

Review Article

The significance of Mivan technology

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Abstract

The technology has been used extensively in other countries such as Europe, Gulf Countries, Asia and all other parts of the world. MIVAN technology is suitable for constructing large number of houses within short time using room size forms to construct walls and slabs in one continuous pour on concrete. Early removal of forms can be achieved by hot air curing / curing compounds. This facilitates fast construction, say two flats per day. All the activities are planned in assembly line manner and hence result into more accurate, well – controlled and high quality production at optimum cost and in shortest possible time. This paper reveals about significance of Mivan.

Keywords:

Aluminium,
Formwork,
Panels,
Concrete,
Floor

1. Introduction

Mivan is basically an aluminium formwork system developed by one of the construction company from Europe. In 1990, the Mivan Company Ltd from Malaysia started the manufacturing of such formwork systems. Now a day's more than 30,000 sq m of formwork used in the world are under their operation. In Mumbai, India there are number of buildings constructed with the help of the above system which has been proved to be very economical and satisfactory for Indian Construction Environment.

In this system of formwork construction, cast – in – situ concrete wall and floor slabs cast monolithic provides the structural system in one continuous pour. Large room sized forms for walls and floors slabs are erected at site. These forms are made strong and sturdy, fabricated with accuracy and easy to handle. They afford large number of repetitions (around 250). The concrete is produced in RMC batching plants under strict quality control and convey it to site with transit mixers.

The frames for windows and door as well as ducts for services are placed in the form before concreting. Staircase flights, façade panels, chajjas and jails etc. and other pre-fabricated items are also integrated into the structure. This proves to be a major advantage as compared to other modern construction techniques.

The method of construction adopted is no difference except for that the sub – structure is constructed using conventional techniques. The super-structure is constructed using MIVAN techniques. The integrated use the technology results in a durable structure.

2. Components

The basic element of the formwork is the panel, which is an extruded aluminium rail section, welded to an aluminium 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. The panels are manufactured in MIVAN'S dedicated factories in Europe and South East Asia. Once they are assembled they are subjected to a trial erection in order to eliminate any dimensional or on site problems.

All the formwork components are received at the site whining three months after they are ordered. Following are the components that are regularly used in the construction.

3. Formworks Assemble

MIVAN aims in using modern construction techniques and equipment in all its projects. On leaving the MIVAN factory all panels are clearly labeled to ensure that they are easily identifiable on site and can be smoothly fitted together using the formwork modulation drawings. All formwork begins at a corner and proceeds from there. (Figure 1 and 2).

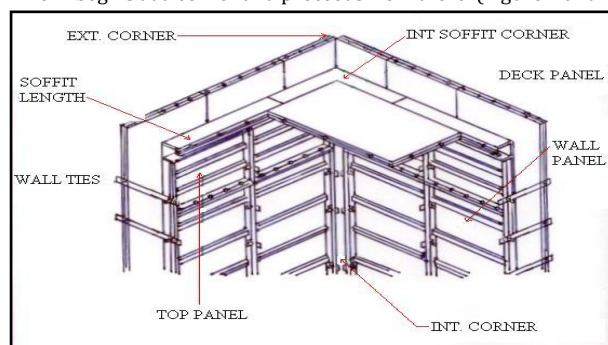


Figure 1: Wall Assembly Details

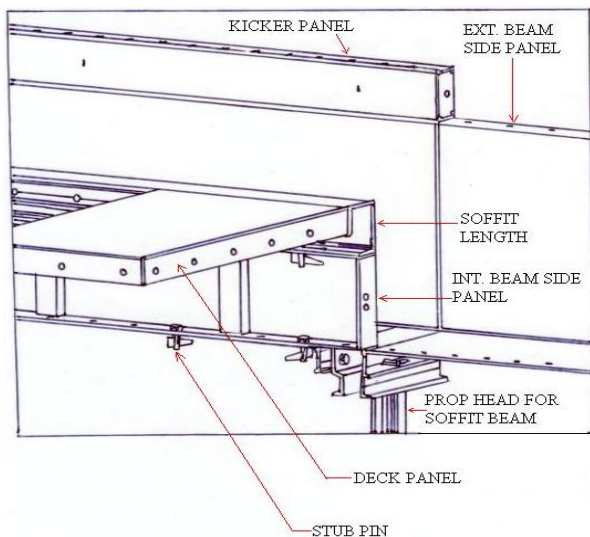


Figure 2: Beam Assembly detail

4. Simplicity – Pin and wedge system

The panels are held in position by a simple pin and wedge system that passes through holes in the outside rib of each panel. (Figure 3)

The panels fit precisely, simply and securely and require no bracing. Buildings can be constructed quickly and easily by unskilled labour with hammer being the only tool required. Once the panels have been numbered, measuring is not necessary. As the erection process is manually, tower cranes are not required. The result is a typical 4 to 5 day cycle for floor – to – floor construction.

5. Efficient – Quick strip prop head

One of the principal technical features which enables this speed to be attained using a single set of formwork panel is the unique V shaped a prop head which allows the ‘quick strip’ to take place whilst leaving the propping undisturbed. The deck panels can therefore be resumed immediately.

6. Construction activities with Mivan as formwork

The construction activities are divided as pre – concrete activities, during concreting and post – concrete activities. They are as follows:

6.1 Pre – concrete activities

- a) Receipt of Equipment on Site – The equipments is received in the site as ordered.
- b) Level Surveys – Level checking are made to maintain horizontal level check.
- c) Setting Out – The setting out of the formwork is done.
- d) Control / Correction of Deviation – Deviation or any correction are carried out.
- e) Erect Formwork – The formwork is erected on site.
- f) Erect Deck Formwork – Deck is erected for labours to work.
- g) Setting Kickers – kickers are provided over the beam.

