AUTOMOTIVE MECHANICS

Level-I

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Module Title: - Applying 5S Procedures

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Introduction to the Module

In automotive technology occupation; the application of 5S helps make improvements in sorting, setting in order, and cleaning work shop areas, tools and equipment and machineries and others facilities in the work shop and standardizing and sustaining them.

This module is designed to meet the industry requirement under the Automotive mechanics occupation, particularly for the unit of competency; application of 5S.

This module covers the units:

- Develop understanding of quality system and continuous improvement
- Sort needed items from unneeded
- Set workplace in order
- Shine work area
- Standardize activities
- Sustain 5s system

Learning Objective of the Module

- Develop understanding of quality system and continuous improvement
- Sort needed items from unneeded
- Set workplace in order
- Shine work area
- Standardize activities
- Sustain 5s system

Module Instruction

For effective use these modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit one: Develop understanding of quality system

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Understanding quality system and continuous improvement
- Elements of quality assurance (QA)
- Benefits of KAIZEN
- Explaining '5S' system

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Understand quality system and continuous improvement
- Understand elements of quality assurance (QA)
- Understand benefit of KAIZEN
- Explain '5S' system

1.1. Develop understanding of quality system and continuous improvement

What is Quality: -

- The ability of a product/service to satisfy stated or implied needs
- Based on customer's perceptions of a product/service's design and how well the design matches the original specifications.
- Achieved by conforming to established requirements within an organization.

The organizational structure, processes, procedures, and resources needed to implement, maintain, and continually improve quality management Employees should understand how the organization defines quality and the importance of maintaining high-quality services and products.

Steps to developing a quality management system

Step1:-. Create a written document that defines quality

Quality is determined by how it is defined and measured

Create a document that articulates the organization's commitment to quality products and services

Step 2: - Develop procedures

Employees work best when they have specific step-by-step procedures to follow.

- The more complex the system the more specific policies and procedures need to be.
- Develop procedures for the users of the system.
- Write procedures and answer the questions: who, what, where, and when.

Step3. Develop work instructions

- Create work instructions for how the work should be done.
- All jobs should have detailed job descriptions that articulate job expectations.

Step4. Collect data

- Create processes for collecting data to monitor if work is being done according to policies and procedures (evidence).
- Once you determine what data you want to collect, create a process to collect, store, and report it.
- Assign responsibility to one person to track, analyze, and report results

Step 5. Quality training

- Help employees understand why quality is important by conducting ongoing training.
- This training should be at a micro and a macro level.
- Micro training will be at the local level. This is where employees learn the exact steps to perform their job assignments. Include service standards and specific job details.

Step 6. Reward and recognize good performance

- Provide incentives for employees to provide quality products and services.
- Create programs that are specifically designed to acknowledge consistent quality work and great customer service.

Step7. Weed out employees who don't get it

- There will be times when you have employees who do the bare minimum and simply don't care.

Continuous Quality Improvement (CQI)

- Continuous quality improvement came into existence in manufacturing as a different approach to quality and quality systems. It does not focus as much on creating a corporate quality culture, but more on the process of quality improvement by the deployment of teams or groups who are rewarded when goals and quality levels are reached.
- CQI allows individuals involved in the day-to-day operations to change and improve processes and work flows as they see fit.
- CQI implementation attempts to develop a quality system that is never satisfied; it strives for constant innovation to improve work processes and systems by reducing time-consuming, low value-added activities. The time and resource savings can now be devoted to planning and coordination.
- CQI has been adapted in several different industries. For example, in health care and other service sectors, it has taken on the acronym FOCUS-PDCA work:
  - ✓ Find a process to improve.
  - ✓ Organize to improve a process.
  - ✓ Clarify what is known.
  - ✓ Understand variation.
  - ✓ Select a process improvement

1.2. Elements Of Quality Assurance (QA)

Quality assurance (QA) is any systematic process of determining whether a product or service meets specified requirements.

QA establishes and maintains set requirements for developing or manufacturing reliable products. A quality assurance system is meant to increase customer confidence and a company's credibility, while also improving work processes and efficiency, and it enables a company to better compete with others.

Importance of quality assurance

Quality assurance helps a company create products and services that meet the needs, expectations and requirements of customers. It yields high-quality product offerings that build trust and loyalty with customers.

Some people may confuse the term quality assurance with quality control (QC). Although the two concepts share similarities, there *are* important distinctions between them.

In effect, QA provides the overall guidelines used anywhere, and QC is a production-focused process – for things such as inspections. QA is any systematic process for making sure a product meets specified requirements, whereas QC addresses other issues, such as individual inspections or defects.

1.2.1. Corrective Action

- It consists of improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations.
- It is usually a set of actions, laws or regulations required by an organization to take in manufacturing, documentation, procedures, or systems to rectify and eliminate recurring non-conformance.
- The corrective and preventive action is designed by a team that includes quality assurance personnel and personnel involved in the actual observation point of non-conformance.
- It must be systematically implemented and observed for its ability to eliminate further recurrence of such non-conformation.
- Action taken to eliminate the causes of non-conformities or other undesirable situations, so as to prevent recurrence.

The standards and procedures defined by a quality assurance program help prevent product defects before they arise.



Fig.1.1. Quality checklist

Quality assurance utilizes one of three methods:

a. Failure testing, which continually tests a product to determine if it breaks or fails.

b. Statistical process control (SPC), a methodology based on objective data and analysis

c. Total quality management (TQM), which applies quantitative methods as the basis for continuous improvement.

Total Quality Management (TQM)

- TQM is a management approach in which quality is emphasized in every aspect of the business and organization.
- Its goals are aimed at long-term development of quality products and services. TQM breaks down every process or activity and emphasizes that each contributes or detracts from the quality and productivity of the organization as a whole.
- Management's role in TQM is to develop a quality strategy that is flexible enough to be adapted to every department, aligned with the organizational business objectives, and based on customer and stakeholder needs.

1.2.2. Monitoring procedures

Quality monitoring means part of the quality assurance focused on maintaining and improving quality and includes identification and use of indicators for detection of deviations from standards and specifications.

Indicators of monitoring procedures

- Identify Program Goals and Objectives.
- Define Indicators.
- Define Data Collection Methods and TimeLine.
- Identify M&E Roles and Responsibilities. ...
- Create an Analysis Plan and Reporting Templates.
- . Plan for Dissemination and Donor Reporting

1.2.3. Standard Operating Procedure (SOPs)

A standard operating procedure, or SOP, **is** a set of detailed step-by-step instructions that describe how to carry out any given process. Most companies that are serious about process management use SOPs to manage their day-to-day activities.

Standard Operating Procedures allow you to: -

- **Achieve consistent results.** With standard operating procedures, you complete your processes in the same way and achieve the right results every time.
- **Reduce costs and increase productivity.** When everyone does the same task in different ways, eventually your organization will run into inefficiencies that cost you time and money. With SOPs you can streamline the process and increase productivity.
- **Create a safe working environment.** SOPs are very useful when it comes to safety. You provide a standardized way of getting things done with minimized risk of safety hazards. In this way your workers are safe and your company reduces the risk of liability.

An SOP, in fact, defines expected practices in all businesses where quality standards exist. SOPs play an important role in your small business. SOPs are policies, procedures and standards you need in the operations, marketing and administration disciplines within your business to ensure success. These can create:

- ✓ Efficiencies, and therefore profitability
- ✓ Consistency and reliability in production and service
- ✓ Fewer errors in all areas
- ✓ A way to resolve conflicts between partners
- ✓ A healthy and safe environment
- ✓ Protection of employers in areas of potential liability and personnel matters
- ✓ A roadmap for how to resolve issues – and the removal of emotion from troubleshooting – allowing needed focus on solving the problem
- ✓ A first line of defense in any inspection, whether it be by a regulatory body, a partner or potential partner, a client, or a firm conducting due diligence for a possible purchase
- ✓ Value added to your business should you ever wish to sell it

Developing an SOP is about systemizing all of your processes and documenting them

Every business has a unique market, every entrepreneur has his/her own leadership style, and every industry has its own best practices. No two businesses will have an identical collection

of SOPs. Below is a listing of just a few typical SOPs, which you will want to consider writing for your own small business.

- Production/Operations
  - ✓ Production line steps
  - ✓ Equipment maintenance,
  - ✓ Inspection procedures
  - ✓ New employee training
- Finance and Administration
  - ✓ accounts receivable – billing and collections process
  - ✓ accounts payable process – maximizing cash flow while meeting all payment deadlines
- Marketing, Sales and Customer Service
  - ✓ approval of external communications: press releases, social media, advert, etc.
  - ✓ preparation of sales quotes
  - ✓ service delivery process, including response times
  - ✓ warranty, guarantee, refund/exchange policies
  - ✓ acknowledgment/resolution of complaints, customer comments and suggestions
- Employing Staff
  - ✓ job descriptions
  - ✓ employee orientation and training
  - ✓ corrective action and discipline
  - ✓ performance reviews
  - ✓ use of Internet and social media for business purposes
  - ✓ Legal
  - ✓ Privacy

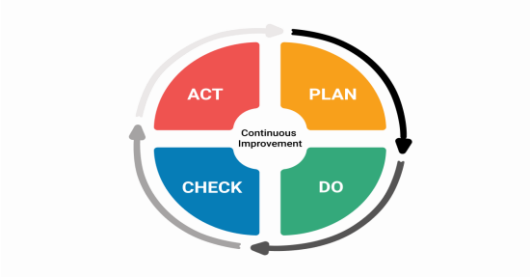
1.2.3. PDCA concept

PDCA is an acronym that gives name to a tool used in process quality management. Its focus is to solve problems by following the four phases indicated by its letters: Plan, Do, Check and Act. Because it's a cyclical tool, it also promotes continuous process improvement.

The basis of this tool is the repetition. It is applied successively to the processes that seek to improve continuously. In this context, planning, standardization, and documentation are

essential practices and accurate measurements. Other factors addressed by the PDCA concept are the talents and skills of the professionals involved.

The 4 stages of the PDCA concept cycle



Fig,1,2. PDCA Concept

Plan: - It is the stage where we analyze the problems that we want to be solved, according to the following order:

- Definition of problems
- Setting goals
- Choice of methods
- Ask the question five times

Keep in mind, you and your team may need to go through the plan a couple of times

Do: - It's time to get hands-on, executing what was determined in the previous step:

- Practice the method
- Execute
- Make changes
- Don't need to strive for perfection, just look for what can be done in a practical way Measure and record the results

Check: - It is one of the most important steps that define the PDCA concept cycle. After checking, we will see if the action has improved:

- Check whether the standard is being obeyed
- Check what's working and what's going wrong
- At every step, ask why?
- With the answers, improve and practice the defined method

Act: - Time to act more assertively.

- Things going as planned? Then continue!
- Well actually, there are some problems? Then act to correct and prevent the errors!
- Improve the work system
- Repeat the solutions that worked

Warnings when applying the PDCA concept

- Only proceed to the Do phase after having considered the Plan phase
- If you find that during the Act stage there is an excess of repetitions and attempts, return to the Plan phase
- Avoid a short circuit in the cycle, by not skipping stages or not devoting enough time for questions and searching for the "whys".

1.3. Benefit of KAIZEN

KAIZEN: - A Japanese philosophy for improvement that can be traced to the meaning of the Japanese words 'Kai' and 'Zen', which translate roughly into: Definition of Kaize 'Kai' - change, alter 'zen' - better, right KAIZEN means "Change for better."

Means improvement, continuous improvement involving everyone in the organization from top manageliment, to managers then to supervisors, and to workers

A Japanese business philosophy that assumes our way of life – be it our working life, our social life, or our home life – should focus on continual improvement efforts

A philosophy of continual, participatory and self-disciplined innovation

Benefit of KAIZEN

- ✓ Reducing waste
- ✓ Simplifying work processes
- ✓ Improving safety
- ✓ Improving Employee and Customer Satisfaction
- ✓ Kaizen simplifies the job.

By having employees, management, and other important stakeholders constantly suggesting improvements, it simplifies everyone's jobs – improvements should streamline all processes.

- **Kaizen changes things up.**

Kaizen is a great way to keep you on your toes and remove the boring tasks from the radar.

Kaizen keeps things from being a total pain in your rear.

Kaizen keeps your work from becoming a huge burden.

