International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 5 Issue 08, August-2016

"Base Line Fixing and Earned Value Analysis in Construction Industry using Primavera"

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Abstract: **- Construction Industry is most ancient and also more developed Industry in all over the world. Construction Industry development is the indication of the country development. Most of construction projects including residential projects, commercial projects, and highway. Earned value is the most widely used term in many Industries. The same earned value concept is adopted in this project to explain the various issues of project. The Earned value concept is the method or special technology for construction project progress evaluation. The concept helps to construction projects by early delay of working or excess in cost or risk in the project, through which suitable remedial measures are taken to run the project as per the schedule. The present project is tried to explain the baseline fixing and earned value analysis by using primavera software. In this study it is only concentrate on manpower required to completion of a project and material and machinery cost is not taken in to consideration. This analysis main goal is to Baseline fixing and by which calculate the earned value of the construction project using the software Primavera. The primavera p6 released 8.2 software was newly introduced software to make the project management work easy and simple. This software can be adopted in any type of industry to make their work simple. This software was adopted in this project to analyze the cost optimization and its control.MS Project is also one of management software but due the unique features of primavera, this software was used in this project.**

Keywords: Earned value, Primavera, construction projects, Baseline

1. INTRODUCTION

Construction Industry is most ancient and also more developed Industry in all over the world. Construction Industry development is the indication of the country development. Most of construction projects including residential projects, commercial projects, highway projects, fly overs etc are the contribution of the construction industry to the country. These projects give society not only buildings and also lot of jobs. These projects require certain amount of money due to buildings expenditure are also known as cost of projects. This cost should within the budgeted value. The Construction company loss or profit is mainly based on budgeted value and actual value difference. In construction projects the cost of a project is depends upon the several factors such as location, quality, design specification, material availability etc. But also construction projects cost is mainly depending on materials, manpower, and machinery. The material and machinery can be arranged easily but arrangement of manpower is difficult the cost of manpower is nearly 30% cost of overall project. Earned Value Analysis is the special technology using in many industry.

1.1Related work

Earned value is the most widely used term in many Industries. The same earned value concept is adopted in this project to explain the various issues of project. The Earned value concept is the method or special technology for construction project progress evaluation.

1.2 Benefits of Earned Value Analysis

- It helps to know the project is run in planned way.
- Better solution for problem solving can be identified.
- To know about future states of project.
- To control cost overrun and time overrun.
- It provides suitable guide lines to the management team.
- To know where tracking is necessary.

1.3 Scope of the work

Construction companies' project monitoring and controlling is very essential process to complete the work in time. But in most of cases work will not running as per plan. Primavera is the software introduced for proper monitoring. Earned value analysis is the tool to check the project progress in time and helps in taking better decision. The present project work aim is to cost controlling and optimization by earned value analysis for a residential apartment. The planned value cost and earned value cost difference shows the cost overrun. Primavera software can be used in the allover India; it is powerful software to identify the problems and resolving methods. The utilization of software can be helps to proper running of project work.

Case study: Dhruthi Constructions Company.

The project data is taken from the Dhruthi Constructions Company. The project duration is 694 days. It is the residential apartment project of four floors. The total area is about 3.4 acres. The each residential home is having area of 1300 Sqft. Each Floor there are four residential homes are going to construct. The activities entered were including from excavation to building handling over.

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1.4 List of formulas using in Earned Value Analysis

- *Schedule Variance (SV):*

It is calculated by the difference in between the Earned value to the planned value. It is the indication of schedule performance. Is the project is running in profit or in loss can be known by this formula.

SV=EV-PV

Where,

SV=Schedule variance

EV=Earned Value

PV=planned Value

If this Schedule variance value is

Positive= Project is overrun the schedule

Zero =Project is running as per the schedule

Negative=Project is lagging behind

- *Cost Variance:*

It is defined as the difference in the Earned value to the Actual cost. It is the cost performance measure.

CV=EV-AC

Where,

CV=cost variance

AC=Actual cost

If the cost variance value is

Positive =the project is running under the budget

Zero =the project is running on the budget

Negative=over run the cost of a project

2. PROPOSED METHODOLOGY OF WORK

2.1Creating the new Enterprise project structure:

The first step in the Primavera project Earned value analysis is the creating the new Enterprise project structure. Every Organization has their unique feature in the top management to bottom management.

