Textile chemical processing

NTQF Level – II

Learning Guide#1

Unit of Competence: Standardize and Sustain 3S

Module Title: Standardizing and Sustaining 3S

LG Code: IND CHP02 M01 0919LO1-LG1

TTLM Code: IND CHP02 TTLM1, 0919v2

LO1. Prepare for work.

Instruction Sheet	Learning Guide #1

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

1. Prepare for work
   1.1 Using work instructions.
   1.2 Reading and interpreting Job specifications.
   1.3 OHS requirements.
   1.4 Observing personal protection.
   1.5 Identifying and checking safety equipment and tools.
   1.6 Preparing and using tools and equipment.

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

- Use work instructions to determine job requirements, including method, material and equipment.
- Read and interpret job specifications following working manual.
- Observe OHS requirements, including dust and fume collection, breathing apparatus and eye and ear personal protection needs throughout the work.
- Identify and check safety equipment and tools for safe and effective operation.
- Prepare and used tools and equipment to implement 3S.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number **3 to 5.**
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 5 and Sheet 6” respectively.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4, Self-check 5 and Self-check 6” in page -5, 9, 14, 17, 20and 25 respectively.
5. If you earned a satisfactory evaluation proceed to “Learning Guide # 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Guide #1.

Information Sheet - 1	Using work instructions.

Introduction:

Work instruction definition:

Work instruction is a description of the specific tasks and activities within an organization. A work instruction in a business will generally outline all of the different jobs needed for the operation of the firm in great detail and is a key element to running a business smoothly.

In other words it is a document containing detailed instructions that specify exactly what steps to follow to carry out an activity. It contains much more detail than a Procedure and is only created if very detailed instructions are needed. For example, describing precisely how a Request for Change record is created in the Change Management software support tool.

Procedures vs. Work Instructions

Many people confuse “procedures” with “work instructions”. In fact, most people write work instructions and call them procedures. Knowing the differences of procedures vs work instructions can help you understand the documentation process much better and therefore, procedure documentation.

Procedures describe a process, while a work instruction describes how to perform the conversion itself. Process descriptions include details about the inputs, what conversion takes place (of inputs into outputs), the outputs and the feedback necessary to ensure consistent results. The PDCA process approach (Plan, Do, Check, Act) is used to capture the relevant information.

Questions that need to be answered in a procedure include:

- Where do the inputs come from (suppliers)?
- Where do the outputs go (customers)?
- Who performs what action when (responsibilities)?
- How do you know when you have done it right (effectiveness criteria)?

- What feedback should be captured (metrics)?
- How do we communicate results (charts, graphs and reports)?

- What laws (regulations) or standards apply (e.g., ISO 9001, 8th EU Directive, IFRS, Sarbanes-Oxley)?

Job Specification:

A statement of employee/workers characteristics and qualifications required for satisfactory performance of defined duties and tasks comprising a specific job or function.

Specification Sample

s.n	Technical parameters	Specification range
1.	Noise level	16dBA
2.	Fan rotation speed	1500rpm
3.	Nominal voltage	12v

Self-Check - 1	Written Test

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

1. Describe work instruction by your own words. (2 points)
2. Describe the difference between procedure and work instruction? (5 points)
3. Define job specification? (2 points)
4. Prepare specification samples (5 points)

Note: **Satisfactory rating – 8 and above points** **Unsatisfactory - below 8 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date: _____**

Short Answer Questions

1. _____
   _____
2. _____
   _____
3. _____
   _____
4. _____
   _____

Information Sheet - 2	Reading and interpreting Job specifications.

Introduction

Job definition:

A Job can be defined as:

- A piece of work, especially a specific task done as part of the routine of one's occupation or for an agreed price.
- A post of employment; full-time or part-time position
- Anything a person is expected or obliged to do, duty and responsibility
- The material, project, assignment, etc., being worked upon.
- The process or requirements, details, etc., of working.
- The execution/completing or performance of a task.

Job Requirements

The requirements for a job vary according to the nature of the job itself. However, a certain work ethic must be cultivated to succeed in any job and this is fundamental to an individual's sense of himself as a worker, as part of production relations and a fundamental economic being.

The basic requirements for a job remain the same no matter what the job is, where it is located or what professional and educational qualifications are required for it.

These are listed as follows:

- Discipline
- Enthusiasm
- Soft Skills
- Qualifications and each of them are discussed as below.

Discipline*:*

Nothing is possible without discipline. Any job requires a fundamental core of discipline from the worker or the employee and this is a quality which is independent of age, stature/size, job and so on. Discipline is absolutely indispensable and provides the impetus/energy for work that can be repetitive, boring and even unsatisfactory at times.

Enthusiasm:

Enthusiasm/ interest for work are also a pre-requisite for any job. An innate love for the job, which in modern parlance/ phrasing is known as job satisfaction, is a core requirement for any job. The drive to succeed, to innovate, to do well and to make one's profession into one's livelihood is a critical drive which needs to be present in the employee or cultivated as soon as possible. Any job is difficult to perfectly carry out without interest.

Qualifications:

This is a more material, tactile need for a job which can be conveyed through degrees and certificates. However education is not limited to what is taught in colleges or vocational training courses.

It is the burning desire to learn more to reach the depths of knowledge about a particular field of interest; to complete the job and learn from it that marks the true enthusiast and the truly learned.

Soft Skills:

Soft skills include those skills which ensure that a job is executed well and the employee can carry himself in the proper manner too. For example: good and smooth communication, computer skills, proficiency in language if needed, presentable appearance, the ability to manage crises are all soft skills which are fundamentally important in any job and which must be cultivated consciously.

Thus, the requirements of a job, though specific to it, cover also a general spectrum. These make for better employees and better individuals.

Self-Check - 2	Written Test

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

1. What is job (1 point)
2. List down the basic requirements of job. (5 points)

Note: **Satisfactory rating – 4 and above points** **Unsatisfactory - below 4 points**

You can ask you trainer for the copy of the correct answers.

Information Sheet - 3	OHS requirements.

Introduction

OHS concepts

Occupational safety and health (OSH) also commonly referred to as occupational health and safety (OHS) or workplace health and safety (WHS) is an area concerned with the safety, health and welfare of people engaged in work or employment.

The goals of occupational safety and health programs include fostering a safe and healthy work environment. OSH may also protect co-workers, family members, employers, customers and many others who might be affected by the workplace environment.

In the United States the term occupational health and safety is referred to as occupational health and occupational and non-occupational safety and includes safety for activities outside work.

Occupational safety and health can be important for moral, legal and financial reasons. In common-law jurisdictions, employers have a common law duty (reflecting an underlying moral obligation) to take reasonable care for the safety of their employees.

Good OSH practices can also reduce employee injury and illness related costs, including medical care, sick leave and disability benefit costs.

As defined by the (WHO) "occupational health deals with all aspects of health and safety in the workplace and also focus on primary prevention of hazards." Health has been defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Occupational health is a multidisciplinary field of healthcare concerned with enabling an individual to undertake their occupation in the way that causes least harm to their health.

In 1950, the International Labor Organization (ILO) and WHO have shared a common definition of occupational health, revise and adopt it since 1995 by the Joint their Committee.

The definition reads: "The main focus in occupational health is on three different objectives:

I. The maintenance and promotion of workers “health and working capacity”

Example: providing occupation medicines, work ergonomics and many others.

II. The improvement of working environment and work to become conducive to safety and health
III. Development of work organizations and working cultures to promotes a positive social climate and smooth operation that enhance productivity of the undertakings.

The concept of working culture is reflected in practice in the managerial systems, personnel policy and principles for participation, training policies and quality management of the undertaking."

OHS requirements are legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of firefighting equipment, enterprise first aid, hazardous materials and substances control.

Personal protective equipment includes those prescribed under legislation/ regulations/codes of practice and workplace policies and practices.

Safe operating procedures include the conduct of operational risk assessment and treatments associated with workplace organization.

Emergency procedures include emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.

The Types of Workplace Hazards

There are a number of incidents/events and accidents that may occur in the workplace as a result of various hazards that are present or may later present themselves within the work environment.

To deal with the issues of safety and health care within the workplace, you need to aware and knowledgeable about the various types of workplace hazards that affect you and your employees. The different types of workplace hazards have been put into the following four categories:

a. **Physical hazards:** These are the hazards that you are most likely to find within the workplace at one point or another. They may include a wide range of things like:
   - Working from ladders
   - Exposed moving parts
   - Frayed electrical cords
   - Unguarded machinery
   - Scaffolding and etc.

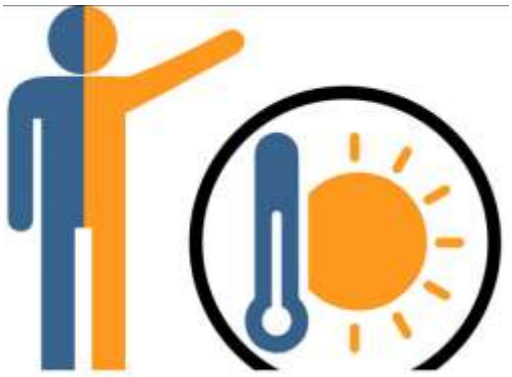


Figure-1: Physical hazards

b. **Ergonomic hazards:** These hazards are usually as a result of the strain that may be put on your body, because of the type of work you are doing, your working conditions or your body position. They may include a wide range of things like:
   - Frequent lifting
   - Repetitive movements
   - Poor lighting

- Improperly adjusted workstations, etc.

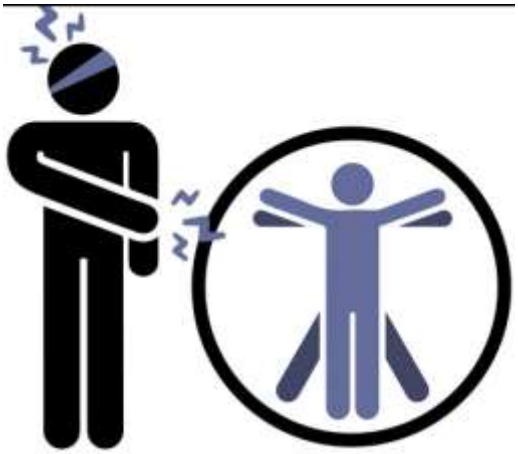


Figure-2: Ergonomic hazards

c. **Chemical hazards:** These present themselves when you are in the workplace and you are exposed to any sort of chemical preparation such as the following:
   - Vapors and fumes
   - Carbon monoxides or other gases
   - Cleaning products or solvents
   - Gasoline or other flammable materials and etc.

d. **Biological hazards:** These are hazards that come from working with animals, infectious plant material and even people. They include a wide range like:
   - Bacteria and viruses
   - Insect bites
   - Animal droppings
   - Blood/body fluids, etc

Figure-3: Biological hazards

Self-Check - 3	Written Test

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

1. What is OHS represents for (2 point)
2. What is OSH represents for? (1 point)
3. What is WHS represents for. (1 point)
4. What are the goals of OHS? (2 points)
5. List some examples of OHS requirements in your work areas. (10 points)
6. List and describe types of Workplace Hazards. (8points)

Note: **Satisfactory rating – 18 and above points Unsatisfactory - below 18 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

Short Answer Questions

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Information Sheet - 4	Observing personal protection.

