

Construction and Project Management

Lecture 9

MS Project 1

First, let us see how to open Microsoft Project. Go to start, select the software and open it. This is how the MS Project window looks like. The first one is the standard toolbar where you have standard options like open, save, print, etc. Next one is the formatting toolbar, with styles, fonts and alignment options. MS project is similar to MS Office, but this particular software is used for project management techniques like planning, scheduling, controlling as well as monitoring when we key in the resources, cost, manpower and material. This is the property toolbar, which is in addition to the MS Office options, and it lists tasks, resources, track and report. You can select tasks and key in the tasks to be performed. Using resources bar, you can assign resources needed for a particular task and change it by adding/deleting/changing the resources. Track is nothing, but monitoring and updating the project. Reports bar helps you to print reports using the in-built template reports. For example, if you want to view your project in terms of cost, you can take a cost report, material report for material viewing, manpower report for manpower, and in cost itself, you can take direct cost and indirect cost reports. It is also possible to generate reports from the start of the project only till the second floor by assigning report start date and end date. The entry bar, like the one in Excel sheets, enables you to enter data.

The view bar has a pre-defined set of use for this particular software. It includes calendars, which details what tasks are going to be done on what days, and Gantt charts, which are default and appear on the right panel of MS Project. After you key in the tasks and give durations, the Gantt chart will be formed. When you link the tasks, the linking will be formed in the Gantt charts as well. Then comes the network diagram and the default network diagram for MS project is precedent network analysis. Task usage is how much task has been completed. Tracking Gantt chart is nothing but when you set a baseline and keep updating the project, it shows you two bars – the first one is the baseline with an activity duration of, say, 8 months and the second is the present duration of, say, 9 months. It could be that the start date is similar and still the project has taken 9 months or the start date

itself could have been pushed and the activity duration may differ. Resources graph will show in the form of a histogram the resources assigned to a particular task. For example, one excavator, 2 masons and 2 unskilled labourers have been assigned for an excavation task.

This is the table, which is like a spreadsheet, and it displays the tasks with its duration, the starting date, finishing date and interdependencies. You can increase the number of tables and columns depending upon the requirements. Then comes the timescale, which gives the timescale of the project's start and end and it can be divided into weeks, days, months or years, and non-working days are usually highlighted this way. Generally, the practice is that if a project starts in March 2016, you start the timescale from December 2015 so that the view is complete and likewise, if January 2018 is the completion date, you can take it till April or May so the project is actually completed and Gantt chart is completed on a whole.

The view bar is not visible generally. To use it, go to view and select the view bar and then the default view channels can be clipped on and viewed. The project guide helps you to digitally convert a project from a manual one and tells you what has to be done in a project as Microsoft Project is a friendly tool. It can be turned on by going to 'view' and selecting project guide. It will give instructions on how to go about project networking.

Creating a project:

Now, let us see how to create a project, how to assign tasks to it, give task durations and how to interlink it. To create a project, click on file and select new. On the new project task pane, click on 'blank project'. If we want to use templates, there are 'n' number of templates available in Microsoft Project and we can make a selection depending upon the type of our project and alter the data like duration, task, etc. Generally, templates are available only for repetitive projects. The project information box is an important box which can be selected by clicking on project and then selecting project information. Here, you can enter your start date, current date (useful for tracking your project), estimated finish date, status date, schedule from (the schedule can be updated right from the start, or can be split by giving the desired dates) and calendar. There are three types of major calendars available, but the standard calendar is the general one. It stipulates working days from Monday to

Friday with 8 hours of work and 1 hour of break each day. In the field, details like ID number, task name, duration, start date and end date are entered, if required, or can be right clicked on the table itself and a new column can be inserted.

Then comes the project properties. Click on file, select properties and such kind of box opens. Under summary, details like the project's title (project name), subject (say Block A, etc), who is doing the project, who is going to review the project, who is the manager and the company's name can be keyed in. Statistics holds the project details, like how much is completed, etc.

Next is the project calendar. As a default, Microsoft Project uses standard calendar, which stipulates working from Monday to Friday with 8 hours of work and 1 hour break in between. Another type of calendar is the 24 hour format, which involves 3-4 shifts of manpower working 24X7. The night shift calendars are used in port projects or any projects in critical location, where morning work cannot be done and night shift working is only permissible (eg-renovation work in offices). In such cases, work is done from Monday night to Saturday morning from 11 pm to 8 am with 1 hour break in between. To select the calendar, select tools and then select change working time. The standard calendar is chosen and you can see here the non-working days (Saturdays and Sundays), 19th is the current date and exception day is where you can key in a holiday. If it is not done by default by Microsoft, then you can edit and make some day as a working day. For instance, under the standard calendar, Saturdays are non-working, but if I want to make it a half day, then select Saturdays and edit the working hours to 4 or 5 hours. This is how you need to work on a calendar as changes in working hours impact the overall project.

