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Cost and Time estimation for Conventional, Aluminium &Tunnel Formwork

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Abstract - *Due to increase in inhabitants, people started to construct the dwelling buildings. At the early days buildings were constructed using conventional type form work system where wooden planks, runners, poles were used for the form work. With the development of technology, man tend to use plywood in its place of planks, steel jacks for support instead of wooden poles. The below study is carried out to compare different Formwork systems on the basis of Time & Cost.*

Key Words: Conventional Formwork, Tunnel Formwork, Aluminium Formwork, Construction Cost, time

1. INTRODUCTION

The expenditure on formwork is occupying a major part in the total cost of construction. Therefore the selection and proper planning the system of form work will reduce the cost of construction, time of construction, the wastages and labour requirement which reduces the total cost of construction.

Formwork systems are among the key factors determining the success of a construction project in terms of speed, quality, cost and safety of the works. Construction industry is seen to be able to play a bigger role into a sustainable society by offering sustainable construction. Formwork system is one of the important construction methods in building construction

2. DATA COLLECTION

Photograph at Tunnel Formwork site during the construction.

Conventional Building during construction is as below

Aluminium Formwork during construction is as below

Case study1: Residential building with G+12 floors (Aluminium Formwork is used)

Case study2: Residential building with G+12 floors (Conventional Formwork is used)

Case Study3: Residential building with G+12 floors (Tunnel Formwork is used)

Case study 1 & 2 are of same site & each case study contains four buildings of G+12 floors.

Table 3.1: Al-Formwork 1st Building cost

Item	Amount
Concrete Quantity	16625986.2
Steel Quantity	26773524
Formwork Quantity	18449026.2
Gypsum	8674220.16
Labour Rate	
Concrete rate	4835298
Steel	8924508
Shuttering	9056794.68
Deshuttering	402524.208
Gypsum	4486665.6
Total	**94228547.05**

Table 3.2: Conventional Formwork 1st Building cost

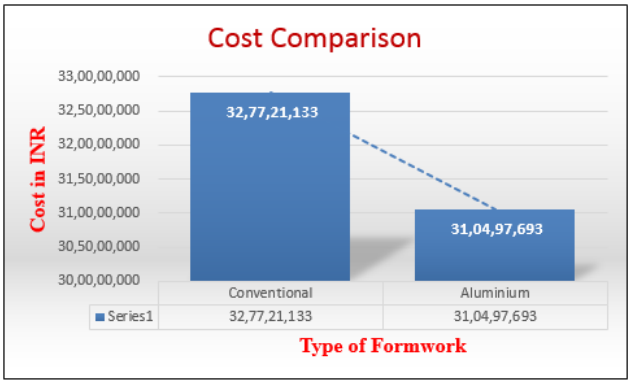
Item	Amount
Concrete Quantity	11552673.19
Steel Quantity	19178505
Formwork Quantity	2375319.8
Brickwork	12199804.2
Internal Plaster	8674220.16
External Plaster	1380380.4
Labour Charges	
Concrete casting	2938492.8
Steel	6392835
Shuttering	7125959.4
Deshuttering	244318.608
Brickwork	4267870.64
Internal Plaster	4539043.328
External Plaster	1060860.82
	81930283.34

3 .DATA ANALYSIS

Total Cost of four Conventional formwork building = 327721133.4 Rs
Total Cost of four Al-Formwork building = 321567109.6 Rs
Total Difference = 6154023.768 Rs
This is the cost with 48 repetitions of Aluminium Formwork.

With proper use and handling these can be used up to 120 repetitions. So, out of 120 only 48 repetitions are used. Hence cost savings for remaining life of Aluminium Formwork is = (120-48)* Initial Investment in Formwork/120 =1,10,69,415.3 Rs.
Currently cost of Al-Formwork building =321567109.6-11069415.3= 31,04,97,693.4 Rs.
Cost of Conventional Formwork Building= 327721133.4 Rs.

Graph:1 Cost Comparison of Conventional v/s Aluminium Formwork



Cost of Conventional Formwork for 81439 m^2 Skin area construction = 32,77,21,133.4 Rs.

Currently cost of Al-Formwork for 134174.736 m^2 Skin area construction= 31,04,97,693.4 Rs.

