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Use of Mivan Formwork in RCC G+12 Building

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Abstract: *Formwork is being used in construction industries as an most important aspect, so as the formwork technology increases the construction industry will see a positive boost in terms of fast construction and eventually the end outcome will give us economic benefits. As the population is increasing, constructing a number of houses to overcome high population rise is a tough task so to make the construction speed fast mivan formwork system has been used in construction in recent years.*

Keywords: Formwork

I. INTRODUCTION

Mivan is a quality aluminium structure developed by a European construction company known as Mivan Company Ltd. In 1990, the company from Malaysia began manufacturing these formwork systems. This innovative form of work is actually suitable for constructing houses in large quantities at a faster speed. The speed of construction needs to be given greater importance, especially for large housing projects or township project. In order to respond to these unusual challenges in terms of time, cost and quality, the real estate industry has come up with a smart method of construction known as the "MIVAN formwork system". There are a number of buildings in Mumbai that are being constructed with the help of the Mivan technology, which has been declared economical as well as satisfying for the overall Indian real estate market. Mivan technology has been used widely in Europe, Asia, Gulf Countries, and other parts of the globe. It is suitable for constructing a large number of houses in a short period of time using room size forms to construct walls and slabs in one constant pour on concrete.

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. With the advancement of technology it developed gradually and people used ply wood sheets instead of timber planks and steel pipes with jacks were used to support the ply wood. Then people invented small units of formworks and connect the repeating units in the construction. The larger units were invented like formworks for slab panels, formworks for columns, beams etc. when the same elements are repeating. Then finally the whole system of formwork is made and initially the material used to it was steel and it was very heavy. Then the aim was to reduce the weight of the system and the materials for formwork have extended to aluminium, plastic, fibre glass etc. Aluminium formwork system provides aluminiumformwork for RCC load bearing or RCC framed multi-storied buildings and enables the walls and slabs to be poured in same operation. These increases efficiency and also produces an extraordinarily strong structure with excellent concrete finish. Due to the fine tolerance achieved in the machined metal formwork components, consistent concrete shapes and finishes are obtained floor after floor. This allows plumbing and electrical fittings to be prefabricated with the certain knowledge that there will be an exact fit when assembled.

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Objective:

OBJECTIVE OF THEWORK

1.Speed: Mivan formwork is designed to expedite construction, reducing the time required to complete projects. This is especially beneficial for large-scale and high-rise buildings.

2. Cost-effectiveness: By using reusable formwork components, Mivan technology can help reduce construction costs in the long run. It minimizes the need for extensive labor and materials.

3. Quality: Mivan formwork ensures high-quality concrete finishes and accurate dimensions, resulting in structurally sound and aesthetically pleasing buildings.

4. Safety: Safety features are integrated into the formwork system to protect workers and ensure a secure working environment.

5. Sustainability: Aluminum formwork can be recycled, making it an environmentally friendly choice for construction.

6. Versatility: Mivan technology can be adapted for various building types and designs, including residential, commercial, and industrial structures.

II. LITERATURE REVIEW

Arbaz Kazi1, FauwazParkar (2015): It can be concluded that on the basis of results obtained it can be concluded thatfor the study project, Plastic formwork seems to be the best feasible solution for the project. AlthoughDoka, Peri, RMD etc. seems to consume less time but the overall cost is quite large and in India, where there are many uncertainties involved in a project, any stoppage of work due to whatever reason, leads to a huge impact on the pockets of developers; as Doka, Peri and RMD needs additional equipment along with its own infrastructure to perform its functions. Also Plastic functions same as conventional timber and does not required any additional equipments for installing, if work is stopped due to certain reasonthelosses incorporatedwill not be huge as in case of other techniques. For this study, MIVAN formwork technique was not taken under consideration, as its initial cost is very high. Also recent studies have shown that MIVAN shuttering becomes economical only if it is used in Mass Housing Projects. The decision was made on parameters like cost, quality, speed of construction etc.

A. Sharmila, Aaron Christopher (2016): in this literature factors affecting selection of formwork were identified through literature study & experts opinion. A questionnaire survey is conducted on high rise building construction projects (above G+5)to find out factors influencing formwork selection in construction projects.The study received 30 respondents the collected data was analyzed through both Relative Important Index method and Microsoft excel. According to their rank indexes the top 5 factors has been ranked accordingly for 30 completed surveys. The top 5 factors are quality and surface smooth, time factor, lifespan, cost and safety. Based on these factors comparative table was prepared from that decision support model was made. And this was analyzed on ongoing and completed projects it gives more than 90% accurate results. From this model the project managers can select the formwork easily based on their requirements. ¬**P.Dinesh, M.Soundararajan (2017):**This study focused on identifying the qualitative factors affecting the selection of the formwork at various constructions. Adaptability & Flexibility (Fixable Sizes) Formwork should be modular and adaptable for various sizes and shapes of the structural system, so that it can be used for many projects. Formwork should be viable for the particular project based on cost and availability, Quality&SurfaceFinishQuality, of structural finish ,Availability Material and supplier availability, Cost , Type of Structure , Time Factor Faster floor cycle is always affects the formwork selection are also adaptability, flexibility, quality cost, type of structure,time factors plays major role while selection of formwork.

