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Comparison between Aluminum and Conventional Formwork Based of Cost and Time

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***Abstract*: The comparison between aluminum and conventional formwork in construction is crucial for determining their impact on cost and time factors. Therefore, a study analyzing the cost and time factors of both aluminum and conventional formwork is essential for making informed decisions in construction projects. This paper compares formwork systems based on cost and time factors using a case study.**

***Keywords*: Aluminum formwork, Conventional formwork, Cost, Time.**

1. Introduction

Formwork is a crucial component of construction, influencing various factors such as cost, time, wastage, and labour requirements. Proper selection of formwork is essential to reduce overall construction project costs, ensuring efficient project completion and reduced wastage.

Aluminium formwork: The modern approach to construction uses lightweight aluminum alloy panels, offering advantages such as easy assembly, durability, and a smooth finish, but also requiring high initial costs, limited modification options, and uniform planning.

Conventional formwork: Formwork made from timber, plywood, or moisture-resistant particleboard is flexible, easy to use, and requires no preplanning. However, it lacks quality assurance, requires time, and is nondurable.

A. Objectives

- To reduce construction time of project
- To minimize construction total cost (Direct cost and indirect cost) of project.
- To compare the formworks cost, duration and quality.

2. Factors Influencing Selection of Formwork System

The factors influencing the formwork systems were identified are as shown below. The four broad categories are:

- General factors
- Building aspects
- Job specific
- Local conditions

The factors, which fall under each category, are:

A. General factors

- Adaptability & flexibility (fixable sizes)
- Duration & repetition (lifespan)
- Quality and surface finish
- Availability
- Cost
- Safety
- Supply

B. Building aspects

- Type of structure
- Maximum load capacity

C. Job specific

- Time factor
- Accessibility to work
- Erection and dismantling (de shuttering)
- Suitability of work for labours

D. Local condition

- Weather condition
- Skilled labour requirements

3. Case Study

A. G+16 - Residential Building

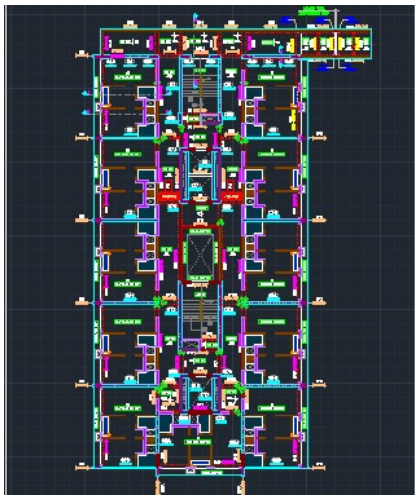

Fig. 1. Project: Shiv Bhumi Wing A

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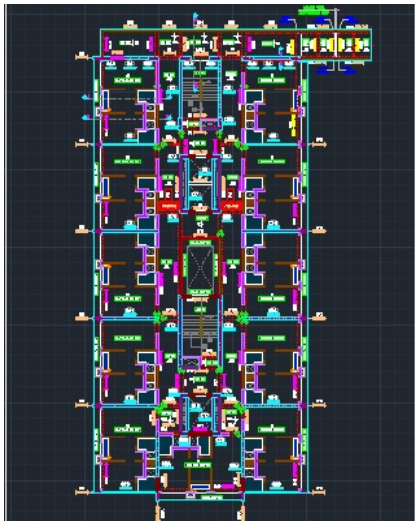


Fig. 2. Project: Shiv Bhumi Wing C

B. Site Photos

Fig. 3. Wing C

Fig. 4. Wing A

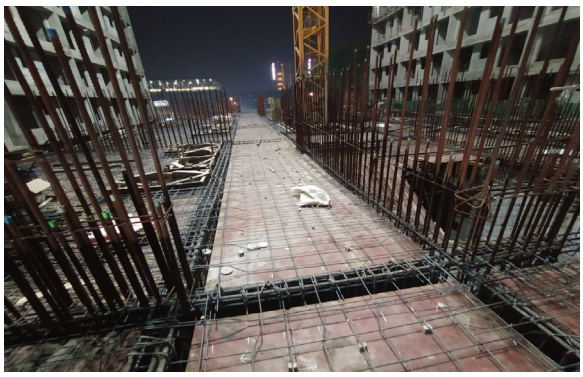


Fig. 5. Wing C

C. Cost

Table 1
Shuttering

S.No.	Formwork	Unit	Cost
1	Aluminium formwork	Sqm	Rs. 10,500
2	Conventional formwork	Sqm	Rs. 2000

