Principles of Industrial Engineering
Professor D. K. Dwivedi
Department of Mechanical and Industrial Engineering
Indian Institute of Technology, Roorkee
Lecture 28
Production Planning and Control: Scope 02

Hello, I welcome you all in this presentation are related with the subject Principles of Industrial Engineering. And you know, we are talking about the production, planning and control. As we have talked that there are different stages or steps related to the production, planning and control to ensure that required quantity of the products is realized in the required quality at right time at the minimum possible costs so that the organization can increase its market base and consolidates of market position by providing the quality products at low cost.

So, as we have seen that there are 3 stages in the production, planning and control, these are like the prior planning, active planning action and the control.

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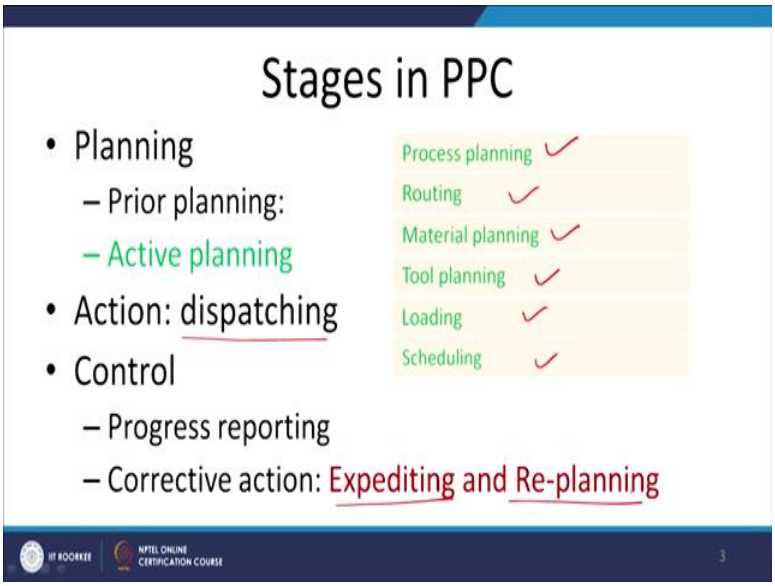

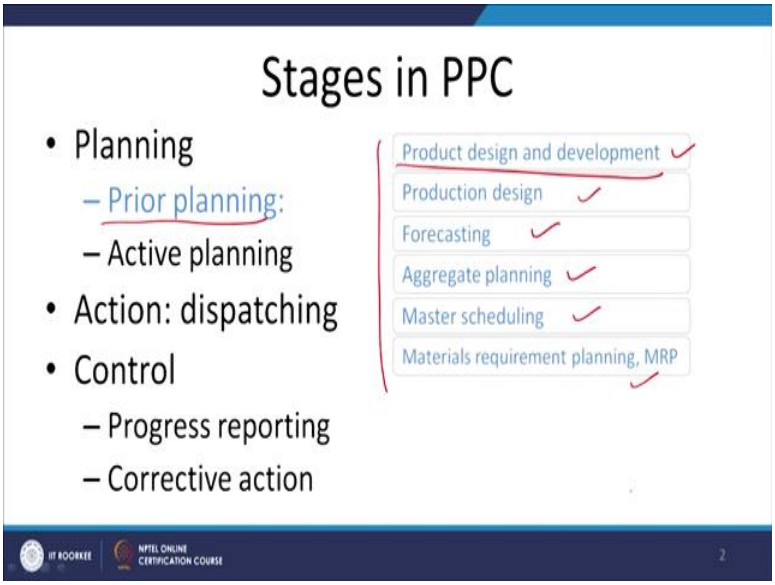

So, these will see in the planning phase, there are 2 aspects like the prior planning and active planning. In case of the prior planning, we have the product design and development. Now we will talk about all these aspects associated with the prior planning in detail. As you can see the prior planning includes the product design and development, production design means design of the production system, forecasting, aggregate planning, master scheduling and material requirement planning. Likewise, the active planning comprises process planning, routing, material planning, tool planning, loading and scheduling.

Action primarily comprises the dispatching the orders for issue of the material, issue of the tools. So, that issue of the orders for inspection, so that the commencement of the production in the soft floor can take place and in the control phase basically checking the progress and see if there is any deviation from the planned production. Then what can be done to meet the target production through the expediting or replanting, or modifying the strategy for realizing the production.

