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Slab Cycle In Mivan Technology

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ABSTRACT :

The construction industry is vast and contributes to the country's economic growth in addition to producing structures that add to productivity and quality of life. It mainly depends on cost and time. The cost required for construction and the time required play a major role in the overall industry. It deals with traditional construction methods; new technologies are also introduced. As the population increases technologies are introduced to fulfill housing requirements and the most common technology of this is Mivan technology.

Keywords:- Mivan, Slab cycle, Shuttering, components, concrete.

Introduction:

Formwork is the temporary structure used to support the concrete. it carries the weight of concrete until it gains its strength. It is an important aspect of construction. There are many types of formwork like wood, steel, plastic, aluminum formwork, etc. Different types of structures require different types of formwork. Concrete shuttering prevents leakage, cracking, or uneven surfaces while it is set. In a construction project, the cost, speed, and quality of a project are based on the type of formwork used for building the structure. Modern formwork

is now in style and works well for big, high-rise structures. The cost of modern formworks may be more than the standard varieties, although they can shorten the project's timeframe.

Mivan Formwork:

The aluminum formwork was made by a Malaysian firm. One of the most widely utilized forms of advanced technology worldwide is Mivan technology. Europe, Asia, and the Gulf are more prone to utilize mivan formwork. nations as well as other regions of the world. It is appropriate for quickly building a large number of homes. time, building slabs and walls in a single continuous concrete pour utilizing room-sized molds. Mivan technology is comparatively more costly than conventional formwork and also has more earthquake resistance

Components of Mivan technology

Beam components

- Beam side panel
  According to the size of the beam the cutting is done to form a rectangular structure
- Prop head for soffit Beam
  For easy dislodging of the formwork V-shaped head is used.

- Beam Soffit Panel

It supports the soffit beam and is a plain rectangular structure of aluminum.

- Beam soffit Bulkhead:- It is used to carry bulk load

Wall Components

- Wall Panel
  An aluminum sheet that forms the face of the wall is properly cut to fit the size of wall.

- Rocker
  It is a supporting component on L-shaped.
- Kicker
  Act as a ledge to the support, at the top of the panel it forms wall support.
- Stub Pin
  It helps in joining wall panels.

Deck Components

- Deck Panel
  It forms a horizontal surface used for the safety of workers and the casting of the slab.
- Deck Prop
  It is a supporting component of the deck panel
- Prop length
  It depends on the slab length.
- Deck Mid
  Helps support and hold the concrete in the middle of the beam
- Soffit Length
  Supports the edge of the deck panel.

Features of Mivan

1. Load Carrying Capacity
   The load-carrying capacity of mivan shuttering is 7-8 Tones per m2. Mivan shuttering is weightless the weight of each shuttering of 18-20 kg per m2.

2. Striking Time
   The Striking time of vertical Structure Shuttering is 12 hours after concreting or when concrete strength has gain 2N/mm2 and horizontal Shuttering is 36 hours after concreting or when strength gain is 10N/mm2.

3. Durability
   The Panel of the mivan is constructed of Structural grade aluminum alloy. A single unit can be reused roughly 200-300 Times.

4. Cycle Time
   High-speed construction can be possible in mivan construction. A 7-day Slab cycle is followed in that.

Methodology

A case study was conducted regarding the slab cycle of Mivan technology, a 4-day slab cycle was conducted on a residential building, usually, the slab cycle is of 7 days, with proper technique it can be done faster than specified. Here is the case study of a residential project where a 4-day slab cycle is performed and completed.

