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TO DESIGN ANALYZED COMPARE A BUILDING WITH MANUALLY PROJECT PLANNING WITH MSP AND PRIMAVERA

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Abstract: *This chapter discusses Mivan technology and the line of balance technique. Additionally, this section compares project planning using MSP and Primavera. Mivan is a system of aluminium formwork. Mivan was invented by a European construction company. In 1990, the Mivan business in Malaysia began producing formwork, and the company was renamed MIVAN. This technique is widely utilised throughout Europe, the Middle East, and Asia. Formwork is described as a temporary construction that serves as a foundation for the permanent structure of the building. MSP Project Management is a well-regarded solution for managing various projects for a variety of clients. P6 is often used as a stand-alone programme in this category. Line of balance (LOB) is a management control method that is used in construction for projects that include blocks of repeated work activities, such as highways, pipelines, tunnels, railroads, and high-rise structures, as well as precast construction and row homes. With the country's population growth, the building process has become exponentially more difficult. As we all know, the construction of high rise buildings is becoming more popular. However, the process of constructing these high rise buildings takes longer, and therefore modern technology is used to shorten the length and expense of the project. The new sophisticated technology is produced for the building of multi-story projects, resulting in the creation of cost-effective and expedited project construction.*

Keywords: *Mivan, MSP, LOB, PRIMAVERA.*

I INTRODUCTION

1.1 INTRODUCTION

This chapter gives information about Mivan technology and line of balance method. And this also gives information of comparison of project planning with MSP and Primavera. Mivan is basically Aluminium formwork system. Mivan system was invention by Construction Company from Europe. In 1990, Mivan company from Malaysia start manufacturing formwork, then after give name MIVAN. This technology is extensively used in Europe, Gulf country and Asia. Formwork is defined as the temporary structure whose purpose to support the building structure. MSP Project

Management is a highly sought-after solution for managing numerous projects for multiple customers. P6 is extensively used in this group as a stand-alone application. Line of balance (LOB) is a management control process used in construction where the project contains blocks of repetitive work activities, such as roads, pipelines, tunnels, railways and high-rise buildings, precast construction, row houses etc. Both Primavera and MS-Project are popular options in the market. The primary distinction between Primavera and MS-Project software is that Primavera is a database-based application, while MS-Project is a file-based application. Primavera is more powerful software than MS-Project since it mitigates project hazards. Due to the fact that inconsistencies,

faults, and flaws have previously been planned and evaluated using project management software, extra expenses may be avoided. Primavera project management software was designed from the start as an enterprise application, whereas MS-Project software was initially developed as a desktop application and then migrated to the project server, where enterprise capabilities were added to serve the purpose of enterprise project management. Primavera P6 is currently planning and gradually moving away from the Windows operating system in order to explore new features and expand the platforms on which it runs. Both Primavera and MS-Project are project management software, however they vary somewhat in that they may be used for a variety of various kinds of projects depending on the nature of the project. The enterprise project management software that is chosen is determined by the organization's requirements and the type of its projects.

1.2 MIVAN TECHNOLOGY

Mivan is basically Aluminium formwork system. Mivan system was invention by Construction Company from Europe. In 1990, Mivan Company from Malaysia start manufacturing formwork, then after give name MIVAN. This technology is extensively used in Europe, Gulf country and Asia. Formwork is defined as the temporary structure whose purpose to support the building structure. The progress of the formwork equidistant with the progress of concrete construction through the 20th century. Modern technology must be required in this time because of increasing the population and land available for constructing houses in limitation. For mass housing project, it is essential to know the new technology for completion of project in fast rate, stand to good quality and able to withstand wear. Mivan technology is capable to constructing a huge no. of houses within short period. Mivan formwork is easily removed. All the activity can arrange in simple manner and get result more accurate, well regulate and high quality production at economically with less period

1.3 PRIMAVERA

Primavera Systems was the initial name of the business, which was founded in 1983 in Philadelphia, Pennsylvania, USA by Joel Koppleman and Dick Faris. In 1998, the software system began to evolve into a server-based architecture that enabled Primavera to function as a portfolio management system.