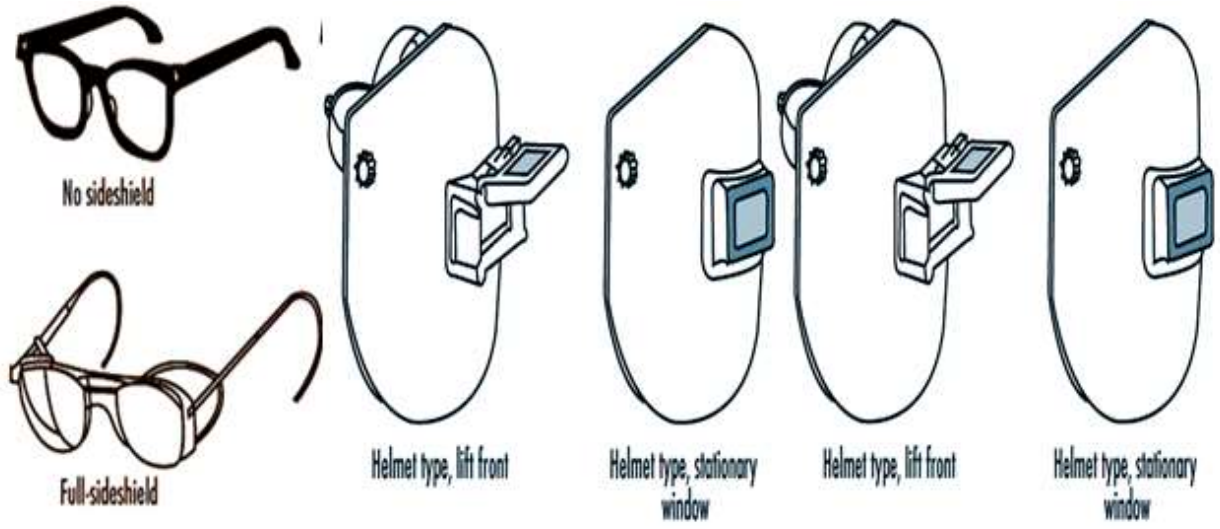
Introduction

Personal protection is issued to help employees in protecting themselves from the hazards of work environments. Personal Protective Equipment includes: fire retardant or chemical-proof clothing for over all body, gloves for hands, hard hats for head, breathing musk for respirators, safety spectacles for eyes, goggles or face shields for faces and boots for foot.

Eye and face protection equipment's are used to protect against flying particles and foreign bodies, corrosive chemicals, fumes, lasers and radiation. The two basic problems in wearing eye and face protectors are:

a) How to provide effective protection which is acceptable for wearing over long hours of work without undue discomfort and
b) The unpopularity of eye and face protection due to restriction of vision. The wearer's peripheral vision is limited by the side frames.

There are different types of eye and face protection equipment.



So at any workplaces, safety clothes required for specific work must be given to workers and must be supervised by their respective work manager whether they wear or not.

Self-Check - 4	Written Test

Instructions: Perform the following tasks. Write your answers in the answer sheet provided:

1. List and describe their use at least 7 safety tools and equipment that one's work supervisor must check at work area. (14 points)
2. What are the two basic problems in wearing eye and face protectors in observing personal protection. (4 points)

Note: **Satisfactory rating – 15 and above points Unsatisfactory - below 15 points**

You can ask your trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____

2. _____
   _____

Information Sheet - 5	Identifying and checking safety equipment and tools.

During work place preparation generally all safety equipment and tools identified must be checked for their quality as per standard set.

- Gloves or shields
- Dust masks
- Boots shoes
- Fire retardant or chemical-proof clothing
- Hard hats
- Safety spectacles for eyes and etc.

Self-Check - 5	Written Test

Instructions: Perform the following tasks. Write your answers in the answer sheet provided:

1. List at least 6 safety equipment and tools that need to be Identified and checked at work place. (6 points)

Note: **Satisfactory rating – 4 and above points Unsatisfactory - below 4 points**

You can ask your trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____

   _____

2. _____

   _____

Information Sheet - 6	Preparing and using tools and equipment.

All the tools and equipment's prepared in work place are grouped in to three for the implementation of 3S. These are:

a. Tools and Equipment used to implement Sorting

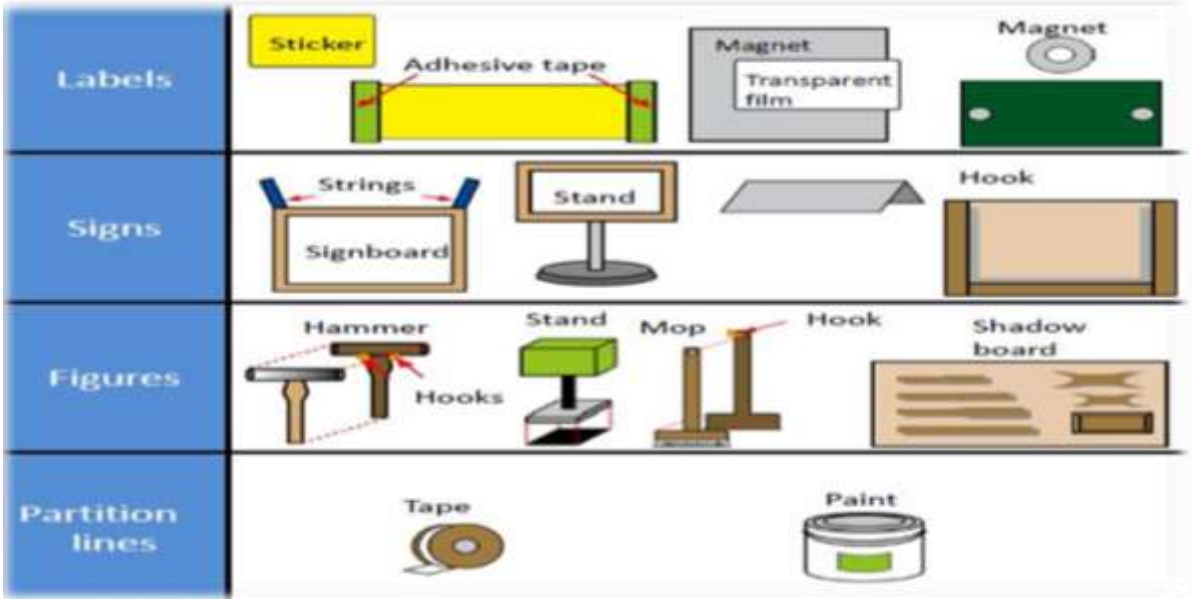
You are required to prepare and use tools and equipment to implement sort..

The following are some tools and materials used to implement the first pillar of 5S-Sort.

- Red tags
- Hook
- Shelves or shadow board/ tools board
- Pencil
- Formats (for recording necessary and unnecessary items, plans etc…)

b. Tools and materials used to implement set in order

The following are some tools and materials used to implement the second pillar of 5S-Set in order.



c. Tools and materials used to implement shine

The following are some tools and materials used to implement the third pillar of 5S-Shine.

- Sponges
- Detergents
- Oils
- Brooms
- Brushes
- Vacuum cleaners
- Containers or Waste baskets or Dust bins
- Gloves
- Dust masks
- Bolts
- Screws
- Boots shoes and etc…









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Self-Check – 6	Written Test

Instructions: Perform the following tasks. Write your answers in the answer sheet provided:

1. List at least 8 tools and materials used to implement shine. (8 points)
2. List at least 4 tools and materials used to implement set-in order. (4 points)
3. List at least 5 tools and Equipment used to implement sorting (5 points)

Note: **Satisfactory rating – 9.5 and above points Unsatisfactory - below 9.5 points**

You can ask your trainer for the copy of the correct answers.

Answer Sheet

Name: _____ Date: _____

1. _____
2. _____
3. _____

List of Reference Materials

1. https://advancedct.com/the-types-of-workplace-hazards
2. http://www.ilocis.org/documents/chpt31e.htm
3. 5S for operators (1995)
4. Journals/publications/magazines
5. Reference Book
6. Job specifications
7. Safety Manual and Guide

Textile chemical processing

NTQF Level – II

Learning Guide#2

Unit of Competence: Standardize and Sustain 3S

Module Title: Standardizing and Sustaining 3S

LG Code: IND CHP02 M01 0919LO2-LG2

TTLM Code: IND CHP02 TTLM1, 0919v2

LO2. Standardize 3S

Instruction Sheet	Learning Guide #2

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

2.1 Preparing and using plan
2.2 Relevant procedures in standardizing 3s
2.3 Preparing and implementing tools and techniques.
2.4 Following Checklists for standardize activities
2.5 Reporting to relevant personnel
2.6 Keeping the workplace to the standard.
2.7 Avoiding problems.

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Prepare plan for the implementation of standardize
- Prepare and use tools and techniques to standardize 3s
- Report results
- Review standardization

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number **3 to 7.**
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 5 , sheet 6 and Sheet 7” respectively.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4, Self-check 5, self-check 6 and Self-check 7” in page - 34, 42, 55, 59, 62, 65 and 70 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation sheet 2 and Operation Sheet 3” in page -36, 38 and 39 respectively.
6. Do the “LAP test” in page – 9 40if you are ready).

7. If you earned a satisfactory evaluation proceed to “Learning Guide # 3”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Guide #2.

Information Sheet - 1	Preparing and using plan

Introduction

Definition of Planning

There are many definitions for the term “planning,” each person has his/her own ideas concerning the meaning of the term “planning.”

Among the most common definitions for this term are:

- Planning is the process by which an individual or organization decides in advance on some future course of action (Omran, 2002, p. 68).
- Planning is the process of determining how the organization can get where it wants to go (Certo, 2000, p.126).
- Planning involves selecting from among alternative future

Within each plan samples there are two components we must consider: they are:

Planned goal to be done and results to be achieved.

Importance of planning:

Planning is the first and most important function of management. In the absence of planning all activities of the organization will become meaningless. The importance of planning has increased all the more in view of the increasing size of organizations and their complexities.

The following facts show the advantages of planning and its importance in work place organization:

(1) Planning Provides Direction:

Under the process of planning the objectives of the organization are defined in simple and clear words. The obvious outcome of this is that all the employees get a direction and all their efforts are focused towards a particular end. In this way, planning has an important role in the attainment of the objectives of the organization.

(2) Planning Reduces Risks of Uncertainty:

Planning is always done for future and future is uncertain. With the help of planning possible changes in future are anticipated and various activities are planned in the best possible way. In this way, the risk of future uncertainties can be minimized.

(3) Planning Reduces Overlapping and Wasteful Activities:

Under planning, future activities are planned in order to achieve objectives. Consequently, the problems of when, where, what and why are almost decided. This puts an end to disorder and suspicion. In such a situation coordination is established among different activities and departments. It puts an end to overlapping and wasteful activities.

Consequently, wastages moves towards nil, efficiency increases and costs get to the lowest level.

(4) Planning Promotes Innovative Ideas:

It is clear that planning selects the best alternative out of the many available. All these alternatives do not come to the manager on their own, but they have to be discovered. While making such an effort of discovery, many new ideas emerge and they are studied intensively in order to determine the best out of them.

In this way, planning imparts a real power of thinking in the managers. It leads to the birth of innovative and creative ideas.

(5) Planning Facilitates Decision Making:

Decision making means the process of taking decisions. Under it, a variety of alternatives are discovered and the best alternative is chosen. The planning sets the target for decision making. It also lays down the criteria for evaluating courses of action. In this way, planning facilitates decision making.

(6) Planning Establishes Standards for Controlling:

By determining the objectives of the organization through planning all the people working in the organization and all the departments are informed about ‘when’, ‘what’ and ‘how’ to do things.

Standards are laid down about their work, time and cost, etc. Under controlling, at the time of completing the work, the actual work done is compared with the standard work and deviations are found out and if the work has not been done as desired the person concerned are held responsible.

