Operations Management
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Lecture – 41
Production Control

[FL] Friends, welcome to the week 9 discussion on our topic on Operations Management. We have already discussed 8 weeks regarding the various aspects of operations management; and if you remember we have covered the product, design and development. We have covered sales forecasting, we have covered the facilities planning, we have covered the layout, then we have covered the project scheduling in terms of CPM and PERT. And now, our focus will be on production control.

By the time we know that what we have to produce and how much quantity we have to produce? We know that how to schedule the operations; how to divide the complete project into its individual jobs or activities, how to establish a precedence relationship among the various jobs and activities.

So, we know by now that a product has to be made the quantity in which it has to be made where it has to be made we have already discussed, where the facility or the factory or the organization must be located. What should be the layout of the machines within the organization? That also we have seen, then the scheduling part may be a little bit of the project management part also; we have seen that the project or the manufacturing activity will consist of number of operations and these operations have to be sequenced in such a way that we are able to meet the delivery schedule or the deadline.

So, these days project based output is desirable project based approach is more relevant, because for a particular product. There is a project team which works on that project right from the conceptualization stage to the final may be manufacturing of the product. So, the project based team or we can also call it as a product based team is formed. So, the concept of project management is also equally important.

So, with this information now we have to enter into the next domain, that is; the production control domain. We have to see that whatever we have planned, we have to

put that plan into action and then compare that how we are faring? How we are doing whether we are able to meet our intermittent targets or intermediate targets or are we lacking behind if we are lacking behind. How to expedite the operations in such a way that we are able to meet our delivery schedule?

So, the control part is related to control of materials control of manpower control of machines. In order to be able to satisfy the time delivery time or the scheduled time which has been agreed upon, because whatever manufacturing is being done whatever product we are producing has to be used by the customer and whatever time has been decided for the delivery has to be honored by the organization; in order to have a good maybe rapid in the business scenario or in the business world.

And therefore, it is very very important to focus on the control part that; whatever is the planned progress and what is the actual progress? What is the difference between the two? If our actual progress is equal to the planned progress, there is no need to worry, but if our actual progress is lacking behind the planned progress. In that case we have to see the level of deviation the difference between the two and then try to pull off over socks try to expedite the operations in such a way that we are able to meet the target.

Now, if you remember in our 8th week of discussion the last two sessions were on crashing. So, that was related to the control part only that if we realize, that we are lacking behind the schedule what we will do? We will thrust additional resources we will put additional manpower. We will put may be additional machines and equipment in order to bring the overall project in schedule. So, we will crash some of the activities we will try to reduce the duration of some of the activities. So, that our overall project completion time remains same.

So, similar is the case here also, but that is the last resort. When we are exercising control our focus would primarily be we will wish that whatever we have planned at all milestones, we are matching our planned progress what whatever we are actually doing is the same as we have planned.

In case there is an emergent situation; we are delayed then only we will focus on expediting our progress. So, the main four functions of production control; basically are the loading, sequencing, scheduling and expediting. So, we will try to understand these functions and try to maybe see that, how we can focus on these functions how we can

implement these four functions. In order to achieve our overall objective of operations management, that is to supply to deliver the right quality of product at right time in right quantity with right may be cost that is the last part is the cost.

So, four words are important I think I have emphasized these four words earlier also in number of sessions the quantity quality time and cost. So, we have to ensure the overall objective is met that we are able to supply the right quality of product in right quantity at right time and in reasonable cost. So, this control function will help us in achieving our target.

Now, let us see maybe with the help of definitions with the help of presentation that; what is the concept of production control? Now production control provides the foundation.

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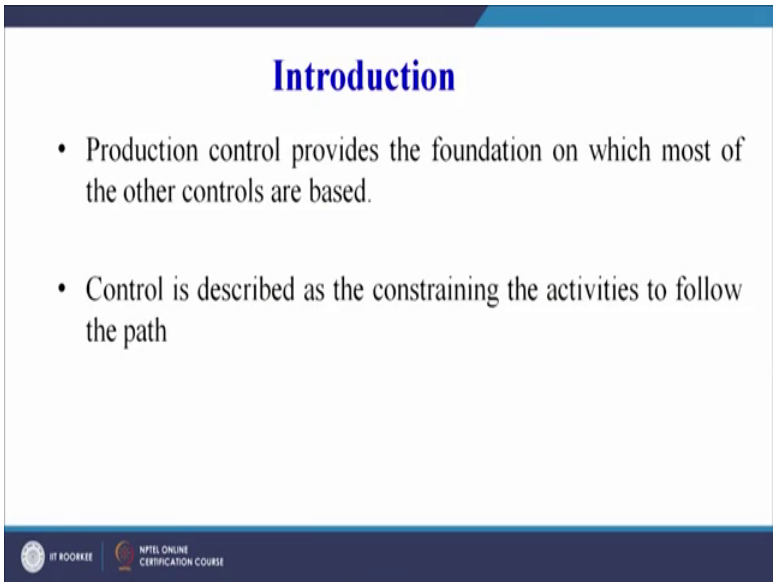

On which most of the other controls are based. Control is described as the constraining the activities to follow the path.

