

Elements of Production Planning and Control

Chapter takeaways

After completion of this chapter the reader would be able to

1. Appreciate the Role and Scope of production planning & control in a successful organization.
2. The specific planning and control principles to be applied for long range and short range plans.
3. Understand the factors contributing to the complexity of control so as to prepare for any exigencies.
4. Relate the P-D-C-A cycle of quality control and the O-A-A-E cycle of production control.
5. Make further study of the references made at the end of the chapter.

Synopsis: *Production planning and Control department is one of the important departments for the manufacturing company whatever may be the field of operations. It ensures availability of each and every material or component required at the shop floor at the right time, at the right place and in right quantities, to ensure smooth flow. While all aspects of this function are discussed in this book, this chapter introduces the principles and precepts behinds this activity, which would later be detailed in subsequent chapters.*

Keywords: *Role of PP&C., objectives and functions of PP&C., preplanning phase, planning phase, control phase, elements of production, definitions of production planning, long range vs short range planning, elements of production control, definitions on production control, essential steps in control activity, O-A-A-E cycle, duties of a production controller, production planning vs production control.*

1.1 Production Planning & Control

Production Planning & Control is the brain and the nervous system of the production programme and is responsible for ensuring the availability of each and every material, part of assembly at the right time at the right place and in right quantities in order to enable the progress of operations according to the predetermined schedules at the minimum possible costs. Nevertheless this function forms of part of the production system and hence we must know more about the production system. PP&C works with Procurement, Manufacturing, and Program Management to develop plans to execute customer requirements.

Production planning is dynamic in nature and always remains in fluid state as plans may have to be changed according to the changes in circumstances. It is mainly concerned with the following important issues:

1. What production facilities are required?
2. How these production facilities should be laid out in the space available for production?
3. How they should be used to produce the desired products at the desired rate of production?

1.2 Role and Scope of Production Planning & Control

- The type and complexity of the Production Planning & Control techniques vary with the type and volume of production.
- Factories producing large volumes of standardized products need very simple production control techniques.
- On the other hand factories producing a variety of products and product mix need meticulous control with complex production control techniques.

- Production Planning & Control has to ensure that all the operations are done on all components without exception.
- PP&C must balance the extent of meticulous control against the costs.

1.3 Objectives of Production Planning & Control

1. Minimize the idle times of men and machines.
2. Minimize inventory turnover.
3. Maximize the percentage of the commitments given to the customers.
4. Maximize the product quality and customer satisfaction.
5. Keep inventory levels low.
6. Provide long runs and low set up times.
7. Minimize bottlenecks along the production flow.
8. Plan early indents to give enough lead time for the purchase of goods at optimal process.

1.4 Functions of Production Planning & Control

While figure 1.1 illustrates the several functions of PP&C, we can summarize them as

1. To aid forecasting the future for scheduling purposes.
2. To aid cost estimation for new jobs.
3. To receive orders from marketing department.
4. To translate the schedules into manpower requirements.
5. To make or buy decisions.
6. To determine the material requirements.
7. Maintain the raw material requirement.
8. Determine the machinery requirement and their special attachments if any.
9. To determine the operations to be performed and the sequence of operations.
10. Prepare operation process charts.
11. Ensure all required equipment and material is available.
12. Plan production schedules.
13. Issue production orders.
14. Incorporate design changes to draw revised operations process charts.
15. Expedite production to ensure it follows the planned schedules.
16. Maintain Progress charts and other control charts and exhibit them so that concerned operatives can see them.
17. If the schedules get changed despite the above, revise the schedules and report them.
18. Maintain and control the finished goods stock registers.

Figure 1.1 illustrates the various functions involved in the manufacturing process, each of which is detailed in subsequent chapters.