- **Kaizen improves job safety records.**

By constantly improving processes, you will be abreast of important new safety standards, the latest in advances in equipment and technology, and the safest way to do things.

- **Kaizen improves everyone's productivity.**

If you eliminate wasteful tasks, then you save time. For example, is it necessary to create a report of reports every month? Are there less wasteful ways to do things? Is everyone making

the best use of their time? Look into the answers to these questions to meet this Kaizen process goal.

- **Kaizen improves the quality of your products.**

By following the Kaizen process steps, you can improve product quality. It is important to have quality products because this will increase your customer base, and ultimately, it will increase your bottom line

Why Kaizen is Necessary?

- ✓ Make optimal use of peoples' skills
- ✓ Improve Safety
- ✓ Reduce overall cost
- ✓ Shorten lead time & improve delivery time
- ✓ Maintain high quality (or improve delivery time quality)
- ✓ Improve space utilization etc.
- ✓ Reduce or eliminate wastes (MUDA)
- ✓ Improve productivity

1.4. Explaining '5S' system

- 5S is defined as a methodology that results in a workplace that is clean, uncluttered, safe, and well organized to help reduce waste and optimize productivity. It's designed to help build a quality work environment, both physically and mentally. The 5S philosophy applies in any work area suited for visual control and lean production. The 5S condition of a work area is critical to employees and is the basis of customers' first impressions.
- **The five S's** 5S benefits, 5S example .5S resources
- The 5S quality tool is derived from five Japanese terms beginning with the letter "S" used to create a workplace suited for visual control and lean production. The pillars of 5S are simple to learn and important to implement:

Table 1.1. The Japanese terms are translated into the English language version of the 5S's.

Japanese	Translated	English	Definition
Seiri	organize	Sort	Eliminate whatever is not needed by separating needed tools, parts, and instructions from unneeded materials.
Seiton	orderliness	set in order	Organize whatever remains by neatly arranging and identifying parts and tools for ease of use.

Seiso	cleanliness	Shine	Clean the work area by conducting a cleanup campaign.
Seiketsu	standardize	standardize	Schedule regular cleaning and maintenance by conducting *seiri*, *seiton*, and *seiso* daily.
Shitsuke	discipline	Sustain	Make 5S a way of life by forming the habit of always following the first four S's.

5S program benefits

Benefits to be derived from implementing a lean 5S program include:

- Improved safety
- Higher equipment availability
- Lower defect rates
- Reduced costs
- Increased production agility and flexibility
- Improved employee morale
- Better asset utilization
- Enhanced enterprise image to customers, suppliers, employees, and management

Five S (5S) Example: Workplace scan diagnostic checklist

Table1.2. 5S workplace checklist

Five S workplace scan diagnostic checklist

Category	Item	Rating Level L0	L1	L2	L3	L4	Remarks
Sort (Organization)	Distinguish between what is needed and not needed						
	Unneeded equipment, tools, furniture, and so on, are present						
	Unneeded items are on walls, bulletin boards, and so on						
	Items are present in aisles, stairways, corners, and so on						
	Unneeded inventory, supplies, arts, or materials are present						
	Safety hazards (water, oil, chemical, machines) exist						
Set in Order (Orderliness)	A place for everything and everything in its place						
	Correct places for items are not obvious						
	Items are not in their places						
	Aisles, workstations, equipment locations are not indicated						
	Items are not put away immediately after use						
	Height and quantity limits are not obvious						
Shine (Cleanliness)	Cleaning and looking for ways to keep it clean and organized						
	Floors, walls, stairs and surfaces are not free of dirt, oil, and grease						
	Equipment is not kept clean and free of dirt, oil, and grease						
	Cleaning materials are not easily accessible						
	Lines, labels, signs, and so on are not clean and unbroken						
	Other cleaning problems of any kind are present						
Standardize (Adherence)	Maintain and monitor the first three categories						
	Necessary information is not visible						
	All standards are not known and visible						
	Checklists don't exist for cleaning and maintenance jobs						
	All quantities and limits are not easily recognizable						
	How many items can't be located in 30 seconds?						
Sustain (Self-discipline)	Stick to the rules						
	How many workers have not had 5S training?						
	How many times, last week, was daily 5S not performed?						
	Number of times that personal belongings are not neatly stored						
	Number of times job aids are not available or up-to-date						
	Number of times, last week, daily 5S inspections not performed						
	TOTAL						

Number of Problems	Rating level
3 or more	Level 0 (L0)
3-4	Level 1 (L1)
2	Level 2 (L2)
1	Level 3 (L3)
None	Level 4 (L4)

Self-check-1

Instructions: Answer all the questions listed below.

1. Explain '5S' system (2 point)

---

2. Write about four benefits of 5S. (4 points)
   a. ----------
   b. ----------
   c. ----------
   d. ----------
3. List about eight benefits of KAIZEN
   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------
   f. ----------
   g. ----------
   h. ----------
4. What Is a Quality Management System?

Unit Two: Sort needed items from unneeded

This unit to provide you the necessary information regarding the following content coverage and topics:

- Techniques of identifying necessary and unnecessary items
- Categorizing unnecessary items
    - ✓ Disposing and waste management

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify necessary and unnecessary items
- Categorize unnecessary items
- Dispose and manage waste

2.1. Techniques of identifying necessary and unnecessary items

The first step in the 5S process is Sort, or "seiri," which translates to "tidiness." The goal of the Sort step is to eliminate clutter and clear up space by removing things that don't belong in the area

How Do You Implement Sort?

Separate necessary items (e.g., tools, parts, and materials) from unnecessary items. We recommend sorting items into four categories:

a. **Items needed in this work area**. These are items you know that you regularly use in the context of this work area and thus will stay in this work area.
b. **Items needed in another work area.** Essentially, these are misplaced items. If an item is used in another work area "sort" it into that area by delivering it to whomever is responsible for that work area.
c. **Items you may need.** For items you are unsure about, use the 5S "red tag" system. Mark such items with red tags, which at a minimum should include the name of who tagged the item, why it is thought to no longer be needed, a proposed review date, and the name of the manager who must approve of disposal. Move the item to a red tag holding area, which should be organized by review month to make it easy to manage the area.
d. **Items you do not need.** These are items that you are 100% confident are not needed. They should be immediately discarded

Sorting activities

Equipment, material, tools files, furniture etc. can be categorized based on the frequency of use!

Examples of sorting

- ✓ Place "Red tag" for categorization of items to identify unnecessary items
- ✓ Move unnecessary items (broken tools, obsolete jigs and fixtures, scrap and excess raw material etc.) to central stored area
- ✓ Free up valuable floor space (Space utilization)
- ✓ Finding abnormality of equipment and tools (Out of order, missing parts etc.)
- ✓ Remove items not used in area outdated materials, broken equipment, redundant equipment, files on the computer, measurements which you no longer use
- ✓ Ask staff to tag all items which they don't think are needed this improves understanding about need and use
- ✓ Classify all equipment and materials by frequency of use to help decide if it should be removed place 'Red Tag' on items to be removed

- ✓ Establish a 'holding area' for items that are difficult to classify hold item for allotted period to enable others not on 5S team to review



BEFORE

Fig.2.1. Before sorting



AFTER

Fig.2.2. After sorting

Procedure for Sort activity

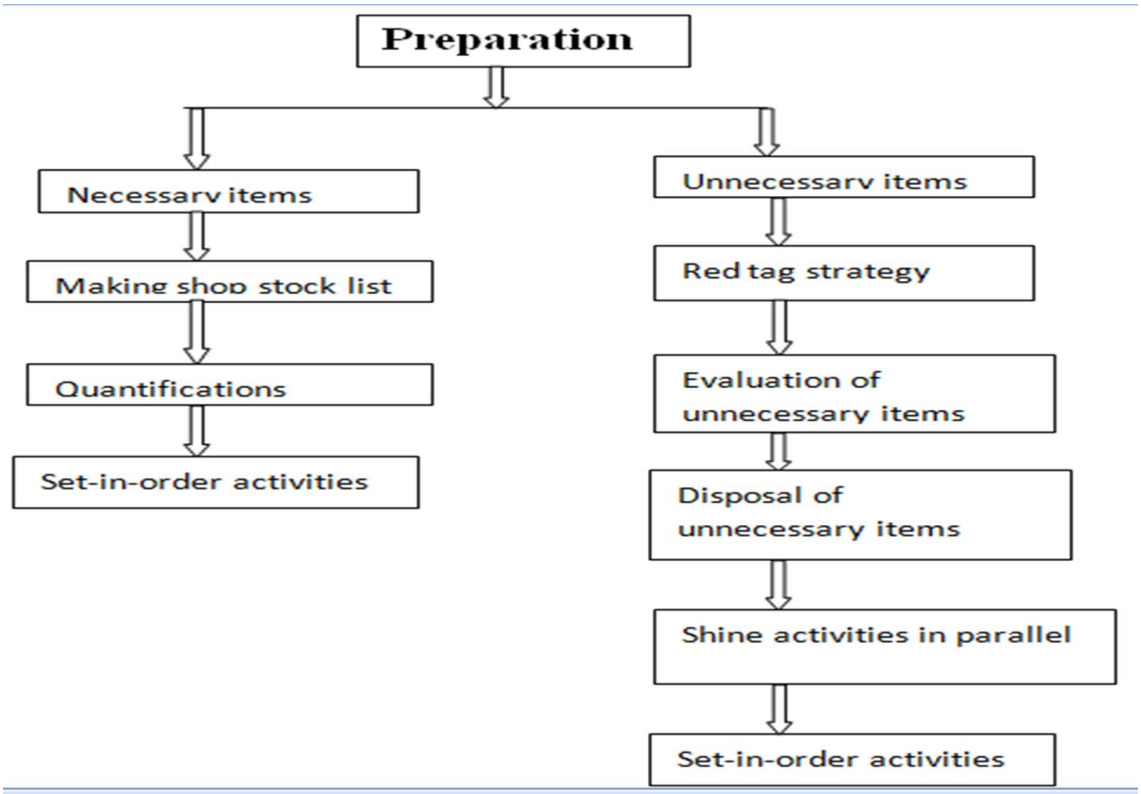


Fig 2.3. Procedure for sort activity

Some of types of unnecessary items are:

- ✓ Defective or excess quantities of small parts and inventory
- ✓ Outdated or broken jigs and dies
- ✓ Worn-out bits
- ✓ Outdated or broken tools and inspection gear
- ✓ Old rags and other cleaning supplies

- ✓ electrical equipment with broken cords
- ✓ Outdated posters, signs, notices, and memos

Tools and material used for implementing sort

- ✓ Red Tags Sticker
- ✓ Hook Nails
- ✓ Shelves Chip Wood
- ✓ Sponge Broom
- ✓ Pencil Shadow Board/ Tools Board
- ✓ Formats (For recording necessary and unnecessary items, plans etc…)

2.2. Categorizing unnecessary items

2.1.1. Re-Using

The process of reusing starts with the assumption that the used materials that flow through our lives can be a resource rather than refuse. Waste, after all, is in the eye of the beholder. One person's trash is another person's treasure. If we really look at things we are throwing away, we can learn to see them as materials that can be reused to solve everyday problems and satisfy everyday needs. Most of us, however, haven't even begun to exploit the resources in our trash. Once you have made up your mind to use trash for positive uses, you can begin to brainstorm and generate ideas. Reusing saves money, conserves resources, and satisfies the human urge to be creative.

The following are some examples of reuse.

- Containers can be reused at home or for school projects.
- Reuse wrapping paper, plastic bags, boxes, and lumber.
- Give outgrown clothing to friends or charity.
- Buy beverages in returnable containers.
- Sheets of paper that have been used on only one side can be used for note-taking or rough drafts.
- Old, outdated furniture can be reupholstered or slipcovered. Have padding added to the furniture to give it a new look. Often the frame can be modified slightly to change the way it looks.
- Old towels and sheets can be cut in small pieces and used for dust cloths
- Packing materials, such as polystyrene, plastic quilting, and similar materials, can be saved and reused again for packing.
- Old tires can be used in the garden and in the play yard.

2.1.2. Re-Cycling

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycling can benefit your community, the economy and the environment.

