

ANALYSIS OF ALUMINIUM FORMWORK STRUCTURE BASED ON DURATION AND COST

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Abstract - Construction is the highly growing sector in India. today's Indian population are increasing vastly. now a days India need the mass housing, in minimum time. that's why the new construction technology is required. the object of this study to analysis the aluminum formwork based on cost and time and also analyzing the methodology, types of formworks, lob scheduling, factor selection of formwork, advantage and limitation. And we will be seeing the Which problems are creating the during work on high rise building. Aluminum formwork system is the best way to get the mass housing in minimum time, cost and manpower.

Key Words: - Formwork, Achievement of good quality structure, duration, cost etc.

1. INTRODUCTION

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. One of the most important factors in determining the success of a construction project in terms of speed, quality cost and safety of work is the formwork used in the project as it accounts about 35 to 40 percent of the total project cost of the structure [2]. Formwork is defined as temporary structures to support the concrete until it supports itself. Its molds the concrete to different types of formworks used in construction, generally differing according to the building requirements. Formworks are generally made by wood, steel, aluminum or prefabricated forms into which the concrete is poured [4]. The construction of formwork takes time and involves expenditure up to 20 to 25% of the cost of the structure or even more. There are many types of formworks like timber formwork, aluminum formwork, tunnel formwork. Aluminum formwork system is use in mass housing projects like multi storey building, row house projects. And will use in develop country like USA, RUSSIA etc. [3]. in India this technology is using vastly. in India the core company of construction are mostly use aluminum formwork to achieve the best quality of homes in less time and cost. aluminum formwork is using in metro city for mass housing like Pune, Mumbai, Delhi, Bangalore, tamil-nadu etc.

1.1 OBJECT OF THE STUDY

Our aim to prove that, the aluminum formwork is suitable for high-rise building as well as mass housing Construction. This formwork is easy to handle, time durable, cost consuming, light weight martial therefore heavy machinery are not required. That's why this formwork is suitable for contractor to complete the project within in less time and less cost.

2. METHODOLOGY

Step 1: Select the suitable topic.

Step 2: Study form the available source (books, literature, Report etc.)

Step 3: Making a list of companies. Select the Construction companies' site for collecting actual data.

Step 4: Making the list of various formworks used in construction.

Step 5: Making the list of formworks, which are affected on construction.

Step 6: visit the various companies' and contractors for interview to identify the various problem are created in various formwork.

Step7: Case study analysis on ongoing project.

Step 8: Analysis of selected projects speed, time, cost, manpower, machinery, quality. Conventional

3. FORMWORK

1) Conventional formwork

Conventional formwork method is suitable for small construction project. its oldest method of formwork. In this type required various type of martial like wooden ply, Bamboo, carpentry. In this formwork the manpower, time, cost and machinery are required in more quantity. Repetitions (10-15) are less in this type.

2) Steel formwork

Steel formwork is good material to use in big project. The repetitions are more that's why its suitable for tanks, dam, retaining wall, chimney, high rise buildings, bridges etc. steel formwork are

heavy martial to handle that’s why in sum condition the machinery (Crane).

3) Aluminium formwork

Aluminium formwork is the Morden formwork technique. This is the suitable formwork method for high rise building. This is advanced method to achieve the mass housing as well as good strength, quality and finishing. aluminium formwork is easy to handle because its light weight as compare to conventional and steel formwork. The strength of aluminium is high therefore more support not required. Repetition is more (120-140), speedy Construction, more manpower is not required and after completed all reptations of aluminium formwork then get good scrap value. that’s why its economical to use for Industrial companies, contractors

4. FACTORS AFFECTING ON SELECTION OF FORMWORK

- a) Size of components
- b) Repetitions of formwork
- c) Quality of material
- d) Availability of material
- e) Cost
- f) Type of structure
- g) Load carrying capacity of material
- h) Time factor
- i) De-shuttering
- j) Type of labour (skilled or Unskilled)
- k) Whether condition

5. COLLECTION OF DATA

Project – I EWS Housing scheme, Pradhan Mantri Awasa Yojana, Pimpri Chinchwad, Pune (ALIMINUM FORMWORK)

Project – II Kumar Pratham, Chikhali, Pimpri-Chinchwad, Pune (COVENTIONAL FORMWORK)

Project – III Sahyadri Shrubbery, Chikhali, Pimpri-Chinchwad, Pune (Steel Formwork).

