

Chapter 18

Asset Basic Care

Good housekeeping

Abstract To describe the features and organizational structures used in care of assets from good housekeeping through to basic maintenance. To consider performance monitoring and recording and continuous improvement techniques. *Outcomes* After reading this chapter you will understand the importance of good housekeeping and basic maintenance and how to organize the workplace so that these are well managed. You will be aware of the continuous improvement cycle and techniques associated with it.

18.1 Introduction

An essential requirement of successful asset management is taking care of assets. This involves activities at several levels, ranging from cleanliness and good housekeeping by the user or operator, to first-line maintenance activities such as servicing, lubrication, and adjustment, to second-line maintenance involving repairs and assembly changes, and on to deeper maintenance or overhaul. In addition, there are many technical factors in maintenance, including condition monitoring.

Determining the right level of maintenance activity and hence of expenditure is not an easy task. The role of asset managers is to be aware of available techniques both in terms of management and technology and to apply them appropriately to the benefit of the business. It may be tempting to senior managers to demand more production or to cut maintenance budgets as a response to problems, but such actions quickly become counterproductive if the basic care and maintenance of assets is neglected.

18.2 Total Productive Maintenance or Asset Basic Care

At first-line level, in a manufacturing context, the process of caring for assets is referred to as *Total Productive Maintenance* (TPM). A more general term is *Asset Basic Care*. Asset Basic Care/TPM involves workplace employees, such as operators and first-line maintenance staff in achieving a high standard of care of assets as an integral part of their normal work. The main focus in Asset Basic Care is on the *people* and how they do their work. Asset Basic Care/TPM is *non-heroic maintenance*. This means doing the routine things well, rather than an emphasis on heroic repair jobs. The major elements include:

- Cleanliness and good housekeeping;
- Routine inspection, lubrication, and adjustment;
- Focus on machine knowledge, machine performance, quality of output and elimination of losses;
- A sense of ownership by operators and first-line maintainers.

The concepts in Asset Basic Care/TPM are summarized in Fig. 18.1.

18.2.1 Workplace Tidiness and Organization

The first essential of asset basic care is a tidy workplace. Some areas have never been tidied up since the industrial revolution. Remove unused or inessential items, especially:

- old or imperfect product
- surplus materials,
- obsolete or unnecessary tools,
- obsolete fixtures,
- obsolete or inessential documents, and
- horse-drawn wagons unless it is a theme park.

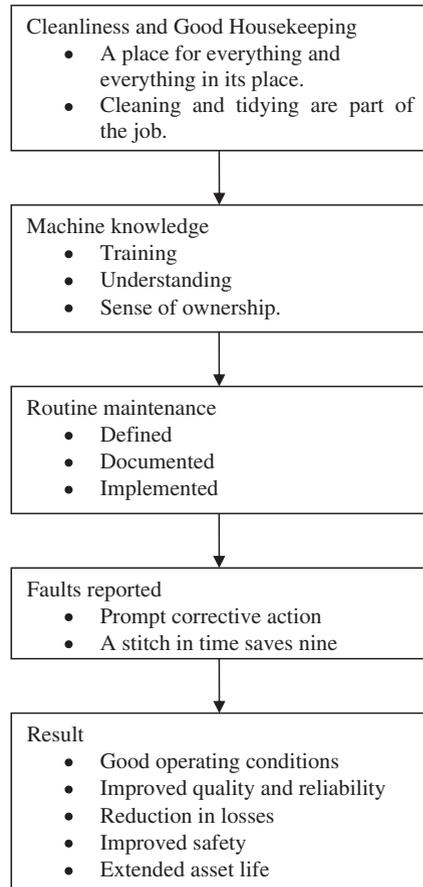
Having tidied up, get organized. For each workplace list all required:

- tools and instruments,
- implements,
- accessories, and
- consumables.

Determine a place for all essential items and provide:

- shelves,
- containers,
- holders, and
- labeling.

Fig. 18.1 Asset basic care or total productive maintenance



Use simple indicators, e.g., marks on the floor, colored shelves to show placement of essential items. Use these facilities and keep items visible.