1.3.1 This triggered the division of the programme into two versions:

- One is a self-contained version of the programme that is usually used by a single high-level user on a single project or a small portfolio of projects.
- The second is an enterprise portfolio management system that enables Primavera to be utilised across

organisations for programme and project management.

Oracle acquired Primavera in 2008, rebranding it as the Primavera Global Business Unit. Oracle is the industry leader in enterprise accounting and financial management software, and Primavera P6 was designed to be more compatible with this environment. These achievements have bolstered Primavera P6's position among the world's biggest pharmaceutical, oil and gas, refinery, infrastructure, and engineering customers and suppliers. Having said that, the standalone version (Primavera P6 Pro) continues to be quite popular. Contractors, suppliers, and manufacturers in the engineering and construction sectors vary in size from thousands of workers globally to groups of two or three persons. P6 is extensively used in this group as a stand-alone application. Contractual reporting obligations between bigger and smaller organisations often necessitate the usage of Primavera P6 for project updates. On a project-by-project basis, the stand-alone version of the programme is often utilised to meet these needs.

1.4 MICROSOFT PROJECT (MSP)

Microsoft has been the industry's 800-pound gorilla for so long that it's difficult to imagine the industry without it. While there have been challenges to Microsoft's dominance and many who have exceeded it, the company has remained a colossus. This is definitely true in the field of project management software, which has been continuously expanding. Without including Microsoft Project, no discussion of project management software would be complete. MSP Project Management is the process of applying expertise and robust methods to customers' projects, depending on each client's unique needs and specifications. It assists MSPs in planning projects and sharing them with partners, project managers, and other stakeholders in order to facilitate collaborative management.

1.5 LINE OF BALANCE (LOB)

Line of balance (LOB) is a management control process used in construction where the project contains blocks of repetitive work activities, such as roads, pipelines, tunnels, railways and high-rise buildings, precast construction, row houses etc. It is a control process for collecting facts relating to time, cost and schedule accomplishment, all the project related task is measured against specific plan. LOB shows the process, status of project, crew size continuity, and background of work, time and phase of project activities providing management with measuring tools. LOB assists project management by comparing a formal objective against actual progress, examining only the deviations from established plans, and gauging their degree of severity with respect to the remainder of the project, dealing with problem and trouble causing areas and problem solving within specific constrains.

1.6 OBJECTIVES

The objectives of this study are specifically given as following.

1. To study the concept of LOB and MIVAN Technology for replacement of the conventional structure with help of management software's ie MSP and Primavera.
2. To understand the relation between LOB and MIVAN Technology.
3. Evaluation of LOB in MIVAN Technology using software MSP and Primavera.
4. Give discussion and suggestion for effective utilisation of software for line of balance method in mivan technology for high rise building

II. LITERATURE REVIEW

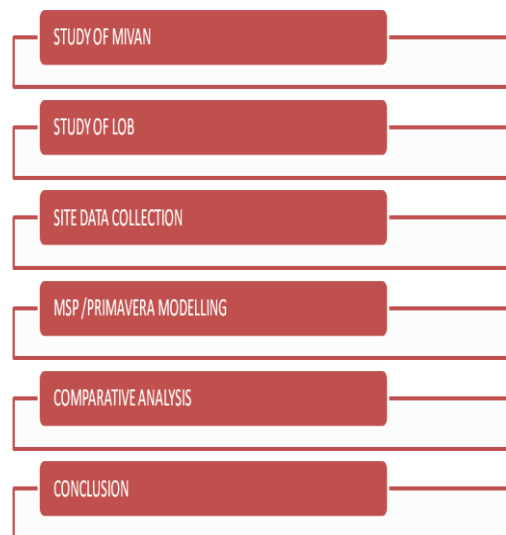
This chapter consist of the most effective means available for the construction of high, medium and low rise mass housing R/C structures. It is a precision-engineered formwork fabricated in Aluminium. Monolithic pouring. Walls, columns, slabs & beam are poured together. Speed - Induces a disciplined & systemized approach to construction, which creates a daily work cycle, the essence of the productivity. The productivity generates a overall work cycle, that can achieve 4/5 day per floor outputs or other cycle times to suit your project requirements. It is flexible in design and can form any architectural or structural configuration, such as stairs, bay windows, and curved features.

