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Review Paper on Conventional and Mivan Formwork used for Construction

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ABSTRACT

The progress made by construction industry of any country would be consider as development of that country. Concrete formwork is the use of support structures and moulds to create structures out of concrete which is poured into the moulds. There are many different types of formwork used in construction, usually differing according to what the building requirements and challenges are. Formwork comprise about 35 to 40 percent of cost required for RCC member. As formwork has a considerable cost share in total project cost, Hence it is necessary to adopt proper design detailing of formwork. Formwork is used by creating moulds out of wood, steel, aluminium or prefabricated forms into which the concrete is poured. This is then allowed to harden and set after which it is stripped, or in the case of stay-in-place formwork it is left as part of the structure. Formwork allows contractors to cast and construct the main parts of a building which are required to be strong and support the structure such as floors and walls, as well as smaller parts of a building such as stairs relatively quickly.

Keywords: MIVAN formwork, Conventional formwork, Detailed estimation, Duration, Comparison.

I INTRODUCTION

The progress made by the construction industry of any country could be considered as the sign of development of that country.Construction is importantpart of Indian economy and it has helpedin the development of country. Today India's urban population is the second largest in the world. Most of the population is under the roof of metropolitan area. Introduction of multinational companies inIndia for construction activities has helped in speedy construction of projects.For constructing mass housing works, it is necessary to have latest technologies which are capable of speedy construction and are able to deliver good quality and durable structure in cost effective manner.

II FORMWORK

Formwork is the temporary structure that enables shaping of concrete into desired shape, holds itin the correct position until it gets hardened sufficiently. It also supports the imposed load directed over it. The structural

system of temporary supports that holds the formwork in position is termed as false work. When formwork is left in place, it results in effective means of curing. The operation of removing formwork is known as stripping. Stripped formwork can be reused. The failure of formwork system during construction causes money and time loss, sometimes injuries and death may occur. Formwork can be made of Timber, Plywood, Aluminium, Precast Concrete etc. Steel and Aluminium forms have advantage over the other types as those can be repetitively used. The disadvantage of timber is that it can warp, swell and shrink.

Requirement of good Formwork are;

1. It should be strong enough to withstand all types of loads.
2. It should be rigidly constructed and efficiently propped.
3. Construction lines should be true.
4. It should be easily removable.
5. It should not get warped.
6. It should be easily available and suitable for reuse.

III CONVENTIONAL FORMWORK:

This formwork consists of standarad framed panels tied together with horizontal members called wailing.The wailing resists the horizontal force of wet concrete.One side of formwork is first erected and is correctly aligned, plumbed and strutted.The steel reinforcement cage is then placed. After placing the other side formwork is erected. Using this system of formwork, all the elements of a building namely, load bearing walls, columns, beams,floor, balconies etc can be constructed with cast in place. Indian construction industry has started using some of the latest technologies. Finally the systems which are reasonable and easy fpr operation with skilled labour are more useful in India.

Advantages of Conventional Formwork:

1. Easy to handle because of its light weight.
2 .Easy to remove.
3. Damaged parts can be replaced with new one.
4. It is very flexible.
5. Easily available.

IV MIVAN FORMWORK

It was developed by Mivan Company Ltdfrom Malaysia in 1990s for constructing mass housing project in developing countries. There is achievement of a high quality wall finish with the help of aluminium forms.There is no need for extensive plastering and proves to be more economical. This systemis suitable for Indian economy to grow and help in for mass construction, where quality and speed can beachieved at high level. The

Mivan formwork is capable to take a live load including impact about 370 kg/m^2.It is fast, simple, adaptable, durable and cost effective, produces total quality work which requires minimum maintenance. Monolithic pouring is carried out in this type of formwork.

