

SET IN ORDER – FUNDAMENTAL STAGE FOR 5S METHODOLOGY

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Abstract: *A useful tool for organizing jobs is the 5S methodology, which is essentially a program structured in five stages to obtain systematically: organization, cleanliness and standardization in the workplace, thus contributing to improving productivity, reducing quality nonconformities and job security problems, being a method that involves employees from all hierarchical levels using standards and discipline. Being a Japanese method for organizing, cleaning, developing and sustaining a productive job, the origin of the name comes from five Japanese words that start with the S sound, respectively: Seiri, Seiton, Seiso, Seiketsu, Shitsuke. This technique was also adopted by the organizations from the strong economies and, by translating the five words from Japanese into English, resulting in an identical name of this methodology: Sort, Straighten, Shine, Standardize, Sustain.*

Keywords: Seiton, Set in Order, Systematization, Arrangement.

1. Introduction

Kaizen management was developed in Japan between 1950 and 1980, when Professor Masaaki Imai, the founder of the Kaizen Institute, published the book "Kaizen: The Key to Japan's Competitive Success." Until then, the name Kaizen was just a common noun in Japanese, meaning "always better". The Kaizen management system, whose success has been demonstrated in Japan, is a concept initiated by the Japanese managers and has the following meaning: *KAI = change* and *ZEN = for the better*, in the sense of continuous improvement, day by day, process by process. Unlike the concept that involves total change, at long intervals and that requires the use of a large volume of resources, Kaizen aims for a slow, gradual

but continuous improvement, with visible effects from day to day and from process to process. One of the specific methods of Kaizen's approach to an organization is to evaluate work organization and visual management standards. To be effective, in areas where visual management is applied, processes must be clearly identified and controlled. First and foremost, you need order, cleanliness and cleanliness rules.

2. Step 2. SEITON

The second step of the process refers to the efficiency and the reduction of the time required for access to the equipment and the accomplishment of the work tasks. This step consists of storing useful items in a pre-established location and in a logical order to facilitate their use, to be easily

accessed or brought back to the same place as quickly as possible. Fixed locations should be established such as: containers, modular shelves, cabinets with transparent doors, panels, floor markings for access roads, containers or dumpsters for all common materials and tools. Their storage is made according to their frequency of use, based on logical, ergonomic, easy-to-understand, acceptable and memorable criteria for each. This will allow subsequent abnormal situations to be immediately observed. If every employee has quick access to any document or material, if the search time for objects is reduced, then the stress, annoyance and risks of tiring searches in crisis situations decrease and the workflow becomes more efficient and staff becomes more productive.

The objective of the arrangement and ordering activities is to establish fixed locations, to maintain order and to ensure easy access and visual control of the workplace. In order to carry out this activity in the best conditions, knowledge of ergonomics and storage is required and variables, such as the frequency of use, the space required for each object, the fixing type of different furniture objects, should be taken into account. These issues are set out in a stabilization plan which must contain:

- a. location: in the container, on the floor, on/in the desk, on the wall/ceiling, etc.;
- b. location and position:
 - on the floor, in appropriately-marked spaces;
 - on shelves (provided that the arrangement takes into account the frequency of use and the mass of the objects, as follows: frequently used objects are arranged on the shelves between the middle and shoulder level and heavier /

massive objects are arranged on the lower shelves);

- on mobile supports/trolleys;
- in cabinets or storage boxes (provided they are correct and complete labeled);
- in special conditions: on inclined or modular shelves, in plastic boxes, hanged etc.

c. the minimum / maximum quantity accepted at the location and the frequency of consumption. In this situation, the FIFO principle can be applied - First In First Out, in which a precise order of production and transfer is maintained so that the first object that enters a process or a place of storage is also the first object that comes out;

d. identification data (item name, supplier, code, replenishment frequency, etc.).

The correct and complete performance of this stage will determine that in the end the essential criteria underlying this stage are met:

- a. each object must have a name or a code;
- b. each object must have a stable place;
- c. there must be no objects which do not have a specific place and no place marked without the corresponding object;
- d. objects used temporarily (jointly) by several persons must have a place of storage known and respected by the employees who use it, from where it can be picked up and returned after use.