Project – I EWS Housing scheme, Pradhan Mantri Awasa Yojana, Pimpri Chinchwad, Pune (ALIMINUM FORMWORK)

In this project total 7 number of tower and each wing have total G+14 floors including 1BHK Flats. This project ongoing for Economical Weaker Section (EWS) Under the Pradhan Mantri Awasa Yojana, Central Govt. of India. Aluminum formwork is using in this project to complete the project in minimum time. The project details are given to below to help us to understood about the project.

ALUMINIUM FORMWORK (PROJECT-I EWS SCHEME)		
SR.	CONSTRUCTION ACTIVITIES ON SITE	DAYS REQUIRED
1	SITE SURVEY	2 DAYS
2	REQUIREMENT OF NECESSARY ITEMS	30 DAYS
3	EXCAVATION UPTO HARD ROCK, SOIL TESTING	12 DAYS
4	P.C.C. 150 MM THICK	4 DAYS
5	FOOTING, PLINTH BEAM	40 DAYS
6	SHEARWALL/COLUMN ABOVE PLINTH BEAM	21 DAYS
7	FIRST SLAB (WITH ALUMINIUM SLAB)	30 DAYS
8	SECOND SLAB	15 DAYS
9	THIRD SLAB TO FOURTEENTH SLAB	7 DAYS PER SLAB
TOTAL DAYS REQUIRED FOR ONE BUILDING		245 DAYS

Table: -1 ALUMINIUM FORMWORK (PROJECT-I EWS SCHEME)

Project – II Kumar Pratham, Chikhali, Pimpri-Chinchwad, Pune (COVENTIONAL FORMWORK)

In this project total 9 number of tower and each wing have total G+14 floors including 2BHK, 3BHK, 3.5BHK Flats. In this project various facility are given to customer like club house, gym, playground etc. Conventional formwork is using in this project to complete the project. Conventional formwork has good finishing. The project details are given to below to help us to understood about the project.

Table: -2 CONVENTIONAL FORMWORK (PROJECT-II, Kumar Pratham)

CONVENTIONAL FORMWORK (PROJECT-II, Kumar Pratham)		
SR.NO.	CONSTRUCTION ACTIVITIES ON SITE	DAYS REQUIRED
1	SITE SURVEY	2 DAYS
2	REQUIREMENT OF NECESSARY ITEMS	30 DAYS
3	EXCAVATION UPTO HARD ROCK, SOIL TESTING	12 DAYS
4	P.C.C. 150 MM THICK	4 DAYS
5	FOOTING, PLINTH BEAM	48 DAYS
6	SHEARWALL/COLUMN ABOVE PLINTH BEAM	31 DAYS
7	FIRST SLAB (WITH ALUMINIUM SLAB)	30 DAYS
8	SECOND SLAB	22 DAYS
9	THIRD SLAB TO FOURTEENTH SLAB	17 DAYS PER SLAB
TOTAL DAYS REQUIRED FOR ONE BUILDING		400 DAYS

Project - III Sahyadri Shrubbery, Chikhali, Pimpri-Chinchwad, Pune (Steel Formwork).

In this project total 6 number of tower and each wing have total G+14 floors including 1BHK, 2BHK, 3BHK, 3.5BHK Flats. Steel formwork is using in this project to complete the project. Steel formwork has good in finishing. The project details are given to below to help us to understood about the project.

Table: - 3 STEEL FORMWORK (PROJECT-III, Sahyadri Shrubbery)

STEEL FORMWORK (PROJECT-III, Sahyadri Shrubbery)		
SR.NO.	CONSTRUCTION	DAYS

	ACTIVITIES ON SITE	REQUIRED
1	SITE SURVEY	2 DAYS
2	REQUIREMENT OF NECESSARY ITEMS	30 DAYS
3	EXCAVATION UPTO HARD ROCK, SOIL TESTING	12 DAYS
4	P.C.C. 150 MM THICK	4 DAYS
5	FOOTING, PLINTH BEAM	43 DAYS
6	SHEARWALL/COLUMN ABOVE PLINTH BEAM	23 DAYS
7	FIRST SLAB (WITH ALUMINIUM SLAB)	30 DAYS
8	SECOND SLAB	16 DAYS
9	THIRD SLAB TO FOURTEENTH SLAB	13DAYS PER SLAB
TOTAL DAYS REQUIRED FOR ONE BUILDING		329 DAYS

A. COST

Project - I EWS Housing scheme, Pradhan Mantri Awasa Yojana, Pimpri Chinchwad, Pune (ALIMINUM **Table: - 1.1** ALUMINIUM FORMWORK (PROJECT-I)

In the above table given, the type of material, size, rate, unit etc. are given its help us to analyze the data of different formwork.

