

## Study of Implementing 5S Techniques in Plastic Moulding

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**ABSTRACT:** 5S is a basic foundation of Lean manufacturing systems. It is a tool for cleaning, sorting, organizing and providing the necessary groundwork for workplace improvement. This research effort dealt with the implementation of 5S methodology in the S.P. Plastic Industry MIDC, Hingna Road, Nagpur 16. A detailed application of the 5S system is given. It will impact the instructors and workman of Industry that work within the selected place. By following the 5S methodology, this research effort may show significant improvements to safety, productivity, efficiency, and housekeeping. The research documents improvements by using before and after pictures. It also intends to build a stronger work ethic within the workman and engineer who would be expected to continue the good practices.

**Keyword-** 5S, Productivity, Quality management

### I. INTRODUCTION

Plastic moulding is very widely used process in today's world. Due to the high cost of metallic materials and their lack of availability the plastic materials are very widely used in many applications.

The plastic material has very good qualities and their qualities can also be improved easily by the use of catalyzers. Thus plastic moulding is getting very high attention. Plastic moulding has very wide classification. Plastic products with simple shapers are easy to manufacture. But products with complex shapes are difficult to manufacture the injection moulding is used.

Injection moulding machines are used for their high productivity and high quality of production. In injection moulding the products which require uniform thickness with high density are easy to manufacture. z The plastic moulding industries are replacing their conventional machines by the injection moulding machines due to their high productivity and user friendly control.

In S.P. Plastic Industries by conducting study that helped us to identify the problems with the machines, environments, safety and cleanness of the industry.

5S is a system to reduce waste and optimize productivity through maintaining an orderly workplace and using visual cues to achieve more consistent operational results. The term refers to five steps – sort, set in order, shine, standardize, and sustain – that are also sometimes known as the 5 pillars of a visual workplace. 5S programs are usually implemented by small teams working together to get materials closer to operations, right at workers' fingertips and organized and labeled to facilitate operations with the smallest amount of wasted time and materials.

"A place for everything, and everything in its place" is the mantra of the 5S method, and storage and workspace systems such maximum use of cubic space for the highest density storage. The result is an improved

manufacturing process and the lowest overall cost for goods produced.

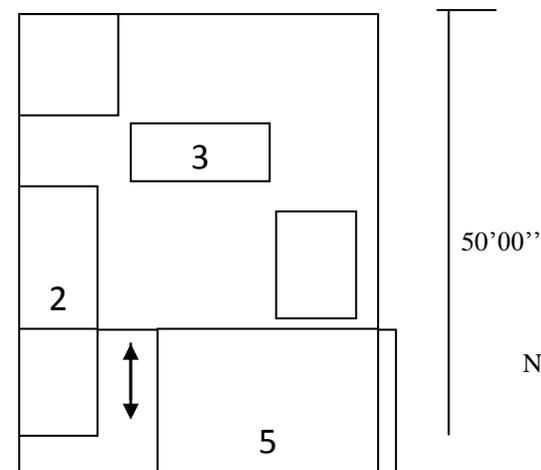
### II. COMPANY INFORMATION

Name of Industry: S.P. Plastic Industry  
Address: 39, Suvarna Laghu Udyog Yojana,  
Electronic Zone Chowk,  
MIDC, Hingna Road, Nagpur 16.

#### 2.1 Product produces

- Mug
- Fruit Container
- Buckets
- Bowls etc

#### 2.2 Plant layout



1. 1<sup>st</sup> floor office: Owner and other official work are done.
2. Raw material storage area.
3. Injection moulding machine 1.
4. Injection moulding machine 2.
5. Dispatch area.

#### 2.3 Raw material

Poly Propylene (Pp) Grannules

Types: Cpp (Colour Poly Propylene), Wpp (White Poly Propylene, Marble Quality), Hd (High Density), Ep (Engineering Plastic).

#### 2.4 Process

This is small industry. In which plastic is used as raw material and this raw material is converted by injection moulding process into the finish good or different parts. The process for the different parts is given below.

1. When raw material comes into the company, it is store in the storage by using fork left (manually).

2. After stage of material the quality inspector check the raw material visually. If any problem found in the raw material then these raw materials send back or salvage it.
3. The raw material fed into the hopper manually. According to part has to be done.
4. For the process injection moulding machines is used in which melted raw material is converting into the finish product by using die cavity.
5. The raw of injection moulding machines fed raw material to the torpedo. The torpedo heat the raw material and convert it into melted plastic, this melted plastic fed through the nozzle in the die cavity and generate the profile according to shape generate into the die cavity.
6. After completion of process the finish good removes from the die and the operator operate machines for next part.
7. The operator removes the exceed material from the finish good by using hacksaw blade.
8. This finish product carry to the storage area manually where quality check visually.
9. Then after packing is done in the storage area.