Case study

Introduction

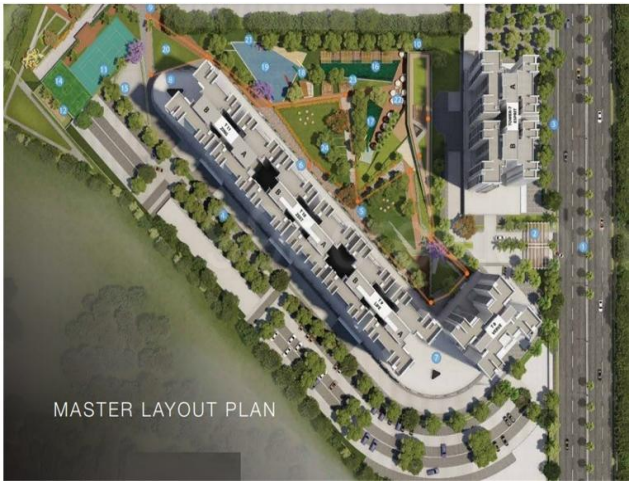
Our Project is a practical type of project that must include a case study to study the aspects practically and also to check the theoretical knowledge at the site and test it over there so to do so we after searching for a site that was well equipped with mivan technology and had everything we need to learn in our project. Generally, a case study is formatted as an essay or a report. Here we have divided all the points of the case into different parts to understand it better. This is a descriptive kind of case study.

Site Detail:-

1. Project Name:- Godrej Rejuve
2. Developer:- Godrej Properties
3. Design Architect:- Kapadia Associates
4. Architect on Record:-
5. Consultant:- Jw Consultants

6. Construction Contractor:- Tricon and Millenium
7. Land Area:- 10 Acres
8. Project Type:- Residential cum Commercial Project
9. Environmental Exposure Condition:- Moderate
10. Project Builtup Area:- 1154000 sq ft
11. Floors:-T7 :-22 Floors ,T8:- 20 Floors , T9, T10, T11 19 Floors

Site Layout:-



Mivan Shuttering 4 days Slab Cycle

Sr No.	Description
1.	Floor Plan T7 19th Floor
2.	Slab Activity Backup
3.	Day- Wise Breakup

Slab Activity Breakup

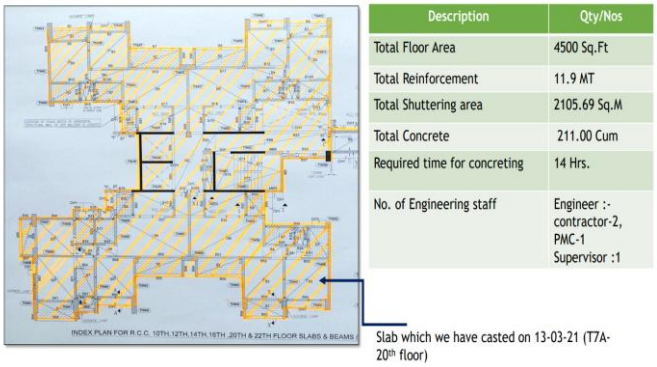
Day -1

1. Survey Marking Point
2. Wall Reinforcement

Wall De-Shuttering & Shifting

Shuttering to wall and vertical Conduit and Fixing of boxes.

Day -2



- 2-day cube testing for the previous slab
- Deck panel De-shuttering with with additional Back-props (1.5 times area)
- Wall and Deck- Shuttering.
- Sleeve Fixing

Day -3

- Slab Reinforcement along with Deck Shuttering
- Electric conduit & Sleeve Fixing.
- Alignment of wall and level of deck slab
- Checking of PMC & Consultants.

Day -4

- Concrete Pouring

Day -01

At Day -01, there were 9 fitters, 20 carpenters, and 11 unskilled laborers used for working.

1. **Survey marking point.**

In the activity, the surveyor does a survey and Gives the points, as per the point given the grid lines are placed on the x-axis and y-axis according to the drawing. The grid lines never change from the start of the building drawing till the end of the building drawing, so keeping the reference of these can help in maintaining the structure.

2. **Deck panel De-shuttering with additional Back-props (1.5 times area).**

In this activity, the work is done using a wooden Patti of the usual size 15 mm to 20 mm in width and can be 200 mm in length. It provides support to the vertical panels to be erected and on this wooden Patti vertical panels are hung and fixed for the casting. At Day 1 4.8 metric ton reinforcement was done

3. **Wall de-shuttering and Shifting.**

The wall panels of the previous floor are de-shuttered and shifted to the above floor, by the time the fitters work on the steel of the above floor. At day one 421.14 square metres of shuttering work was done.

4. **Shuttering to the wall and vertical Conduit and Fixing of boxes.**

After the wall shuttering of the previous floor is removed the shuttering of the wall of the above floor is done with the MEP work proceeded, and every electric and plumbing connection is done as required.

At day one 952.40 Rmt conduit was done.

