

Department of Mechanical Engineering  
 B.E. Semester – VI  
**Industrial Engineering (2161907)**  
 List of Experiments

Sr. No.	Title	Date of Performance	Date of submission	Sign	Remark
1	To Study & Prepare Operation Process Chart (OPC) for given assembly.				
2	To Study & Prepare Flow Process Chart and Flow Diagram for given assembly for OPC.				
3	To study & Prepare Man-Machine Chart for the given situation.				
4	To study & Calculate co-efficient of correlation for time study person using performance rating technique.				
5	To study & Calculate standard time for given job.				
6	To study & Prepare a frequency Distribution Curve for the data source given.				
7	To study & Construct X bar- R Chart for given process.				
8	To study & Construct P-chart for given process.				
9	To study & Construct C-chart for given process.				
10	To study about Sampling Plans & Decide about acceptance or rejection of a particular product using sampling plans.				
11	Tutorial – 1: Example solved on plant layout				
12	Tutorial – 1: Example solved on Forecasting				

# EXPERIMENT NO: - 01

**AIM:** To Study & Prepare Operation Process Chart (OPC) for given assembly.

**OBJECTIVES:** After completing this experiment, you will be able to:

- Identify operations and inspections.
- List the operations and inspections involved in manufacturing process of each part of an assembly or processes.
- Note down details about materials, machines and equipment used for each component of an assembly.
- To understand sub assembly and assembly procedure.
- Construct Operation (Outline) Process Chart.

## Introduction: -

**Work Study:** - It is a generic term for those techniques, particularly method study and work.

**Method Study:** - Method study is the systematic recording and critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing costs.

**Work Measurement:** - Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at defined level of performance.

[Work Study by ILO page no; 28, 29]

Thus work study is a management technique to increase productivity and is divided into two broader concepts Method Study and Work Measurement.

As per the definition of method study the main objective, is to improve the existing method of doing work and to develop more effective and economical method. Method study uses different methods to record the data.

The most commonly used method study charts and diagrams are as follows:

### **A. Charts: *Indicating process SEQUENCE***

Outline Process Chart,

Flow Process Charts (Man, Material & Equipment type)

Two handed process Chart.

### **B. Charts: *using a Time Scale***

Multiple Activity Chart (Man-Machine Chart)

SIMO Chart

### **C. Diagrams: *Indicating movement***

Flow Diagram

String Diagram

Cycle graph

Chrono cycle graph Travel Chart.

In this experiment we are going to study about Operation (Outline) Process Chart.

**Operation (Outline) Process Chart:** It is a process chart giving an overall picture by recording in sequence only the main operations and inspections. In an outline process chart, only the principal operations are carried out and the inspections made to ensure their effectiveness are recorded, irrespective of who does them and where they are performed. In preparing such a chart, only the symbols for 'operation' and 'inspection' are necessary.

### **Symbols used for Operation (Outline) Process Chart.**

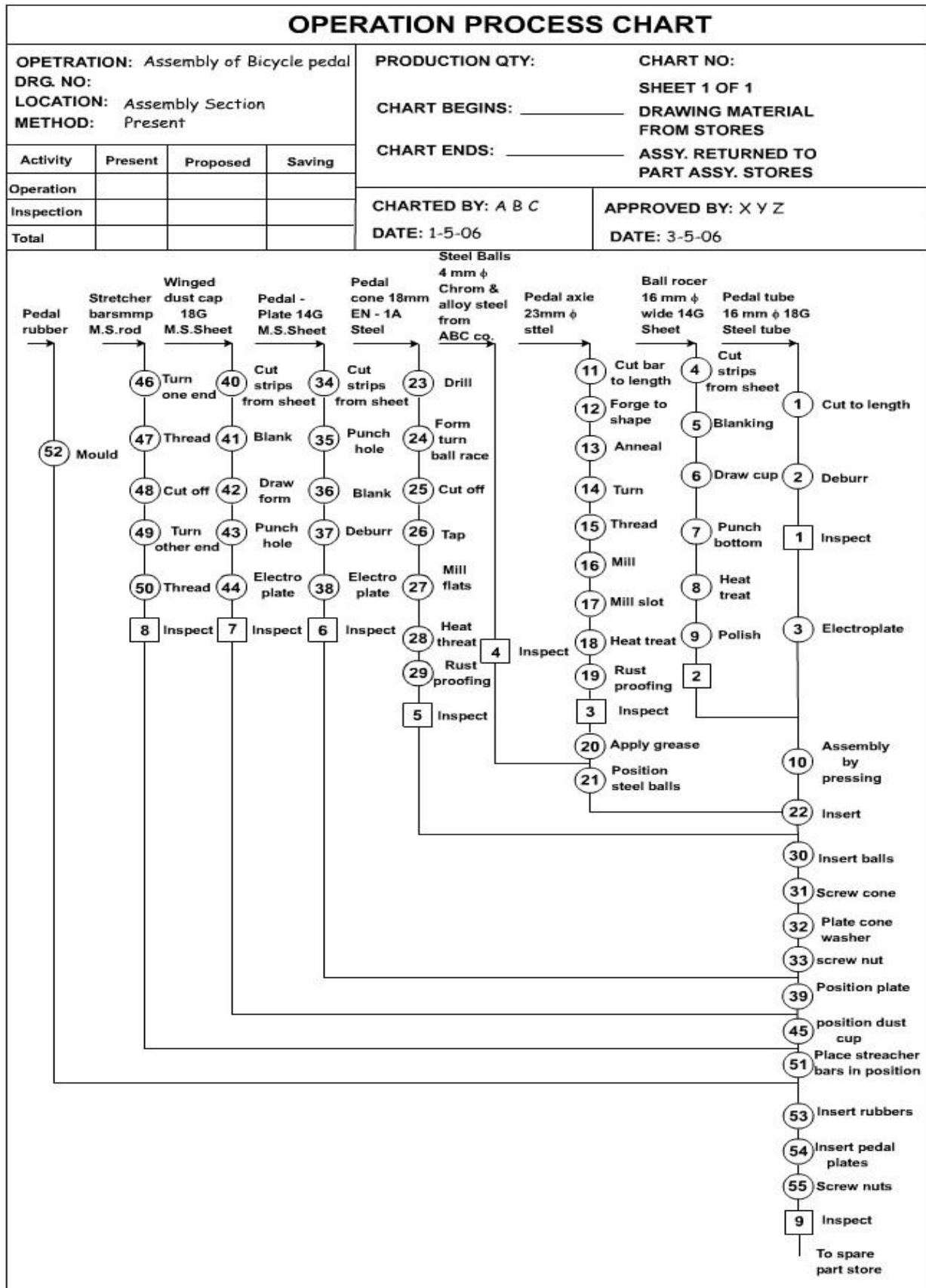
**Operation:** - The symbol for operation is as shown:

**Operation** indicates the main steps in a process, method or procedure. Usually the part, material or product concerned is modified or changed during the operation i.e. physical / chemical e.g. changing shape in machining, chemical change during chemical process; adding or subtracting during assembly or disassembly. When man type charts are produced operation is indicated when any activity or work is done by the man who is used for that particular scenario, for e.g. a clerical routine, an operation is said to take place when information is given or received, or when planning or calculating takes place.

**Inspection:** - The symbol for inspection is as shown:

**Inspection** indicates an inspection for quality and / or a check for quantity. e.g. measurement of dimension/values, etc., counting number of components etc., An inspection does not take place the material any nearer to becoming a completed product. It merely verifies that an operation has been carried out correctly as to quality and/or quantity, were it not for human shortcomings, most inspections could be done away with.

*[Work Study by ILO page no: 70-72]*



Operation process chart for assembly of bicycle pedal

Figure 1.1: Example of OPC for an assembly of bicycle pedal

**Exercise: Construct OPC for the given assembly and situations.**

1. Manufacturing blade assembly of table fan. Each blade consists of the following components:

(i) Blade. (ii) Fixing plate. (iii) Three pieces of bolt and nut pairs. (iv) Six pieces of washers

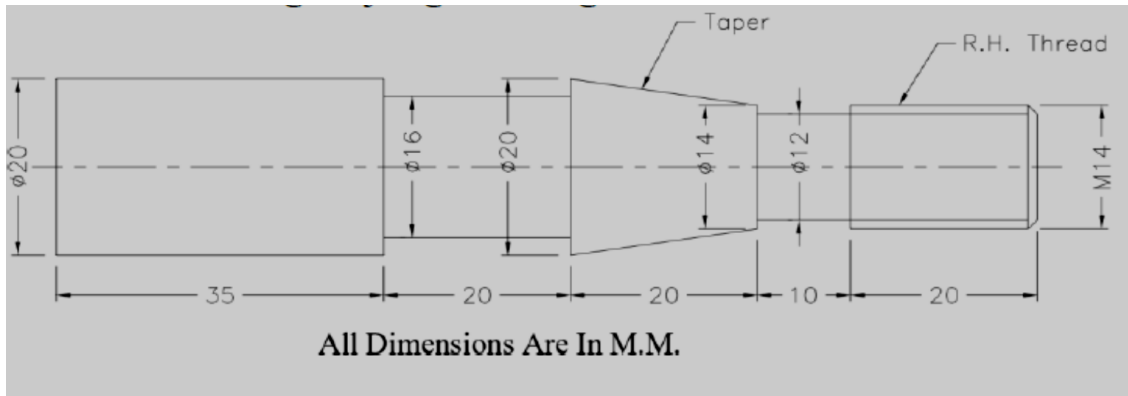
2. Assembly of Nut Bolt and Washer

3. Writing a letter using a short hand typist. :

Chart Begins: Short Hand typist in his office awaiting for dictation.

Chart Ends: Short Hand typist put typed letter and its copies in Dispatch Tray.

4. For manufacturing the job given in figure. Construct for both material and machine tool used.



5. Repair of Car punctured tyre.