For example, now we are driving on a road. So, the vehicle must maneuver or move on the road only suppose the vehicle tends to go out of the road, that is the time where we have to exercise, we have to restrained and we have to constrained the steering in such a way that we move on the road only. So, this is the control that is being exercised.

We are having a planned progress that; we must be able to produce 500 products in a week. What is control? Now, maybe after 3 days we will check, what is our actual production? We say we will suppose if we see it is 100 only after 3 days of manufacturing, we see that our actual production is 100 only and we have to satisfy a target of 500 in a week and in day in 3 days we have produced only 100.

So, what does that mean? That we are slow we have to pull up. So, the control basically is checking at intermediate level comparing our planned progress with the actual progress. And, then if required then expediting the operations in such a way, that we are able to meet the target and in this example of a target is 500 products in a week.

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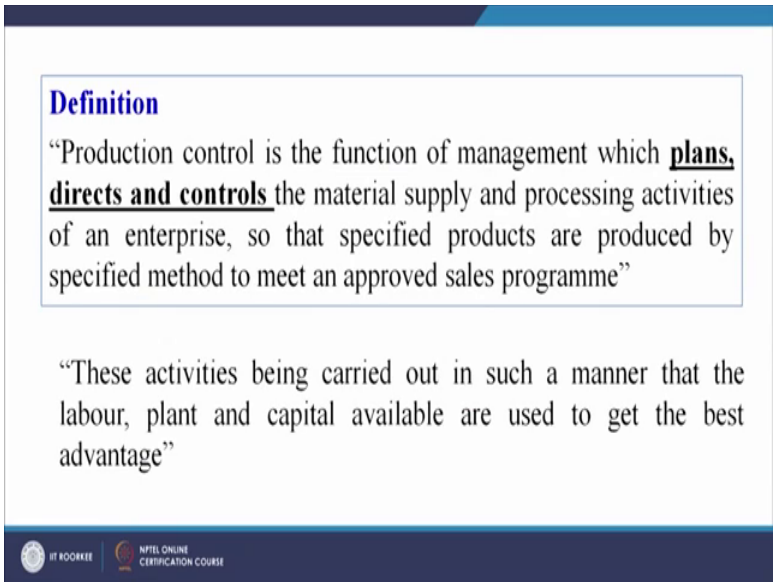

Now, what is the definition; the definition can be, "Production control is the function of management which plans, directs and controls the material supply and the processing activities of an enterprise, why plans, directs and control? Why the planning, directing, controlling is required. So, that the specified products are produced by the specified method to meet an approved sales programme". So, we have to we have this information already available with us that what has to be produced therefore, the specified products have to be produced the method also is well known to us.

So, we have to follow the two things whatever are the design specifications or the product that has to be produced, that is fixed the method also is fixed and we have agreed

upon a specific sales program, that is we have already entered into an agreement with our customers. So, we have to honor that agreement.

So, basically production control will focus on planning, directing and controlling the material supply and the processing activity. So, they it is basically controlling the operations, in such a way that the right product is produced in right quantity by the right method. In order to be able to deliver the product at right time; So, the right product and right method is already well known to the management.

Now, the right methods can be it can be combination of operations like; casting, welding or maybe some time shouldering brazing forging. So, there can be number of manufacturing operations, but in our course our focus is not on manufacturing technology our focus is on managing the operations. So, in your ug or pg curriculum, there is a maybe clear distinction that there will be courses dedicated to the manufacturing technology only where you will be learning.

All these process mechanisms, what are the inputs to these processes? What are the outputs that you can generate? What are conventional methods of manufacturing? What are unconventional methods of manufacturing? So, basically all that is well known to the management that this is a sequence of operations to be followed to create this product.

So, the production control will focus on managing the operations in such a way controlling the operations in such a way that the right product is produced processed by the right method in right quantity. And the time is honored for which the contract has been signed.

So, these activities being carried out in such a manner that the labor plant and capital available are used to get the best advantage; So, we have to plan and control in such a way that we make use of the available resources to the fullest; that is the optimal utilization of the resources is ensured. So, that we the; we are able to derive advantage by making use of the resources at our disposal.