Project - II Kumar Pratham, Chikhali, Pimpri-Chinchwad, Pune (COVENTIONAL FORMWORK)

In the below table given, the type of material, size, rate, unit etc. are given its help us to analyze the data of different formwork.

Table: -2.1 CONVENTIONAL FORMWORK (PROJECT-II, Kumar Pratham)

Conventional Formwork Project-II			
Sr. No	Description	Unit of Material	Formwork
1	Size of Component (wooden)	Sq. ft	7 x 5
2	Cost of Component	Rs/Sq. ft	46
3	Weight Of Product	Kg	6
4	Maintenance	Rs/Sq. ft	8
5	Skilled Labour	Rs/Day	700
6	Unskilled Labour	Rs/Day	450
7	Number Of Repetitions	No	10-Dec
8	Salvage Value	Percentage	8
9	Additional Component	Nails, foam, Shin-kanga, wooden plank.	

Project - III Sahyadri Shrubbery, Chikhali, Pimpri-Chinchwad, Pune (Steel Formwork).

Table: - 3.1 STEEL FORMWORK (PROJECT-III, Sahyadri Shrubbery)

Steel Formwork Project-III			
Sr. No.	Description	Unit of Material	Formwork
1	Size of Component (Steel)	Meter	1.2 X 2.4
2	Cost of Product	Rs/sqm	5400
3	Weight of Product	Kg	28
4	Maintenance	Rs/sqm	14
5	Skilled labour	Rs/Day	700
6	unskilled labour	Rs/Day	500
7	Number of Repetitions	No's	20-30
8	Salvage Value	Percentage	20
9	Additional Component	Props, Bolt-Nut	

In the above table given, the type of material, size, rate, unit etc. are given its help us to analyze the data of different formwork.

6. COST AND SCRAP VALUE OF FORMWORK

Table: - 4 Cost and Scrap Value

Aluminium Formwork Project-I			
Sr. No.	Description	Unit Of Material	Formwork
1	Size of Component	MM	2050 X 500
2	Cost Of Product	Rs/Sqm	9500
3	Weight of Product	Kg	15
4	Maintenance	Rs/Sqm	17
5	Skilled labour	Rs/Day	700
6	Unskilled labour	Rs/Day	500
7	Number of Repetitions	No's	120-150
8	Salvage Value	Percentage	50
9	Additional Component	U-Jack, Pin, Wedge, Props, Solider, Bracket, Wall-tie	

Cost and Scrap Value					
Sr.n o	Descriptio n	Formwor k	Uni t	Rate per unit	Scra p valu e
1	Aluminum	Aluminu m	Sq m	950 0	50%
2	Convention al	Wood	Sq m	400 0	8%
3	Steel	Steel	Sq m	520 0	20%

As per the above table the highest cost value and scrap value is aluminum formwork. And lowest cost value scrap value is the conventional formwork martial. But the aluminum formwork repetitions are more as compare to conventional formwork. The aluminum formwork is suitable for high-rise building and that's why its economical in the project of high-rise building. And another reason the of why used the aluminum formwork is the scrap value of material is 50% of Purchase value.

7. ANYLISIS OF DATA

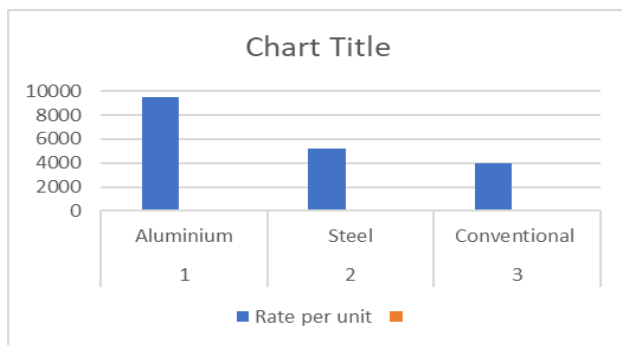
a. COST VALUE OF FORMWORK

Table: - 5 cost value of formwork

Sr. no.	Description	Rate unit per
1	Aluminium	9500
2	Steel	5200
3	Conventional	4000

In the above table show that the difference between the various formwork material. Its help to contractor for the selection of material. The value of aluminum is more because the aluminum is the valuable material and its making cost is high.

