



## Application of 5s To Improve Visualization / Visual Controls: A Case Study

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### ABSTRACT

5S is a Japanese methodology to organize and improve the efficiency of a shared workspace by incorporating seemingly regular tasks such as cleaning, sorting, and re-arranging the surroundings and method of operation within the workspace. 5S consists of five phases or activities with names starting with the letter S, and provides a foundation for any organization's Lean initiative for continuous improvement. This paper documents a case study undertaken by the author to implement 5S in whole plant of an automotive parts manufacturing company. The study focused on implementing 5S and documents results in form of photographs & 5S score of the plant. The study also assesses its own approach and serves as a platform for achieving tangible and intangible gains in productivity. The study simplifies the application of 5S. The purpose of this paper is to investigate the applicability of 5S Technique in automotive parts manufacturing organization using a case-based approach. The research is administered with personal interviews, primary, secondary data and observations. The findings revealed that 5S technique could be applied to automotive industries in order to reduce unnecessary motion, can save shop floor's space, & can improve overall visualization / visual controls of the organization. This paper focuses on steps and activities carried out to implement the 5S technique in the company, which have the less visual controls for inventory, standard's awareness to operators, unnecessary materials, lack of arrangement, Poor cleaning etc. (Initial study of the plant was done earlier through Value Stream Mapping Technique) The outline of this paper is: Section 1 provides overview of 5S Technique. Section 2 introduces problems and scope of work. Section 3 describes the steps and procedures used to implement 5S. Section 4 analyses the outcome of this implementation in form of photographs & before after 5S audit score.

**KEYWORDS:** Structurize, Systematize, Sanitize or Shine, Standardize, Sustain

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### I. INTRODUCTION

5S is a methodology for organizing or a shared workspace such as a production floor. It is a component of lean manufacturing and philosophy for managing a work place or workflow with the intention of improving efficiency, eliminating waste, and increasing process consistency. "A place for everything and everything in its place" is the mantra of the 5S methodology. 5S is a system to reduce waste and optimize productivity through maintaining an orderly workplace and using visual clues to achieve more consistent operational results. It derives its name from the use of five Japanese words beginning with the letter S as the cornerstones of this philosophy. These words are "Seiri" meaning Sort, "Seiton" meaning Set in Order, "Seiso" which implies Shining or Cleanliness, "Seiketsu" which means Standardize and "Shitsuke" which implies Sustaining.

5S is a holistic application used to raise moral, ethical standards strongly associated with culture and society. 5S not only improves organizational working environment but also improves the overall industrial management process performance as well (Ho, 1999b). This practice is based on neatness, cleanliness, standardization and discipline in order to achieve quality standards in goods and services (Ho and Cicmil, 1996; Patten, 2006). 5S not only simplifies the work environment and reduce the wastage but also contributes towards safety enhancement at workplace (Korkut et al., 2009). It helps in providing order and discipline at the organization with the supervision on even smallest details of company. Ho et al. (1995) have stated that 5S requires total employee involvement (TEI) at each level of the organization for obtaining significant enhancement in organizational performance. Further, 5S calls upon strong commitment from top to bottom management to bring quality and continuous improvement in an organization (Liker, 2004).

5S steps involve a structured improvement program with a series of identifiable steps related to each other in progressive manner. As the words are related to Japanese language, Ho (1999b) has removed the

complexity of Japanese words so that it can be easily understood and adopted by various organizations across the globe for realizing significant organizational performance improvements. Following are the elements of 5S methodology (Table 1).

Table 1: Elements of 5S				
Japanese Words (5S)	English Meaning (5S)	English Meaning (5C)	Meaning	Features
(1S) Seiri	Structurize	Clear	Organization	Discarding unnecessary items from the workplace.
(2S) Seiton	Systematize	Configure	Neatness	Arrange necessary items in good order for quick retrieval and storage.
(3S) Seiso	Sanitize or Shine	Clean and Check	Cleaning	Clean the workplace so that there is no dirt, dust on workplace & try to eliminate the source of dirt & dust
(4S) Seiketsu	Standardize	Conformity	Standardization	Do Labeling, Location Marking & Show Min – Max for every storage item to maintain the above 3S.
(5S) Shitsuke	Sustain	Custom and practice	Discipline	Routine practice of 5S initiatives by imbibing it in the standard operating procedures and making it customary for everybody in the organization.