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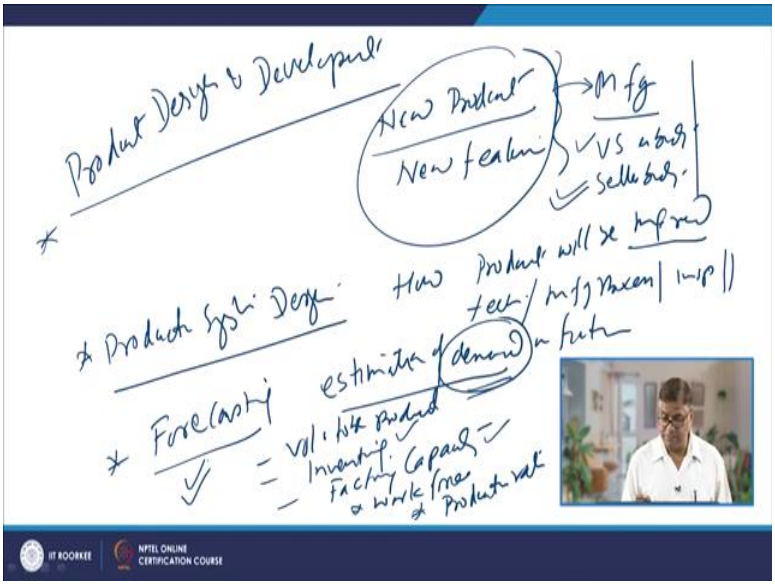

So, we will be going through these points in detail like the product design is the first point product design and development. So, as I have said earlier under this basically either the new products are designed or other existing product with the new features are designed and this is done considering the manufacturing constraints, considering the usability of the product, considering the sellability of the product.

Because what whatever product new product will be designed, it should be designed in such a way that it can be manufactured very efficiently at low cost. And it should be usable means it should be user friendly and it should be sellable, it should attract the customers so, that it can have the grip in the market easily.

So, the suitable strategy should be followed for designing the newer products and their development, then the production system design, this was the another point. So, under this primarily strategies for producing the newly designed product or the design product are developed like, how the product will be manufactured using the newer technologies or the existing processes. So, basically identification of the technologies, manufacturing processes, inspection procedures which will be used are identified, so that they can be brought in place as and when it is required.

Another aspect related to the prior planning was the forecasting. As I have said under this basically estimation of the demand, estimation of the demand in future that will be there for a particular product is identified and based on that, we determine the kind of the volume to be produced, number of units to be produced and what kind of the inventory is there in

prevailing conditions. So, that also is kept in mind the kind of the things that are to be produced. Then the factory capacity system capacity is also identified, the kind of inventories to be maintained, the kind of the factory capacity that will be needed, the kind of the workforce that will be needed to meet out the demand which will be there in future and these things are done considering the production rate risk required for meeting the required demand which will be therein future.

And therefore, in identification of the in determining the kind of the manpower, material, the factory capacity, the kind of inventories which will be required to be maintained that will be based on the expected demand in future and which will be based on the forecasting. So, forecasting is very important aspect related with the production, planning and control and about this we will be talking in detail.

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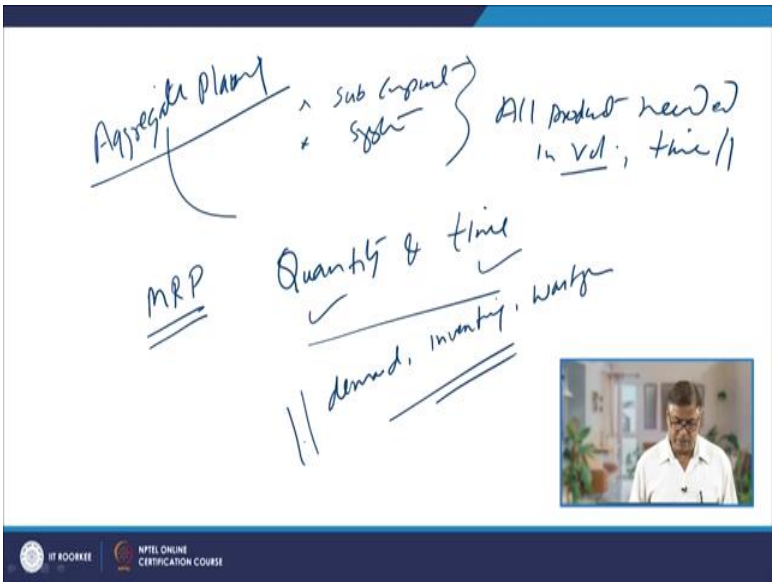