2.1 Mr. Trahash K. Matey11 , et.al.,2017,

India is the second largest in construction industry. For growing need for shelter it is important that requirement of resources should be delivered on time. Linear scheduling methods is best suited to projects that display repetitive characters but their use in the construction industry is limited. Line of balance is linear scheduling method that also makes use of network technology. The Line of balance method is well suited to projects that are composed of activities of a linear and repetitive nature. Line of balance method of scheduling for project comprised of work of repetitive natures which involved in housing project, urban residential development, roads construction, high-rise construction buildings, pipelines, precast concrete production etc. To monitor the project LOB method become easier to visualize and operate using set of flow line graph where Gantt chart graph do not give much details. It is important for project manager to handle the project within specific set of limitation where resources are available and optimum use. The overall objective of this study is to identify the total duration required by project for its completion and comparison with actual plan

by using line of balance method and find out the float the project and representing the project with the use of flow line chart for repetitive nature of activities.

III. METHODOLOGY



Flowchart 1: Methodology

3.1 DATA COLLECTION

In high-rise residential building, number of activities is carried out like brickwork, plastering, plumbing, electrification, etc. on each unit, and same activities are repeated from one floor to another. For drawing LOB graphs, such repetitive activities and duration of each activity was collected. Also, to draw the histogram and to calculate activity progress rate, EFR and IFR, number of labours associated for each activity was collected in detail from the respective site.

3.2 BAR CHART

The bar chart is pictorial representation in two dimensions of the project. The project is broken down into a number of independent manageable jobs or units known as activities for which suitable work duration is decided on the basis of available resources of Balance technique uses man-hour estimate and optimum crew size. The two oblique and parallel lines used in line of balance technique denote the start and finish times of each activity in all the units from first to last.

3.3 PLOTTING HISTOGRAM

The resources, especially in case of manpower, are limited and it is necessary that the person in charge of execution or the manager has to prepare a resource analysis report which may enable him to put to best use of manpower resource at his hand. There will be peaks and valleys in the form of required resources in any project and the manager can try to level out these peaks and valleys with the help of resource analysis report. A graph is plotted for the requirement of resource against the period of requirement and this is known as Resource Usage Profile or in general in the language of

statistics a Histogram. It is a bar graph of raw data that creates a picture of the data distribution. In this case Histogram will show what the maximum and minimum number of labours required is for a given period of the activity.

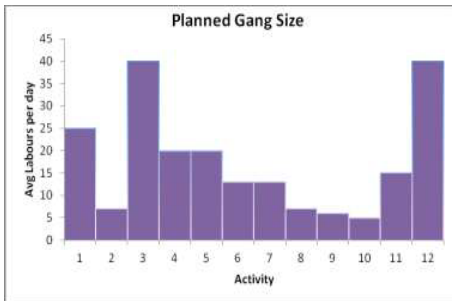


Fig 1: Histogram for planned gang size(Source : www.ijariie.com)

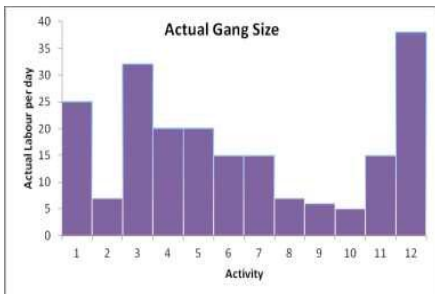


Fig 2: Histogram for actual gang size(Source :www.ijariie.com)

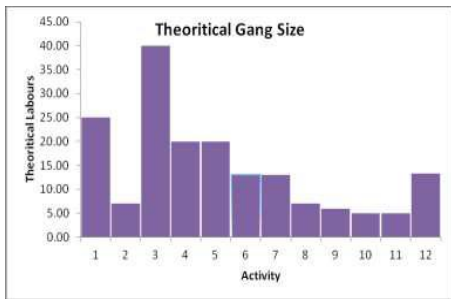


Fig 3: Histogram for theoretical gang size(Source : www.ijariie.com)

3.4 CALCULATION OF COST OF THE PROJECT:

Crashing of activities will be done by reducing the duration of the activities and increasing the resources, therefore, it will effect on the total cost of the project. Hence calculation of the cost of the project will be done after crashing of activities.

