

Implementation of 5S in Empty Cement Bag Manufacturing Industry

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Abstract— This paper explains the methods and techniques of 5S use to increase the quality of Empty Cement Bags. As nowadays cement industries uses Automatic Bag Placer for packing of cement, the requirement of bags is straight and wrinkled free. It can be observed that introducing the 5S rules bring the great changes in the company, for example: process improvement by costs reduction, increasing of effectiveness and efficiency in the processes, increase in productivity and quality of product, increase in efficiency of worker, safety. The 5S methodology permits to analyze the processes going at the workplace and establishment of 5S sustaining well organized, clean, high effective and high quality workplace. The training for the 5S system to the worker of industry is very important. Other Most important thing is to take equal participation and constant improvement in the method. This method can be used in all companies. Its result is the effective organization of the workplace and increase in quality and productivity.

Key words: 5S Implementation, Automatic Bag Placer, Elimination of Waste, Quality Improvement

I. INTRODUCTION

The cement bags used here at J K Lakshmi cement Ltd, Grinding Unit, Kalol are mostly made up of PP Woven sacks. P.P stands for Polypropylene bags. Woven Sacks are the best and the most cost effective solutions for industries like cement, fertilizer, sugar, chemicals, food grains etc. There are various types of bags made out of PP/HDPE and with or without laminations. The cement bags used consist of valve on one side of the bag, which is used to fill cements and then that valve is sealed with the use of system available in Auto Roto Packer. The main property of this PP woven bags is that it is stitched on the corner of top and bottom, so because of this process double layers are formed on top and bottom side of the bags, which result in sagging of the bags from middle as it has only two layers.

The main features of PP Woven sack are:

- High strength fibres
- Heat-cut or hemmed top
- Single fold or Double fold bottoms
- Water and Dust proof
- Double side printing
- Single side valve opening

II. AUTOMATIC BAG PLACER

To make the process easy automatic bag placers are used to keep the empty cement bags in the magazine that are made available in it. The Bag placers are placed in front of Rotopacker, so as the roto packer rotates the bag placer picks one single bag and shoots it to the nozzle available in the roto packer. The stack of 15 to 17 are placed in the bag placer which is built on the moving conveyor which keeps rotating

after every 16 seconds to make the new magazine available for filling of the bags.

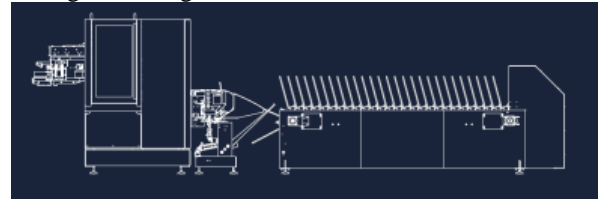


Fig. 1: Automatic Bag Placer [13]

A. Advantages:

- It automates the whole packing process.
- Can make full use of packing machines filling capacity.
- Flexible and rapid changeovers for various bag size and types are possible.
- Reduces Man power and labour cost.
- Bag holding capacity: 225 bags

III. CONCEPT OF 5S

5S is a technique originated from Japan and it was first developed by Hiroyuki Hirano. It include five words Seiri, Seiton, Seiso, Seiketsu and Shitsuke, which means Sort, Set in order, Shine, Standardize and Sustain respectively. The 5S technique is included within “Kaizen” which means “change for the better”. It allows the enhancement of efficiency and productivity. The 5S technique is a structured program to systematically achieve total organization cleanliness, and standardization in the workplace. The benefit of 5S technique is improvement in productivity, quality, health and safety.

A. Current Scenario of Empty Cement Bag Manufacturing Industry

In the present process of manufacturing the empty cement bags, the continuous, long roll of bags is cut in the required amount of size, and this cut bags are sewed with the help of the sewing machine to make the valve for the entrance of cement in it. Than this bags sewed are checked by the labour, which counts manually and then finds defects in it. Because of the manual process of checking, the labours lack discipline which result in the wrinkled bags, while the new Automatic Bag placers are introduced in the market which have only one and only requirement, that the empty cement bags should be straight and wrinkled free.

Terms of 5S systems are given below:

- SEIRI (Sort): The removal of all unwanted, unnecessary, and unrelated materials in the workplace.
- SEITON (Set in order): This step consists of putting everything in an assigned place so that it can be accessed or retrieved quickly as well as returned in that same place quickly.
- SEISO (Shine/clean): It is consists of cleaning up the workplace and giving it a 'shine'.

