

Minimize Waste With the **5S** System

By Jim Parrie, Ph.D, CPF

Production managers often ask for training techniques for reducing waste on such things as ATG tape, foamboard, glass, and other materials. Reducing these areas of waste are important. However, there are scores of other types of waste that must be reduced if you want to have an efficient facility.

In lean manufacturing, waste is defined as anything that does not add value. This means that waste includes not only material waste but also such things as time and motion. Essentially, there are nine forms of waste:

- Overproduction. This involves producing more frames, mats, or materials than needed for an order or producing components too early.
- Over-processing. This includes unnecessary processing or procedures; in essence, work done on a product that adds no value.
- Defective products. Basically, producing defective frames or mats that require reworking or must be thrown away.
- Transportation. This encompasses handling materials more than once, unnecessary moving or handling of materials, or carrying one frame when the employee could push a cart with 50 frames with the same effort.
- Inventory. Maintaining unnecessary raw materials in stock, work in process, and excess finished back-up stock.
- Waiting time. Employees hanging around with nothing to do, idle machine time, and other time when no value is added to the product.
- Motion. Movement of equipment or people that adds no value to the product.
- Safety. Unsafe work areas that result in lost work hours and added expenses.
- Information. Out-of-date electronic information and production and pricing software instead of having current, correct master data.

By using only the work elements you need, staying organized, and setting work standards, you can improve production while reducing cost and waste



anything wasteful and that doesn't add value), quality is improved and production time and costs are reduced. To begin eliminating waste, many firms today have implemented a system known as 5S. The intent of 5S is to have only what you need available at a workstation, a place for everything and everything in its place, a standard way of doing things, and the discipline to maintain it. Created in Japan, the 5S's are: *seiri*, *seiton*, *seiso*, *seiketsu*, and *shitsuke*.

Lean Production

Many people attribute lean thinking to Japanese companies like Toyota, but it actually goes back to the America Revolution and before. Most of the basic principles can be seen in Benjamin Franklin's *Poor Richard's Almanac*, which says, "He that idly loses 5s [Shillings] worth of time, loses 5s, and might as prudently throw 5s into the river." He added that avoiding unnecessary costs could be more profitable than increasing sales: "A penny saved is two pence clear. A pin a-day is a groat a-year. Save and have."

It was Taiichi Ohno at Toyota who formalized lean production into its current form. Levels of demand in the post-war economy of Japan were low, and focusing on producing the lowest cost per item through economies of scale had little relevance. Having visited supermarkets in the U.S., Ohno recognized that scheduling work should not be driven by sales or production targets but by actual sales. In the financial environment of this period, overproduction was not an option. And so the notion of "pull" rather than sales-target driven "push" came to underpin production scheduling.

By eliminating waste (*muda*, a Japanese term for



Frequently used parts should be close by so workers don't have to reach to get them. They should also be clearly labeled to eliminate searching for the right item.

Seiri: Tidiness, organization. It refers to the practice of sorting through all the tools, materials, etc., in the work area and keeping only essential items. Everything else is stored or discarded. This leads to fewer hazards and less clutter to interfere with productive work.

Seiton: Orderliness. This focuses on the need for an orderly workplace. Tools, equipment, and materials must be systematically arranged for the easiest and most efficient access. There must be a place for everything, and everything must be in its place.

Seiso: Cleanliness. It indicates the need to keep the workplace clean and neat. Cleaning in Japanese companies is a daily activity. At the end of each shift, the work area is cleaned up and everything is restored to its place.

Seiketsu: Standards. This allows for control and consistency. Basic housekeeping standards apply everywhere in a facility. Everyone knows exactly what his or her responsibilities are. Housekeeping duties are part of regular work routines.

Shitsuke: Sustaining discipline. This refers to maintaining standards and keeping the facility in safe and efficient order day after day, year after year.



Work stations should have a place for each tool, with no toolboxes or drawers to interfere with visibility or requiring unnecessary motion to open and close.

Sort

The first “S” (Sort) in the English version of the 5S's requires you to distinguish between what is needed and what is not. It then requires you to discard what is not needed. This is known as “red-tagging.” A team goes through all items (tools, equipment, material) and asks the question, “Do I need this to do my job on a regular basis?” Items that are used very infrequently or not used at all should be red-tagged.

After determining what is actually needed, all documentation is updated to reflect the needed parts. The



Effective production facility signage should indicate cells, product lines, and work stations.

easiest way to do this is to remove all items from a worktable and place them on the floor. Then have an employee justify the need for each item.

Starting with fitting tables, any items that the fitter does not use within 30 days should be removed from the table. Any items that fitters feel they will “need” someday should be placed in a designated area. When a fitter needs to use an item, a log indicating the day and date of that use should be signed. This will show how often a “needed” item is actually used. After six months the log is reviewed. If there any items in the designated area that have not been checked out, those can then be removed from the building.