4.5 INFERENCES:

From the Line of Balance graph of the actual activities and the crashed activities, inferences will be drawn whether this method is suitable for crashed activities or not and the crew size will be calculated from Histogram.

3.5 FLOW LINES USING VICO CONTROL SOFTWARE:

VICO software facilitates to draw flow line view with Gantt chart. VICO gives flow lines views which is good in visualization, Gantt chart lacks in showing as it consist of bar chart and difficult to view. VICO flow lines view shows start and end duration with date which can be visualize easily. Both views helps in planning and scheduling project effective way. Buffers can be easily seen in VICO Control flow line view as shown in Figure.

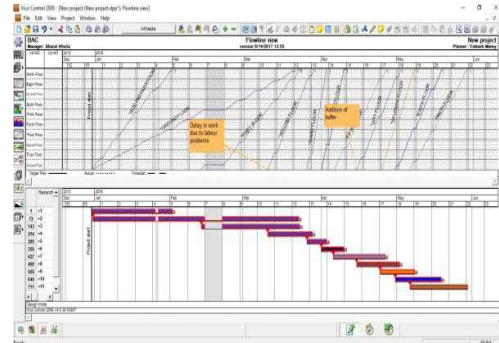


Fig 4: Flow lines with Gantt chart view using VICO Control Software (Source :www.ijariie.com)

IV. CASE STUDY

4.1 WORKING OF MIVAN TECHNOLOGY

Step1:-Shuttering detailed drawings is provided and before manufacturing or fabrication all the building architecture and structural drawings are freeze. If any revision in drawing during the execution of work it will become be some.

Step2:-When marking of columns is done by the surveyor, the fixing of Mivan shuttering is done after the reinforcement column work is completed.

Step 3:- Reinforcement of beams, slabs and conduit work takes place after fixing and erection of vertical wall panels.

Step 4:- Pouring of concrete take place after the slab and beam shuttering with conduit work is done.

4.2 CASE STUDY

STARGAZE



Fig 5: 3rd eye view of actual site

4.3 SITE DETAILS

- Name of site : stargaze
- Location of site : Bavdhan, West Pune zone, Pune, Maharashtra 411021
- Design Team : JW consultancy
- Owner and Developer :Kolte Patil
- Architect : ManojTatuskar and VikasAcharikar
- Cost of project : 64.4 Lakhs Onwards
- Structural Engineer : JW consultant
- Builder :Kolte Patil
- Area : 1.91 acre
- Residential building having No. of Towers: 6, Towers No. of Floors: 10 Floors, No. of Units: 462 Units.
- This project is based on sustainable structure
- Present condition of the project : under construction
- No. of Towers: 6, Towers No. of Floors: 10 Floors, No. of Units: 462 Units.

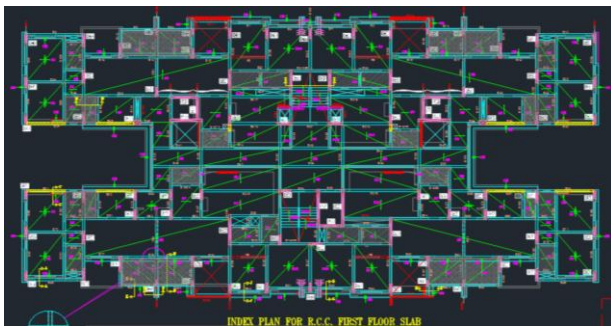


Fig 6: First floor slab



Fig 7: Floor plan

4.4 STARGAZE BY KOLTE PATIL

Stargaze is spread across beautiful 18 acres, of which nearly 50% is reserved for greenery and open spaces. The landscape

is designed in a contemporary resort style, with the lush tropical planting to cool the environment and provide beauty. The terraced garden stimulates the senses and exposes residents to the joys of nature with aromatic and colourful plantings that attract birds and butterflies. A meditation garden and a yoga lawn offer an escape from the stresses of the work day. For social interaction, large gathering spaces and leisure pavilions, some with traditional game tables and some with barbecues, are provided to create an atmosphere for a close knit community. For kids, there are several play areas, a water play park, a cricket practice pitch, basketball and tennis courts, a skating rink, a miniature golf course, a rock climbing wall and a infinity edge swimming pool that will offer residents endless opportunities for fun and relaxation. All of the activity areas are linked together by a pedestrian/jogging path that connects throughout the entire development.