Table 2
Labour cost

S.No.	Formwork	Cost
1	Aluminium formwork	Rs. 1000/Sqm
2	Conventional formwork	Rs. 1300/Sqm

Table 3
Salvage value

Formwork	Salvage Value in %
Aluminium formwork	80 %
Conventional formwork	10 %

Table 4
Usage of formwork

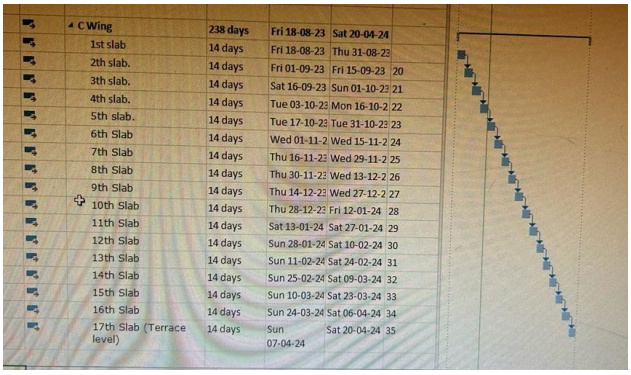
Reuse	Times
Aluminium formwork	150-300
Conventional formwork	10-15

Table 5
Partition wall/Non-structural wall

Formwork	Wall
Aluminium formwork	Executed along with slab, beam and column
Conventional formwork	Blockwork is needed separately.

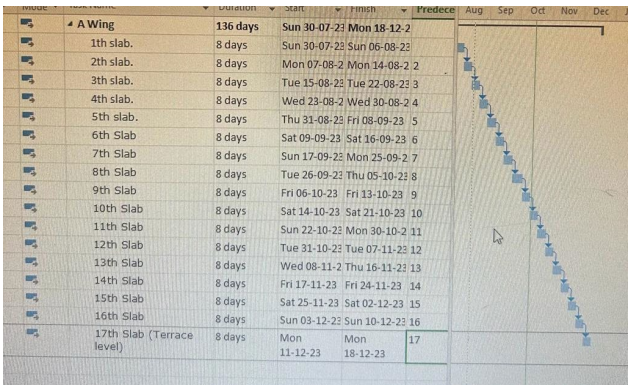
D. Time Period

Below is the Microsoft project schedule for the conventional formwork and Aluminium formwork in which the no. of days required to complete the shuttering for the slab and column.



C Wing	238 days	Fri 18-08-23	Sat 20-04-24	
1st slab	14 days	Fri 18-08-23	Thu 31-08-23	
2th slab.	14 days	Fri 01-09-23	Fri 15-09-23	20
3th slab.	14 days	Sat 16-09-23	Sun 01-10-23	21
4th slab.	14 days	Tue 03-10-23	Mon 16-10-2	22
5th slab.	14 days	Tue 17-10-23	Tue 31-10-23	23
6th Slab	14 days	Wed 01-11-2	Wed 15-11-2	24
7th Slab	14 days	Thu 16-11-23	Wed 29-11-2	25
8th Slab	14 days	Thu 30-11-23	Wed 13-12-2	26
9th Slab	14 days	Thu 14-12-23	Wed 27-12-2	27
10th Slab	14 days	Thu 28-12-23	Fri 12-01-24	28
11th Slab	14 days	Sat 13-01-24	Sat 27-01-24	29
12th Slab	14 days	Sun 28-01-24	Sat 10-02-24	30
13th Slab	14 days	Sun 11-02-24	Sat 24-02-24	31
14th Slab	14 days	Sun 25-02-24	Sat 09-03-24	32
15th Slab	14 days	Sun 10-03-24	Sat 23-03-24	33
16th Slab	14 days	Sun 24-03-24	Sat 06-04-24	34
17th Slab (Terrace level)	14 days	Sun 07-04-24	Sat 20-04-24	35