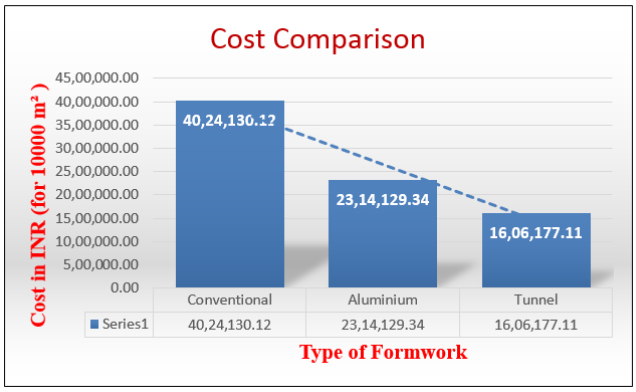
Cost of Tunnel Formwork for 81721 m^2 Skin area construction = 13,12,58,400 Rs.

Cost for 10000 m^2 Skin area construction for Conventional FW= 40,24,130.12 Rs.

Cost for 10000 m^2 Skin area construction for Aluminium FW = 23,14,129.34 Rs.

Cost for 10000 m^2 Skin area construction for Tunnel FW= 16,06,177.11 Rs.

Graph:2 Cost Comparison for Conventional, Aluminium & Tunnel Formwork

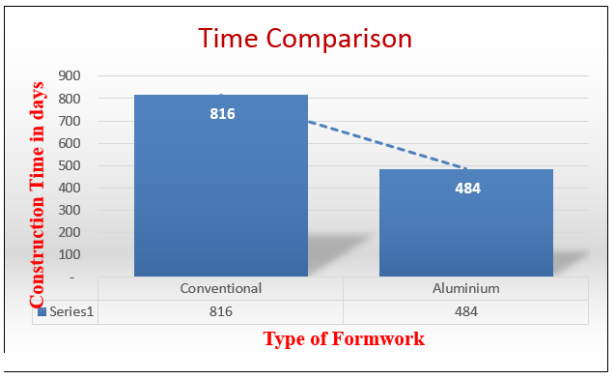


Total Days required for Conventional Formwork Building construction=**816**

Total Days required for Aluminium Formwork Building construction=**484**

Total Days difference **= 332 Days**

Graph:3 Time Comparison of Conventional v/s Aluminium Formwork



Time for Conventional Formwork for 81439 m^2 Skin area construction = **816 Days.**

Time for Al-Formwork for 134174.736 m^2 Skin area construction= **484 Days**

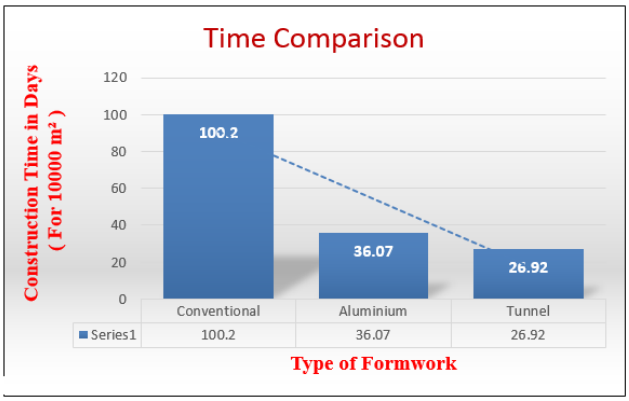
Time for Tunnel Formwork for 81721 m^2 Skin area construction = **220 Days**

Time for 10000 m^2 Skin area construction for Conventional FW= **100.2 Days**

Time for 10000 m^2 Skin area construction for Aluminium FW= **36.07 Days**

Time for 10000 m^2 Skin area construction for Tunnel FW= **26.92 Days**

Graph:4 Time Comparison for Conventional, Aluminium & Tunnel Formwork



4. CONCLUSIONS

Following Table gives the idea about the cost & time taken by Conventional, Aluminium & Tunnel Formwork system for construction of 10,000 m^2 of skin area.

Item	Conventional Formwork	Aluminium Formwork	Tunnel formwork
Cost for construction of 10,000 m^2 of Concrete area in INR	40,24,130.12	23,14,129.34	16,06,177.11
Time for construction of 10,000 m^2 of Concrete area in Days	100.2	36.07	26.92

- From the results obtained we can conclude that, Aluminium formwork is Cost effective in comparison with Conventional Formwork.
- Aluminium formwork is better for use in the constructions, where Time effective formwork is necessary, than Conventional Formwork.
- Tunnel Formwork is the most time & cost effective formwork among Conventional, Aluminium & Tunnel Formwork.
- Also, the duration of the project can be reduced largely with the use of Tunnel formwork where 1-4 days cycle is possible. So this is the fastest formwork system compared to conventional & Aluminium formwork.
- Time saving is equal to money saving. So, even though initial investment is large, Tunnel Formwork can be suggested for faster construction.
- If the number of repetitions are more for residential buildings, then Aluminium formwork is suggested as it saves the time & cost of finishing & shuttering.

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