- SEIKETSU (Standardize): It defining the standards by which personnel must measure and maintain cleanliness.
- SHITSUKE (Sustain): This last step is about 'Discipline.' It maintain orderliness and to practice the first 4 S as a way of life the introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

B. 5S Methodology

1) SEIRI

The necessary and unnecessary materials available in the workplace should be sorted and classified [2]. Through the suitable sorting it can be identified the materials, tools, equipment and necessary information for realization the tasks [6, 13]. Sort by the tools that are frequently used are placed within easy reach, and those that are not used often [8]. This leads to fewer hazards and less clutter to interfere with productive work [7, 9].

- Benefit:
 - Process improvement by costs reduction
 - Stock decreasing
 - Better usage of the working area
 - Prevention of losing tools

2) SEITON

This means preparing the necessary items neatly and systematically so that they can easily be taken and returned in the original place after use [1,14]. Forming a regular workplace, avoiding time loss while searching for material and so improving the efficiency are the main objectives [2,10]. The goal is to minimize the number of moves that a worker has to perform during operation [8].

- Benefit:
 - Process improvement (increasing of effectiveness and efficiency)
 - Shortening of the time of seeking necessary things
 - Safety improvement

3) SEISO

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 [2, 10]. Cleaning should become a daily activity. Work place should be cleaned at regular intervals [9]. To help identify dust lean factory floors, often painted in bright colors and enhance the light sources within the plant [8].

- Benefit:
 - Increasing of machines efficiency
 - Maintenance the cleanness of devices
 - Efficiency
 - Keep the clean workplace, easy to check
 - Quick informing about damages (potential sources of damages)
 - Improvement of the work environment, elimination of the accidents reasons

4) SEIKETSU

To establish standards of the best practice in the workplace and to ensure that the standards are compiled and to undertaking that the workplace is clean and tidy at all times

[1]. The necessary systems are formed in order to maintain the continuance of these good practices at the workplace. Worked out and implemented standards in the form of procedures and instructions permit to keep the order on the workplaces. Standards should be very communicative, clear and easy to understand [6, 10]. Basic housekeeping standards apply everywhere in the facility. Everyone knows exactly what the responsibilities are. Housekeeping duties are part of regular work routines [7]. There is a need after some period to choose the best ways to practice sort, set in order and cleaning and abide by them [8].

- Benefit:
 - Safety increasing and reduction of the industry pollution
 - Working out the procedures defining the course of processes

5) SHITSUKE

Train employees disciplined for practicing 5S system continuously so that the habits and culture within the organization [1,14]. The task here is undertaken by the leader directors. The directors should explain the importance of 5S to the personnel through various trainings and the knowledge of the personnel about 5S should be kept updated through the 5S boards to be formed at the workplace [2]. To maintaining the standards and keeping the facility in safe and efficient order day after day, year after year.

- Benefit:
 - Increasing of the awareness and morale
 - Decreasing of mistakes quantity resulting from the inattention
 - Proceedings according to decisions
 - Improvement of the internal communication processes
 - Improvement of the inter-human relations

IV. PROCEDURE FOR WRINKLE FREE BAGS

The main requirement for the automatic bag placer is the empty cement bags used must be wrinkle free and all the opening valve should be in same orientation. But initially I noticed that the bags coming from the supplier Gopala Poly Plast were not fulfilling its requirements. So to make it wrinkle free and in proper orientation, many analysis were done on it and few changes were also made in the procedure of the production of the cement bags.

A. Stages of Bag Production

- 1) Automatic Cutting of Bags from the roll into the required size and required amount.
- 2) Automatic Sewing of the Bags.
- 3) Manual Counting and Detecting any defects in bag like not proper sewing of the opening valve or any hole in the bags.
- 4) Manual stacking of the bags
- 5) The stacks of 500 bags are pressed with the use of automatic press, to make it a single bundle.

In these five processes we noticed that the bags were not getting wrinkled in the starting of two processes, were the bags are automatically cut and sew. While the main problem of wrinkled were analysed when the manual counting of bags were done and when these counted bags were placed or stacked at one place from where it was used to get to press for making a single bundle of 500 bags.

The main reason for wrinkle in the other three processes was that the work was done manually by the use of labours. So because of that the work was not done in sequence and correct order was not followed to make correct size and shape bags.

Below are the few photos of the different stage of bag production where the wrinkled were observed:

- 1) The bags are checked and counted by workers and stacked on each other, due to way of placement of the bags, the wrinkles are already formed in the bags in initial stages itself.