The choice of location is done by applying a series of rules:

1. The rule of motion economy, which reduces travel distances. The tool applicable to determine the movements performed by employees is called the “Spaghetti diagram” (figure 1). Following this rule helps save employees time and energy by avoiding inappropriate location and difficult access to them.

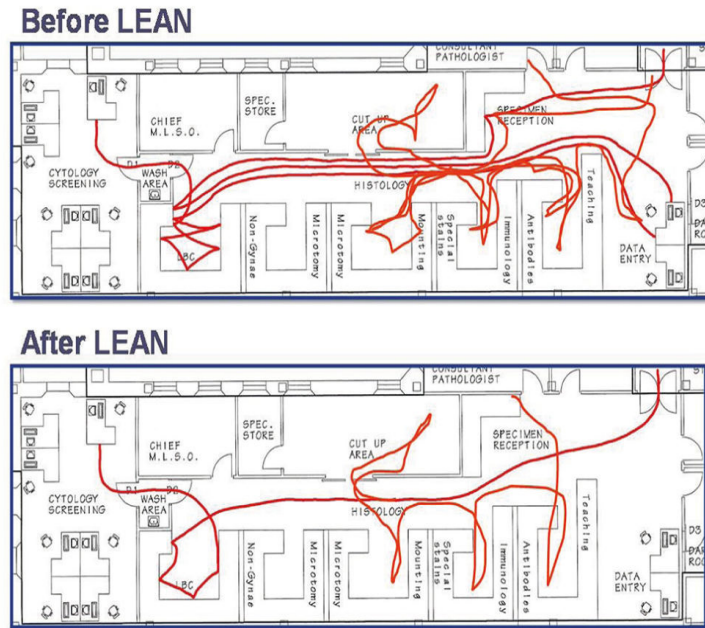


Figure 1: Example of a Spaghetti diagram for optimizing travel to work[1]

2. Rational location rule, correlated with the process flow, which seeks the answers regarding the optimal location. The tool applicable to establish these areas is "5 Why" and the phrase of an optimal location says that; *"I see, I can take it and put it back, quickly and easily."*

The coding system of the objects and the types of markings must be consistent and easy to understand by those who use it. The basic rule should be stated: "any object should be easy to find and put back in its place". In other words each object should have a specific place, well individually delimited, the place should have a clear address (area, shelf, position, etc.) and have a label/marking indicating the address of the location and the owner, possibly handling and storage requirements. In practice, this rule applies in several ways:

- Signs and indicators showing the place, type of object and quantity. It is advisable to use colored visual markings to the detriment of memorizing codes and positions / addresses that, over time, can be forgotten;
- Alphanumeric codes for identifying objects and addresses of location positions;

- Labels in standard format or individual markings for objects, applied for periodic inventory and record keeping. The content of these labels must be legible, clear and contain at least the following information: name of the object, identification number (serial number), location, minimum/maximum quantity. The method of attachment must allow changes to be made so that the use of magnetic labels or adhesive tapes to the detriment of paint markings is indicated.

The bookmarks that can be used are:

- warning lines for high-risk areas (hatched yellow - black or white - red lines);
- demarcation lines of access roads and production areas (in yellow or green);
- contour lines for marking the position of the mobile equipment (necessary to bring them back to the initial position);
- lines demarcating the space required to open the doors (to avoid blocking them);
- lines of restriction of storage areas for unfinished production (areas W.I.P. - Work In Process)
- arrows (footprints) to indicate directions of movement and orientation.



Figure 2: Markings for delimiting areas in a hall [2]

Figure 2 show a visual management system adapted to a production hall where the meaning of the markings is as follows:

Floor marking applications:

1. purple band - finished products;
 2. white tape - storage cart for transporting 5S products;
 3. blue band - delimitation of equipment disposal areas;
 4. yellow band with arrows - traffic marking (of traffic directions);
 5. white tape - the work area of the operators at the work station;
 6. green strip - delimitation of equipment disposal areas;
 7. black stripe - delimitation of equipment disposal areas;
 8. yellow tape - storage pallet storage area;
 9. T-strips or corner marking tapes;
 10. red/white strip - free zone or markings for STOP type traffic;
 12. black/yellow strip - dangerous area;
 13. yellow band - traffic flow;
 14. area with black and white stripes - free maintenance area;
 15. area with black/yellow stripes - electric area;
 16. green band - safety zone;
 17. fingerprint cuts - pedestrian areas;
 18. marking the slippery floor;
- Equipment applications:
19. fire safety label;

20. door safety sign;
21. emergency eyewash label;
22. the identification document of the access dock;
23. safety sign for lifting the elevator;
24. shelf identification label;
25. label positioning locations;
26. labels for shelves and baskets.