Self-Check - 1	Written Test

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

1. Define the term planning? (1 point)
2. What are two main components of plan sample? (2 points)
3. List down the importance of planning? (6points)

Note: **Satisfactory rating – 5.5 and above points** **Unsatisfactory - below 5.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

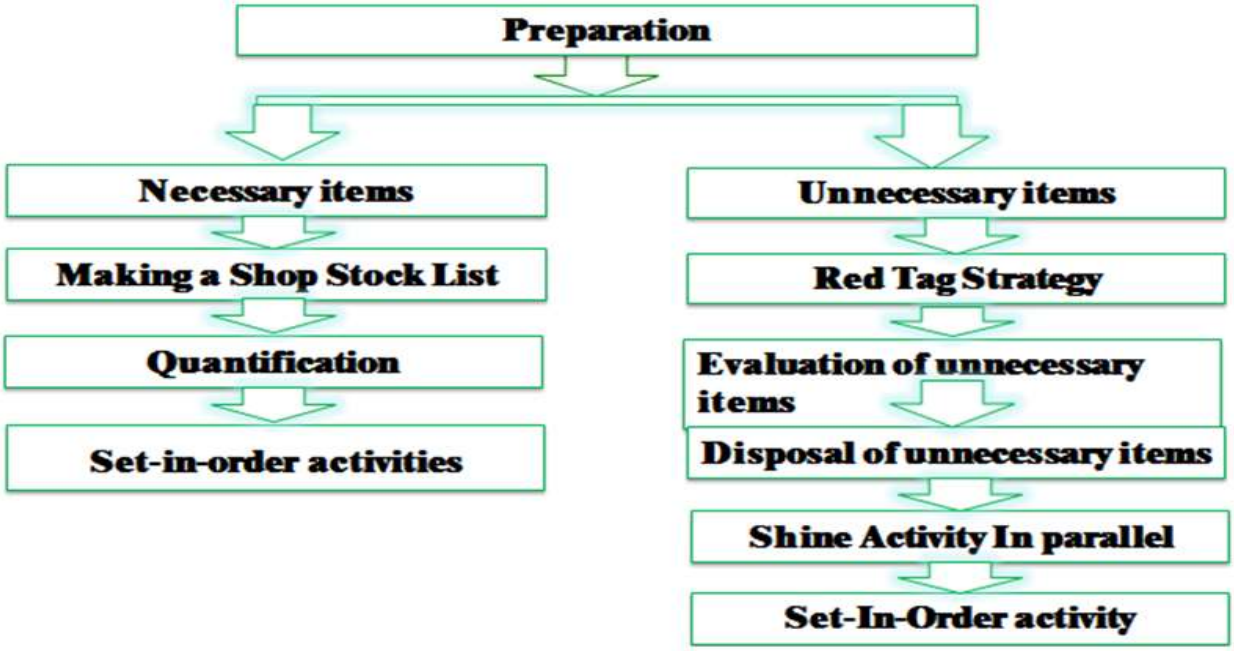
Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____
3. _____
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____

Operation Sheet - 1	Sorting activity plan

Sorting implementation procedures:

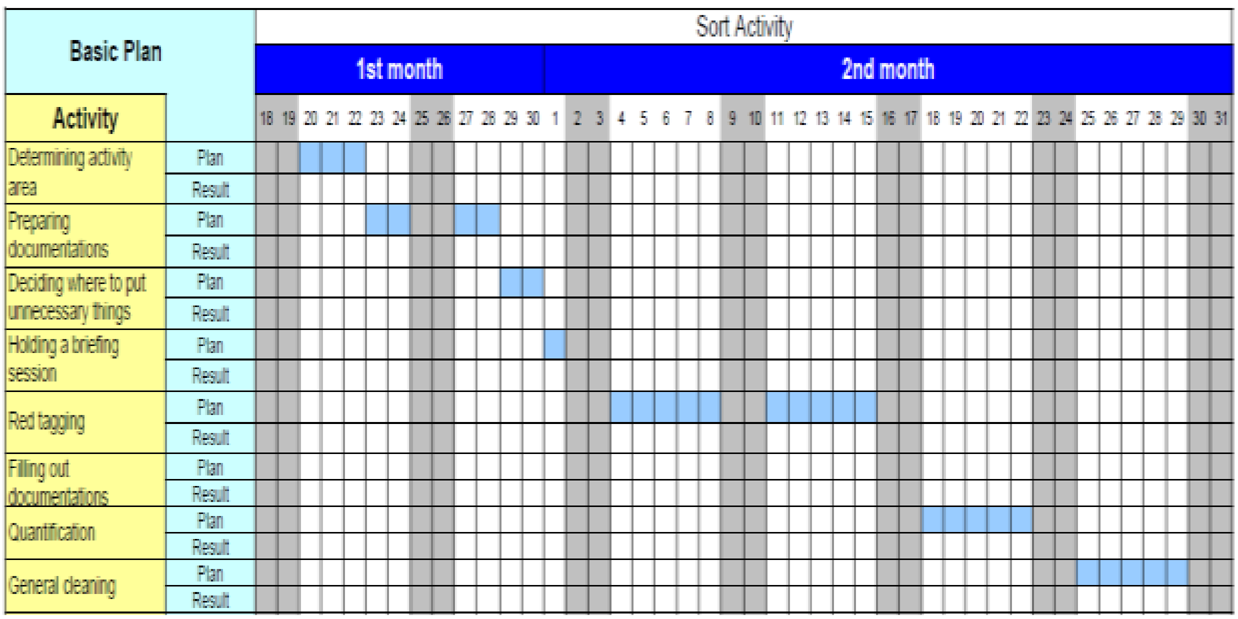


Sort activity plan sheet (sample):

Preparation date: Year Month Day

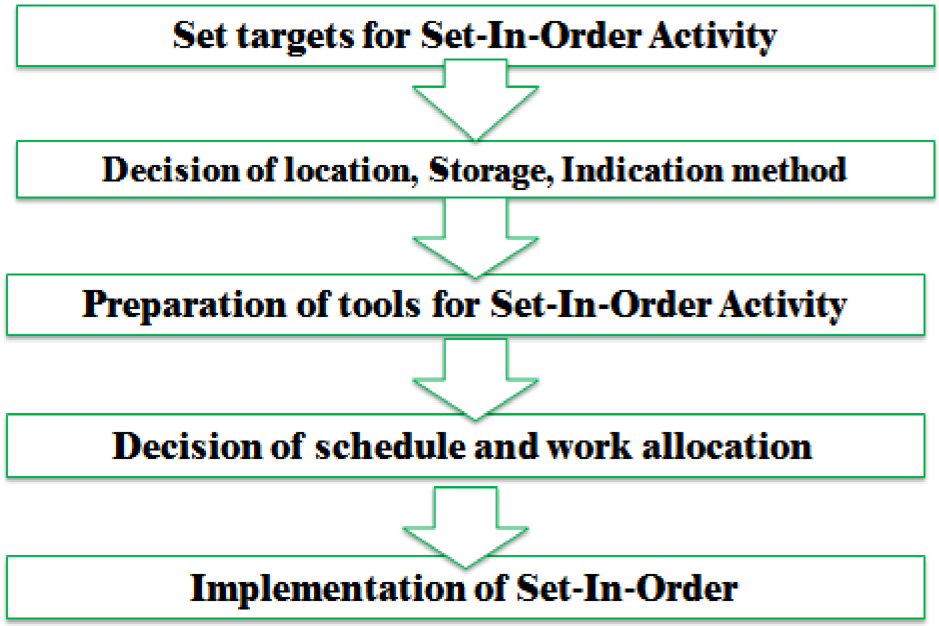
Prepared by 5S Committee

Area : M-1

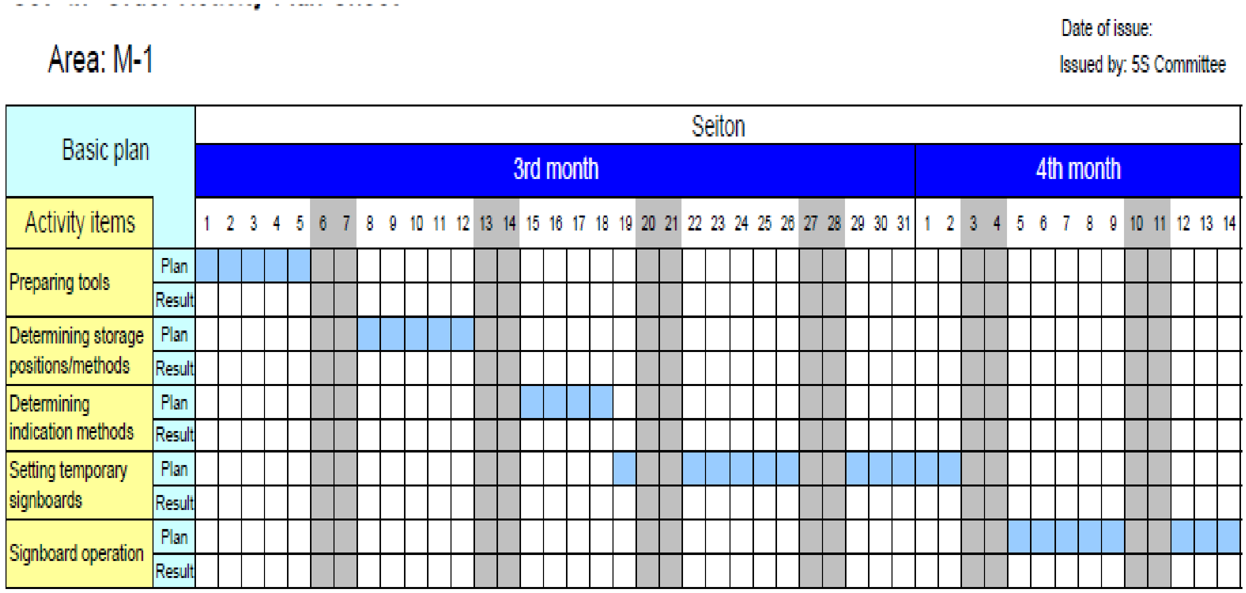


Operation Sheet - 2	Set in order plan

Set-in order implementation procedures:

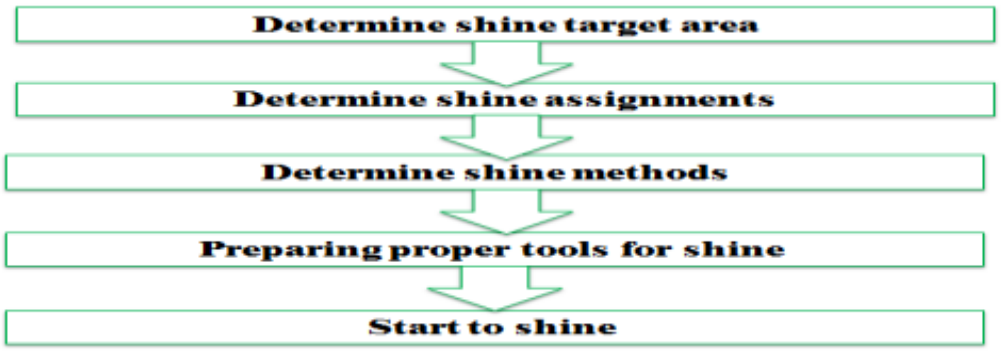


Set in order activity plan sheet (sample):



Operation Sheet - 3	Shinning activity plan

Shinning Implementation procedures:



Set in order activity plan sheet (sample):

Area : M-1

Preparation date: Year Month Day
Prepared by 5S Committee

Basic Plan		Seisou Activity: 5th month																												
Activity		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Preparing necessary tools	Plan																															
	Result																															
Determining activity area	Plan																															
	Result																															
Designing procedures for the Seisou Activity	Plan																															
	Result																															
General cleaning	Plan																															
	Result																															
Working out the problems revealed through the general cleaning	Plan																															
	Result																															

LAP TEST	Practical demonstration

Name_____ Date_____

Time started_____ Time finished_____

Instructions:

Task-1. Try to prepare sorting plan. (5points)

Task-2. Try to prepare set-in order plan. (5points)

Task-3. Try to prepare shinning plan. (5points)

Task-4. Request your instructor for evaluation & feed buck.

