

Impact on quality of production using 5S method

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Abstract. Efficient and quality work requires a clean environment, security and rigor. The principle of 5S, namely Seiri, Seiton, Seiso, Seiketsu, Shitsuke, allows the construction of a functional working environment, driven by simple, precise and efficient rules. The 5S is the foundation on which progress is being made, the deployment of Lean-manufacturing means and methods, being a lever of change management. At the same time, the 5S can be considered as the basic rules of order, discipline, unmistakable preliminaries for a whole improvement project.

Keywords: *quality, production, 5S method.*

1.Introduction

Method 5S is a structured program to systematically achieve "organization, cleanliness and standardization at work", thus contributing to improved productivity, reducing quality issues and work safety.

The 5S cycle is indeed evolutionary, it follows the PDCA (Plan-Do-Check-Act) principle, which is very common in the improvement processes. The first (and the largest, moreover) cleanup aims to establish the status of the seats. This phase, in particular, can be exploited to plan the actions, fix and plan the objectives (Plan), with the respective employees and employees involved. The actions are completed (Do) and the result is checked. Finally, the gap between what was found and the objectives (Act) is evaluated, the new actions (Plan) are redefined and planned and their nominal allocation is made.

The rules of the principle under consideration are transversal in so far as they are not devoted to an activity or method. Starting the related procedures begins, firstly, by setting the initial status of jobs and measuring the gap in relation to the objectives. Thus, the effort will be measured, but also where it will lead, if the state is clearly visible (visual management). Visibility is a real red thread in the application of 5S.

2.Structure of the principle

Starting from the phrase "losses are potential benefits," any elimination of a loss means a gain. However, it is important to note that there will be no real improvement in productivity or quality if waste persists. In conclusion, we can say that the 5S is a generic term to win by eliminating waste.

Often, the 5S method is misinterpreted and is widely considered to be just a cleaning activity. Although cleanliness is important, 5S has a much broader sphere of application. This method is related to the organization of the workplace. It is an access gate that allows the LEAN journey to begin, involving employees in the development and use of standards and practices.

The 5S is the first five letters of some Japanese origin terms.



Figure 1. Steps of 5S method according to Trilogiq.

Seiri – Sorting



Figure 2. Workshop example where 5S implementation is required.

The motto of this rule is "to choose and keep the necessary stance on the job and to discard the rest." Accumulated objects do not favor the cleanliness and efficiency of an activity. The sorting thus involves, therefore, sorting the separation of the useless, eliminating the extra things from the workplace.

Seiton – Ordering

Seiton means arranging, reducing unnecessary searches.

The perception of such an approach could be summarized as follows:

- disposition of useful objects in a functional manner;
- the coercion of putting back used and used tools;
- naming and establishing a well defined place for all tools;
- acquisition or creation of accessories and / or media, enabling the means to be identified quickly and as generously as possible;
- defining the rules of ordering.

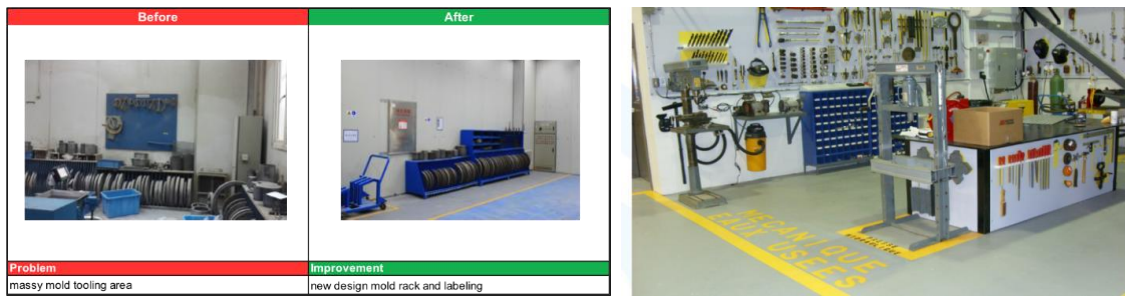


Figure 3. Workshop example where 5S has been deployed.

In order to meet its requirements, Seiton may assume, among others:

- surface painting to view dirt;
- visual delimitation of the work areas;
- place the tools on the paintings to create a visual management system.

Seiso – cleaning

Inainte:



Dupa:



Figure 4. Example of equipment after the cleaning step.

