

# CONSTRUCTION SCHEDULING PROJECT WITH TIME USING CRITICAL PATH METHOD

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## Abstract

*This article evaluates the viability of using critical path method models for determining construction schedules. Networks were analyzed using by CPM calculation and MS Project software. Despite some detractor's opinions, Microsoft Project (MSP) CPM scheduling software is here to stay as many contracts are now mandating its use. Most people using MSP on construction projects find that MSP is fine for planning the work but very difficult to use when maintaining the status and forecasting accurate project completion. MSP is also difficult to use when performing delay analyses. The good news is that you can 'make' MSP properly reflect the consequences of an update displaying proper Retained Logic. This paper will explain how to best use MSP in place of P6 or other more status-oriented scheduling software.*

**INDEX TERMS – Microsoft Project, Project Management, Planning, Construction Organization, Activities**

## 1. INTRODUCTION

Over the last two decades Primavera products became the predominant scheduling software of the construction industry worldwide. Sadly, nothing lasts forever and many contracts have recently started to specify MS Project (hereinafter referred to as, "MSP") as the required scheduling software. MSP has its advantages; it costs less than many of its competitors and it is 'user-friendly'. It is easy to start scheduling activities immediately. MSP easily produces decent default graphics and reports. Another reason for MSP's popularity is that a majority of US Federal Government PCs come equipped with MSP. It is difficult to justify requesting the authority to purchase another scheduling software when you already have one installed on your computer 'for free'. Most construction contracts for construction projects require periodic schedule updates. A schedule update is an assessment of the project status and prediction of how and when the project will be completed. Proper updating of the work schedule is an integral part of project management and a critical communication tool between the parties. The schedule update should reflect the current plan to reach project completion and an accurate record of the past performance. The major steps in updating a schedule involve:

1. Setting a baseline
2. Updating the schedule
3. Comparing schedule updates

These steps are common to every software package and considered a regular course of business for construction schedulers. MSP has many unique features specifically designed to make using the software simple. However

when it comes to updating a schedule using MSP, construction schedulers often find MSP extremely confusing. This is mainly due to the MSP's 'ease of use features' getting in the way of reflecting the consequences of the current status. It gets even more complicated if you ever have to do a forensic delay analysis on a MSP schedule. Cheer up, as all is not lost. A clear understanding of how MSP calculates a schedule will make it possible to properly use MS Project in place of a Primavera product, if needed. This paper documents the complete process of tracking a schedule in MSP as well as the details of how to 'make' MSP properly handle a typical status update involving out-of-sequence status.

### **1.1. About Microsoft 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. As resources are assigned to the task and the program calculates the cost equal to the work times the rate, which rolls up to the task level and then to any summary tasks level and finally to the project level. Resource definitions (Labour, equipment and materials) can be shared between projects using a shared resource pond. Each resource can have its individual calendar, which defines what days and time is resource present. Resource rates are used to calculate resource assignment costs. Each resource can be assigned to multiple tasks in multiple projects and each task can be assigned numerous resources. The execution of the scheduled task work based on the resource availability as defined in the resource calendars. All resources can be defined in Work, Material and Cost. Therefore it cannot estimate how many finished products can be obtained with a given amount of raw materials. This makes Microsoft Project unsuitable for solving problems of available materials constrained production. The application creates critical path schedules, and critical chain and event chain methodology third-party plug-ins are also obtainable. Schedules can be resource leveled, 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.

### **1.2. Objectives of the Project**

- To study total project management and key elements of project management.
- To understand function, process and application of project management software - MS Project.
- To identify the specific area of total project management, where MS Project software should be implement.
- To study construction of Buildings (Villa) in An and Region.
- To implement MS Project software for construction of Buildings.
- To co-relate modern project management software techniques & construction of Buildings.
- To establish the ease of monitoring & control using software.