The goal and the process of the first “S” is organization. Distinguishing needed from unneeded items, it forces people to remove all items not currently used for work, whether they are in the factory or the office. It is initially the most difficult for people who are afraid to let go of parts, machines, and data “just in case” they may be needed in the future.

Red-tagging allows workers to set aside and evaluate items and information in terms of their usefulness and frequency of use. The items and information are

Keys to Sustaining 5S Success

Many organizations make some early 5S improvements then slide back into their old ways while others maintain their 5S programs for years. What separates the two? An unsuccessful implementation of 5S is typically an incomplete 5S program. There are three keys to successfully sustaining 5S: commitment, top management support, and performance measurement.

Commitment. The first key is to commit to all five S's. This may appear obvious, but a well-meaning executive once told me, “We are just going to implement three S's for now; we aren't ready for all five.” The fifth S, *Shitsuke*, actually translates more closely to “commitment” than “sustain.” According to Tomo Sugiyama (author of *The Improvement Book*), “Shitsuke is a typical teaching and attitude towards any undertaking to inspire pride and adherence to the standards established.” If your entire organization is not committed to 5S, your 5S program will be short-lived.

Top Management Support. Commitment is not possible without top management's visible support for the program. All employees must believe that the organization is committed to the program. One way for top management to get involved on a continuing basis is to conduct quarterly 5S visits to each work area to inspect 5S conditions and offer advice and support to employees. Another effective

method for demonstrating top management support is to mandate and to participate in the visible promotion of 5S. Some ways to do this are:

- *Designated 5S days.* Select one day per month or quarter to emphasize 5S throughout the plant.
- *Slogans.* Select a 5S-related slogan, post it in public areas throughout the plant, pass out shirts with the slogan to successful 5S teams, etc.
- *Public Announcements.* In monthly or quarterly announcements and all-employee meetings, take some time to emphasize the importance of the 5S program.
- *Seminars.* Have employees participate in seminars throughout the year, including those that are 5S-related.

Performance Measurement and Reward System.

The third key is to measure 5S performance in each work area and set up a system to reward teams that achieve 5S success. Organizations with successful 5S programs measure their performance with weekly audits using checklists and score sheets. Audit results are posted in public areas. This creates an atmosphere of friendly competition and will help instill pride in the teams. This measurement should be combined with a reward system; most successful organizations offer monthly or quarterly rewards for teams in various 5S categories that range from movie tickets to cash bonuses.

returned, stored elsewhere, sold, given away, or thrown away. Red-tagging is preferably done in one target area at a time over one or two days. When red-tagging is complete, problems and annoyances in the workflow are reduced, communication between workers is improved, product quality is increased, and productivity is enhanced.

Set in Order

The second “S” (Set in Order) requires items to be organized so that they are easy to use and labeled so that anyone can find, use, and return them to the correct place easily. Visual controls should be used where practical. These include any communication device that tells you at a glance how the work should be done. The requirements



Wall charts at workstations should clearly show standard procedures, such as this one showing a facility's preferred ways to cut mats.

for setting in order include:

- Equipment and tool organization. Simple, organized storage with visual confirmation. An employee knows exactly where it goes and if it is missing or the storage space is empty with just a glance.
- Tools and equipment used most frequently are closest to an employee.
- Workstations have a place for each tool and no toolboxes or drawers that interfere with visibility and require unneeded motion to open and close.
- Tape is used on the floor to indicate areas of operations, parts, walkways, discrepant materials, and hazards.
- Work instructions are current and at workstations.
- Signage strategy. Indicates cell, product lines, and workstations as well as production goals and status. Area information boards should show key status indicators, such as inventory, training, and calibration.
- Ergonomic guidelines should be used in work and tool design.

"Set in order" organizes a work area for maximum possible efficiency. Organization and orderliness work best when they are implemented together. "Set in order" means arranging items so that they are easy to use and labeled so that anyone can find them and put them away. The key word here is "anyone." Labeling is mostly for other people who need what is in the area when its

The Importance of Standardized Work

One element that seems missing in many so-called “lean” factories around the U.S. is standardized work. Most self-proclaimed lean factories have mastered the U-shaped cell in terms of layout. But an important element—standardized work charts—are often missing.

When asked about this, most people get a very puzzled look or point to a dust-covered binder of work instructions. They often say, “The operators know what to do; they've been doing it for a long time and don't need standardized work charts.”

In looking at the process in depth, everyone in a cell typically takes a Burger King approach to manufacturing—they have it their own way. As important as highly detailed work instructions may be, standardized work charts are much more important. They allow anyone in a factory to understand what the standard work is and, more importantly, whether or not it is being followed.