Information Sheet -2	Relevant procedures in standardizing 3s

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.

As you read this section, you will discuss some of the tools for implementing Standardize of the Sort, Set in Order, and Shine activities. This is because in order to standardize we must use these same tools in a more systematic way to make sure that the first three pillars are maintained.

Self-Check - 2	Written Test

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

1. List down the procedures for standardizing 3S (3 point).

Note: **Satisfactory rating – 2.5 and above points Unsatisfactory - below 2.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
   _____
   _____
   _____
   _____

Information Sheet - 3	Preparing and implementing tools and techniques

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) includes:
  - Suspension
  - Incorporation
  - Use Elimination

Procedures of making the 3S Activities a Habit

This includes three steps.

1. Assign responsibility (uses 5S Job Cycle Charts)
2. Integrate 3S Duties into Regular Work Duties (uses visual 5S and 5Minute 5S)
3. Check on 3S Maintenance Level (uses Standardization level checklist and 5S checklist) and their detail is as follow.

1. Assign 3S Responsibilities

When it comes to maintaining three pillar conditions, everyone must know exactly what they are responsible for doing and exactly when, where and how to do it. If people are not given clear 3S job assignments based on their own workplaces, the Sort, Set in Order, and Shine activities will not have much meaning. Similarly, clear 3S instructions must be given to the people who deliver goods from outside suppliers.

The delivery sites should be clearly marked and a 5S Map posted to show where each supplier's goods are to be unloaded. At each unloading site, signboards should make it clear whose things go where and in what amount. 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 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												

Figure: A 5S Job Cycle Chart

2. Integrate 3S Duties into Regular Work Duties

If people carry out three pillar maintenance duties only when they see three pillar conditions slipping, then the five pillar implementation has not yet taken root.

Maintenance must become a natural part of everyone's regular work duties. In other words, the five pillars must be part of the normal work flow. We sometimes refer to this as "5S line integration" or establishing a five pillars flow. 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.

The main point of Visual 5S is that anyone should be able to distinguish between abnormal and normal conditions at a glance.

Five-Minute 5S

When using the Visual 5S approach, instant visibility can act as a trigger for taking immediate three pillar action(Sort, Set in Order, and Shine activities) against the discovered abnormalities (i.e., overproduction, disorder, and contamination).

We must also deal with the question of how skillfully and efficiently these actions are carried out. Instead of following two hours for removing all of the cutting shavings from the floor, we can set up a half-hour or a one-hour Shine procedure that accomplishes the same task.

The term "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.

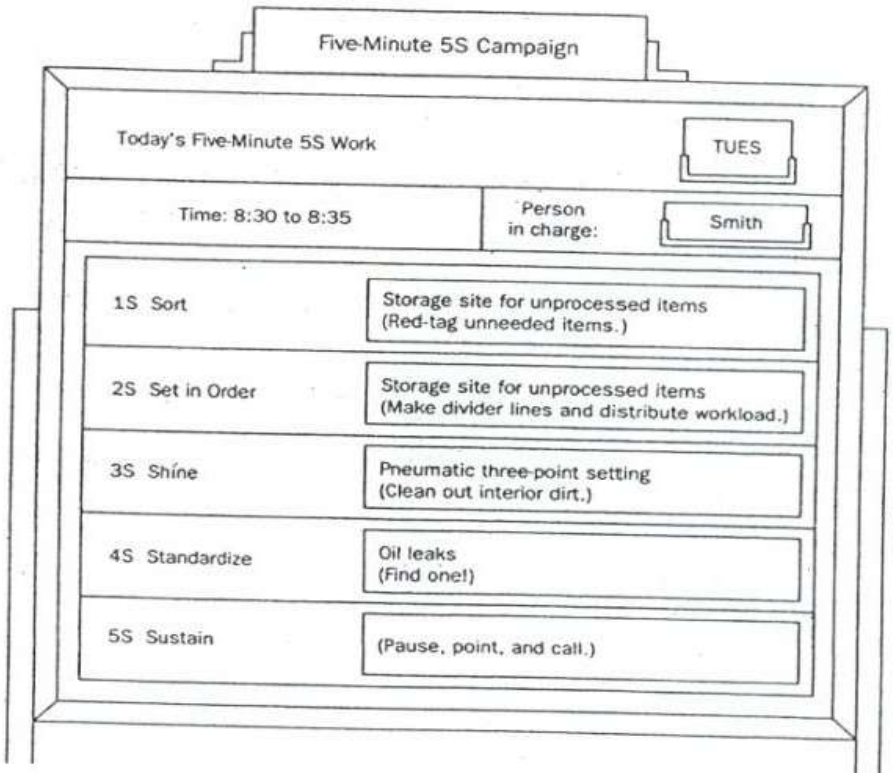


Figure: Five-Minute 5s Signboard

3. Check on 3S Maintenance Level

After we have assigned the three pillar jobs and have incorporated the three pillar maintenance into the everyday work routine, we need to evaluate how well the three pillars are being maintained. For this, we can use a Standardization-level Checklist as shown in the figure below.

Standardization-Level Checklist		Dept.: Assembly Dept. 1	Feb. 15, 1994	
		Assigned area	Entered by: McCarthy	Page

No.	Process and checkpoint	Sort	Set in Order	Shine	Total
1.	Work at Line A, Process 1	1 2 3 (4) 5	1 (2) 3 4 5	1 (2) 3 4 5	8
2.	"	1 (2) 3 4 5	1 2 (3) 4 5	1 2 (3) 4 5	8
3.	"	1 (2) 3 4 5	1 (2) 3 4 5	1 (2) 3 4 5	6
4.	"	1 (2) 3 4 5	1 2 (3) 4 5	1 (2) 3 4 5	7
5.	"	1 2 (3) 4 5	1 2 (3) 4 5	1 2 3 (4) 5	10
6.	"	1 2 3 (4) 5	1 2 3 (4) 5	1 2 3 (4) 5	12
7.	Average and total for Line A	1 2 (2.6) 3 4 5	1 2 (2.8) 4 5	1 2 (2.8) 4 5	(50)

Figure: Standardization Level Checklist

To evaluate the effectiveness of the maintenance activities, the evaluator ranks the Sort, Set in order, and Shine levels on a scale of 1 to 5. Such checklists can be made for specific workshop and/or production processes.

The Concept of Prevention

When we find that tools have not been put back correctly, we immediately take care of them. When we find an oil puddle on the floor, we immediately mop it up. Making these actions habit is the foundation of Standardize. However, when the same problems keep on happening over and over again, it is time to take the concept of Standardize to the next level: prevention.

To take this pillar to a higher level, we must ask "why?" Why do unneeded items accumulate (despite Sort procedures)? Why do tools get put back incorrectly (despite

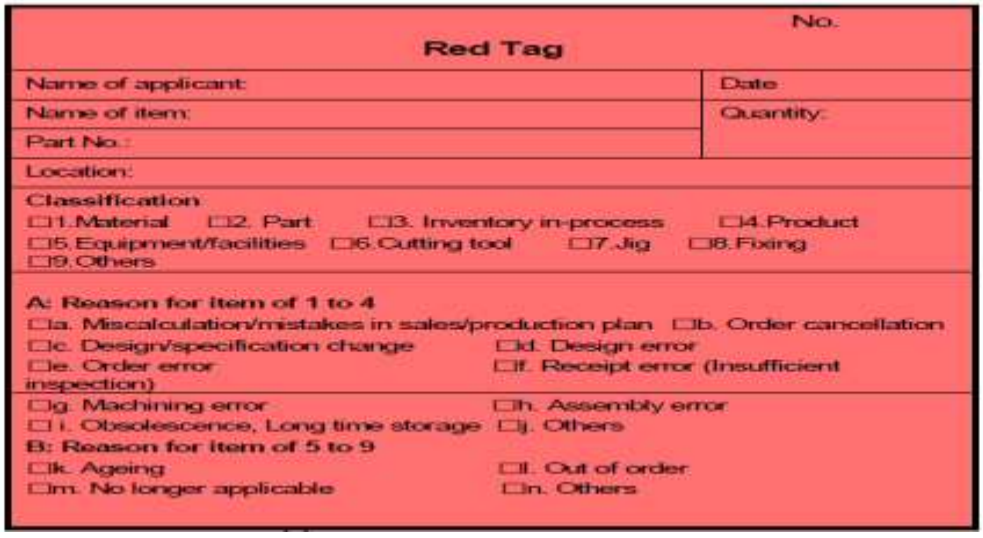
Set in order procedure? Why do floors get dirty (despite Shine procedures)? When we ask "why" repeatedly, we eventually find the source of the problem and can address that source with a fundamental improvement. Such improvements can help us develop Unbreakable standardization, which means:

- Unbreakable sorting
- Unbreakable setting in order
- Unbreakable setting shining

Unbreakable Standardization	=	Unbreakable Sorting + Unbreakable Set in order + Unbreakable Shining

Prevent unneeded items from Accumulating (Preventive Sort Procedures)

The Red-Tag Strategy described sorting out unneeded items. This strategy is a visual control method that enables anyone to see at a glance which items are no longer needed.



No.

Red Tag

Name of applicant:	Date
Name of item:	Quantity:
Part No.:	
Location:	

Classification
☐1.Material ☐2. Part ☐3. Inventory in-process ☐4.Product
☐5.Equipment/facilities ☐6.Cutting tool ☐7.Jig ☐8.Fixing
☐9.Others

A: Reason for item of 1 to 4
☐a. Miscalculation/mistakes in sales/production plan ☐b. Order cancellation
☐c. Design/specification change ☐d. Design error
☐e. Order error ☐f. Receipt error (Insufficient inspection)
☐g. Machining error ☐h. Assembly error
☐i. Obsolescence, Long time storage ☐j. Others

B: Reason for item of 5 to 9
☐k. Ageing ☐l. Out of order
☐m. No longer applicable ☐n. Others

Preventive sorting means that instead of waiting until unneeded items accumulate; we find ways to prevent their accumulation. We could also call this approach "unbreakable' sorting because once sort procedures have been implemented, having only needed items in the workplace becomes an "unbreakable" condition.

To achieve unbreakable sorting we must prevent unneeded items from even entering the workplace. These words- «only what is needed" which is same with the just-in- time (JIT) philosophy.

Prevent Things from Having to Be Put Back (Preventive Set in Order Procedures)

Preventive setting in order means keeping set in order procedure from breaking down.

The 5 Whys and 1How (5W1H) Approach

Usually we ask "why" at least five times to get to the root of the problem. When we do find the underlying cause, we ask "how" we call fix it. Accordingly, this method is called the "5W1H' approach.

When we ask "why" setting in order is breakable, we find that one answer is because people make mistakes putting things back. At this point, we need to identify what types of items are not being returned correctly.

Once we identify this, the question is how to achieve unbreakable setting in order by making it impossible to return them to the wrong place. If we can somehow eliminate the need to return items at all, we can achieve unbreakable setting in order.

Three techniques for doing this are:

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 above shows this method in practice. Here a weighted pulley device is used to suspend tools from an overhead rack. When the operator finishes using the tool, he merely releases it and it automatically returns to its proper storage place.