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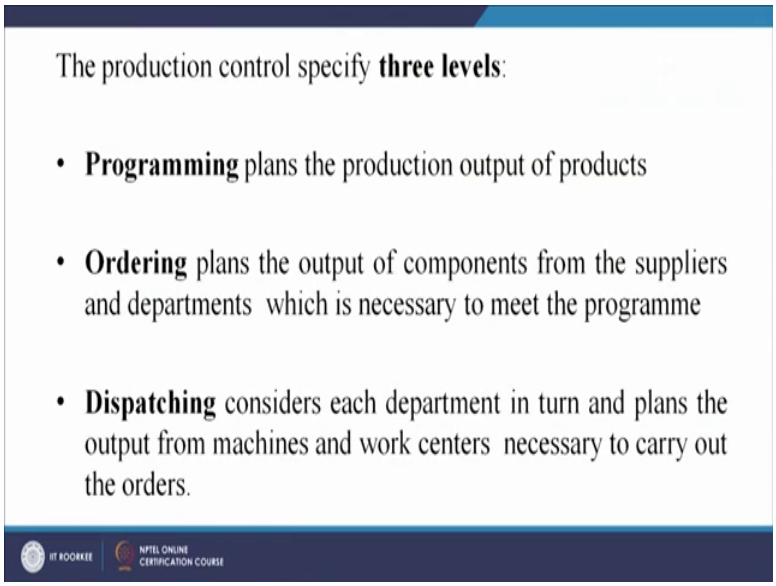

The production control specifies three levels: first is programming plans the production output of product. So, we know that how many products have to be produced in a given. Time ordering it plans the output of components from the suppliers and departments which is necessary to meet the program. So, already we know that what is the number of products how they have to be produced that is known and when they have to be delivered. So, that is a overall program.

Then the ordering is another function in order to satisfy that demand or satisfy that number, that we have to deliver we need to have raw materials parts equipments sub assemblies whatever is required. So, ordering plans the components from the suppliers and departments which is necessary to meet the program which is our first level of production control and finally, the dispatching considers each department in turn and plans the output from machines and work centers necessary to carry out the order.

So, now dispatching means giving the orders so, that the manufacturing can start at the individual work centers and output of one one work center can be the input to the next work center. So, it considers each department and in turn plans the output from the machines and work centers necessary to carry out the order.

So, basically planning is done materials are ordered and finally, the orders are issued to each and every work center to start the manufacturing activity. So, that the final output is produced now outline of production control the first may be loading and scheduling.

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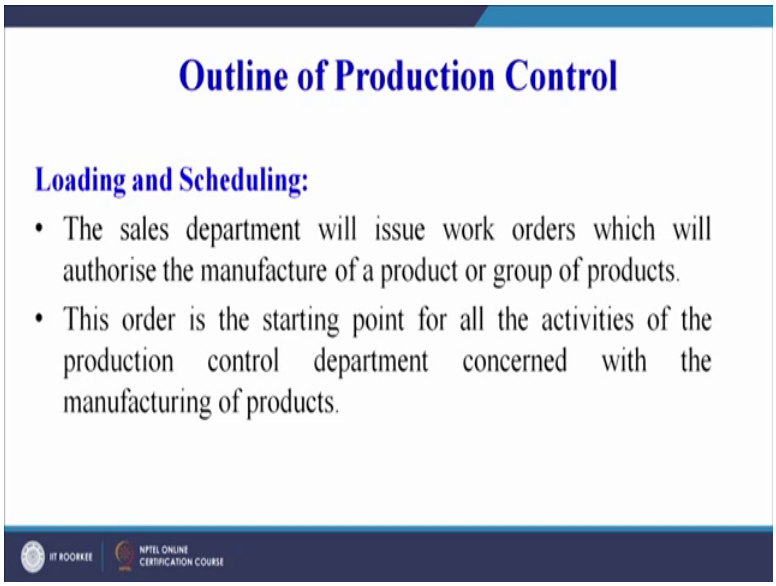

The sales department will issue work orders which will authorize manufacture of a product or group of product. So, there is a order with the sales department which will authorize the manufacturing department to start the manufacturing activity.

This order is the starting point for all the activities of production control department concerned with the manufacturing of products. So, basically the order will come to the sales department, it may not be a direct order. It may be the forecast by the sales department also that they have forecasted that demand using any of the methods that we have studied earlier in this course. So, whatever is the number that has to be produced that will be issued as an order that this is what is required and this is the number of products to be processed by such and such date. So, the time is also fixed the number of products is also fixed.

