

Research study on Optimization of Cost and Duration with Line of Balance by Using MSP and Primavera

Jahir M Jamadar ¹ Prof. Shripad B. Kore ²

PG. Student, M. Tech, Dept. of Civil Engineering, Sanjay Ghodawat University, Atigre, Kolhapur¹

Assistant Professor, Dept. of Civil Engineering, Sanjay Ghodawat University, Atigre, Kolhapur²

Abstract — This research is about the MIVAN technology and the balance technique line. In addition, this section compares project planning using MSP and Primavera. MIVAN is an aluminum formwork system. MIVAN was invented by a European construction company. In 1990, MIVAN started to produce formwork in Malaysia and the company was renamed MIVAN. This technique is widely used in Europe, the Middle East and Asia. Formwork is described as a temporary structure 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 various clients. P6 is often used as a standalone program in this category. Line of balance (LOB) is a management control method used in the construction industry for projects that involve blocks of repetitive work activities, such as highways, pipelines, tunnels, railways and high-rise buildings, as well as prefabricated buildings and terraced houses. . As the country's population grew, the construction process became exponentially more difficult. As we all know, the construction of high-rise buildings is becoming more and more popular. However, the construction process of these high-rise buildings takes longer, so modern technology is used to reduce the length and cost of the project. New sophisticated technology is produced for the construction of multi-storey projects, resulting in the creation of cost-effective and expedited project construction.

Keyword: MIVAN, MSP, LOB, PRIMAVERA.

1. INTRODUCTION

Line of balance (LOB) is a control management process used in the construction industry where the project contains blocks of repetitive work activities such as roads, pipelines, tunnels, railways and high-rise buildings, prefabricated buildings, townhouses, etc. Process when collecting facts about time, cost and schedule performance, all project-related tasks are compared to a specific plan. LOB displays process, project status, continuity of team size and work background, time and phase of project activities, provides management with measurement tools. LOB helps project management by comparing the formal goal with actual progress, examining only deviations from established plans

and measuring their degree of severity with respect to the rest of the project, addressing problem and problem areas, and solving problems within specific constraints.

- 1 Predicting future performance.
- 2 The programmed number of completed units is met.
- 3 A constant rate of repetitive work is maintained.
- 4 Workers and the plant are constantly moving through the project to maintain and fully employ a balanced workforce.
- 5 The cost benefits of repetitive work are achieved.

Line-of-balance (LOB) is a variation of linear scheduling methods that allows operations to be balanced so that each activity is performed continuously. The main advantage of the LOB methodology is that it provides information about the speed and duration of production in the form of an easy-to-interpret graphic format. A LOB chart can show at a glance what is wrong with an activity flow and can reveal potential future bottlenecks. It is clear that LOB allows a better understanding of a project composed of repetitive activities than any other planning technique, because it allows adjusting the production rate of activities. Allows smooth and efficient.

1.1. MIVAN Technology

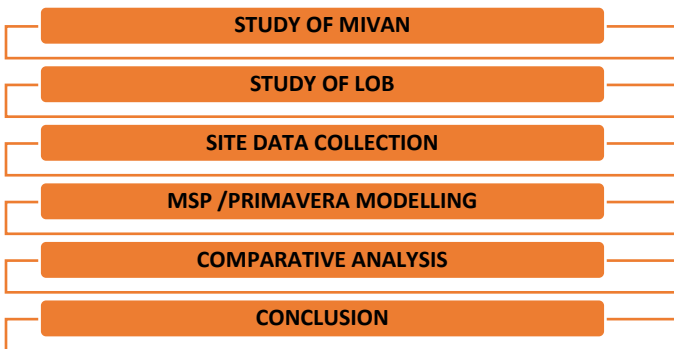
MIVAN is essentially an aluminum formwork system. The MIVAN system was an invention of a construction company from Europe. In 1990, MIVAN from Malaysia started producing formwork, then named MIVAN. This technology is widely used in Europe, Gulf countries and Asia. Formwork is defined as a temporary structure whose purpose is to support a building structure. The development of formwork at the same distance as the progress of concrete construction in the 20th century. Nowadays, modern technology must be required because the population is growing and the land available for building houses is limited. For a mass housing project, it is essential to know new technologies for quick project completion, quality service life and wear resistance. MIVAN technology is able to construct a huge no. home in a short time. MIVAN formwork can be easily removed. All activities can be easily arranged and the result is more

accurate, better controllable and higher quality production at economy with shorter time.

2. METHODOLOGY

It is difficult for a project manager to know what activity is taking place on a particular floor when it comes to a construction project that is broken down into a large number of activities. The Line of Balance planning technique can be applied to a project consisting of repetitive activities, as it facilitates continuous monitoring of the project at each milestone.