The main benefits of recycling are:

- **Recycling generates industry:** As New Mexicans recycle, there will be a growing supply of materials generated. In order to utilize these recycled materials, manufacturing facilities will emerge to find uses for them. As more recycling plants are built and more products are manufactured, we will gain a greater understanding of the entire process.
- **Recycling creates jobs:** EPA estimates that recycling 10,000 tons of materials would create 36 jobs compared to six for land filling the same amount (EPA, 2002). Some communities have formed working partnerships with workshops for the disabled, developed and administered job-training partnerships, or otherwise found work for unemployed labor in recycling programs.
- **Cost avoidance of recycling:** For years, recycling has been hampered by the belief that it should make money. That may be true for some recyclables, but not for others. Rather, recycling should be thought of as a cost-effective disposal option. It usually requires fewer government subsidies than landfilling or incineration. It saves natural resources and helps protect the environment. Lower taxes, energy savings, and a cleaner environment are the real "bottom lines" in favor of recycling.

2.1.3. Disposing and waste management

Disposing is discarding or discharging materials in accordance with local environmental guidelines or laws".

"**Waste management** is the collection, transport, processing, recycling or disposal, and monitoring of waste materials."

Output of daily waste the output of daily waste depends upon the

- Dietary habits,
- Life styles,
- Living standards and
- The degree of urbanization and industrialization.
- The solid waste produced ranges between 0.25 to 2.5 kg in different countries.

How waste affects health?

- It decomposes and favors fly breeding
- It attracts rodents
- The pathogens may be conveyed back to man's food through flies and dust.
- Water and soil pollution,
- An unsightly appearance, bad odors.
- Incidence of vector- borne diseases.

The methods of waste disposal are:

- Dumping
- Controlled Tipping or Sanitary Land-fill
- Incineration
- Composting
- Manure Pits
- Burial

2.3. Housekeeping Techniques and Strategy

The following are the benefits of practicing good housekeeping daily in your workplace:

- **It opens the door for deeper safety interactions:** This enables to discuss and take in safety interventions when our work area is clean and tidy. It is always unsafe to work in a workplace cluttered and untidy.
- **It creates a sense of Order:** Good housekeeping is an indication that the rest of the workplace is well managed.
- **It exposes potential hidden hazards:** Clutter covers safety concerns. Hidden hazards get exposed when items are stacked and stored properly.
- **It improves productivity:** The first thing that often comes to mind when it comes to getting housekeeping done is, "I really don't have the time for this." Yet we end up spending double that time looking for something that is lying behind a pile of rubbish.
- **It reduces slip and trip hazards:** Experience has shown me that slip and trip incidents in the workplace account for a large percentage of injuries. Clean up now and get the immediate benefits.
- **It aids effective emergency response:** It creates safe environment when having to get the emergency exits.

- **It reduces fire hazards:** Many potential fire hazards are eliminated through proper housekeeping.
- **It allows better identification of missing items:** If a workplace is well kept, tidy and having items/materials consolidated into distinct areas it makes it much easier to identify missing items/materials.
- **It makes stacked materials intrinsically safer:** If items need to be removed from an untidy pile it often results in falling/sliding objects that may cause serious injury.
- **It creates good first impressions:** Any new employee will get off to a good start if they first enter a clean and orderly work site. Half the battle will be won.

Self-check-2

Instructions: Answer all the questions listed below. Write your answers in the sheet provided in the next page.

1. List tools and materials used to implement Sort. (5points)

……..

…….

2. write at least 5 types of unnecessary items
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
3. write at least 5 locations where unneeded items tend to accumulate
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
4. Defining Disposing and waste management……

   ……..

   …….

Operation sheet 2

OPERATION TITLE: - Sort needed items from unneeded

PURPOSE: - Focuses on eliminating unnecessary items from the workplace

Procedures unnecessary items are

- ✓ defective or excess quantities of small parts and inventory
- ✓ outdated or broken jigs and dies
- ✓ worn-out bits
- ✓ outdated or broken tools and inspection gear
- ✓ Old rags and other cleaning supplies
- ✓ electrical equipment with broken cords
- ✓ outdated posters, signs, notices, and memos

Lap Test-2

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks.

Task 1: Identify and prepare tools and materials for implementing sort activity.

Task 2. identifying necessary and unnecessary items

Task 3. Categorizing unnecessary items

Unit three: Set workplace in order

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Location selection methods for essential and non-essential items
- Methods of evaluating assigned location
- Strategies of set-in order

This guide will also assist you to attain the learning outcomes stated in the cover page.
Specifically, upon completion of this learning guide, you will be able to:

- Locate selection methods for essential and non-essential items
- Evaluate Methods of assigned location
- Set in order

3.1. Location selection methods for essential and non-essential items

Introduction to Set In order

The second step, Set in order, was originally called “seiton,” which translates to “orderliness.”

A variety of names have been used in English: “Systematic organization,” “Straightening out,” and “Simplify,” for example. No matter what it’s called, the goal of this step is to organize the work area. Each item should be easy to find, use, and return: a place for everything, and everything in its place.

Implement straighten/se in order?

Area: M-1

Date of issue:
Issued by: 5S Committee

| Basic plan | | Seiton | | |

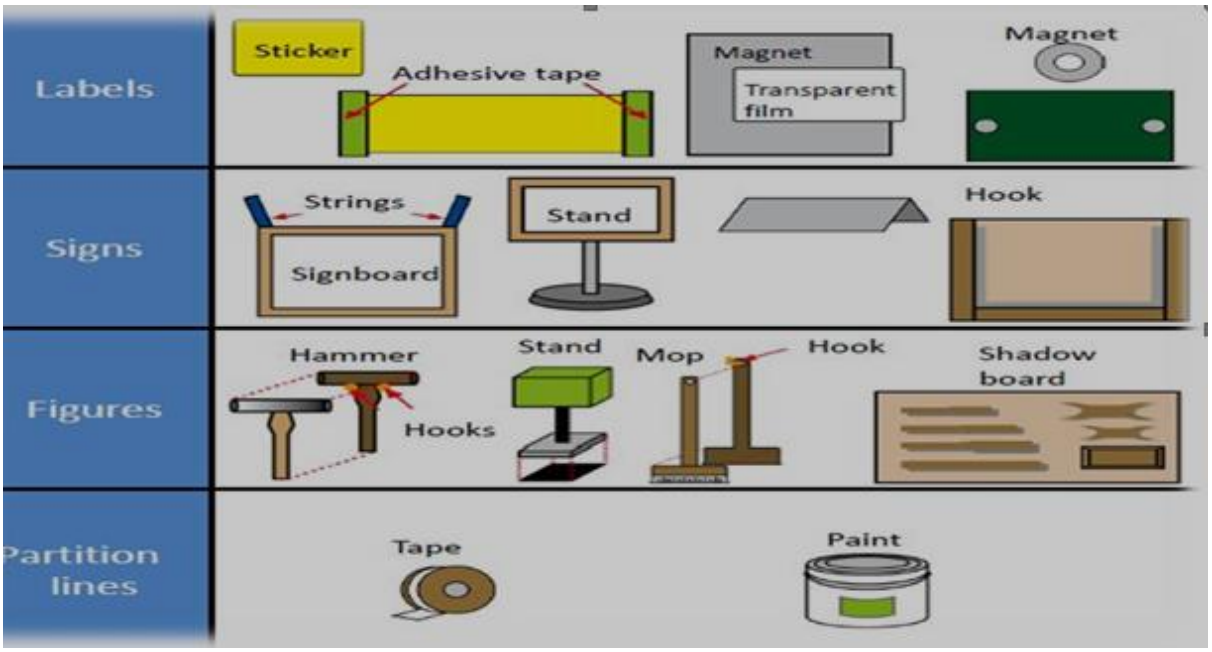


Fig.3.1. Location of items

Set targets for Set-In-Order Activity

Decision of location, Storage, Indication method

Preparation of tools for Set-In-Order Activity

Decision of schedule and work allocation

Implementation of Set-In-Order

Table 3.2. Procedures for set in order

After you've sorted items, it's time to decide how you want to organize them. We recommend the following methodology:

- **Provide easy access to frequently used items.** The key to reducing waste from excess motion is to place frequently used items within easy reach.
- **Group like items.** Group the remaining items into logical categories and brainstorm the best way to organize and store each of these categories.

- **Visualize item homes.** For each group, decide on the best way to make it clear when an item is missing or misplaced. A classic example is creating a shadow board for tools.
- **Use containers.** If it is appropriate for the type of item, consider organizing it within a container.
- **Unleash the labeler.** If an item is too big to put into a container, consider giving it a frame and putting a label on the item in addition to the frame.

Some examples of straighten/set in order: -

- Give every item a distinct "home."
- Use color as a way of organizing and creating meaning.
- Separate everyday tools from special-case tools.
- Dedicate a surface or area entirely to shadow boxes and tool storage.
- Dedicate another surface or area entirely to working.

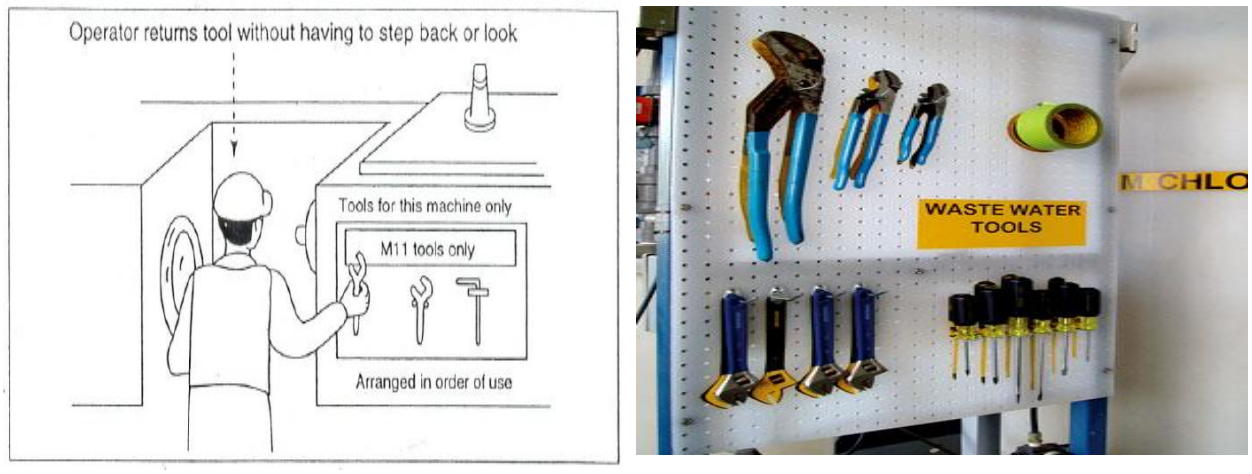


Fig.3.2. Tools kept at hand and stored in the order used

5S map is a diagram or floor plan that provides an overview of a work area, process, or station. It provides a visual reference to show where the tools, supplies, workers, and travel paths are, and how they relate to each other. A good map may also include a description of the work that happens in the area shown.

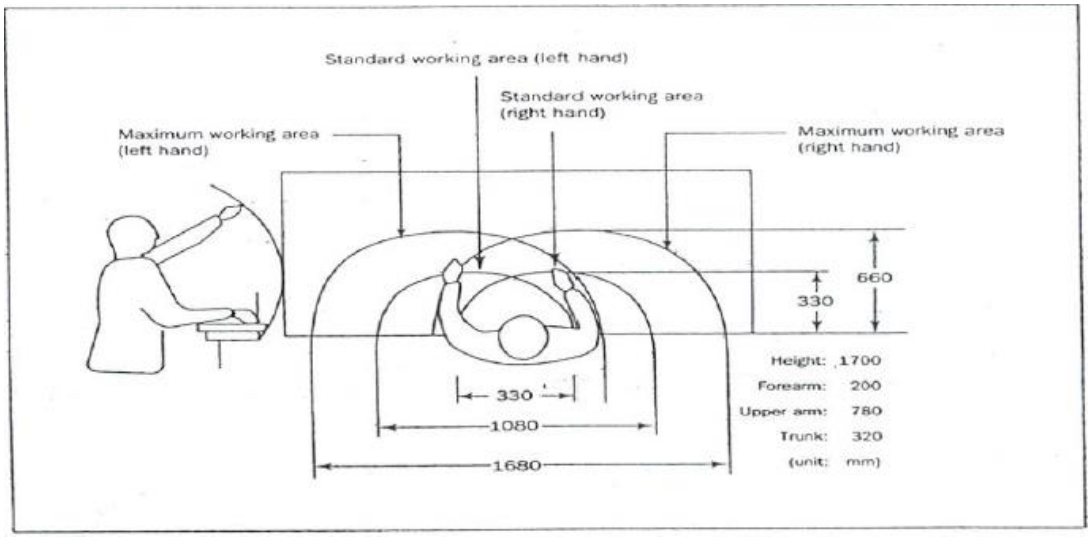


Fig.3.3. Guidelines for locating parts, equipment's, and machinery to maximize motion efficiency.