## II. LITERATURE REVIEW

Many authors have attempted to define project management. LOCK'S view was that project management had evolved in order to plan, co-ordinate and modern industrial and commercial projects. BURKE considers project management to be specialized management techniques, to plan and control projects under a strong single point of responsibility. TURNER suggested that project management could be described as; the art and science of converting vision into reality. Taylor (1911) & Gantt (1919) was pioneer in the science of project management and they contributed greatly to the practice of modern.

Project management. Although great events of the past suggested the theories of project management, it was only in the early twentieth century that the theories, methodology and framework aimed at project management were in established. Construction of the Pyramids of Egypt. The Great Wall of China and The coliseum in Rome represent examples of man's effort that must have been regimented by principles of project management. A Timeline, as per Carvalho & Rabechini Jr. (2011) present great landmarks of project management from the twentieth century. This is able to present the evolution of project management practice and represents milestones for construction industries

Period	Events
Post-war	Creation of CPM net
1960	Significant associations arise as IPMA and PMI
1970	Stagnation. Software for Project Management are featured
1980	Growing practice of Project Management in the World
1990	Exponential growth in the number of certified publication
2000	Emphasis on setting the practice of Project Management

## III. SOFTWARE APPLICATION IN PROJECT MANAGEMENT

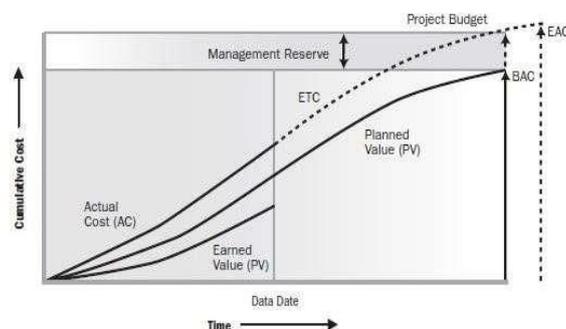
- Some of the advantages associated with project management software are;
- Speed and accuracy have greatly improved.
- It is not a very costly proposition and even medium and small companies can afford these software.
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- Most of the software are user-friendly and one can use them quite easily.

- The software can handle complex problems involving multiple stakeholders as well as a number of constraints.
- It is easy to modify the inputs and maintaining the records has also become easier.
- Decision making has become easier. It is possible to try different possible alternatives and select the best alternatives with assistance of what if analysis in project management software.
- **Microsoft Project supports three types of resources;**
- **Work Resources** include the people and equipment needed to complete the task.
- **Cost Resources** represent a financial cost associated with tasks that need to account for. Example; Expenses like travel, entertainment and so on.
- **Material Resources** are consumable that uses up as the project proceed. Example; a construction project might
- **Earned Value Management (EVM) or Earned Value Project (EVP) or Earned Value Performance**
- **Management (EVPM)** is a project management technique for measuring project performance and progress in an objective manner.
- **Planned Value:** Planned value is the authorized budget assigned to scheduled work.
- **Earned Value:** Earned value is a measure of work performed expressed in terms of the budget authorized for that work.

□ **Actual cost:** Actual cost is the realized cost incurred for the work performed on an activity during a specific time period.

Data like the Activities Starting Date, Finish Date, Duration of Activities and their Delays,

Relationship of Activities and task, Amount of Resources used for the Activities etc. was collected from the Construction Organization of Pune, India to analogize the data and make the data use in the Microsoft Project with the proper changes were made. Information you gather can come from a range of sources likewise, there are a variety of techniques to use when gathering primary data listed below are some of most common data collection technique.