## II. BACKGROUND OF RESEARCH PROBLEM

In case of the existing organization, during study of value stream mapping of 03 parts namely emblem Maruti Suzuki, Emblem S Mark & Emblem VXI, many non-value added activities were find out but other than specific non-value added activities for specific parts in specific process / department / area. Some common problems were observed in whole plant which are extremely crowded plant (full of material, objects etc.) and hard to work in. Desk drawers are full of papers and stationary supplies. Excess or unneeded Stock hides production problems. Unneeded items and equipment make it harder to improve process flow. Person sent to find a tool or some items & searched in whole plant. Items not kept back in the same location so worker picks up wrong piece for assembly. Boxes of material kept in the walkway, causing someone to trip and get injured. Missed items can not be find easily. Location not defined or areas not marked for gangways, pathways, ok, hold, rejection area etc. Puddles of oil or water lead to slippages and injury. Cutting shaving, dirt can be mixed up in the production resulting in defects. Cutting shaving can get into people's eyes and create injury. Windows are so dirty so no sunlight enters – Defects are less obvious in the dark. Filthy work environment lowers morale. At the end of the day, piles of unneeded items are left from the day's production and lie scattered. Tool storage sites become disorganized and need to be put in order at the end of the day. So in order to overcome all these problems & to improved visualization / visual controls in the plant it is concluded that these day to day problems can be solved by effective implementation of 5S in whole plant based on literature review & review of lean manufacturing principles.

### PROBLEM STATEMENT

Based on the above explanation a broader research problem can be stated as: “How can 5S Technique be effectively used to improve the visualization / visual controls of the organization.”

### OBJECTIVES OF THE STUDY

In answering the research problem, the study sought to accomplish the following research objectives.

1. To analyse the 5S implementation status (Before – After) in the Organization.
2. To improve the visualization / visual controls by implementation of 5S Technique.

## III. LITERATURE REVIEW

Purpose of the study by Mr. Carmen Jaca (2014) was to study management practices in successful Japanese companies in order to determine what 5S principles were behind them. After visiting and conducting interviews at five different plants, a multi-case study analysis was developed to identify the key aspects of the success of the implementation of 5S in Japan. Although each of the companies studied was different. As a result, best managerial practices based on 5S principles were explained, and the most important principles associated with the success of the 5S method were described and discussed which are Japanese cultural background, Kaizen, Career development, Guarantee comfort and safety for the workers & Establishment of non-negotiable rules.

Purpose of the study by Cristina Veres (2017) was to study the relationship between 5S evaluation & productivity in a local company from Mures County, Romania. The objective of this paper was to demonstrate that 5S method is very important and have a positive correlation to overall performance of production results. The need of having 5S method implemented represent one of the first step taken in the Lean Management strategy and it determines, as a result, the increase of the productivity of the organization.

Purpose of the study by José H. Ablanedo-Rosas (December 2010) was to understand the implementation experience, empirical relationships, and ongoing challenges associated with the 5S practice in Mexican organisations. A survey of 33 questions was done with 14 questions aimed to gather general information and 19 questions related to the 5S practice. The surveyed organisations identified the following success implementation factors: investment in 5S training for top management and workforce; top management commitment to the 5S practice; the 5S practice is included in the organisational strategic planning; the organisation is focused on how to keep the 5S practice going; the organisation measures the positive impact of the 5S implementation in the organisational culture; the 5S practice is used as the basis for advanced quality and continuous improvement philosophies; and the organisation measures the benefits from 5S implementation such as quality improvement.

Purpose of the study by Jugraj Singh Randhawa (2017) was to empirically test the relationships among various 5S implementation constructs and competitive dimensions parameters constructs in manufacturing organizations. The study validates the contributions of 5S program toward realization of significant improvements of various competitive dimensions such as overall organizational achievements, production achievements, quality and continuous improvement achievements, cost optimization achievements, employee-related achievements, effective workplace utilization and safety enhancement achievements accrued by Indian manufacturing organizations.

Purpose of the study by Kaoru Kobayashi (March 2008) was to investigate and clarify the ways in which 5S has been understood and implemented by Japanese and Western businesses. This research also highlights the distinction between '5S as a philosophy or way' and '5S as a technique or tool' by comparing the major frameworks provided by Osada (1989, 1991) and Hirano (1995, 1996). A quantitative content analysis approach was used to compare and contrast the use of 5S through 38 measured components from the World Wide Web (Web) pages of organisations in Japan, the UK and the US. Six dependent variables are studied through the lens of country of origin as independent variable. As a conclusion of research Neither the UK nor the US has embraced 5S as a holistic strategy through which business excellence may be achieved. In Japan, using 5S as a business excellence strategy, rather than just as a tool, provides a platform for business success.

Purpose of the study by Oleghe Omogbaia (2017) was to assess, in advance, the system performance outcomes when 5S practices are improved. The simulation results were the stimulus for real life improvements in the system because the simulation results were able to mimic the real-life outcomes. The SD model was built and simulated to indicate how system throughput will improve as 5S practices are improved.

