispositioned on a regular basis: sold, repaired, donated, re-located, or thrown away.

Set in Order

In the second step of 5S, we create an environment where ‘there is a place for everything and everything has a place’. We want to set up our storage so that we have what we need, where we need it, and in the quantities that we need. We also want things easy to find, use, and return.

The set in order step is where major productivity gains are created—by eliminating searching, sorting, and waiting. Once we recognize that ‘moving’ is ‘not working’ we can create a work environment that has the materials and tools readily at hand so that we can stay on task performing value added activities.⁵ (In lean series module 303—Flow, we discuss the use of water spiders to supply materials and to take away finished products to further help the cell increase their value-added activities.) To this end, our goals are:

- Eliminate searching time (waste)
- Make things easier to get to and use - most frequently used items nearby.
- Make things easy to put back - maintain the orderliness.
- Make thing understandable at a glance - visual controls.⁶

To support these goals, storage should follow a few simple rules:

- Store items in accordance with frequency of use:
 - Items used hourly should be kept with you or at point of use.
 - Items used daily should be stored close to point of use.
 - Items used monthly or within the last six month should be stored in a central location within the work area
 - Items used within the last 6 – 12 months should be stored at a distance

- Items not used in the last year—red tag
- Design storage to drive First-In-First-Out (FIFO) of all inventory items.
- Label everything-what it is, how much should be there, where it should be.

When conducting the set in order step, do not worry about creating works of art.

Make the storage areas functional, visual, and maintainable.

Follow the same storage rules (functional, visual and maintainable) for visual management with the added requirement that visual management must be easily understood by everyone. When we start to create visual management (signs and labels), we can fall into the trap of assuming that everyone knows the information already. This is a faulty assumption—not everyone knows and most people that *‘do know’* don’t really have a full understanding. Additionally, we forget the primary reason for visual controls is to define the desired “normal” state (standard) so we can quickly recognize any deviation from that standard.⁷ Hence create signs and labels for everything.

Keep the visual controls simple--consider adopting some simple standards around sizes and colors to avoid confusion. Also realize that you will probably not get the signage & label completely right the first time so make temporary (or easily updated) signs and labels—improve and change them as you learn. The key is to just do it! (Figures 3 shows an example of a Set in Order implementation.)



Figure 3 – Example of a cabinet after Set In Order

Shine

In the third step of 5S (Shine), we create and maintain a clean work environment that is organized and free of clutter. The process of regularly cleaning the work area will make it easier to see contamination sources and future maintenance issues that can be fixed before they impact production.

Note that some people confuse this phase with the deep cleaning and inspection activities that are part of implementing Total Productive Maintenance (TPM). In actuality, the implementation and sustaining of the shine phase will be an enabler to the more detail activities of TPM.

Initially, the team will be cleaning (or more realistically scrubbing) everything in the area. Later, once you have completed scrubbing, then you will enter a maintenance and improvement process.

The maintenance and improvement phase of shine is typically where most 5S implementations stall which is why progressing to the fourth and fifth S's are so important. The later phases create the structure and process discipline to sustain and improve the results of the initial shine phase.

During the initial implementation of Shine, you may decide to also paint your equipment. Ideally, if you paint your equipment, then use white paint. By painting everything white, it will be easier to see dirt and contamination for immediate correction. In typical manufacturing settings, we don't want this type of exposure, but when we begin the lean journey we now consider "this exposure" to be "opportunities for improvement". Implied in this new thought process is that the "opportunities" will be corrected, fixed, and prevented.

When your team conducts their first shine activities, don't forget safety. Make sure that all equipment is properly de-energized and "locked out" by properly trained team members or maintenance. Other potential hazards to consider is lifting, pinch points, and sharp edges. It is a good idea to hold a safety meeting to reinforce safety first and to raise awareness of potential hazards before starting.

After you have completed the initial shine implementation, then you will want to maintain your gain. Taking pictures of the newly shined area will create visual standards for the area and make for easier audits later.

Standardize

In the fourth step of 5S (Standardize), we need to create the Standard Operating Procedures (SOPs) for maintaining the first 3S's. As Hirano put it: "We define it as a state that exists when the first three pillars---Organization, Orderliness, and Cleanliness---are properly maintained."⁸ The Standard Operating procedures should:

- Determine the steps necessary to sustain the first 3S's:
 - Break up the areas into zones and assign ownership for future cleaning activity

- Assign ownership for common areas for future cleaning activity
- Identify cleaning and inspection activities with required intervals
- Document these tasks using standard checklists. (Use the pictures from the Shine phase to visually establish the expectations.)
- Schedule time for completing the interval reviews.
- Create a process for improving 5S based on findings from the reviews (i.e. implement countermeasures to prevent sources of dirt and contamination.).
- Create an audit process for verifying that reviews are taking place.

