General Implementation and Calculation of 5s Activity in any Organization

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Abstract: ***This paper is a proposal to do calculation of 5S activities and to do improvement at weak points of 5s system with the help of allotted rating and graph plotted.***

Keywords: Quality improvement, equipment effectiveness, 5s methodology

1 Introduction

Total productive maintenance (TPM) has an aim to improve the overall equipment effectiveness of the system. It faces with the six great losses decreasing the efficiency of the equipment. 5S is the initial pillar of TPM which is basically deals with the material arrangements, tool availability, cleaning of machine and establishment of standard process. 5S has positive impact on safety, quality, efficiency and morale. In this study 5S system used for ensuring order in discipline in the companies. This proposed system has not been implemented in any company but it is effective and easily applicable to any kind of Manufacturing Corporation.

In this study I focused on rating of 5 S systems, which make as able to understand the improvement criteria for particular S region. Here we give total rating of 25 score, which is divided in five equal parts for each S we give highest mark as 5. After that we will make a graph which will make us able to understand the efficiency and make able to do better improvement.

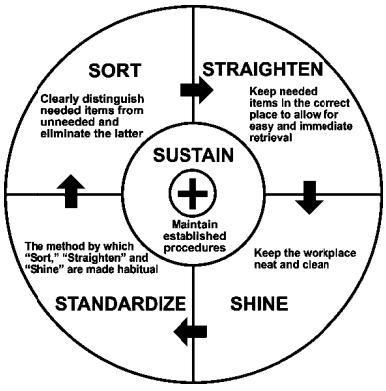


Figure 1: 5 s System

2 5S Detail and Calculation

The 5S system consists of 5 s abbreviates of Japanese word which are given below:

Seiri (Sort)

Seiri is the 1st S in 5S system, which is basically deal with the availability of material and process of product manufacturing. For calculation of Seiri rating we allot 5 criterion regions for Seiri arrangement, and decide that the sub system should achieve minimum 3 points out of 5 because it tends us to define that system will be in issue when it is above 50 % active. The criteria for Seiri rating are given below.

1) Material availability or excess.
   Give **1** point if material is full and give **0** if material is not in proper quantity.
2) Defective goods: if there are **N** items which contain **M** item as defective then the point will be
   [1-{M/N}] = Fraction of fine goods.
3) Operating Condition: Operating condition is also an important aspect for the arrangement of tools and material, because without the comfort of operator the best process arrangement also has zero value. If operating condition is under control then allot **1** point to the system, if not then give **0** point to the system.
4) Relative information about the operation like working condition, material information, process guidelines etc. Allot **1** point for full information and give **0** point for partial information.
5) Elimination of waste is also a main aspect for 5s system
   Let total **P** no of waste are listed but only **Q** were eliminated then point for elimination process will be :
   [1 – {Q/P}] = Fraction of waste elimination

Now add all the five scores and get total rating of Seiri system out of **5**. If this Seiri system will get less than 3 points then do the arrangement again because if it got below 3 points it means it has very poor conditions of analysis.

Seiton (Set in order/straighten)

The 2nd S of 5S is Section which means to do proper or regular arrangement of equipment for proper process to be done in sequence , which leads to do mistake proofing work. Forming a regular workplace, avoiding time loss while searching for material and improving the efficiency are main objectives.

According to this purpose, a localization order is designed for easily accessing to the necessary materials at required times and the materials are put their own places again after utilization. As a result of the arrangement performed at the work stations (machines, tools, hand tools, materials to be used, etc.), these should be kept at a place where can be accessed easily due to the case of requirement.

The criteria for Seiton rating are giving below;

1) Perfect allocation of required tools: Let there are **A** no of tools and B no of tool are not in proper sequence. Then rating for perfect allocation will be:
   [1 – {B/A}] = Fraction for tool in proper sequence
2) Material arrangement rating: This criteria basically dealing with the providing of raw material or accessories for the particular operation. Let **L** be the lack of material and **T** be the total material required.
   [1 – { L/T}] = fraction of material available
3) Regular arrangement of Tools: This criteria shows the consistency if the system about providing service for proper fulfilment of tooling requirement. Let **G** be the no. irregular process and **F** be the total no process.
   [1 – {G/F}] = Fraction of consistency to tool arrangement.
4) Consistency in arrangement of material : Leading aim as "every time perfect arrangement"
   Let **U** be the fail arrangement and **Y** be the total no of arrangement
   [1- {U/ Y}] = Fraction of consistency
5) Working Efficiency of the Seiton System:-
   Working time for process / Total time allotted for the process
   Now do sum of all the above five criteria and note it as the rate of the Seiton system.
   This rate should have minimum value of 3 points , if not then system will set again or need analysis again.

Seiso (Shine/ Sweep/ Clean):

In order to realize effective tasks, it is essential to create a clean and regular working and living environment. This is because dust, dirt and wastes are the source of untidiness, indiscipline, inefficiency, faulty production and work accidents. We can handle cleaning practices as a two stepped approach; "general cleaning of workplace and availability of dirtiness sources" and "machine, hardware, tool cleanliness" referred as detailed cleaning. In case of detailed cleaning, some advantages can be obtained.
Seiso process indicates the line "Renovation of the work place"

Seiso system contents the following criteria region:

1) Is the Machine Clean or Not : If the machine is clean then give **1** Point to the system and if machine is not clean then allot **0** point.
2) Process path clean: If the path of process is clean then allot **1** point to the system and if it having some dust then allot **0** point.
3) Proper Environment for working condition: Working condition include the ergonomics of the worker like proper light and air course, which makes the operator continuously fresh and energetic and make him stay away from errors during operation. Working condition rate will be
   Let **J** will be total aspect for favourable condition and **I** be the no on fail arrangement.
   [1- {I / J}] = fraction of environment
4) Consistency in cleaning: Let P be the total No of cleaning required and S be the No of cleaning not done or we can say inconsistency. So consistency rate will be
   [1 – { S / P }] = fraction of consistency
5) Safety from accident : Let H be the total no of accident chances and E be the total no for accidents occurs .Then safety rate will be **1 – { E / H }] = fraction of safety**

Now do sum of all the above five criteria and note it as the rate of the Seiso system.
This rate should have minimum value of 3 points, if not then system will set again or need analysis again.

