Work Study

Work study is an Imp. tool in hands of managment for achieving greater productivity in the Organisation.

→ It is an analytical study of the use of workers, materials & equipment in Order to Improve existing methods of work performance by elimination of every type of waste.

Work Study Techiques

- Method study
- Work measurment

objective of Work Study

1) To analyse the present method of doing a job systematically in Order to develop a new & better method.

2) To establish standard time by measuring the time required to do the job by a qualified worker.

3) To Inc. the productivity & to achieve best quality product at min. cost

4) To Improve operation efficiency.

Aim: Work Study

1) Effective use of manpower
2) Effective use of method, machine & equipments
3) Efficient layout & plant & improved workflow.
4) Simplification & standardisation of operations.
5) Increase productivity & operational efficiency.
6) Reduced material handling cost.
7) Greater job satisfaction to employee.

Steps in Work Study

It includes Eight step process —

(1) Identify & select the job.
(2) Recording - (using the most effective recording techniques)
(3) Examine & analyse (data & facts obtained in previous steps examined)
(4) Develop the most economical method.
(5) Measure the quantity & work using appropriate methods & measurement. Cal. std. Time.
(6) Define best method & required Time.
(7) Install new method
(8) Maintain the standard practice by a proper control mechanism.

Method Study → It is the systematic recording & critical examination of existing & proposed ways of doing work.

Work Measurment → It is the application of techniques design to establish time for a qualified worker to carry out a specified job at a defined level of performance.

Involvement of Trade Unions

Resistance to Work study by workers & Unions –

Work study is often resisted by workers ez of fear of financial loss & creating social problems.

For overcoming such resistance, the following steps should be taken by management –

1) Management must take initiative for free consultation with the workers, unions before the work study is started.

2) There must be a definite policy for the adjustment of the redundant unnecessary worker or their voluntary retirement.

3) Work study Improve the flow of work & supply of material

Resistance to Work Study by Managers -

Managers may also show resistance to work study as it involves chages in work method & learning of new practices.

Resistance to work study by managers can be overcome by following steps -

1) Adequate communication of the purpose & benefits of work study to organisation & the staff.

2) Misconceptions about work study must be cleared.

3) The suggestion by the managers should be given due to consideration.

4) The managers must be given a role in planning & implementation of work study. -

Method Study OR Work Simplification

It can be defined as systematic procedure for analysing the existing method of doing a job including the various human movement involved in it.

→ The main objective of method study is to evolve the most economical method of doing the job.

Study

Objective of Method Study

1) To Improve manufacturing process & procedure.
2) To Improve factory, office & workplace layout.
3) To Improve plant & equipment design.
4) To Reduce human fatigue & effort in performance of work.
5) To Improve the use of manpower, machine power & material.
6) To Improve physical working Condition.

Advantage – ① Improved working method
② Work Simplification ③ Better product quality.
④ Improved workflow & workplace layout
⑤ Improved equipment design.
⑥ Higher Safety to workmen
⑦ Optimum utilization of all resources.

Steps in Method Study → [SREDIM]
↓
Stand for a six Verb
↓
(activities or steps)

Select (S) → Record (R) → Examin (E) → Develop (D) → Install (I) → Maintain (M)

SREDIM approach to method Study

2) Collection of Recording facts → all the Relevant
3) Examination of data → all the facts recorded
4) Development of improved method → The best method
5) Installation → The New method
6) Maintenance. → The New method by Routine checks.

Purpose ~~Techniques~~ of Method Study

It may be noted that method study covers three broad areas —

(i) It is a diagnostic tool (Locating faults)
(ii) It is a Remedial tool (Improvement of situation)
(iii) It is a Constructive tool (Sets standard for control)

Economic Consideration In method Study

(i) Cost of study
(ii) Time loss due to Investigation
(iii) Costs associated with the Implementation of changes In present methods.

(The Considerations for above three costs are imp, as the method study is primarily based on the principle of economic use of resources.)