2.2 Creating new organization project structure:

The project overall team is responsible for the project progress. The management team divided the responsible person to the each work.

2.3 Creating the new project calendar:

A project is follows their specific set of calendar. The project completion and duration is also varied by the project calendar.

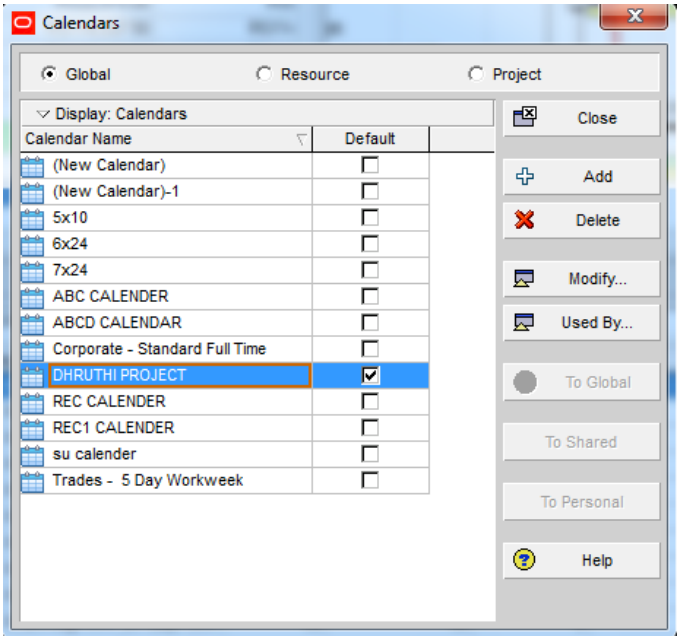

Fig No 01: Calendar

2.4 Generating the new Work break down structure:

When our project planning is complete then we go for generating the new project Work breakdown structure.

2.5 Entering the all activities:

The next step in the project is the entering the all project activities which are the fundamental elements of the project.

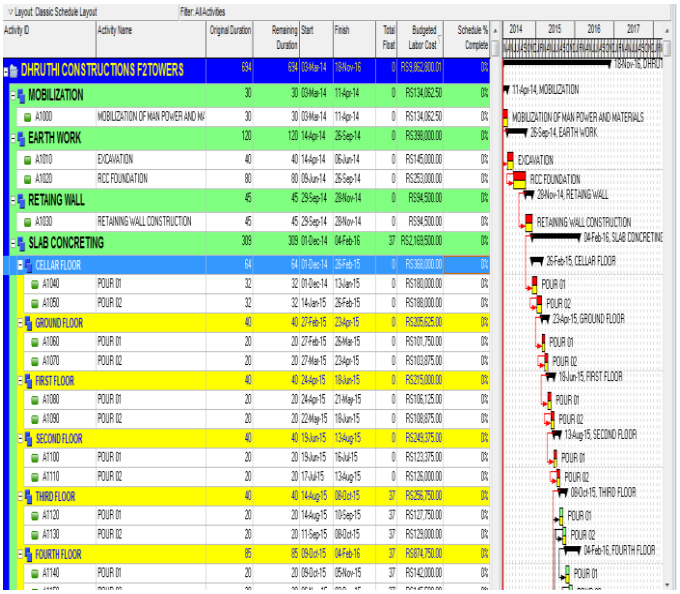

Fig No 02: Activities

2.6 Relationship Generating:

After entering all the activities the next step is to assigning the relationship to the activities. These relationships may have SS, FS relations.

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2.7 Resources Assigning:

After making relations between the activities the next step is to assigning the required resources to the activities. The resources are mainly 3 types, namely labor, non-labor and materials.

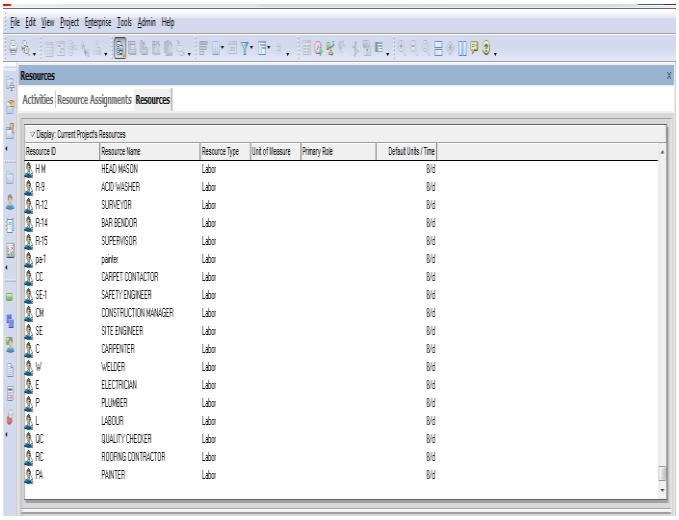

Fig No 03: Resources

2.8 Resource Usage profile graph

Resource usage profile graph is the graphical representation of the overall resource usage for completion of project. The resource graph can be shown the over allocation and overall cost of the resource.

