

PRODUCT DESIGN

Product design is a strategic decision as the image and profit earning capacity of a small firm depends largely on product design. Once the product to be produced is decided by the entrepreneur the next step is to prepare its design. Product design consists of form and function. The form designing includes decisions regarding its shape, size, color and appearance of the product. The functional design involves the working conditions of the product. Once a product is designed, it prevails for a long time therefore various factors are to be considered before designing it. These factors are listed below: -

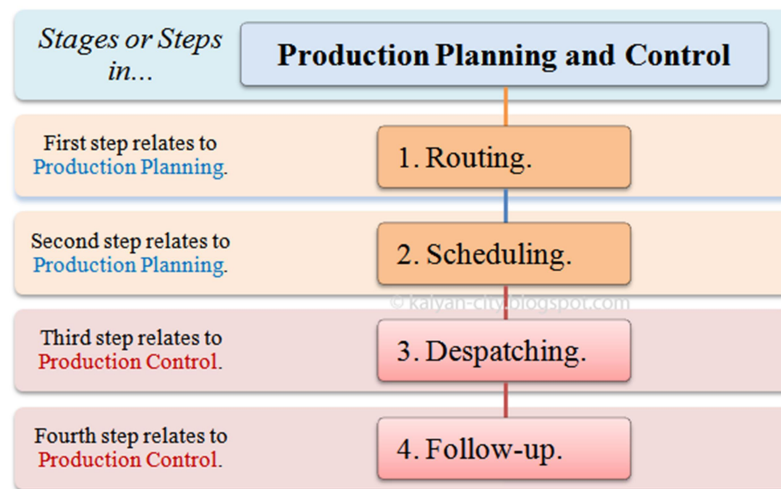
- (a) Standardization
- (b) Reliability
- (c) Maintainability
- (d) Servicing
- (e) Reproducibility
- (f) Sustainability
- (g) Product simplification
- (h) Quality Commensuration with cost
- (i) Product value
- (j) Consumer quality
- (k) Needs and tastes of consumers.

Above all, the product design should be dictated by the market demand. It is an important decision and therefore the entrepreneur should pay due effort, time, energy and attention in order to get the best results.

Standardization

- Sizes for screws, nuts bolts and other threaded fasteners were first standardized based on work of by Joseph Whitworth.
- Pipe sizes
- Shoe size standardization
- The screw base size and thread dimensions of electric lamp bulbs was standardized by Thomas Edison.
- Electrical voltage and frequency
- Electrical wiring and device standards

Steps in Production Planning and Control



1. Routing

Routing is the first step in production planning and control. Routing can be defined as the process of deciding the path (route) of work and the sequence of operations.

Routing fixes in advance:

- The quantity and quality of the product.
- The men, machines, materials, etc. to be used.
- The type, number and sequence of manufacturing operations, and
- The place of production.

In short, routing determines 'What', 'How much', 'With which', 'How' and 'Where' to produce. Routing may be either very simple or complex. This depends upon the nature of production. In a continuous production, it is automatic, i.e. it is very simple. However, in a job order, it is very complex.

Routing is affected by the human factor. Therefore, it should recognize human needs, desires and expectations. It is also affected by plant-layout, characteristics of the equipment, etc.

The main objective of routing is to determine (fix) the best and cheapest sequence of operations and to ensure that this sequence is followed in the factory.

Routing gives a very systematic method of converting raw-materials into finished goods. It leads to smooth and efficient work. It leads to optimum utilization of resources; namely, men, machines, materials, etc. It leads to division of labor. It ensures a continuous flow of materials without any backtracking. It saves time and space. It makes the work easy for the production engineers and foremen. It has a great influence on design of factory's building and installed machines.

So, routing is an important step in production planning and control. Production planning starts with it.