Process Analysis

- It is a part of method study / work simplification programme in any enterprise.

→ It deals with the subdivision of process of manufacturing into its basic elements & also the subdivision of material movements.

→ A process usually consists of -

(a) Set of tasks (b) flow of material

(c) storage of material & Information

Advantages of Process analysis

1) It facilates understanding of the overall nature of process under study.

2) It eliminates the Unproductive & Unnecessary elements in the process.

3) It eliminates Improper Utilisation of men & machines.

4) It ensures Speedy work by cutting delays.

Steps In Process Analysis

1) Select the Process

2) Breakdown the Process Into Operation.

Construct a process chart & a flow diagram.
Analyse the process chart & flow diagram
5) Reconstruct the process chart.
6) Test the proposed method.
7) Explain the New method to workers & put it into operations.

Process charts

A process chart is a diagram which gives an overall view of the process.
→ It helps in visualising various possible alternations or improvements.
→ It Records graphically the operations connected with a process.
→ No. of Symbols Used in Process Chart.

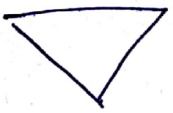
Process chart Symbol →

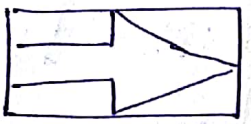
(1) Operation → ○ → It indicates the main steps in a process.

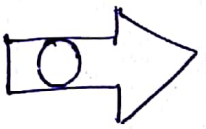
(2) Transportation → ⇨ → It indicates the movement of material

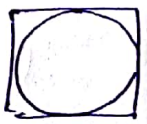
(3) Inspection → □ → It indicates any type of Inspection or checks measurement.

(4) Delay → D → It occurs when something stop the Process.

Storage →  → It indicates a stage when a finished goods awaits in actin.

(6) Transportation & Inspection →  → It indicates the Combined activity of Transportation & Inspection.

(7) Operation & Transportation →  → Combined activity of O & T

(8) Inspection & Operation →  → Combined activity of I & O.

The process chart may be classified as —

1) Outline Process chart
2) Flow Process chart - multiple activity chart.
3) Two hand Process chart

(1) Outline Process chart

→ This chart records overall picture of process & states of only main events.

→ It consider only main operations & Symbol & thus it makes use of only two symbols.

→ Symbol used are — operation ○
& Inspection □

Flow Process chart

→ It is the detailed version of outline process chart.

→ It Records all the events.

→ It is defined as a graphic representation of all operations, transportation, inspection, delay of storage occuring during the procedure & also includes information such as time required & distance moved.

→ It is of three types — (i) Man flow process chart
(ii) Material " " "
(iii) Equipment " " "

Objective of Flow Process chart

(i) To Visualise the Complete sequence of events occuring in a process.

(ii) To Study events in a Systematic manner.

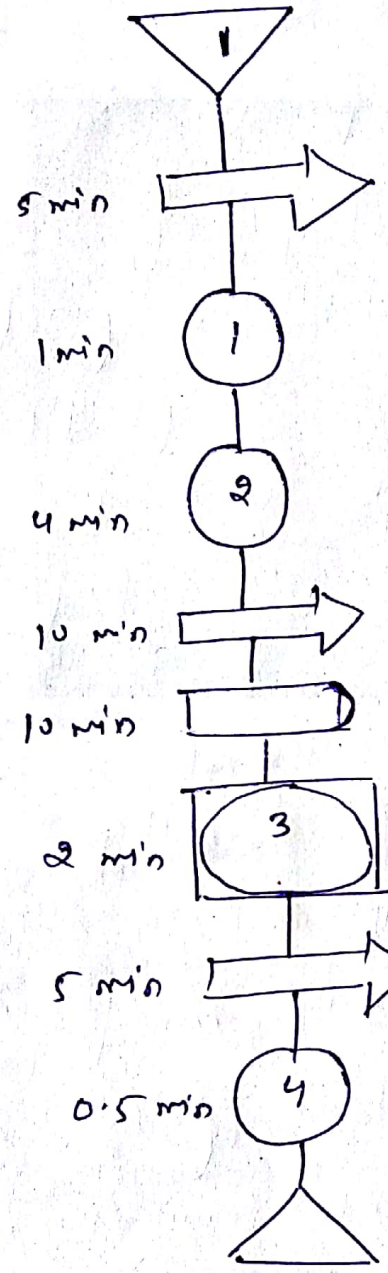
(iii) To Reduce distance travelled by raw material during the process of manufacture.