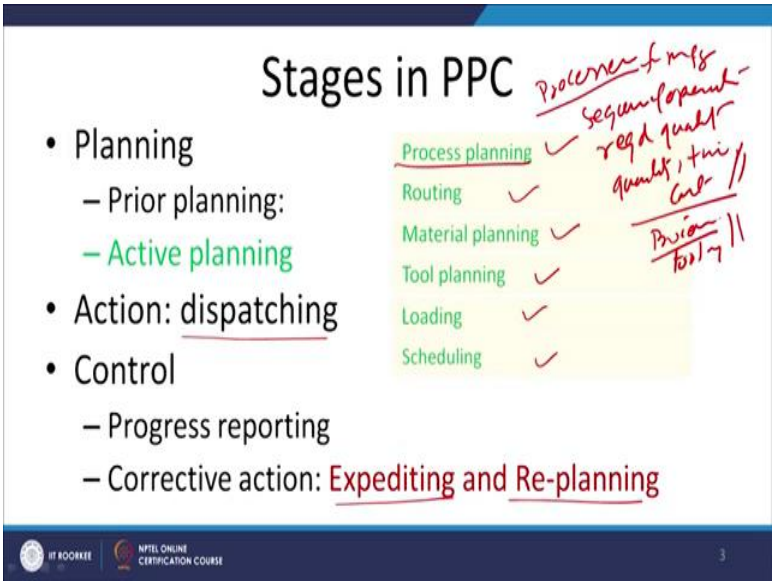

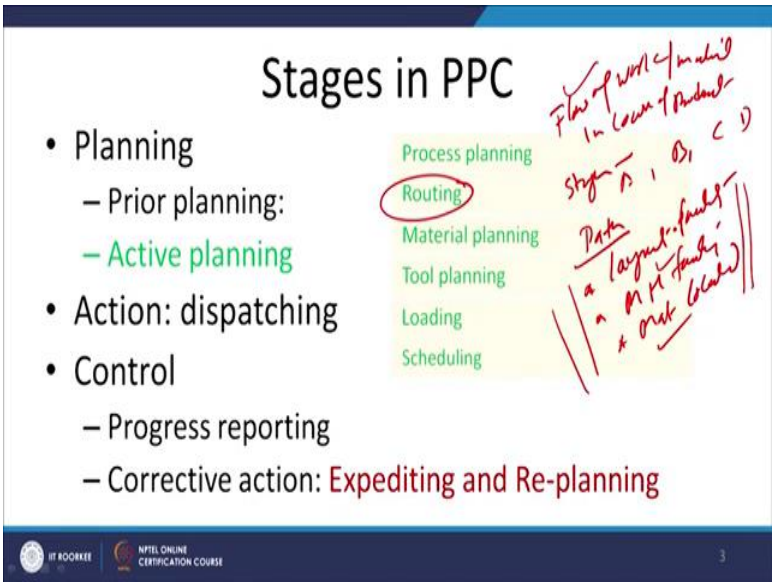

Then we have the aggregate planning. In aggregate planning, basically we have the company may be manufacturing the number of sub components or the number of systems. So, what are all products that will be required to be manufacture, all products needed in the volume at what time they will be needed is identified under the aggregate planning because aggregate means, what are the different types of the products that will be required in require in the given volume at a particular time.

So, that the production goes on smoothly and the requirement of the customers are fulfilled. Then, we have the MRP, Material Requirement Planning. As I have said under this basically the quantity of the different the materials which will be needed for a smooth flow of the work and the time are determined when what quantity at what time the different materials which will be needed for a smooth flow of the work that is identified.

And for this you may keep in mind the kind of the demand which is MRP can be based on the demand which is there the kind of inventories which exists the kind of the wastages which will be there. So, what is the volume that is to be produced, what are the inventories existing, what rate production is being done all that will be there in form of the inputs.

We will be talking about the MRP in detail. Then, if we see under the, so we have talked about all these points. So, under the active planning, basically we have the process planning. In case of the process planning, we basically try to determine what the different processes that will be used for manufacturing of product, that is one.

Then what will be the sequence of operations which will be performed to make the product and what will be the kind of the required quality. So, the sequence of operations that will be needed to produce the products of the required quality in the required quantity at required time and so, that at the required cost it is being made available and this is also be helping to identify the kind of the processes that will be needed, the kind of the tooling that will be needed to manufacture the product in the required quantity.

Then we have the routing, routing is about the flow of the work or the material in course of production. So, means what will be the different stages through which it will be passing, stage A, B, C, D like these are the different stages through which it will be passing. So, what will be the different paths it will be following that will depend upon the layout of the facilities.

How the machines have been arranged then what kind of the material handling facilities are there and where the different materials are located. So, these 3 factors significantly be governing the flow of the work in course of its stages for completion to produce a particular product.

So, whatever the stages through which our raw material will be passing in cost of the production. So, that flow of the work that will be based on where which kind of the facilities located, what kind of the material handling devices are located and where the material is located.

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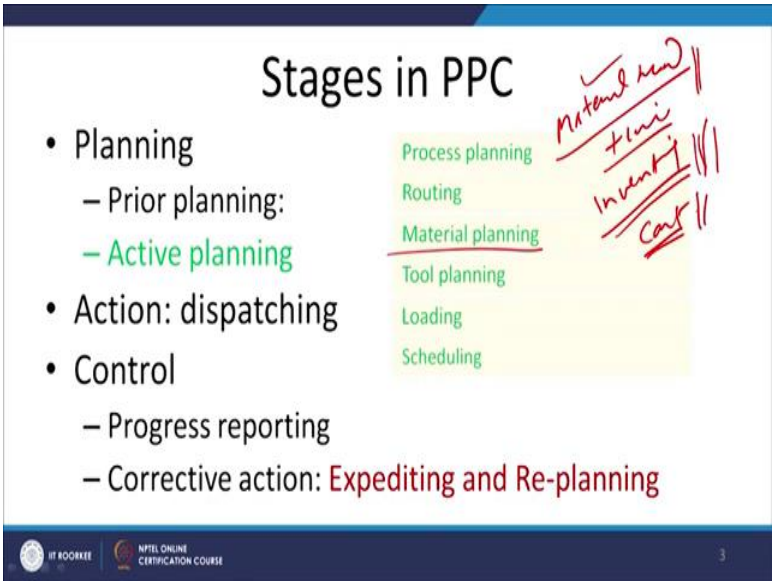