Purpose of the study by Rod Gapp (January 2008) was to identify and present key concepts of 5S from a Japanese management perspective. These findings link 5S to aspects of Japanese management approach, which were aligned to an integrated management system rather than a simple management tool or technique. This was demonstrated in the conceptual map with the four key areas being; management, activity, training and improvement. These four areas provide the organisation with a defined platform for managerial decision-making within a total participative environment of the development and implementation of the 5S management approach. Although this study did not focus on the aspect of "how to" implement 5S, the use of me-de-miru (visual) methods could be a success factor for the 5S implementation. This highlights an area that will have practical applications when better understood.

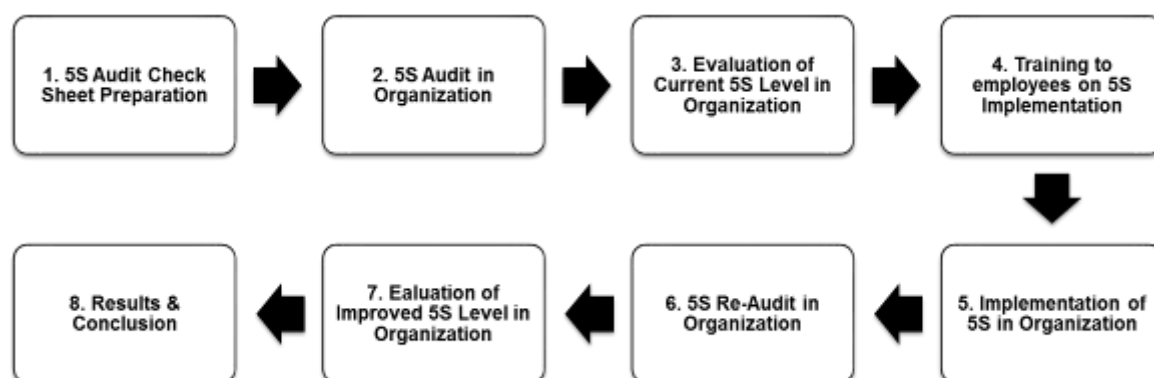
Purpose of the study by Mr. Soumya R. Purohit (August 2015) was to highlight the step-by-step implementation guideline required for successful exercise of 5S as a part of the daily management practices. It shows the method to implement each pillar of the 5S Methodology- Seiri, Seiton, Seiso, Seiketsu and Shitsuke in the industry in order to bring about an overall improvement in its performance.

Purpose of the study by Mr. Vipul kumar C. Patel (August 2014) was to reduce the process wastes, smooth the process flow and maintain proper quality control, improve storage facilities, safety, security and process cost savings in a company through case study. Before and after picture were taken for the applying 5S methodology in a company. 5S implemented had been carried out in storage department and insulator department. After implementation of 5S in the storage department the space saving was 12.91% and certain process wastes were reduced. In insulator department the workplace became efficient and effectiveness.

#### **IV. METHODOLOGY**

Based on literature review & working experience of researcher, methodology was designed in order to carry out the steps in implementation & evaluation of 5S in the organization. In order to do that 5S audit check sheet was designed & after a site study, observations & personal interviews of individuals 5S audit was done. Based on evaluation of current level of the 5S Implementation, Improvements were identified & systematic implementation of 5S was done in the organization. In order to find out the effects of 5S implementation, after audit was done & based on evaluation of 5S, effects of systematic 5S implementation were concluded. Results shows significant improvement in the visualization & employee behaviour. Methodology is shown through Figure 1.

Fig. 1 – Methodology – Step-by-Step Process



### 5S Audit Check Sheet Preparation

Based on literature review & working experience of researcher 5S audit check sheet was designed. Which has total 15 check points (C1 to C15) covering check points in each category from 1<sup>st</sup> S to 5<sup>th</sup> S. Following is the 5S audit check sheet which is shown through Table 2.

Table - 2 : 5S Audit Check Sheet

Category	Check Point No.	Check Points
1S	C1	Are unneeded equipment, tools, furniture, material, extra papers etc. present in the area?
	C2	Is the 1S area in use & team members are aware of its purpose?
2S	C3	Is the necessary material's bin / box kept on pallets? (No parts on direct shop floor)?
	C4	Are needed items like jigs, fixtures, tools, equipment, log sheets, ref. samples & inventory properly managed and in their correct locations?
3S	C5	Is any dust, dirt, oil leakage or water leakage observed on shop floor's objects?
4S	C6	Are walk ways and workstations clearly marked and identified as per floor marking standard?
	C7	Are Pipes of air, water, oil etc. identified with standard colors & organized in proper way?
	C8	Is the maximum stacked height of material displayed & maintained?
	C9	Are the documents / files have proper indexing & partition & linked with master list of files?
	C10	Is the internal packing standard of material fixed, displayed & followed?
	C11	Are display boards organized, current and tidy with standard page set up & controlled documents?
	C12	Are electrical equipment properly managed i.e. plugs, loose wires & panels closed?
5S	C13	Are the 5S Rules visualized & concerned persons are aware of same?
	C14	Needed item / file can be found in 60 seconds?
	C15	Is the 5S checked on regular basis?