### III. AREA OF STUDY

Proper utilization of storage space more prominently.

#### 3.1 Objective of study

To improve the productivity by introducing 5S system in the work place.

#### 3.2 Problems identification

While studying identified problems are

1. Utilization of stored space for finished product is not proper.
2. Utilization of stored space for raw material is not proper.
3. More time is required for packing of finished product.

Analysis and elaboration of the problem

##### 3.2.1 Utilization of stored space for finished product is not proper:

As per our study it is found that the total build up area of the plant was not properly utilized. it is also found that the storage space was not enough to store the finished product. The production in one day was occupying more than the hall of the space of the storage space. Thus the total production of the day has to send to market to store the ongoing production. This space utilization of storage space can be done more efficient.

##### 3.2.2 Utilization of stored space for raw material is not proper:

Utilization of space due to unwanted raw material and there is no specified space for raw material storage.

3.3.3 More Time Required for Packing of Finished Products: The finished product of the machine has to be well packed before it reaches the market because, the quality of the product has to be good and no damage should be there on the product. The packing of finished product was collected in a lot of thousand and then packed in big polythene bags. The bags are so large that the

labours were not able to handle the bags properly and set the goods in the bags. This process was not properly done, and was time consuming. The process could be done by the automatic packing machines

#### 4.5 'S' SYSTEM

Establish and maintain a clean, neat and tidy workplace Translation of 5 Japanese S's, what is 5S and why do we want to do it? 5S represents 5 disciplines for maintaining a visual workplace (visual controls and information systems).

These are foundational to Kaizen (continuous improvement) and a manufacturing strategy based "Lean Manufacturing" (waste removing) concepts.

5S is one of the activities that will help ensure our company's survival.

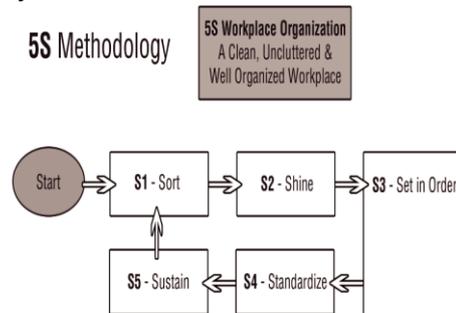


Fig.1

#### 4.1 Sort / Arrangement (SEIRI)

(Eliminate unnecessary items)

Through the suitable sorting it can be identified the materials, tools, equipment and necessary information for realization the tasks. Sorting eliminates the waste material (raw materials and materials), nonconforming products, and damaged tools. It helps to maintain the clean workplace and improves the efficiency of searching and receiving things, shortens the time of running the operation. The 1S rule's proceedings

A) On the first stage one should answer to so-called Control Questions:

- Are unnecessary things causing the mess in the workplace?
- Are unnecessary remainders of materials thrown anywhere in the workplace?
- Do tools or remainders of materials to production lie on the floor (in the workplace)?
- Are all necessary things sorted, classified, described and possess the own place?
- Are all measuring tools properly classified and kept?

On the basis of the answer to the above questions it is possible the estimation of the workplace in terms of the 1S rule so littering the workplace. If on any question answer is yes, it should execute sorting of things, which are in the workplace.

B) On the second stage one should execute the review of all things which are in the workplace and group them according to the definite system. According to carried out sorting it should execute the elimination from the workplace the things, which were found „unnecessary”.

C) To permanent usage the 1S rule is so-called the Programmed of the Red Label. It means giving the red label to things, which operator will recognize as useless

within his workplace. This label will make possible not only the elimination of the given thing, but through its own formula will make possible the liquidation of the reasons of appearing on the workplace this given thing.

#### 4.2 Set in Order / Neatness (SEITON)

(Efficient and effective storage method)

Especially important is visualization of the workplace (eg. painting the floor helps to identify the places of storage of each material or transport ways, drawing out the shapes of tools makes possible the quick putting aside them on the constant places, colored labels permit to identify the material, spare parts or documents etc.).

Implementing the 2S rule

It should execute the segregation of things and mark the places of their storing. Used things should always be divided on these, which should be:

- In close access (1st degree sphere),
- Accessible (2nd degree sphere),
- In the range of hand (3rd degree sphere).