(iv) To Reduce distance travelled & storage of finished parts.

(v) To minimise movement of men in shop.

(vi) To eliminate non-productive time of operation.

Flow process chart for machining the component-



Summary of flow Chart

Symbol	frequency	Time	distance
○	4	7.5 min	–
⇨	3	–	20
▭	1	2 min	–
D	1	10	5
▽	2	–	–

Multiple Activity chart

→ It is a chart on which activities of men or machines are recorded on a common time scale in order to show their interrelationship.

→ The multiple activity charts are used to study ideal time of man & machine.

→ These charts are used when a process involves a coordination of services.

Objective

→ To detect the ideal time of machine & man.

→ To optimize work distribution b/w workers & machines.

→ To Balance the work team & to decide the no. of workers in the group.

→ To develop the improved method of doing a task.

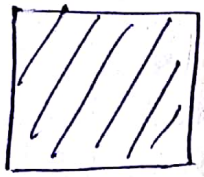
Types of multiple activity analysis chart –

(i) Man - machine chart :- One man handling machine

(ii) Man - multimachine chart :- One man handling a no. of machine.

(iii) Multi-man machine chart :- A no. of persons working on a Computer System. Two symbols are used in the chart. One shows working & other shows idle condition.

Symbols are shown as –

Symbol	Description
1. 	The shipped space shows that both man & machine are working.
2. 	It is used to show that one of the two i.e. man or machine is in idle state.

How to draw multiple activity chart ?

→ To draw multiactivity chart, a seprate Vertical bar is used for each man or machine.

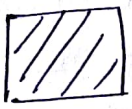
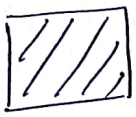
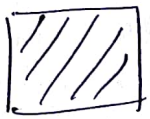
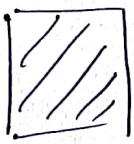
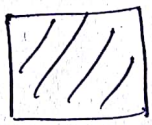
→ A Common time Scale is provided for all machines & operators.

→ Activities of each machine or man is marked in the respective Colounm.

Application of multiple activity chart

1) Plant Repair & maintenance.
2) Planning Team Work
3) Manage the Jobs etc.

Multiple activity chart

Time	Man			Machine	Time
0.5	Cleaning & Casting			Idle	0.5
0.5	Fitting to Remove sharp edges			Idle	0.5
0.4	Keep casting in box & pick up next.			Idle	0.4
1.0	Cleaning of machine			Idle	1.0
1.2	Locate casting in fixture & start machine			Idle	1.2
1.5	Idle			Cutting Slot	1.5
2.0	Idle			Cutting (min)	2.0

Two Handed Process chart

This is the most detailed type of flow chart in which the activity of the workers hands are recorded in relation to one another.

→ It gives Synchronised graphical representation of the sequence of manual activities of workers.

→ Two handed process chart has two charts, one for the left & other for the right hand.

→ The Simultaneous activities are recorded opp. to each other on the chart.

Symbol

1.	○	operation	An operation occurs, whenever the hand grasps, assembles tools etc.
2.	⇨	Transport	It occurs when the hand moves from one position to another at the workplace.
3.	▭	Delay	When there is no any activity performed.
4.	▽	HOLD	A hold occurs when the hand holds an object. so that the other hand may be able to do something to that obj.

