WORK STUDY

❑Defined as the analysis of a job for the purpose of finding the preferred method of doing it and also determining the standard time to perform it by the preferred or given method. It is the systematic examination of activities in order to improve the effective use of human & other resources. Work study, therefore, comprises of two areas of study. Method Study (Motion Study) & Time Study (Work Measurement).

.

METHOD STUDY PROCEDURE

❑Method study (also sometimes called Work Method Design) is mostly used to improve the method of doing work. The following is the procedure followed in the work study. Select the job on which method study is to be applied. Gather the information - Examine the information. Develop the suitable method - Install the process - Maintain the process.

.

METHOD STUDY PROCEDURE

❑Method study (also sometimes called Work Method Design) is mostly used to improve the method of doing work. The following is the procedure followed in the work study. Select the job – on which method study is to be applied- Gather the information - Examine the information.-Develop the suitable method - Install the process.-Maintain the process.

STEPS INVOLVED IN METHOD STUDY

- Select – Record – Examine – Develop – Install - Maintenance

METHOD STUDY

- Economic Factors: High labor, machinery & Maintenance. Technical Factors : Poor Training & knowledge, Not fit for the job. Human Factors: Age group (high /low), Promotions, salary.

- **Objectives:** To improve the labor work. To improve the usage of machinery. To improve the production .To improve the training on the work methods. To improve the knowledge on the work. To select suitable for the job. To improve the promotions. To improve the position of the worker.

TIME STUDY

- Work measurement, also called time study, establishes the time taken by a qualified worker to complete a specified job at a defined level of performance.

- **PURPOSES:** To develop costing system. To determine the production schedules. To develop incentive schemes. To compare the time taken by alternative methods of a given job. To standardize the job in terms of standard time. To determine the optimum number of men and machines to ensure their effective utilizations.

TIME STUDY - PROCEDURE

- ❑Step 1: Define objective of the study.
- ❑Step 2: Verify that the standard time.
- ❑ Step 3: Select operator to be studied.
- ❑Step 4: Record information about the standard time.
- ❑Step 5: Calculate the Normal Time.
  - ▪Normal time = Observed time x Rating Factor.
- ❑Step 6: Determine allowances for fatigue and various delays.
- ❑Step 7: Determine standard time of operation.
  - ▪Standard time = Normal time + allowance.

TIME STUDY - PROCEDURE

- Have necessary skill for the job.
- Have sufficient experience with the given the job.
- Have the speed of working.
- Have knowledge about the purpose of job.

WORK SAMPLING

- Work Sampling is a fact finding approach. Work Sampling is based upon the laws of probability. A sample taken at random from a large group tends to have the same pattern of distribution as the large group or universe. Includes. Activity and Delay Sampling : To measure the activities and delays of workers or machines (e.g. to measure the percentage of the day that a person is working or not working). Performance Sampling : To measure working time and non-working time of a person on a manual task, and to establish a performance index or performance level for the person during his or her working time.

WORK SAMPLING PROCEDURE

. Define the problem - State the main objectives of the problem – accuracy – confidence level-Describe the details of each element to be measured- Conduct a pilot study-Calculate the percentage of occurrence of the delay-Design the sample size-Record the information-Summarize the information-Prepare the report.

PMTS

- **Predetermined motion time system (PMTS)** is a work measurement technique whereby times established for basic human motions are used to build up the time for a job at a defined level of performance.
- PMTS also called **predetermined time system (PTS)**, is a database of basic motion elements and their associated normal time values, together with a set of procedures for applying the data to analyze manual tasks and establish standard times for the tasks.
- They include motions such as **reach, grasp, move**, and **release**.

PMTS - ADVANTAGES

- PMT systems offer a number of advantages over stop-watch time study. With PMT systems one time is indicated for a given motion, irrespective of where such a motion is performed.
- A PMT system, which avoids both rating and direct observation, can lead to more reliability in setting standard times.
- PMT systems are not too difficult to apply and can be less time consuming than other methods.
- PMT systems are particularly useful for very short repetitive time cycles such as assembly work in the electronics industry.