And, now the orders have to be issued to start the manufacturing and then with certain time domains or within certain time intervals the checking also has to be done; that whether we are moving on the right track; whether our actual progress is meeting with the planned progress or not.

So, loading and scheduling the sales department will issue work orders which will authorize the manufacture of a product or group of products, this order is the starting point for all the activities of the production control department concerned with the manufacturing of products. So, there will be numb different activities which the

production control department has to undertake, but the sales department has ordered or issued an order to the production control department to start the manufacturing process.

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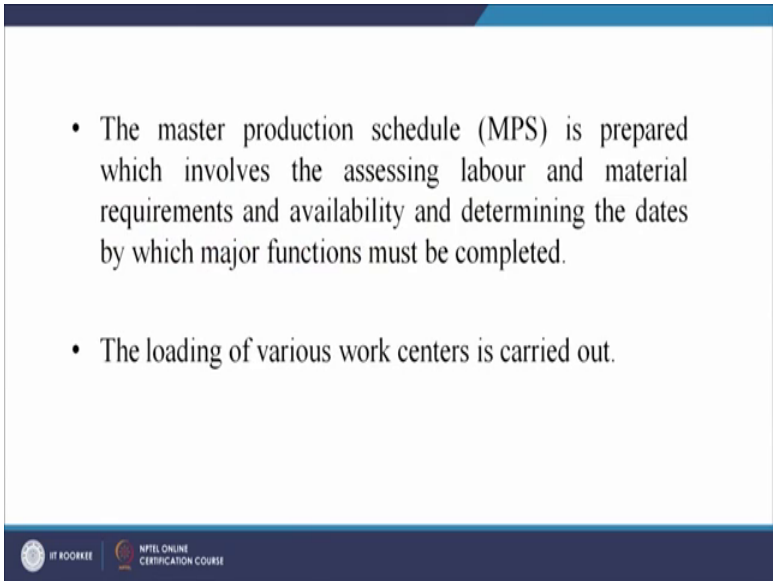

The master production schedule is prepared which involves assessing the labor and material requirements and availability and determining the dates by which major functions must be completed. In this week of our discussion the last session will focus on the master production schedule, we will see that what is the master production schedule? How it is prepared? What are the inputs required for preparing a master production schedule and how we can use the master production schedule?

So, in a production control section our focus will be first we to see the master production schedule that which machine which men or a group of men and which particular product has to be focused as per the orders given by the sales department. So, the master production schedule is prepared which involved the labor, that is which group of people or which department or which manufacturing department will focus on which particular product, and what are the material requirements for satisfying the order that has been issued by the sales department.

And the availability of different types of machines will be seen and then even if there is some conflict among the utilization of machines; that will be resolved in order to meet the deadline of the product delivery and availability determining the date by which the

major functions must be completed. So, as the word schedule is coming in master production schedule.

So, we will see that if suppose we have to deliver a product by 15th of October 2017. So, in master production schedule we will set the time deadlines that the final delivery is on 15th October 2017. So, what are the important operations that must be completed before the product is delivered on the said date.

So, we will fix timely deadlines that the assembly will start on 10th October the subassemblies must be completed by 9th October, then we will say the subassemblies are 5 in number. So, each sub assembly we will see how much time it will take. Now, suppose one sub assembly takes 10 days of time.

So, we will see that the sub assembling process for this particular sub assembly which takes 10 days time must start on October first. So, that it is finished by October 10 and after October 10 all the 5 sub assemblies are assembled into the final product in 5 days and we are able to supply our order by October of 15th or 15th of October 2017.

That is the way we will work on the master production schedule. So, that we are able to see that when which operation must be starting and be completing. So, that our overall due delivery date is honored or is met. So, the loading of various work centers then is carried out the various machines are allocated the work as per the master production schedule.

Then the materials control also because the machines will work on materials to produce the products our focus will also be on the materials control. The function of material control section of production control is assessing the need for material and then taking appropriate actions to meet these requirements.

And in our discussion of this course on operations management we will have discussion on one week clear on materials management aspects only. So, we will focus on that scope objectives needs of materials management the classification of materials such as abc classification, ved classification. The economy order quantity model the production quantity model. So, all these topics we are going to cover in our subsequent week on materials management.

So, the materials control part will be taken care as a complete one week discussion. So, here there are few things that are mentioned taking appropriate action to meet these requirements that is we have to order the materials to our vendors who are going to supply these raw materials to us assessing the need of the required material that is also.