While this technique does not eliminate the need to return items to a specific place, it does effectively eliminate the need for people to return them. People may make mistakes in returning things, but suspension devices do not. This technique achieves unbreakable setting in Order.

Figure: Tools Suspended from an Overhead Rack

b. Incorporation

Incorporation means creating a flow of goods or operations in a factory process in which tools, measuring instruments and others are smoothly integrated into the process. Such devices therefore do not have to be returned after use.

The figure below shows an example where a measuring gate has been incorporated into a cutting process for an automobile part. The measuring gate catches any pieces

that have not been machined to the correct height. This measuring procedure is an example of "mistake-proofing" (or poka-yoke).

The incorporation of the measuring gate into the cutting process means that its storage place is also its place of use. It is therefore used (for full-lot inspection) without having to be put back anywhere.

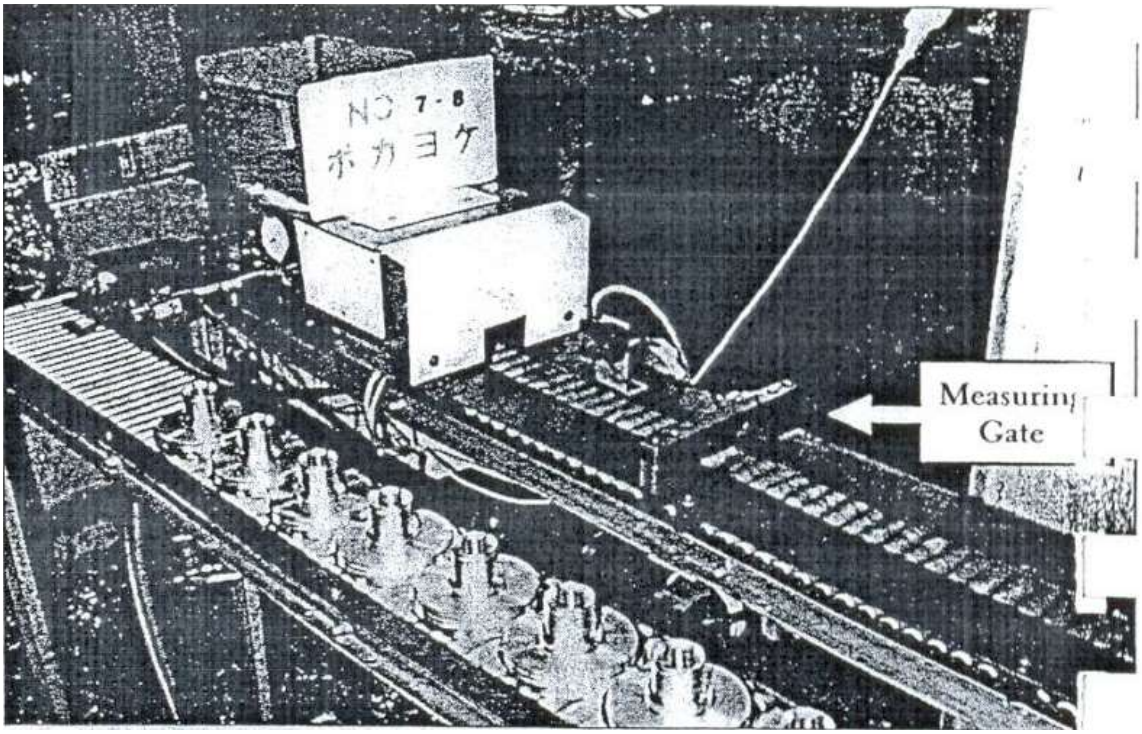


Figure: Incorporating a Measuring Gate into the Process Flow

c. Use Elimination

Suspending or incorporating jigs, tools, or measuring instruments effectively eliminates the need to return them after each use. However, these items are still being used. The question is whether there is some way to serve the function of the tool without using the jig, tool or measuring instrument.

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:

a. Tool unification
b. Tool substitution
c. Method substitution

a) 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.

b) Tool substitution

Tool substitution means using something other than a tool to serve the tool's function, thereby eliminating the tool. For example, it is sometimes possible to replace wrench-turned bolt with hand-turned butterfly-grip bolts, thereby eliminating the need for a wrench.

c) 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).
Bolt fastening is just one way to fasten things. Fastening pins, clamps and cylinders can also be used for this purpose. *We* may find we can improve efficiency even more by replacing one method with another. This is "method substitution."

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.

The 5Why approach can be applied in figure out why dirt is being generated, and how this problem can be fixed. For example, instead of mopping up oil puddles, figure out where the oil is leaking from and repair the leak.

1. Question: Why mop the floor every day?

Answer: Because oil collects on the floor.

2. Question: does oil collect on the floor every day?

Answer: Because there's a leak from the drill press machine

3. Question: Why is there a leak from the drill press machine?

Answer: Because oil is leaking from a valve.

4. Question: Why is oil leaking from a valve?

Answer: Because it's broken.

5. Question: Why hasn’t the valve been replaced?

Answer: because we didn’t notice it was broken

6. Question: How can we coordinate getting the valve fixed?

Answer: The maintenance team will order the part and the operator will replace it.

Self-Check- 3	Written Test

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

1. List down at least 6 tools and equipment's used to standardize 3S? (6points)
2. List down the three techniques for eliminating the use of certain tools. (3 points)
3. What is use of Red-tag strategy? (1point)

Note: **Satisfactory rating – 6 and above points Unsatisfactory - below 6 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____
3. _____
   _____

Information Sheet - 4	Following Checklists for standardize activities

5S Checklists like the one in the figure are used to check five pillar levels in the factory as a whole. When a company implements 5S Month of intensive activities, 5S Checklists should be used to make weekly evaluation of five pillar conditions. Example see the following sample standardize activities check list.

5S Checklist - Manufacturing

Work Area: . . . . . **Date:** . . . . . .

5S Leader: . . . . . **5S Auditor:** . . . . . .

S1 - Sort - SEIRI:	✓ / x
1. No unnecessary items are left or stored in the workplace.	
2. All machines and pieces of equipment are in regular use.	
3. All tools, fixtures and fittings are in regular use.	
4. Storage area is defined to store broken, unusable or occasionally used items.	
5. Standards for eliminating unnecessary items exist and are being followed.	

S2 - Set in order - SEITON:	
6. Locations of tools and equipment are clear and well organized.	
7. Locations of materials and products are clear and well organized.	
8. Labels exist to indicate locations, containers, boxes, shelves and stored items.	
9. Evidence of inventory control exists (i.e. Kanban cards, FIFO, minimum/maximum, etc.).	
10. Dividing lines are clearly identified and clean as per standard.	
11. Safety equipment and supplies are clear and in good condition.	

S3 - Shining - SEISO:	
12. Floors, walls, ceilings and pipework are in good condition and free from dirt and dust.	
13. Racks, cabinets and shelves are kept clean.	
14. Machines, equipment and tools are kept clean.	
15. Stored items, materials and products are kept clean.	
16. Lighting is enough and all lighting is free from dust.	
17. Good movement of air exists through the room (to limit the spread of viruses).	
18. Pest control exists and effective.	
19. Cleaning tools and materials are easily accessible.	
20. Cleaning assignments are defined and are being followed.	

S4 - Standardize - SEIKETSU:

21. Information displays, signs, color coding and other markings are established.	
22. Procedures for maintaining the first three S's are being displayed.	
23. 5S checklists, schedules and routines are defined and being used.	
24. Everyone knows his responsibilities, when and how.	
25. Regular audits are carried out using checklists and measures.	

S5 – Sustain - SHITSUKE:

26. 5S seems to be the way of life rather than just a routine.	
27. Success stories are being displayed (i.e. before and after pictures).	
28. Rewards and recognition is part of the 5S system.	

Comments: . . . . . .

Continuous Improvement Toolkit . www.citoolkit.com

Figure: checklists for an entire factory

Self-Check- 4	Written Test

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

1. Write the use of check list in standardization of 3S? (2points).

Note: **Satisfactory rating – 2 and above points Unsatisfactory - below 2 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____

   _____

Information Sheet - 5	Reporting to relevant personnel

Introduction:

Concepts of reporting:

Reporting is giving a spoken or written account of something that one has observed, heard, done or investigated in workplace area. Regardless of our topic, the report must contain different activities performed in our work shop area to meet the standardization of 3S.

The report brought to concerned personnel may contain wrongly done activities to standard or well done to the standard set. Before reporting, the data to be report are collected and analyzed first and finally reported to the concerned personnel.

Generally the use of reporting is recommending the wrongly done activities in work place to standard and providing appraisal for well-done activities to the standard set.

After the concerned personnel read and analyze the report, he/she may react to the finding. The reaction may be recommending for improvement or punishment also.

Self-Check- 5	Written Test

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

1. What is the role of concerned personnel in reporting? (1points).
2. What is use of reporting? (1points)

Note: **Satisfactory rating – 2 and above points** **Unsatisfactory - below 2 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____

   _____

2. _____

   _____

Information Sheet -6	Keeping the workplace to the standard.

Introduction:

Concepts of work standards:

Standardized work is one of the most powerful but least used lean tools. By documenting the current best practice and forming it the baseline for kaizen or continuous improvement.

As the standard is improved, the new standard becomes the baseline for further improvements and so on. Improving standardized work is a never-ending process.

Basically, standardized work consists of three elements:

a) Takt time: This is the rate at which products must be made in a process to meet customer demand.
b) The precise work sequence: This is in which an operator performs tasks within takt time.
c) The standard in process inventory: Including units in machines, required to keep the process operating smoothly.

Establishing standardized work relies on collecting and recording data on a few forms. These forms are used by engineers and front-line supervisors to design the process and by operators to make improvements in their own jobs.

Standardized work benefits:

- Documentation of the current process for all shifts,
- Reductions in variability,
- Easier training of new operators,
- Reductions in injuries and strain and
- A baseline for improvement activities.

Work standardization is the processes of making something conform to a standard. It is different from standardized work. Standardization techniques are: poka-yoke, visual management, checking and auditing.

Self-Check- 6	Written Test

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

1. List and describe the three elements of standardized work. (6 points).
2. List at least 6 benefits of standardized work. (6points).
3. List down at least 4 work Standardization techniques. (4points).

Note: **Satisfactory rating – 9 and above points Unsatisfactory - below 9 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
2. _____
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
3. _____
   a. _____
   b. _____
   c. _____
   d. _____

Information Sheet -7	Avoiding problems.

Introduction:

Problems waste time and resources and fester into bigger headaches. As well-known management consultant William Edwards Deming once said, “If you do what you’ve always done, you’ll get what you always got.”

Implementing a problem-solving approach in your business can help you quickly zero in the root causes of recurring operational issues and find solutions. The problem-solving approach can be broken down into seven steps.

1. Identify problems

Problems can show up as temporary obstacles, wasted efforts and interruptions in production. The first step is to be aware a problem exists and view it as an opportunity for improvement.

2. Describe the current situation

In order to fully understand a problem, you need to go to the source and find all the contributing factors. Ask yourself the following questions:

- Who? (Who is concerned or needs to be informed?)
- What? (What are the processes, products or parts in question?)
- When? (When did the problem occur?)
- Where? (Where did the problem occur?)
- Why? (What changed recently? Are there new participants?)
- How? (Does the problem happen constantly or only occasionally?)

3. Take temporary countermeasures on the spot

Don’t look for the perfect solution at the outset. First, put out the fire. For example, if you notice you are missing resources to finish an order, possible countermeasures could be to borrow material from another team, move on to another order or transfer employees to another order.

4. Find the root cause

Analyzing the fundamental causes of a problem is like pulling weeds. If you don't pull up the roots, they'll just grow back. Problems can be divided into either simple-to-normal difficulty or complex difficulty.