The main objective of this study is to draw a balance line for repetitive activities and compare the actual and delayed work in each stage of work and summarize the activities that are critical and draw conclusions.



3. STUDY AREA

1.1 Stargaze



Fig 1 Stargaze

- Name of site : stargaze
- Location of site : Bavdhan, West Pune zone, Pune, Maharashtra 411021
- Design Team : JW consultancy
- Owner and Developer : Kolte Patil
- Architect : Manoj Tatuskar and Vikas Acharikar

- Cost of Flat : 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: 14 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: 14 Floors, No. of Units: 462 Units

4. DATA ANALYSIS OF CASE STUDY

1.1 Rate analysis is done to workout rates used in construction

The BBS is generated from the working drawings and the MSP plan is prepared from the data obtained on site. Important aspects of quality planning such as time, resources such as machine and material variables are incorporated into the MSP plan for quality costs.

Table 1 Cost Concrete Work

Sr No	DESCRIPTION	Concrete Quantity (meter cube)	Cement Cost	Sand Cost	Agg. 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

Table 2 Steel Cost

Sr. No	Bar Size	Weight of Bar in kg	Cost per kg	Total cost
1	8 mm	44088.66676	42	1851724.004
2	12 mm	2181.224999	42	91611.44997
3	16 mm	42375.25049	42	1779760.521
4	20 mm	10911.56755	42	458285.8371