### 5S Audit in Organization

After finalization of 5S Audit check sheet, we need to find out the gap with respect to 5S implementation. In order to do that we decided that we will do a formal 5S audit in the organization. We had a site tour covering all workshops or departments of the organization & scored each department for each check points as per 5S audit check sheet. Following is the 5S audit report of the organization which is shown through table 3. We went to each department & based on observation we gave score for each check points. Scores were decided from 1 to 4. 1 means Poor, 2 means fair, 3 means good & 4 means excellent.

**Table - 3 : 5S Audit Report of the Organization**

Category	Check Point No.	Workshops / Departments									Total Score	% Score
		Store	Molding	Plating	Painting	Assembly	Quality	FG Store	Maintenance	Tool Room		
1S	C1	2	2	2	2	2	2	2	2	2	18	50.0
	C2	1	1	1	1	1	1	1	1	1	9	25.0
2S	C3	1	3	1	1	1	1	1	4	4	17	47.2
	C4	3	1	2	2	2	3	4	1	1	19	52.8
3S	C5	2	2	3	4	4	4	4	1	1	25	69.4
4S	C6	3	2	3	3	3	3	2	2	2	23	63.9
	C7	4	2	4	4	4	4	4	4	4	34	94.4
	C8	1	1	1	1	1	1	1	1	1	9	25.0
	C9	1	1	1	1	1	1	1	1	1	9	25.0
	C10	3	2	2	2	4	4	4	4	4	29	80.6
	C11	2	2	2	2	2	2	2	2	2	18	50.0
	C12	4	4	3	4	4	4	4	4	3	34	94.4
5S	C13	1	1	1	1	1	1	1	1	1	9	25.0
	C14	1	1	1	1	1	1	1	1	1	9	25.0
	C15	1	1	1	1	1	1	1	1	1	9	25.0
Total Score		30	26	28	30	32	33	33	30	29	Avg. % Score	
% Score		50.0	43.3	46.7	50.0	53.3	55.0	55.0	50.0	48.3	50.2	

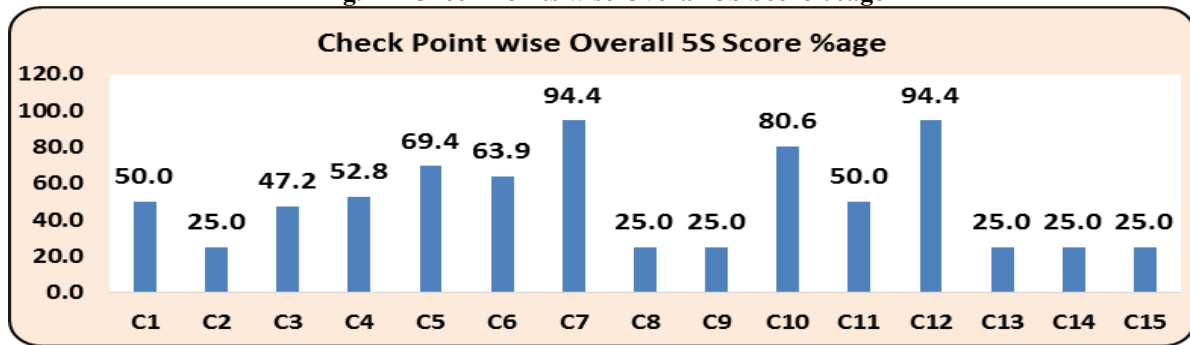
We had calculated total audit score & % score in two terms. One is check points wise & another is department wise. Overall average score is 50.2% for the whole organization. In any of the department desired level of 5S is not observed. However some of the check points are strengthen like C7 & C12 in the organization but at the same time some of the check point are very poor like C2, C8, C9, C13, C14 & C15 which needs to be improved.

#### Evaluation Of Current 5S Level In The Organization

In order to find out the major gaps in 5S implementation or to evaluate the current level of 5S in the organization. We prepared Bar graphs in two terms. One is check points wise overall 5S score %age & another is department wise overall 5s score %age. Which are shown through Figure. 2 & Figure. 2a.