MS Project 2

Now, we need to start entering the task. This can be done by going to the enter bar and keying in the task. For entering a subtask, select any particular task, right click and insert row or even press insert key from the keyboard. As a default, when you enter a new task, it will appear one row above the selected row. Editing a task is the same as in Excel, it is done by placing it on the task and retyping it. Otherwise, it can be done by selecting the task name, clicking in the entry bar to edit text and pressing enter or checking the green tick mark. For moving a task, select the entire task by clicking on the task ID number, right click on it and select 'cut task', click

one row below where you want to insert it and click 'insert task'. Copy task, insert task and delete task are done in the same way as in Excel. To copy, right click copy and then paste it wherever required, to insert right click insert or press insert key in the keyboard, and for deleting a task right click delete. Whenever we edit a particular task, we need to select the entire row by selecting the ID number, else errors will creep into scheduling. The task duration can be entered in months, hours, minutes, days, weeks or even a mix of everything. But, it is a good practice to stick to one particular type like doing the complete scheduling in days. Place the cursor in duration column and give an entry, then give a start date and the finish date will automatically be updated depending upon the duration given.

Linking: There are four types of linking for any particular task -- start to start, finish to start, start to finish and finish to finish. These are the four major interdependencies of task linking, as we have seen earlier, and we will be calculating the forward and backward passes during the critical path method as well as PERT type of manual calculation. The same thing is applicable here also. When you want to link the tasks, the dependencies between the tasks should be ascertained. Select the tasks to be linked and click on the link task button and from the Gantt chart double click the link and you can then select the dependency. Finish to start is the default dependency in MS Project. If you want to change the dependency, right click on the particular link that is generated and you will get this task dependency toolbar, where you can change the type. Here, from painting to carpeting is going to be finish to start, i.e. once painting is completed only, carpeting work will start and the lag is 0 days because as soon as painting is completed, carpeting work will start.

Task Constraint types: There are a lot of constraints for any particular task, the three major ones being flexible, semi-flexible and inflexible. Flexible tasks can be taken up as late as possible or as soon as possible as it does not affect the project duration. For instance, carpeting work can be taken up by the end user whenever he wishes. This is similar to float. Semi-flexible means 'start no earlier than', 'finish no earlier than', 'start no later than' and 'finish no later than'. If we consider the same example, carpeting work cannot be started before painting work is completed and hence it comes under the 'start no earlier than' category. Also, carpeting work can be completed only before handing over work is started – 'finish no earlier than' category. If I have to complete my project in April 2016, carpeting

work cannot be taken up after mid February – ‘start no later than’ category. Also, the work should get completed by March, if you have to hand over the project in April 2016 because one month is for de-snagging and minor corrections – ‘Finish no later than’ category. Mostly, all the critical path activities will be inflexible, i.e. it must start on this date and finish on this date. If it changes, the project duration is ultimately going to get affected.

How to apply constraint? To apply a constraint to a task, double click on the task itself and the task information tool bar will open, click on the ‘advanced’ tab and select the constraint type from the drop down box. If it is going to be ‘finish no earlier than’, provide the constraint date and also the duration of the task. For the same task, under general, you can find data like duration and task name. Predecessor shows the task that is preceding, and resources shows the resources that are assigned to this particular task. If you want to write any particular note or describe anything or if you have done any assumption for the particular activity, you can do it in notes. Anyone doing the scheduling or any other person viewing it will get to know about the assumptions. To see the resources assigned to the particular task, click on ‘view’ and select ‘resource sheet’ and you can see here the resources assigned, the type of resources like material, work (manpower) and cost (direct and indirect cost). Initial is pre-determined or you can define the code and numbering based on your company. The rate of the resources is also given. How do you assign resources to a particular task? Click on the Gantt chart view, select a task for which you want to assign resources, click the ‘assign resources’ button, this particular window will open, click on the resources and assign it.

By keying in the task, giving the inter relationship, constraints, notes, assigning resources, the network has been formed. The next step is to find the critical path. Even when we do it manually, the next step is to find the critical path, total project duration, non-critical activities and if you want to optimize the project duration and project cost, crashing is done. In the same way here, once the network is formed, find the critical path. To display the critical path, there is a wizard. Click on the format button and select Gantt chart wizard and in the wizard, click ‘next’ and select critical path, once the critical path is selected, select resources and dates and click next. Once this is done, the verification is done, following which you have to format and exit the wizard. The critical path for that particular network is seen, highlighted in red.

This is what I do when I start the project. So, I treat this particular network as my master schedule. In Microsoft Project, it is called as baseline. So, this particular project needs to be set a baseline. Click on tools, select tracking, and then select 'set baseline'. So, the master schedule becomes the baseline, which is nothing but the base schedule depending upon which updating of the project will happen. What is the relevance of this particular updation with respect to the baseline, whether there are any changes, any delays or any cost increase or any resource addition can be tracked when you set a baseline. The baseline will not change. In one particular project, you can set up to 11 baselines. So, you can have R0 schedule, R1, R2, etc and everything can overlap because the project is not set for constraint duration though we plan for it, there might be changes like an extension given or design change. So, once you select set baseline, then select for entire project and click ok. Thus, your baseline is set. Once the baseline is set, the project statistics dialog box is used. In the project, select project information dialog box and then click on statistics. Here, the current date is 23rd of March and the baseline date is also the same and hence 0 days of variance. The variance, the remaining days, any changes in terms of cost, manpower involved can be calculated from this itself.

Finalizing and updating is nothing but once that is done, you have a set of format reports. Here, overview gives the general outline of the project, current activities brief about only the current activities going on, and other templates are Costs, workload and assignments going on. Such kind of pre-determined templates are there and when you want to see only the updated processes, go to report menu in project formatting and select reports. Select whichever report you want and print it.