Although there are no specific color requirements for floor marking, the following serves as a color-coding guide recommended for use in many facilities.

- yellow marking - is used for safety purposes indicating caution (for organizing purposes, for pedestrian paths, vehicle routes, color, work areas and storage spaces).
- White marking - is used for general purposes, such as contours around equipment or storage shelves.
- redmarking - is used for safety purposes or as a hazard indicator or to mark the boundaries of an area with defective products or an area for the storage of material waste.
- orange marking - is used for safety purposes, to indicate a higher level of caution than yellow. It is also used to indicate materials or products kept for inspection.
- marking with black / green / blue / purple - these colors can be used to indicate

the storage places of raw materials, materials being processed or finished products.

- black / yellow striped marking - is used for safety purposes and indicates caution. This combination of stripes is frequently used to delimit pedestrian paths (lanes), vehicle paths, color, work areas and storage spaces (figure 3).

- black / white striped marking - is used for general purposes, such as contours around equipment or storage shelves.

- red / white striped markings - are used to indicate areas to be kept free / unoccupied / unblocked for safety reasons such as around exit points (figure 4), electrical panels, P.S.I. or hazardous equipment.



Figure 3: Warning markings for high risk areas[3]



Figure 4: Markings for delimiting areas to be free (white-red and black / yellow striped marking), and pedestrian alleys (yellow stripe marking)[4]

- scheme/location map for quick identification of the position of objects.

The unwritten rules for fixing various objects say that:

- the object used several times a day (very frequently) is placed, if possible, on the equipment or the work desk;
- the object used on average once every two days (frequently) is placed very close to the equipment or work desk, usually on a shelf or on a shelf at medium height;

- the object used once a week (relatively frequently) is placed close to the equipment or work desk, usually on a shelf or on a shelf above;

- the object used once a month (rarely) is placed on the top shelf or in a warehouse;
- space will be used mainly vertically rather than horizontally (scattering objects throughout the work area causes large-scale body movements, repetitive and tiring over time;

– the fundamental principles of ergonomics will be respected:

- the principle of gravity;
- grouping principle;
- the principle of the established place;
- the principle of work safety (in lifting, placing, pushing, pulling, carrying and moving objects, especially those with large dimensions and mass);
- the principle of symmetry;
- the principle of simultaneity and continuity of the movements performed;

• the principle of logical succession of movements;

• the principle of avoiding unnecessary effort (avoiding repeated bending, lifting, twisting movements).

– an attempt will be made to create a job that will help increase work efficiency. In temporal terms, this effectiveness means that:

a. in offices (figure 5):

- the holder of the workstation must find any object in maximum 30 seconds;
- the workstation replacement must find any object in maximum 60 seconds.



Figure 5: Arranging the drawers of a workstation or office[5] [6]

b. in production (figure 6):

- daily used objects will be found in 10 seconds;

– weekly used objects will be found in 30 seconds;

– monthly used objects will be found in 60 seconds.



Figure 6: Maintenance tool kits of the Royal Norwegian Air Force[7]

3. Conclusions

The 5S method is often considered to be very simple and particularly useful. However, most organizations fail to pass 3S

and hence the natural question: "If it is so easy to understand and apply, why is it so difficult to apply 5S permanently?"

One reason often cited is that when the employee is pressured by deadlines, urgent customer and / or superior requirements, or any sort of day-to-day problems, he tends to ignore and consider order and cleanliness a chore. However, the cause comes from the attitude of many employees at work who think of the form: “if we still know that someone is coming after us to sweep, what

is the point of bending over to pick up a paper clip? Or why write on a bookcase what it contains if everyone can look for what they need? ” Even worse is when the mentality of some is guided by the famous principle of life: “Leave for tomorrow what you can't do today, because tomorrow you will either won't have to do it, or someone else will do it!

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