

MIVAN FORMWORK AND CONSTRUCTION EQUIPMENTS

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ABSTRACT: *Construction is one of the significant sectors of Indian economy and is an integral part of the development. Today India's urban population is the second largest in the world and its future development leads to increased demand for housing to cope with this problem India should desperately need to plan for acquisition of land and rapid creation of dwelling units. Construction is a complex process involving basically the areas of Architectural planning, Engineering & Construction. Fortunately, some of the advanced technologies catering to faster speed of construction are already available in the country. For e.g. Prefabrication, autoclaved blocks, tunnel formwork, aluminum formwork (MIVAN Technology) of construction etc.*

I. INTRODUCTION

Formwork is defined as temporary structure whose purpose is to provide support and containment for fresh concrete until it can support itself. It moulds the concrete to the desired shape and size and controls its position and alignment. The development of formworks is parallel with the growth of concrete construction throughout the 20th century. The advancement of technology, increase of population and the space limitation lead the way to construct high-rise buildings. But the task was not very easy at the beginning but now the man made the task easy by inventing new machinery and new techniques. The most important factor in terms of cost, quality and speed in a high-rise building construction project is the type of the formwork used in the project. The first formwork type to be used is the conventional type formwork where the timber planks were supported on timber columns.

INNOVATION IN CONSTRUCTION

The traditional mode of construction for individual houses comprising load bearing walls with an appropriate roof above or reinforced concrete (RC) framed structure construction with infill masonry walls would be totally inadequate for mass housing construction industry in view of the rapid rate of construction. Further, such constructions are prone to poor quality control even in case of contractors with substantial resources and experience.

FORMWORK

When concrete is placed, it is in plastic state. It requires to be supported by temporary supports and castings of desired shape till it becomes sufficiently strong to support its own weight. This temporary casing is known as the formwork or forms or shuttering. The term moulds is sometimes used to indicate formwork of relatively small units such as lintels,

cornices etc.

MIVAN FORMWORK

Forms made from aluminum are in many respects similar to those made of steel. However, because of their lower density, aluminum forms are lighter than steel forms, and this is their primary advantage when compared to steel. As the strength of aluminum in handling, tension and compression is less than the strength of steel, it is necessary to use large sections. The formwork turns out to be economical if large numbers of reuses are made in construction.

II. METHODOLOGY

GENERAL

Literature review consists of an overview, a summary, and an evaluation of the current state of knowledge about a specific area of research. It may also include discussion of methodological issues and suggestions for future research.

DATA COLLECTION

Data collection includes primary data and secondary data for the preparation of questionnaire survey. It includes literature survey, observation methods, telephonic interactions and interviews.

DATA ANALYSIS AND COMPRASION

Data collected is analyzed whether it satisfies the requirement of the research of the project. Data should be relevant to the project work in order to get necessary inputs

MIVAN FORMWORK

Mivan is basically an aluminum 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 days 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.

FORMWORK COMPONENTS

Wall Panel

Kicker

Stub Pin

BEAN COMPONENTS

Beam Side Panel

Prop Head for Soffit Beam

Beam Soffit Panel

Beam Soffit Bulkhead
Deck component
Deck Panel
Deck Prop
Prop Length
Deck Mid – Beam
Soffit Length
Deck Beam Bar

III. FEATURES OF MIVAN FORMWORK

Sheet Thickness & Panel Sizes

- The concrete face of panels (Al Sheet) is 4 mm thick.
- Standard sizes of Panels are: 2000x600, 2000x300, 1200x300, 850x300.
- Apart from above any size as required shall be manufactured and delivered.

Load Carrying Capacity

- High load carrying capacity of 7-8 Tonnes Per square meter
- Weight
- Light weight is the main advantage over conventional formwork technology.
- Aluminium formwork weighs around 18-20 kg per meter square.

Cycle Time

High speed of construction can be achieved by this system that means faster completion of project. 7 Days per floor.

Striking time

- Vertical (Wall) Formwork – 12 hours after concreting or when concrete strength has reached 2N/mm².
- Horizontal (Deck) Formwork – 36 hours after concreting or when concrete strength has reached 10N/mm².

Pouring System

Monolithic pouring for:

Slabs

Walls

Columns

Beams

Durability

The panels are made out of Structural Grade aluminum alloy. Around 200 repetitions can be achieved while using aluminum Formwork System

IV. RESEARCH

SPEED OF CONSTRUCTION

The speed of construction is much slower due to step by step completion of different stages of the activities such as erection of formwork, concreting and deshuttering and thereafter plastering and other finishing activities.

