

Implementation Plan Of 5s Methodology In The Basic Surgical Instruments Manufacturing Industry Of Sialkot

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Abstract— 5s is a methodical practice for the organization of work place. It is basically a tool of lean manufacturing, practiced to standardize the maintenance of the workplace environment. This perpetuation of the work place enhances the labour efficiency. This paper explores the implementation of the 5s in the surgical instruments industry of Pakistan. The paper will highlight the step by step implementation guideline required for successful exercise of 5s as a part of the daily management practices. The observations are based on the onsite visits and interviews with the experts. The hindrances in adapting the 5s have also been brought to light. The implementation of 5s has been mapped out by lots of researchers, this paper follows the guidelines of those works but modified for the specified industry. The paper is based on the observation of the management practices of the workplace for the manufacturing of simple surgical instruments e.g. surgical scissors, tweezers, forceps etc. The implementation of each practice of 5s has been explained.

Index Terms— 5s, Implementation, Lean Manufacturing, Surgical Instruments, Workplace environment, Hindrances, Adopting 5s

1 INTRODUCTION

THIS paper focuses on the basic tool of workplace organization of lean manufacturing. 5s tool basically lays down five practices having a name that starts with an S. 5s methodology originated in Japan with 5 practices as Seiri, Seiton, Seiso, Seiketsu and Shitsuke which in English are Sort, Set in order, Shine, Standardize and Sustain [1]. It is a system to regulate the work flow by systemizing the workplace, thus supporting the culture of continuous improvement [2]. 5S is a means of ameliorating the workplace praxis for implementing lean manufacturing through visual management. 5S methodology consists of 5 steps and the name of each step starts with an S, these 5Ss are: Separate, Set to Order, Shine, Standardize and Sustain [3]. 5S facilitates in demarcating the normal and abnormal working conditions and serves as bedrock of Kaizan activities, cost reduction and snug working conditions. 5S is an efficacious system for the organization of the workplace. In simple terms, 5S is better housekeeping and in industrial terms it is first step towards improved productivity using workplace organization [4]. The surgical instruments industry is an ever growing trade. The environment of the workplace is a very important factor in the manufacturing process, since the health and physical stresses on the human body greatly influence the quality of the product. This paper serves the purpose of being a guide line for the improvement of the environment of the manufacturing as well as the office space. The research work showed that only a nominal number of entities in this sector of industry are aware of the 5s methodology. So this paper also serves as a source of knowledge for those who are not aware. The intention in writing this paper is to produce a guideline for the people in the industry to understand the implementation of the 5s methodology.

2 LITERATURE REVIEW

Having understood the definition of 5s, the work on its implementation has been discussed in this section of the paper. The strategy devised by Hirano depicts that the implementation should be carried in such an order that the simpler and basic methodologies should be installed first. Hirano describes the sequence of implementation in the following figure [5].

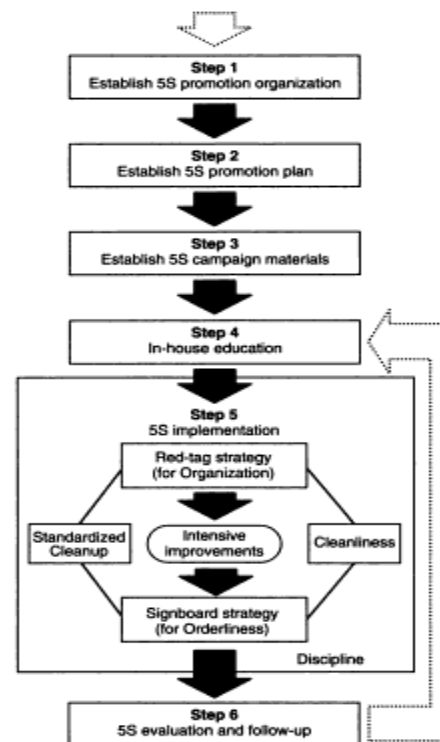


Figure 1
Hirano's 5S
Implementation
Strategy

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Skaggs described some benefits of implementing 5s as a source of reduction of wastes and no value adding work activities while simultaneously increasing the productivity and efficiency of the workplace. The most interesting aspect of 5s is that it doesn't require specialized personnel for its implementation [6].