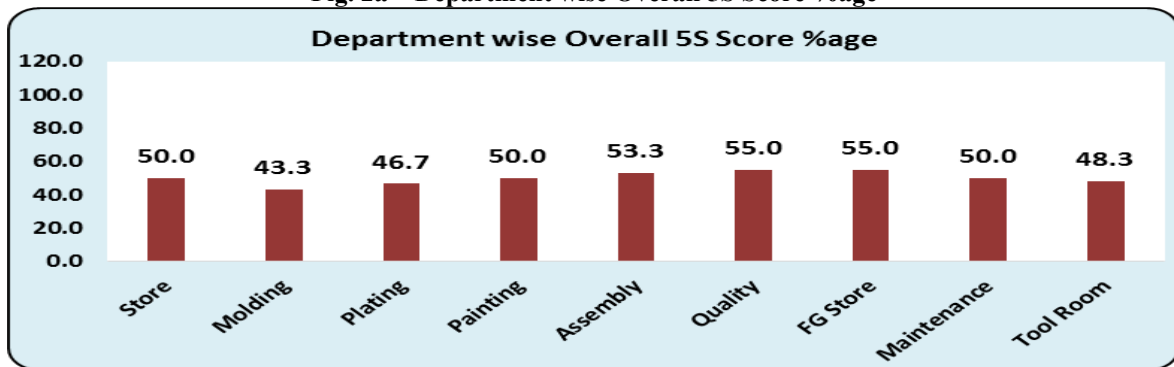
It is analysed that a department may be good in particular check point or particular category of 5S. But every checkpoint needs to be implemented or strengthen in each department. It is also observed that a particular check point is effectively implemented in whole organization but still needs some improvement or can be strengthen. Considering this situation we did not matched implementation of specific check point in specific department. Instead we decided to ensure systematic implementation of 5S in whole plant from start which will cover all departments of the plant.

Fig. 2 – Check Points wise Overall 5S Score %age



Through above figure it is analysed that in any of the checkpoint 100% score is not achieved. However, some of the checkpoints are effectively implemented like C7 & C12 while rest checkpoints have huge scope of improvement through systematic implementation of 5S.

Fig. 2a – Department wise Overall 5S Score %age



Through above figure it is analysed that in any of the department 100% score is not achieved. This means every department has the huge scope of improvement through systematic implementation of 5S.

#### Training to Employees On 5s Implementation

Before start of 5S implementation, the very first & important step was to take commitment from the management for 5S implementation. So that management could provide resources, time & manpower accordingly. We ensured this from management of the organization & after that we provided training to all workers & staff members covering fundamentals of 5S, Benefits of 5S & step by step methodology of 5S implementation what we are going to follow.

#### Implementation of 5S in Organization

In order to implement 5S we made a plan considering all necessary steps included in 5S implementation which are shown in table 4 & explained the plan to the management & staff members of the organization. So that 5S could be implemented effectively.

Table - 4 : 5S Implementation Plan

Major Activity	Step	Task
Pre - establishment	1	All departments / areas to be divided in small - small zones.
	2	5S Zone Layout to be prepared & Zone wise responsibility to be defined.
	3	All items in each zone including tools, machines, material, gauges, jigs, fixture, files, documents etc. to be listed out.
1 <sup>st</sup> S Implementation	4	Unneeded items to be segregated from all listed items in each zone.
	5	1 S area to be prepared in each department.
	6	All unnecessary items to be identified with red card & to be kept in 1S Area.
2 <sup>nd</sup> S Implementation	7	All unneeded items to be disposed off from the working area.
	8	Location to be fixed to keep all needed items based on user's ease.
	9	All productionize material to be kept on pallets.
3 <sup>rd</sup> S Implementation	10	Items & areas with dust, dirt, oil leakage or water leakage to be identified.
	11	Sources of dirt, dust & leakage to be identified & removed if possible.
	12	All items & areas to be cleaned & shine by denting, painting etc. if required.
4 <sup>th</sup> S Implementation	13	All items & locations to be Identified by visible labels.
	14	Floor marking standard to be defined for appropriate color coding of walk ways, work stations, type of

	material, items & etc.
<b>15</b>	Walk ways and workstations to be marked and identified as per floor marking standard.
<b>16</b>	Pipes of air, water, oil etc. to be identified with standard colors & organized in proper way.
<b>17</b>	Maximum stacked height of material to be displayed.
<b>18</b>	Proper indexing & partition to be done for all documents / files.
<b>19</b>	Master list of files, samples, gauges, tools, fixtures etc. to be prepared in order to easy finding of same.
<b>20</b>	Display boards to be organized & standardized.
<b>21</b>	All electrical equipments to be properly managed i.e. plugs, loose wires & panels closed etc.
<b>5<sup>th</sup> S Implementation</b>	<b>22</b> Zone wise 5S Rules to be prepared & visualized.
	<b>23</b> Training to be given to all concerned persons regarding 5S rules of specific zone.
	<b>24</b> 5S audit check sheet to be prepared for each zone.
	<b>25</b> Frequency & responsibility to be defined for regular audits of 5S.