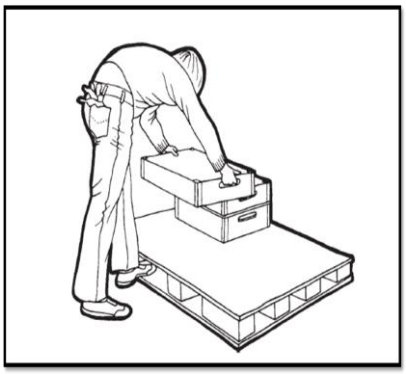


Fig.3.4. Motion wastes



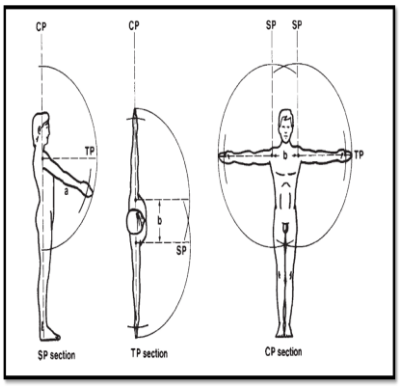


Fig.3.5.No waste of motion

Depending on your facility's needs, you may find one approach easier than another:

- Draw up a map, and then implement it
- Physically arrange the workplace first, and then map it out
- Map as you go, testing ideas and writing down what works well

The purpose of the set-in order stage is to find a place for everything and put everything in its place.

Key takeaways from the set-in order stage:

- Arrange items for convenience when using.
- Eliminate wasting time looking for certain tools and items.
- Simplify the work process by making it easier to find necessary tools.
- Create a plan to help the workplace stay in this new organization.
- Organize items based on their frequency of use and proximity to where they are used.

Setting the space in order

Some guidelines to consider when choosing homes for items:

- If items are used together, store them together.
- Put frequently used items closest to the user.
- If possible, devise a let-go system in which tools are attached to a retractable cord and automatically go back to the stored position.
- Place items so the user doesn't need to bend or twist much to access them.
- Arrange tools and materials in order of use.

3.2. Methods of evaluating assigned location

The 5S map is a tool that can be used to evaluate current locations of parts, jigs, tools, dies, equipment, and machinery, and to decide best locations. 5S Map involves creating two maps 'before map' and 'after map'. The 'before map' shows the layout of the workplace before implementing set in order. The 'after map' shows the workplace after implementing set in order. The 5S Map can be used to evaluate the locations in a small or large workplaces, like in a single workstations, on a production line, or in a department.

The steps of using the 5S Map:

A. Make a floor plan or area diagram of the workplace you wish to study. Show the location of specific parts, inventory, tools, jigs, dies, equipment and machinery.

B. Draw arrows on the plan showing the work flow between items in the workplace. There should be at least one arrow for every operation performed. Draw the arrows in the order that the operations are performed, and number them as you go.

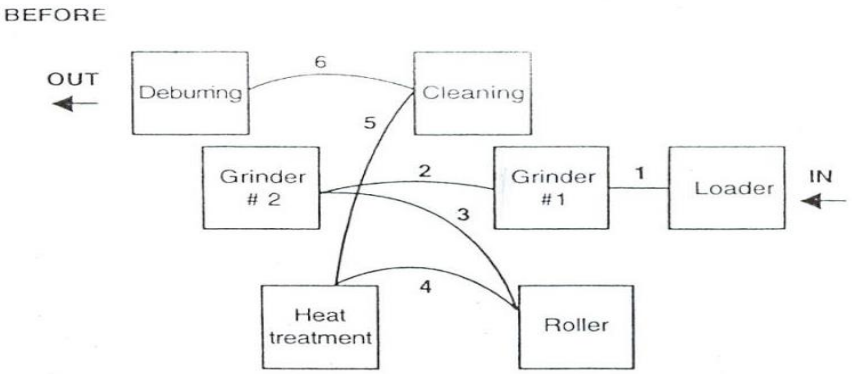


Fig.3.6.5S Map of old layout in machining operations ('before map')

C. Look carefully at the resulting "spaghetti diagram".

D. Make a new 5S Map to experiment with a better layout for this work place. Again, draw and number arrows to show the flow of operations performed.

E. Analyze the efficiency of the new layout (the after map), based on the principles explained in the above.

F. Continue to experiment with possible layouts (after maps) using the 5S Map until you find one which you think will work well.

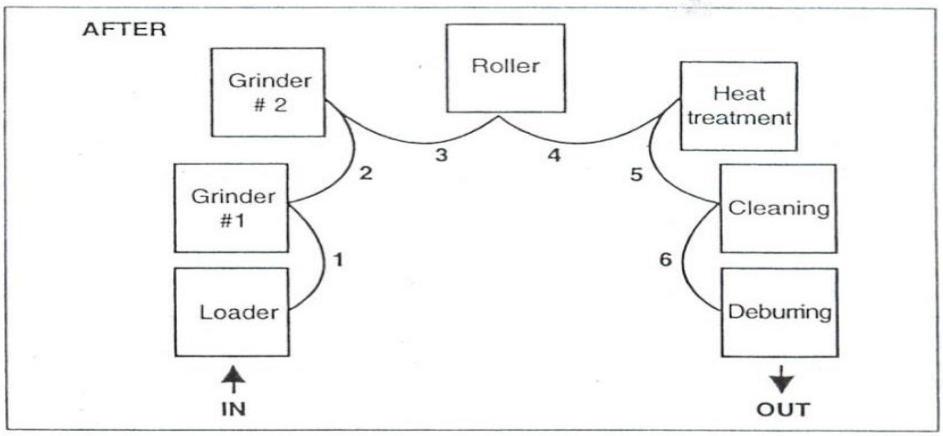


Fig.3.7. 5S Map of new layout (the after map) in machining operations.

G. Implement this new layout in the work place by moving parts, tools, jigs, dies, equipment, and machinery to their new locations. 8. Continue to evaluate and improve the layout in the workplace

3.3. Strategies of set-in order

The set-in order step utilizes several strategies to accomplish its goals and one of them is called shadow boarding. Essentially, the tools being organized are traced and cut out of vinyl, and the vinyl outline is then placed in a tool drawer or on a pegboard. This way, when employees are returning an item back to the area, they can immediately identify its home.

A. **Painting strategy:** is used to divide the factories or workshop's walking areas (walkways) from the working areas (operation areas). When putting lines to divide walkways from operation areas, the following factors should be considered:

- U-shaped cell designs are generally efficient that straight production lines.
- In-process inventory should be positioned carefully for best production flow.
- Floors should be levelled or repaired before we put lines.
- Walkways should be wide enough to avoid twists and turns and for safety and a smooth flow of goods.
- The dividing lines should be between 2 and 4 inches in width.
- Paint colors should be standardized. For example
  - ✓ Operation areas are painted by green;
  - ✓ Walkways are fluorescent orange or red;
  - ✓ Lines that divide the walkways from operation areas are yellow in color.

Dividing lines can be used to show:

- Cart storage locations, be placed, or to show hazardous areas.

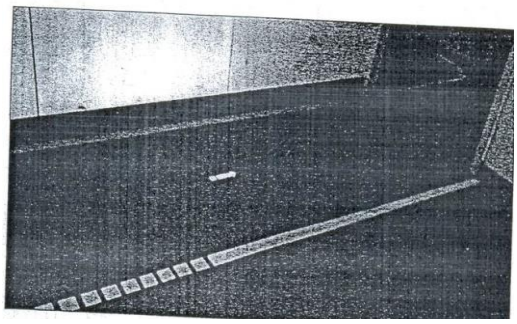


Fig.3.8. Aisle direction line

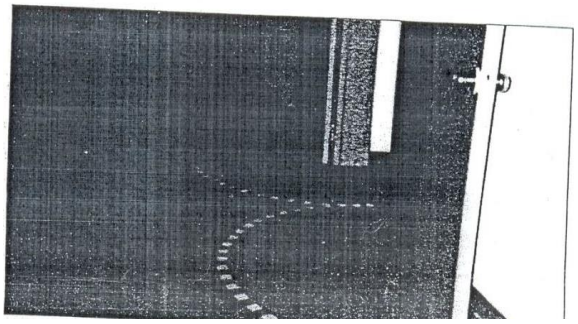


Fig.3.9. Door-range line



Fig.3.10. Tiger marks,

B. **Color-code strategy:** is used to show clearly which parts, tools, jigs and dies are to be used for which purpose. For example, if certain parts are to be used to make a particular product, they can all be color-coded with the same color and even stored in a location that is painted with that color.

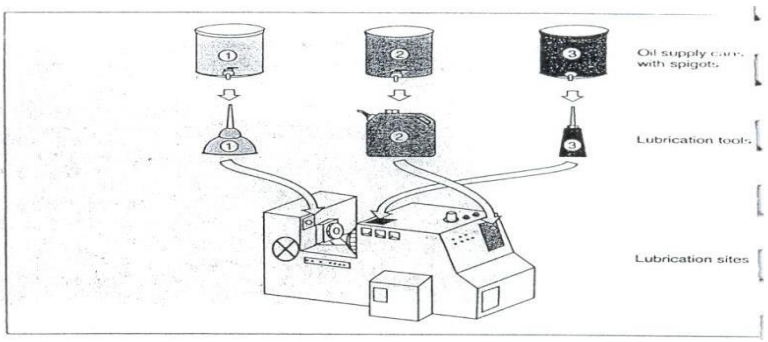


Fig.3.11. Color-coding for lubrication

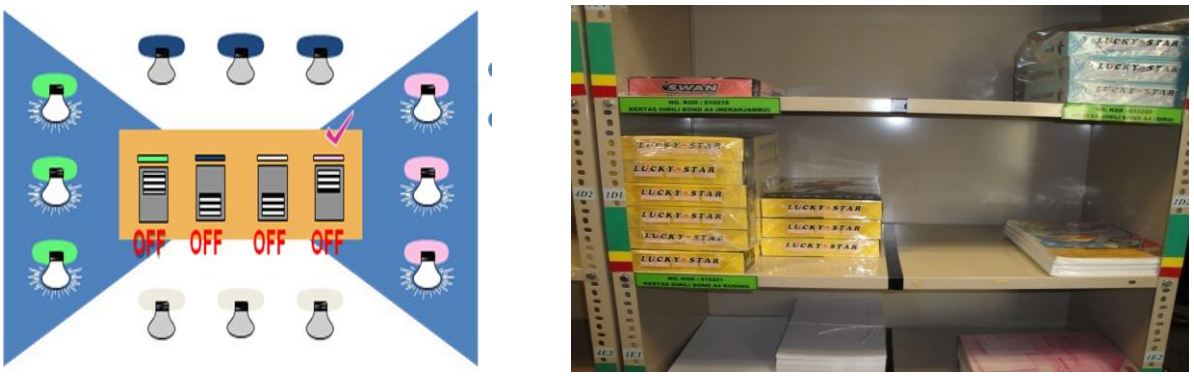


Fig.3.12. Matching levels color identification

C. **Outlining strategy:** is used t show which jigs and tools are stored were. Outlining simply means drawing outlines of jigs and tools in their proper storage positions. When you want to return a tool, the outline provides an additional indication of where it belongs.