Reinforcement (MT)	Shuttering (Sq.m)	Conduit (Rmt)	Fitter (NOS)	Carpenter (NOS)	Unskilled (NOS)
4.8	421.14	952.40	9	20	11

Day -02

On day 02, there were 9 fitters,
20 carpenters and 11 unskilled laborers used for work.

Reinforcement (MT)	Shuttering (Sq.m)	Conduit (Rmt)	Fitter (NOS)	Carpenter (NOS)	Unskilled (NOS)
3.7	1052.85	952.40	9	20	11

2-day cube testing for the previous slab.

A cube test is done to check the Strength of the concrete, and the sample from the previous slab is taken and tested to know the strength of the concrete. The strength is expected to be 70% of the concrete mix. If it is 70% then only the concrete use is proceded. On day 2 3.7 metric ton reinforcement was done.

Deck panel De-shuttering with additional Back-props (1.5 times area).

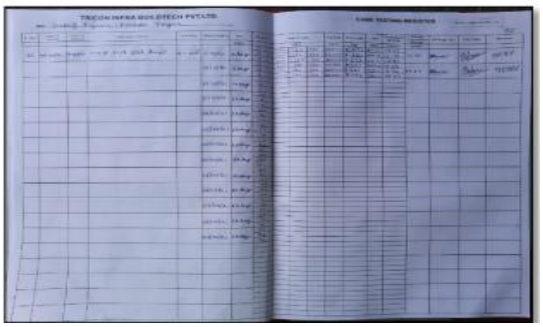
After the transfer of wall shuttering the deck panel is removed, back-props are provided at 1-1.5m as per given in the drawing. Back props are important to provide after removing the deck panel. On day 2 1052.85 square metre shuttering was done.

Wall and Deck- Shuttering

Simultaneously the shuttering of the above floor is done. The steel is already extended above the previous floor by the lapping process.

Sleeve Fixing

Sleeves are fixed at the wall and beams, as per the requirements.at day 2 952.40 conduit was done.



Day 03

On day 3, there were 22 no of fitters, 20 carpenters and 11 unskilled labor used for working.

1. **Slab Reinforcement along with Deck Shuttering**

Slab reinforcement i.e. placing of steel is done on the slab, bars are placed properly as given in the drawing with proper spacing of bars, parallelly the Deck shuttering goes on

Deck shuttering is provided with the slab reinforcement At day 3, 2.4 metric ton reinforcement was used.

2. Electric conduit & Sleeve Fixing.

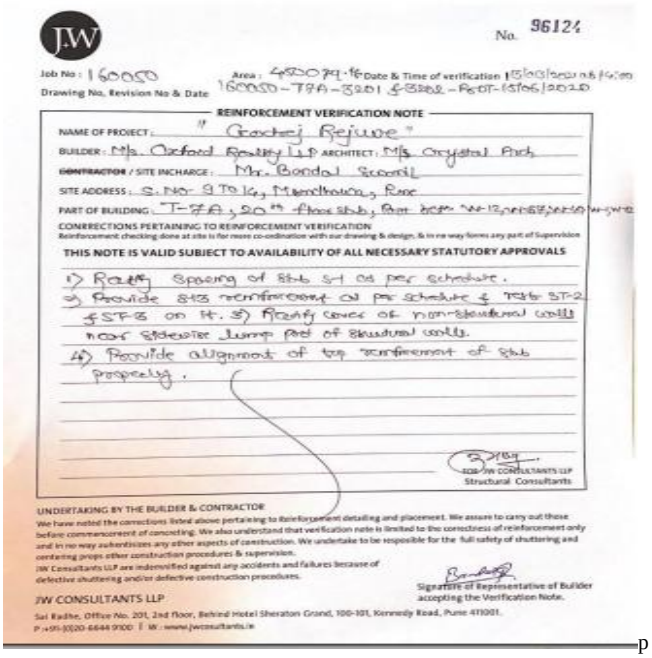
After the slab reinforcement has been done, the electric work proceeds, all the electric points are placed as required, and sleeve fixing is done as per the requirement. At day 3,238 .10 Rmt conduit was fixed.

3. Alignment of wall and level of deck slab

After the wall shuttering, the alignment of the wall is checked with the rope or plumb bob, the wall shuttering alignment needs to be straight and proper.