### **Pre-Establishment**

For the successful implementation of 5S, distribution of work & defining responsibility for the task is very important. That is why we decided to divide big workshops / departments in small – small zones. We made a 5S zone layout of each department on paper & assigned the responsibility for 5S implementation to individuals in specific zone.

After defining responsibility for each zone we asked to responsible persons to prepared a list of items including tools, machines, material, gauges, jigs, fixture, files, documents etc. available in his / her zone. So that we could ensure effective implementation of 5S on each items kept in his / her zone or working area.

### **1<sup>st</sup> S Implementation**

After defining responsibility in each zone we segregated the necessary & unnecessary items from the list of each zone based on user's feedback. All unnecessary items were identified with red tag. Every red tag has the following information.

1. What is the item?
2. How much Quantity?
3. Why is it removed out (damaged, excess, etc)?
4. What is approx value?
5. Zone & department from where the item is removed?

After identification of all unnecessary items, such items to be removed from the working area. In order to do that separate 1S area was perpeared in each department & all unnecessary items were kept in 1S area.

After segregation of unnecessary items, next step was to dispose off these items. Based on literature review, researcher observation & discussion with experts available in the organization best possible disposal methods were decided which are shown through table 5. All unnecessary items were disposed off based on the items & best feasible method.

**Table - 5 : Disposal of Unnecessary Items OR red tagged items**

<b>Disposal Method</b>	<b>Description</b>
<b>Distribute</b>	Distribute items to another part of the company on permanent basis.
<b>Lend out</b>	Lend items to other sections of the company that can use them on a temporary basis.
<b>Return</b>	Return items to the supplier company.
<b>Sell</b>	Sell off the unneeded items to other companies if possible.
<b>Throw it away</b>	Dispose of as scrap or incinerate items that are useless or unneeded for any purpose.

### **2<sup>nd</sup> S Implementation**

2<sup>nd</sup> S means to arrange needed items so that they are easy to use & anyone can find them easily. A phrase is said for effective implementation of 2<sup>nd</sup> S which is “A place for everything & everything in its place”. Implementation of 2<sup>nd</sup> S was done keeping following things in mind.

1. Frequently used items to be kept near the place of use.
2. Infrequently used items to be kept away from the place of use.
3. Storage of items together, if used together and in sequence, if used in sequence.
4. Storage of tools according to function or product based on the type of usage.
5. Items to be kept on workstation in such a way that operator could maintain a comfortable posture with comfortable motions for work.

Other than above things while deciding the appropriate locations for all needed items pallets availability was ensured to keep the productionize materials either Raw Material, Work In Progress Material & Finished goods

material. Productionize materials has to be kept on pallets in order to avoid damage to the material & easy pick up / handling of materials. Keeping in mind all the rules of 2<sup>nd</sup> S implementation each responsible person contributed in the successful implementation of 2<sup>nd</sup> S in his / her zone.

### **3<sup>rd</sup> S Implementation**

3<sup>rd</sup> S means to clean & shine. Ideal situation of 3<sup>rd</sup> S is no dirt, dust or everything is well cleaned & shined, either items or location. During implementation of 3<sup>rd</sup> S Items & areas with dust, dirt, oil leakage or water leakage were identified. List of such items & areas was prepared & handed over to housekeeping department. Sources of dirt, dust & leakage were identified & removed at feasible areas & appropriate actions were taken. Old items or tools which could not be repaired such items were replaced with new ones & areas & locations were cleaned & shined by denting, painting etc. wherever needed. In order to ensure sustenance of 3<sup>rd</sup> S Housekeeping check sheets were prepared & zonewise responsibilities, frequency of cleaning were fixed.

### **4<sup>th</sup> S Implementation**

After implementation of 1S, 2S & 3S, we need to standardize the things otherwise things will return in same situation. In order to do that we need to prepare some rules, labeling, marking differentiation of items. So that needed items could be find out easily & any missing item or any abnormality could be visualized. While 4S implementation we did following things on shop floor.