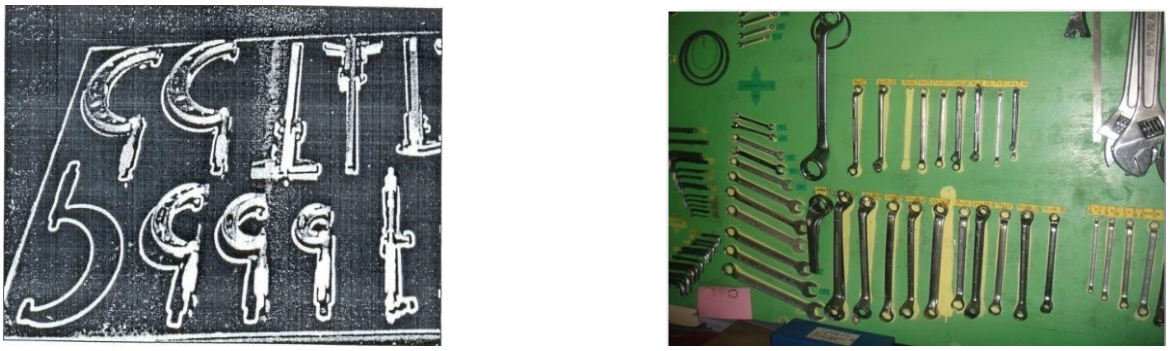


Fig.3.13. Outlining of tools to show their locations



Fig.3.14. Outlining of tools and equipment's to show their locations

3.3.1. Visual Control

In implementing set in order pillar, we use visual controls so that communications became easy and smooth. For example, we can visually know where items are placed and where to return them and so on. A visual control is any communication device used in the workplace that tells us at a glance how work should be done. Through visual controls, information such

as where items belong, how many items should be placed there, what the standard procedure is for doing something, the status of work in process etc. can be communicated.

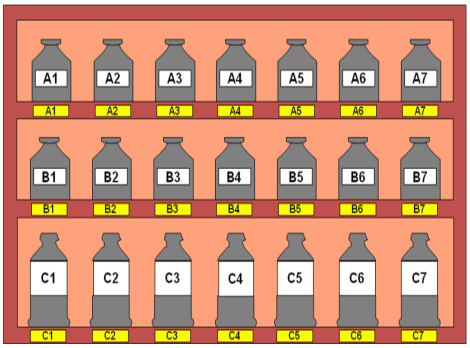


Fig. Visual controlling items

3.3.2. Motion Economy

There are principles helpful in deciding the best locations for parts, equipment's, and machinery, as well as tools by removing motion wastes. Motion wastes are unnecessary movements created when people move their trunks, feet, arms, and hands more than needed to perform a given operation. These wastes lead to waste of time, energy and effort. These motion wastes can be minimized by locating parts, equipment's, and machinery in the best locations possible.

More important than removing motion wastes is asking why it occurs. By asking 'why' we can find the methods of manufacturing that work and approach the zero-waste mark. Eliminating the unnecessary motions from existing operations is called Motion improvement.

Principles of Motion Economy: 3 Categories | industry

This article throws light upon the three categories of principles of motion economy.

The categories are:

A. Use of Human Body

B. Arrangement of Workplace

C. Design of Tools and Equipment.

A*. Use of human body*:

- The two hands should begin and complete their motion at the same time.
- `Arm movements should be symmetrical, simultaneous and in opposite directions.
- Hand and body motions should be confined to lowest classification to perform the work satisfactorily.
- The two hands should not be idle at the same time (except during rest).
- Momentum should assist the worker (otherwise reduce to minimum).

- Smooth continuous and curved movements preferable over straight-line movement with sharp changes in direction.
- Ballistic movements are (easy fast and accurate) preferred over controlled movements.
- Arrange work to provide natural rhythm where possible.
- Eye fixations should be as few and as close together as possible.

B. Arrangement of workplace:

- Make definite and fixed place for all tools and materials. In other words there should be a place for everything and everything at its place.
- Locate tools materials and controls as close to the place, of use as possible.
- Gravity feed the material to the point of use (though bins and containers).
- Locate materials and pools to permit best sequence of operations.
- Good illumination for satisfactory visual perception
- Use drop delivery where possible.
- Arrange work place height to permit alternate sitting and standing at work.
- Provide chair of suitable type and height to permit good posture.

C. **Design of tools and equipment:**

- Relieve hands if the work can be economically done by jig, fixture or pedal.
- Combine two or more tools where possible.
- Pre-position tools/materials where possible.
- When fingers are loaded divide work with according to the capabilities of the fingers.
- Locate levers and handler to permit work with least change in body posture and greatest mechanical advantage.

Self - check 3

Instructions: Read the following instructions and answer the questions. (2 points each)

I/ <u>Choose the best answer</u>

1. The process used to arrange necessary items in their designated locations are;
   A. Items frequently used B. Items sometimes used
   C. Items not used at all but must kept D. All
2. Deciding location/layout, storage and indication methods activities are;
   A. Marking reference materials with an oblique line to detect disorder
   B. Putting names and numbers on all jigs and tools.
   C. Storing similar items together
   D. All

<u>II/Give sort answer</u>

3. Give definition of the second pillar of 5S – Set in order. (2 points)
4. What is 5S Map? (2 points)
5. What the three are the strategies for implementing set in order? (3 points)
   a. ----------
   b. ----------
   c. ----------
6. What are the three standardized colors used for dividing and marking walkways and operation areas? (3 points)
   a. ----------
   b. ----------
   c. ----------

Operation sheet 3

OPERATION TITLE: - Set workplace in order

PURPOSE: - arrange the items that are needed in the area and identify them

Procedure of using 5S map

Step 1. Make a floor plan or area diagram of the workplace you wish to study. Show the location of specific parts, inventory, tools, jigs, dies, equipment and machinery.

Step 2. Draw arrows on the plan showing the work flow between items in the workplace. There should be at least one arrow for every operation performed. Draw the arrows in the order that the operations are performed, and number them as you go.

LAP Test 3

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks. (8 hours)

Task 1: Following the steps for using 5S Map, draw before and after map/ layout of your work shop.

Unit Four: Shine Work Area

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Benefit of Shine
- Shining techniques of work area
- Tools and equipment for shine activities
- Schedule daily/weekly activities

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Understand benefit of Shine
- Know Shining techniques of work area
- Use tools and equipment for shine activities
- Schedule daily/weekly activities

4.1. Benefit of Shine

The third step of 5S is Shine, or “seiso,” which means “cleanliness.” While the first and second steps cleared up space and arranged the area for efficiency, this step attacks the dirt and grime that inevitably builds up underneath the clutter, and works to keep it from coming back.

One of the most important benefits of Shine is catching problems early and preventing unexpected breakdowns.

Benefits of shine

One of the more obvious purposes of shine is to turn the workplace in to clean, bright place where everyone will enjoy working. Another key purpose is to keep everything in top condition so that when someone needs to use something, it is ready to be used. Companies or organizations should avoid the tradition of annual at the end of the year or on spring cleanings. Instead, cleaning should become a deeply ingrained part of daily work habits, so that tools, equipment, and work areas will be ready for use all the time.



Fig.4.1. Worker’s cleaning machines

Cleanliness for factories and offices is a lot like bathing for human beings. It relieves stress and strain, removes sweat and dirt, and prepares the body and mind for the next day. Cleanliness is important for physical and mental health. Just as you would not bath only once a year, performing shine procedures in a factory should not be an annual activity. Cleaning should be done on daily basis.



Fig.4.2. Shine activities relieves stress and strain

Shine activities can play an important part in bringing work efficiency and safety. Cleanliness is also linked with the morale of employees and their awareness of improvements.

Factories or workshops that do not implement the shine pillar suffer the following types of problems:

- Poor morale and inefficiency at work. This could be due to dirty windows that can pass only little light.
- Unable to see or find defects in dark and messy workplaces.
- Slipping and injuries can be created due to puddles of oil and water on the floor.
- Frequent breakdown of machines due to insufficient check-ups and maintenances which in turn leads to late deliveries.
- Low and unsafe operating machines due to insufficient checkups and maintenance which in turn leads to hazard and accidents.
- Defects will result due to shaving cuts getting mixed in to production or assembly processes.
- Shaving cuts can get in to people's eyes and create injuries.
- Low morale due to filthy work environments.

Routine Cleaning



Fig.4.3. Routine Cleaning

The Shine step is not meant to be a job for the maintenance or janitorial staff. Each worker should clean their own work area, and the equipment they use. This approach has several benefits:

- Workers who are familiar with the area will quickly notice any problems that arise
- Hazards or difficult situations will be understood and accounted for
- Items that are out of place or missing will be recognized
- Workers will tend to keep their own workspaces cleaner during normal operations

Shine as Preventative Maintenance

Keeping work areas clean will have many advantages. One important advantage is that it's easy to spot leaks, cracks, or misalignments. If the people keeping the area clean are the same people who work there regularly, they will be quick to recognize any of these problems.

Leaving those problems unnoticed and unresolved could result in equipment failure, safety hazards, and loss of productivity. With the constant cleaning and inspections used in the Shine step of 5S, the system can feed into a preventative maintenance program. This way, 5S can extend the working life of equipment and help reduce emergency downtime.

4.2. Shining techniques of work area

Shine creates a work environment that engages and empowers operators by giving them more responsibility and agency over their work area. It also helps them to identify problems before they interfere with production. For example, in a clean work environment, it is much easier to spot emerging issues such as fluid leaks, material spills, metal shavings from unexpected wear, hairline cracks in mechanisms, etc.

Shine activities should be taught as a set of steps and rules that employees learn to maintain with discipline.

Inspection

Once daily cleaning and periodic major clean ups become a habit, we can start incorporating systematic inspection procedures in to the shine procedures. Even when equipment in the workplace appears to function normally, it may be developing many problems. Always when machines or other equipment begin to show sign of minor, sporadic malfunctions, the operators not the maintenance people notice it first. Therefore, it is important to consider the operators information about the equipment.

The following types of equipment problems frequently exist in factories:

- Oil leaks from the equipment on to the floor.
- Machines are so dirty that operators avoid touching them.
- Gauge displays and other indicators are too dirty to be read.
- Nuts and bolts are either loose or missing.
- Motors overheat.
- Sparks flare from power cords.
- V-belts are loose or broken.
- Some machines make strange noises.

Daily cleaning or inspection can help to find these problems and solve them.



Fig.4.4. Before shine



Fig.4.5.After shine

- **Inspection steps**

The steps of inspection and shine procedures are parallel. But the steps of inspection give greater emphasis on the maintenance of machines and equipment. These steps are:

Step 1: Determine inspection targets

The targets for inspection are similar to the targets of shine activities. These include machines, equipment's, jigs, dies, cutting tools and measuring instruments.

Step 2: Assign inspection activities

In principle, the people who carry out inspection on a particular machine should be the same people who operate the machine. But most often one person can operate several machines at a time (as in multi-process handling). In this case, it is good to involve line supervisors and group leaders in the inspection duties. Once inspection activities are assigned, they have to be written up on a large signboard for the workshop or on small signboards that are attached to each target machine.

Step 3: Determine inspection methods

First all of the items to be inspected should be listed then an inspection checklist should be prepared based on the listed inspection items. The following shows an example of an inspection checklist.

Mechanism	No.	Point	Main Response			
			Clean	Lubricate	Replace	Restore
Lubrication system	26.	Is there any dirt or dust in the oil inlets?	○			
	27.	Do the oil level indicators show adequate levels?		○		
1. Oil inlets	28.	Can the oil level indicators be clearly seen?	○			
	29.	Are there any cracks in the oil tank?				○
2. Tank	30.	Is the bottom of the oil tank dirty?	○			
	31.	Is the oil in the tank dirty?			○	
3. Oil pipes	32.	Is there any oil leakage from the tank or pipe joints?			○	○
	33.	Are oil levels adequate?		○		
4. Lubrication sites	34.	Is the correct type of oil being used?			○	
	35.	Is there any clogging in the oil pipes?			○	○
	36.	Is there any dust or dirt at lubrication sites?	○			
	37.	Are the lubrication tools dirty?	○			

Table: Sample of inspection checklist

Step 4: Implement inspection

When implementing inspection, use all your senses to detect abnormalities. Inspection is not simply a visual activity. There are some ways to detect abnormalities. These are:

- Look closely at how the machine works and watch for slight defects (e.g. oil leakage, debris scattering, deformation, wear, warping, mild, missing items, lopsidedness, inclinations, colour changes).
- Listen closely for changes in the sounds the machine makes while operating (e.g. sporadic sounds, odd sounds).
- Use your nose to detect burning smells or other unusual odours (e.g. burning rubber)
- Touch the machine where it is safe during operation and during downtime to detect deviations from normal conditions (e.g. strange vibrations, wobbling, looseness, excessive heat, shifting).

