

Implementing

5S

To Promote Safety & Housekeeping

The ideal factory should operate 100 percent of the time and at 100 percent of capacity. This would be achieved with no downtime, no defects and, most importantly to safety practitioners, *no safety problems* (Japan Institute).

Good housekeeping will eliminate safety problems, improve morale, and increase efficiency and effectiveness. Employees appreciate a clean, orderly workplace where they can accomplish tasks without interference or interruption (National Safety Council 76). This concept is most-attractive to production managers when coupled with the fact that such a workplace will also yield improvements in productivity and quality, while lowering product costs and enhancing the flexibility of operations. This has been accomplished in companies from various industries (e.g., Toyota, Ford, Boeing) through the implementation of "lean manufacturing" tools such as "Kaizen" and "5S."

In Japan, the basic principles of industrial housekeeping are known as the five S's: seiri (organization), seiton (tidiness), seiso (purity), seiketsu (cleanliness) and shitsuke (discipline) (Japan Institute). These principles first emerged following World War II, as part of the quality movement in Japan; the goal was to eliminate

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obstacles to efficient production. These concepts can be easily applied to other functions and activities, both in and out of the workplace (Productivity Inc. 7-11). Proactive safety programs will inevitably benefit from the implementation of 5S workplace improvements.

The Japanese terms that make up the 5S acronym can be loosely translated to the following English terms: sorting, simplifying, sweeping, standardizing and self-discipline (Table 1). The goals of the first two steps in this process are to eliminate searching for parts or tools, avoid unnecessary movements and actions, and prevent the use of wrong tools or parts. The safety professional can easily identify incidents that may have been prevented had the worker had the appropriate tool when needed.

TABLE 1

Japanese Term	English Translation	Equivalent Terms Starting with the Letter "S"
seiri	organization	sort
seiton	tidiness	systemize or simplify
seiso	purity	sweep
seiketsu	cleanliness	standardize or sanitize
shitsuke	discipline	self-discipline

SEIRI/SORTING

Seiri refers to the process of evaluating the workplace, then segregating and discarding unnecessary items. Initially, tools, machinery and other materials in a particular work area are evaluated to determine whether they are adequate or essential to the process. Items that do not belong in the area may be quickly eliminated. Other items may require modification or enhancements. Although it can be taxing in organizations that maintain equipment for "possible future use," this process is most effective when care is taken to identify and keep only essential items.

Clearing the area, then allocating space for remaining items by placing, stacking and storing the materials enhances housekeeping and overall safety. Unapproved personal protective equipment, such as old respirator cartridges and homemade tools that often go undetected in toolboxes and lockers, are eliminated as well. In addition, necessary safety enhancements, such as machine guarding improvements can be identified and tracked to completion as a requirement for keeping a certain piece of equipment.

SEITON/SYSTEMIZING

Seiton refers to the development of control techniques to ensure adherence to overall standards. Everyone who visits a work area should be able to readily

understand the arrangement of the work, as well as the overall flow of the process. The object is to arrange the work in such a manner that discrepancies can be easily identified and corrected. Organizations determine what preparations are done when the machine is running to ensure that items and tools are available when needed and in the right quantities. Everything is put in place and organized according to frequency of use.

A good safety program should include this type of optimization. For example, by reducing the total amount of chemicals and hazards associated with a task, safety professionals can more-readily determine required safety equipment and how it should be stored and dispensed.

Implementation of visual controls is highly encouraged during this step. Operators may apply these principles by referring to checklists, designing tool boards and parts containers, and improving workspace layout. The practice of shadow boarding (i.e., outlining a tool directly behind where it is stored) can be used to quickly identify when equipment is missing from a workstation. Other concepts, such as "first in first out" accounting principals and color-coding materials can be implemented to organize the flow of the work.

Another example of how visual controls can enhance a safety program is to label energy sources and energy control points in a lockout program. This helps ensure that even those unfamiliar with certain machinery can quickly identify hazardous energies that must be controlled and the appropriate places to perform lockouts. This process may also include posting machine-specific lockout procedures on equipment itself.

SEISO/SWEEPING

The main goal of an effective housekeeping program is to get everyone to accept that proper workspace maintenance is part of their job. By implementing a daily cleaning process, waste sources will be identified.

For example, daily cleaning of oil in walkways will reinforce the need to repair a leak's source. In turn, this will eliminate a potentially serious slip hazard. "Clean as you go" programs have been implemented in several industries for this purpose. The overall safety effort suffers when employees simply accept disorderliness as an unavoidable condition of work.