Then we have the material requirement planning under the material requirement planning basically identification of the various materials that are needed that will be needed at particular time for producing the required goods and for that what are the inputs which are used is like what kind of inventory we have, we do not want to purchase very lot of very large quantity of the materials that are needed because it will be causing very high inventory and which will be increasing the cost unnecessary by blocking the capital.

So, we want that the material is purchased in appropriate quantities, so that it is available whenever it is needed while maintaining the inventory at the minimum possible level. So, that there is no stock out situation. Main goal here is to reduce the cost while at the same time making the required material available whenever it is needed. So, basically the kind of what are the different materials in different quantities at different time when it is needed that is identified considering the inventory and the cost related aspect.

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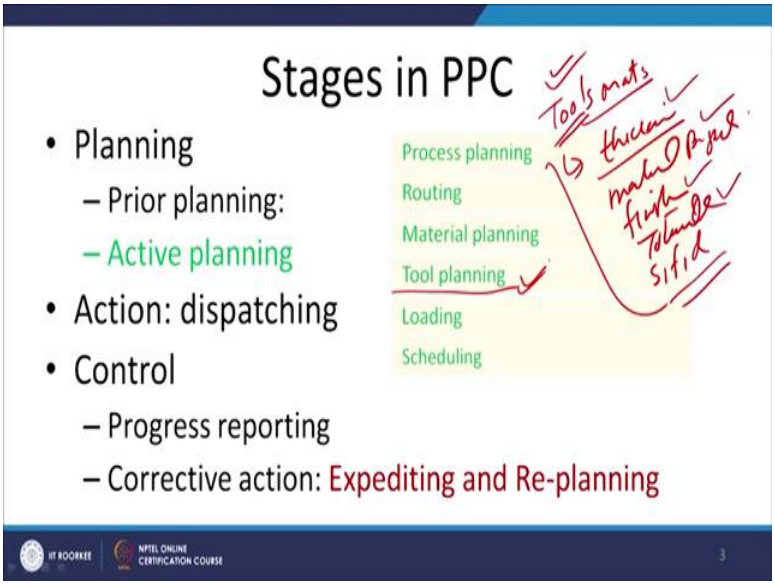

Next is the tool planning? So, what will be that like in typical manufacturing like that, in machining processes, the different types of the cutting tool materials are used in the forming process, the different types of the dyes are used, so what we will do the different types of the tools or the tool materials, tools, different tool materials that are needed that will depend upon the number of factors like kind of the thickness of the work piece, the kind of the material properties, the kind of the finish which is needed, the kind of the tolerance which is allowed in course of the manufacturing the product and the kind of the parameters to be used in terms of the speed, feed depth of cut during the machining say.

So, considering these factors, basically the plan is developed for identifying the kind of various tools at will materials which will be needed, so that the tools can perform successfully to produce the goods and the goods which are desired at right time in desired quality. So, depending upon the kind of the material to be processed, its dimensions, the kind of finish which is needed tolerance which is allowed. The kind of the parameters which are to be used for processing suitable tool materials are identified under the tool planning.

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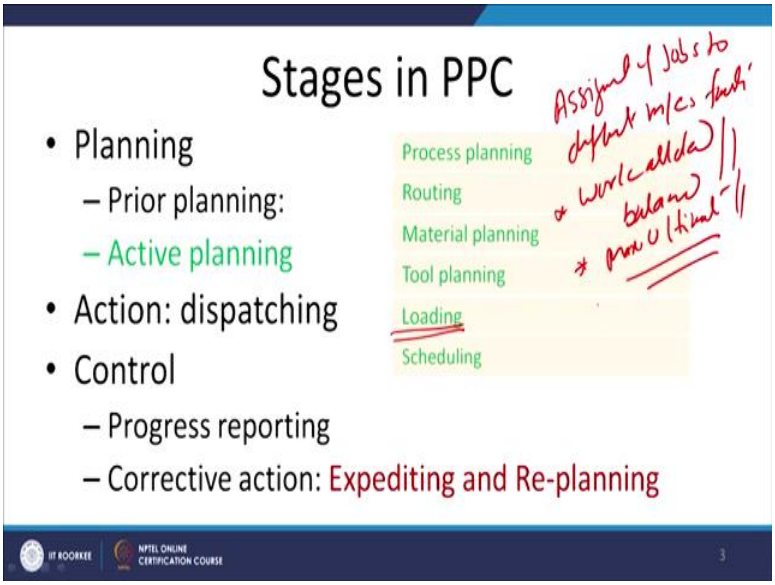

Then we have the loading, loading means the kind of the assignment of the jobs to the different machines or the facilities which are they are so that the work allotted is balanced, it is not skewed. So, the all facilities are loaded and they are engaged. So, not neither they are over loaded or nor they are kept idle.