- a. Thermally Insulated & Energy Efficient
- b. Tiny air pores and thermal mass of blocks provide excellent thermal insulation, thus reducing heating and air conditioning costs of a building.

4.5 PLANNING AND SCHEDULING

In a construction project, proper planning and scheduling in detail is necessary for eliminating unnecessary delay of the project and also to have an alternative for the delaying of the projects. Due to improper planning and scheduling of a project, leads to substantial wastage of amount of time, money and resources. With globalization the construction project has become vast and complex. And with the help of project planning software huge amount of paper work for planning of any project is reduced. The desired result of a project cannot be achieved by providing better planning, proper organization and sufficient flow of resource. The organization need to be alert about their possible success and failure throughout the project. The main objective of this study is to plan, schedule and track a residential building project with the use of MSP 2013 software, analysing the result and which method is suitable for residential building project is determined and measure are recommended to the organization for enhancing their project planning skills.

V. RESULT AND DISCUSSION

5.1 DATA ANALYSIS OF CASE STUDY

5.1.1 Rate analysis is done to workout rates used in construction

From data collected from site BBS is prepared from working drawings and MSP schedule is prepared the important aspect of quality planning such as time, resources like machine and materials factors are added in MSP schedule for cost of quality

Table 1: Cost Concrete Work

Sr No	DESCRIPTION	Concrete Quantity (cubic meter)	Cement Cost	Sand Cost	Aggregate Cost
1	Quantity Of Concrete In Pcc	11.592	17994.49344	22127.87143	81842.81213
2	Quantity Of Concrete In Footing	47.817	296909.1418	182554.9393	225067.7334
3	Quantity Of Concrete In Column G Floor To 10th Floor	165.6	1028256.768	632224.8979	779455.3536
4	Quantity Of Concrete In Column 11th To 14th Floor	28.566	177374.2925	109058.7949	134456.0485
5	Quantity Of Concrete In Beam Plinth Beam To 14th Floor	287.498988	1487634.764	603318.543	223145.2145
6	QUANTITY OF CONCRETE IN SLAB 1st TO 14th FLOOR	477.333024	2469911.999	1001686.533	202083.709
7	Quantity Of Concrete In Under Ground Tanks	158.88328	822125.644	333417.6223	123318.8466
8	Quantity Of Concrete In Top Terrace Tanks	24.72448	127934.3493	51884.48611	191901.524
9	Total	1202.014772	6428141.452	2936273.688	689820.1173

5.2 RESULTS AND DISCUSSION

Table 2: Days count for Normal Construction

Sl. No	Description	Unit	Convention al formwork
1	Material cost	Sq. mtr	500
2	Labour cost	Sq. ft	110
3	Number of repetitions		15-20 times
4	Minimum duration of slab cycle		21 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*10.1*500=4881683.5
6	No. of days per tower		992