1.2 MSPAND PRIMAVERA Scheduling

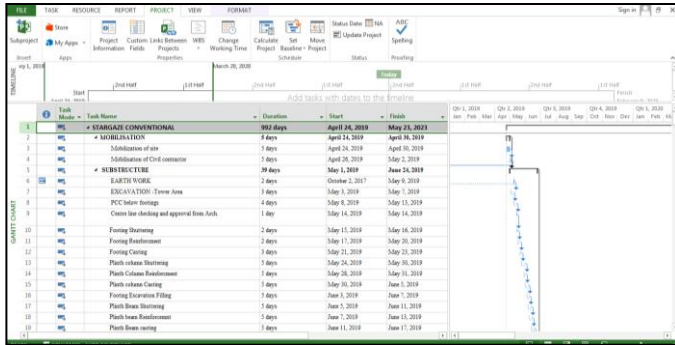


Fig 2 Days count for Normal Construction

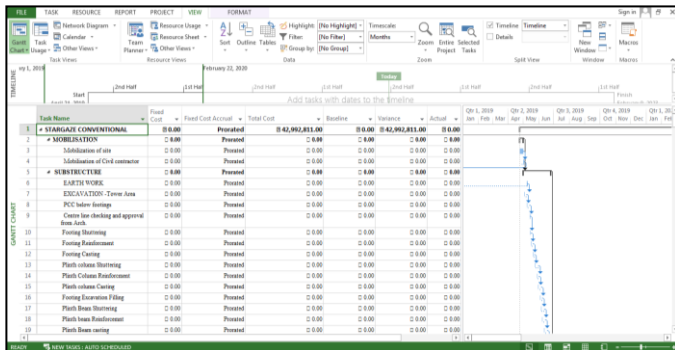


Fig 2 Costs for Conventional

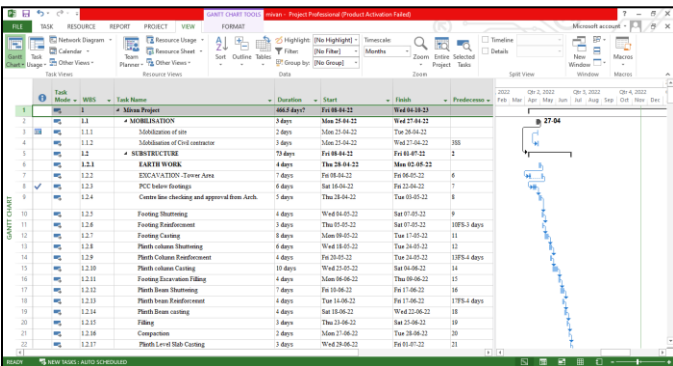


Fig 3 Days count for MIVAN Technology

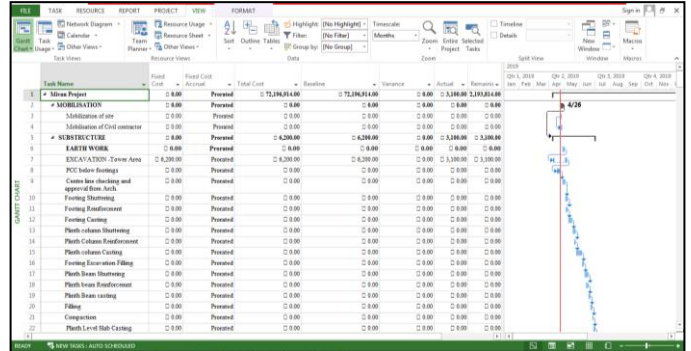


Fig 4 Costs for MIVAN in MSP

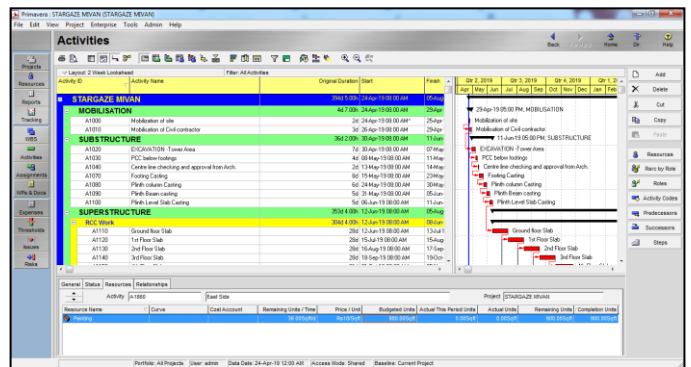


Fig 6 Days count for MIVAN Technology

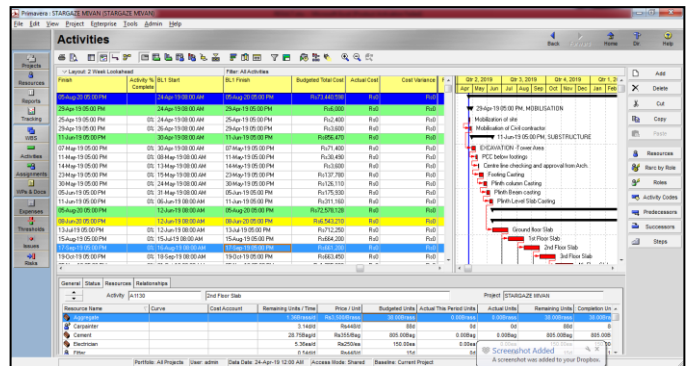


Fig 7 Costs in Primavera

Table 3 Total Project Duration In Days

Total Project Duration In Days		
Conventional	MIVAN In MSP	MIVAN In Primavera
992	476	394

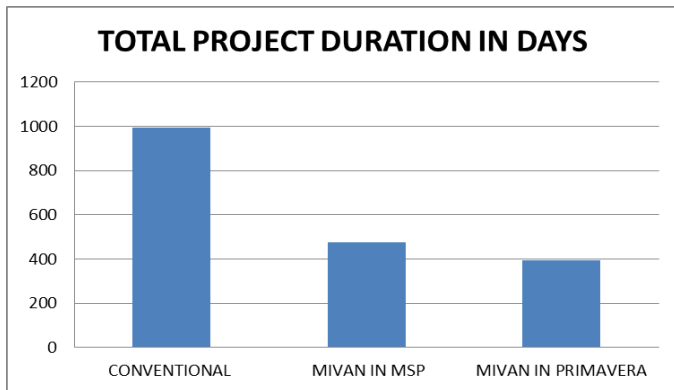


Fig 8 Total Project Duration In Days

Table 4 Total Project Duration In Days

Total Project Cost In Cr		
Conventional	MIVAN In MSP	MIVAN In Primavera
4.92	7.21	7.34

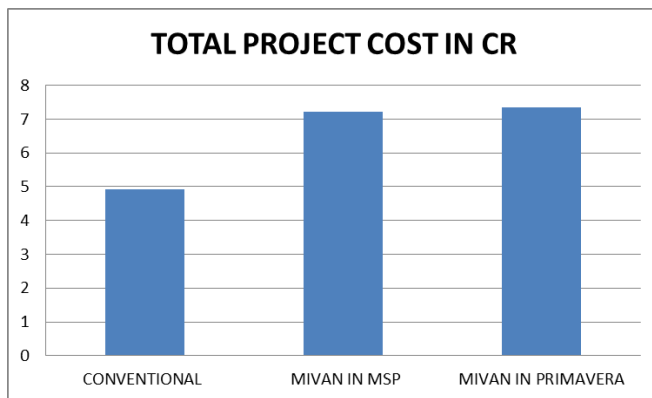


Fig 9 Total Project Duration In Days

5. CONCLUSION

1. As the country's population grows, so does the workload of the construction process. As we all know, the construction of high-rise buildings is becoming a trend, and since the construction process of these high-rise buildings takes longer, modern technologies are used to reduce the length and cost of the project.
2. A new sophisticated technology is developed for building multi-storey projects, resulting in cost-effective and fast project construction.