So, balanced work is there to maximize the utilization of the resources available. So, basically loading means the assignment of the different jobs to the segment of the jobs to the different machines and the facilities so, that the balanced work is assigned to the different machines to maximize the utilization. And while at the same time, the target production is also realized.

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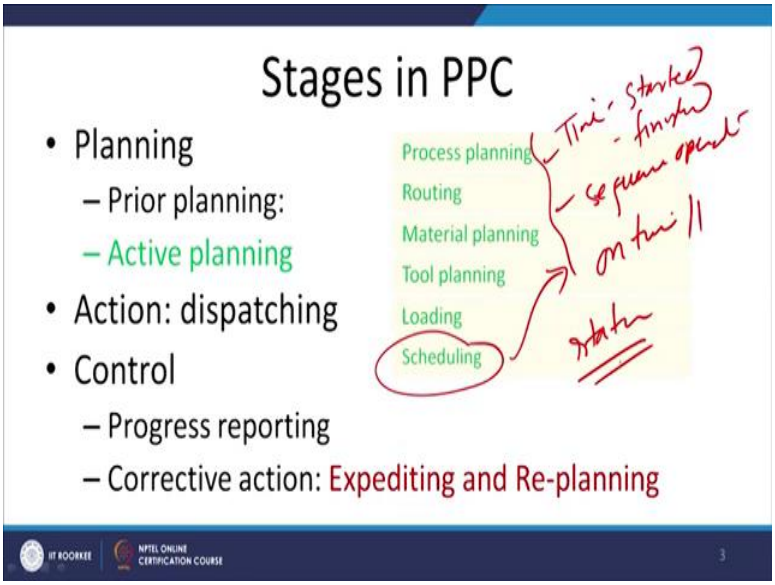

Then we have the scheduling, under the scheduling, basically it will be the time when particular work will be started and it will be finished, it will also be telling us the sequence in which operations will be done, sequence of operations in which the jobs will be done, so that it will be completed on time.

So, proper scheduling will help in, so we will help in loading the different machines in such a way that all machines are loaded in balanced way and in scheduling we will be identifying when particular work will be started on a particular facility and when it will be completed, what will be the different sequence of operations and the job will be done. We will also be indicating about the status of the progress of the work at a particular facility.

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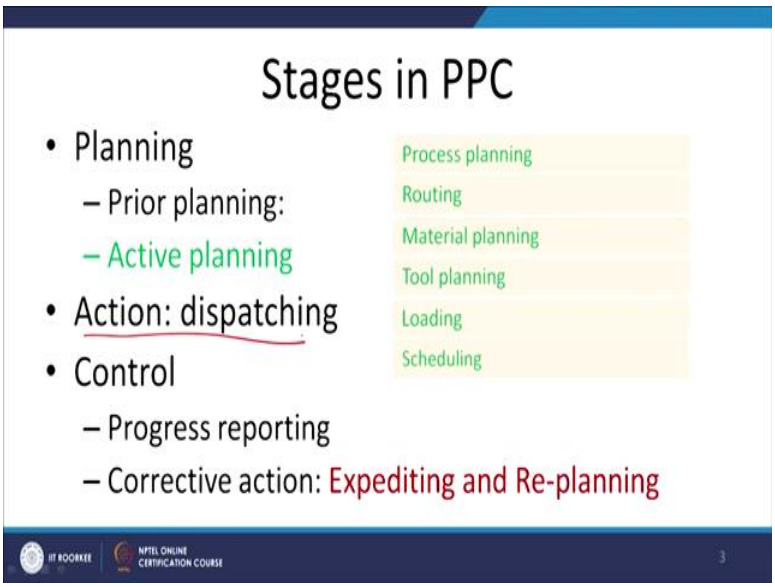