3 METHODOLOGY

The study has followed qualitative research based on data collected from survey questionnaire, adopted from Summit Business Solutions, New York. The literature review was carried out, and the existing literature reveals that the 5s has significant effect upon the improvement of the organization. The existing workplace maintenance practices of the target industry were observed and the factors which are vital for the workplace maintenance in these industries were evaluated. The observations were discussed with the industry experts. The questionnaire was adopted from the Summit Business Solutions, New York, so that the authenticity of the questionnaire remains intact. The questionnaire is basically an audit sheet to evaluate the status of 5s in the company. The company can use this sheet to self assess during the implementation phase. [Annex A] A comparison of the ideal conditions for 5s implementation with the existing conditions was carried out and based on the difference, implementation strategy was mapped out. This comparison was achieved by using a tool developed by Lean Enterprise Ltd, USA that has data of 30 companies already using 5s. The generation of scores from this tool gave the current standing of the samples in 5s. The implantation strategy follows the maps developed by Hirano and Hiroyuki [5] in their book and also the strategy developed by Osada and Tkahashi [7].

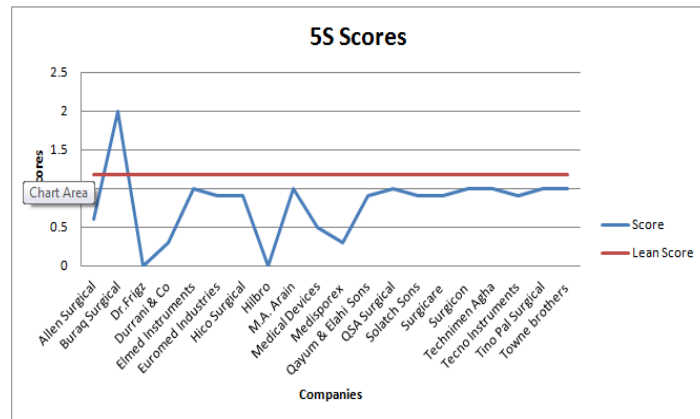


Figure 2 Scores of Samples based on Lean Enterprise Based tool

4 IMPLEMENTATION

The implementation strategy that developed as a result of this research work is based on the simple sequence of steps of 5s. The recommended practice for the successful implementation of each step has been explained. The implementation should begin with a specific area or a process. All the processes or areas of the company should not be put under the changes for 5s, since this will affect the operations of the company greatly. The implementation follows the simple sequence of steps as enlisted below.