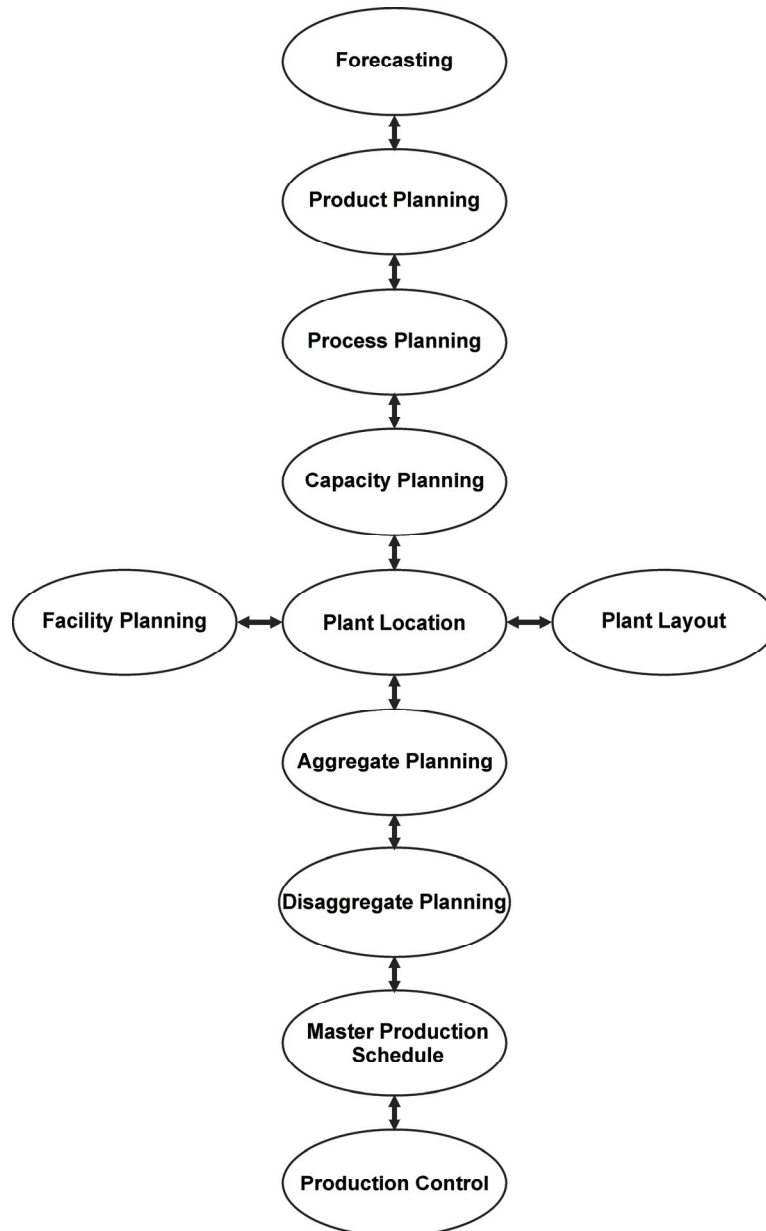


Figure 1.1 Several Functions of Production Planning & Control.

1.5 Phases of Production Planning & Control

While figure 1.1 above illustrates the several functions of PP&C, these functions can be classified into 3 distinct phases, pre-planning, planning and control phases. We can summaries them as below Fig. 1.2 illustrates these phases.

1.5.1 Preplanning Phase

- Market survey and Forecasting
- Product design
- Product specifications
- Process design
- Plant Layout

1.5.2 Planning Phase

- Capacity planning
- Aggregate planning
- Material planning
- Enterprise Resource Planning
- Operation sequencing
- Tools planning
- Scheduling
- Loading

1.5.3 Control Phase

- Dispatching
- Expediting
- Production follow up
- Data collection and interpretation
- Progress reporting
- Replanning and modification

1.6 Functions of Production Planning

While the previous paragraphs detail the overall objectives, functions etc., of the Production Planning and Control as a department, the basic objectives and functions etc., of the individual phases of the planning and control functions are detailed below. Production Planning can be split into six basic functions as also illustrated by figure 1.1.

1. *Product planning*: product engineering, product design and development, functional and technological considerations, quality considerations.
2. *Forecast planning*: quantity forecast, demand pattern forecast.

3. *Process planning*: technology selection, process selection, machine selection, tool selection, process parameter selection, operation sequencing etc.
4. *Equipment planning*: types of equipments, number of equipments, machine capacity analysis, maintenance planning.