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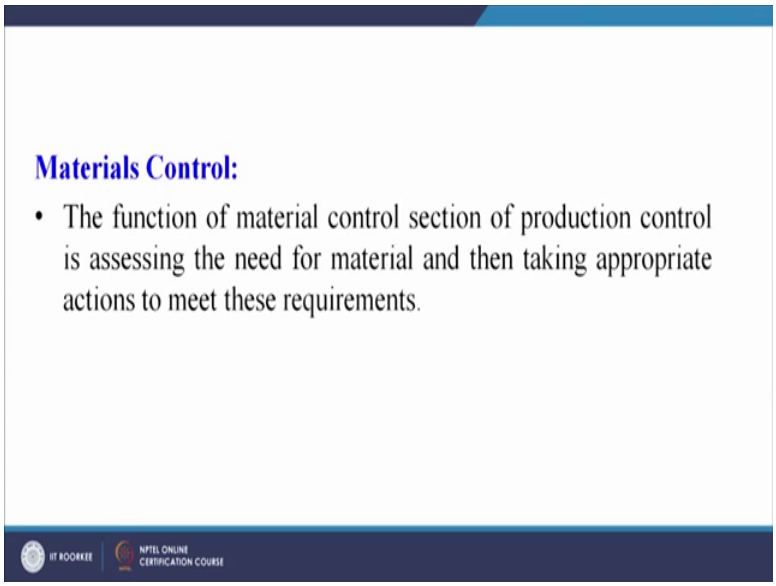

One function of materials management; So, it is an important concept or aspect of operations management. So, we will be discussing it in much more detail.

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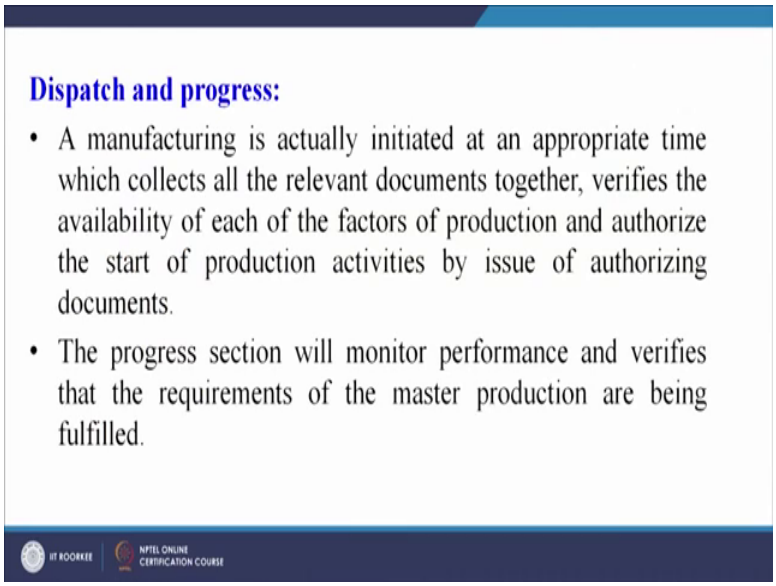

Then the dispatch and progress first we know that what has to be done the master production schedule requirement of materials. And then we will see that the dispatch is kind of an authorization, that the process must start a manufacturing is actually initiated at an appropriate time which collects all the relevant documents together verifies the availability of each of the factors of production and authorize the start of production activities by issuing of authorizing documents. So, the dispatch is basically that everything has been planned and finally, the manufacturing activity has to start.

The progress section will monitor the performance and verifies that requirements of master production are being fulfilled. So, progress may be we will check match the progress with the planned activity or with the planning that we have already carried out and try to see if there are certain deviations.

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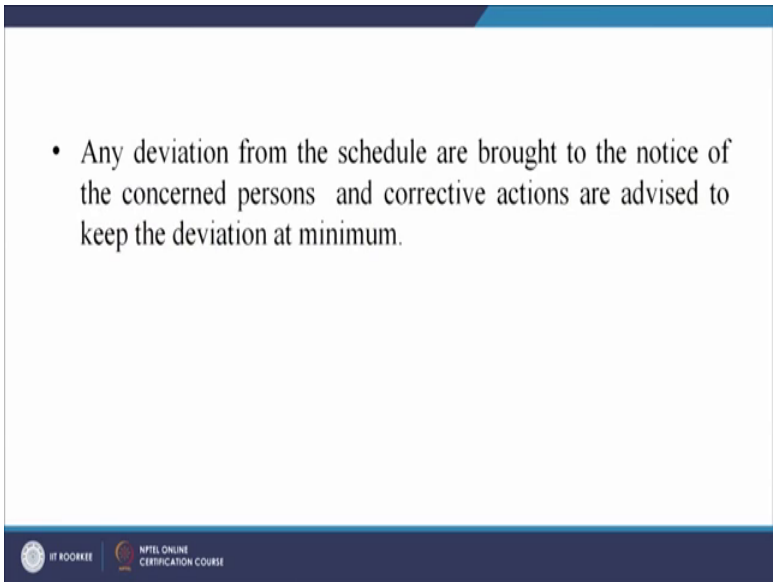