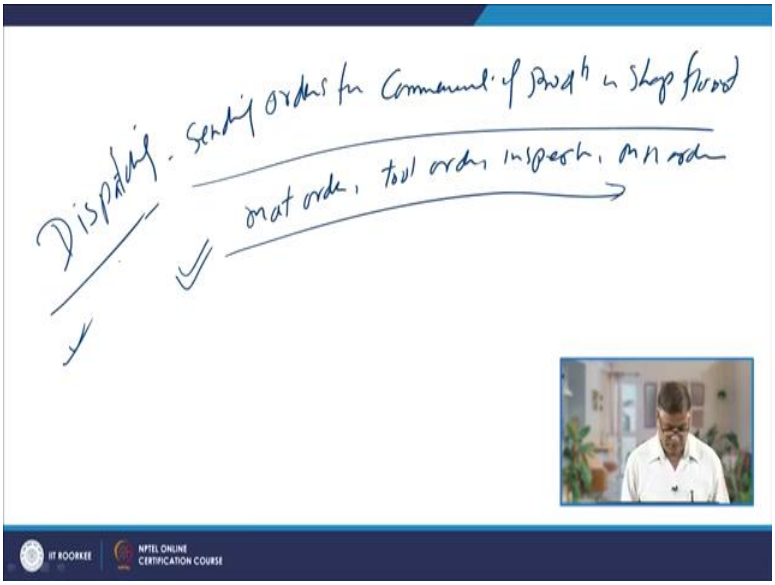

Then we have the action phase, under the action, basically it is about the dispatching. So, in dispatching what we see, dispatching, dispatching means sending the or dispatching the orders for commencement of production, production in the shop floor. So, what our orders are needed those are issued in the shop floor and whichever maybe informed like say material order, tool order, inspection order, material handling order. So, whatever is needed for commencement of the production, those orders are issued, so under the dispatching or in the action phase.

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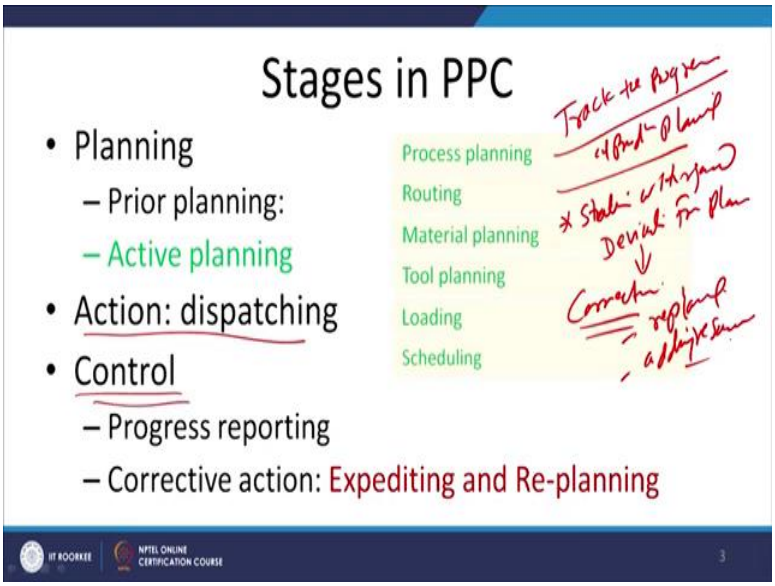

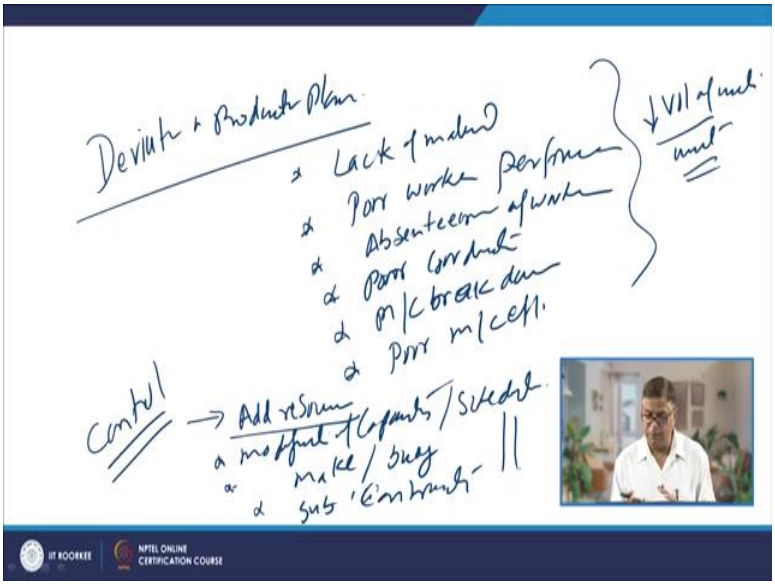

And thereafter, we have the control phase. In control phase, the focus is to know, to track the progress to track the progress of production plan. And this tracking helps to know the kind of the status with regard to deviation if any deviation from plan if any, and once this division is identified, it is required to take the suitable corrective action. So, this corrective action can be in form of reap planning, adding more resources, etc. So, what are the different things which we will look into and the things that can cause the deviation in production plan?

So, this division can occur means the division in production plan can occur from the variety of regions like the things are not going as per plan means, due to the lack of material, required type of the material is not available in required quantity say or poor worker performance, worker performance is slow. So, not required output is being achieved or absenteeism of the of the workers, absenteeism of the workers or poor coordination.

