WORK MEASUREMENT,SAMPLING, STUDY, METHOD STUDY,

TIME STUDY, MOTION STUDY

WORK MEASUREMENT

Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specific job at a defined level of performance.

APPLICATIONS

Work measurement is widely used in factories where work or at least some part of the work is repetitive.

There are three main criteria for jobs to be measurable. They are –

a) The work should be identifiable in terms of the no. of units a worker performed.
b) The work should be performed in a reasonably consistent manner.
c) There should be considerable volume of work to justify a study and keeping counts and records.

PROCEDURE

The steps involved in work measurement are –

SELECT - Selecting the work to be studied.

RECORD – Recording all the relevant data relating to the circumstances in which the work is being done, the methods and the elements of activity in them.

EXAMINE – The recorded data and the detailed breakdown critically to ensure that the most effective motion and method are being used and that unproductive and foreign elements are separated from productive elements.

MEASURE – The quantity of work involved in each element in terms of time, using the appropriate work measurement technique.

COMPILE – To compile the standard time for the operation, which in case of stop watch time study will include time allowances to cover relaxations, personal needs etc.

DEFINE – To define precisely the series of activities and method of operation for which the time has been compiled and issue the time as standards for the activities and methods specified.

WORK MEASUREMENT TECHNIQUES

Work measurement can be carried out by the following techniques.

1) Work sampling
2) Analytical estimating
3) Predetermined time standards(PTS)
4) Standard rate
5) Stop watch time study

1. Is work measurement required in a monopoly market?

Ans- The total process of work study is meant for improving productivity & quality of the outputs of an organisation. This is only required in a fully competitive market rather than in a monopoly market where the customers' needs & requirements are given little or no importance.

2. What are the outcomes of work measurement?

Ans - Work measurement provides the basis for tying payment with outputs in the form of incentives to workers. This aids as a motivating factor for the workers to increase outputs.

3. Does output depend on payment of incentives only?

Ans - There are so many methods applied to motivate people for increased output and Incentive is just one of them. So output cannot be increased by payment of incentives only.

WORK SAMPLING

Work sampling is a method of finding the percentage occurrence of a certain activity by statistical sampling And random observations.

Work sampling is a work measurement technique in which a large number of instantaneous observations are made at random intervals over a specified period of time of a group of workers, machines & process.

PROCEDURE

(A) Preparation for work sampling

1) Statement of the main objective of the study.
2) Obtain the approval of the supervisor of the department in which work sampling is to be performed.
3) Establish quantitative measure of activity.
4) Selection of training of personnel.

5) Making a detail plan for taking observations.

(B) Performing work sampling
1) Describing and classifying the elements to be studied in details.
2) Design and observation form.
3) Determine the no. of days or shifts required for the study.
4) Develop properly randomised times of observation.
5) Observing activity and recording data.
6) Summarising the data at the end of each day.

(C) Evaluating and Presenting results of work sampling
1) Evaluate the validity and reliability of data.
2) Presenting and analysing data.
3) Planning for future studies.

ANALYTICAL ESTIMATING

This is a work measurement technique, which is used to give fair approximation of the time required to carry out some non-repetitive tasks such as maintenance work.

The method is to analyse the job into groups of basic elements and supply element times either from known time study results or from experience of similar work.

ADVANTAGES

1) It has obvious value in preventive maintenance. Target times can be set for jobs, e.g. routine overhauls, and comparison of actual and standard times can supply management with useful information.
2) On production side, the techniques provide standard times in default of synthetic data, for short Production or for new processes. This helps in the design and layout of plant and gives a common yardstick for the comparison or performance between plants or sections.
3) Analytical estimating facilitates much better planning and day-to-day control of labour force and cost control.
4) It provides basis for incentive scheme.
5) When the task has been analysed into elements, these are examined for possible improvements.
6) The most appropriate tools are materials to be carried should be decided and suitable kit boxes and trolleys designed and developed.

WORK STUDY

INTRODUCTION

A manager's job in an enterprise is concerned particularly with the deployment of its resources in order to achieve its Objectives .Different enterprises may have very different resources and different objectives.

For example, a platoon fighting in a jungle, a hospital for the terminally ill, a village grocery stores or computers; they all have some people engaged, with matching available means, to achieve specific ends.

Work study is of interest to a manager because it is concerned with all the resources with which the manager Has to deal with; i.e. people, equipments, workplace and material. He achieving systematic improvement in both effectiveness and efficiency of resource utilization becomes possible.

