

Mivan Technology

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Abstract— The aluminum formwork system was developed by Malaysian Company and that's why the aluminum formwork technology is named after it. Mivan is new construction technology upcoming for successful completion of mass housing project in India. In this project we have discussed about cost comparison of mivan technology with conventional construction technology. The Mivan technology is absolutely fine with cost, quality and time saving as compare to conventional. In this project we have taken a review from the people who are occupying the houses constructed by mivan technology to get the feedback from occupant on mivan technology. The project also include remedial measure for one of the defect in mivan technology i.e. segregation while placing the concrete resulting honeycombing in shear walls by using "MasterGlenium ACE 30JP" admixture.

Index Terms— cost comparison, user review, Master Glenium ACE 30JP" admixture

I. INTRODUCTION

The Mivan Technology System was developed by Mivan Company Ltd from Malaysia late 1990s as a system for constructing mass housing project in developing countries. The units were to be of cast-in-place concrete, with load bearing walls using a formwork of aluminum panels. To be erected by the hundreds, of a repetitive design, the system ensured a fast and economical method of construction. The concrete surface finish produced with the aluminum forms allows achievement of a high quality wall finish without the need for extensive plastering. This is one of the systems identified to be very much suitable for Indian conditions for mass construction, where quality and speed can be achieved at high level. The speed of construction by this system will surpass speed of most of the other construction methods/technologies

I. MIVAN FORMWORK

A. Requirement of Mivan Formwork

The Mivan formwork is made up of of an aluminium alloy. While Construction is in process , the formwork is supposed to bear, besides its own weight, the weight of wet concrete, the live load due to labor, and the impact due to pouring concrete and workmen on it. The vibration caused due to vibrators used to compact the concrete should also be taken care off. Thus, the design of the formwork considering its requirements is an essential part during the construction of the building. The Mivan Formwork should be able to take a live load including the impact about 370kg/m². It is however, usual to work with a small factor of safety in the design of

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formwork. The surfaces of formwork should be dressed in such a manner that after deflection due to weight of concrete and reinforcement, the surface remains horizontal, or as desired by the designer. The sheathing with full live load of 370 kg/m² should not deflect more than 0.25 cm and the joists with 200kg/m² of live load should not deflect more than 0.25cm. Maintaining the Integrity of the specifications. The modular nature of the mivan formwork should allow easy fixing and removal of formwork and the construction can proceed speedily with very little deviation in dimensional tolerances. Further, it should is quite flexible and can be easily adapted for any variations in the layout.

B. Genenral specification of Mivan Formwork

The basic element of the Mivan Formwork is the panel, which is an extruded aluminum rail section, welded to an aluminum sheet. This produces a lightweight panel with an excellent stiffness to weight ratio, yielding minimal deflection under concrete loading. Panels are manufactured in the size and shape to suit the requirements of specific projects. The panels are made from high strength aluminium alloy with a 4 mm thick skin plate and 6mm thick ribbing behind to stiffen the panels. Earlier the panels were used to manufacture only in factories in Europe and South East Asia but in recent the formwork componants are started manufacturing in india as well e.g. COSMOS Construction Machinerics And Equipments Pvt. Ltd . Once they are assembled they are subjected to a trial erection in order to eliminate any dimensional or on site problems. The formwork components are durable they can be used repetitively up to 200 times. It is light weighted so heavy lifting is eliminated, the heaviest components is of 25 kg, a labor can easily lift it

II. COST COMPARISON

By adopting Mivan technology in the project not only it gives the better quality of construction and but also increases the speed of construction and reduces the cost since some of the construction activities are completely eliminated and others are reduced to a extent . This project includes the cost comparison of conventional construction with Mivan Technology of construction. The following comparison is from the data acquired at Paranjpe schemes's "Blue Ridge" a 138 acre integrated township Hinjewadi , Pune.

A. Detailes about the structure

It is a part of Paranjpe schemes's "Blue Ridge" a 138 acre integrated township Hinjewadi , Pune. We have acquired the data of Tower HA-1 (25 Floors).