Step 5: Correct equipment problems

All equipment abnormalities or slight defects should be fixed or improved. There are two approaches to do these:

4.3. Tools and equipment for shine activities



Every home must have certain cleaning tools; hardworking tools that will help the cleaner get the job done quickly and efficiently.

The beauty of having these must-have home cleaning tools is that they will enable you to manage, organize, and stay on track daily, weekly, monthly and annual cleaning assignments.

Thus, you will never regret having these cleaning tools. In this article, we will be sharing 5 essential cleaning tools that will make your home have a sparkling look.

Broom, dustpan and mop

This is very important because if you have any hard surfaces like linoleum, cork, tile and wood, then you will need a broom, dustpan and mop to get them clean efficiently and on time. One of the best reasons why people use dustpans is because it enables them to clean all kinds of spills, or dirt in their homes.

Scrub brush

Cleaning your home with a simple cloth or sponge is good for simple stains, but it is not the ideal especially if you want to clean tough stains. You need to invest some funds in getting a scrub brush with a grip handle.

Spray bottle

Spray bottles is one of the things you really need to keep around your home always. If you have to rinse anything in your home, you can use spray bottle successfully anytime, any day without stress.

Microfiber cleaning cloths

It is important to have microfiber cleaning cloths- they are as important as having white towels, with microfiber you can keep the surfaces clean with just a little water. It won't scratch or leave streaks behind.

Vacuum cleaner

You need vacuum cleaners around your home- these machines will help in keeping allergies at bay and floors clean. If you don't have this machine, it might be extremely difficult for you to keep your home sparkling.



Fig.4.6. Electric cleaning tools



Fig.4.7. House hold/Workshop cleaning tools

4.4. Scheduling daily/weekly activities

Shining Assignments

Workplace cleanliness is the responsibility of everyone who works there. Each employee should be assigned specific area to clean. To do these two methods can be used:

A 5S Assignment Map – shows all the target areas for shine activity and who is responsible for cleaning them. By marking on 5S Map, the shine assignments can be shown.

A 5S schedule – shows in detail who is responsible for cleaning which areas on which days and times of the day. Then this schedule should be posted in the work area.

General Cleaning Assignment Sheet

Date of cleaning: Year Month

Activity area		Target place/object	Group	Leader	Tools	Required number of workers
Zone A	Machining--Group A area Machining--Group B area Machining--Group C area	Lathe Press machine Floor Resting-place Pathway	Manufacturing	A	Detergent Waste cloth Scraper Broom mop	25
Zone B	Purchasing area Material area					
Zone C	Painting area Processed products discharge area					

Example 1: Table: 4.2. Cleaning assignment sheet

Regular Cleaning Assignment Sheet

Worksite			Group						5S promoter			
No.	Day	Target place/object	Person in charge A	B	C	D	E	F	Frequency	Time	Start	Tool
1	Mon											
2												
3												
4	Tue											
5												
6												
7	Wed											
8												
9												
10	Thu											
11												
12												
13	Fri											
14												
15												

Example 2: Table: 4.3. Regular cleaning assignment sheet

Self-check 4

Instructions: Read the following instructions and answer the questions. (2 points each)

I/ Choose the best answer

_____1. ---------- is removing the dirt, grime, and dust from the work area

A. Set in order B. Shine C. Standardize D. All

--------- 2. Which one of the following is not the benefit of shine?

A. Defects are easier to see in a well-lit and clean environment
B. A work area clean of debris is less likely to cause a tripping hazard
C. A clean work area promotes improved morale and instills pride in the team members
D. D. None

--------- 3. Why implement Shine activities?

A. Improves productivity B. decrease quality
C. Increase un planned downtime D. Increase searching

--------- 3. Which one of the following is the implementation of shining activities?

A. Ask yourself< what are we going to clean>?
B. Set a schedule and assign individuals
C. Create procedures for continued daily shine processes D. All

II/ Give sort answer

3. Give definition of the third pillar shine. (2 points)

---

4. What are the two methods used to assign shine activities to employees? (2 points)

a.----------

b. ----------

Operation sheet 4

OPERATION TITLE: - Implementing shine activity

PURPOSE: - a cleared up space and arranged the area for efficiency

Procedure

1. **Performing shine activity in the assigned workshop**

Sample format for general cleaning assignment

General Cleaning Assignment Sheet

Date of cleaning: Year Month

Activity area		Target place/object	Group	Leader	Tools	Required number of workers
Zone A	Machining-- Group A area	Lathe	Manufacturing	A	Detergent	25
		Press machine			Waste cloth	
	Machining-- Group B area	Floor			Scraper	
		Resting-place			Broom	
		Pathway			mop	
	Machining-- Group C area					
Zone B	Purchasing area					
	Material area					
Zone C	Painting area Processed products discharge area					

Sample format for regular cleaning assignment

Regular Cleaning Assignment Sheet

Worksite			Group						5S promoter			
No.	Day	Target place/object	Person in charge						Frequency	Time	Start	Tool
			A	B	C	D	E	F				
1	Mon											
2												
3												
4	Tue											
5												
6												
7	Wed											
8												
9												
10	Thu											
11												
12												
13	Fri											
14												
15												

2. **Steps in inspection**

Step 1: Determine inspection targets

Step 2: Assign inspection activities

Step 3: Determine inspection methods

Step 4: Implement inspection

Step 5: Correct equipment problems

Lap test

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks. 6hours

Task 1: Following the shine procedures, perform shine activity in the assigned workshop.

Task 2: Following the steps for inspection, perform inspection of equipment's, tools and machines in your workshop.

Unit Five: Standardize Activities

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Purpose and Benefits of Standardize
- Standard for set in order and shine

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Know purpose and benefits of Standardize
- Set Standard for set in order and shine

5.1. Purpose and Benefits of Standardize

What is Standardizing?

The Standardize step is a bridge between the first three steps (Sort, Straighten, and Shine) and the last step (Sustain). In this step your goal is to capture best practices for 5S as standardized work for your team

Why Do You Need to Standardize?

Standardize makes 5S repeatable. It transforms 5S from a one-off project to a reproducible set of activities.

The first three steps of 5S cover the basics of clearing, organizing, and cleaning a work space; on their own, those steps will provide short-term benefits. The fourth step is Standardize, or "seiketsu," which simply means standardization. By writing down what is being done, where, and by whom, you can incorporate the new practices into normal work procedure. This paves the way for long-term change



Fig.5.1. Discussion in 5S program

The purpose of 5S is to make your workplace better, not to make it unchangeable. You are writing the standards for your facility, and you can change them to fit new information or new business needs.

- Lead to workplace standardization
  - ✓ prevent setbacks in the first three pillars
  - ✓ Make implementing them a daily habit
  - ✓ Ensure that all the three pillars are maintained in their fully implemented state.
- Lead to work standardization
  - ✓ Muda elimination
  - ✓ Quality improvements
  - ✓ Cost improvements

- ✓ Delivery time improvements
- ✓ Process improvements

Here are some of the problems that result when we do not implement Standardization well:

- Conditions go back to their previous and undesirable levels even after a companywide 5S implementation campaign.
- At the end of the day, piles of unneeded items are left from the day's production and lie scattered around the production equipment.
- Tool storage sites become disorganized and must be put back in order at the end of the day.
- Cutting shavings constantly fall on the floor and must be swept up.
- Even after implementing Sort and Set in order, it does not take long for office workers to start accumulating more stationery supplies than they need.

5.2. Standard for set in order and shine

How to Implement Standardize

The three steps to making Sort, Set in Order and Shine activities (the three pillars or 3S) a habit are:

Step 1: Decide who is responsible for which activities with regard to maintaining 3S conditions.

Step 2: To prevent backsliding, integrate 3S maintenance duties in to regular work activities.

Step 3: Check on how well 3S conditions are being maintained.

Common Tools and Techniques to standardize 3S are:

- 5S Job Cycle Charts
- Visual 5S
- The Five Minute 5S
- Standardization level checklist
- 5S checklist
- The five Whys and one How approach(5W1H)
- Suspension
- Incorporation
- Use Elimination

The Three steps to make the 3S activities a habit/standardize using the tools and techniques of 3S standardization

A. Assign 3S responsibilities

The suppliers should be made responsible for maintaining 3S conditions at their own unloading sites and encouraged to join in full 5S implementation.

Tools for assigning 3S responsibilities include:

- 5S Maps
- 5S schedules

- 5S job cycle charts, which list the 5S jobs to be done in each area, and set frequency cycle for each job (see the figure below).

In the example shown in the figure below, 5S duties are sorted out according to the first three pillars and the scheduling cycle. In the figure, code letters are used for the various cycle periods: A is for 'continuously," B for "daily (mornings)," C for "daily (evenings), " D for "weekly," E for "monthly" and F for "occasionally." Each 5S job assignee can then use these charts as 5S Checklists. This particular example shows clearly who is responsible for each job, which area, what to do, and when to do it.

5S Job Cycle Chart		Div./Dept./ Section	Production Div. 1, Assembly Dept. A										
		Entered by:	Comarella					Date:	1 Feb 1994				
								Job Cycle					
No.	5S Job		Sort	Set in Order	Shine	Standardize	Sustain	A	B	C	D	E	F
1.	Red-tag strategy (occasional, companywide)		○									○	
2.	Red-tag strategy (repeated)		○					○					
3.	Place indicators (check or make)			○						○			
4.	Item indicators (check or make)			○						○			
5.	Amount indicators (check or make)			○						○			
6.	Sweep around line				○				○				
7.	Sweep within line				○				○				
8.	Sweep around worktable				○				○				
9.	Sweep on and under worktable				○				○				
10.	Sweep work areas and walkways												

Table: - 5.1. A 5S Job Cycle Chart

B. Integrate 3S Duties into Regular Work Duties

Visual 5S and Five-Minute 5S are two approaches that help make maintenance work part of the everyday work routine.

Visual 5S: - The Visual 55 approach makes the level of five pillar conditions obvious at a glance. This is particularly helpful in factories that handle a great variety and number of materials.

Five-Minute 5S: - "Five-Minute 5S" is a loose one-the actual time can be three minutes, six minutes, or whatever is appropriate. The point is to make the five-pillar work brief, efficient, and habitual. In figure below shows a signboard that was made as part of a Five-Minute 5 campaign.

Three techniques for achieving unbreakable setting in order

a. Suspension
b. Incorporation

c. Use elimination.

a. **Suspension: -** In the Suspension technique, tools are literally suspended from above, just within reach of the user

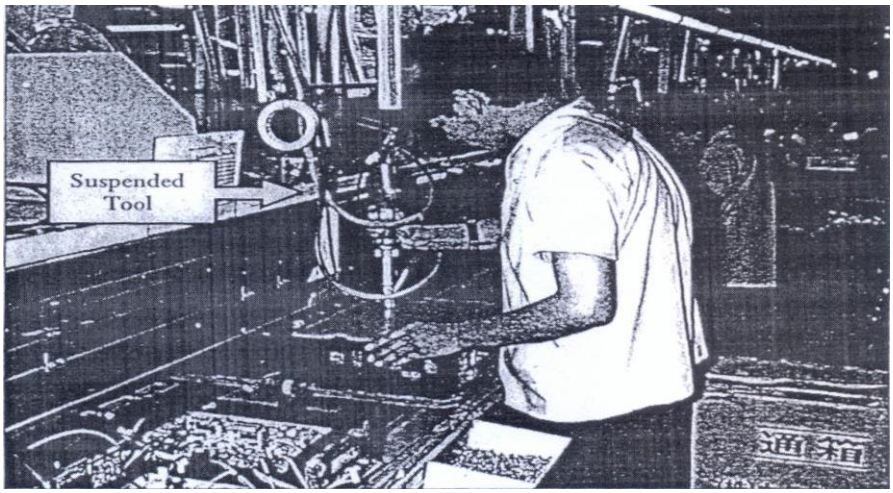


Figure:5.2. Tools Suspended from an Overhead Rack

b. **Incorporation: -** Incorporation means creating a flow of goods or operations in a factory process in which (1) jigs, tools, and measuring instruments are smoothly integrated into the process and (2) such devices are stored where they are used and therefore do not have to be returned after use

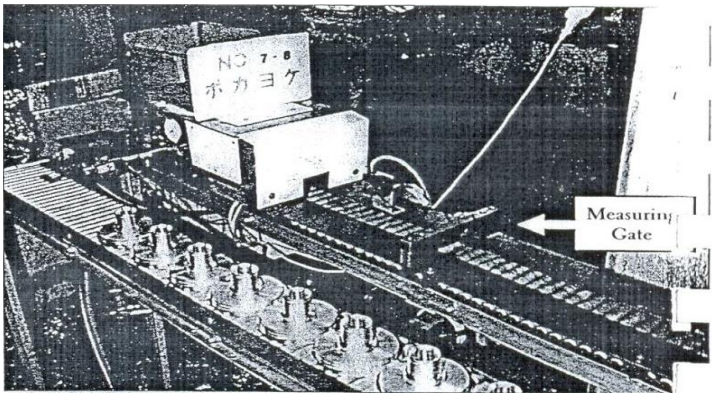


Fig.5.3. Incorporating a Measuring Gate into the Process Flow

c. Use Elimination

A set-in order approach that eliminates the use of a particular jig, tool or measuring instrument is in fact unbreakable setting in order.