For simple-to-normal problems, you can use the "five whys" approach—asking "why" at least five times to trace the problem back to its fundamental source.

For example, if protective strips are coming off a machine, you would ask the following:

Q. Why are the strips coming off?

A. There isn't enough glue.

Q. Why isn't there enough glue?

A. The gluing equipment wasn't working well.

Q. Why wasn't the gluing equipment working well?

A. The glue reservoir is blocked.

And so on for at least five whys. In this case, you might eventually trace the problems back to a new employee who hasn't had enough training on maintaining the machine.

More complex problems can be analyzed systematically using what's known as an Ishikawa diagram, a method of thoroughly evaluating a production process. This approach allows you to evaluate machines, labour, materials, methods and the physical and human environment.

You explore all possible root causes of a problem by asking questions in each of these areas.

For example, with machines, you would ask questions such as: Does it meet production requirements? Is inspection adequate? Does it meet accuracy requirements? For each question, you answer yes or no and give supporting facts. This focuses the team on causes and not symptoms.

5. Propose solutions

Now consider solutions that address the fundamental cause of the problem. Fully examine different options, taking into account how other teams will be affected. Come to

a consensus on the best solution. Plan alternatives in case the first solution doesn't work.

6. Establish an action plan

Develop an action plan to implement your solution. Allocate sufficient resources and establish a timeline. Monitor progress and standardize the solution so you can apply it across your business.

7. Check results

Collect data to evaluate your results. Consider measuring your progress with performance indicators, benchmarking against your initial situation or any applicable standards. Evaluate gaps between actual and anticipated results; keep team members informed; and adjust your plan as necessary.

Self-Check- 7	Written Test

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

1. List down the seven steps or procedure followed in problem-solving approach.(7 points)

Note: **Satisfactory rating – 6 and above points Unsatisfactory - below 6 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
   g. _____

Lists of Reference Materials

1) http://www.yourarticlelibrary.com/planning/what-is-the-importance-of-planning-in-management/903
2) https://www.lean.org/Workshops/WorkshopDescription.cfm?WorkshopId=20
3) https://www.bdc.ca/en/articles-tools/operations/operational-efficiency/pages/7-steps-solve-operational-problems.aspx

Textile chemical processing

NTQF Level – II

Learning Guide#3

Unit of Competence: Standardize and Sustain 3S

Module Title: Standardizing and Sustaining 3S

LG Code: IND CHP02 M01 0919LO3-LG3

TTLM Code: IND CHP02 TTLM1, 0919v2

LO3. Sustain 3S

Instruction Sheet	Learning Guide #3

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

3.1. Preparing and following plan.
3.2. Discussing, preparing and implementing tools and techniques.
3.3. Inspecting workplace.
3.4. Cleaning up workplace.
3.5. Identifying situations and taking actions.
3.6. Recommending Improvements.
3.7. Following checklists and reporting.
3.8. Avoiding Problems by sustaining activities

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

- Prepare and follow plan to standardize 3S activities.
- Discuss, prepare and implement tools and techniques to sustain 3S based on relevant procedures.
- Inspect workplace regularly for compliance to specified standard and sustainability of 3S techniques.
- Clean up Workplace after completion of job and before commencing next job or end of shift.
- Identify situations where compliance to standards is unlikely and actions specified in procedures are taken.
- Recommend improvements to lift the level of compliance in the workplace.
- Follow checklists to sustain activities and report to relevant personnel.
- Avoid problems by sustaining activities

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number **3 to 5.**
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 5 , sheet 6 and Sheet 7” respectively.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4, Self-check 5, self-check 6, self-check 7 and Self-check 8” in page - 80, 89, 96, 99, 103, 106, 112 and 116 respectively.
5. If you earned a satisfactory evaluation proceed to “Learning Guide # 4”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Guide #3.

Information Sheet-1	Preparing and following plan.

Introduction:

Concepts of sustain:

Sustain means making a habit of properly maintaining correct procedures. Usually you commit yourself to sustain a particular course of action because the rewards for keeping to the course of action are greater than the rewards for departing from it or the consequences of not keeping to the course of action may be greater than the consequences of keeping to it.

Analyze and discuss the following figure regarding sustain!!

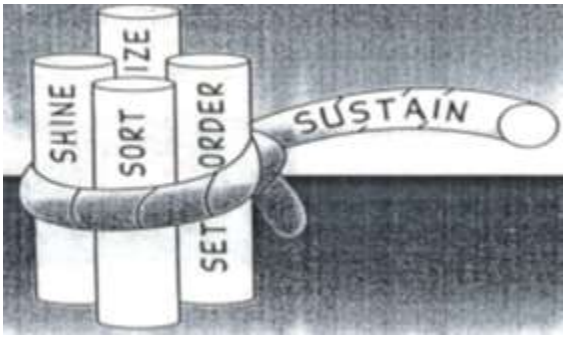


Figure: The sustain pillar holds the first four pillars together.

The same principle applies in your 55 implementation. Without your commitment to sustain the benefits of the 5S activities, implementation of the first four pillars quickly falls apart (see Figure above). However, if the rewards of implementing the first four pillars are greater for you than the rewards of not implementing them, sustaining them through the fifth pillar should be some- thing you take to naturally.

It' true that the five pillars take time to implement, but this investment of time will bring a great return for you and your company.

5S related problems and others are likely to occur in any factory or office that lacks a commitment to sustain the five pillar gains over time.

How to Implement Sustain

Creating Conditions to Sustain Your Plans

The implementation of the sustain pillar is different from that of the sort, set in order, shine or standardize pillars in that the results are not visible and cannot be measured.

Commitment to it exists in people's hearts and minds and only that have shown its presence. Because of this it cannot be “implemented” like a technique, However, we can create conditions for encouraging the implementation of the sustain pillar.

The types of conditions or structure useful for sustain the five pillars.

- **Awareness.** You and your coworkers need to understand what the five pillars are and how important it is to sustain them.
- **Time.** You need to have enough time in your work schedule to perform 5S implementation.
- **Structure.** You need to have a structure for how and when 5S activities will be implemented.
- **Support.** You need to have support for your efforts from management in terms of acknowledgement, leadership and resource
- **Rewards and Recognition.** Your efforts need to be rewarded.
- **Satisfaction and Excitement.** The implementation of the five pillars needs to be fun and satisfying for you and the company. This excitement and satisfaction gets communicated from person to person, allowing 5S implementation to build as it involves more people.

Roles in Implementation

In order to sustain 5S implementation in your company, both you and the company management have important roles to play. Part of this role involves creating the conditions that sustain 5S activities. The other part involves demonstrating a commitment to 5S yourself.

The Role of Management

The supervisors and managers in your company have a major role to play in ensuring the success of the five pillars by creating conditions that help sustain 5S activities. This role includes:

- educating you and your coworkers about 5S concepts, tools, and techniques;
- creating team for implementation
- allowing time for implementation and creating schedules for this work
- Providing resources for 5S implementation. such as supplies-s
- acknowledging and supporting 5S efforts
- Encouraging creative involvement by all workers, listening to their ideas, and acting on them.
- creating both tangible and intangible rewards for 5S efforts
- promoting ongoing 5S efforts

Your supervisors and managers also have an important role to play in implementing the fifth pillar in their own work. When they sustain the first four pillars, they perform three very important functions.

- improving the quality and efficiency of their own work
- teaching by example
- demonstrating the company's commitment to 5 implementation

Yours Role

Similarly, you have an important role to play in creating the conditions that Sustain 5S activities. This role includes:

- continuing to learn more about 5S implementation
- helping to educate your coworkers about the 5S
- being enthusiastic about 5S implementation
- helping to promote 5S implementation efforts

You also have an important role to play in order to sustain 5S activities in your own work. This role includes:

- taking the initiative to figure out ways to implement the five pillars in your work on a daily basis
- asking your supervisor or manager for the support or resources you need to implement the five pillars
- participating fully in company 5S implementation efforts
- bringing to your supervisor or manager your creative ideas for promoting or implementing the five pillars
- participating fully in company 5S promotion efforts

Self-Check- 1	Written Test

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

1. Define the term sustain? (1 point)
2. List down at least 6 conditions to sustain the five pillars. (6 points)

Note: **Satisfactory rating – 4.5 and above points Unsatisfactory - below 4.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____
   _____
   _____
   _____

Information Sheet-2	Discussing, preparing and implementing tools and techniques.

Common Tools and techniques to sustain 5s are:

There are many tools and techniques to sustain commitment to 5S implementation. These are:

- 5S slogans
- 5S posters
- 5S photo exhibits & storyboards
- 5S maps
- 5S pocket manuals
- 5S department/benchmarking tours
- 5S months
- 5S audit
- Awarding system
- Big cleaning day
- Patrolling system
  - Top management Patrol
  - 5S Committee members and Promotion office Patrol
  - Mutual patrol
  - Self patrol
  - Checklist patrol
  - Camera patrol

5S Slogans

They are most effective when they are suggested by you and your coworkers. They can be displayed on buttons, stickers, flags, or posters. It encourages all the participants.

Samples of slogan

“Refresh yourself and workplaces by 5S activity.”

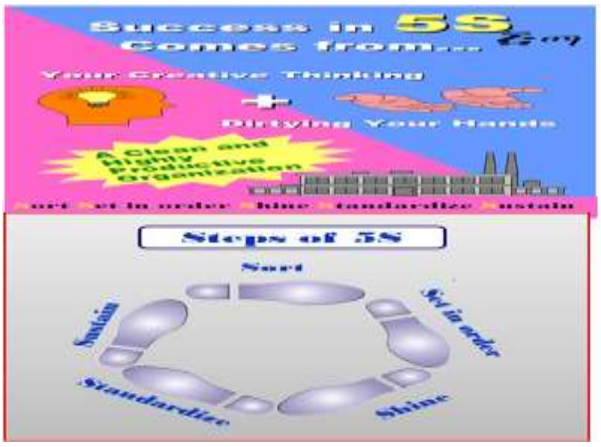
“Let's maintain current 5S activity and KAIZEN for tomorrow”

“We polish “Our Minds” as well us our factories”

5S Posters

Posters displaying 5S Slogans or descriptions of 5S activities can be posted throughout the workplace. They can serve to remind everyone of the importance of the five pillars, or to communicate the results or status of 5S activities.

Samples of poster



5S Photo Exhibits and Storyboards

"Picture is worth a thousand words". Photo Exhibits and Story boards showing the before and after of 5S implementation activities are powerful tools for promoting the five pillars. Photos and Storyboards can also communicate the status of five pillar activities.

55 Maps

It is used to get employees involved in five pillar improvement on an ongoing basis. 5S improvement Maps should be hung in a central location with suggestion cards attached so anyone can suggest improvements.

55 Pocket Manuals

It contains five pillar definitions and descriptions and is small enough to fit into the pocket of work clothes. Shop floor workers, supervisors and managers can all use SS Pocket Manuals for easy reference to the 5S essentials.