1.	Grade of Concrete	M 35
2.	Slump	180 – 200 mm
3.	Wall Thickness	External : 200 mm Internal : 100 mm
4.	Steel	Partition wall: 10 mm dia. Structural: 12 mm dia. Shear Wall : 16 mm dia.
5.	Slab Thickness	Hall : 175 mm Bedroom : 150 mm

		Kitchen : 125 mm
6.	Finishing	External : Texture Paint Internal : Paint over gypsum
7.	No. of Floors	25 floors
8.	Area	3 BHK : 184 sq. meter 2 BHK 125.4 sq. meter

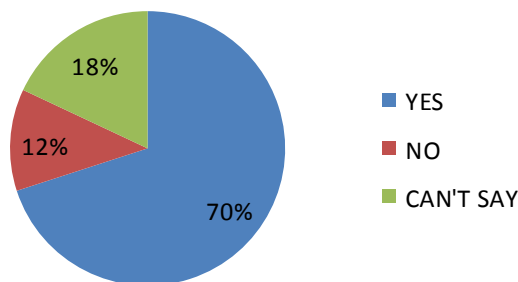
Table 1: cost comparison between construction by conventional and mivan technology and mivan technology

Sr. No	Parameter	Cost By Conventional Technology	Cost by Mivan Technology	Cost Saving
1.	Shuttering after repetitions	Wooden Materials =Rs. 88.50 /sq.m M. S. Material = Rs. 100.00/sq.m	Rs. 83.8/ sq.m	Rs. 104.63/sq.m
2.	Concreting	Rs. 1400 / sq.m	Rs. 1505/sq.m	Rs. -105/sq.m
3.	Reinforcement	1,480.00	2,115.20	-635.2/sq.m
4	Brickwork	484.00	0.00	480/sq.m
5	Plaster	700.00	0.00	700/sq.m
6	Total cost saving			Rs. 548.43/sq.m

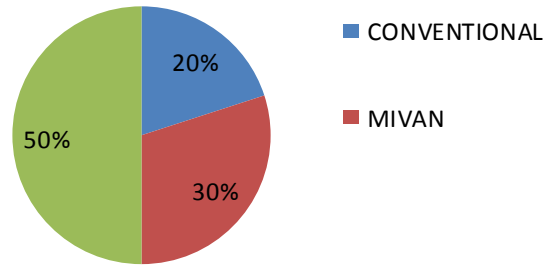
III. FEEDBACK

It's now well known that the Mivan Technology reduces the cost of construction from above analysis, hence the technology is useful to the construction company and builder . However what about the end user i.e the people who are going to occupy the houses built by mivan technology. In India the occupants of houses built by mivan technology must have experience of living in a house constructed by conventional technology as mivan technology has recently came in india. Based on this fact, in this project we have taken a survey of people who are occupied in houses built by mivan technology. We have prepared questionnaire and took the feedback from occupant. The result analysis of selective question out of questionnaire of this survey is as follow

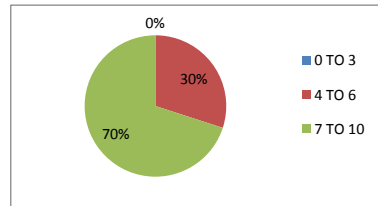
1. Is house more Specious ?



2. Which technology of house construction is more comfortable?



3. How much you would rate to Mivan technology of house construction?



IV. HONEYCOMBING AND CRACKS IN SHEAR WALL

The mivan technology follows monolithic construction i.e. all the structural member viz. beam, shear wall, slab are casted at same time. In conventional construction the concrete is placed from height of 0.6 to 1 meter, and that is what recommended height to place the concrete. In Mivan Technology of construction the concrete is placed from height of 3 meter in shear wall and compacted using vibrator, now as height of placing concrete is more there are chances of segregation in concrete resulting in honeycombing and cracks in wall. In mivan construction it is generally happened that after removing formwork there is honeycombing in shear wall, in this project we had tried to fix the problem of honeycombing in shear wall. We had gone to BASF The chemical company pertaining this problem; they suggested us to use the MasterGlenium ACE 30JP as admixture to concrete so as to increase the workability of concrete to reduce honeycombing and increase the strength of concrete. One of the measures to check the workability of concrete is its slump and to check the strength is compressive strength. In this project we have compared the slump and strength of concrete using admixture and no admixture by slump cone test and compressive testing machine respectively. Following are the details .