18.2.2 Maintain Standards

- Take countermeasures against dirt and dust.
- Determine how everything is to be kept clean.
- Provide equipment such as brushes, cloths, vacuum cleaners, and dish washers.
- Design out systematic uncleanliness, using shields, covers, waste disposal methods, etc.
- Make cleaning and tidying up a standard part of every job.

Set cleaning and tidying standards and routines.

- Assign responsibilities.
- Rotate tasks among operators and allow them to agree on who does what.
- Specify cleaning time, e.g., 5 min at end of each shift and half hour per week, plus if idle.
- Assign responsibilities for all aspects of supply, storage, and disposal of workplace items.

18.2.3 Training

Create the training material for:

- correct operating conditions and procedures
- machine knowledge
- basic maintenance procedures
- fault reporting procedures
- knowledge of existing types of faults or losses.

This is done by supervisors and experienced maintenance personnel, initially for a pilot area, later extended to all operations. Training facilities are needed, e.g., training room next to the shop floor, white board, projector, and training materials.

18.2.4 Machine Knowledge

Develop and display machine information on notice boards beside the machines.

- Name of machine
- What it is intended to do
- How it works—without going into unnecessary technical detail; use simple flow chart
- Written, step-by-step details of all necessary procedures, including operating conditions, e.g., temperature, pressure, vibration, and alignment checks.
- Troubleshooting guide.

The creation and maintenance of this material is a worthwhile learning task for young graduates.

18.3 Basic Maintenance

Asset performance and sustainment are greatly improved if equipment is kept in good condition. To achieve this, basic maintenance must be carried out on a regular basis. Besides cleanliness, this includes lubrication, adjustment of things that

are intended to be adjusted, and tightening or replacement of loose or missing nuts and bolts. In Asset Basic Care/TPM, we organize basic maintenance with the aid of the following steps:

- Create basic maintenance procedures, standards, and routines.
- Specify maintenance and inspection intervals and times.
- Identify and document lubrication points, adjustment points, checks for nut or bolt tightness and anything else that the operators or first-line maintainers can usefully know.
- Color code lubrication points and adjustment points by interval, e.g., daily, weekly, and monthly checks.
- Identify abnormal conditions in specific terms, e.g., pressure or temperature gage readings, measurements, flow rates.
- Specify action to be taken (e.g., call the mechanic) if conditions are abnormal.
- Define basic inspection procedures, this can include checks for:
 - Loose, missing, broken bolts fasteners, clamps, etc.
 - Frame and structural cracks, weld failures, etc.
 - Corrosion
 - Wear
 - Vibration
 - Oil/fuel/coolant/air leaks,
 - Accident damage, e.g., bent sheet metal, broken items, etc.
- Specify action to be taken from inspection results, including immediate corrective action, and the raising of work requests for activities which can be deferred. Define how to report conditions which are outside the operator’s scope of activity.
- Train workforce personnel in basic maintenance, diagnostics, and reporting.
- Assign responsibilities.
- Rotate tasks among operators and allow them to agree on who does what.

18.3.1 Assign Housekeeping and Basic Maintenance Tasks

Appraise tasks and assign them as you think best, with input from those involved. The essential thing is that all tasks are assigned, Fig. 18.2 shows examples of possible assignments.

Fig. 18.2 Assignment of basic care tasks

Task Type	Assign to
Cleaning/housekeeping	Cleaner or operator
Operating	Operator
Servicing	Operator or lubricator
Minor set up	Operator or technician
Minor repair	Operator or technician
Skilled maintenance	Technician

18.3.2 Routine Maintenance by Technicians

More technical maintenance activities will normally be assigned to technicians. Particular attention must be paid to the carrying out of maintenance activities which are required by law or by good practice, such a boiler or pressure vessel inspections.

18.3.3 Accredited Workers

After training, test the competency of workers on machine knowledge, operation, and basic maintenance. Recognize their achievements by accrediting them to operate the relevant machines; give them a certificate. This may involve upgrading and higher pay, but an overall payoff can be expected.

The workers closest to the equipment, operators, and first-line maintenance technicians, have the greatest level of involvement and the greatest degree of equipment knowledge at the user level. This knowledge can be leveraged by empowering the workers to take a wide range of actions in support of production operation and maintenance. In addition to good housekeeping and basic maintenance, these actions can include the replenishment of work place equipment, contact with second-line maintenance, participation in quality and condition-monitoring activities and performance recording and analysis. Participation in continuous improvement activities and root cause failure analysis activities should also be encouraged.