Flow Diagram & String Diagram

The flow process chart shows the sequence of nature of movement, but it does not show the path of movements.

→ There are undesirable features like back tracking & unnecessary long movements, so to record these unnecessary features flow & string diagram are used.

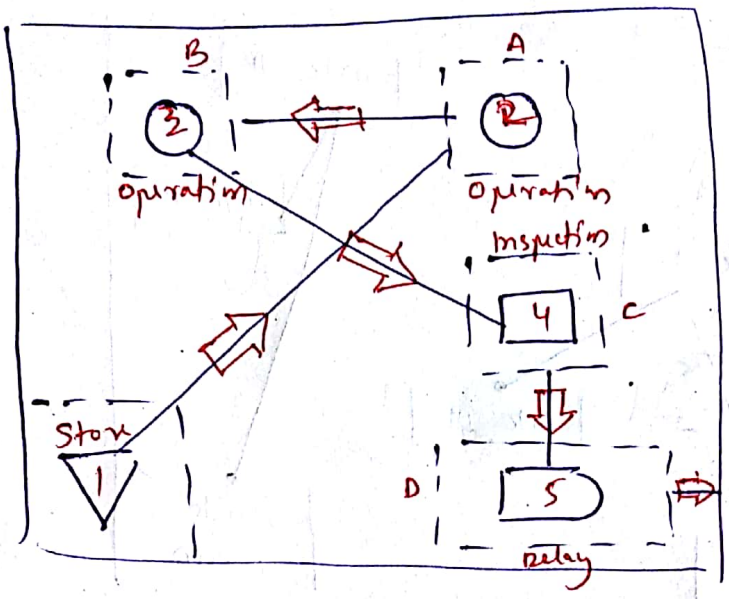
FLOW DIAGRAM

→ It is a drawing showing the various activities identified by their numbered symbols & are associated with a particular flow process chart i.e. man or material type.

→ The Relative positions of the m/c tool, work benches, storage, Inspection benches are marked on scale.

→ The path followed by material / man is traced by drawing lines.

→ The raw material from the store move to station A, where a operation is performed. The semifinished component is sent to station B.



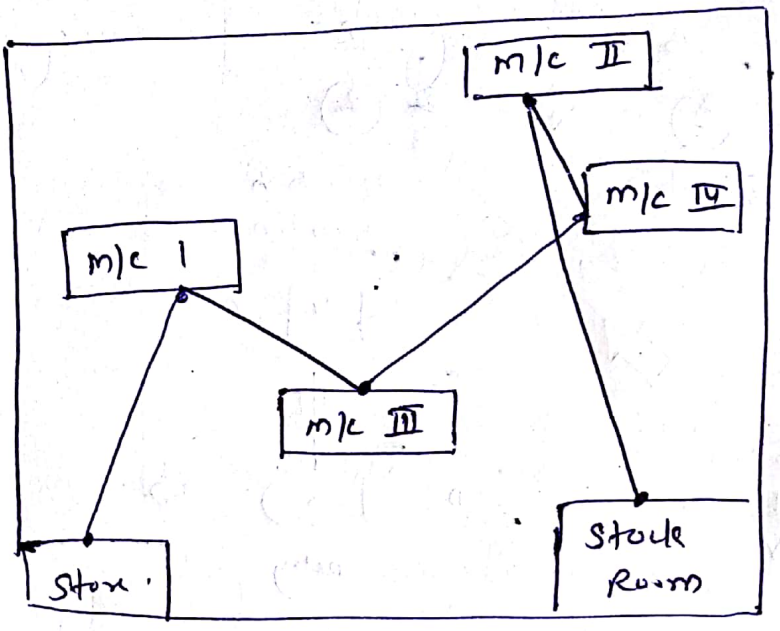
STRING DIG.

→ A string dig: is layout drawing on which the length of string is utilised to record the extent as well as pattern of movement of operators, material, machine working in a limited period.