2.9 Scheduling:

The first step in the project analysis is the scheduling the overall project. It is the important step in the analysis due to calculate the total duration and cost. If any changes were done in stage scheduling can be done to recalculate the cost or others.

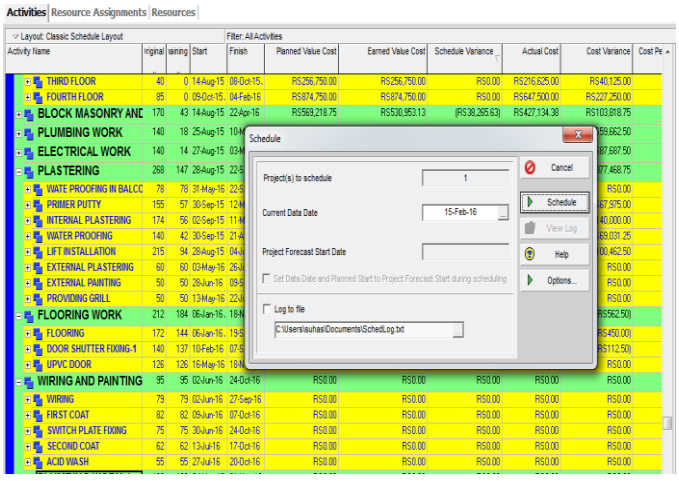

Fig No 04: Scheduling

2.9.1Baseline Fixing:

The baseline is the supporting tool to updating or track the project to any date. It is the copy of the current project once this process completes then only we go for tracking.

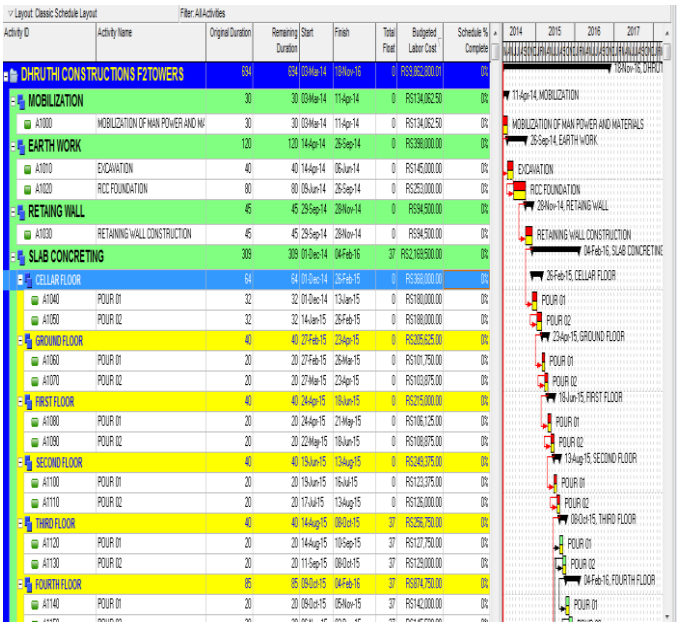

Fig No 05: Baseline Fixing

2.9.2Updating the project progress:

The essential step in the project is to updating the progress to review date. The above process is very important due to analyze the real project progress.