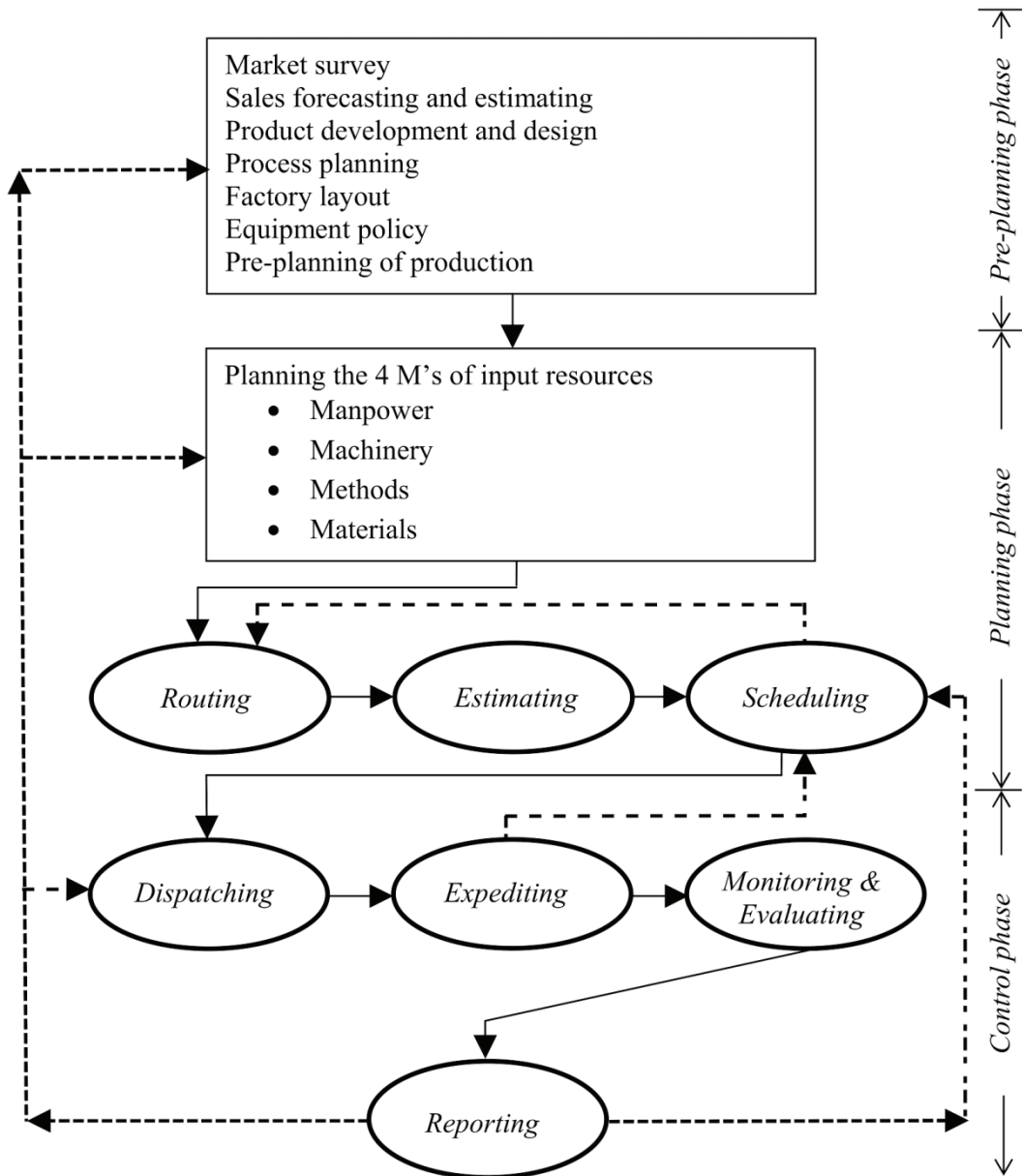


Figure 1.2 Summary of Functions of P & C.

5. *Materials planning*: materials specifications, material volumes, economical lot sizing, inventory planning, store planning.
6. Last but not the least is the core function of Production [planning, viz machine loading, operations scheduling, job sequencing etc.]

The six basic functions as explained above can be elaborated as follows

1. To decide on the production volume based on sales forecasting.
2. To make or buy decision based on cost economics.
3. To decide on the operation sequence based on product specifications.
4. To determine the run quantities and number of set-ups with an objective of minimizing the total work in process inventory.
5. To determine for each product,
 - (i) the type of material to be used
 - (ii) The machines to be operated on,
 - (iii) The tools to be used,
6. To determine the right place and right time when the above are required.
7. To undertake steps to fulfill the production target established by master schedule and budgets.

1.7 Definitions of Production Planning

Production planning incorporates a multiplicity of production elements, ranging from the everyday activities of staff to the ability to realise accurate delivery times for the customer. With an effective production planning operation at its nucleus, any form of manufacturing process has the capability to exploit its full potential. Let us see what famous management gurus have to say about the function of planning and production planning in particular.