To the estimation of the workplace in terms of the 2S rule that is setting in order things serve the following Control Questions:

- Is position (location) of the main passages and places of storing clearly marked?
- Are tools segregated on these to regular uses and on specialist tools?
- Are all transport palettes storage on the proper heights?
- Is anything kept in the area of devices against the fire?
- Has the floor any irregularity, cracks or causes other difficulties for the operator's movement?

Things used occasionally and seldom should be on the workplace but outside the direct using sphere. Their distance and location from the place of work should depend on the frequency of using these materials or tools. Places of storage should be marked in the manner making possible their quick identification. It can be used colored lines, signs or tool boards.

#### 4.3 Shine / Cleanliness (SEISO)

(Thoroughly clean the workplace)

Regular cleaning permits to identify and to eliminate sources of disorder and to maintain the clean workplaces. During cleaning it is checked the cleanness of machine, workplace and floor, tightness of equipment, cleanness of lines, pipes, sources of light, current data, legibility and comprehensibility of delivered information etc. Indispensable is also taking care of and maintenance the personal tidiness of the operator.

Implementing the 3S rule

The first step of realization the 3S rule is renovation the workplace. It is assumed that „the first cleaning” forces the exact checking of usage two of the previous rules. The usage of the 3S rule relies on everyday keeping in faultless cleanness the workplace. It is executed by the operator of the given workplace. To the estimation of the workplace in terms of the 3S rule, that is cleaning the workplace, serve the following Control Questions:

- Are the oil's stains, dust or remains of metal found around the position, machine, on the floor?
- Is machine clean?
- Are lines, pipes etc. clean, will they demand repairing?
- Are pipe outlets of oils not clogged by some dirt?
- Are sources of light clean?

#### 4.4 Standardize / Order (SEIKETSU)

(Order and control to be established for)

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. Regarding this during preparation and improving, it should be involved all participants of the process on the given workplace, it means direct workers. The group knows the best specificity of its own activities, and process of elaboration and after that, usage gives them possibility of understanding the essence and each aspect of the operation. In the aim of assuring all the easy access, obligatory standards should be found in constant and visible places.

It is assumed that standards should not be implemented only in the typical operational processes e.g. production, movement maintenance, storing, but also in the administrative processes, for example: book-keeping, customer service, human resources management, or secretariat service.

#### 4.5 Sustain / Discipline (SHITSUKE)

(Sustain new status quo 'everything in its place')

Implementing the idea of the 5S will demand from workers the compact self-discipline connected with implementing and obeying the rules of regularity in cleaning and sorting. It leads to increasing the consciousness of staff, and decreasing the number of non-conforming products and processes, improvements in the internal communication, and through this to improvement in the human relations.

It is also important to understand the need of executing the routine inspections of usage the 5S rule. This inspection is executed by helping of so-called Check List and created on its basis the radar graph of the 5S, which serves to estimation of the workplace. The inspection of realization of the 5S rule is executed once a month by chosen team implementing the 5S rule – the control team

## V. IMPLEMENTATION OF 5S TECHNIQUES

### 5.1 Sort

All unneeded tools, parts and supplies are removed from the area. The company layout is fixed according to process but the company does not consist of a systematic arrangement for various material handling and storage

### 5.2 Set in Order

A place for everything and everything is in its place.



Fig. 2

### 5.3 Shine

The area is cleaned as the work is performed



Fig. 3

### 5.4 Standardize

Cleaning and identification methods are consistently applied.



Fig. 4

### 5.5 Sustain

5S is a habit and is continually improved the company culture

## VI. BENEFITS

1. The production rate will increase due to systematic arrangement.
2. The space utilization will increase.
3. The atmospheric conditions will improve.
4. Clean and hygienic condition is achieved.
5. It is convenient to handle and operate each and every material.
6. Moral support of the operators and workmen's are improved.
7. Storage space is increased within the same area.

## VII. CONCLUSION

The advantages from implementing the 5S rules 1S:

- Process improvement by costs' reduction,
  - stock decreasing,
  - Better usage of the working area,
  - Prevention of losing tools, 2S:
  - Process improvement (increasing of effectiveness and efficiency),
  - Shortening of the time of seeking necessary things,
  - Safety improvement.
- 3 S:

- Increasing of machines' efficiency,
- Maintenance the cleanness of devices,
- Maintenance and improvement of the machines' efficiency,
- Maintenance 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 S:
- Safety increasing and reduction of the industry Pollution,
- Working out the procedures defining the course of processes, 5 S:
- 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 interhuman relations.

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