Chart -1: Cost Value Of Formwork



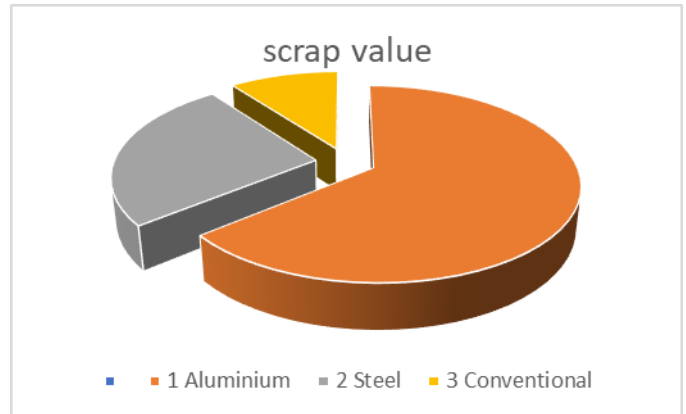
b. SCRAP VALUE FORMWORK

Table: - 6 scrap value of formwork

sr no.	Description	scrap value
1	Aluminium	50%
2	Steel	20%
3	Conventional	8%

In the above table show that the scarp value of various formwork material. Its help to contractor for the selling of scarp after use of the material. The scrap value of aluminum is more and the scrap value of conventional (wooden) formwork is very less.

Chart -: 2 Scrap Value of Formwork



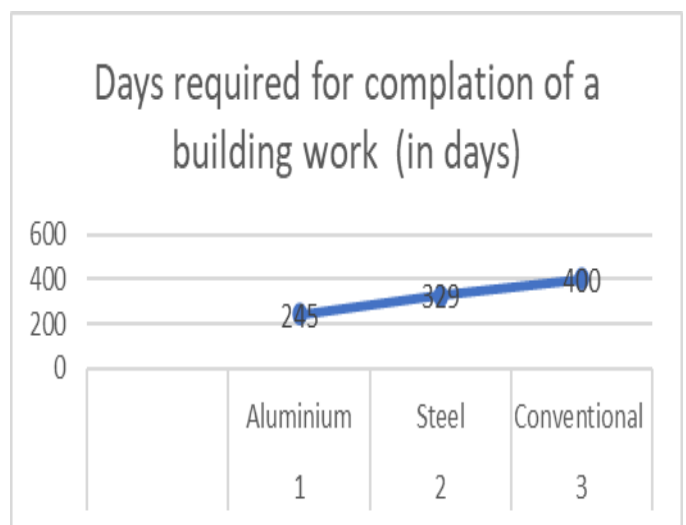
c. TIME ANYLISIS

Table: - 7 Time required of various material

Sr. No.	Description	Days required for completion of a building work (in days)
1	Aluminium	245
2	Steel	329
3	Conventional	400

In the above table show that the time required for various formwork material. Its help to contractor for the complete the project in minimum time by using suitable material. The time required for conventional (wooden) formwork is more and the time required for aluminum formwork is very less.

Chart -: 3 Days required for Formwork



d. REPETITIONS OF FORMWORK

Table: - 8 Repetitions of various material

SR.NO	Description	Repetitions in No's
1	Aluminium	140
2	Steel	40
3	Conventional	12

In the above table show that the repetitions for various formwork material. Its help to contractor for the complete the project in minimum material setup by using suitable material.

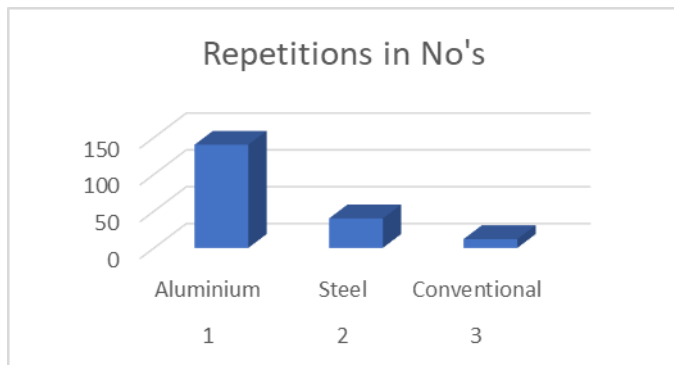


Chart No:- 4 Repetitions of various material

8. CONCLUSIONS

The construction sector in India is developing strongly. formwork has the biggest role to play in this field. This has a big impact on the project. A big country like India needs more houses. This makes the availability of maximum number of houses important in the shortest possible time. Based on the complete study and information we have done; it has been concluded that we can choose aluminum formwork as the best option. This gives us excellent quality, excellent concrete finishing and importantly maximum housing availability in the shortest possible time and minimum cost. This allows us to use this formwork excellently in the construction sector.

Aluminum formwork can repeat it the most.

So, it is excellent compared to the rest.

It is easy to use as it is underweight.

But the study revealed that aluminum formwork we can only use it in a big project.

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