Planning is deciding the best alternative among others to perform different managerial operations in order to achieve the predetermined goals

..... Henri Fayol

Planning is the determination in advance of line of action by which certain results are to be obtained

..... Hart

Planning is an intellectual process, the conscious determination of the course of action, the basing the decisions on purpose, facts and considered estimates

..... Koontz and O'Donnell

Planning is found amentally in a mental pre-disposition to do things in orderly way, to think before acting and to act in light of facts rather than of guesses.

..... Urwick

Planning is the continuous process of making present entrepreneurial decisions systematically and with best possible knowledge of their futurity by organizing systematically the efforts needed to carry out these decisions and measuring the results of these decisions against the expectation through organized and systematic feed-back.

..... Peter Drucker

Planning is the process of selecting and relating of facts in the visualization and formation of proposed activities believed to be necessary to achieve the desired results

..... George Terry

Production planning is the planning of production and manufacturing processes in a company or industry. It utilizes the resource allocation of activities of employees, materials and production capacity, in order to serve different customers.

..... Wikipedia

Production Planning is the administrative process that takes place within a manufacturing business and which involves making sure that sufficient raw materials, staff and other necessary items are procured and ready to create finished products according to the schedule specified.

..... Business dictionary

1.8 Long Range vs Short Range Planning

(a) Long range planning:

- location of the factory / service center
- Product development
- Process development
- Plant layout
- Long term capacity
- Equipment planning for production
- Materials handling
- Supporting activities
- Employee welfare

(b) Intermediate and short range planning:

- Material requirement planning for
 - Purchased items
 - Machine scheduling & loading
- Planning of controlling systems for
 - Production control
 - Material control

Quality control
Labour control
Financial control

(c) Short-range plans (Detailed plans):

- Machine loading
- Job assignments

While theoretically production planning encompasses all as the above factors, it practically refers to those involving the short range planning especially of machine scheduling and loading. Nevertheless the production planner has to ensure perfect planning and control of all the other aspects to achieve an optimal production planning & control objective.

In other words as Ray Wilde puts it,

“Production planning is that determination, acquisition and arrangement of all facilities and materials necessary for the production of the products.

1.9 Elements of Production Control

Despite planning to the minute details, it is not always possible to achieve production 100% as planned. There may be innumerable factors which affect the production system and because of which there may be a deviation from the actual plan. Some of the factors that affect are:

1. Non availability of materials (due to shortage etc.).
2. Plant, equipment and machine breakdown.
3. Changes in demand and rush orders.
4. Absenteeism of workers.
5. Lack of coordination and communication between various functional areas of business.

Thus production Control is an essential element of Production Planning & Control. Control is a continuous process that helps the management to get the performance of each unit or individual correspond to the standards fixed, to detect the variations as and when they occur and to take corrective action to prevent their occurrence in future. In other words it provides a categorized record of what happens in the business process and pin points the reason for their occurrence. It provides data that enables the management to take corrective action.

If there is a deviation between actual production and planned production, the control function comes into action. Production control through control mechanism tries to take corrective action to match the planned and actual production. Thus production control reviews the progress of the work, and takes corrective steps in order to ensure that programmed production takes place.

1.10 Functions of Production Control

1. To give directives so that the products in the factory proceed without hindrance and interruptions.
2. To deliver necessary orders to workforce so that the production plans can be carried out.
3. To make available necessary items like the machines, materials, men, jogs and fixtures, tools etc., in the right time.
4. To monitor the progress so that the quality and quantity are as per the specifications.
5. To achieve all the above mentioned at optimal cost

1.11 Definitions on Production Control

A better understanding of their functions of Control can be understood by the definitions put forth by several writers and management experts as below.

The managerial function of control is the measurement and correction of the performance of the subordinates in order to make sure that the enterprise objectives and the devised plans are accomplished.

..... Koontz & O'Donnell

In an undertaking, control consists of verifying whether everything occurs in conformity with the plans adapted, the instructions issued and principles estimated. It has the far objective to point out weaknesses and errors in order to rectify them and prevent reoccurrence. It operated on everything – things, people ad actions.

..... Henry Fayol

Control is exercised by means of media such as ethics, policies, organizations, structures, supervision, systems, order costs and discipline.

..... Terry

Control is the process that measures current performance and guides it towards some predetermined goals.

..... Joseph Massey

Control has been defined as an aspect and projection of planning. Whereas planning sets the course, control observes deviations from the course and initiates action to return it the chosen courses or to an appropriately changed one.

..... Mary Cushing Niles

Control is the process of taking steps to bring actual results closer together.

..... Philips Kotler

Management Control is the process by which a manager can assure that the resources are obtained and used effectively in the accomplishment of the organization's objectives.