18.4 Performance Recording

Collect and display simple statistics, e.g.,

- Machine down time by weeks (time lost to operators).
- Machine lost time by weeks (time machine available but not effectively used by operators).
- Quality losses by weeks, numbers of subquality product.
- Unplanned maintenance activity by months, showing type of breakdown/repair.
- Time spent on (particular) setups.
- Causes of losses sequenced by frequency of occurrence.
- Causes of losses sequenced by cost significance.
- Trend over time to show improvements and opportunities.

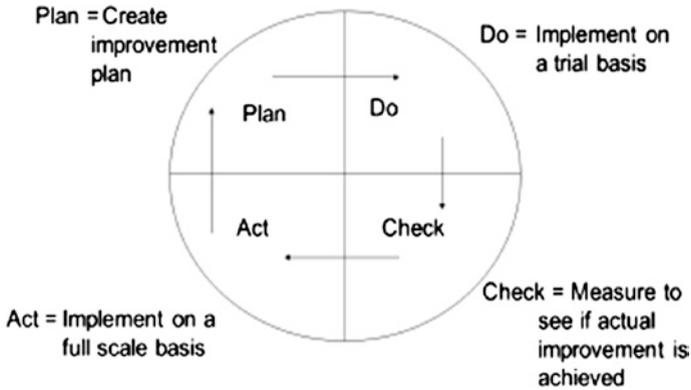


Fig. 18.3 Continuous improvement cycle

18.5 Continuous Improvement¹

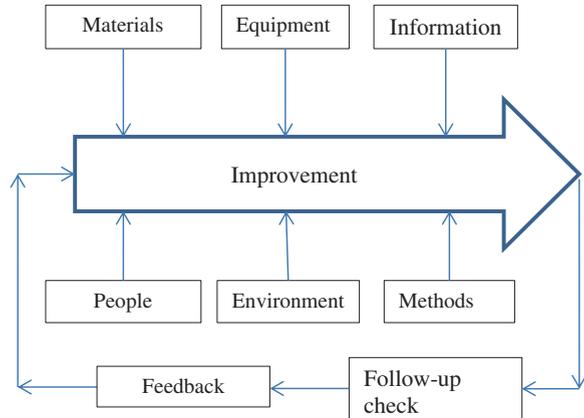
Continuous Improvement is an ongoing process whereby we try to improve products, services, or processes, in incremental steps. This approach is in contrast to, though not excluding, occasional breakthroughs. The high standard of housekeeping and maintenance, and the recording of performance data and identification of losses and their causes, as promoted by TPM, provide a basis for the improvement of performance, of quality and of reliability. In the production context, the potential for and methods of improvement are well documented in works on TPM and Total Quality Control, such as those of Hartmann, Ishikawa, and Suzuki listed in the references section. These advantages should also be carried over to nonmanufacturing asset management situations. Operations information regarding losses and data from inspections and routine maintenance form an important source of knowledge regarding equipment condition. This then forms a basis for improvements in performance and reliability of equipment and as a possible pointer toward equipment replacement. In forming a budget, we should allow funding to encourage developments which can support continuous improvement and which can emerge from any level of the business.

18.5.1 Deming Wheel

The cycle of continuous improvement is illustrated by the “Deming wheel” shown in Fig. 18.3 Continuous Improvement Cycle. The wheel involves four steps known

¹ ISO 55001 Clause 10.3 Continual improvement: “The organization shall continually improve...”.

Fig. 18.4 Fishbone diagram (Ishikawa)



as Plan, Do, Check, and Act which are shown and explained in Fig. 18.3. Care must be taken to ensure that changes are approved by technically qualified and authorized persons before being implemented.

18.5.2 Fish Bone Diagram (Ishikawa²)

Another aid to continuous improvement is the systematic consideration of the factors involved in a process. The “fishbone” diagram, of which a simplified version is shown in Fig. 18.4, acts as a guide in relation to the various types of factors that may be involved in an industrial process. Points to be considered are:

- Materials: Suitability, Wear, Corrosion, and Fatigue
- Equipment: Suitability, Capacity, Condition, Instrumentation, and Calibration
- Information: Documentation, Access, and Up-to-date?
- People: Knowledge, Training, Skills, Teamwork, Recognition, and Feedback
- Environment: Temperature, Humidity, Lighting, and Cleanliness
- Methods: Defined, Appropriate, Documented, and Followed?