- i. Sorting
- ii. Set in Order
- iii. Shine
- iv. Standardize
- v. Sustain

The successful implementation for each phase is as under

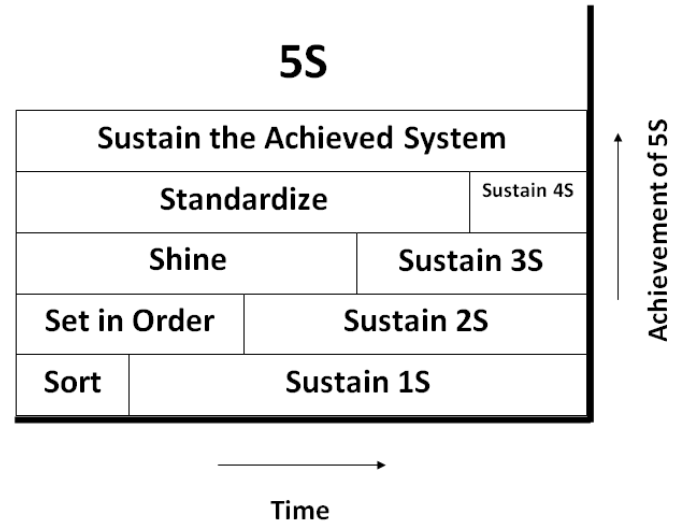


Figure 3 Implementation of 5S

4.1 Sorting

Sorting is basically tidiness of the workplace, which ensures the separation of useful and useless devices and thus promotes the removal of useless devices resulting in a leaner workplace. There are two aspects that need to be considered, the equipment and the materials. The arrangement of the equipment points at the worn out and broken machinery and other manufacturing components and the arrangement of the material points at the allocation of the space for the stored or work in progress materials and goods. A system for the removal of the wasted or useless components and materials should be made in such a manner that the counterproductive aspects are continuously removed. From this analysis the implementation of sorting can be achieved by following the below stated steps.

- a) The less needed or useless things are separated and removed.
- b) The locations for the disposal of useless things are identified.
- c) The work areas as well as the paths ways are marked with blue and red paints.
- d) Management rules are displayed on wall and on the spots these rules are to be followed.
- e) Power outlets are in sufficient number
- f) The baskets for the motion of surgical instruments have an allocated space.
- g) There is proper check and balance on the closing of door and windows after working hours.

4.2 Set in Order

Setting in order is basically the orderliness of the equipment by allocating each component a specified location, so that it can be retrieved quickly with wastage of time. The implementation should follow these steps.

- a) All the storage areas are given addresses and are marked with indicators of location
- b) The desired contents of a specific shelf are indicated on the rack.
- c) The maximum and minimum limits in terms of weight and quantity are displayed.
- d) Walkways, workstations, prohibited areas and

storage areas are marked with white, yellow and red paint.

- e) All the tools, jigs, fixture and instruments have defined allocated locations for their storage and retrieval.

4.3 Shine

The third S in the 5s methodology is Shine which represents the cleanliness of the workplace. After sorting the useful stuff and setting them in order, the cleanliness is the factor that affects its use. A cleaner work environment results in comfortable working conditions and psychological relief for the workers, thus increasing the efficiency. Furthermore, cleaner machinery runs for longer time without breakdowns, consequently reducing costs. Cleanliness is basically a part of maintenance, based on daily performance. The implementation strategy requires following steps.

- a) The floors and machinery needs to be cleaned daily so that there is waste free environment with no extra or gathered water or oil, on either one.
- b) Machines need to be wiped and cleaned in order to remove the oil and chips of metal, thus prolonging the life of the machine.
- c) Equipment inspection and equipment maintenance should be performed simultaneously.
- d) There should be a habit of keeping the work place clean, by putting into practice the cleaning of machines as a part of job of the worker.
- e) A capable person with knowledge of 5s should be made person in charge of the cleanliness of the whole company.

4.4 Standardize

Standardization is the practice of performing the first S of the methodology as a standard procedure. This practice has to be performed on daily basis and should not be overlooked for complete and productive implementation of 5s. A culture of carrying out the sorting, orderliness and cleanliness should be developed and every person in the company should support it. The implementation of standardization includes the following steps.

- a) Generation and circulation of improvement memos, indicating key performance indexes.
- b) Improvement in any area should be accomplished by the continuous generation of new ideas.
- c) Standard procedures should be formed, and documented. The procedures should be clear and should be used actively.
- d) With the development of the 5s standards, the newer standards should also be considered so that the future of the standardization practice remains updated.
- e) Most importantly the first S three i.e. Sorting, Orderliness and cleanliness should be maintained, and documented on daily basis.

4.5 Sustain

Sustaining the practice of 5s is basically the development of a disciplined environment for the performance of the first four S. The first four S can be sustained by training the manpower on regular basis and developing a procedure so that the practices are audited on daily basis. A 5s Performa, indexed with this paper, adapted from Summit Business Solutions, or other

consultant should be used to sustain the practice. The implementation of sustaining the 5s procedure is as follows.