Fig. 2: Stacks of Counted bags [Courtesy: Gopala Poly Plast]

- 2) It can be concluded from figure 3.4 that the placement of bags is poor and due to this the wrinkled are formed easily, as the property of PP woven bags is it has only two layers in middle and four layer at top and bottom as top and bottom are sewed.



Fig. 3: Stacks of Bags for bundle [Courtesy: Gopala Poly Plast]

- 3) The counted bags are kept near the automatic press to make the single bundle of 500 bags. This also results in wrinkles.



Fig. 4: Stacks for pressing [Courtesy: Gopala Poly Plast]

So by observation of 7 days at Gopala poly plast, we did analyses of the wrinkles. Below is the report of Wrinkle analyses.

Day	Procedure	Wrinkle	Remarks
1	Cutting	NO	No wrinkles were found on cutting
2	Sewing	NO	No wrinkles were found on sewing
3	Counting and Detecting defects	YES	Heavy wrinkles formed
4	Pressing 500 bags on press to make single bundle	YES	Heavy wrinkles formed
5	Storage at G.P.P for two days	NO	Wrinkles were already formed in process 3
6	Dispatching of Bundles in trucks	NO	Wrinkles were already formed in process 3
7	Storage of Bundles at J.K Lakshmi cement ltd.	YES	Wrinkles were already formed in process 3

Table 1: Wrinkle analysis

B. Suggestions

To improve the quality of the bags and to decrease the wrinkles from the empty cement bags, the main three suggestions were given:

- Implementation of 5S.
- Keeping Plates of heavy material in between stacks of 100 to decrease wrinkles.
- Keeping the stack of 50-50 with valve on opposite sides after each 50 stacks. In the above three suggestions, the trial by keeping plates in between stacks of 100 bags were done, whose result were better than before processes, but it was not implemented because it had limitation. We used plates of Belt conveyors to keep in between bags, so the weight increased because of that. So this process failed because of heavy weight.

V. IMPLEMENTATION OF 5S

A. Suggestions

The suggestion for 5S system was implemented at Gopala poly plast. It is divided in main five stages:

- 1) Sorting – Separating the needed bags from the not-needed bags.
- 2) Simplifying – Making the place easy to work.
- 3) Systematic Cleaning or Sweeping – Keeping the place cleans for work.
- 4) Standardizing – Developing common methods for consistency.
- 5) Sustaining – Holding the gains and improving.

B. Recommendation before Implementation of 5S

- Decide the work area for the particular process.
- Clean the waste bags at the very moment of process.
- Keep the stack in proper order after counting.

- Do not attach strip while counting and detecting defect of bags.
- Keep bags in 50 with valve on other side after each stack.
- If possible keep Plates in between every 100 bags while process of pressing.
- Discipline in the processes

C. Planning for 5S

- The team for implementation of 5s was assembled which includes Labour for counting and detecting bags, the operator of pressing machine, the supervisor of the whole process.
- The work area was defined for all the work processes to make the work easy and quick.
- Every group members were assigned the work of their own specialization and were made to do work with discipline and ethics. The proper way of work was taught to all the team members.
- The communication board was installed at the start of floor, which consist of all the work data and time of the worker.
- The targets for the 5s system were made and tried to achieve it in respective time. The activities were made for each member with proper schedule.
- The supervisor was told to review the work of each and every team member time to time. The lesson to work in team was taught to all the members.

D. Advantage of 5S

- 1) 5S concept is very simple and easily understood by everyone because this only requires knowledge of the conventional discipline and high commitment. This practice can be implemented at all levels.
- 2) 5S will foster teamwork, discipline and will increase the sense of responsibility and compassion for company.
- 3) 5S will create clean, productive work environments and secure the delivery system towards a world-class.
- 4) On-going commitment from management and involvement are the cornerstone of all citizens for the successful implementation of 5S practices.
- 5) 5S is an on-going need to maintain excellent service delivery performance.

E. Results



Fig. 5: Before and After Implementing 5S [Courtesy: Gopala Poly Plast]

VI. CONCLUSION

The study these papers demonstrates the efficient implementation of 5S technique leads to subsequent improvement in productivity of the manufacturing company. The 5S improves environmental performance and thus relate primarily in reduction of wastes in manufacturing. It promotes neatness in storage of raw material and finished products. The 5S implementation leads to the improvement of the organization in many ways for instance. The implementation of the 5S system of rules leads to the following effects regarding the improvement in quality:

- Visible results within a short period of time (2-3 weeks)
- Workers get used to order and discipline
- Labelling draws attention to change that is about to occur
- Reduction of physical effort, less accidents during the production process
- Increase of the workers' professional training, better organization of activities.

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