Prof. R. B. Bajare, ShubhamDeshmukh, AshwinMahajan, RoohiKarnataki, Indrayani V. Patil. (2017): The purpose of choosing Mivan Technology over conventional method was the speedy construction, Monolithic homes in landslide prone zone and Strengthened structure in high rainfall intensity area. Due to complexity of reinforcement and less thickness of wall, problems of honeycombing and shear cracks due to mass concreting are observed on sites and also, the problem was identified on other sites too. Therefore these problems need to be tackled in effectiveway to ensure quality and safety of structure.

Rahul B. Mojidra1, Pinal H. Patel, Vinu R .Patel (2017): Focused on the seismic design of buildings, reinforced concrete structural walls, or shear walls, act as major earthquake resisting members. Concrete walls are provided for the

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additional gravity force resistant. The properties of these seismic shear walls dominate the response of the buildings, and therefore, it is important to evaluate the seismic response of the walls appropriately. In these papers conventional, monolithic with external walls structural systems and monolithicwithinternalwall system forG+ 20,G+ 25, G+ 30 story's was studied with the help of ETABS v 15 analysis and design. Additional Parameters like Lateral displacement, story drift are calculated for both the structures. we concluded thatthere is drastic improvementin the monolithic structure as compared to conventional structure in term of strength as well as cost.

Naveen V. Chikkaveerayanavar, NareshPatil (2017): Discussed on the rise of the population of the country, the task of construction process as monumentally increased. As we all know the construction of high rise building is becoming a trend and the process of construction ofthese high rise building takes more time and hence to reduce the duration and cost ofthe project advanced technology are adopted. The new advanced technologies aremanufactured for the construction of multi stored project which leads to production of cost efficient and speedy construction on residential projects.

Prof. AshishP.Waghmare,(2017): Proposed an generalized approach, at early days buildingwere constructed using conventional type form work system where wooden planks, runners, poles were used for the form work. With the development of technology, a tend to used plywood in its place of planks, steel jacks for support instead of wooden poles. Due to increase in inhabitants, people started to construct the dwelling building. At early days buildings were constructed using modern type form work system.

III. METHODOLOGY

In this part everything related to mivan its limitations, advantages, its usability, special features, everything is explained according to the literature reviewed and the studies made on the formwork system on case study. There are a number of buildings in Mumbai that have been constructed using mivanindia is fastly adopting mivan as an most used formwork system so knowing all the concepts related to it is very beneficial.

Advantages of Mivan Formwork

1. Mivan Formwork requires relatively less labour.
2. Faster completion of floors.
3. Lesser number of joints and reduced leakages.
4. Smooth finishing of wall and slab.
5. Low maintenance.
6. More seismic resistance.
7. Huge carpet area.
8. Good quality construction work.
9. Faster completion.
10. No need for plastering.

Disadvantages of Mivan Formwork

1. Alignment maintenance needs skilled laborers.
2. Initial setup takes time.
3. It is expensive and used for typical floors only.
4. It needs skilled laborers for alignment maintenance.
5. Construction joints should be set properly.
6. Leakage issues like seepage, leakages during monsoon.

Main Features of Mivan Formwork

1. Load Carrying Capacity The load-carrying capacity of Mivan formwork is 7-8 Tonnes per square meter. Mivan formwork is lightweight and weighs around 18-20 kg per meter square.

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2. Striking Time. The striking time of vertical (wall) formwork is 12 hours after concreting or when concrete strength has reached 2N/mm2 and horizontal (deck) formwork is 36 hours after concreting or when concrete strength has reached 10N/mm2 .

3. Durability. As the panels of Mivan formwork are made of structural grade aluminum alloy, they are very durable and sturdy. A single component can be repeated around 200 times.

4. Cycle Time. High speed of construction can be achieved by this system that means faster completion of the project. Approximately, the times required to cast floor is 7 days with the use of Mivan formwork.

Mivan Formwork consists of many components which when connected to each using the drawing provided then it can be used for concreting, the material used for making these components are high strength aluminum alloy.

The main components of mivan are

1. Wall components
2. Beam components
3. Deck components
4. Other components

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