

Incorporating a 6th 'S' – Safety in 5S Lean Methodology

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Abstract— 5S is a systematic strategy to enhance your housekeeping and institutionalize your procedures making them increasingly productive and less unpleasant for your workers. 5S benefits are many, higher efficiencies, less pressure, less mishaps, larger amounts of value, less breakdowns thus on.6S and 5S both work on keeping the losses of Muda, Muri, and Mura, particularly focusing on Muda or the seven squanders. Muda is the non-esteem including activities inside your procedures; Muri is to overburden or be preposterous while Mura is unevenness. The name 5S originates from the 5 Japanese words that make up the 5 phases of 5S, every one beginning with the letter "S". 6S has included the extra "S" of security to the first 5. So the phases of 6S are sort, set all together, clear, institutionalize, continue and security. The primary advantages of 6S over the advantages of 5S is that additional emphasis on wellbeing, utilized in territories with progressively dangerous procedures it can decrease much further the danger of an episode. So 6S; 5S + wellbeing is a decent wagered on the off chance that you need to drive down the conceivable outcomes of any type of mishap.

Key words: Safety, Lean, Waste Elimination, Value Added Activity

I. INTRODUCTION

A. 5S

5S is a methodical type of visual administration using everything from floor tape to tasks manuals. It isn't just about neatness or association; it is likewise about augmenting productivity and benefit. 5S is a system that underlines the utilization of an explicit attitude and instruments to make proficiency and esteem. It includes watching, breaking down, teaming up, and scanning for waste and furthermore includes the act of evacuating waste. 5S, once in a while alluded to as 5s or Five S, alludes to five Japanese terms used to depict the means of the 5S arrangement of visual administration. Each term begins with a S. In Japanese, the five S's are Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. In English, the five S's are deciphered as Sort, Set all together, Shine, Standardize, and Sustain.

B. 5S Methodology

The 5S philosophy is a deliberate way to deal with working environment association. This strategy incorporates the five stages of Sort, Set all together, Shine, Standardize, and Sustain. As a rule, the means of 5S include experiencing things in a workspace, evacuating what's superfluous, sorting out things, cleaning, performing upkeep, and ensuring these things move toward becoming propensities. These means ought to happen in a specific order, and there must be an arrangement set up for playing out the errands related with these means all the time. Toward the finish of a 5S execution

you will see trademark things, for example, approach manuals, shine in obscurity tape or photoluminescent tape on the floor, hued containers, red labels, and 5S strolls occurring. At last, it should all indicate effectiveness. The 5S procedure started in Japan and was first actualized by the Toyota Motor Corporation. The philosophy was created as an approach to set aside a few minutes (JIT) producing conceivable. This sort of assembling plans to deliver just the measure of an item that is required, when it is required. Having a composed working environment that uses viewable prompts to keep up itself permits JIT assembling to continue all the more easily; in this kind of condition, it's less demanding to see issues and move materials efficient.

C. Origin of 5S

1) Toyota Production System

The 5S procedure follows its heredity to post-war Japan, where the pioneers of a blossoming Toyota Industries (née Toyoda Automatic Loom Works) were trying to diminish producing waste and wasteful aspects. Their answer, named the Toyota Production System, incorporates various strategies that would end up popular in their own right, incorporating Just-In-Time assembling, Jidoka, and the center idea of the visual working environment.

At first, the Toyota Production System was a firmly watched mystery, however the enormous monetary blast Japan experienced during the 1980s drew serious enthusiasm from outside organizations thinking about how Toyota, the shiniest gem in Japan's assembling crown, had the ability to construct such huge numbers of items, so rapidly, at such a top notch level. As a slow, worldwide trade of thoughts started to come to fruition, creator and ULVAC Inc. official Hiroyuki Hirano concocted the five mainstays of the visual work environment, an idea that would transform into the 5S technique as we probably am aware it today. The 5S approach has picked up significance consistently and is currently one of the essential central components of Lean, alongside other Lean procedures and practices, for example,

- Visual Workplace
- Six Sigma
- Kaizen
- Kanban
- Gemba
- TIMWOOD
- Lean Manufacturing

D. 5S Lean

The term 5S is regularly combined with Lean since 5S is a fundamental piece of Lean assembling. Executing 5S of every a working environment makes it simpler for individuals to explore, find what they need, and keep things composed. When a practical 5S framework is set up, other Lean assembling activities, for example, kanban or kaizen can be

actualized all the more effectively on the grounds that the working environment is now simple to work in. Without 5S to maintain everything in control so issues are effectively recognizable, other Lean endeavors regularly observe less achievement. As a rule, 5S is the thing that makes whatever remains of Lean conceivable.