In a clean environment, leakage or any other anomaly is detected more easily and quickly.

Maintenance of machinery, equipment and the working environment is important for health and safety, as well as for the reduction of waste. Minimizing time losses caused by slowdowns in production and stops for repairs, which could have been avoided, will allow us to focus on high-quality production. After a first major cleaning, a mandatory 5S insertion step, continuity must be ensured in this direction. To this end, it is possible to use different solutions:

- division of the workshop into areas with responsibility for each of them;
- cleaning the workplace and its environment;
- identifying and, if possible, eliminating the causes of dirt;
- It is advisable to nominate the objectives and a system for assessing the degree of their fulfillment.

Seiketsu – defining standards

This rule obliges you to respect the previous 3S, without which you can not go to the next step. The first three precepts are mandatory actions, which are most often executed under the impulse of a hierarchical constraint. In order to maintain cleanliness and eliminate disorder causes, it becomes normal, natural and indispensable to enroll as standards, norms.

Seiketsu helps to combat natural trends in the so-called *laisser-aller* and return to old habits.

Creating standardized tasks, optimized in simple, easy steps, for each stage of the process. The visual management of standardized processes guides operators to perform tasks set in the same way,

each time, using a clearly defined process. It combines and efficiently uses various resources such as time, technology, tools and materials.



Figure 5. Example of equipment after the cleaning step.

It is usually best to formulate rules and define standards with the involvement of staff, following the objectives:

- overcoming resistance to change;
- guaranteeing the ownership of the project;
- facilitating adhesion to the project;
- facilitating the implementation and observance of the rules set by the staff involved during the three previous stages.

Shitsuke - to pursue and to improve / evolve

Finally, in order to implement the first 4S, the rules should be continuously monitored, recalled and corrected for deviations from the standard.

Shitsuke or pursuit, but involves also involvement, self-evaluation, promoting team spirit, establishing rules of conduct, implementing good communication, valorizing the results obtained, etc.

After a successful run, it is possible to continue sorting, improving the arrangement (or cleanliness) and some places not considered in the first stage. This improvement should lead to updating the standard and the benchmarks to follow.

Continued maintenance, monitoring, and adjustments are required. Processes can be further analyzed and optimized by applying different LEAN techniques to deliver cost savings and sustain high standards as well as increased efficiency for continuous improvement.

The continuous success of the 5S method depends on the team's discipline to use audit documents and should be a key performance indicator, evaluated and reviewed during the work.

3. Conclusions

A modern and performing production system can be considered when embracing more quality assurance tools, or methods promoted by the Lean Manufacturing concept.

Driving a 5S-style approach, as well as the communication that needs to surround it, should be as visible as possible. The implementation of the TPM rules, the rapid change of tools and series (SMED), but also the quality management, implies the start of the proper work by setting up and defining the bases for a good deployment of these approaches.

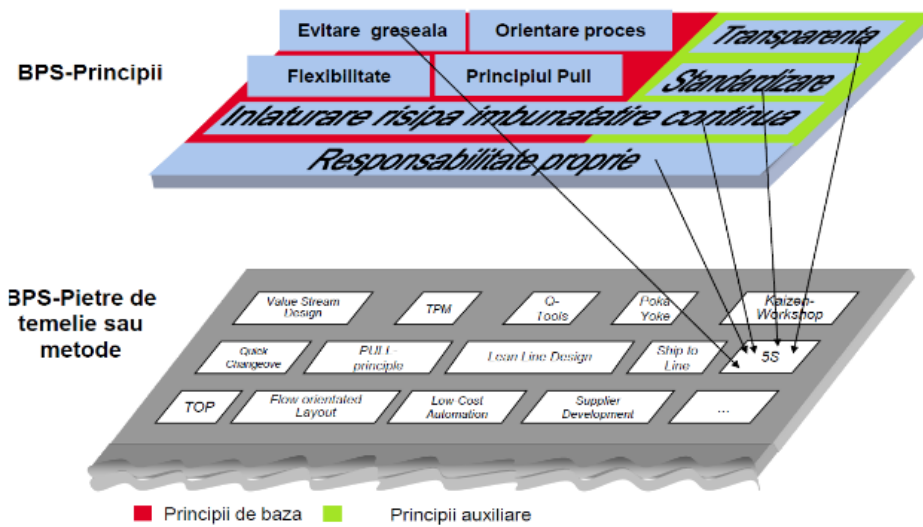


Figure 6. Convergence of the principles of the Bosch-Rexroth production system to 5S.