The two main aspects of work study are –

a) Method study – It is the critical study of ways of doing work.
b) Work measurement – It is the assessment of the time a job should take.

By carrying out investigation along the above line, the engineer will be able to achieve useful results. At the outset, therefore, of any work study programme, it is vital that all concerned should understand the principles, techniques and limitations of work study. As with any facet of management, success depends on the co-operation of the people concerned and positive steps must be taken to obtain the goodwill of those whose work is to be studied. Secrecy or the appearance of secrecy must be avoided at all costs. The ideal situation is one where work study is not considered as a separate entity but as an integral part of all activities.

PURPOSE OF WORK STUDY

The objectives of work study are to obtain the optimum use of the human and material resources available to an organization for the accomplishment of work on which it is engaged. Fundamentally the objectives are –

a) The most effective use of plant & machinery.
b) The most effective use of human efforts.
c) The exact evaluation of human work.

The function of work study is to obtain facts and then to use these facts as basis for improvement.

BENEFITS OF WORK STUDY

1) **Management** benefits through increased efficiency and therefore increased profits.
2) **Worker** is assured of a fair return for a fair day's work. He is protected from unfair demands. The work is made easier and more productive.

3) It provides **trade union** with reliable data for measuring a fair day's work for a fair day's pay and vice versa.
4) This enables trade union to do more objective negotiation with the management based on factual evidence.
5) The **consumer** is assured through work study that he will be provided with greater amount of goods and services of optimum quality at lower prices.

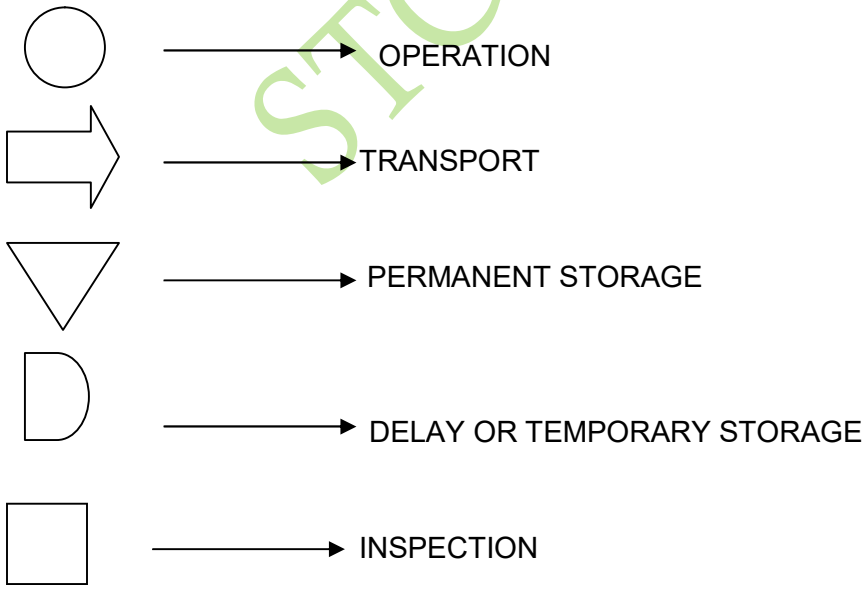
METHOD STUDY

The steps involved in method study of any work are as follows;

1) **Select** – Selection of the work to be studied is a management responsibility. Areas where method study is needed to be done may be indicated by –
    a) Bottlenecks generating high work in progress, long delivery times or unbalanced workflow.
    b) Idle plant or people giving rise to underutilization of resources.
    c) Poor morale evidenced by petty or trivial complaints poor quality and/ or high rate of absenteeism.
    d) Inconsistent earnings where the earnings are tied to output.

It is unwise to carry out a study on a disputed job since the motives of the study will be under suspect.