#### IV DATA COLLECTION

**CALCULATION OF DURATION BY CPM METHOD**

**OBSERVATION**

ACTIVITY	EVENT	DESCRIPTION OF WORK	DURATION
A	1-2	Foundation work	1 day
B	2-3	Earth work excavation	3 days
C	3-4	Plain cement concrete	18 days
D	4-5	Foundation (up to plinth level)	28 days
E	5-6	Plinth beam	16 days
F	6-7	Earth filling, flooring	25 days
G	6-8	Super structure (up to roof level) including lintel sunshade all opens	48 days
H	8-9	Electrical plumbing carpenter work	5 days
I	9-10	RCC slab, beams, columns up to first floor (including, bar bending, curing)	58 days
J	10-11	Plastering work inside, out side	36 days
K	11-12	White washing, doors and windows fitting	4 days
L	12-7	Painting ,tiles work	9 days
M	7-13	First floor all works	116 days
N	13-14	Second floor all works	116 days
O	14-15	Elevation work, finishing the project work	5 days

**CALCULATIONS**

Analysis the network diagram we got two different path

Path 1: A-B-C-D-E-F-G-I-J-K-L-H-M-N-O

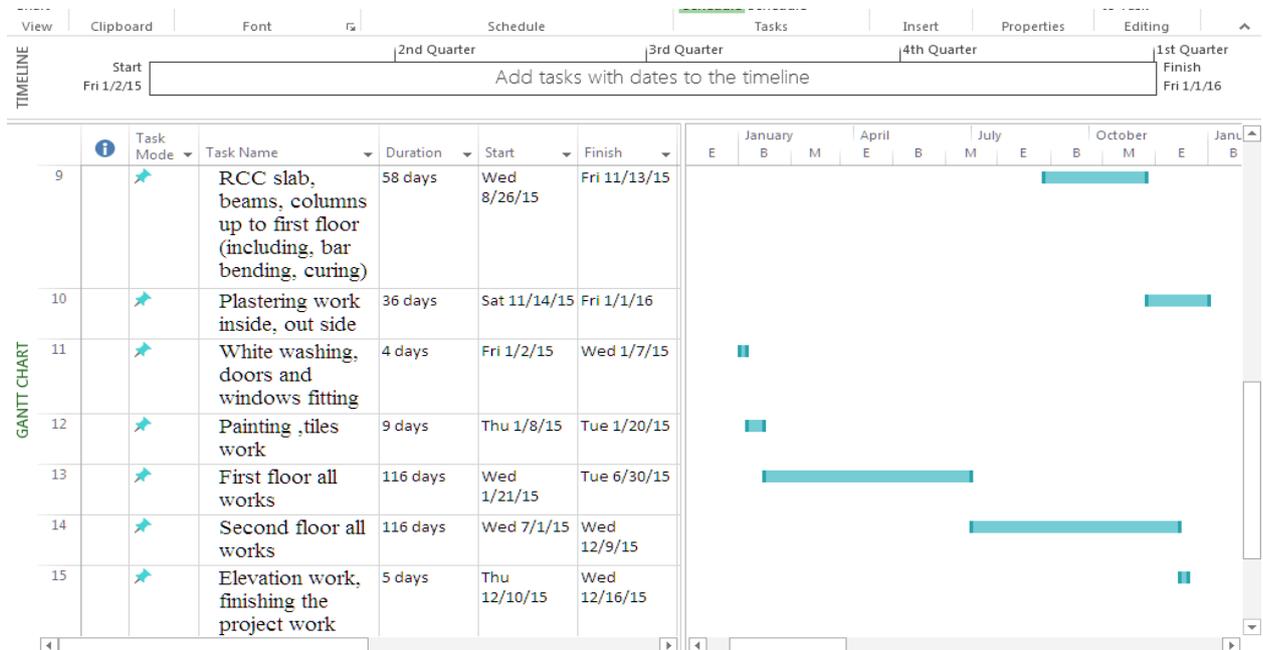
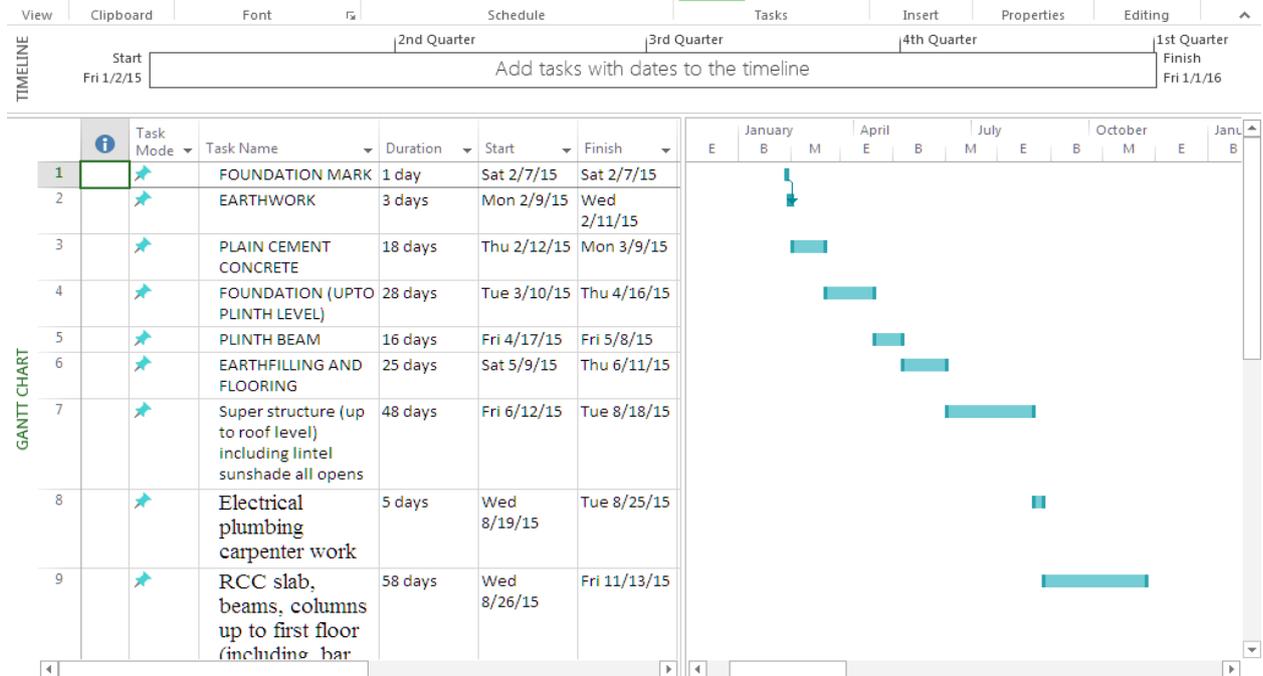
Path 2: A-B-C-D-E-F-H-M-N-O (sub critical)