Care must be taken to ensure that changes are approved by technically qualified and authorized persons before being implemented.

² Ishikawa, Kaoru, “Guide to Quality Control”, Asian Productivity Organization.

Fig. 18.5 Workplace problem report

WORKPLACE PROBLEM REPORT	
To: Improvement Co-ordinator	
From:	
Date:	Reference No.:
Details of Problem:	
Suggested Solution (If Any):	

18.6 Improvement Coordinator³

An improvement coordinator is a person who acts as a focus for improvement suggestions, receiving proposals, and assessing and progressing them. Organizations can benefit from having an improvement coordinator (not usually a full time commitment but something extra for an already busy person!) and a standard form called a Workplace Problem Report. Anyone can originate a Workplace Problem Report and send it to the Improvement Coordinator. An email message is an alternative to the printed form. An example of a form is in Fig. 18.5.

The Improvement Coordinator maintains a record of all Workplace Problem Reports received, and acts as follows:

- Check problem and possible solutions with originator and relevant managers, technical personnel, suppliers, etc.
- Initiate and monitor appropriate actions if any.
- Report on results. This should include cases where no action is taken, with reasons.

³ ISO 55001 Clause 10.1 Non-conformity and corrective action: “When a nonconformity or incident occurs...the organization shall ... react ... take action ... review ... make changes if necessary...”.

18.7 Asset Basic Care/TPM—Management Support

Maintenance must be recognized as important by senior managers and all employees—the Plant Manager needs to commit to this. This recognition includes ensuring that routine maintenance is carried out and is not neglected due to pressure from operations staff or lack of maintenance budget.

Management should assign specific equipment to specific operators or small groups, giving them responsibility and empowerment. As an example, it is a practice in the United States Air Force to assign management of each aircraft to an individual. This individual follows the aircraft when it goes for servicing or repair and ensures its security, integrity, and priority are maintained.

Have a clear chain of technical expertise and use it. Do not remove all expertise from a site. Have a fully functioning work request, job scoping, job planning, work order, job scheduling, and progress/result reporting system.

18.7.1 Asset Basic Care/TPM Summary

- Cleaning and housekeeping.
- A place for everything and everything in its place.
- Visible, documented procedures.
- Operator and first-line technician training in...
- Lubrication skills.
- Diagnostic skills.
- Minor adjustments.
- Minor setup changes.
- Routine maintenance (technicians).
- Minor repairs (technicians).
- Operator/maintainer certification.
- Sense of ownership.
- Continuous improvement.
- Create routine maintenance schedules on a calendar.
- Balance the workload.
- Publish the schedule, working with production to ensure agreed program.
- Stick to the routine!
- Work request and work management systems to be used for all nonroutine work.

18.7.2 Asset Basic Care/TPM Benefits

- More production through reduction in losses
- Improved product quality
- Improved working conditions

- Improved safety
- Overtime reduction
- Reduced absenteeism
- Environmental and legislative compliance
- Extended asset life.

18.8 A Shock from Japan

“What did you do after the war, Pop?” Jock asked, on one of his weekly visits to his grandad.

“I had a few different jobs in the big car companies in and around Birmingham,” said Pop. “The most interesting was later when all those Japanese production methods hit us. I didn’t know what they were talking about at first. There was Just In Time and Kanbans and TPM. Our factory was near the original site where James Watt and Matthew Boulton started building their steam engines that kicked off the industrial revolution around 1789. The trouble was that no one had tidied up for 200 years. There was an amazing amount of accumulated dirt, dust, swarf, congealed oil and broken or reject castings in our machine shop.

“I’d retired from production management by then and was assigned to ‘continuous improvement’. I tried to change things in the machine shop but it was too hard. Luckily we had an assembly area where most of the workers were women. They quickly picked up on the idea of everything being clean and tidy and were soon ahead of me, bringing in pot plants and feather dusters and stuff. Once the other departments saw how nice and clean their assembly area was they got the message. We took four big skips of rubbish out of the machine shop in 1 day.”