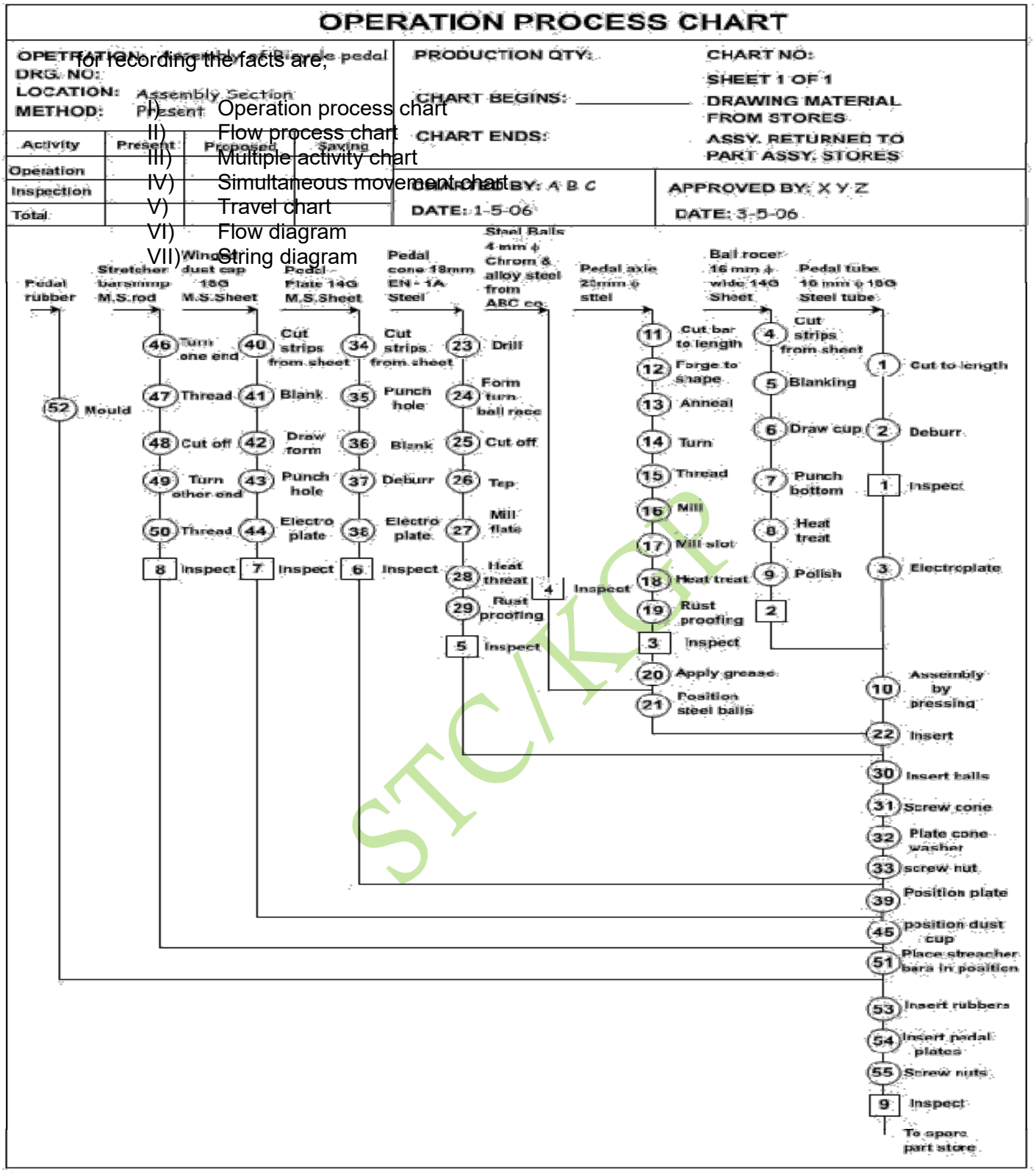
2) **Record** – Once the task is selected, the study will be started by the concerned personnel, recording facts by direct visual observations. Symbols used for recording are as follows -



These symbols combined in a process chart give a vivid picture of a process. Some of the charts and diagrams