Advantages of Mivan:

1. High quality formwork ensures consistence of dimensions.
2. On removal of mould a high quality concrete finish is produced to accurate tolerances and verticality.
3. Total system forms the complete concrete structures.
4. Custom designed to suit project requirements.
5. Unsurpassed construction speed.
6. Panels can be reused up to 250 time
7. Can be erected using unskilled labour.

Advantages of Mivan formwork over conventional construction.

a. More seismic resistance is achieved.

b. The durability of a complete concrete structure is more than conventional brick bat masonry.

c. Due to shear walls the walls are thin thus increasing carpet area.

d. Unsurpassed construction speed can be achieved due to light weight of forms.

Factors influencing selection of formwork system

The factors influencing the formwork systems were identified are as shown below.

The four broad categories are:

A. General factors

B. Building aspects

C. Job specific

D. Local conditions

The factors, which fall under each category, are:

A. General factors

a) Adaptability & flexibility (fixable sizes)

b) Duration & repetition (lifespan)

c) Quality and surface finish

d)Availability

e) Cost

f) Safety

g) Supply

B. Building aspects

a) Type of structure

b) Maximum load capacity

C. Job specific

a) Time factor

b) Accessibility to work

c) Erection and dismantling(de shuttering)

d) Suitability of work for labours

D. Local condition

a) Weather condition

b) Skilled labour requirement

V TYPES OF FORMWORK BASED ON STRUCTURAL MEMBER:

Wall Formwork

Wall formwork is used for concreting of shear or RCC wall in dams, wing walls, basement rcc walls etc. Wall shuttering made up of timbers to which plywood sheeting boards are fastened at the inner side. The postboards are diagonally supported with the help of boards at both sides.

Beam Formwork

Beam is the most important member in RCC framed structure. Beam formwork includes sheeting bottom and side sheeting panels. The individual parts of form-work are prepare on the beam size. For prefabrication of the sheeting, a table for fabricating must be arranged on site.

Foundation Formwork

Foundation formworks are designed according to foundation type required on site. Shuttering design depends on foundation type like footing, combined footing, raft. Normally, there is a difference in the design for individual foundations, and shuttering for strip foundations. The design of shuttering is state by the size andheight of the foundation.

Column Formwork

Formwork arrangement for column may differ on the basis of column outline like rectangular, circular, and hexagonal or any other shape. The sheeting of column shuttering is constructed according to the column dimensions. The panels are placed in a foot rim, anchored in soil with the help of bolts.

ESTIMATE OF TIME FOR ONE FLOOR OF AREA OF CONVENTIONAL FORMWORK:

ACTIVITY	NO OF DAYS
Column shuttering	12
Column steel-reinforcement	12
Buffer	12
Beam & slab shuttering	2
Beam & slab steel placing	15
Levelling	12
Concrete placing	3
Removal of formwork	6
Brickwork	15
Plastering	15
Finishing	15
TOTAL	**167**

ESTIMATE OF TIME FOR ONE FLOOR OF AREA OF MIVAN FORMWORK:

ACTIVITY	NO OF DAYS
All Shuttering	18
Steel Reinforcement	18
Concel electrification & plumbing	6
Allignment checking	3
Buffer time	2
Concrete placing	3

Removal of Vertical formwork	2
Removal of Other formwork	14
Lifting of wall panels	2
Gypsum plastering & painting etc	30
TOTAL	**98**

VI CONCLUSION

Cost of construction with MIVAN formwork increases by almost 25-30 % as compared to the conventional method. Cost of construction per. Sq.ft in MIVAN is as high as 33 % as compared to the Conventional Method. The difference in per. Sq.ft cost of construction increases by almost 392 Rs/Sq.ft in MIVAN. Duration of Construction in MIVAN is less than Conventional Method by almost 25 % and 534 days i.e 1.5 yrs. Thus from the above points it is quite clear that construction by MIVAN formwork is quite expensive than the Conventional Method. However it can save considerable amount of time in construction of high rise building. Also, many of the finishing works is saved in Mivan which includes plastering (both internal and external), brickwork etc.

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