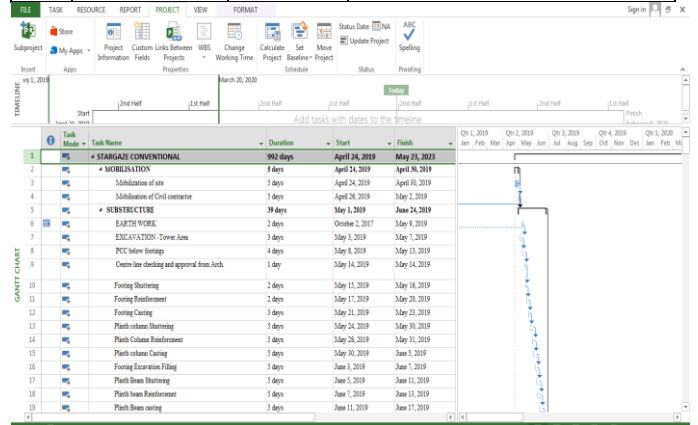


Fig 8: Days count for Normal Construction

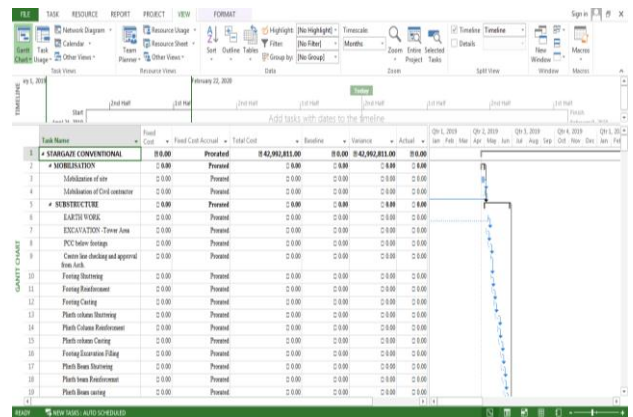


Fig 9: Costs for Conventional

SR NO	BRICK TYPE	SIZE (INCH)	RATE/PCS
1	CLAY BRICKS	9X4X6	4.3
2	FLY ASH BRICKS	225X100X75(MM)	5.25
3	CONCRETE HOLLOW BRICKS	230X110X112.5	6
4	RED CLAY BRICKS	9X4X3	5
5	WIRE CUT BRICKS	9X4X3	7
6	STONE RED BRICKS	190X90X90 (MM)	5

5.2.1 Application MIVAN in Stargaze Case Study in MSP

In this part the comparative analysis is done if CONVENTIONAL form work is replaced by mivan shuttering

Table 3: Days count for Mivan Technology

Sl. No	Description	Unit	Mivan technology
1	Material cost	Sq. mtr	9000
2	Labour cost	Sq. mtr	37.1612
3	Number of repetitions	times	200-300
4	Minimum duration of slab cycle		10 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*37.1612*9000=323293115
6.	No. of days per tower		467