So, poor coordination means the flow of the work across the divisions is not smooth, unnecessary delays are taking place or the machine breaks down or the poor machine efficiency, means machines are not able to work at the full capacity and all these factors will be reading to the reduction in the volume of the units being produced per unit time.

So, reduction in the production rate will be leading to the failure in the target failure in completion of the target production and that is why we need the control phase. In control phase, once we identified that there is a deviation and they will not be able to meet the target on time, then here we may add resources, more material, more machines, more capacity. So, we can say modification of capacity is one thing. Then we have the modification of schedule. We can work more or we can work less as per the need. We can take decision also if there is

a situation that we may not be able to produce, then we can take decision about the make or the buy decision or subcontracting.

These are the other things which can be done to ensure that we have the required number of units on the time when it is desired. So, this is about the control phase under the control phase there is one very interesting thing that is about the expediting.

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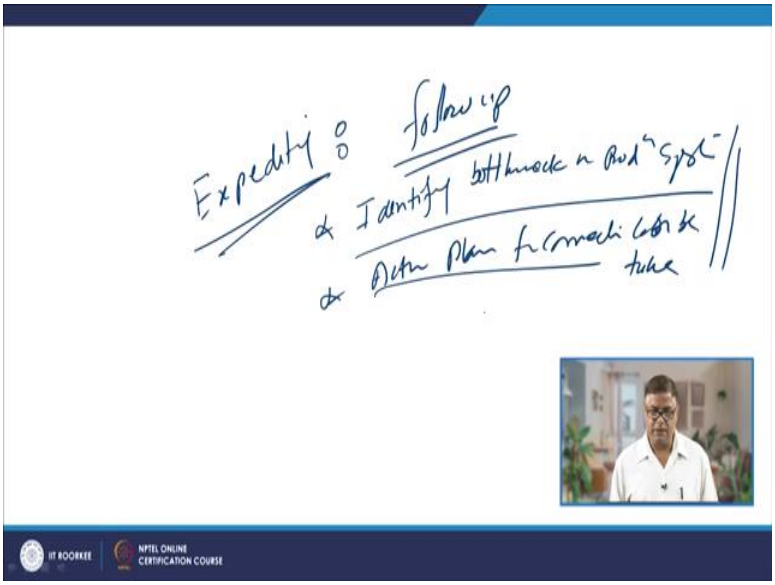

Under the expediting, means we will be having the close observation of the execution basically it involves the follow up see what is the current status at any time and that will help us in identifying the bottleneck, bottleneck in production system and if we can estimate the bottleneck in the production system suitable efforts can be made to avoid or reduce such kind of the bottleneck. And then action plan based on this suitable action plan for correction can be taken. So, basically identifying the bottleneck was the bottleneck is identified we will be able to see what will be the maximum production rate that can be realized.

And considering that in mind suitable action plan, like increase in modification of the schedule or modification of the system capacity or the subcontracting kind of thing can be taken up.

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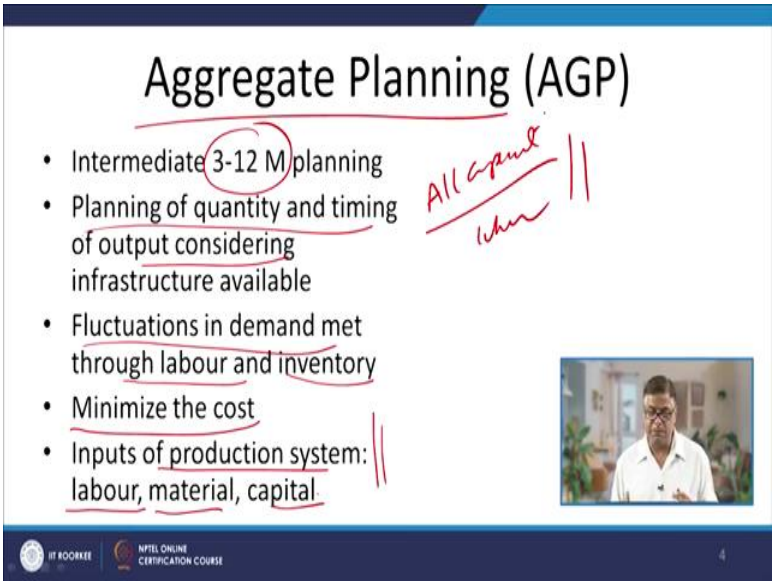

Now, we will see a few things in more detail about say aggregate planning. In aggregate planning basically, this is the intermediate kind of the planning which is done for the like say the period of 3 months to 12 months period, and when the number of components are being produced or sub components are being produced, what will be the all components that will be needed and when they will be needed that is identified in this stage.

So, the planning of the quantity and timing when the different units or sub components that will be needed that is identified. And it also considers like whatever is the identified the demand is there, the how that will be met and if there is any fluctuation in demand, then the fluctuation in demand will be met through the labor adjustments or through the inventory.