II. 5S IMPLEMENTATION & SAFETY

A. Implementation of 5S

At the point when the work environment is a wreck, forms back off. 5S, an orderly technique for working environment association, keeps spaces spotless and clear of messiness so forms run all the more proficiently. This 5S Guide clarifies the means of a 5S program, how to begin a program, and what devices you'll have to make 5S a triumph

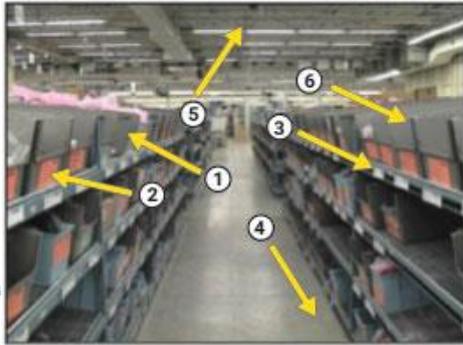


Fig. 1: Before 5S Implementation

- 1) Inventory stacked far out of reach
- 2) Unused older inventory
- 3) Safety hazard; boxes stacked in aisles
- 4) No discernable organization such as barcoding, inventory dating, color coding, or naming convention
- 5) Trash and debris allowed to accumulate



Fig. 1: After 5S Implementation

- 1) Uniform bins and racking
- 2) Date tracking of inventory
- 3) Bin contents are labeled
- 4) Bins, racks, and floors are kept clean and in good repair
- 5) Lighting in facility is sufficient
- 6) Racks are low enough that ladders are not required to access inventory

B. Safety: A Big Concern in Industry

Falls are the main source for damage and passing among American laborers, particularly in the development segment. This commonness of fall-related dangers in the working environment is likewise found in the assembling business. Government offices every now and again refer to falls as one

of the main three foundations for death, damage or time off. Thusly, falls present a genuine hazard for those working at assembling offices. Businesses must find a way to actualize thorough fall insurance measures at their organizations. The same number of specialists work substantial apparatus regular at work, appropriate machine guarding is fundamental to protect laborers. Wounds and passing's including controlled modern trucks is another of the best three dangers confronting the assembling business today. While electrical perils are a genuine worry for those straightforwardly working with power, for example, circuit testers and architects, the assembling business likewise has numerous electrical dangers for its laborers. A portion of these electrical dangers may incorporate inappropriately introduced gear, uncovered wires, opened electrical boards and the sky is the limit from there. For instance, amid the winter months, snow may gather on specialist's boots. When it liquefies, it might result in little puddles all through an office. On the off chance that wires are not legitimately secured, this occurrence could result in electric stun. Numerous vitality sources in the work environment can be perilous to assembling specialists, for example, electrical, mechanical or concoction machines and gear. While laborers are overhauling or keeping up these bits of substantial hardware, the surprising arrival of vitality or startup of the gear could cause genuine damage or demise. This is the reason bosses must pursue appropriate lockout/tagout techniques to keep this event.

III. UNDERSTANDING THE SIXTH S - SAFETY

A. Safety

A great many people working for a distribution center or assembling organization will perceive the term 5S and promptly realize it is tied in with lessening waste and enhancing profitability. Be that as it may, notwithstanding 5S, there is additionally a 6th S known as safety. While the 6th S isn't a piece of the first Lean idea created at Toyota, its usage can help enhance profitability and dispose of waste from multiple points of view.

B. The 6S Controversy

Throughout the Lean manufacturing community there is some controversy about whether 6S should be a standard or not. The argument against 6S points out that safety should be a key component of each of the other S's, and therefore having a 6th separate S is actually redundant. Nonetheless, those who like the idea of 6S believe that while safety should be a factor in each of the other S's, it is important enough to warrant its own category as well. There really is no right or wrong answer, but it is difficult to argue that safety is not one of the most important factors in reducing waste and improving productivity.