3. A case study on a housing project was prepared and the results of a comparison of traditional formwork and MIVAN technology were found. MIVAN technology has proven to be suitable for large construction projects and can be reused about 200-300 times.
4. Despite the significant initial investment in the MIVAN technology, it delivers a cost-effective project and there is no need for plastering as it provides a better finish than conventional formwork.
5. Using MIVAN technology, project duration can be shortened. As a result, MIVAN technology is unsuitable for small-scale applications.
6. By using the number of employees, the breakeven technique is useful in evaluating the rate of production of each activity.
7. Increasing the workforce will speed up project output, but increasing the workforce will increase costs.
8. The use of VICO Control 2009 software helps in successful planning and visualization of activity planning and scheduling at each site.
9. You can compare the activity rate calculated from the balancing formula row.
10. The required resources, i.e. the required manpower, can be determined using a formula that gives both theoretical and actual results.
11. The purpose of this study is to investigate and put into practice the LOB method and the VICO control tool for calculating the total duration of a high-rise residential building project. Based on the results, a better approach to project planning from the LOB and VICO tool will be chosen for the calculation of project progress lines. The LOB technique and the VICO tool are graphical representations of repetitive tasks that allow the project manager to evaluate projected and actual production rates and make the necessary decisions.
12. The standard shuttering technique is widely used throughout the world, although it increases the time and cost of the construction operation. Classic formwork is unsuitable in areas with a high population, limited usable land and rapid

construction work. The MIVAN formwork system fulfills all this.

13. MIVAN technology delivers improved results in terms of cost effectiveness, speed of construction and durability of the building structure.
14. Construction speed can be achieved using MIVAN formwork in a 4-day cycle per floor. It is possible to remove the floor slab forms without removing the support, but they are not conventional. The traditional system has a displacement that is 86% greater than the MIVAN design system.

6. REFERENCES

- [1] Mr. Trahash K. Matey, Col. B. K. Bhonde Asst. Prof, Asst. Prof. Sudhanshu Pathak, Mr. Bharat Kholia, 'A Case Study: Line of Balance (LOB) Method for High Rise Residential Project', Vol-3 Issue-4 2017
- [2] Hisham A. Abou Ibrahim & Farook R. Hamzeh, 'Role of Formwork Systems in High-Rise Construction', April 2016
- [3] Pawan M. Walvekar, Hemant L. Sonawadekar, 'Seismic Performance Evaluation of MIVAN Structural System v/s Conventional Structural System with Effect of SSI by Pushover Analysis', Volume: 04 Issue: 06 | June -2017
- [4] Danish Sadruddin Ansari, Pratik Sudhakar Kudale, 'Comparative Analysis of MIVAN Formwork Building and Conventional Formwork Building Based on Cost and Duration', Volume No.5, Issue No.8, 1 August 2016
- [5] Pacheco, M. T. G., and Heineck, L. F. M. (2008). Encontro Nacional de Tecnologia do Ambiente Construído, Fortaleza. Anais... Fortaleza: ENTAC.
- [6] Arditi, D., Tokdemir, O. B., and Suh, K. (2002). "Challenges in Line-of-Balance Scheduling". ASCE, J. of Constr. Engrg. And Mgmt., 128:545-556.
- [7] IJRET: International Journal of Research in Engineering and Technology ISSN: 2319-1163 | ISSN: 2321-7308 Volume: 03 Special Issue: 09, NCETCE-2014, June-2014
- [8] Kushal Patil, Ajitkumar Jadhav, Nikhil Shingate, "MIVAN Technology IJRET: International Journal of Research in Engineering and Technology, ISSN: 2321-0869, Volume-3, Issue-6, June 2015"
- [9] Thiyagarajan, V. Panneerselvam, K. Nagamani, "Aluminium formwork system using in high-rise buildings construction" Volume 8, Issue 6, Nov - Dec 2017
- [10] P.P. Pattanshetti, H.B. Patil, "MIVAN technology"
- [11] Naveen V. Chikkaveerayanavar¹, Naresh Patil, "planning and scheduling of shuttering system for multi-storeyed building", IJRET: International Journal of Research in Engineering and Technology, Volume: 04 Issue: 07, July -2017
- [12] Sirse Guruling Ramling, Patil Yogendra Ramesh, "MIVAN formwork technology", ISSN: 2454-8499, Vol. 2, Special Issue 1, March, 2016
- [13] Prof. R. B. Bajare, Shubham Deshmukh, Ashwin Mahajan, Roohi Karnataki, Indrayani V. Patil, "Remedies to the common deficiencies faced in MIVAN technology at malin rehabilitation", Volume 14, Issue 2 Ver. IV (Mar. - Apr. 2017)