..... Robert Anthony

Managerial planning seeks consistent, integrated and articulated programs, while management control seeks to compel events to conform to the plans.

..... Goetz

Management control is a conscious planned, directed, coordinated, and organized process by and through which the manager ensures that the objectives, plans and policies of the top management for the enterprise and carried out by the people for whom he is personally responsible.

..... Cyril Hurdon

Controlling is the decision making and command work that related to the prevention, correction and minimization of deviations from the performance level specified in the mission and derivative plans.

..... Hodge & Johnson

The essence of control is the action which adjusts operations to determined standards and its basis is the information in the hands of the manager.

..... Douglas Sherwin

Production control is the task of predicting, planning and scheduling work, taking into account manpower, materials availability and other capacity restrictions, and cost so as to achieve proper quality and quantity at the time it is needed and then following up the schedule to see that the plan is carried out, using whatever systems have proven satisfactory for the purpose.

..... American Production and Inventory Control Society

Production control provides the foundation on which most of the other controls are based. It is the function of management which plans, directs and controls the material supply and processing activities of an enterprise, so that specified products are produced by specified methods to meet an approved sales programme. These activities being carried out in such a manner that the labour force and capital available are used to the best advantage. The production control has 4 phases – programming, ordering, dispatching and post-operative.

- Programming phase plans the production output of products.
- Ordering phase plans the output of components from the suppliers and department which is necessary to meet the programme.

- Dispatching phase considers each department in turn and plans the output from machines and work centers necessary to carry out the orders.
- Post-operative phase evaluates the progress to get feedback information for further planning.

1.12 The Essential Steps in Control Activity

The essential steps in control activity are:

- Initiation the production.
- Progressing.
- Corrective action based upon the feedback and reporting back to the production planning.

1.13 The Elements of Production Control

1. *Control of activities:* This involves the release of manufacturing orders, setting plans in motion at an assigned time by means of dispatching.
2. *Control of material movements:* This requires observations of item of receipt of material from vendor of issuance to shop and of movement within the shop, all in accordance with the production plans.
3. *Control of tool availability:* This requires observation of the availability of the tools specified by the production planning division in the tool crib, as and when planned.
4. *Control of due dates:* This requires observation of the effect of delays or stoppages on machine loading which may interfere with the completion of the work assigned to the machine on the due date process. Machine loading is defined as the amount of work assigned ahead to each machine. It is sometimes wrongly called “machine burden”.
5. *Control of quantity produced:* This involves observation of work in process at predetermined stages to determine, if the right quantity of acceptable work has been processed.
6. *Control of replacements:* This requires observation of the quantity of raw material and of work in process that fails to pass each stage of inspection, with provision for issuing replacements orders for such material or work.
7. *Control of labour efficiency:* This requires the observation and recording of the time taken on each unit of work in process and comparison with the time allowance as planned. It also involves a comparison of the total man hours consumed with that planned for specified periods.

8. *Control of progress of orders:* This requires the observation of the progress of orders by making off completed work on the production schedule and the production department copy of the combined manufacturing order and route sheet.

1.14 Factors Contributing to the Complexity of Control

1. Number of components in the product
2. Number of operations in each component
3. Existence of dependent operations like the rigid sequence of operations
4. Variations in the capacities of similar machines
5. Machine breakdown history
6. Degree of sub assembly
7. Customer orders with specific delivery dates
8. Small lot orders

1.15 O-A-A-E cycle of Control Procedure

While paragraph 1.13 details of the production control elements, the table 1.1 below details in general, the overall control phases like observation, analysis, action and evaluation (O-A-A-E), that have to be exercised in each control procedure element like the process, inventory, inspection and cost.

Table 1.1 Elements of Control Procedure.

	Processes	Inventory	Inspection	Cost
Observation	Compare output vs. time for active processes and measure breakdown and idle times for idle processes	Record of stock level	Process control and control charts	Collect cost data
Analysis	Compare actual progress with scheduled progress	Demand distribution, trends and seasonal variations	Process capabilities and trends	compute costs and compare with estimates
Action	expedite	Issue production and procurement orders	Initiate 100% inspection and adjust the processes	Adjust sales price, if possible
Evaluation	Process capacity and maintenance schedules	Replenish policies and inventory systems	Reassessment of specifications, process improvement and inspection procedures	Economic evaluation of processes; preparing better data for future estimates