PMTS - CHARACTERISTICS

TABLE 14.1 Characteristics of PMT System Levels

Characteristic	First-Level PMTS	Higher-Level PMTS
Accuracy	Most accurate	Less accurate
Application time	Much time to set standard	Less time to set standard
Suited to specific types of tasks	Highly repetitive	Repetitive or batch
Cycle times	Short cycle (e.g., 1 min)	Longer cycle times feasible
Motion elements	Basic motions	Aggregates of basic motions
Methods description	Very detailed	Less detailed, easier to apply
Flexibility of application	Highest flexibility	Less flexibility

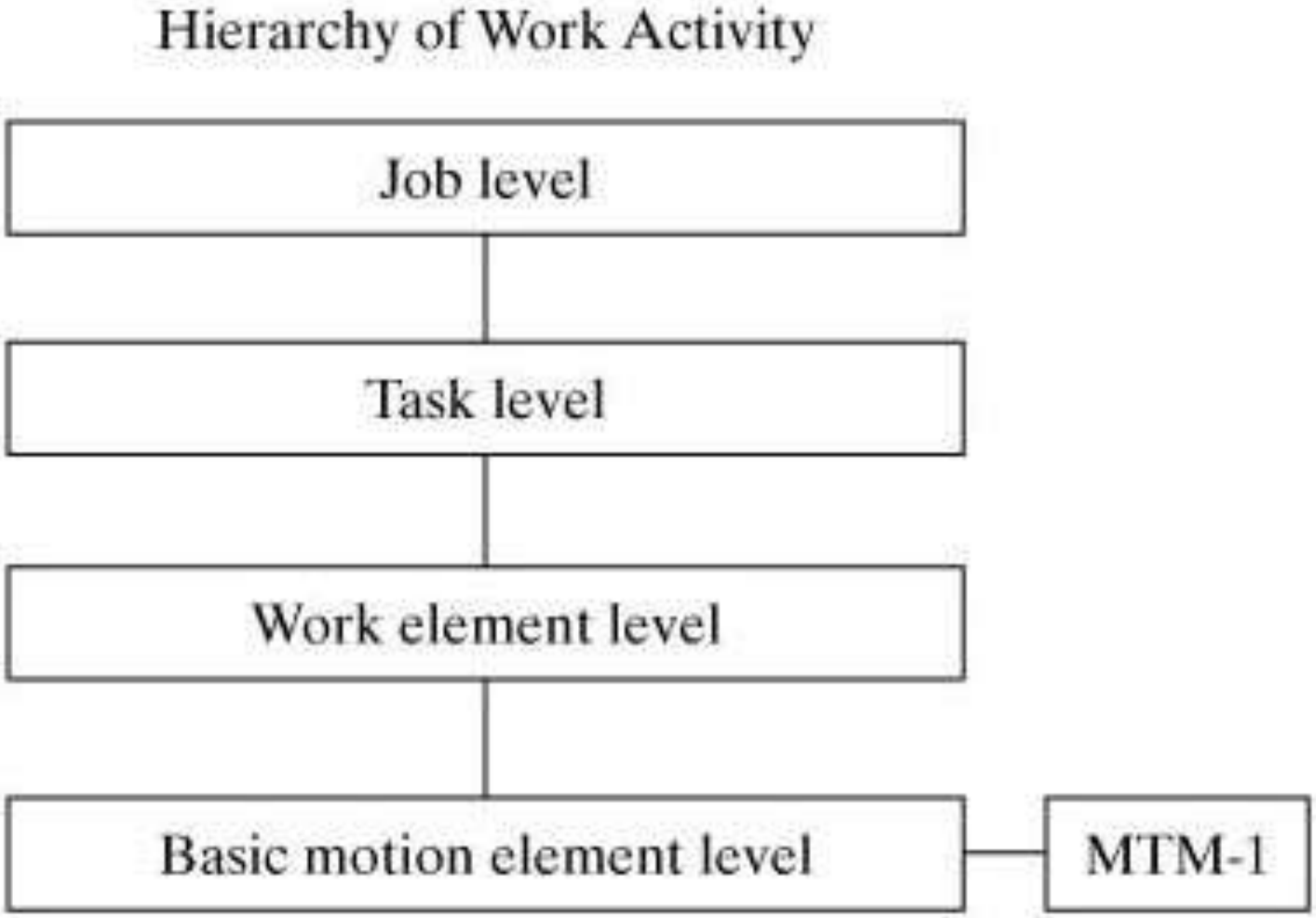
MTM

- MTM is a procedure which analyzes any manual operation or method into the basic motions required to perform it, and assigns to each motion a predetermined time standard which is determined by the nature of the motion and the conditions under which it is made. MTM gives values for the fundamental motions of: reach, move, turn, grasp, position, disengage, and release. Most predetermined motion time systems use time measurement units (TMU). One TMU is defined to be 0.00001 hours, or 0.036 seconds.

MTM - ADVANTAGES

- Improving existing methods to increase production and decrease labor cost per unit. Establishing time standards as basis for wages and incentive plans.
- Developing time formulas or standard data for future use guiding product design for most efficient manufacture effective tool designs for most efficient manufacture. Selecting effective equipment for most efficient manufacture.

MTM - HIERARCHY



RATING TECHNIQUES

- The purpose of rating is to determine from the time actually taken by the operator being observed the standard time which can be maintained by the average qualified worker and which can be used as a realistic basis for planning, and incentive schemes. Time study is concerned with speed at which operator carries out the work, in relation to the concept of normal speed.“Speed” here means the effective speed of operation.

$$\text{Observed time} \, x \, \frac{\text{Rating}}{\text{Standard Rating}} = \text{Basic Time}$$

WORK FACTOR SYSTEM

- Estimate of the effort or time needed by a potential perpetrator, with specified expertise and resources, to overcome a protective measure. A Work Factor is an estimate of the effort or time needed by a potential adversary, with specified expertise and resources, to overcome a protective measure.
- A workplace factor is anything that positively or negatively affects an employee's ability to: (a) do their job well and (b) feel engaged in and fulfilled by their work. Examples of workplace factors include: Quantity and quality of workload.