Any deviations from the schedule are brought to the notice of the concerned persons and corrective actions are advised to keep the deviation at the minimum. So, now, the actual manufacturing process or actual operations are being planned and executed in order to meet the delivery schedule.

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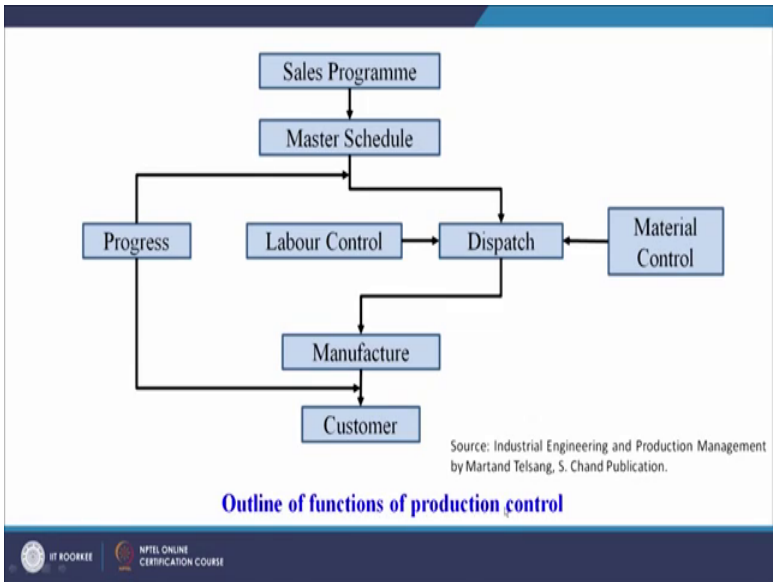

Now, this is an outline of functions of production control the source is industrial engineering and production management by Martand Telsang. So, this is a diagram adopted from this book. So, we can see here we have a sales program where we get the number or the forecast? What has to be produced based on that? A master production schedule is prod is prepared based on that dispatch, that is the order is issued or authorization to start the manufacturing activity.

Then material control the raw materials have to be managed the materials have to be ordered they have to be accounted for they have to be checked for quality, then the labor control how many people are required? What is the workforce requirement? Whether, the people need to be hired, in case, of higher demand or higher number of orders. So, all that control has to be exercised. So, this is an input to dispatch and dispatch is finally, authorizing the actual manufacturing and then once the manufacturing is done it will go to the customer.

And the progress has to be evaluated at all these levels that whether we are able to match up to our planning or not. If we are lacking then the deviation has to be reported and appropriate actions have to be initiated, that is the action of expediting our activities in such a way that we are able to meet the delivery schedule.

Then the loading sequencing and scheduling are other functions of the production control the output plans.

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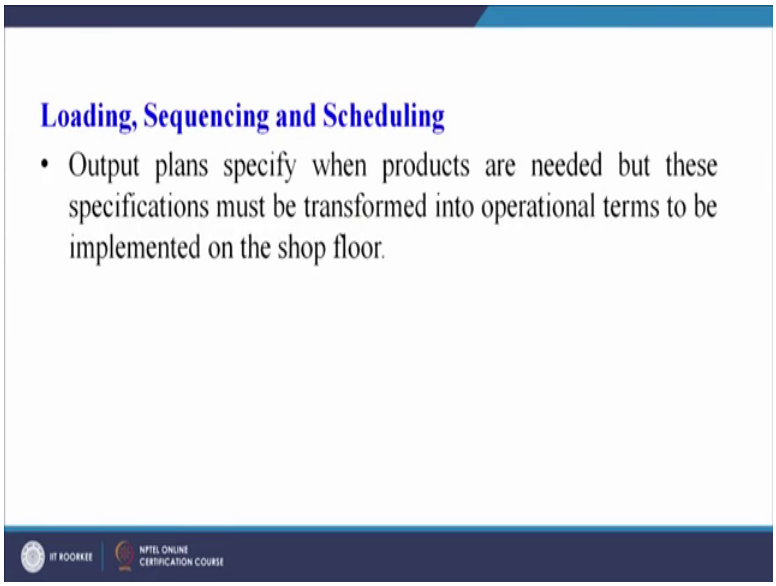

Specify when products are needed, but these specifications must be transformed into operational terms to be implemented on the shop floor. So, we know that what has to be produced is known the sales department may give us an idea that may be 500, 5000, 1000 or 500,000 parts have to be produced by such and such date. So, we have a number available with us, but how that number has to be executed on the shop floor has to be executed on our manufacturing plant that has to be planned properly and then assess that whatever is the planning whether it is helping us to achieve our due date or not.

