

Scheduling using MS Project for a Linac Bunker

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Abstract: This paper explains about scheduling for a Linear Accelerator Bunker. The software used for scheduling is MS Project. It calculates the total project duration, slack, start & end dates for each tasks etc.

Keywords: critical path, base line, Linac, MS Project, slack.

1. Introduction

Project Management is the Application of knowledge, skills and Techniques to project activities to meet project requirements. Project management is the art and science of converting the client's vision into reality by working efficiently, effectively and safely. The British standard BS 6079:2000 defines project management as the planning, monitoring and controlling of all aspects of a project and the motivation of all those involved in it to achieve the projective objectives on time and to the specified cost, quality and performance. Project management according to ISO 10006:1997(E), includes the planning, organizing, monitoring and controlling of all aspects of the project in a continuous process to achieve its objectives. Project management institute of the USA describes project management as the application of knowledge, skills, tools and techniques to project activities in order to meet the project requirement.

2. Literature review

Wallace Agyei (2015) the study was aimed at finding the difference between the cost and minimum expected time that will be required to complete the project. Both CPM and PERT techniques were used for analysis and from the result it was concluded that schedule proposed by bus provides much shorter completion time as compared to the actual time taken by the process.

Rashmi J.V. and Amey A. Kelkar (2017) They analysed the planning and scheduling of multi-storeyed building in two phase by conventional execution approach & again analysis of same building was carried out by applying MSP to compare the result for justification. For their study they considered G+3 with basement and the type of RCC frame structure, to estimate the overall cost and time required to execute a multi storied residential building. The result of their study showed that proper manage of project management skills and technique

reduces the time by 23.2% and cost by 3.14%.

E. Suresh kumar and S. Krishnamoorthi (2015) in their study they focused on the scheduling using MSP and earn value analysis for an apartment building. Thereby time required for the process of cost overrun is avoided. Project schedule is considered as core of the project plan, and the purpose of the project schedule is to show the organization how the work will be performed to uncover the mistakes. After completion of project it has been observed that there is more difference between budget cost and actual cost, cost increases as the material price increases. Earned value analysis is carried out in order to find the variance cost of the project.

3. Construction project management

Project management is a highly specialized job, to achieve this project management involves following three phases

- Project planning
- Project scheduling
- Project controlling

A. Methods for scheduling

Many methods are there for project scheduling purpose. Commonly used methods are

- Bar charts
- PERT
- CPM

4. About MS project

Microsoft Project is a project management software program developed and sold by Microsoft, which is designed to assist a project manager in developing a plan, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads. Project creates budgets based on assignment work and resource cost.

The application creates critical path schedules, and critical chain and event chain methodology third party plug-ins are also obtainable. Schedules can be resource levelled, and task networks are visualized in a Gantt chart. Additionally, Microsoft Project can identify divergent classes of the users. These different classes of users can have differing access levels to projects, views, and other data. Customization of aspects in

Microsoft Project such as calendars, views, tables, filters, and fields are stored in an enterprise global which is accessible by all users.

5. Scheduling for a Linac Bunker

For this project MS project is used as a planning and scheduling software. First step is to provide project information; in that basic detail about the project including the start date is provided. In this project the project start date is given as 2-05-2019, which is shown in the below image

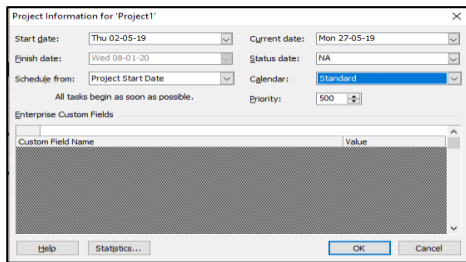


Fig. 1. Project information

The calendar selected is standard calendar. If required, we can change the project calendar by setting new working time also we can set the holiday list. Calendar enables us to assign proper dates for holidays, ease of labour, procurement of resources and carrying out the proper planning and scheduling. Next step is to define the tasks. The project is divided to a no of tasks and sub tasks. These tasks are entered based on their hierarchy as shown below in chronological order. This is known as work breakdown structure.

A work break down structure can define the success of a project. It provides the foundation for all project management work, including, planning, cost and effort estimation, resource allocation, and scheduling. The below drawing shows how the project is divided to tasks and sub tasks. First the project is divided to three parts General work, sub structure, super structure then each of this is divided further to different activities. This helps to make the full project into micro tasks.