55 Department Tours

When one department in a company has implemented the five pillars successfully, it can serve as a model area for other departments to come visit. Since "seeing is

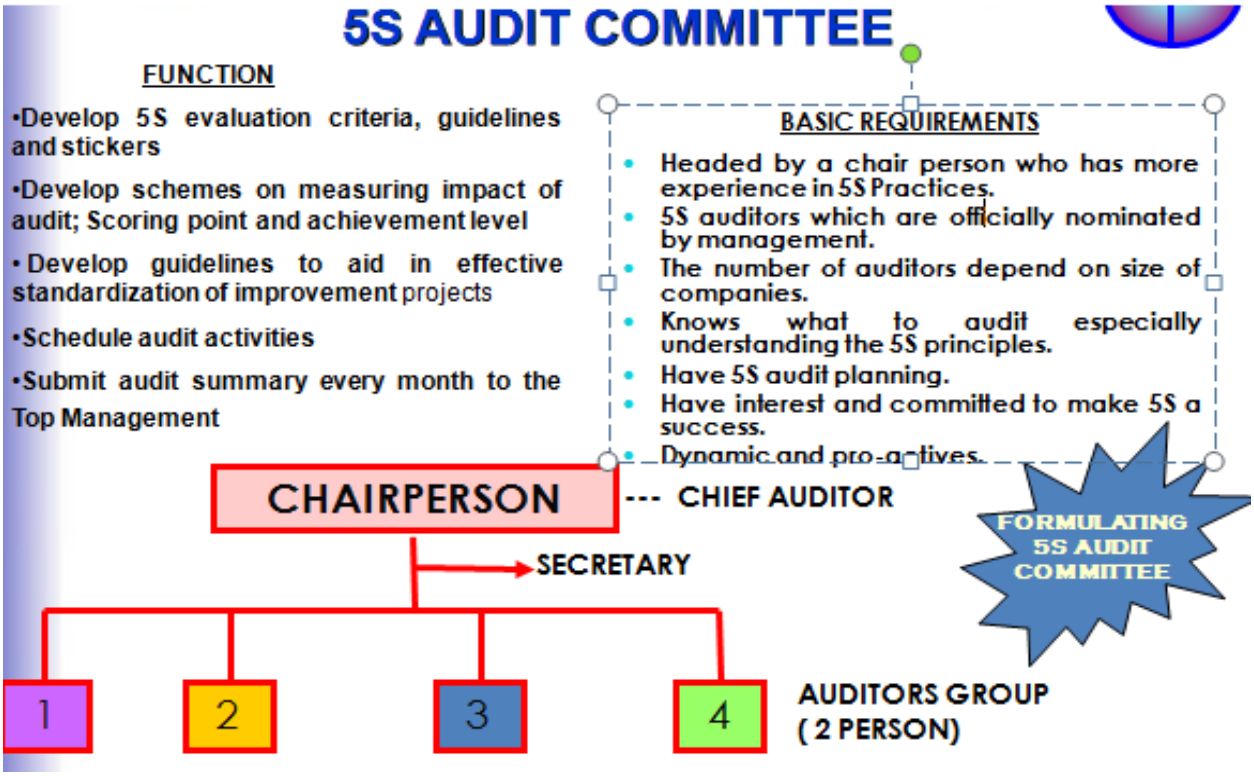
believing," this technique is extremely effective for promoting 5S implementation throughout a company.

55 Months

Companies should designate two, three, or four months every year as "5S Months." During these months, various activities such as 5S seminars, field trips, and contests can be carried out of further promote 5S implementation in the company.

5s Audit

- ❖ Its purpose is to outline an approach making 5S a success in industrial as well as our working areas.
- ❖ Enable 5S teams to design and establish a simple, effective and visual workplace organization.
- ❖ Continual Improvement internal audit program enhance excellent service delivery
- ❖ Audit findings can be used to identify trends and the key issues.



Performing Audit

Preparation

1. All 5S auditors gather at the meeting room ½ hour before audit
2. Briefing by 5S audit chairman :-
   - ❖ Activities of the day
   - ❖ Highlight any new criteria to be checked
   - ❖ Action date (2 weeks from audit date)
   - ❖ Time to report back
3. Wearing 5S auditor tag
4. Previous audit summary report will be distributed to the auditors' team as a reference in order to avoid in consistency auditing.

During Audit

1. Bring all audit materials e.g. checklist, file holder & audit summary report
2. Get the KPT leader or facilitator to accompany auditor
3. Good public Relation
4. Check outstanding matter from the previous audit summary report
5. Propose idea for improvement and justified.
6. Close matter when action has been taken.
7. Take photo to make the 5S initiative effective, safe work place, cost saving.
8. Listen to the feedback given by workers.
9. Provide positive suggestion for improvement.
10. Prepare audit report of each working area on the Audit summary
11. Document must be signed by auditor & team leader
12. Audit to the next area
13. You may take 10 – 15 minutes for one zone.

Focal Points 5S auditors should examine:

- Do the Top and Middle managers support 5S program?
- Are people proud of their workplaces?
- Are workplaces clean and organized, safe for people to work in?
- Are machines and equipment clean and well maintained?
- Are items easy to retrieve?
- Are machines and tools conveniently located?
- Are inventories stored for FIFO retrieval?
- Are products free from dust?
- Do people clean daily without prompting?
- Are the uniforms worn by people clean and tidy?
- Is a good image of the enterprise reflected in its people?

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							

Set-up "Audit summary Report"

Audit Area: _____

Date: _____

No.	Areas of Audit	Improvement needed			Situation during Audit	Proposed enhancement
		Sort	Set in order	Shine		
1						
2						

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.

Awarding System:

Awarding for 5S promotion results according to evaluation is recommended. Awards may be:

- For Good performance
- Award for efforts
- Award for good Ideas
- Prize winner
  - Group
  - Individual

Big Cleaning Day:

It is a cleaning that carried out from two to four hours by the organization.

Example: Before national holidays

Patrolling System:

- Top management Patrol
  - Check Up the activities Comprehensively
  - Give emphasis on sustaining of the activity
  - consider committees feedback
- 5S Committee members and Promotion office Patrol
  - Evaluate “5S Check List”
  - Record problems on”5S check findings”
  - Tack picture of 5S problems
- Mutual patrol
  - Check mutually among KPT
- Self-patrol
  - 5S leader and members check the results of activity by themselves.
- Checklist patrol
  - Point out the problems by themselves at site as well as evaluate the results and encourage members to urge KAIZEN.
- Camera patrol
  - Visibly highlight the problems and progress of the activity using photographs.

Self-Check - 2	Written Test

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

1. What are the common tools and techniques to sustain 3S? (13 points)
2. What is the 5S pocket manuals? (1 points)
3. What are the activities performed during preparation of audit and during audit (5 points)
4. List types of patrolling system. (6 points)

Note: **Satisfactory rating – 13.5 and above points Unsatisfactory - below 13.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
2. _____
3. _____
4. _____

Information Sheet-3	Inspecting workplace.

Introduction

Concepts of Inspection

An inspection involves checking something, i.e., examining and assessing something. The inspectors determine whether the item or material is in proper condition and of the right quantity. They also determine whether it conforms to the company's, industries, local, or national rules and regulations

It is natural to do a certain amount of inspection while implementing sorting, set-in order and shine activities. Once these activities become a habit, we can start incorporating systematic inspection procedures in to their procedures.

Even when equipment in the workplace appears to function abnormally, 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.

Points to considered in inspecting sorting activity:

- Whether necessary and unnecessary materials separated well and placed into their own place.

Points to considered in inspecting set-in order activity:

- Whether frequently used materials are placed near by operator or unfrequently used materials are placed outside of work place.

Points to considered in inspecting shinning activity:

- 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.

Before Shine

After Shine

Inspection steps:

The steps of inspection and 3S implementation 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 3S 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?	○			

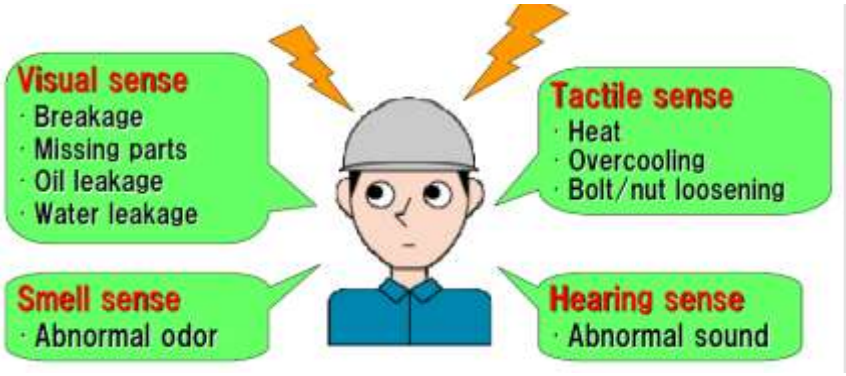
Table: Sample of inspection checklist

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.
- 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, looseness, excessive heat, shifting).



Step 5: Correct all problems

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

Instant Maintenance: whenever possible, an operator should immediately fix or improve a problem he or she discovers during inspection. But the operators should know what level of maintenance work they can handle by themselves and immediately.

Requested Maintenance: In some cases, a defect or problem may be difficult for the operator to hand alone and immediately. In this situation, the operator should attach a maintenance card to the site of the problem in order to make it visible. He or she can also issue a maintenance kanban to request help from the maintenance department.

It is also good to log requested maintenance on to a checklist of needed maintenance activities. Once a requested maintenance is taken care and its result confirmed, the activity should be checked off in the 'confirmation' column of the checklist. The maintenance card should then be retrieved from the machine where it is attached.

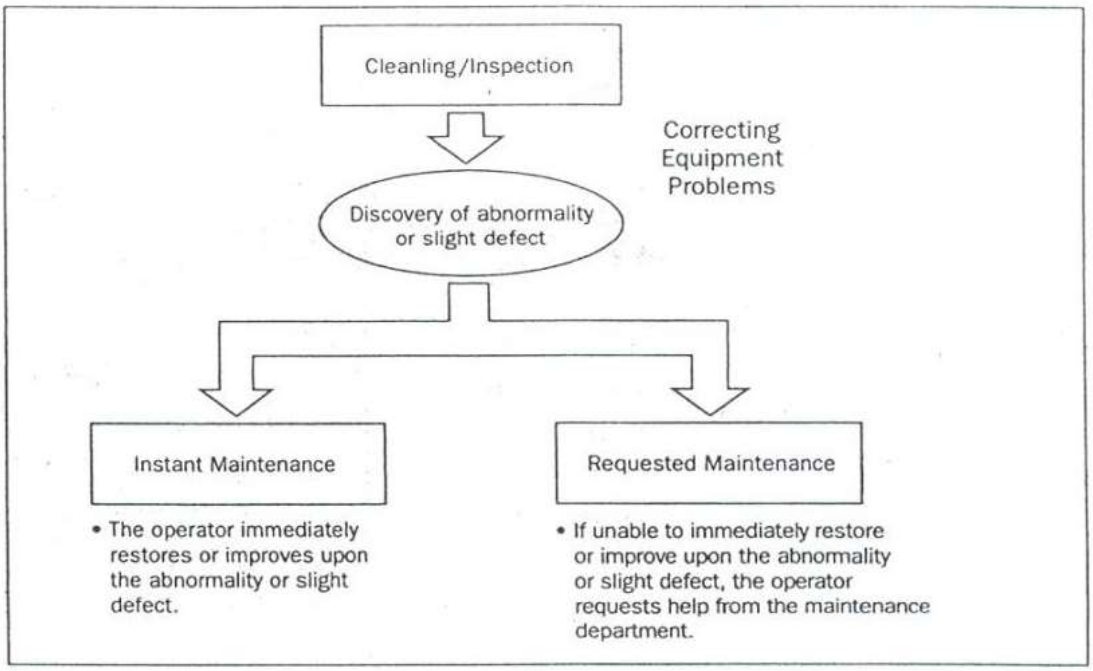


Fig. Two approaches for solving equipment problems

Self-Check - 3	Written Test

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

1. What is inspection? (1point).
2. Write down points to be considered in inspecting sorting activity, set-in order activity and shinning activity. (3points).
3. List steps of inspections? (5points).