C. Hazards Are Inefficient

1) Mishaps Waste Time

When there is a mishap in an office, it is regularly important to end work while it is researched. Contingent upon the seriousness of the mishap, this can cause a work stoppage for a considerable length of time or even days. Clearly this is exceptionally wasteful. Enhancing security will decrease the

quantity of mishaps, which will at that point enhance profitability.

2) *Wounds Slow Work*

When somebody is harmed at work, they will probably need to take a break to recuperate. It might be important to bring another person into the office, which will cost time and cash. What's more, any specialists' remuneration that should be paid out could be viewed as squandered cash too. Indeed, even once the worker returns, the individual may never be as productive again because of the enduring impacts of the damage.

3) *Wellbeing Improves Organization*

Many security upgrades can enable an office to remain progressively sorted out, which enhances productivity. For instance, if floor checking tape is utilized to isolate up passageways into driving and strolling ways, everybody will know where they should be. This may enable individuals to travel quicker, which thus enhances efficiency.

4) *Worker Confidence*

Employees who work in a perilous domain are bound to do things gradually to help secure themselves. At the point when representatives feel sure that the office is a sheltered work environment, they can move at a quicker pace and complete the work legitimately and in an opportune way.

D. *Incorporating Safety into Lean 5S*

Regardless of whether it is called 5S or 6S, security ought to dependably be fused into each Lean proficiency exertion made. Extraordinary compared to other approaches to do this is to investigate how all endeavors with any of the initial 5 S's will affect wellbeing. Each office should think of the particulars for how this is done, yet numerous organizations have discovered that creation a basic graph can be useful.

The outline beneath shows how it functions and how the 6th S might be received into utilization in the work office.

5S Title	Improvement Title	The 6th S Impact
Sort	Keep tool benches clean using foam inserts	Tools will be kept in better condition and will therefore be safer. Also reduces the risk of accidental cuts when searching for tools.
Set in Order	Organize warehouse shelving using labels	Being able to find items in the warehouse quickly will reduce the risk of items falling or someone being injured while searching through multiple areas.
Shine	Perform preventative maintenance on machines	Keeping machines in proper working order will help ensure they do not malfunction and cause an injury.
Standardize	Ensure employees across shifts are performing tasks the same way	Prevent accidents when employees are working on other shifts since everyone

		will be used to doing things the same way
Sustain	Analyze 5S improvements from previous quarter to ensure implementation is effective	Ensuring improvements were properly rolled out will help keep all the safety benefits in place long into the future

Table 1: Adoption of 6th S in work facility

All the components were assembled as per design. After assembling all the parts, whole system was checked and it was made sure that all the parts functioned well. Wire rope was wound on the spool and passed through all rollers as per design. The bob was attached at one end of wire rope so that it would hang inside the hole of silo. Motor drive and controller were connected properly with motor. Limit switch, Encoder and through beam sensor were also connected correctly in the circuit.

E. *5S and 6S: How to Make it Stick*

Organization authority must give obvious help, not simply lip benefit. Workers can differentiate between a corporate vision and simply one more action tossed down from the front office. On the off chance that they aren't sold on the thought, the representatives won't partake in an important way. Educate everybody. You must draw in them in kaizen occasions. You must include these specialists and let them roll out the improvements. You may have a lead champion or a nonstop enhancement pioneer of the processing plant, however in the event that that individual is driving the activity, it won't continue itself. Be dull. An organization can't have one occasion and anticipate that a culture should create. The kaizen occasions—centered activities to enhance an explicit procedure—pull the laborers in, and ceaselessly holding these occasions' helps representatives to remember the disposal of waste occurring.

IV. CONCLUSION

Wellbeing ought to dependably be the highest need in each working environment. A protected workplace decidedly influences efficiency and quality. A protected work environment makes a calm and sound climate where all specialists feel sheltered and secure. A spotless and sorted out working environment can likewise make it simple to perceive and control potential perils. The initial step to wellbeing is recognizing existing perils and those which are probably going to be available in the work environment. All representatives must know about the diverse sorts of work environment dangers and assess these perils through hazard appraisals or a Job Safety Analysis (JSA). These essential strategies complete standard wellbeing systems and fundamental controls to lessen or dispense with these perils.

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