Standardized work is part of the foundation of the Toyota production system and is one of the keys to stability in a factory. If everything is not done consistently in any factory, basic stability will be unachievable. And anyone who has studied lean production

can tell you that without basic stability, it will fail 100 percent of the time.

That's why standardizing every operation is a very important tool. While it is often not considered a tool per se, having a standard work chart for every operation is absolutely critical to lean production success. For example, in a manufacturing cell, each operator should have a standard work chart showing the operations he/she is to perform, the standard times for each operation, and a graphic representation. The standard work chart should be on one page.

Standard work charts should be used to ensure that processes are being followed consistently in many areas:

- Manufacturing cells and all production operations
- Material delivery to manufacturing cells
- Warehouse operations
- Document control activities
- Production planning activities
- All other repeatable activities in a factory or office.

Standardized work and work charts are critical to lean production success. Implementing lean production without them is like building a house with part of the foundation missing.

"owner" is away. The benefit is economy of time and motion. When orderliness is implemented, there is no wasted human energy or excess inventory.

Shine

The third "S" (Shine) involves bringing a workspace back to proper order by the end of each day. It requires periodic (at least once a day) cleanup, responsible person(s) identified for cleanup, establishment of cleanup/restocking methods (tools, checklists, etc.), and periodic supervisor inspection.

"Shine," as the word implies, means to thoroughly clean everything in the work area. Planning a cleanliness campaign is a five-step process that includes cleanliness targets, assignments, methods, tools, and follow-up inspections. The goal is threefold: to turn the workplace into a clean, bright place where people enjoy working; to review the first two S's; and to find the source of dirt or litter and eliminate it. The definition of cleanliness is keeping everything swept and clean. "Shine" should become so deeply ingrained as a daily work habit that tools are also kept in top condition and ready to use at any time.

Standardize

The fourth "S" (Standardize) is the method you use to maintain the first three S's. Organization, orderliness, and


cleanliness are maintained and made habitual by instituting those duties into regular work routines. The methods need to be standardized and followed company-wide. Once the first three S's are in place, standardize the details and create a plan to maintain and continue improving everything. This plan should include creating procedures and simple daily checklists, which are posted very visibly in each work area. The checklist should serve as a visual reminder to ensure that the daily 5S requirements are being met. Standardized cleanup integrates Sort, Set in order, and Shine into a unified whole.

Sustain

The fifth "S" (Sustain) allows an organization to sustain its 5S program. This requires an executive 5S champion who ensures that 5S becomes part of the company culture, makes periodic walk-through inspections/audits and posts results, and does 5S performance measurements of workgroups.

Not implementing this final "S" is where most companies fail and fall back into their old ways. Very often, 5S is thought of as an activity rather than an element of company culture. Companies implement 5S for several months only to find themselves soon back to their previous habits. To make 5S work, it is critical that performance is measured and that top management is committed to the concept.

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To “sustain” requires discipline. Without that, it is impossible to maintain consistent standards of quality, safety, clean production, and process operation. The more closely workers are able to follow manufacturing standards, procedures, and rules, the less likelihood there is for errors, defects, waste, and accidents.

Trying to impose discipline in an authoritarian manner won't get far in most firms today. Rather, people should be motivated to want to follow the rules because workplace rules are actually a set of shared values. These are achieved by coaching and team participation, not by orders and penalties. Implementing 5S includes coaching so that workers do the simple things right. Getting an entire staff to buy into these basic values is essential if you want to develop a truly effective organization.

In fact, empowering shop workers to take control of their daily activities and work environment is the unifying principle of 5S. By taking an active role in designing and maintaining their own workplace, workers take more pride in their work. This leads to greater satisfaction as well as higher productivity.

A 'Must-Have' Tool

Many production managers and owners believe that 5S is a “must-have” tool. For any tools used to become lean—quick changeover, total productive maintenance, mistake proofing, and so on—5S significantly helps in

both implementing and sustaining these improvements.

For framing facilities, the benefit of the 5S system is that employees will create fewer defects, less waste, fewer delays, fewer injuries, and fewer breakdowns. This translates into lower cost and higher quality. For employees, the 5S's also create an excellent working environment. It gives them an opportunity to provide creative input regarding how a workplace should be organized and laid out and how standard work should be done. Employees will then be able to find things easily, every time. A workplace will be cleaner and safer. Jobs will be simpler and more satisfying with many obstacles and frustrations removed.

The gold standard for 5S is that anyone should be able to find anything at their own workplace in less than 30 seconds and anywhere else in the workplace in less than 5 minutes without talking to anyone, opening a book, or turning on a computer. 5S is the foundation for successful lean implementation and is an invaluable tool to begin, support, and sustain a journey to lean production. ■

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