- a) Training should be ensured. From top management to labour force, training should be performed on regular basis.
- b) The tools and equipment should always be placed on their allocated defined places. The goods should be maintained in the defined areas.
- c) All the procedures should be updated on regular basis and should be adhered upon on daily basis.
- d) An activity book should be prepared and made available to all the employees. The employees should review the book on regular basis.
- e) An evaluation performa should be filled on daily basis and kept as record for the assessment at the end of each month. A performa developed by leanmap consultants has been annexed [Annex B].

4 HINDRANCES

During the study, some factors were also observed that create obstacles in the successful implementation of the 5s methodology. These observed facts are brought to the readers' knowledge so that these hindrances can be removed during the implementation phase of 5s. During the visits to the sites, it was observed that

- a) Workers always try to do the tasks with minimum effort, even if it causes damage to the machinery or the product.
- b) The workers do not follow the guidelines given to them in any training program that they had already attended.
- c) The clerical staff keeps the records in poor conditions and in the form that requires a lot of time for retrieval.
- d) Management is reluctant on spending for the training of the employees.

5 CONCLUSION

The surgical instruments industry is an industry that will remain in an ever-growing phase. Since the competitors in the international market are facing competition at all levels, the implementation of 5s will be an advantage over others in the way that the efficiency of the company will improve due to better working conditions of employees. 5s is also the first step in the implementation of lean manufacturing practices. So the successful implementation of 5s will put the company on the track of becoming lean. The successful implementation of 5s is completely dependent upon the devotion and adherence of the people to the rules and standards. The implementation of 5s is least affected by the technical or natural failures or disasters.

6 ANNEXURE

Annexure A is the audit sheet adapted from the Summit business solution inc. New York.

freeweb.dnet.it/storage01/5S_Audit.pdf Annexure B is the 5s sustainability sheet from leanmap Consultants. www.leanmap.com

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ANNEXURE A

5S AUDIT

0=Very Bad 1=Bad 2= Average 3=Good 4=Very Good

1S	No	Check item	Description	Score					Category Subtotal
				0	1	2	3	4	
SORT	1	Materials or parts	Does the inventory or in-process inventory include and unneeded materials or parts?						
	2	Machines or equipment	Are there any unused machines or other equipment around?						
	3	Jigs, tools, or dies	Are there any unused jigs, tools, dies or similar items around?						
	4	Visual control	Is it obvious which items have been marked as unnecessary?						
	5	Written standards	Has establishing the 5S's left behind any useless standard?						
			Sub Total						

2S	No	Check item	Description	Score					Category Subtotal
				0	1	2	3	4	
SET IN ORDER	6	Location Indicators	Are shelves and other storage areas marked with location indicators and addresses?						
	7	Item Indicators	Do the shelves have signboards showing which items go where?						
	8	Quantity Indicators	Are the maximum and minimum allowable quantities indicated?						
	9	Demarcation of walkways and in-process inventory areas	Are white lines or other markers used to clearly indicate walkways and storage areas?						
	10	Jigs and tools	Are jigs and tools arranged more rationally to facilitate picking them up and returning them?						
			Sub Total						

3S	No	Check item	Description	Score					Category Subtotal
				0	1	2	3	4	
SHINE	11	Floors	Are floors kept shiny clean and free of waste, water and oil?						
	12	Machines	Are the machine wiped clean often and kept free of shavings, chips and oil?						
	13	Cleaning and checking	Is equipment inspection combined with equipment maintenance?						
	14	Cleaning responsibilities	Is there a person responsible for overseeing cleaning operations?						
	15	Habitual cleanliness	Do operators habitually sweep floors, and wipe equipment without being told?						
			Sub Total						