Seiketsu (Standardize) Seiketsu is generally means for make a peak standard which should be achieve by the manufacturing process practice. Standard should be very cleaning, communicative and easy to understand. Standard rate will be found by calculating the average of previous three S, because standard of any system will rise and fall by the mean rate depending factors.

Standardize (Seiketsu) =

$$\frac{\text{Sieri rate + Seitorate + Seiso rate}}{3}$$

Shitsuke (Sustain/self-discipline)

Sustain is the last S of the 5S system which is deal with the regularity of maintaining the standard of the organization for the particular process, which is only done by regular practices and by following the proper instruction of machine operating. By doing regular following of accurate of instruction we can maintain the machine condition at its peak level, which may help for better production and stay away from breakdown.

i.) Formation of a disciplined company.
ii.) Removing small faults through the aid of cleaning.
iii.) Providing the execution of visual control.
iv.) Granting the responsibility of the machine to the worker.
v.) Providing the performance of protective activities.
vi.) And granting the responsibility of the workplace to the personnel.

Shitsuke rate will be depending on the previous 4 S because without that the regularity will not maintain. Therefore Shitsuke rate will be the average of previous 4 S ratings.

Shitsuke (Susutain) =

$$\frac{\text{Seiri rate + Seiton rate + Seiso rate + Seiketsu rate}}{3}$$

After the calculation of this rating of 5 S we will make a graph which will show the real condition of System and can find the improvement required region.

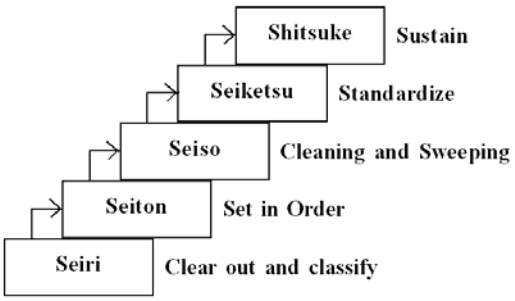
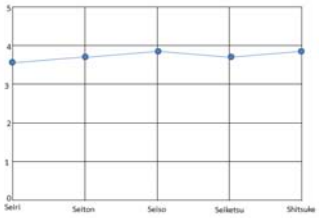


Figure 2: Hierarchy of 5S system

3 Graph Plotting

In this graph Horizontal line will contain 5 S's and Vertical line contain rating from 0 to 5
Let us assume some values for making graph.
Reading of 1st Week:
Seiri rate (S1) : 3.5
Seiton rate (S2) : 3.6
Seiso rate (S3) : 3.9
Seiketsu rate (S4): 3.6
Shitsuke rate (S5): 3.65

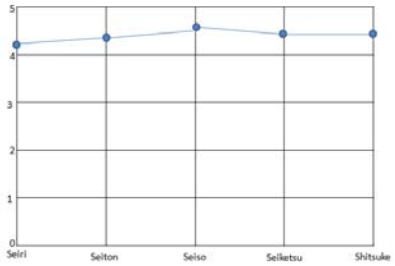


In this graph we can easily find the weakest point of the system, like wise here we can see that curve is little bit bend or low at Seiri and Seiton system which are being affect the reading the Seiketsu and Shitsuke system and because of that the overall efficiency of the system will affect. After getting this rating graph we can focus on improvement of the weakest point of make higher efficiency of the 5 S's system. So the efficiency of the system is:

$$\frac{(3.5 + 3.6 + 3.9 + 3.6 + 3.65) * (100)}{25} = 73\ \%$$

Now , suppose after improvement we can see that the rating will increase of all the system and because of that we will get less cervical graph which shows that we heading toward the standardization. Let the new rating of 2nd week will be as follow;

Seiri rate (S1) : 4.2
Seiton rate (S2) : 4.4
Seiso rate (S3) : 4.6
Seiketsu rate (S4) : 4.4
Shitsuke rate (S5) : 4.4



So the efficiency of the system

$$\frac{(4.2 + 4.4 + 4.6 + 4.4 + 4.4) * (100)}{25} = 88\ \%$$

Week	Se-iri	Seto n	Seis o	Seike-tsu	Shit-suke	Effi-ciency
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

After doing improvement, efficiency of the system is increase from 73 % to 88 % data recording method for 5 S's system as per week:

The overall efficiency of the 5 S's system for the permitted or approved period will be the average of the particular efficiencies of required week.

4 Conclusion

The calculation of 5S helps us to get real scenario of the implemented S systems and to judge its level of acceptance. 5S system stand at good position in lean manufacturing, because without it we cannot get proper working environment and culture, 5S also leads towards the job satisfaction for the operator by means of providing clean atmosphere and safety criteria during working hours. By applying 5S we can also maintain the organizational look in better way or make it clean every time. This calculation is much easier than other process and can be easily applicable to any manufacturing region by understanding the process and its difficulties which cause the defective work and poor quality of product during production. After getting the rating graph and efficiency we can easily concentrate on weak point of the 5S system to do improvement to achieve maximum rating which also tends the whole system to

achieve higher efficiency. It is very easy to maintain the 5S system in any manufacturing area just to concentrate on consistency of providing services and arrangement of tool at the optimum regularity.

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