

# COMPARISON AND EFFECTIVENESS OF MIVAN FORMWORK OVER THE CONVENTIONAL FORMWORK

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**Abstract**— *The formwork is temporary structure to support the building structure and it is the main factor for successful of completion of project with respect to speed, quality, economic and safety. In building construction most effective way is the speed of the work early as possible that depend on selection type of formwork. Such type of formwork is Mivan formwork. Mivan formwork is one of the most method for concrete pouring in single operation of wall with roof so that less consume time and it is on light in weight than conventional so that easily handle. This paper represent comparison of Mivan over the conventional formwork.*

**Index Terms**— *Mivan formwork, Conventional formwork, Comparison*

## I. INTRODUCTION

Mivan is basically Aluminum 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 20<sup>th</sup> 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.

### A. MIVAN FORMWORK

- Using this unique system building elements such as wall, floor, balconies, door, and window opening cast in place in single site operation. The Resulting building strong accuracy in shape and size of the building element.
- The main component of Mivan is panel which is excluded from rail section may get result of light weight of formwork.
- Light weight panel gives the good stiffness to weight ratio, minor deflection under concrete loading.
- Panel is made of aluminum composite with 4mm thick skin plate and 6mm thick ribbing.
- Speed of construction : The wall and floor are cast together in one continuous operation and easily removal with less time
- Aesthetic: Room size wall and roof element of building cast against steel plates have very smooth surface so that get the smooth wall and no requirement of plastering.
- Efficiency: 87.5% of plinth area as per useful carpet area.

### B. CONVENTIONAL FORMWORK

- Conventional formwork has normal quality
- Speed of construction is slow because of step by step completion of building element like Column, Beam, Slab so that lines on surface is visible may be due to plastering must be required.
- In conventional formwork wood so it is not eco-friendly.
- Various type of conventional formwork such as steel formwork, wooden formwork. It is not easily carried because of heavy in weight.

### C. ADVANTAGE OF MIVAN FORMWORK OVER CONVENTIONAL FORMWORK

- Box type Mivan Formwork is more earthquake resistance to the structure.
- Durability of Mivan Formwork is higher than the conventional formwork.
- Carpet area is more may be due thin shear wall.
- Construction speed is high.
- More effectiveness in the construction.
- No. of joints less so that the seepage and maintenance is lower.

### D. ADVANTAGE OF MIVAN FORMWORK.

- Formwork is light in weight so that easily handle by labor.
- Erection of formwork can be carried by unskilled labor.
- Formwork panel can be used up to 200 times.[8]

### E. LIMITATION OF MIVAN

- May be small size finishing line so that line seen on the concrete surface.
- In Mivan formwork changes are not possible.

- Box type formwork may cause compression cracks are visible on concrete surface.
- Shear wall may cause higher heat of hydration generate.

## II.LITERATURE REVIEW

- Danish Sabruddin Ansari(2016) <sup>[1]</sup> estimated that construction cost with Mivan formwork is raised by 25-30% as compared to conventional formwork and also concluded that time required by Mivan Formwork is less than conventional by almost 25% and 534 day. Cost of construction per sq. m in Mivan formwork is high as 33% as compared to the conventional formwork. Mivan formwork require a no. of spacer, these spacer is put @2 feet c/c and create problem such as leakage ,seepage at monsoon time.
- GanarA.S (2015)<sup>[2]</sup> said that cost of Mivan formwork is 14.04% economical than the conventional formwork building can be done in half duration of construction of conventional building of 12 floor. Wastage of formwork in mivan formwork is very less than conventional. Difference of duration between Mivan formwork & conventional formwork is 50%.
- D.M.Wijesekara (2012)<sup>[3]</sup>is concluded if worth of construction project can be controlled when building has less than 10 typical no. of storey. Also say that when construction activity can be represent material is unique which depend on the design of structure but the labor requirement and duration of the project are wholly depend on the modern technology and also represent that the both formwork is modeled for G+3, G+6, G+9 is analysis and design as per IS code. Linear and Non-Linear consequence compared to gravity loading and inelastic seismic loading with soil flexible support. The result is remarked that Mivan structure gives better earthquake performance than the conventional structure.
- Tejas D. Aradhye(2016)<sup>[4]</sup> studied on advance tunnel formwork in high rise building and conclude that initial investment and per day operation in tunnel in tunnel formwork is more than the Mivan formwork. Slab cycle can be achieve 1-3 day by Tunnel formwork and 7-10 day by aluminum formwork. He compare aluminum formwork and Tunnel formwork then concluded that initial investment and per day operation cost in Tunnel formwork is more than aluminumformwork. Formwork cost itself around 20-25% of total project cost.
- MayankPatel (2015) <sup>[5]</sup> represent that Mivan formwork is save cost and time is more compare to conventional formwork. Surface finishing of Mivan gives better result over the conventional, so do not require plaster, we apply directly putty or paint.Mivan formwork give the finishing,eleiminate the internal& external plaster and wall can be directly apply minimal skim coat, all these resulting in cost saving.
- Sandip.P.Pawar (2014)<sup>[6]</sup> said when formwork system used in project floor cycle will be become 6-10 day hence project period will be reduce. At the same time a smooth concrete surface can be obtained as the system can be assembled without any discontinuous in the surface hence less finishing work will be there and hence the cost for finish as will be reduced.There will be less waste disposal and less machinery usage. Not only direct benefit, there are many indirect benefits of using aluminum panel system formwork in the high rise building construction project.
- Pawan M. walvekaar(2017)<sup>[7]</sup> studied that Mivan structural system general decrease the natural period and increase base shear while the conventional structural system decrease the base shear and increase the natural period .Conventional structure system has lower base shear compared with Mivan structural system. Mivan formwork has base shear 40% more than conventional formwork. Structural stiffness of Mivan has high so that the attract more base shear.
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- Aniket S Kadam(2016)<sup>[8]</sup> concluded that the mivan formwork resist its own weight with live load due to moving labor , vibration , wet concrete. The capacity of mivan formwork to bear live load 370 kg/m<sup>2</sup>. They also said that main component of mivan formwork is board which is excluded from the rail section and weld with aluminum thin sheet may should formwork become light weight.This light weight formwork has good surface so that get uniform finishing surface of concrete. Mivan formwork is takeoff one place to another place and easily remove from the concrete surface. They evaluate that mivan is not only give the better quality but also give the speed of construction speed.
- Naveen V.Chikkaveerayanavar(2017)<sup>[9]</sup> concluded that Mivan is costlier than the conventional formwork but it has capable of reduce to cost and time of the project. They said Mivan has restrict repair and rehabilitation of building structure and produce good quality of construction with high durability with minimum cost. They evaluated that Mivan formwork easily dismantled by air curing process. Good grade of the cement used in construction gave high quality, strength more seismic resistance.
- Pradeep B(2016)<sup>[10]</sup> reported that RC wall building has less displacement than the conventional at same soil zone so that RC wall building has more effective resistance than conventional building. They also said that RC wall building has much lesser value of storey drift compare to conventional so it is proved that RC wall building is safe against to drift caused by earthquake. Mivan building has lesser value of base shear.

## III.CONCLUSION

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 satisfy in MIVAN formwork system. Mivan technology give the better result in Cost effectiveness, Speed of the construction with higher durability of building structure. 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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