A. Specification of MasterGlenium ACE 30JP

- Appearance : Brownish Liquid
- Specific Gravity: 1.00-1.02 g/cm³
- PH Value : 6-9

B. Concrete mix design

- Grade Designation: M35
- Type of Cement: OPC 53 Grades
- Reduced water content for admixture: 20 %
- Mix design
✓ Conventional concrete: 1:1.4:2.2

✓ Concrete using admixture: 1:1.2:3.2

C. Slump cone test result

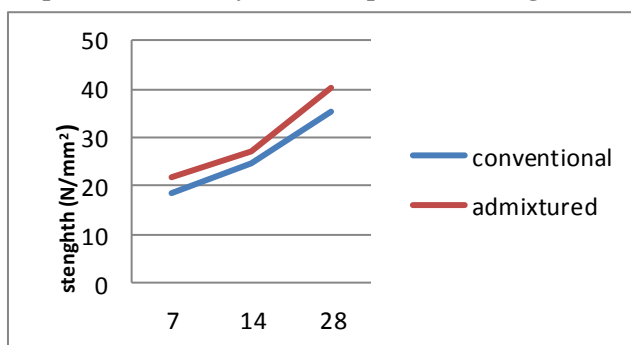
Sr. No.	Description	Slump
1.	Conventional concrete	100 mm from top
2.	Concrete using admixture	220 mm from top

D. Compressive strength testing result

Sr. No.	Day	Load (KN)		Strength (N/mm ²)	
		Conventional	Admixture d concrete	Conventional	Admixtured concrete
1.	7	414	453	18.40	20.17
2.	14	577	610	25.67	27.12
3.	28	798	902	35.48	40.12

By using admixture the workability of concrete is increased by 120 % whereas the strength of concrete is increased by 13 %

Graph 1: Result analysis of Compressive Strength Test



V. CONCLUSION

The task of housing due to the rising population of the country is becoming increasingly monumental. In terms of technical capabilities to face this challenge, the potential is enormous; it only needs to be judiciously exploited by innovative construction methods. Traditionally, construction firms all over the world have been refraining to adopt the innovation and changes. It is the need of time to analyze the depth of the problem and find effective solutions. mivan serves as a cost effective and efficient tool to solve the problems of the mega housing project all over the world. MIVAN aims to maximize the use of modern construction techniques and equipments on its entire project.

We have tried to cover new aspects related to mivan technology viz. cost comparison based on case study, feedback from the people and remedial measure to solve the one of the major defect in mivan technology. We thus infer that mivan technology is able to provide high quality construction at unbelievable speed and at reasonable cost. This technology has great potential for application in India to provide affordable housing to its rising population.

Thus it can be concluded that quality and speed must be given due consideration with regards to economy. Good quality construction will never deter to projects speed nor will it be uneconomical. In fact time consuming repairs and modification due to poor quality work generally delay the job and cause additional financial impact on the project. Some experts feel that housing alternatives with low maintenance

requirements may be preferred even if at the slightly may preferred even if at the higher initial cost.

From the survey and cost comparison we can come to the conclusion that mivan technology is win-win situation for the builder who is going to construct and consumer who is going to occupied the house. Hence mivan technology is the need of time to solve the problems of mega housing projects in India.

VI. FUTURE SCOPE

This thesis work is restricted to some aspects of Mivan technology . The future researchers can continue by working over the aspects of mivan construction such as Climatic effect on structure as whole structure is constructed in concrete only and Modernization in electrification work in mivan formwork. Furthermore interviews of different people from construction industry can be taken based on questionnaire prepared and analysis can be done.

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