There are three techniques for eliminating the use of certain tools:

- Tool Unification
- Tool Substitution
- Method Substitution

Tool Unification: - Tool unification means combining the functions of two or more tools into a single tool. It is an approach that usually reaches back to the design stage. For example, we can reduce the variety of die designs to unify dies or make all fasteners that require a screw-driver conform to the same kind of screw-driver, flat-tip or Phillips.

Tool substitution: - Tool substitution means using something other than a tool to serve the tool's function, thereby eliminating the tool.

Method substitution: - If we substitute ordinary wrench-turned bolts with hand-turned butterfly-grip bolts, we have eliminated the wrench, but we have not eliminated the method (bolt fastening).

Standards for Location Indicators

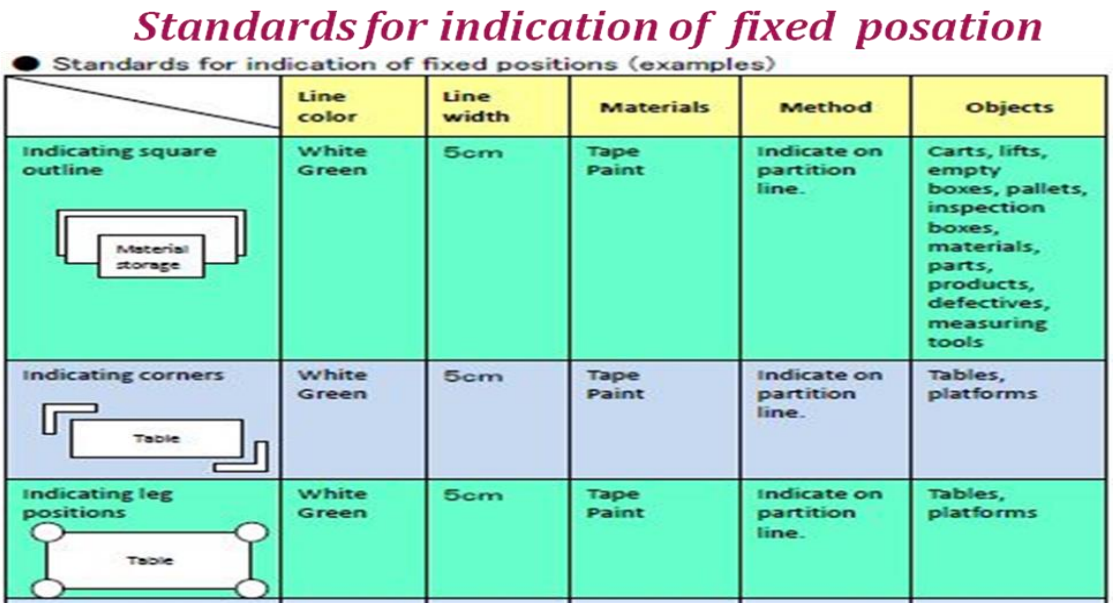


Fig 5.4. Indication of fixed position

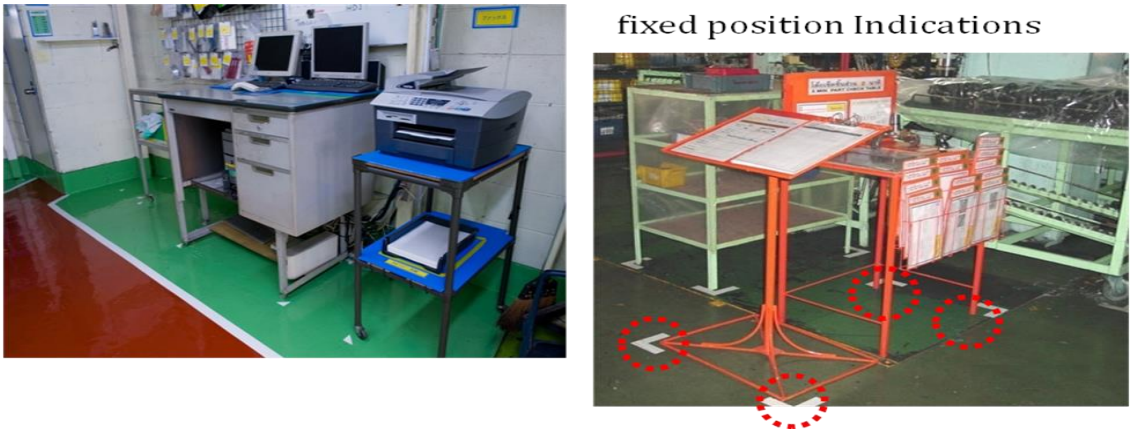


Fig.5.5. Fixed position indication

Indications on Shelves

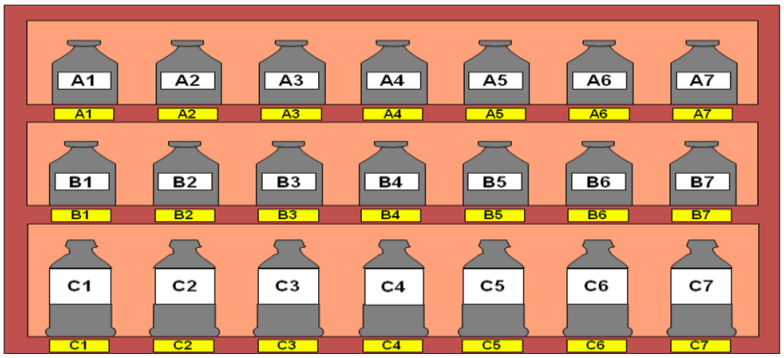


Fig.5.6. Indications on Shelves

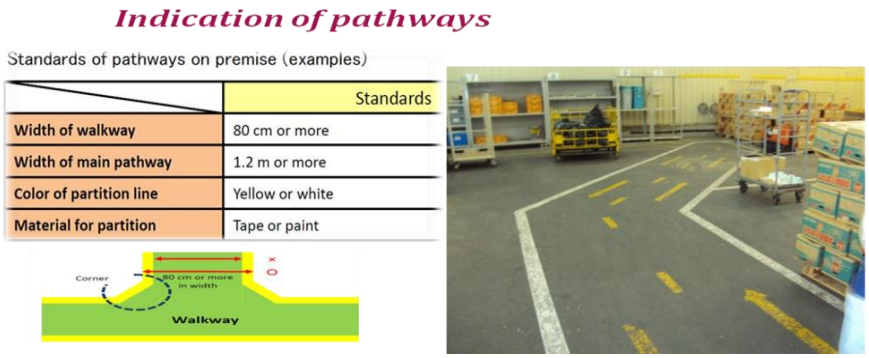


Fig.5.7. Indication pathways

Prevent Things from Getting Dirty (Preventive Shine Procedures)

Preventives shine Procedures will prevent things from getting dirty to begin with. Anyone has participated in 5S implementation can tell you that the initial cleanup is very hard work. To minimize the drudgery of cleaning up, the key is to treat contamination problems at their source. For example, instead of mopping up oil puddles, figure out where the oil is leaking from and repair the leak.

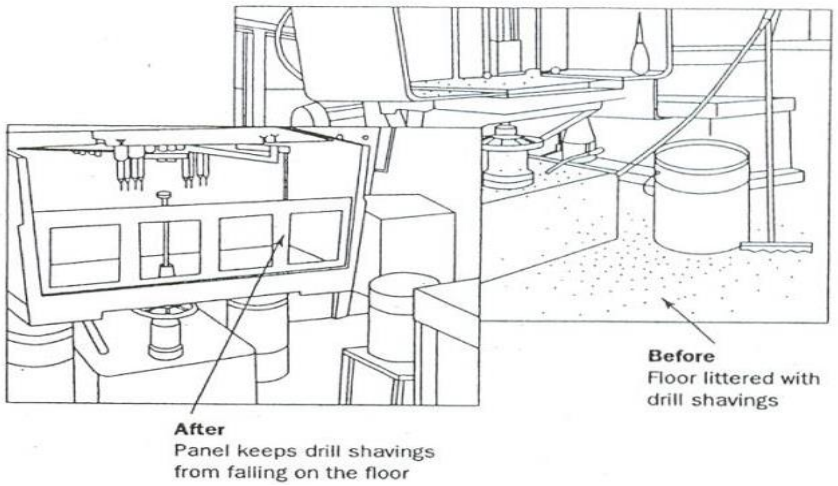


Fig.5.8. A Preventive Cleanliness Device of a Drill Press

Self-check 5

Directions: **I/ Choose the best answer**

---------- 1. Which of the following is not benefits of 3S?

A. Muda elimination B. Quality improvements

C. Cost improvements D. Delivery time improvements

E. None

---------- 2. Standardization is useful for:

A. Easy implementation of S1 to S3 activities B. Equalization process output

B. Everyone's participation D. All

II. Give short answer

1. Define the fourth pillar of 5S? (2 point)

---

2. Describe the benefits from standardize. (3points

---

3. List at least five tools and techniques used to standardize the 3S.
   a. ---
   b. ---
   c. ---
   d. ---
   e. ---
4. What is suspension in terms of sustaining of the 3S? (2 points)

---

5. Define incorporation. (2 points)

---

6. Describe Use Elimination in sustenance of the 3S. (2 points)

Operation sheet 5

OPERATION TITLE: - Implementing shine activity

PURPOSE: - Sequence of Implementing Standardize

Procedure Steps: -

1. Assign 3S Responsibilities for everyone in the work place by using the tools by using the tools such as 5S Maps, 5S schedules, 5S job cycle charts
2. Integrate 3S Duties into Regular Work Duties by using the two approaches: visual 5S and five-minute 5S
3. Check on 3S Maintenance Level by using Standardization-level Checklist and 5S checklist and make maintenance/correction on back sliding the 3S.
4. Prevention of back sliding of the first three pillars by using 5W1H approach, suspension, incorporation and use elimination.

Lap test 5

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks within ---8 hours.

Task 1: Prepare standard to the sort, set in order and shine activities in your workplace.

Unit six: Sustain 5S system

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Techniques of Sustaining 5S
- Planning Stage
- Organizational Structure of 5S
- Method of evaluating current condition and taking action

Strategy of continuous improvement sustainability This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Sustain 5S techniques of
- Apply Planning Stage
- Understand organizational structure of 5S
- Know Method of evaluating current condition and taking action

6.1. Techniques of Sustain 5S

Sustain Means making a habit of properly maintaining correct procedures, Maintain S1-S4 through discipline, commitment and empowerment, It focuses on defining a new mindset and a standard in workplace

The fifth step of a 5S program is Sustain, or "shitsuke," which literally means "discipline." The idea here is continuing commitment. It's important to follow through on the decisions that you've made — and continually return to the earlier steps of 5S, in an ongoing cycle.