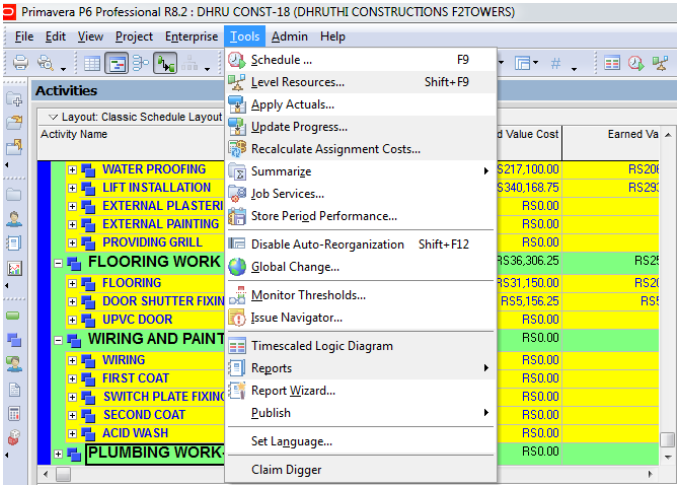

Fig No 06: Baseline Fixing

2.9.3Tracking the project progress

The important step in the Earned value analysis is the tracking the project to review date. The real project progress is getting to know by tracking.

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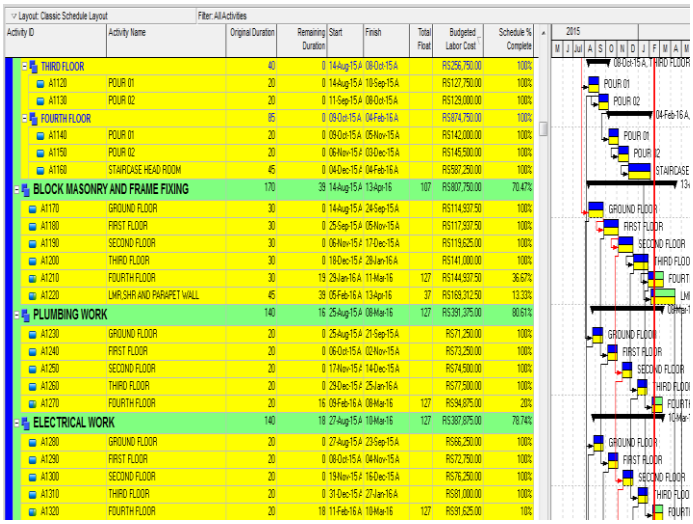

Fig No 07: Block Masonry, Plumbing Work Tracking

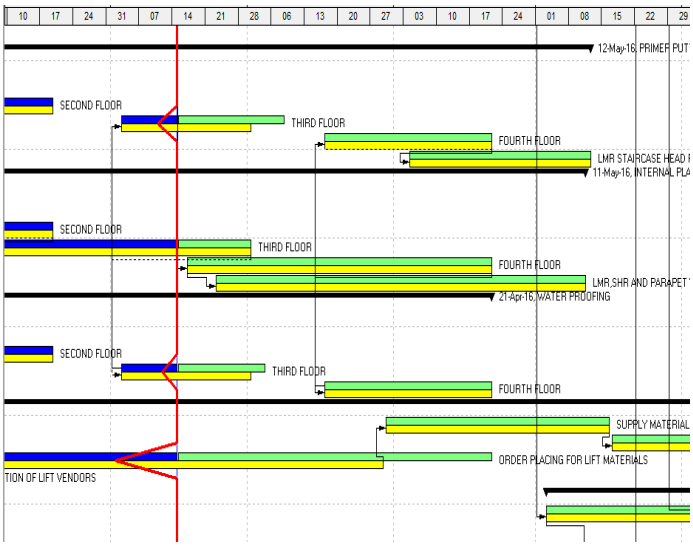

Fig No 08: Primer Putty Work is under the progress is shown in Tracking

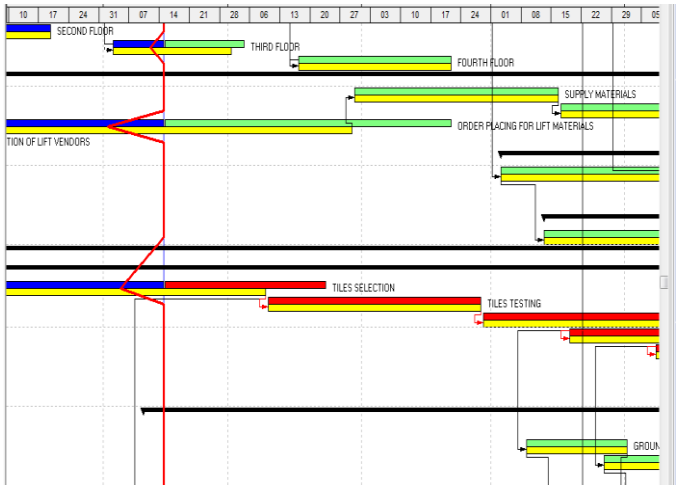

Fig No 9: Lift Installation Order Placing for Materials work is under progress is shown in Tracking