Reinforcement (MT)	Shuttering (Sq.m)	Conduit (Rmt)	Fitter (NOS)	Carpenter (NOS)	Unskilled (NOS)
2.4	421.14	238.10	22	20	11

if any issue is detected by the consultant then the issues are solved as gnal of consultant, work cannot be done.



No. 96124

Job No : 160050

Drawing No, Revision No & Date

Area : 450079.46 Date & Time of verification : 15/01/2024 08:40:00

160050-TFA-5201 & 5202 - REOT-15/06/2020

REINFORCEMENT VERIFICATION NOTE

NAME OF PROJECT : "Gaodevi Rejuve"

BUILDER : M/s. Oxford Realty LLP ARCHITECT : M/s. Crystal Park

CONTRACTOR / SITE INCHARGE : Mr. Bandal Sir

SITE ADDRESS : S.No. 9 To 14, Manchhauna, Pune

PART OF BUILDING : T-FA, 20th floor Slab, Part beam NW-12, NW-65, NW-10, W-SW-12

CORRECTIONS PERTAINING TO REINFORCEMENT VERIFICATION

Reinforcement checking done at site is for more co-ordination with our drawing & design, & in no way forms any part of Supervision

THIS NOTE IS VALID SUBJECT TO AVAILABILITY OF ALL NECESSARY STATUTORY APPROVALS

1) Reqd. Spacing of Slab ST as per schedule.
2) Provide S13 reinforcement as per schedule & TSTB ST-2, ST-3 on H. 3) Reqd. cover of non-shuttered walls near Slidester Jump part of structural walls.
4) Provide alignment of top reinforcement of slab properly.

JW CONSULTANTS LLP
Structural Consultants

UNDERTAKING BY THE BUILDER & CONTRACTOR

We have noted the corrections listed above pertaining to Reinforcement detailing and placement. We assure to carry out these before commencement of concreting. We also understand that verification note is limited to the correctness of reinforcement only and in no way authenticates any other aspects of construction. We undertake to be responsible for the full safety of shuttering and centering props other construction procedures & supervision.

JW Consultants LLP are indemnified against any accidents and failures because of defective shuttering and/or defective construction procedures.

JW CONSULTANTS LLP

Signature of Representative of Builder accepting the Verification Note.

Sai Radhe, Office No. 201, 2nd floor, Behind Hotel Sheraton Grand, 100-101, Kennedy Road, Pune 411001.

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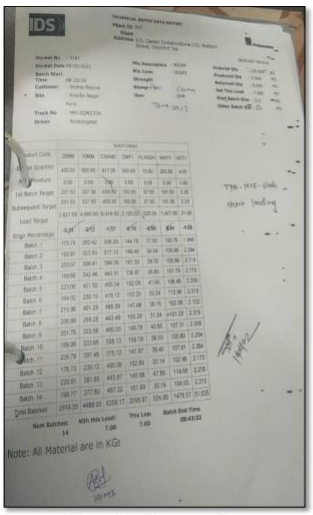
Day -4

Concrete Pouring.

Cast the concrete according to the pathway decided earlier and follow the instructions given by the site engineer to the workers. Firstly columns are filled with concrete then beam and lastly concreting of the slab is done at the site consisting of mivan formwork. To avoid the voids and to get better finish good quality needle vibrators are used on the sites mostly of best in class as it has to go right through the bottom of columns and shear wall and vibrate it. Rubber hammer are the other things which are used at construction sites and hammer made with rubber which makes vibrations when hit hard on wall panels. So the workers hit it on the panels from the downside at the time of casting. After that power float is used for the smooth finish surface purpose.

After this casting of the slab is done, all post-concrete activities are conducted on site which are common with conventional formwork systems.