1.16 Duties of a Production Controller

- (a) To draw up the detailed time table for carrying out the various operations including ordering material, making or buying tools, instituting special training schemes.
- (b) To allocate particular men or machines to be put on the work.
- (c) To issue orders to the various people concerned, to the buyer, to get material; to the store keep, to issue it; to the tool room, to obtain or make and issue tools and set up machines; to operators, instructing them what to do and when, how and where to do it; to the transport men, to move materials when required.
- (d) To receive reports back from the people concerned about how the orders have been carried out. The main purpose of these reports is to enable the controller to satisfy himself that production is going ahead according to plan, and if necessary should unforeseen circumstances arise, to modify the plans. A further function of production control is to keep load on the shops steady and well divided, to prevent overloading, delays, overtime, etc. The production controller is in a position to advise the production planning about facilities available, having in mind the work already in hand, he can also inform the sales department before deliver dates for new job orders are agreed in any contract.

1.17 Advantages of Robust Production Control

- Ensures a smooth flow of all production processes
- Ensures production cost savings thereby improving the bottom line
- Controls wastage of resources
- Maintains standard of quality through the production life cycle.

1.18 Checklist of Information Required for Production Control Function

1. Product data:
 - Design
 - Specifications
 - Tolerances
 - Production process
 - Operational details
 - Details of assemblies and subassemblies
2. Bill of materials, which can be had from the R & D or Product Department.
3. Availability of materials as from stock register or from periodic stock statements.
4. Standards of quality, specifications and tolerances and drawings.

5. Type of fixtures tools, jigs and dimensional gauging instruments that will be required for production.
6. Standard times for each operations on each unit as available from time study, from operation analysis and from technical experience.
7. Machine output or equipment capacity (at normal and peak loads): This can be derived from the analysis of machine capacity and consists of the units of work per hour capable of being handled by each machine or process.
8. Actual machine and operator capacities as obtained from production booking.
9. The economic lots of quantities for manufacture for each product.
10. *Job analysis*: This indicates the particulars of the work to be done, its condition, skills needed and personnel type needed.
11. Factors to be coordinated at each of the production stage in order to accomplish the plan according to the time schedules.
12. Rate of output per month or per week or per day.
13. Material cost per unit.
14. Obsolescence and its rate.
15. Inventory costs and the rate of interest on invested capital.
16. Ascertainment of customers order in hand and the delivery dates promised for each product.
17. Quantities immediately required for delivery purposes and that required to stock purposes.
18. Job analysis and personnel information about the labour available, the wage rates and output of workers.
19. Other information relating to
 - (a) Completion time of all previous operations of part and assemblies
 - (b) Power production and consumption internal transport and materials handling service
 - (c) The actual costs of all previous performance
 - (d) The customers order on hand and the delivery dates promised
 - (e) What immediate production is needed for customers and what for stock purposes.

It should be noted that a balanced production planning would tend to increase the operating efficiency by stabilizing productive activities facilitate selling and customer service and help in reducing the production costs. Fig 1.3 alongside illustrates the flow of information between the different departments for smooth manufacturing activities.