Note: **Satisfactory rating – 5.5 and above points Unsatisfactory - below 5.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
2. _____
   a) _____
   b) _____
   c) _____
3. _____
   a) _____
   b) _____
   c) _____
   d) _____
   e) _____

Information Sheet- 4	Cleaning up workplace.

Introduction:

Concepts of work place cleaning:

Cleaning is the process of removing unwanted substances, such as dirt, infectious agents and other impurities from an object or environment. Cleaning uses many different methods.

Methods of work place cleaning:

Cleaning is broadly achieved through mechanical action or solvent action; many methods rely on both processes.

Example:

- **Washing:** usually done with water and often some kind of soap or detergent
- **Acoustic cleaning:** the use of sound waves to shake particulates loose from surfaces. Example-Ultrasonic cleaning, using ultrasound, usually from 20–400 kHz
- **Dry cleaning of clothing and textiles:** using a chemical solvent other than water
- **Flame cleaning** of structural steel with an oxyacetylene flame

In general by whatever cleaning methods, work place must be cleaned and neat.

Self-Check - 4	Written Test

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

1. Define the term cleaning by your own word? (1 point)
2. List and discuss methods of work place cleaning. (2 points)

Note: **Satisfactory rating – 2.5 and above points Unsatisfactory - below 2.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____
   _____

Information Sheet-5	Identifying situations and taking actions

Kaizen events/situations are focused and structured improvement projects, using a dedicated cross-functional team to improve a targeted work area, with specific goals, in an accelerated timeframe. They most often are conducted in a three- to five-day workshop setting, although they may be somewhat shorter or longer in duration.

Kaizen event/situations teams apply structured process tools and human creativity with a goal of substantially improving the performance of the work area, process or product.

Many organizations report promising initial results from kaizen events and this will also lead to the creation of a culture of continual improvement. Some organizations seem to be able to sustain improved levels of performance.

Many, however, find that within six months to one year, work area performance has degraded, sometimes even to pre-event performance levels. Both consultants and industry leaders acknowledge that even in companies where events/situations are generally successful, unsuccessful events (for example, few significant improvements were made, even initially) are common.

Kaizen event/situation framework:

As part of the research at Oregon State and Virginia Tech, a framework for categorizing kaizen event/situation processes was developed. It can be used to guide the design of kaizen events by helping organizations identify strengths and opportunities for improvement for both individual events and a kaizen event program as a whole.

By evaluating the current maturity of organizational processes against the kaizen event framework, organizations can identify aspects of kaizen event design and management in need of improvement. In addition, by examining the practices of other organizations, leaders can identify specific ways to improve their own kaizen event programs.

The kaizen event/situation framework is organized from around four categories of kaizen event processes: planning, implementing, sustaining and organizational support.

4. **Planning processes:**

It provides organizations with a clear priority and rationale for supporting the kaizen events that will have the most impact and for establishing the initial scope of the intended outcomes of these events. Planning encompasses three critical process areas:

a) Identifying candidates for kaizen events
b) Selecting between alternative candidates
c) Defining the kaizen event scope

5. **Implementing processes**:

It focuses on a specific event/situation once it has been defined. These processes are conducted before, during and after an event. The four process areas included in implementation are:

a) Preparing for the event
b) Executing the event
c) Conducting follow-up actions
d) Deploying/organizing improvements more broadly following the event.

6. **Sustaining encompasses:**

Performance reviews, dissemination of results and lessons learned and standardization of improvement activities.

7. **Organizational support:**

It is related to the management of the kaizen event program as a whole. This includes employee training and education, kaizen event program management and employee motivation.

In general after kaizen situation/events are identified, the immediate action must be taken.

Self-Check -5	Written Test

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

1. List and discuss the four kaizen event/situation framework. (8 points)

Note: **Satisfactory rating – 5 and above points** **Unsatisfactory - below 5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
   _____
   _____
   _____

Information Sheet-6	Recommending Improvements.

Introduction:

Concepts of recommendation:

It is a suggestion or proposal as to the best course of action, especially one put forward by an authoritative body.

Whenever 3S is sustained at work place by someone, always there is an improvement to their working area too. So the one who sustains those 3S must get improvement recommendation for what he/she did according to standard set regarding the sustainability criteria of 3S. The reason behind of providing improvement recommendation is to enhance the morale of the worker that sustains 3S activity in his/her working area.

The type of recommendation given to outstanding worker is determined by the authoritative body of that company/office. This may include: incentive/bonus, certificate, education chance, change of work position and etc.

Linking incentives and bonuses to process improvements is an effective way to stimulate employee interest in process improvement. Below is a step by step process to use to reward employees for remaining engaged in process improvement strategies:

- Identify specific process-related goals for employees to attain
- Tie goal attainment to employees' receipt of rewards
- Choose rewards that are relevant and desirable to employees
- Make sure that employees also know how their goal attainment is influencing company goal attainment

Not all process improvement strategies produce desirable results. The best way to achieve desired results for your company is to seek the guidance of an experienced professional. The process management experts with score, help companies of all sizes improve their processes and workflows. Scoring commitment to providing companies of all sizes with cost-effective solutions has made them a trusted leader in the process improvement industry.

Self-Check -6	Written Test

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

1. What is importance of recommendation for your improvement at your work area? (1 point)
2. List down ways of providing recommendations. (4 points)

Note: **Satisfactory rating – 3.5 and above points Unsatisfactory - below 3.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____

Information Sheet-7	Following checklists and reporting.

5S is a Lean technique that involves activities designed to create and maintain a disciplined workplace. It helps create a better working environment and can be implemented to eliminate waste and improve the flow of work. A 5S checklist is often used to evaluate the performance of 5S implementation in any workplace. This tool will help ensuring that 5S standards and workplace organization are being met. It enables the observer to better address compliance gaps and provides opportunities for continuous improvement.

This template is a Microsoft Excel spreadsheet that you can use and modify to meet your specific needs. It can easily be modified to include additional checklist items. It comes in two different variations; one that is designed for manufacturing workplaces and another that is designed for offices.

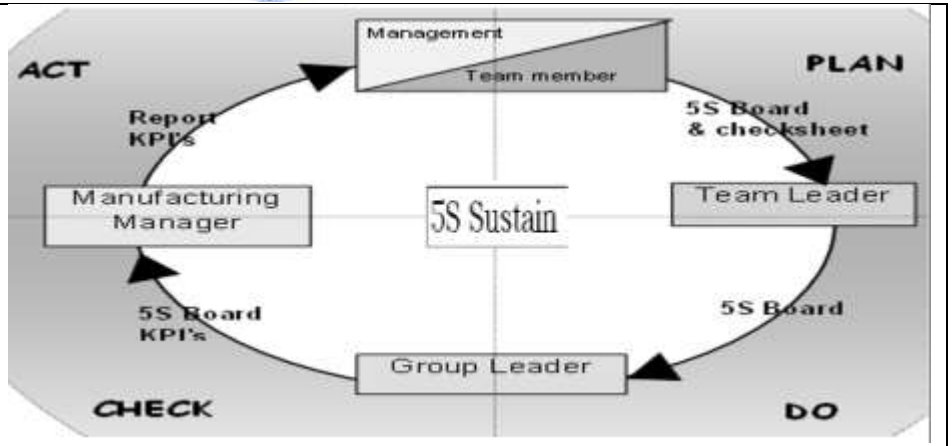
5S Checklist Template

5S Daily Checklist- WORK AREA (5S- SORT, SET, SHINE, STANDARDISE, SUSTAIN																															
Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1. no unnecessary things present																															
2.All cells clean, waste bins empty & located in designated spot.																															
3. All packing tables clean as per photo displayed																															
4. Brooms present on every table																															
5. All unused fans/heaters & lights turned OFF																															
6. All cardboard waste dumped in master bin outside																															
7.machine & surrounding area clean																															
8. All pallets/trolleys sitting in designated area																															
9. All walkways are																															

clean																														
10. Bins & bin lifter sits on green designated spot																														
11. Check if electric connection for lights, sealer, weigh balance are switched off at the end of shift.																														
12. Bins to be refilled by warehouse dropped off at warehouse pick up point																														
13. No items on EXIT way and near power line																														

Date Opened	**5S needs and requirements**	**Select codes:** **M-machine,** **E- Equipment,** **T-Tools,** **C-Consumable,** **R-Raw material.,** **I- Information**	**Actions taken**	**Responsibility**	**Date Closed**	**Status**

Instruction: This Daily 5 S Checklist has to be done by area team leader or designate. Tick √ box if all good else put a cross X in the respective box. Mention any needs or requirements in the space provided.

CODE: Machine: Any mechanical device used to manufacture product Equipment: Tables, benches etc **Consumable:** Any item, other than raw materials, consumed in the job **Raw material:** Items that make up in the finished product. **Information:** Information required to perform tasks	

Self-Check -7	Written Test

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

1. What is use of 5S checklist? (1 point)
2. List down the areas where 5S checklist is used. (2 points)

Note: **Satisfactory rating – 2.5 and above points Unsatisfactory - below 2.5 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____

Information Sheet-8	Avoiding Problems by sustaining activities

Sustainment is usually the most difficult part of 5S. The attitudes and activities must be institutionalized and repeated until they become part of the culture and the fabric of everyday work.

After they are sustained, then workplace problems get reduced.

The table below summarizes eight common tools that help with sustainment. A combination of several or all of these tools is usually necessary.

Eight tools to sustain 5S:

1	Code of Conduct	A document that spells out the standards of behavior expected of all employees with respect to 5S.
2	5S Corner	A small area where people on the work teams can obtain supplies, information and assistance for their efforts. Usually operated by the 5S Coordinator.
3	5S Checklist	A list of specific items to check regularly within each area. This list is agreed upon by each work team.
4	5S Patrol	A small, rotating team of associates from each area who inspect each area and advise the work teams/
5	Steering Committee	Volunteers from each area meet to determine the overall direction of the effort.
6	Visual Coordinator	The coordinator provides support, advice, training and coordinates activities.
7	Management Champion	An executive with high standing and credibility who has the responsibility for supporting the program.
8	Management Watch	A regularly scheduled event where the Management Champion tours areas under 5S improvement. The purpose is to reinforce behavior through encouragement and ensure that resources are available.

This cannot be outsourced or solved with software. Management, top management, must reinforce it constantly with time, attention and repetition.

5S
Code of Conduct Example

- If you open it, close it.
- If you turn it on, turn it off.
- If you unlock it, lock it.
- If you move it, put it back.
- If you borrow it, return it.
- If you use it, take care of it.
- If it belongs to someone else, ask permission.
- If you make a mess, clean it up.

Self-Check – 8	Written Test

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

1. List the eight tools to sustain 5S in avoiding problems. (16points).
2. Define 5S corner. (1points).

Note: **Satisfactory rating – 12 and above points Unsatisfactory - below 12 points**

You can ask you trainer for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ **Date:** _____

1. _____
   _____
2. _____
   _____

List of Reference Materials

1. 5S for operators (1995)
2. Job specifications
3. Safety Manual and Guide
4. https://tallyfy.com/successful-process-improvement-initiative/
5. http://www.strategosinc.com/articles/5S/5s_sustain.htm
6. https://marketbusinessnews.com/financial-glossary/inspection-definition-meaning/
7. https://en.wikipedia.org/wiki/Cleaning
8. Jennifer Farris (jfarris@vt.edu) is a PhD candidate in industrial and systems engineering at Virginia Tech. In addition to lean production and kaizen events, her research interests include performance measurement, product development and project management.
9. https://www.reliableplant.com/Read/7319/kaizen-success-sustainability
10. https://citoolkit.com/templates/5s-checklist-template/
11. http://lean-learnings.com/Downloads/5S-%20Daily%20Checklist.pdf