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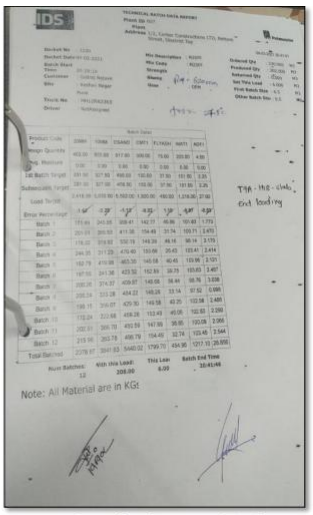

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COMPARISON

➢ Introduction

When we compare mivan with other forms of formworks we can see many changes in terms of its materials used, the work cycles and comparison in terms of end outcomes in this way mivan can be compared with other sort of formworks. Mainly in India the most used formwork is conventional type of formwork so comparing it with mivan makes the most sense in terms of speed of construction, quality, aesthetics, external finishes, maintenance and also the cost comparison has to be done and all this comparison will be done with the reference to case study and research works done till now.

- Quality Comparison

As mivan is a new technology and is for the new era of construction it also provides great quality in terms of wall finishing and smoothness of the wall no voids are seen after the concreting maximum of it is wiped because of the good construction material used and aluminum formwork used. Houses made by mivan formwork systems are more powerful than houses made from conventional formwork systems.

- Aesthetics Comparison

In conventional construction partition walls are made with block work except shear walls all the walls are made with block works and hence shows the unevenness with beams and columns and gives an un aesthetic look to the structure. In mivan all the wall and other components of the superstructure are casted together so it doesn't show unevenness and gives the building an aesthetic look.

- External Finishes Comparison

In conventional formwork systems and in block work manual cement plastering is required and is also not permanent it requires continuous repair and due to its poor strengths it has to be repainted frequently and while in mivan external wall shows smooth finishes and requires no repairing frequently.

- Maintenance Comparison

In the Conventional form of construction there is an high chances of maintenance work as plaster requires repair ceiling plaster may get affected due to leakage so as inner walls may get affected due to leakage as the block wall tends to have maintenance cost high but as compared to mivan their is an negligible cost of repair and no frequent repairing is needed in this kind of construction.

- Cost Comparison

As cost in the conventional initial phase of the project is much less as compared to the mivan but in the long term mivan wins the cost comparison as mivan is for 250 slab cycles using is for construction is the first choice for builders financially. As mivan is an aluminum formwork it has good scrap values also which is way more than other forms of formwork.

Sr No.	Formwork	Scrap Value%
1.	Conventional	10%
2.	Steel	30%
3.	Aluminum	50%

RESULT AND ANALYSIS

In a country like India where each day a new construction project is being started and being at the top in terms of population growing, The need of adopting new construction techniques is most here so to cope with this population and need of mass housing technology mivan can be used in India and is safe to use according to indian construction requirements and is better then the existing formwork systems which have been used till now in construction industry. We can now say that aluminum formwork is better for high rise structure but now there are many other factors to be considered when selecting a formwork system. Mivan can't be used anywhere like for small projects if used there it will be sent to scrap early without using it fully.

1. Availability of local resources
2. Formwork cycle required?
3. Crane dependency? 4. Enough repetitions of floors?
5. Construction period specified?
6. Environmental Friendly?
7. Size of building?
8. Floor plan symmetricity?
9. Type of building design?

10 These are the questions that affect the selection of formwork techniques and formwork selection should be done according to it to avoid losses.

CONCLUSION

Our conclusion will be that mivan formwork can become the backbone to the Indian construction industry, As India is the construction capital of the world due to the frequency of construction going on in India and due to the large population adopting mivan as the main form of Formwork system will be very much beneficial to our countries growth, it can fulfill our demand for efficient and sustainable housing also the speed of construction and cost is less as compared to other forms of formwork system. 1. Adopting new techniques in construction after using traditional techniques for many years is very difficult but needs to be adopted for the betterment of the Indian construction industry. 2. It can also be concluded that the overall cost and duration is reduced drastically when we use mivan as the main formwork system instead of conventional formwork system. 3. The floor-to-floor cycle when using mivan is of 7 days which is standard which changes due to site conditions it goes to 4 days and even at 10 days which is still way less than conventional formwork system which is of 20 days minimum. 4. Mivan formwork is not only a fast pace construction system but also cost-efficient and can be used for mass township projects. 5. Mivan even has indirect benefits as it has good scrap value and is 100% recyclable and also thus environment friendly. It can now be concluded that the minivan is the most suitable type of formwork system in India as it is economical since labor cost is comparatively less and the number of repetitions is more and is also time-saving.

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