2. Scheduling

- Scheduling is the second step in production planning and control. It comes after routing.
- Scheduling means to:
- Fix the amount of work to do.
- Arrange the different manufacturing operations in order of priority.
- Fix the starting and completing, date and time, for each operation.
- Scheduling is also done for materials, parts, machines, etc. So, it is like a time-table of production. It is similar to the time-table, prepared by the railways.
- Time element is given special importance in scheduling. There are different types of schedules; namely, Master schedule, Operation schedule and Daily schedule.
- Scheduling helps to make optimum use of time. It sees that each piece of work is started and completed at a certain predetermined time. It helps to complete the job systematically and in time. It brings time coordination in production planning. All this helps to deliver the goods to the customers in time. It also eliminates the idle capacity. It keeps labor continuously employed.
- So, scheduling is an important step in production planning and control. It is essential in a factory, where many products are produced at the same time.

3. Dispatching

Dispatching is the third step in production planning and control. It is the action, doing or implementation stage. It comes after routing and scheduling.

Dispatching means starting the process of production. It provides the necessary authority to start the work. It is based on route-sheets and schedule sheets.

Dispatching includes the following:

- Issue of materials, tools, fixtures, etc., which are necessary for actual production.
- Issue of orders, instructions, drawings, etc. for starting the work.
- Maintaining proper records of the starting and completing each job on time.
- Moving the work from one process to another as per the schedule.
- Starting the control procedure.
- Recording the idle time of machines.
- Dispatching may be either centralized or decentralized:
- Under centralized dispatching, orders are issued directly by a centralized authority.
- Under decentralized dispatching, orders are issued by the concerned department.

4. Follow Up

Follow-up or Expediting is the last step in production planning and control. It is a controlling device. It is concerned with evaluation of the results.

Follow-up finds out and removes the defects, delays, limitations, bottlenecks, loopholes, etc. in the production process. It measures the actual performance and compares it to the expected performance. It maintains proper records of work, delays and bottlenecks. Such records are used in future to control production.

Follow-up is performed by 'Expeditors' or 'Stock Chasers'. Follow-up is necessary when production decreases even when there is proper routing and scheduling. Production may be disturbed due to break-downs of machinery, failure of power, shortage of materials, strikes, absenteeism, etc.

Follow-up removes these difficulties and allows a smooth production.

ROUTING:

Routing may be defined as the selection of path which each part of the product will follow while being transformed from raw materials to finished products. Path of the product will also give sequence of operation to be adopted while being manufactured. In other way, routing means determination of most advantageous path to be followed from department to department and machine to machine till raw material gets its final shape, which involves the following steps:

Type of work to be done on product or its parts, Operation required to do the work, Sequence of operation required, where the work will be done, a proper classification about the personnel required and the machine for doing the work. For effective production control of a well-managed industry with standard conditions, the routing plays an important role, i.e., to have the best results obtained from available plant capacity. Thus routing provides the basis for scheduling, dispatching and follow-up.

Techniques of Routing:

While converting raw material into required goods different operations are to be performed and the selection of a particular path of operations for each piece is termed as 'Routing'. This selection of a particular path, i.e. sequence of operations must be the best and cheapest to have the lowest cost of the final product. The various routing techniques are:

Route card:

This card always accompanies with the job throughout all operations. This indicates the material used during manufacturing and their progress from one operation to another. In addition to this the details of scrap and good work produced are also recorded

Worksheet: It contains Specifications to be followed while manufacturing. Instructions regarding routing of every part with identification number of machines and This sheet is made for manufacturing as well as for maintenance.

Route sheet: It deals with specific production order. Generally made from operation sheets. One sheet is required for each part or component of the order. This includes the following: Number and other identification of order. Symbol and identification of part, Number of pieces to be made, Number of pieces in each lot if put through in lots. Operation data which includes: List of operation on the part. Department in which operations are to be performed, Machine to be used for each operation. Fixed sequence of operation, if any

Move order: Though this is document needed for production control, it is never used for routing system. Move order is prepared for each operation as per operation sheet. On this the quantity passed forward, scrapped and to be rectified are recorded. It is returned to planning office when the operation is completed.