Path 1 duration days = 1+3+18+28+16+48+5+58+36+4+9+116+116+5 = 463 days, 1 year 98 days

Path 2 duration days = 1+3+18+28+16+25+116+116+5 = 328 days, 11 months

The critical path of the network analysis Path 1: A-B-C-D-E-F-G-I-J-K-L-H-M-N-O a completion duration of the project is 463 days or 1 year 98 days

**V. RESULT ANALYSIS**



**VI.CONCLUSION**

Based on the project work, “MS PROJECT SOFTWARE CONSTRUCTION” the following conclusions are drawn out:

Practice and Understanding of total project management provides better result, product, and service to the project organization. Effective project management provides balance between Scope, Time, Cost, Quality, Resource and Communication. Project management Software MS Project provides better planning, scheduling, monitoring and controlling of small as well as large projects. During the execution of a project, software is helpful for promoting effective coordination. Research and Study state that implementation of MS Project software for Time and Cost Management is proven technique. Implementation of MS Project software for construction of Buildings such as Villas, for Time and Cost Management provides effective monitor and control. For infrastructure project like construction of Buildings, implementation of MS Project software gives better schedule to control the project. Time management which gives accurate planning and scheduling of project and Cost management which gives earned value management of project. Earned Value Management gives better financial control of overall cost of the project. It can be used for measuring project performance and progress in an objective manner. Software provides effective Monitoring and Controlling through various Reports.

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