After the above activities have been completed it is necessary to check the following.

- i. All formwork should be cleaned and coated with approved realize agent.
- ii. Ensure wall formwork is erected to the setting out lines.
- iii. Check all openings are of correct dimensions, not twist.
- iv. Check all horizontal formwork (deck soffit, and beam soffit etc.) in level.
- v. Ensure deck and beam props are vertical and there is vertical movement in the prop lengths.

- vi. Check wall ties, pins and wedges are all in position and secure.
- vii. Any surplus material or items to be cleared from the area to be cast.
- viii. Ensure working platform brackets are securely fastened to the concrete.

6.2 On concrete activities

At least two operatives should be on standby during concreting for checking pins, wedges and wall ties as the pour is in progress. Pins, wedges or wall ties missing could lead to a movement of the formwork and possibility of the formwork being damaged. This – affected area will then required remedial work after striking of the formwork.

Things to look for during concreting:

- i. Dislodging of pins / wedges due to vibration.
- ii. Beam / deck props adjacent to drop areas slipping due to vibration.
- iii. Ensure all bracing at special areas slipping due to vibration.
- iv. Overspill of concrete at window opening etc.

6.3 Post – concrete activities

- i) Strike Wall Form- It is required to strike down the wall form.
- ii) Strike Deck Form- The deck form is then removed.
- iii) Clean, Transport and stack formwork
- iv) Strike Kicker Formwork – The kicker are removed.
- v) Strike wall – Mounted on a Working Platform the wall are fitted on next floor.
- vi) Erect Wall – Mount Working Platform and the wall is erected.

Normally all formwork can be struck after 12 hours.

The post – concreting activities includes:

6.4 Cleaning

All components should be cleaned with scrapers and wire brushes as soon as they are struck. Wire brush is to be used on side rails only. The longer cleaning is delayed, the more difficult the task will be. It is usually best to clean panels in the area where they are struck.

6.5 Transporting

There are basic three methods recommended when transporting to the next floor:

- i. The heaviest and the longest, which is a full height wall panel, can be carried up the nearest stairway.
 - ii. Passes through void areas.
 - iii. Rose through slots specially formed in the floor slab for this purpose.
- Once they have served their purpose they are closed by casting in concrete filter.

6.6 Striking

Once cleaned and transported to the next point of erection, panels should be stacked at right place and in right order. Proper stacking is a clean sign of a wall – managed operation greatly aids the next sequence of erection as well as prevents clutters and impend other activities.

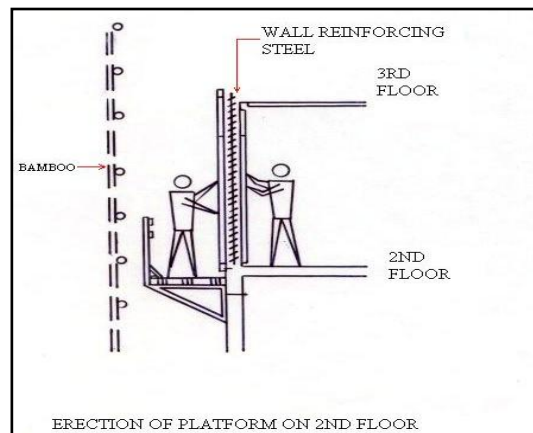


Figure 3: Sequence for striking and erecting the wall mounted on working platform

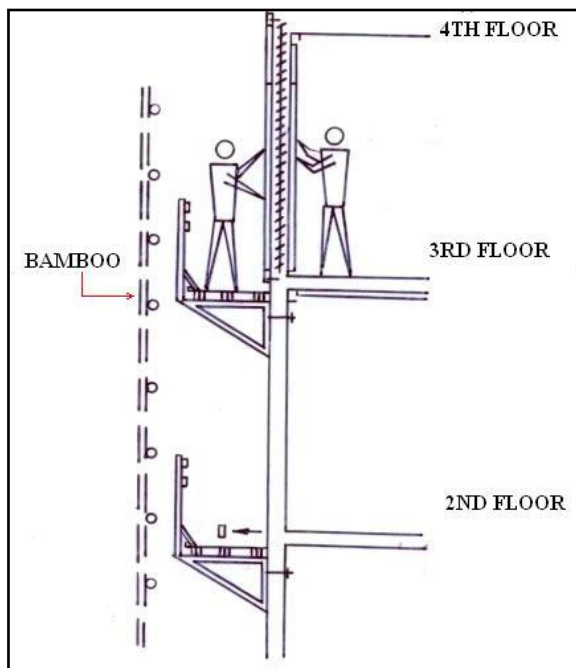


Figure 4: Removing Kicker from 2nd floor level & erecting all formwork on 3rd floor

7. The Advantages of this system are

The MIVAN formwork is specifically designed to allow rapid construction of all types of architectural layouts.

- 1) Total system forms the complete concrete structure.
- 2) Custom designed to suit project requirements.
- 3) Unsurpassed construction speed.
- 4) High quality finish.
- 5) Cost effective.
- 6) Panels can be reused up to 250 times.
- 7) Erected using unskilled labor.

Quality and speed must be given due consideration along with economy. Good quality construction will never deter to projects speed nor should it be uneconomical. In fact, time consuming repairs and modifications 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 the initial cost is high.

8. Conclusion

Traditionally, construction firms all over the world have been slow to adopt the innovation and changes. Contractors are a conservative lot. 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 each and every aspect related to aluminum (MIVAN) form construction. We thus infer that MIVAN form construction 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.

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