Dedication to a good housekeeping routine will inevitably resolve safety concerns. Hazards associated with wasteful operations can be greatly reduced by identifying those responsible for routine maintenance or housekeeping, and providing them with the appropriate tools to clean the area.

SEIKETSU/STANDARDIZING

Procedures and tools must be designed for the job at hand. Variability in the process can be controlled by eliminating "non-standard" resources. In this step of the process, the best way to complete the task at hand should be determined. Procedures and tools reflect current practices and change to reflect modifications. In the end, the organization will work to the best practices.

By revisiting the previous three S's, one can evaluate how well they are being maintained as well as their effectiveness. This is perhaps the most-effective step in enhancing a proactive safety program. For example, verifying that all employees follow the same confined space procedure and that exceptions are not routinely made can highlight areas where either written programs or tools need to be updated. This is accomplished by revisiting the first steps in the 5S process:

- 1) Have excess items been eliminated from the work area (e.g., old protective gear, outdated monitoring equipment)?
- 2) Are all necessary items readily available and are visual controls in place (e.g., alarms, communication signals, rescue equipment in racks)?
- 3) Is the area and equipment properly maintained (e.g., adequate ventilation, free of debris, monitors properly calibrated, permits completed appropriately)?

Such an evaluation can help identify necessary changes to the confined space program without waiting for an accident to occur.

SHITSUKE/SELF-DISCIPLINE

Safety professionals refer to the perceived need for an effective safety culture or climate (Sarkus 18-25). Similarly, self-discipline deals with forming favorable habits and maintaining them in the long term. Self-discipline is not as easily measured as the previous steps in this process. Much like in popular behavioral safety programs, its presence manifests itself in employee actions. The company must create the appropriate environment and structures to foster the desired behaviors, which in turn will drive continuous improvement.

Management commitment to the 5S concept is best demonstrated by continuously evaluating the progress of the overall program and showing visible support or "leading by example." Posting progress and results achieved can help maintain enthusiasm for the program. To appeal to the competitive spirit of the workforce, safety and health indicators should be posted on bulletin boards and in meeting areas.

It is also effective to blend safety information into existing production and quality reports and postings. This will ensure that safety information is present-

ed in a manner consistent with the rest of the organization, especially if it is maintained and tracked by the affected work departments and personnel.

CASE STUDY 1

The Boeing Co. incorporated safety into its lean manufacturing initiatives. The 5S tool that is often associated with productivity and quality initiatives is being used to examine each job process in order to eliminate routine and wasteful activities that pose potential safety hazards. This step-by-step process has been used throughout the organization, including its military, space and commercial aircraft operations.

For example, within the Wing Responsibility Center, the 5S process was used to eliminate an entire step from the process, thus reducing labor hours and rework. In addition, chemical use in the area was eliminated and hazardous waste was reduced 98 percent. Employees' increased safety knowledge and capabilities were key to these improvements (Ansari and Batoul 389-398).

Team input is important in Boeing's program. Teams may include the employees who work on the particular process being improved, manufacturing engineers, lean manufacturing specialists, area managers, and safety and environmental representatives. During the initial steps, a tagging system is often used to identify equipment being eliminated from an area. These tags notify those in the immediate area of the reason, methods and time frame for disposal.