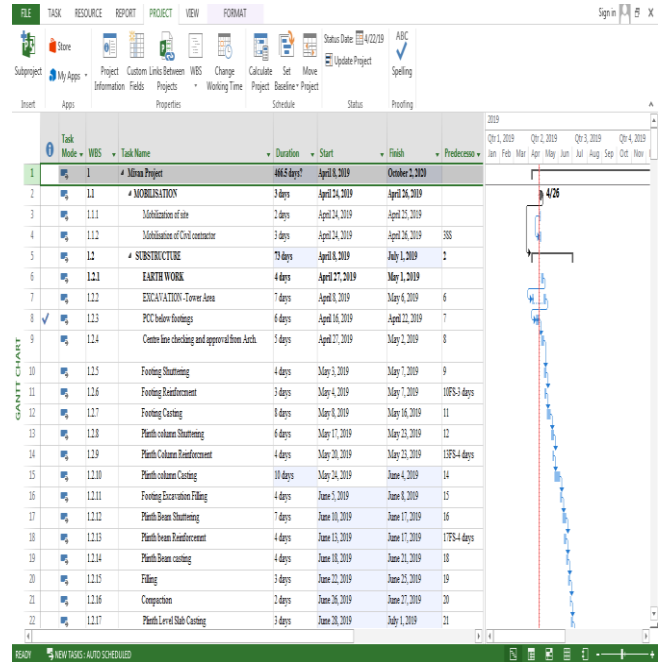


Fig 10: Days count for Mivan Technology

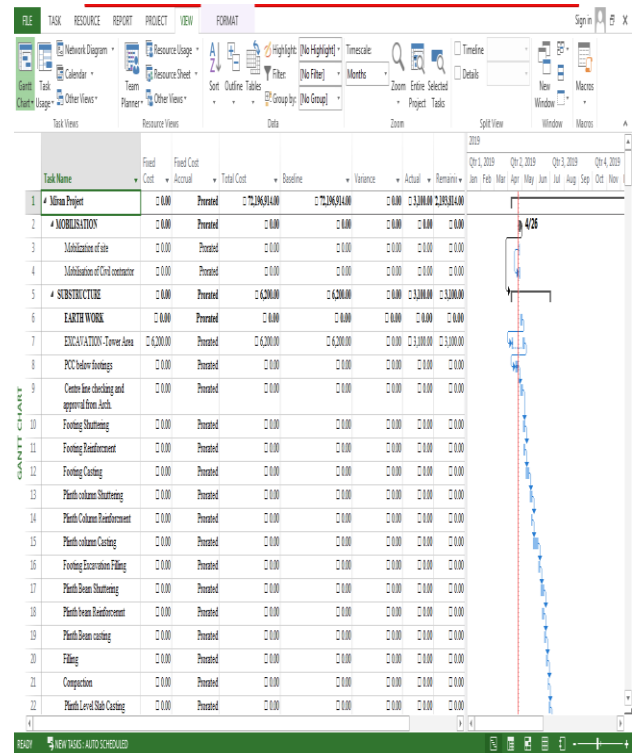


Fig 11: Costs for MIVAN in MSP

5.2.2 Application MIVAN in Stargaze Case Study in Primavera

In this part the comparative analysis is done if conventional form work is replaced by mivan shuttering

Table 4: Days count for Mivan Technology

Sl. No	Description	Unit	Mivan technology
1	Material cost	Sq. mtr	9000
2	Labour cost	Sq. mtr	37.1612
3	Number of repetitions		200-300 times
4	Minimum duration of slab cycle		10 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*37.1612*9000=323293115
6.	No. of days per tower		394

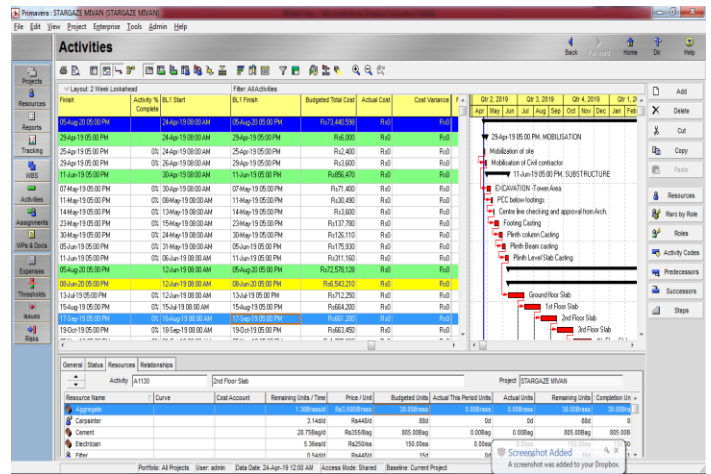
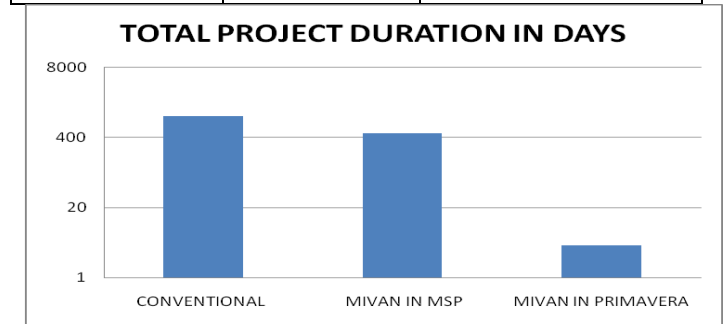