→ When paths are many & repetitive, a flow dig. becomes congested & it will be difficult to understand. In such condition, the string dig. is prefered.

→ string dig is a scale plan of the shop on which length of string is used to record the extent.

→ It provides the actual distance travelled during the period of study.



adv.

1) It is useful in such cases, where there are many paths of a repetitive nature.
2) It indicates clearly the backtracking, over utilised paths, under-utilised paths.
3) It is very helpful in deciding the most economical routes to do a particular operation.

TRAVEL CHARTS

TRAVEL CHART

UNIT-3

→ Travel chart is quicker & more manageble recordig technique.

→ A ~~Tabular~~ Travel chart is a tabular record for presentig quantitative data about the movment a workers, materials or equipment b/w any no. & places over a given period & Time.

→ Travel chart is a square shape, having small squares within the main square.

→ Each small square represents a work Station.

→ Due to Involvments & many complex movment in string diagram it becomes very complicated, So In such condition we use Travel chart.

Models

Sometime when the picture & existig condition is not clear by the use & process chart or flow diagram, models are used to provide visual representation & proposed layout before proceedig the actual arrangment & the Workplace.

Type — → 2D Model
→ 3D Model

2D Model :-

Two dimensional models are used for various machines, equipment & benches.

→ They are made from cardboard, plywood or plastic sheets.

→ With the help of 2D model, there is a saving of lot of time.

ii) 3D Model :-

These are three dimensional model or Block model represent the real situation because besides length & width they show the height of facility also.

→ These models are useful in industries, plant, flour mill etc.

MOTION STUDY

→ Initiated by Frank Gilbreth & his wife Lillian Gilbreth.

Motion study is a device of work Improvement or work simplification.

→ Motion study is a scientific way of determining the best method of doing work with the help of a close security of the motions made by a worker or machine.

→ The aim of motion study is to find scheme of least wasteful method of labour.

Therbligs

The analysis of breakdown of a task into basic elements of motion is called 'THERBLIGS'.

Therblig analysis

Gilberth's System of Therbligs

 Search

 Find

 Select

 Grasp

 Position

 Transport loaded

 Assemble

 Use

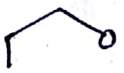
 Disassemble or take part

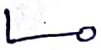
 Inspect

 Prepare for next operation

 Release load

 Transport empty

 Wait (an unavoidable delay)

 Wait (A.D)

 Rest

 Plan

Micromotion study (objective, steps)

. Micromotion study is a set of technique intended to divide human activities into groups of movements or micromotions.

→ micromotion study technique is best suited for those operation which are short in cycle & which are repeated thousand of times.

→ It is the study of movement to find one best pattern of movements that consume less time & require less effort to accomplish the task.

→ It is the study of fundamental element of an operation with objectives the help of high speed movie camera in order to eliminate the unnecessary motion involved in operation & balancing necessary motion.

i) To assists in finding the most efficient way of doing a work.

ii) To help to study repetitive short cycle operation which cannot be studied by existing methods.

iii) To train the operater regarding the motion economy.

(iv) To assist in research ~~work~~ projects in the field of work study.

(v) To keep record of method.

(vi) It helps to study complex activities of short duration performed with extreme rapidity.

Steps In Micromotion study :-

1) Filming the Operation to be studied
2) Analysing the film
3) Charting the results of analysis (graphic representation).
4) Developing an Improved method.

Equipment Required for filming the Operations -

1) Movie Camera
2) 16 mm film - Used for Recording both sound & vision.
3) Microchronometer / Wink counter - It is a digital device, thus it read quickly. It is a timing device.
4) Exposure metre - to determine exposure.
5) Flood light & reflectors.
6) Motion picture projector with screen.

Principles of Motion Economy → It is developed to

achieve synchronisation of human body movements, best layout of workplace & optimum design of equipment.

Ⓐ → There are five basic principle -

Ⓑ → Principle of ① minimum movement ② Simultaneous & Symmetrical movement ③ Rhythmic movement ④