Such kind of the planning helps in minimizing the cost and for aggregate planning, aggregate planning acts as a input for the production system, identifying the kind of the labor material or capital which will be needed for a smooth production.

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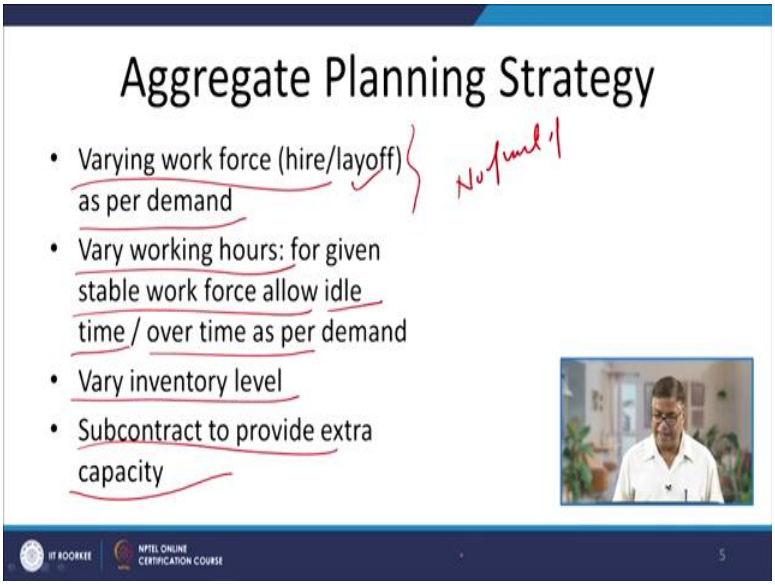

In aggregate planning strategies to meet the number of units to be produced of the different components at a given time various strategies can be followed, like varying the workforce. Like if more volume is needed we can deploy more workers to increase the production using the facilities available, number of shifts can be increased or if the number of units desired are reduced, then the layoff or firing can also take place. So, the varying the workforce as per that demand is one of the way then instead of adjusting the number of workers the another possibility is that varying the work working hours.

So, for a given stable workforce, means for a given number of the workers, you can allow the idle time if the reduction in production is needed or we can work over time for fulfilling the extra demand or increase in demand or to deal with the rush order situation. The aggregate means the fluctuation in demand can also be met through the varying variation in the inventory level or sub contracts can be provided to have the to deal with the extra demand, so subcontracting of the work to provide the extra capacity.

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In master production schedule, after the aggregate planning master production schedule is developed. And this helps in planning of the material and the capacity, what material that will be needed and what kind of the capacity that will be needed to fulfill the aggregate plan. So, master scheduling can be for the time range between from few weeks to the few months and it will depend upon means this period will depend upon the product characteristics and the kind of the lead time which will be there, lead time is the kind of the time that will be needed to get the delivery of the material or of the subcomponents after placement of the order.

So, as per the product characteristics and the lead time, the master schedule can be developed for a time period of from varying from the few weeks to the few months.

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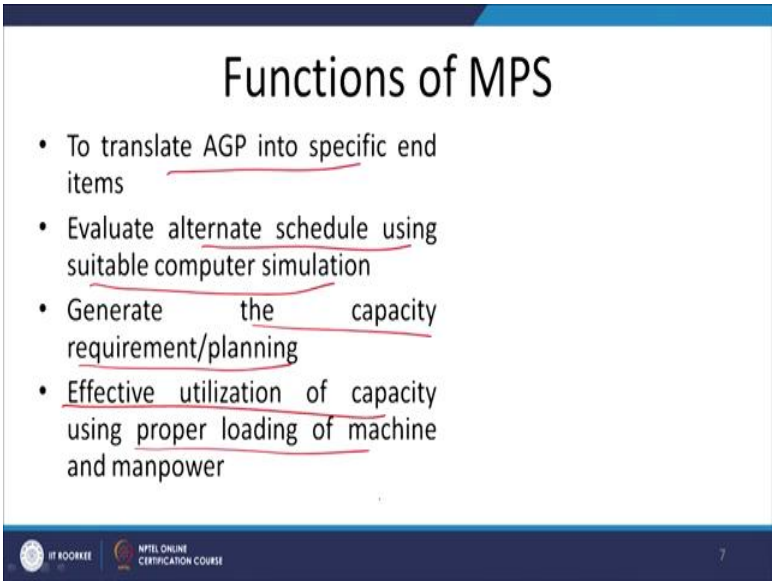

And what are the main functions of the master production schedule? It helps to translate the aggregate plan into the specific end items, evaluate the alternative schedule using the suitable computer simulations, so that the best possible production schedule is effected for maximizing the productivity. It provides the inputs for the capacity requirement under the capacity planning. And it also helps in effective utilization of the capacity through the proper loading of the machines and manpower.

Now, I will summarize this presentation. In this presentation basically I have talked about the details of the different activities which are done under the different stages of the production planning and control and what is the scope of the aggregate planning and the material master production schedule. Thank you for your attention.