Fig 13: Costs in Primavera

TOTAL PROJECT DURATION IN DAYS		
CONVENTIONAL	MIVAN IN MSP	MIVAN IN PRIMAVERA
992	476	3.94



TOTAL PROJECT COST IN CR		
CONVENTIONAL	MIVAN IN MSP	MIVAN IN PRIMAVERA
4.92	7.21	7.34

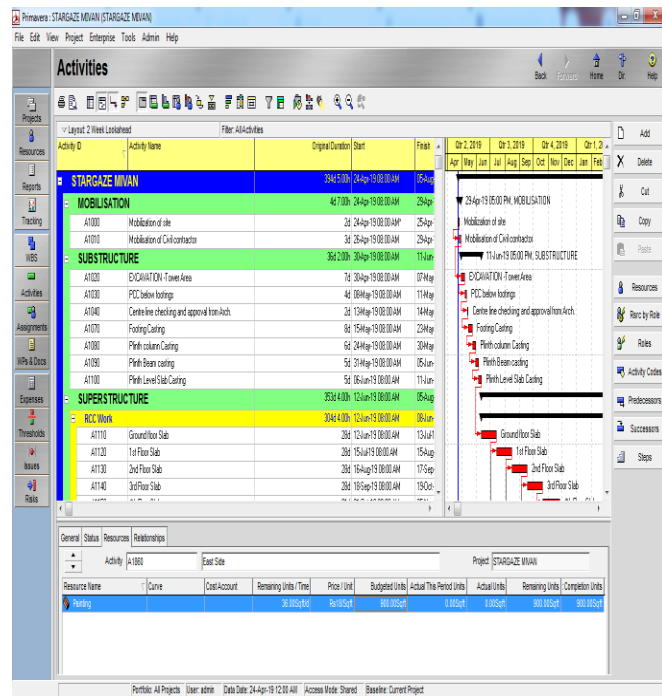
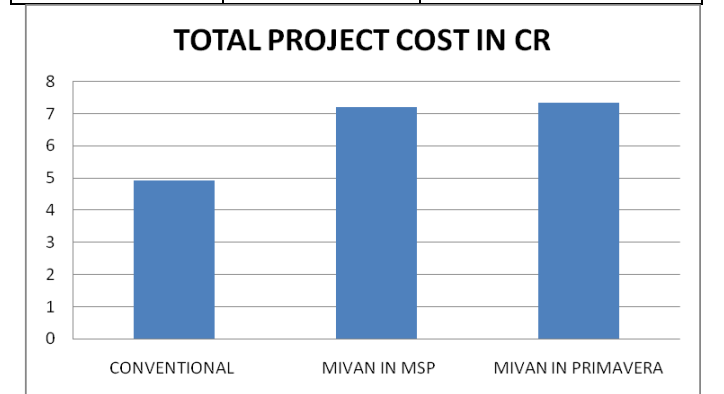


Fig 12: Days count for Mivan Technology

VI. CONCLUSION

1. With the rise of the population of the country, the task of construction process as monumentally increased. As we all know the construction of high rise building is becoming a trend and the process of construction of these high rise building takes more time and hence to reduce the duration and cost of the project advanced technology are adopted.
2. The new advanced technology is manufactured for construction of multi storied project which leads to production of cost efficient and speedy construction of project.
3. A Case study was conducted on a residential project and comparison between the conventional formwork and Mivan technology was analyzed and results were determined. It was determined that Mivan technology is suitable for large scale building projects and they can be reused for about 200-300 times.
4. Even though the initial investment of Mivan technology is high, it provides cost efficient project and eliminated the need of plastering work as it gives a good surface finish compared to conventional type of formwork.
5. The duration of project can be minimized by adopting Mivan technology. And hence it is concluded that Mivan technology is not suitable for small scale projects
6. Line of balance method is effective in finding out rate of production of each activity using crew size.
7. Increase in labours increases the project production rate but increase of labours cause increase in cost.
8. Implementation of VICO Control 2009 software helps in planning and visualizing in effective way in planning and scheduling of activities in each location.
9. Activity rate can be compared which is calculated from line of balance formula.
10. Resources required i.e. labours required can be calculated from formula which gives theoretical and actual results.

11. In this research, the objective is to study and implement the LOB method and VICO control tool for the calculations of total project duration of high rise residential building. According to the result the better method for the scheduling of project will be selected from LOB and VICO tool for the calculation of flow line of project progress. LOB method and VICO tool are a graphical representation of repetitive activities where project manager can compare the planned and actual rate of production by which project manager can take suitable action over progress.
12. Conventional formwork system is mostly adopted in the world but it has more consume time and costly in construction project. Conventional formwork not suitable where population is large, less land available and construction project work required in speedy. This all condition satisfies in MIVAN formwork system.
13. Mivan technology gives the better result in Cost effectiveness, Speed of the construction with higher durability of building structure.
14. In Mivan formwork, speed of construction can be achieved by 4 day cycle per floor. Removing of floor slab forms without removing prop is possible, while in conventional not possible. Displacement of the conventional system is 86% more than that of Mivan structural system.

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