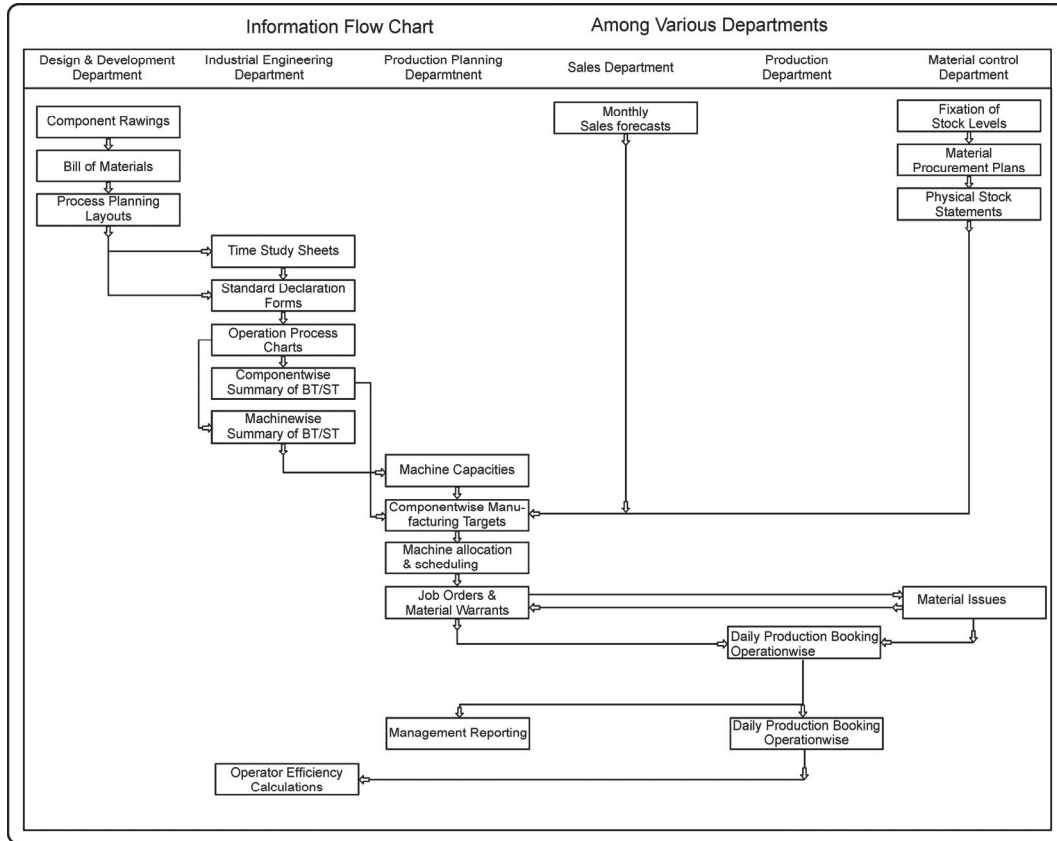


Figure 1.3 Information Flow among the Manufacturing Departments.

1.19 Data vs Information per <http://www.diffen.com>

	Data	Information
Meaning	Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized.	When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information.
Etymology	"Data" comes from a singular Latin word, datum, which originally meant "something given." Its early usage dates back to the 1600s. Over time "data" has become the plural of datum.	"Information" is an older word that dates back to the 1300s and has Old French and Middle English origins. It has always referred to "the act of informing," usually in regard to education, instruction, or other knowledge communication.

Table Contd...

Example	Each student's test score is one piece of data.	The average score of a class or of the entire school is information that can be derived from the given data.
Features	<ol style="list-style-type: none"> 1. Data is a set of discrete, objective facts about events. 2. Symbols which represent information for processing purposes, based on explicit or implicit agreements about the meaning of the data 3. Data is factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation. 	<ol style="list-style-type: none"> 1. Information is knowledge of ideas, facts and/or processes 2. Information is meant to change the way the receiver perceives something, to have an impact on his judgment and behaviour 3. Think of information as data that makes a difference 4. Information is data interpreted in its original meaning.

1.20 Data Definitions per <http://searchdatamanagement.techtarget.com>

1. Data is information converted into binary digital form.
2. Data life cycle management (DLM) is a policy-based approach to managing the flow of an information system's data throughout its life cycle.
3. In computer systems, data is often distinguished from "control information," "control bits," and similar terms to identify the main content of a transmission unit.
4. In telecommunications, data sometimes means digital-encoded information to distinguish it from analog-encoded information such as conventional telephone voice calls.
5. Data transmission can be sent with intermittent connections in packets that arrive in piecemeal fashion.

1.21 Production Planning vs Production Control

While we had discussed in detail the several complementary characteristics of the two major functions of PP&C viz, production planning and production control, let us now see the conceptual differences between them as illustrated in table 1.2 below.

Table 1.2 Distinction between Production Planning and Production Control.

Production Planning	Production Control
1. Production planning is a pre-production activity.	Production control will be in action when production activity begins.
2. It coordinates the production department with other departments of the business.	It promotes effective shop operations by way of monitoring of activities within the production department.
3. Planning involves the collection, maintenance and analysis of data with respect to time standards, materials and their specifications, machines and their process capabilities.	Control is concerned with communications of their information and producing reports like those of output, productivity, rejection rate, etc.
4. Planning determines what and how much to produce, the batch quantity and the resources needed.	Control plans and organizes the control charts etc., needed for follow up.
5. Planning is useful to anticipate the problems and devising remedial measure in case the problem arises.	Control is useful in determining the delays and inefficiencies in the process. And also in taking corrective steps to ensure that the actual performance is as per the planned performance.
6. Planning is a centralised activity and includes functions like materials control, tool control, process planning and control.	Control is a widespread activity includes functions such as dispatching, programming and inspection etc.
7. Planning sees that all the necessary resources are available to make the production at right quality and time.	Control keeps track of the activities, and sees whether everything is going as per schedule or not.