So, the output plans specify, when products are needed how many are needed and when they are needed is known to us, but these specifications must be efficiently effectively transformed into operational terms to be implemented on the shop floor, that is basically, we can understand it this way that suppose the target is 500 products in a week. This 500 may be divided, then further into on daily basis then within the day also on shift basis.

Then we have to see who are the people who are going to produce this product; which person will be responsible for which activity, which machine will be allocated, how many machines are will be used for a particular operation, how many manners will be used for a particular operation; all that has to be actually calculated in operational terms. So, that the overall of our sales program or sales commitment is honored and we are able to satisfy the time where that has been set for the delivery of the orders.

So, all this will come under the loading sequencing and scheduling. So, loading maybe we have to calculate the requirements how many machines how many man or how many number of man hours are required, then we have to see the sequence of operations finally, we have to see the time also that, when which particular activity or operation must end when the new operation must start. So, that we are able to finalize our product by the due date. So, all these three words are important functions of production control in order to achieve our targets.

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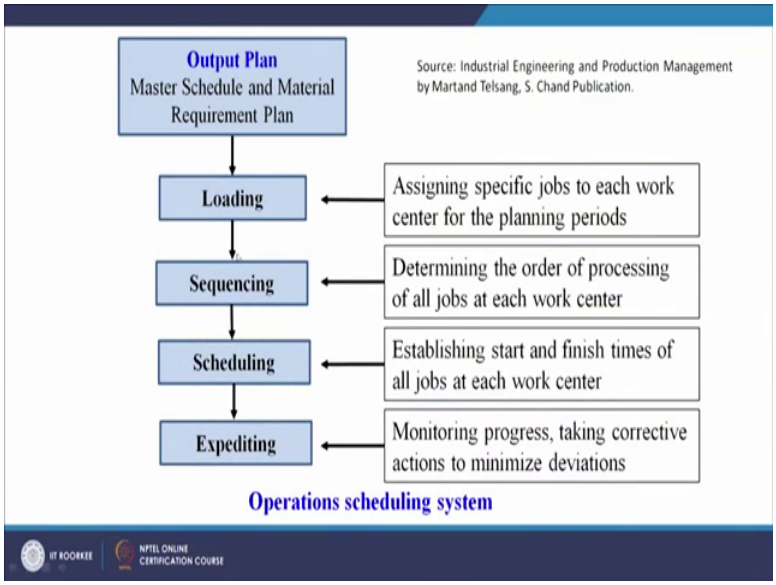

Now, we can see here I think already I have explained the words or the meaning of the words, but once again let us see them output plan we have a master schedule and material requirement plan. So, there is a term called materials requirement planning; which we will cover in our section or in our week on materials management in which we will see I have already highlighted the various aspects related to materials management. So, we need to have these two things ready we must have our master production schedule ready we must have our materials requirement plan ready in our production control section.

Then, we have to first go for loading assigning specific jobs to each work center for the planning period. Suppose the planning period is 2 months of within those 2 months, we will assign the specific jobs to each work center, then sequencing determining the order of processing of all jobs at each work center. So, sequence is prepared then scheduling

establishing start and finish times of all jobs at each work center we have to clarify this to each work center that what is the time available with them to complete the work assigned to that center.

Then expediting so, we will monitor the progress taking corrective action to minimize the deviation. So, to speed up pulling up of the socks is at the expediting stage. So, we have to do all these functions as these are the production control functions in order to meet our targets.