Form LEVC102.2

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5S AUDIT

0=Very Bad 1=Bad 2= Average 3=Good 4=Very Good

4S	No	Check item	Description	Score					
				0	1	2	3	4	
STANDARDIZE	16	Improvement memos	Are improvement memos regularly being generated?						
	17	Improvement ideas	Are improvement ideas being acted on?						
	18	Key procedures	Are standard procedures clear, documented and actively used?						
	19	Improvement plan	Are the future standards being considered with a clear improvement plan for the area?						Category Subtotal
	20	The first 3 Ss	Are the first 3 Ss (sort, set locations and shine) being maintained?						
			Sub Total						

5S	No	Check item	Description	Score					
				0	1	2	3	4	
SUSTAIN	21	Training	Is everyone adequately trained in standard procedure?						
	22	Tools and parts	Are tools and parts being stored correctly?						
	23	Stock controls	Are stock controls being adhered to?						
	24	Procedures	Are procedures up-to-date and regularly reviewed?						Category Subtotal
	25	Activity boards	Are activity boards up-to-date and regularly reviewed?						
			Sub Total						

GRAND TOTAL SCORE	
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ANNEXURE B

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS					
1	LEANMAP																														10 Point Checksheet (10P)										Leanmap.com									
2																															Navigating to Results																			
4	Process:										Purpose:										Reference:										Responsible:										Date:									
5	Factory Organization										Keep factory clean and organized										10PC										Enter Name										01/01/20									
7	1 Setup																																																	
8	What?										This list defines the acceptable standard, and measures conditions against the standard.																																							
9	Why?										Rules ensure a safe and efficient work-place by reducing waste and variability.																																							
10	Who?										The supervisor/manager is responsible for the standards and that people follow.																																							
11	When?										All work-days, no exceptions.																																							
12																																																		
13	2 Rules																																																	
14	Rule-01:										Assignment ok > all items have a defined place and correct label (number/description).																																							
15	Rule-02:										Level ok > quantity, fill-height or volume does not exceed the maximum level.																																							
16	Rule-03:										Placement ok > all items are placed in the their designated place.																																							
17	Rule-04:										Availability ok > all items are available when needed, no wait, nothing out of stock.																																							
18	Rule-05:										Items ok > all components, tools, papers etc are defined and known (no foreign objects).																																							
19	Rule-06:										Function ok > all systems, tools, machines, programs, lights etc are fully functional.																																							
20	Rule-07:										Trash ok > all bins are empty and cleaned at the end of each shift (empty at shift-start).																																							
21	Rule-08:										Tools ok > all tools are available at their assigned place, nothing missing or broken.																																							
22	Rule-09:										Data ok > all plans updated: shipment-schedule, check-lists, daily action plan, labor-plan etc.																																							
23	Rule-10:										Cleanliness ok > entire area cleaned-up at shift-end and disinfected per weekly plan.																																							
24																																																		
25	3 Daily Check																																																	
26	Check <input checked="" type="checkbox"/> Assignment ok																																																	
27	Check <input checked="" type="checkbox"/> Level ok																																																	
28	Check <input checked="" type="checkbox"/> Placement ok																																																	
29	Check <input checked="" type="checkbox"/> Availability ok																																																	
30	Check <input checked="" type="checkbox"/> Items ok																																																	
31	Check <input checked="" type="checkbox"/> Function ok																																																	
32	Check <input checked="" type="checkbox"/> Trash ok																																																	
33	Check <input checked="" type="checkbox"/> Tools ok																																																	
34	Check <input checked="" type="checkbox"/> Data ok																																																	
35	Check <input checked="" type="checkbox"/> Cleaned ok																																																	
36																																																		
37	4 Daily Sum										0-10																																							
38																																																		
39	5 Daily Performance										10																																							
40																																																		
41	6 Weekly Review																																																	
42	Period										Avg										Approval																													
43	Week-1																																																	
44	Week-2																																																	
45	Week-3																																																	
46	Week-4																																																	
47	Week-5																																																	
48	7 Monthly																																																	