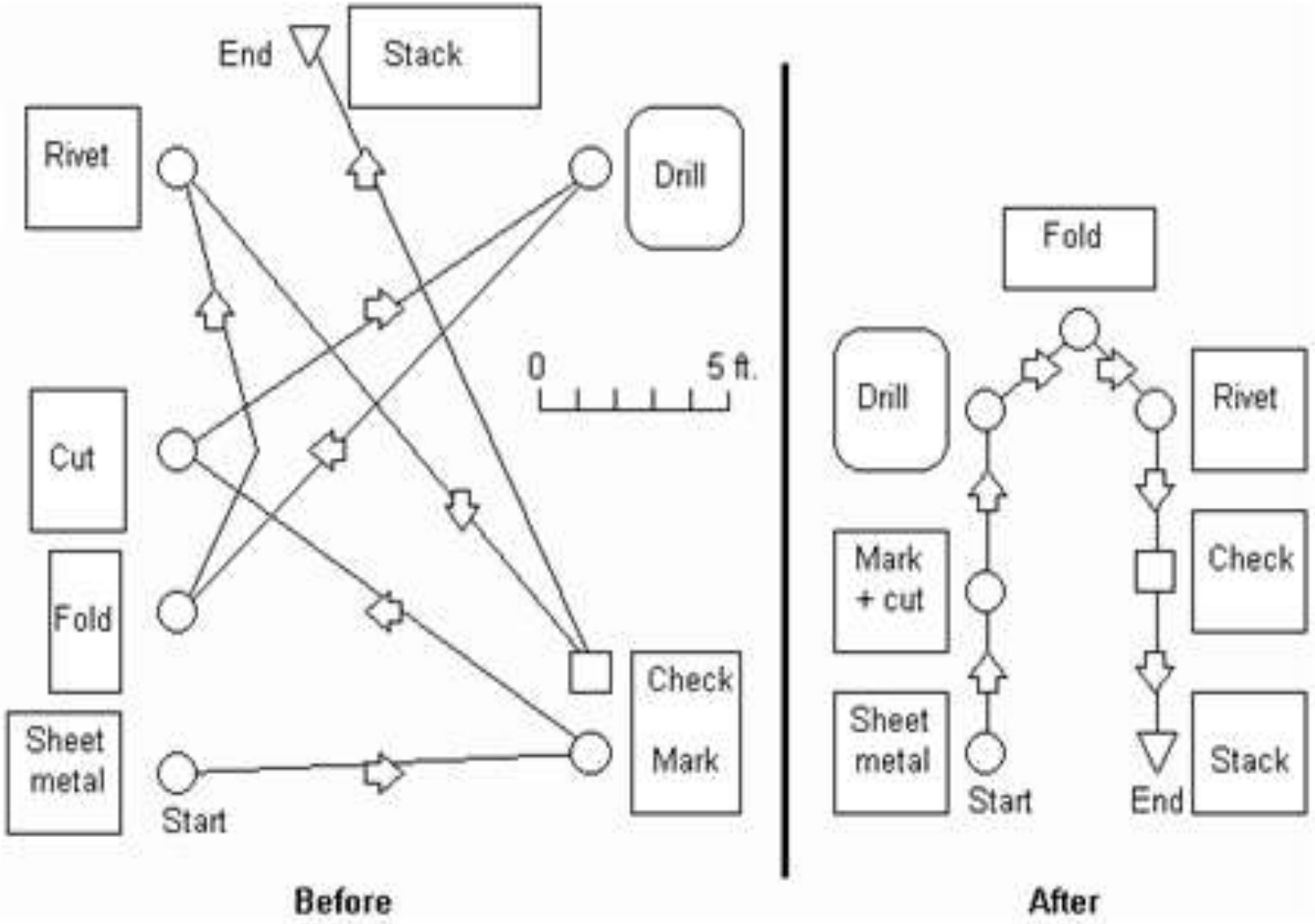
WORK FACTOR SYSTEM

- A workplace factor is anything that positively or negatively affects an employee's ability to: (a) do their job well and (b) feel engaged in and fulfilled by their work. Examples of workplace factors include: Quantity and quality of workload.
- WORK-FACTOR, WF, is a detailed system of Method study and Time study for analyzing the actions and motions of workers. It is a system of pre-determined times, also called a P.E.M.T.S., Predetermined Elemental Motion Time System. The system is based on the pioneering work of Frank B.

STRING DIAGRAMS

- String diagram is a scale plan of the shop, in which every machine or work bench is marked and a peg is struck in the area representing a facility. A continuous colored string traces the path traced/adopted by the operator or materials or machines while performing particular activity. String diagrams are a formal graphical language for representing morphisms in monoidal categories, or more generally 2-cells in 2-categories. They are a prominent tool in applied category theory.

STRING DIAGRAMS



STRING DIAGRAMS

- String diagram is a simple tool for analyzing and designing work space such that movement can be minimized. The basic diagram is a scale plan or model on which a thread is used to trace and measure the path of workers.
- Materials or equipment during a specified sequence of events. It is also common to indicate type of actions being done at each point. This is typically done using the same symbol set that is used in the flow process chart.
- String diagram is a simple tool consisting of a scale plan or model on which a thread is used to trace and measure the path of workers, materials or equipment during a specified sequence of events.