The 5S, together with other approaches, are meant to become true living rules, with influences even on individual private behaviors. When we want to apply the 5S principle, we must be aware that any construction of progress will be even better as the starting point is solid and stable. The significance of the previous requirements implies that the state of the workplaces was well done, the first actions have brought improvements, characteristic of them being their perennality.

According to the Bosch-Rexroth production system, Lean Manufacturing is presented as a pyramid, the basis of which is the applied and tracked methods.

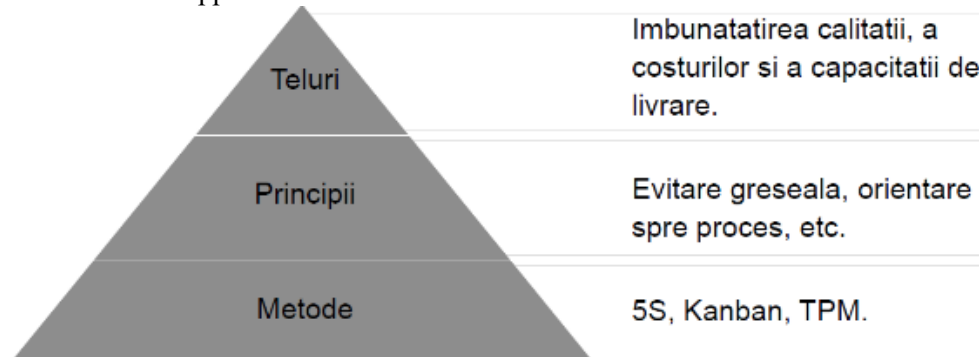


Figure 7. The Quality House of the Bosch-Rexroth Production System.

In the Bosch-Rexroth production system, its principles, in most cases, converge to 5S. When the 5S were put into operation, and the system was understood and applied, the goal will be an annual 5S, related to the various services included in the overall quality objectives.

The average of the 5S monthly audit results should at least achieve the expected objective and the existence of the inspection team should be preserved.

An essential condition for long-term success of 5S - involvement from all hierarchical levels.

At the same time, the 5S Method is the basis of the concept of Total Productive Maintenance (TPM), without which it can not be approached, ie no Lean Manufacturing improvement actions.

8 PILLARS OF TPM

Design

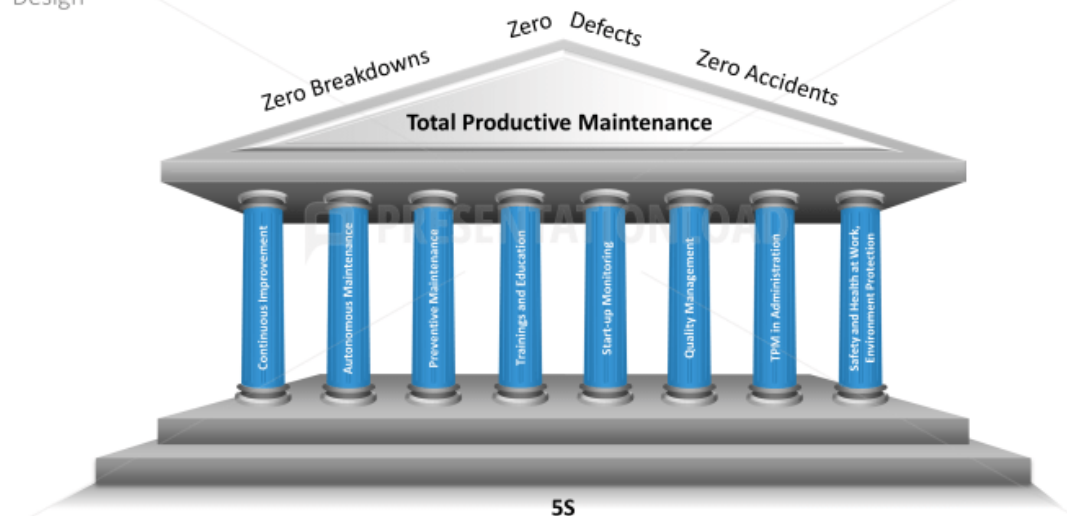


Figure 8. Example of communication of the evolution of implementation.

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