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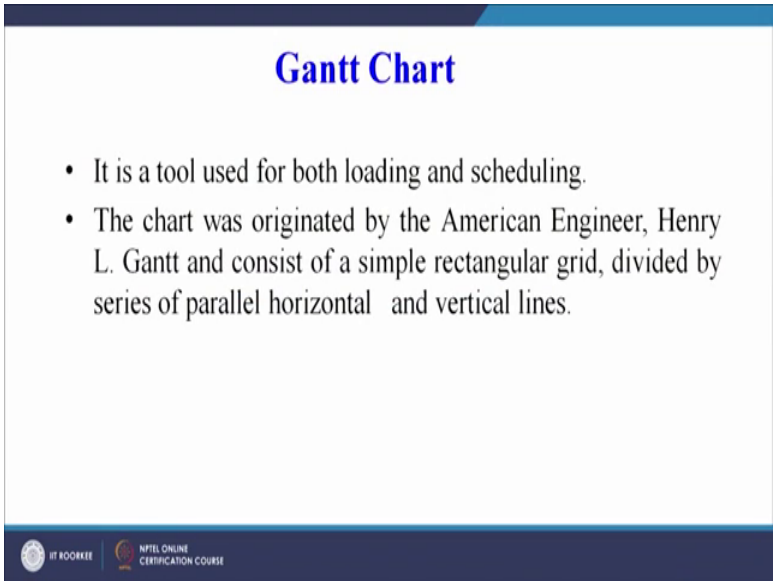

Now, Gantt chart is one tool which is used it is a tool used for both loading and scheduling. The chart was originated by the American Engineer, Henry L. Gantt and therefore, the name also Gantt chart and consists of a simple rectangular grid, divided by a series of parallel horizontal and vertical lines.

So, we can see one Gantt chart, because maybe reading this theoretically or verbatim is not that clear looking at the chart will give an idea; now this is a Gantt chart here we can see the cumulative.

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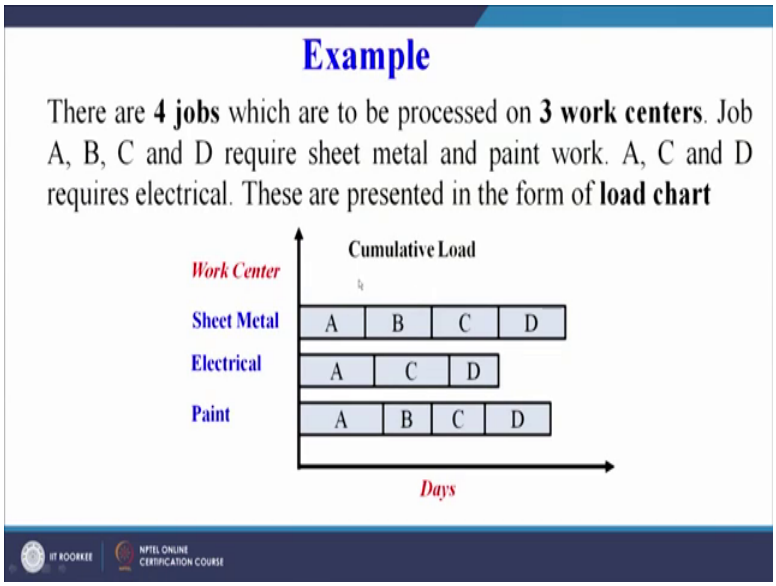

Load is there the days x axis represents the time domain y axis represent the activity or the work center. So, there are four jobs which are to be processed on three work centers. So, work centers are sheet metal electric work center and the painting work center job A, B, C, D requires sheet metal and paint work A, C and D requires electrical and these are presented in the form of a load chart that sheet metal on what particular day it will process component A. So, work center sheet metal on day zero suppose it will start working on component A that is job A.

So, there are 4 jobs which are to be processed on 3 work center job A, B, C and D require sheet metal and paintwork you can see A, B, C and D, A, B, C and D both require sheet metal and paintwork and A, C, D jobs require electrical operations these are represented in this chart. So, we can see job A requires sheet metal operations or goes to sheet metal work center on the beginning days a goes to paint also electrical also. This way we can represent the operations being conducted on the shop floor in the form of a graphical output. So, we know we can look at this and plan our activity accordingly.

So, with this we come to the end of today's session. So, in our next session in this week our focus will be on the other aspects that is sequencing and scheduling. So, we will start with the basic discussion on loading here, we can see that this is a load chart where we know that which center is going to perform on which particular product on which particular day. So, this is; what is the basic objective of our loading function?

So, in this chart I think it is clear that job a will go to sheet metal in the beginning day these numbers are not given, but at least we can make 1, 2, 3, 4, 5, 6 day wise schedule can be worked out. So, job A goes to sheet metal job A goes to electrical also job A goes to paint also in on the very first day.

So, accordingly we know that which particular work center is going to work on which particular job on which particular day. So, that is basically the loading requirement. So, in the next session we will start with loading we have try to understand it in a much clearer manner. And then we will shift to sequencing and scheduling in the subsequent sections or the subsequent sessions during this week.

Thank you.