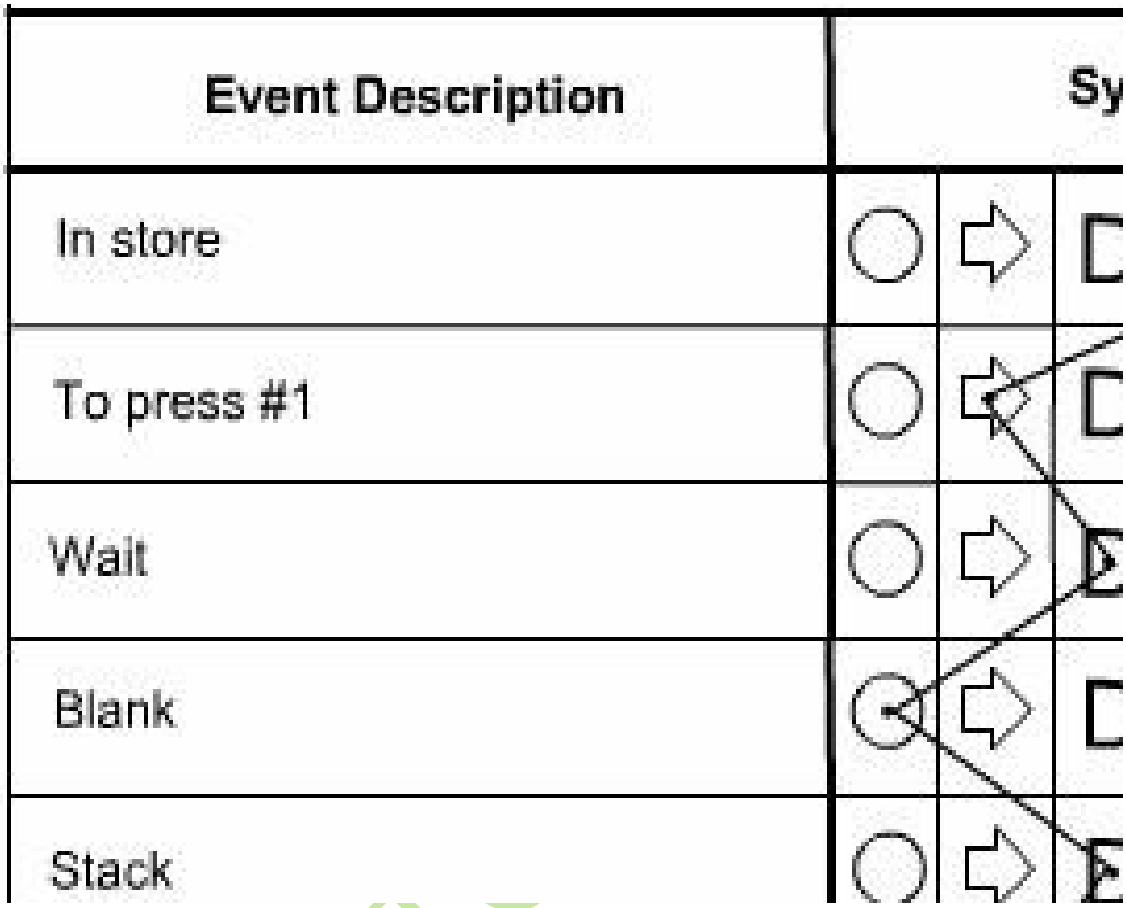
for recording the facts are,

I) Operation process chart
II) Flow process chart
III) Multiple activity chart
IV) Simultaneous movement chart
V) Travel chart
VI) Flow diagram
VII) String diagram



Operation process chart for assembly of bicycle pedal

Flow process chart: A flow process chart is used for recording greater detail than is possible in an operation process chart. It is made for each component of an assembly rather than for the whole



3)Analyse & Develop – The analysis of the facts and the development of a new method can and in general should be carried out away from the place where the task is being performed. Since it is not easy to separate the development from the analysis and for this reason these two are considered together. It is carried out by applying a systematic approach of attacking operations with a series of questions from which bottlenecks can be easily detected.

4)Install – The new method once approved by the industrial engineering department, requires to be installed. A process layout is to be written down and the technique is to be explained to the management first and then to the supervisors and workers concerned. Studies made without any good intention are liable to fail. For installation, requisite training is to be imparted to the operators so that the expected production can be achieved.

5)Maintain – Work habits different from the installed method will develop until the new technique is maintained. To acquire this, continuous vigil is necessary both from the industrial engineers as well as from the supervisors. Methods are to be written down clearly and must be thoroughly understood by the supervisor. If variations in the method is required, the report can be submitted to the study team to incorporate it in the process layout.

1. Is Method study applicable for all organizations?

Ans - Method study is applicable only when we need to increase productivity of an industry and if there is any blockage of work in the process as mentioned in *select.* Hence it is not applicable for all industries.

2. Is Work Study required for ISO 9001:2000 organisations?

Ans – Work Study, ISO 9001:2000 & Total quality management all have acommon goal; i.e. to earn more profits through improved process and optimum utilization of resources. Hence Work study may be very much required in an ISO 9001:2000 organisation.