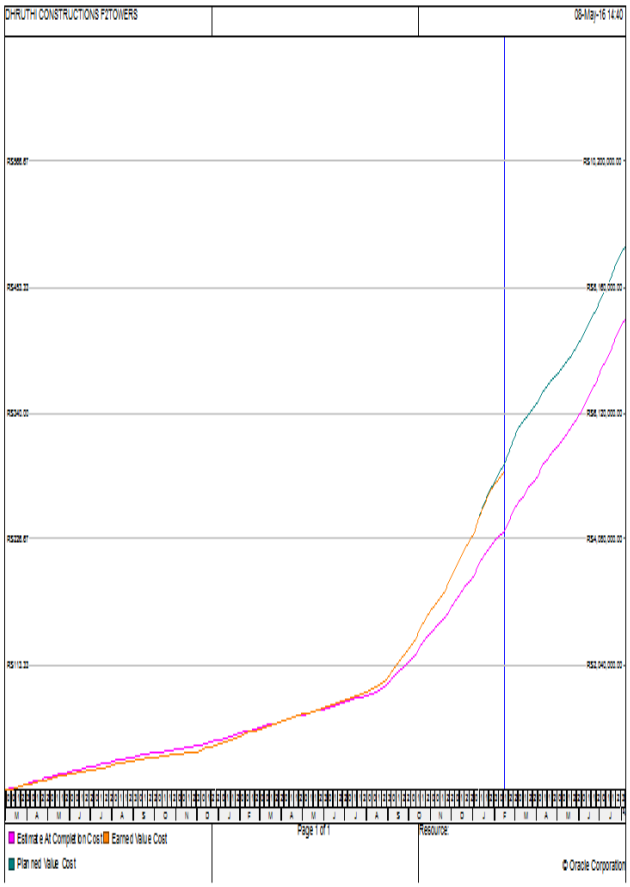

Fig No: S Graph showing that Earned value cost is lower at starting stages later it increases the estimated cost

2 EXPERMENTAL RESULTS AND DISCUSSIONS

Difference in the Planned Value cost and Earned Value cost:

Table No: 01 Difference in the Cost

Activity Name	Planned Value Cost in Rupees	Earned Value Cost in Rupees	Cost Variance in Rupees
4th Floor Block Masonry	53,143.75	28,987.00	6,600.00
SHR, Parapet wall Block Masonry	22,575.00	8,465.64	3093.00
4th Floor Plumbing	18,975.00	9,487.50	2,287.50
4th Floor Electrical work	9,162.00	27,487.50	8,062.25
3rd Floor Primer Putty	29,600.00	14,800.00	5,350
3rd Floor Internal Plastering	107,800.00	107,800.00	38,500.00
3rd Floor Water Proofing	29,100.00	18,187.50	6,781.25
Order Placing for lift Materials	111.793.00	64,912.00	13,837.50
Tile Selection	31,150.00	20,025.00	450.00
Door Shutter Selection	5,156.00	5,156.25	112.50

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3 CONCLUSION OF THE PROJECT:

The planned value cost and earned value cost difference shows the cost overrun. Primavera software can be used in the allover India; it is powerful software to identify the problems and resolving methods. The utilization of software can be helps to proper running of project work.

Earned value analysis gives the difference in the planed cost to actual cost. The entire project is running as per the schedule but several activities are not under the schedule. The reports were generated WBS level through which clear cost optimization and control can be achieved.

- The overall project was 72% completed.
- The project is 8% lagging behind.
- To complete the project, it will take 20 extra days.
- The overall project is under the schedule except several WBS.
- The schedule variance of project is positive value that means project is on schedule.
- Block masonry, plumbing work, primer putty, plastering work has positive value of schedule variance therefore these are over the schedule. Door shutter fixing and internal plastering is as per the schedule.
- Cost variance of project is positive value that means project is running as per budgeted cost.
- The schedule variance index is less than one that means project is not running as per the schedule.
- The cost variance index of all WBS is greater than one that means project is currently with in the budget.
- Estimate shows Rs.4, 40,800 is the expected extra cost to complete overall project.
- The CPI is greater than one which means that the project cost is as per the budget.

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