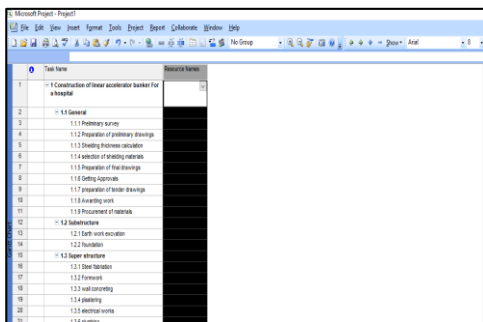


Fig. 2. Adding task

To enter the duration for each activity is an important step. Duration is calculated based on the quantity of work is to be done. Linking different tasks can be done after entering all the tasks in their respective column. In the predecessor column

enter the no of the task which is acting as a predecessor, more than one predecessor can be added. Predecessor is not given for the summary task. Once the relationship between the activities is given then MS project will automatically calculate the total duration required for the project and also the finishing time for each activities and thus for the entire project. The below image shows the relationship between the activities.

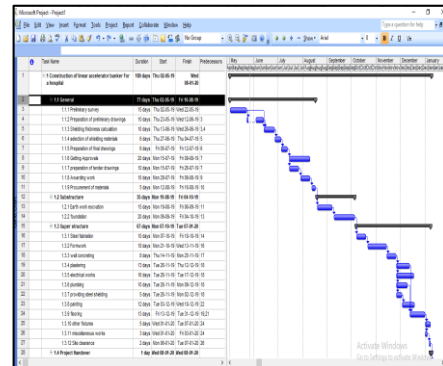


Fig 3. Gantt view

Adding of predecessors will automatically calculate the task dates throughout the tasks. Link different tasks only if there is a real dependency is there between the tasks otherwise it will calculate the project duration and critical path wrongly. We can link any two tasks in a project to show their relationship. Actually these relationships drive the project schedule. Once we link the tasks, every change we made to the predecessor affects the successor and so on. Here we can see that the total duration for the project is 180days.

In addition to the list view Gantt chart view also provides an illustrated version of the tasks, with Gantt bars that shows the duration of the projects tasks across a timeline. For each task the associated Gantt bar begins at the start date, and ends at the finish date. Gantt chart also shows the predecessor relationship between the activities.

Every task is important, but only some of them are critical. The critical path is a chain of linked tasks that directly affects the project finish date. If any path on the critical path is late the whole project is late. The critical path is a series of tasks that control the calculated start or finish date of the project. The tasks that make up the critical path are typically interrelated by task dependencies. There are likely to be many such networks throughout a project. When the last task in the critical path is complete the project is complete.

The Gantt chart view is the most used view for showing the critical path. Tasks on the critical path now have red Ganttts. The below image shows the view of the critical path (red) for this project.

Slack, also called float is the amount of time a task can slip before it bumps in to another task. It's automatically calculated in our project when we schedule tasks using MS project. We can use it as a buffer time if we needed when our schedule is at a risk of being delayed. A task with zero slack is considered a

critical task. If a critical task is delayed, the project finish date is also delayed. To make sure that our project finishes on time optimizing tasks that have slack and are not on the critical path. Total slack can be positive or negative. A negative slack value indicates there is not enough time scheduled for the task and more time is needed to prevent our project finish date from slipping. Below image shows the slack/Float available for this project.

Final step in project management is controlling. To happen this, a well-managed project often involves comparing a project to earlier version of it. This is a critical part of tracking the project. Before starting to track a project, we need to set a baseline so that we can compare it with our up to date schedule later in the project.

6. Conclusion

A linear accelerator is used for oncology treatment; it is providing external beam radiation which can be focused at a particular point affected by the disease. The purpose of providing radiation shielding is to reduce the effect of radiation outside the room to a minimum level so that it will not affect public outside the room. Scheduling is done using MS Project for the same project. Total duration for the project is calculated, finishing date for the project is identified after scheduling using MS project. Critical path is identified; slack/float is calculated for the project. A baseline is set for the schedule which allows the future tracking of the project.

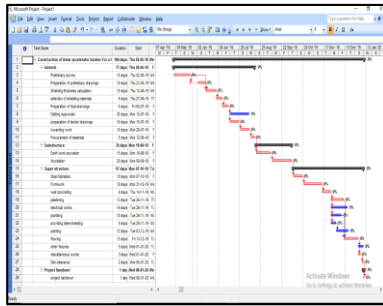


Fig. 4. Critical path

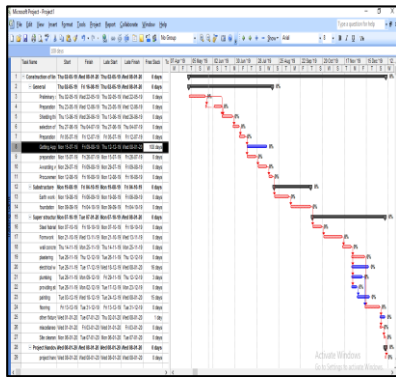


Fig. 5. Float

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