Remember SOPs should be specific, use visuals to reinforce the words and use a format that allow editing to incorporate learnings. The documentation should highlight identification of the abnormal so corrective actions can occur. Visual boards should be used to show the status and the findings of the reviews. Additionally, emphasize the importance of using the 5-whys to determine root causes of dirt and contamination so that they can be eliminated permanently.

Systemize

In the fifth and final step of 5S (Systematize), we want to create an environment where 5S has been adopted as a way of life and people are continually thinking of ways to make things better. It becomes a disciplined habit vs. a special program or an initiative.

Think of the systemize phase as an inflection point—where either the organization has raised the bar on Organization, Orderliness, and Cleanliness or has just completed an intensive clean-up project!!! The success of systemizing 5S will rely on the commitment (and involvement) of management at all levels. Lack of management

commitment is the root cause of most 5S implementation failures. Management (from top to bottom) must be seen supporting the program:

- Everyone must be conducting 5S walks—auditing processes and questioning the trends on the visual boards.
- Every manager must be demanding root cause for reoccurring problems.
- Every manager must be asking about what 5S improvements the teams have made (and sustained).

Additionally, the 5S program needs to be continually refreshed. Top management must periodically raise the bar on 5S—by increasing cleanliness standards or challenging the time required to complete 5S activities (while still maintaining current performance).

Other refresh activities include:

- The checklists need to be periodically reviewed and updated to reflect changes.
- 5S training needs to be included in new employee training.

Summary

5S represents a simple "good housekeeping" approach to improving the work environment consistent with the tenets of Lean Manufacturing philosophies. 5S is termed an approach because it is a sequenced process for first raising the bar, then sustaining the gains and finally incrementally raising the bar again and again.

While 5S may be simple to understand, the process of implementation has its challenges. The challenges stem from the fact that a successful 5S program requires standard work and discipline as well as housekeeping and organization.

To be successful, 5S requires management commitment at all levels to create a culture with the discipline to carry out the standard work necessary to sustain as well as improve 5S. It requires active commitment and participation—not just memos.

Remember---5S is not an event or one time project—you will always be conducting 5S!!

Acronym List:

C/O – Change Over

C/T – Cycle Time

FIFO –First In First Out

JIT – Just in Time

SMED – Single Minute Exchange of
Dies

SOP – Standard Operating Procedures

TPS – Toyota Production System

VSA – Value Stream Analysis

VSM – Value Stream Map

VSL – Value Stream Leader

WIP – Work In Process (or Progress)

Suggested Reading

- *5 Pillars of the Visual Workplace-The Sourcebook for 5S Implementation*, Hiroyuki Hirano, Productivity Press.
- *The Toyota Way Fieldbook*, Jeffrey Liker and David Meier, McGraw-Hill.
- *Kanban Made Simple: Demystifying Toyota's Legendary Manufacturing Process*, John Gross and Kenneth McInnis, AMACON Books

Recommended Websites:

- www.ArtofLean.com
- www.Lean.org
- www.ShingoPrize.org

Footnotes:

1. Toshiko Narusawa and John Shook, *Kaizen Express-Fundamentals for Your Lean Journey*, (Cambridge, MA, Lean Enterprise Institute, 2009), p. 33
2. Jeffrey K. Liker and David Meier, *The Toyota Way Fieldbook: A Practical Guide for Implementing Toyota's 4Ps*, (New York, McGraw Hill, 2006), p. 64.
3. Ibid, p64.
4. Hiroyuki Hirano, *5 Pillars of the Visual Workplace-The Sourcebook for 5S Implementation*, (Portland, OR, Productivity Press, English Translation 1995), p 69.
5. Ibid, p. 15.
6. Graham Ross and Barry Jeffrey, *Lesson 4 Straighten – Organising the way needed things are kept*, (Kaizentrainer.co.uk 2009).
7. Jeffrey K. Liker and David Meier, *The Toyota Way Fieldbook: A Practical Guide for Implementing Toyota's 4Ps*, (New York, McGraw Hill, 2006), p. 139.
8. Hirano, p. 257.