“After that I got an assignment in a car lamp factory. I remember my first meeting on the site. The new managing director was on a mission to boost production and told the managers to get production up to one million lamps per month, ‘or else’.”

“About a month later I came out on to the landing beside the offices which looked over the production area. The partly finished lamps were moved around in metal cages. The production area was solid with cages and the crane driver had a cage on the crane and was looking for somewhere to put it down—but there was no space left. Everything was jam-packed and production was at a standstill!”

“Luckily this crisis gave me an opportunity. For one thing, it was obvious that setting a goal of producing one million lamps a month was dumb. The factory had met the target by churning out lamps which were easy to make and disregarded everything else, including the customers.”

“I got them to switch to a Kanban system where work centers had marked spaces between them for holding inter-process stock. Once their ‘output’ space was filled, they stopped producing. The old hands said that they would never achieve quota this way, but in fact sales increased. I was surprised myself. It didn’t seem to make sense, but I found that, although the throughput of lamps

at particular work centers was less, this was more than offset by less rejects and less re-work. Also, the kanbans ensured that we were making the lamps that the customers wanted.”

“That’s great,” said Jock, “but we don’t seem to have taken much of it on board in maintenance or in the mining and mineral processing industries that I’ve seen. Maintenance workshops always seem to look like your description of 20 years of rubbish,—stockpiles of ore or tailings seem to build up all over the place. I may be exaggerating a bit, but I think that there’s a lot we can learn from the ‘lean’ techniques that you manufacturing blokes were using years ago.”

18.9 Self-Assessment Exercise

Note: In this exercise the term Asset Basic Care is used to include the concept also known as TPM.

1. What is meant by Asset Basic Care?
2. Identify four features of Asset Basic Care.
3. Identify six activities involved in Basic Maintenance.
4. What is meant by Continuous Improvement?
5. What are the four stages of continuous improvement which appear on the Deming wheel?
6. What is the role of an Improvement Coordinator?

18.10 Self-Assessment Exercise Solutions

1. *What is meant by Asset Basic Care?*
Asset Basic Care involves workplace employees, such as operators and first-line maintenance staff in achieving a high standard of care of assets as an integral part of their normal work.
2. *Identify four features of Asset Basic Care.*
Cleanliness and good housekeeping;
Routine inspection, lubrication, and adjustment;
Focus on machine knowledge, machine performance, quality of output and elimination of losses;
A sense of ownership by operators and first-line maintainers.
3. *Identify six activities involved in Basic Maintenance.*
Any of the following:
 - a. Create basic maintenance procedures, standards, and routines.
 - b. Specify maintenance and inspection intervals and times.

- c. Identify and document lubrication points, adjustment points, checks for nut or bolt tightness, and anything else that the operators or first-line maintainers can usefully know about.
 - d. Color code lubrication points and adjustment points by interval, e.g., daily, weekly, and monthly checks.
 - e. Identify abnormal conditions in specific terms, e.g., pressure or temperature gage readings, measurements, flow rates.
 - f. Specify action to be taken (e.g., call the mechanic) if conditions are abnormal.
 - g. Define basic inspection procedures this can include:
 - i. Loose, missing, broken bolts fasteners, clamps, etc. Frame and structural cracks, weld failures, etc.
 - ii. Oil/fuel/coolant/air leaks,
 - iii. Accident damage, e.g., bent sheet metal, broken items, etc.
 - h. Specify action to be taken from inspection results, including immediate corrective action, and the raising of work requests for activities which can be deferred. Define how to report conditions which are outside the operator's scope of activity.
 - i. Train workforce personnel in basic maintenance, diagnostics, and reporting.
 - j. Assign responsibilities.
 - k. Rotate tasks among operators and allow them to agree on who does what.
4. *What is meant by Continuous Improvement?*
Continuous Improvement is an ongoing process whereby we try to improve products, services, or processes, in incremental steps.
5. *What are the four stages of continuous improvement which appear on the Deming wheel?*
- a. Plan
 - b. Do
 - c. Check
 - d. Act
6. *What is the role of an Improvement Coordinator?*

An improvement coordinator is a person who acts as a focus for improvement suggestions, receiving proposals and assessing and progressing them.