In this system the wall and the floors are casted simultaneously in one continuous operation and also the

finishing work can be started immediately, so the speed of the construction is much faster.

Quality

Due to conventional method of construction normal quality is obtained

Superior quality is obtained due to in-situ casting of whole structure and transverse walls done in continuous operation

Aesthetics

In the case of conventional construction the partition walls are made up of bricks due to which the column and the beam show unsightly projections in room interiors.

In case of Mivan system the partition wall and the ceiling elements are casted together due to which the interiors have neat and clean lines without unsightly projections in various corners. The wall and the ceilings also have a smooth even surface.

External finishes

All the external walls are made up of bricks, so it requires manual cement plastering which needs to be repainted frequently.

All the external walls are made up of concrete and do not require manual cement plastering and also have smooth finishing, so this will need no frequent repainting.

Maintenance

The maintenance cost is too high as it requires frequent repairs of plasters of wall and ceilings, painting of outer and inner walls due to leakages.

The maintenance cost is negligible as the walls and ceiling are made up of high quality concrete which do not require frequent repairs.

THE ADVANTAGES AND DISADVANTAGES OF MIVAN:

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

- Total system forms the complete concrete structure.
- Custom designed to suit project requirements.
- Unsurpassed construction speed.
- High quality finish.
- Cost effective.
- Panels can be reused up to 250 times.
- 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.

LIMITATION OF MIVAN FORMWORK:

Even though there are so many advantages of MIVAN formwork the limitations cannot be ignored. However the limitations do not pose any serious problems. They are as

follows: -

- Because of small sizes finishing lines are seen on the concrete surfaces.
- Concealed services become difficult due to small thickness of components.
- It requires uniform planning as well as uniform elevations to be cost effective.
- Modifications are not possible as all members are cast in RCC.
- Large volume of work is necessary to be cost effective i.e. at least 200 repetitions of the forms should be possible at work.
- The formwork requires number of spacer, wall ties etc. which are placed @ 2 feet c/c; these create problems such as seepage, leakages during monsoon.
- Due to box-type construction shrinkage cracks are likely to appear.
- Heat of Hydration is high due to shear walls.

V. CONSTRUCTION EQUIPMENTS

Excavators are heavy equipment consisting of a boom, bucket and carbon a rotating platform (known as the "house"). The house sits atop an under carriage with tracks or wheels. All movement and functions of the excavator are accomplished through the use of hydraulic fluid, be it with rams

TYPES OF EXCAVATOR:

- COMPACT EXCAVATOR
- CRAWLER EXCAVATOR
- WHEELED EXCAVATORS
- BACKHOE LOADER
- DRAGLINE EXCAVATOR
- BUCKET WHEEL EXCAVATOR
- LONG REACH EXCAVATOR

BACKHOE LOADER

Backhoe loader, also called a loader backhoe and commonly shortened to backhoe, is a heavy equipment vehicle that consists of a tractor fitted with a shovel/bucket on the front and a small backhoe on the back. Due to its (relatively) small size and versatility, backhoe loaders are very common in urban engineering and small construction projects (such as building a small house, fixing urban roads, etc).

DRAGLINE EXCAVATOR

Dragline Excavation Systems are heavy equipment used in civil engineering and surface mining. In civil engineering the smaller types are used for road and port construction. The larger types are used in strip mining operations to move overburden above coal, and for tar-sand mining. Draglines are amongst the largest mobile equipment ever built on land, and weigh in the vicinity of 2000 metric tons, though specimens weighing up to 13,000 metric tons have also been constructed. A dragline bucket system consists of a large bucket which is suspended from a boom (a large truss-like structure) with wire ropes.

GRADER EQUIPMENT

A grader, also known as a road grader, a blade, a maintainer or a motor grader. This is a construction machine with a long blade used to create a flat surface. Graders can produce inclined surfaces, to give cant (camber) to roads. In some countries they are used to produce drainage ditches with shallow V-shaped cross-sections on either side of highways

VI. CONCRETE MIXER

A concrete mixer (also commonly called a cement mixer) is a device that homogeneously mixes cement, aggregate such as sand & gravel and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. For smaller volume works portable concrete mixers are often used so that the concrete can be made at the construction site, giving the workers ample time to use the concrete before it hardens.

VII. 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.

Civil engineers not only build but also enhance the quality of life. Their creativity and technical skill help to plan, design, construct and operate the facilities essential to life. It is important for civil engineers to gain and harness the potent and versatile construction tools.

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.

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