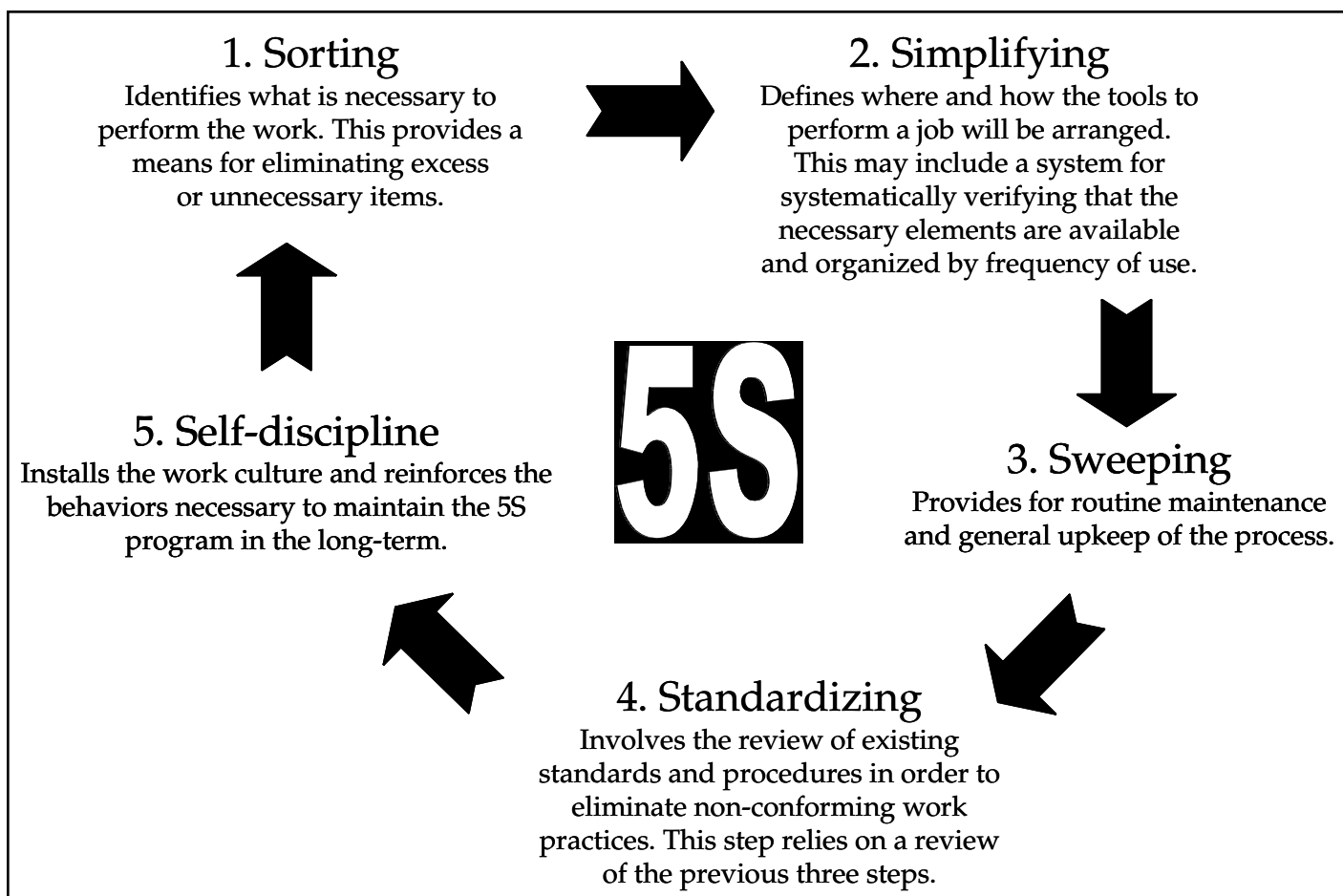
Implementation has been visually apparent at the company's welded-duct plant in Auburn, WA. To extol the five S's, display boards include photos of proper and improper housekeeping along with various performance metrics. Painted silhouettes show where to place brooms, mops and tools on the wall, and all are neatly stored in designated places when not in use. At first, the workforce reacted negatively, claiming, "It's not my job; my job is making parts." Gradually, attitudes changed and peer pressure took over (Schonberger).

CASE STUDY 2

The 5S tool has also been successfully implemented in smaller operations, both in the U.S. and abroad. Such is the case for Cooke Brothers Ltd., a family-owned metal hinge manufacturing firm in the U.K. with approximately 98 employees. The equivalent term commonly used by U.K. firms is 5C: clear out; configure; clean and check; conformity; and custom and practice.

The firm provided in-house training for all employees regarding the 5S system, which was seen as a pivotal technique for improving housekeeping, safety, health and environmental per-

FIGURE 1



formance throughout the firm. An employee survey was conducted to determine the extent of the program's success in meeting these goals, as well as to identify barriers encountered during the process.

Results showed that the 5S program, by its very nature, is a tool that can help introduce good environmental management practices, and can subsequently be used to improve housekeeping and employee safety and health. Waste reduction—particularly of water, oil and energy—was evident at the production level. The program promoted neatness in storage of all items, including oils and chemicals.

The most-significant barriers identified were the need to shorten communication lines and gain employee input. By initiating an improved communication and involvement system, Cooke Brothers was able to implement the 5S program effectively and, in turn, improve housekeeping, safely store substances and materials, develop better safety and health practices and reduce environmental risk (O'hEocha 321-330).

CONCLUSION

Often the 5S principles are implemented only on a superficial level (e.g., posting slogans, painting floors and machinery), while the actual optimization of safety

processes is overlooked. The tools described in this article can be used to break down existing procedures and ensure that safety is effectively included into the overall production process. Including safety efforts in the overall business objectives can help achieve a higher level of participation. Safety professionals should embrace manufacturing initiatives that will directly result in buy-in from other departments. Combining lean manufacturing initiatives with safety personnel and expertise yield safety results that are well aligned with the rest of the organization. ■

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