1.22 Benefits of Production Planning & Control

1.22.1 Benefits to Consumers

- Increased productivity
- Better quality standards
- Prompt deliveries
- Improved knowledge base and sharing

1.22.2 Benefits to the Producer

- Adequate wages
- Job security
- Improved working conditions
- Increased satisfaction
- Increased use of best practices
- Reduced duplicative workflows
- Improved decision making
- More commonality in approaches and tools
- Optimized resources
- Improved project performance

1.22.3 Benefits to Investors

- Security
- Adequate returns on investments
- Fame and popularity
- Capture of market share

1.22.4 Benefits to Suppliers

- Cooperation
- Well balanced and assured purchases
- Prompt payment

1.22.5 Benefits to Community

- Stability
- Economic and social status
- Employment
- Price and satisfaction

1.22.6 Benefits to the Nation

- Prosperity
- Taxes and revenue

1.23 Industrial Engineering vs. Production Planning and Control

Even though Production Planning and Control is a major and critical function of production management, its skills are akin to the industrial engineering activities

especially with regards to creativity. In fact the industrial engineering has widened its tentacles from its basic function of work study into several fields of management. The Industrial Engineering Topics covered during The 2nd International conference on *Advances in Industrial Engineering Applications (ICAIEA - 2014)* conducted by the IED of Anna University on January 6 to 8, 2014, as listed below illustrates how industrial engineering tentacles have widened,

1. Applied Operations Research
2. Business Process Reengineering
3. Clean /Lean /Cellular Manufacturing
4. Customer /Supplier Relations Management
5. Design of Experiments
6. Engineering Ergonomics
7. Engineering Optimization
8. Engineering Quality Control
9. Enterprise Resource Planning
10. Facility Location and Layout Design
11. Financial Engineering
12. Health Care Systems Engineering and Management
13. Industrial Scheduling
14. Inventory and Materials Management
15. Just in Time Manufacturing
16. Knowledge Management
17. Lean Six Sigma
18. Manufacturing Systems Engineering
19. Metaheuristics
20. Operations Management
21. Physical Asset Management
22. Product Design and Development
23. Project Management
24. Reliability Engineering and Maintenance
25. Robotics. AS/RS, Factory Automation
26. Safety Engineering
27. Strategic and Operational Management
28. Supply Chain and Logistics Management
29. System Dynamics

30. Systems modelling and Simulation
31. Taguchi Techniques
32. Total Employee Involvement
33. Total Productive Maintenance
34. Total Quality Management
35. Usability Engineering

1.24 Conclusion

For efficient, effective and economical operation in a manufacturing unit of an organization, it is essential to integrate the production planning and control system into the overall operation management system, and the fundamentals of the PP&C activities are detailed in this chapter, and their detailed discussions follow in the subsequent chapters.

1.25 Further Reading

1. Proceedings of the World Congress on Engineering and Computer Science 2010
2. <http://www.tarakos.de/en/factory-planning.html>
3. <http://www.productionplanning.com/Production-Planning.aspx>
4. <http://www.defence.gov.au/DASP/Docs/Manuals>
5. <http://www.lockheedmartin.com>

Criteria Questions

(The figures in the bracket provide a clue to the answer.)

1. Define Production, Production Planning and Production Planning & Control. What is the scope of Production Planning and Control in Industry? (1.1, 1.2)
2. Explain the terms planning, operations and control. (1.1)
3. Explain in detail the various objectives of Production Planning & Control. (1.3)
4. What are the important functions of Production Planning & Control (1.4)
5. Explain in detail the planning stage. (1.7)
6. Write about the phases of Production Planning & Control. (1.5)
7. Explain with reference to PP&C, the following: Routing, Scheduling, Loading & Dispatching (1.5.2)
8. How do you think the planning phase differs from the control phase? (1.6)

9. Distinguish between long range planning and short range planning. (1.8)
10. Explain the production control function. (1.9, 1.10)
11. What are the basic elements of production control? (1.13)
12. Illustrate some factors that contribute to complex production control. (1.14)
13. What do you understand by O-A-A-E cycle? (1.15)
14. What do you think are the duties of a Production Controller? (1.16)
15. Discuss how Production Planning differs from Production Control. (1.18)
16. What are the advantages of Production Planning & Control? (1.19)
17. In one of the industrial discussions, a progressive entrepreneurs said that 'I do not use any planning and control function in my unit, but it is functioning well.' Do you agree with his statement? If so why? If not why?