Time Study

Steps in making a time study

1) Select the work to be study

- The job is a new one not previously carried out.
- A change in material or method of working has been made and a new time standard is required.
- A complaint has been received about the time standard for an operation.
- A particular operation appears to be “bottleneck” holding up the subsequent operations and possibly previous operations.
- Standard times are required prior to the introduction of an incentive scheme.

2) Obtaining and recording all the information about the job, the operator and the surrounding conditions, which is likely to affect the carrying out of the work.
3) Breakdown the operation into “elements.”

4)Measure the time by means of a stop watch taken by the operator to perform each element of operation. Either continuous method or snap back method of timing could be used.

5)At the same time assess the operator’s effective speed of work relative to the observer’s concept of normal speed. This is called performance rating.

6)Adjust the observed time by rating factor to obtain normal time (basic times) for each element.

3) Sum the normal times for each element to develop a total normal time for the task

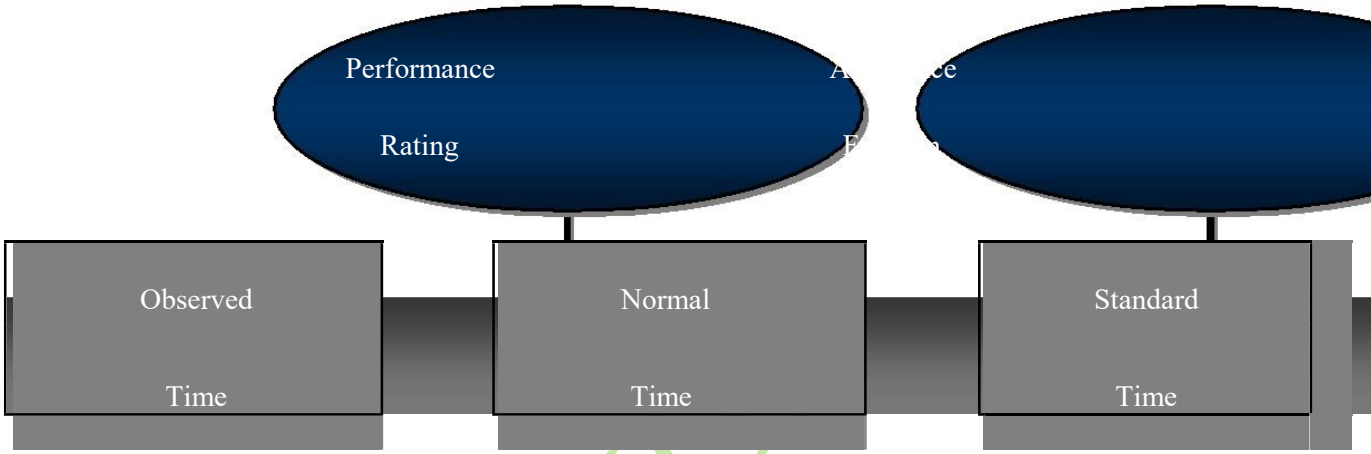
7) Determining the allowances to be made over and above the normal time for operation.

8) Determining the “standard time” for the operation.

9) Test and review standards wherever necessary.

Time study

- Personal time allowance : 4% - 7% of total time - use of restroom, drinking water, etc.
- Fatigue allowance - to compensate for physical or mental strain, noise level, tediousness, heat and humid assumption of an abnormal position, etc.
- Delay allowance - based upon actual delays that occur.



Standard time = observed time + rating factor + Personal allowance + Fatigue allowance + delay allowance + work related contingency allowance.

- Observed time = 8.6 minutes
- Performance rating = 0.95
- Allowance fraction = 0.125

Find the standard time

Normal time = Observed time x Performance rating = 8.6 x 0.95
= 8.17 minutes

Standard Time = Normal time / (1 – Allowance fraction) = 8.17 / (1 - .125)
= 8.17 / (0.875)
= 9.337 minutes

Motion study

. Motion study is a technique of analyzing the body motions employed in doing a task in order to eliminate or reduce ineffective movements and facilitates effective movements.

- By using motion study and the principles of motion economy the task is redesigned to be more effective and less time consuming.
- Objective of motion study is job simplification so that it is less fatiguing and less time consuming.
- Lillian Gilbreth used motion picture to study worker motions – developed 17 motions called “therbligs” that describe all possible work.