Sustainability activities

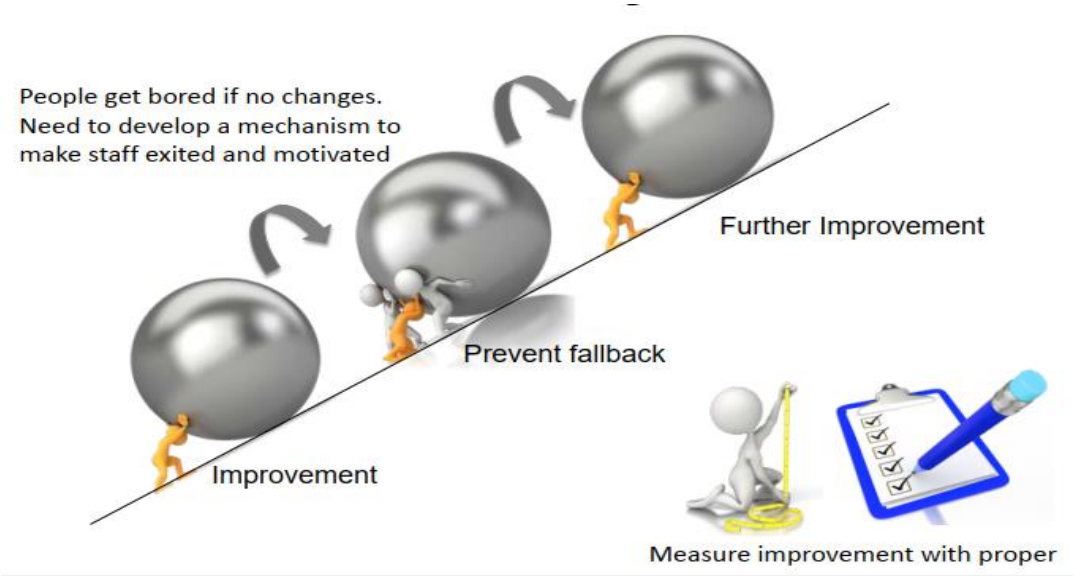


Fig.6.1. Sustaining activities

Examples of sustain activity

- Regular progress reporting
- Refresher training
- Periodical evaluation of 5S activities with proper advices for continuation and further improvements
- Appreciation, recognition and awarding on good 5S activities
- Reminder using 5S corner, new letters, good practice sheet etc.

Common Tools and techniques to sustain 5s are:

There are many tools and techniques your company can use to help sustain commitment to 5S implementation. We offer these below so you will be aware of them. At some point in your 5S implementation work, you may be called upon to use or even coordinate the use of these techniques. These are:

- 5S Slogan

- 5S poster
- 5S newsletter and kaizen board
- 5S audit
- awarding systems
- Big cleaning day
- 5S month Benchmarking tour

6.2. Planning Stage

At this stage, you will literally plan what needs to be done. Depending on the project's size, planning can take a major part of your team's efforts. It will usually consist of smaller steps so that you can build a proper plan with fewer possibilities of failure.

Before you move to the next stage, you need to be sure that you answered some basic concerns:

- What is the core problem we need to solve?
- What resources do we need?
- What resources do we have?
- What is the best solution for fixing the problem with the available resources?
- In what conditions will the plan be considered successful? What are the goals

Steps for planning

- 5S organization structure
- Recognition of current condition
- Deciding activity range
- Goal setting
- Planning stage
- Budgeting
- Kick-off

5S Organizational Structure

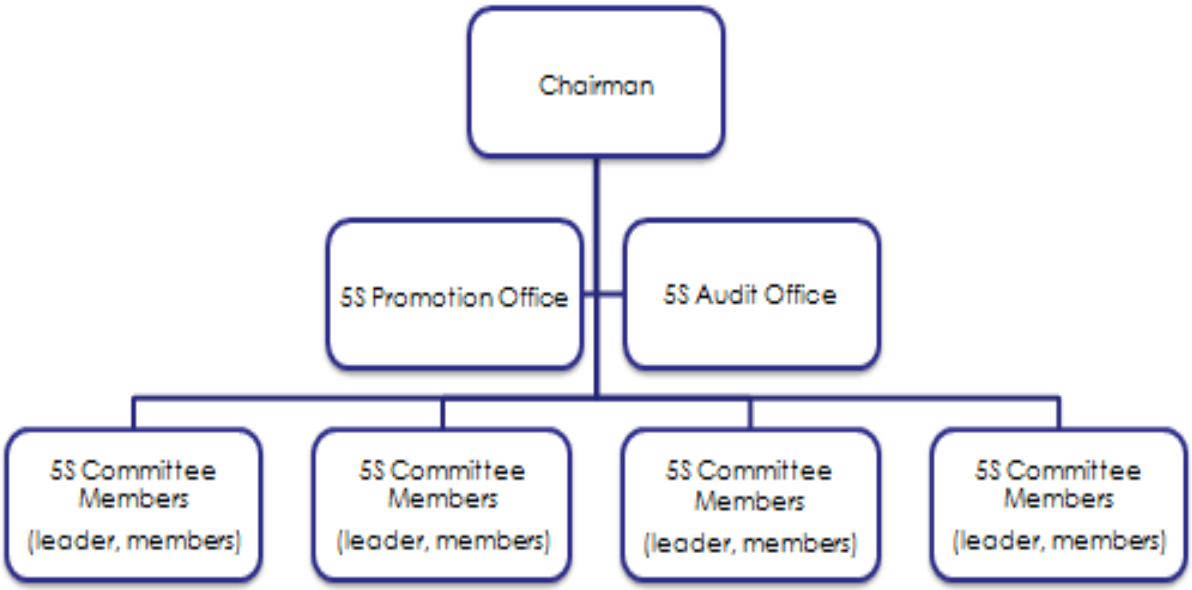


Fig. 6.2. Organizational structure

5S Promotion office duties

- Prepare over all 5S implementation plan at company level.
- Follow up standardize 5S activities at the company.
- Perform any other 5S related activities.
- Organize Training

Recognition of current condition

- By using 5S Checklist and
- Photography

Decide Activity range



Fig. 6.3. ***Decide Activity range***

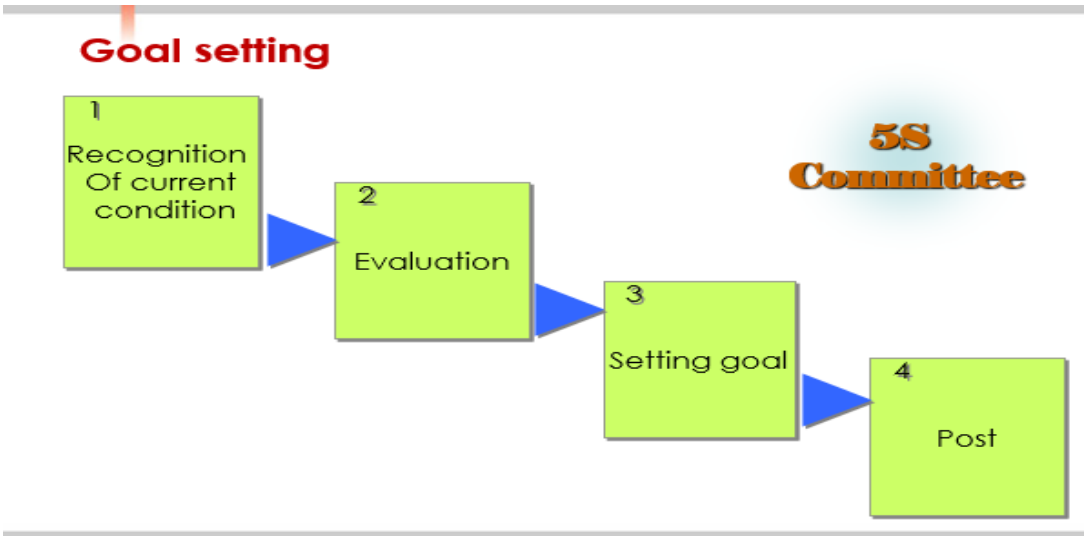


Fig. 6.4. Goal setting

Table 6.1. Overall promotion plan

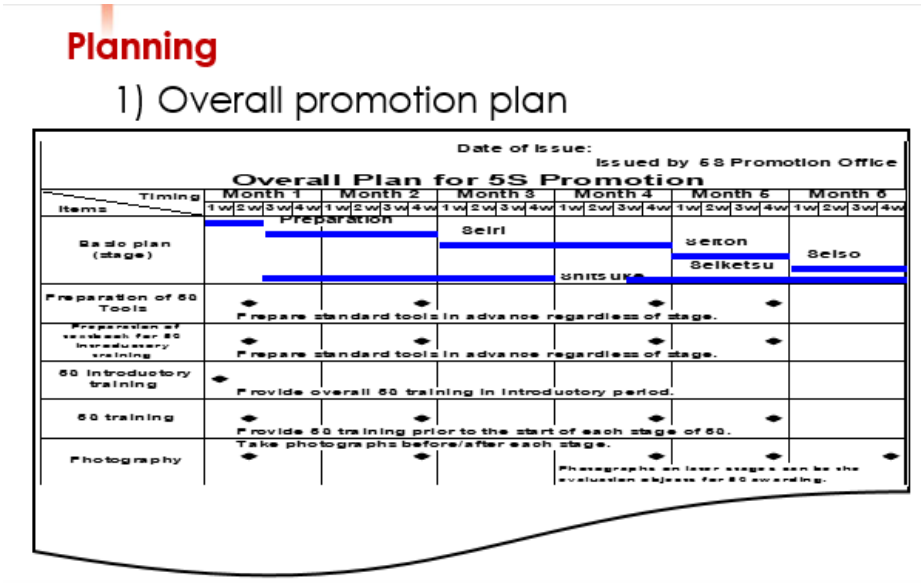




Fig.6.5 Budgeting



Fig.6.6. Kickoff



Fig.6.7. Promotion declaration of 5S activity

6.3. Method of evaluating current condition and taking action

Develop 5S Evaluation Criteria & Guidelines

1. Set up audit checklist criteria according to area of 5S team

ASPECTS	NO	AUDITED ASPECT	SCORE					REMARKS
			5	4	3	2	1	
FLOOR	1	NO DUST ON THE FLOOR						
	2							
	3							
EQUIPMENTS ARRANGEMENT	4	TIDY AND WELL ARRANGED						
	5							
	6							
EQUIPMENTS AND TOOLS	7	IN GOOD CONDITION AND BEING USED						
	8							
	9							

Table 6.2. Developing 5S evaluation criteria & guidelines

2. Set-up "Audit Summary Report"

Audit Area : Group 5S
Date: .....

No.	Areas of Audit	Improvement Needed			Contoh Cemerlang	Situation During Audit	Proposed Enhancement
		Sort	Set In Order	Shine			

Auditor: a) ..... Signature: .....

b) ..... Signature: .....

Table 6.3. Setting-up audit summary report

CRITERIA FOR 5S AUDIT RATING

RATING ACCORDING TO SCALE 1 TO 5

Evaluation Scale	5S Practice	5S Theory	Data/Fact
1 (0 - 30 %)	• Nothing at all and no sense of commitment. • Not doing 5S at all.	• No knowledge and cannot explain.	•No data. •No improvement effort.
2 (31 – 50 %)	•Doing some but not sufficient. •Doing before auditors arrival.	• There is a knowledge but people do not know how to practice.	• There is data but superficial.
3 (51 – 70 %)	• Doing what is supposed to do but need to put more effort.	• Understand and have overall knowledge.	• Sufficient data but not in order.
4 (71 – 90 %)	• Almost ok, but not fully completed yet or insufficient.	•Almost ok, but in some are need further improve.	• Sufficient data and in order. • Able to explain.
5 (91 – 100 %)	•There is a proper evidence of 5S. •5S culture can be seen.	•Completely YES	• Orderly stratified data. • Can show and answer immediately • Visual Control is functional.

Table 6.4. Criteria for 5S audit rating

6.4. Strategy of continuous improvement sustainability

Continuous improvement (CI) is a highly effective mindset, culture and toolkit for tackling rapid changes in the modern workplace.

What are the continuous improvement strategies for sustainability?

The three continuous improvement strategies for sustainability should embody several critical success factors. Only then can real transformational changes take place.

A. Align strategy and leadership

Good leadership underpins the successful development of any CI strategy. A successful and sustainable continuous improvement system requires a well-orchestrated plan to ensure that management and their teams realize positive change with confidence and consistency.

B. **Embed implementation design**

Implemented and managed effectively, continuous improvement helps integrate all functions, processes and practices across the value chain.

C. Clarify organization roles and responsibility

A continuous improvement culture refers to the system of values shared by an organization that promotes the belief that whatever is good today might not be good enough from a sustainable perspective.

Self-check-6

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the fifth pillar of 5S? (2 point)

   ---

2. List problems avoided by implementing sustain? (2 point)

   ---

3. Why sustain is important? (2 point)

   ---

4. Explain how to implement sustain (2 point)

   ---

5. What are the roles of you and your management in implementation of sustain ? (4points)

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