1. All needed items & their locations were Identified with visible labels having item name / code, amount etc.
  2. Inventory levels were colour coded to indicate the minimum, re-order & maximum level.
  3. Different colours were allotted to different kind of material, items, pipes, ways etc.
- In order to ensure effective implementation of above three points & standardization through out the plant, floor marking standard was prepared. Color coding & floor marking was done as per floor marking standard.
4. Min – Max. stock of inventory items were visualized for Raw Material, Work in Progress & Finished Goods Stock.
  5. All files, samples, gauges, tools, fixtures etc. were labeled, their locations were marked & their master lists were prepared in order to easy finding of same. All display boards were standardized by proper labeling, marking & outlining of documents. 1S, 2S, 3S & 4S were implemented in all zones in each department & significant improvements observed in visual controls. Abnormalities were clearly visualized.

### **5<sup>th</sup> S Implementation**

5<sup>th</sup> S means to make it a habit of properly maintaining correct procedures. It is done with the objective of achieving higher productivity and better quality through higher employee morale. In order to do this we prepared 5S rules for each zones covering shop floors & offices. We also gave training to all concerned workers & staff members regarding 5S rules & their maintenance in their respective areas. Other than this 5S awareness programs were run among employees through 5S Slogans, 5S Posters, 5S Maps, 5S Pocket Manuals & 5S Competitions etc. Last step in 5<sup>th</sup> S implementation was to fix 5S audit check sheet, audit frequency & responsibility. 5S audit check sheet is standardized covering all check points from C1 to C15 which are discussed above in Table 2. In order to ensure involvement of all employees & management in the sustenance of 5S we fixed layered audit schedule which is shown through table 6.

**Table 6 – Layered 5S Audit Schedule**

S. No.	Auditor	Audit Area	Audit Frequency
01	Operator	Own Work Station	Shift Wise
02	Supervisor	Own Zone	Shift Wise
03	Section Incharge	Own Section	Daily
04	Deptt. Head	Own Department	Daily
05	Senior Management	Own Division	Weekly
06	Top Management	Whole plant	Monthly

5S Audit score of each department is also reviewed in Management Review Meeting & Best department is recognized & rewarded.

### **7.6 5S Re-audit in Organization**

After systematic implementation of 5S, we need to quantified the improvements with respect to 5S implementation. In order to do that we decided that we will do a formal re audit of 5S in the organization as we

did in start of the activity. We had a site tour covering all workshops or departments of the organization & scored each department for each check points as per 5S audit check sheet. Following is the 5S audit report of the organization which is shown through table 7. We went to each department & based on observation we gave score for each check point. Scores were decided from 1 to 4. 1 means Poor, 2 means fair, 3 means good & 4 means excellent.

**Table - 7 : 5S Audit Re-Audit Report of the Organization**

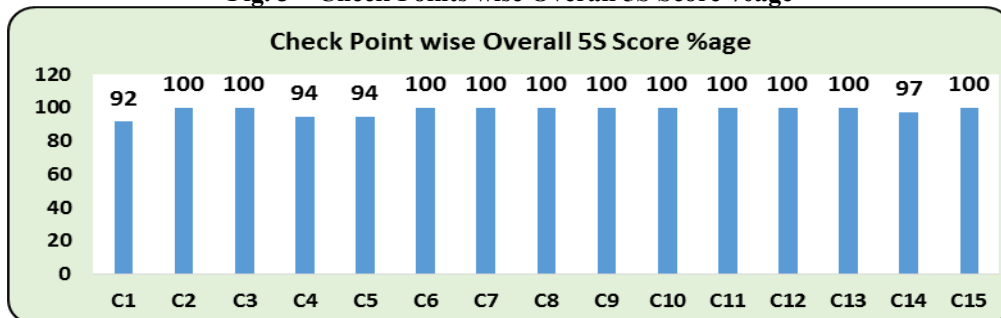
Category	Check Point No.	Workshops / Departments									Total Score	% Score
		Store	Molding	Plating	Painting	Assembly	Quality	FG Store	Maintenance	Tool Room		
1S	C1	3	4	4	4	4	4	4	3	3	33	92
	C2	4	4	4	4	4	4	4	4	4	36	100
2S	C3	4	4	4	4	4	4	4	4	4	36	100
	C4	4	3	4	4	4	4	4	4	3	34	94
3S	C5	4	4	4	4	4	4	4	3	3	34	94
4S	C6	4	4	4	4	4	4	4	4	4	36	100
	C7	4	4	4	4	4	4	4	4	4	36	100
	C8	4	4	4	4	4	4	4	4	4	36	100
	C9	4	4	4	4	4	4	4	4	4	36	100
	C10	4	4	4	4	4	4	4	4	4	36	100
	C11	4	4	4	4	4	4	4	4	4	36	100
	C12	4	4	4	4	4	4	4	4	4	36	100
	C13	4	4	4	4	4	4	4	4	4	36	100
5S	C14	4	4	4	4	4	4	4	4	3	35	97
	C15	4	4	4	4	4	4	4	4	4	36	100
Total Score		59	59	60	60	60	60	60	58	56	Avg. % Score	
% Score		98	98	100	100	100	100	100	97	93	98.5	

We had calculated total audit score & % score in two terms. One is check points wise & another is department wise. Overall average score is 98.5% for the whole organization. Which proves that methodology what we had adopted in order to implement 5S was very effective.

#### Evaluation of Improved 5S Level In The Organization

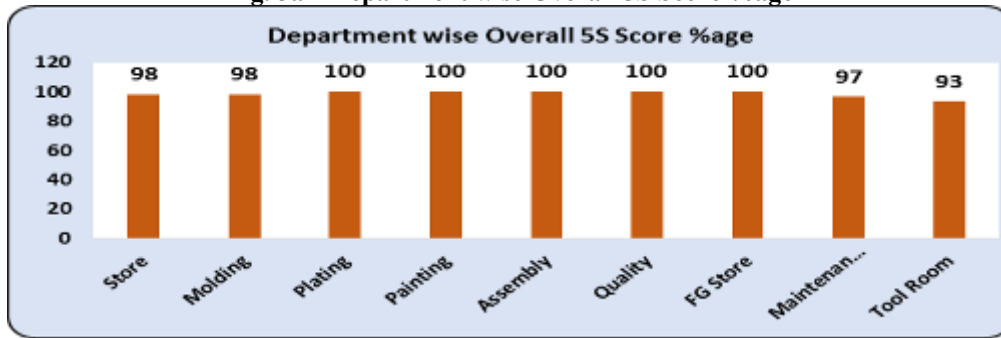
In order to find out the improvement in 5S implementation or to evaluate the improved level of 5S in the organization. We prepared Bar graphs in two terms. One is check points wise overall 5S score %age & another is department wise overall 5s score %age. Which are shown through Fig. 3 & Fig. 3a.

**Fig. 3 – Check Points wise Overall 5S Score %age**



Through above figure it is analysed that in all of the checkpoint approx. 100% score is achieved in the organization. However, some of the checkpoints like C1, C4, C5 & C14 yet have some improvement scope.

Fig. 3a – Department wise Overall 5S Score %age

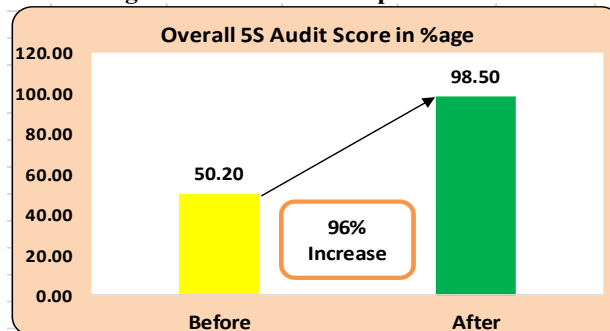


Through above figure it is analysed that all departments have scored approx. 100%. While Store, Molding, Maintenance & Tool Room yet have some improvement scope.

## V. RESULTS & CONCLUSION

After systematic implementation of 5S, It is observed & analysed that overall 5S audit score is improved from 50.2% to 98.5% which is increase of almost 96%. This is shown through figure 14.

Fig. 4 – Results of 5S Implementation



Other than this following intangible advantages or impact of 5S implementation were observed.

1. Stocks were confinement.
2. Usage of workplace was improved.
3. Prevention of losing the tools or other items was ensured.
4. Time to search necessary things was reduced.
5. Working conditions for workers was improved.
6. Customer appreciation has been increased after maintaining a clean and neat layout.
7. The standards of the company came to next level.
8. Slips and falls of the material have been reduced.
9. Safety Hazards associated with workstations & layout are reduced.
10. Quantity of mistakes are reduced resulting from the inattention.
11. Inter human relations are improved.

The 5S system is a good starting point for all improvement efforts aiming to drive out waste from the manufacturing process and ultimately improving a company's bottom line production by improving products and services and lowering costs. Many manufacturing facilities ranging from SMEs to large scale industries have opted to follow the path towards a "5S" work-place organizational and housekeeping methodology as part of Continuous Improvement or Lean Manufacturing processes in order to achieve higher levels of quality through minimization of waste.

This concept is especially attractive to older manufacturing facilities looking to improve their bottom line production without the need for capital investment. 5S implementation is not a one time activity, It is a continuous process which needs to be performed & monitored on regular basis. There is also great scope for improving this methodology. Now, the 5S concept is evolving into a 6S Methodology. There has been a prolonged debate since past few years whether to add 'Safety' as the new S's or not. Therefore, we can say that this methodology is still evolving and a lot of innovations to implement this methodology are also coming up.

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