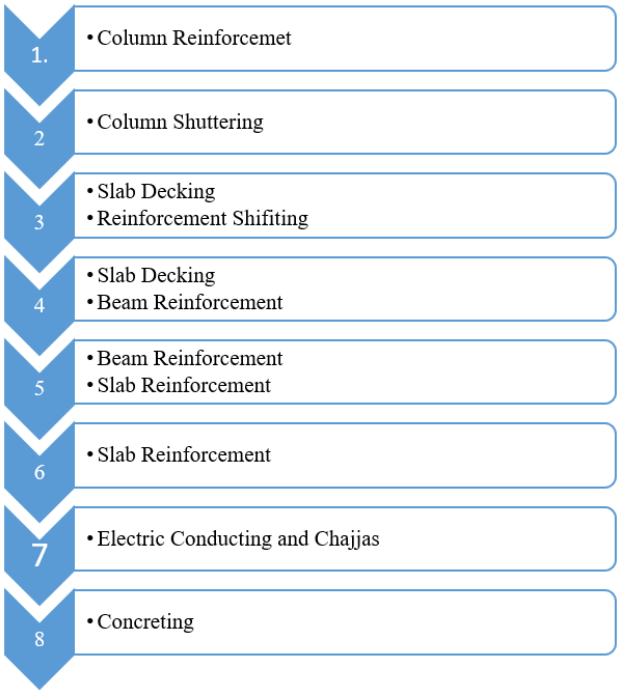
Fig. 6. Schedule of conventional formwork



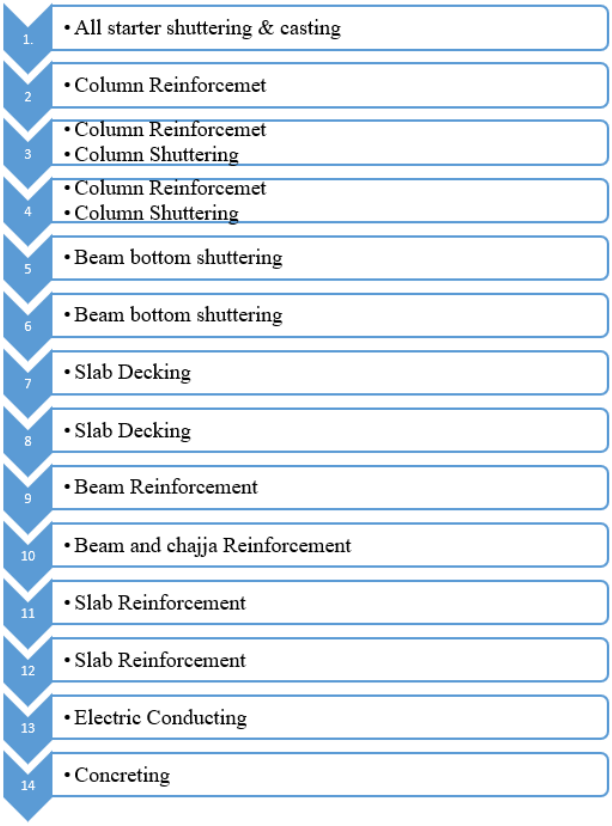
A Wing	136 days	Sun 30-07-23	Mon 18-12-2	
1th slab.	8 days	Sun 30-07-23	Sun 06-08-23	
2th slab.	8 days	Mon 07-08-2	Mon 14-08-2	2
3th slab.	8 days	Tue 15-08-23	Tue 22-08-23	3
4th slab.	8 days	Wed 23-08-2	Wed 30-08-2	4
5th slab.	8 days	Thu 31-08-23	Fri 08-09-23	5
6th Slab	8 days	Sat 09-09-23	Sat 16-09-23	6
7th Slab	8 days	Sun 17-09-23	Mon 25-09-2	7
8th Slab	8 days	Tue 26-09-23	Thu 05-10-23	8
9th Slab	8 days	Fri 06-10-23	Fri 13-10-23	9
10th Slab	8 days	Sat 14-10-23	Sat 21-10-23	10
11th Slab	8 days	Sun 22-10-23	Mon 30-10-2	11
12th Slab	8 days	Tue 31-10-23	Tue 07-11-23	12
13th Slab	8 days	Wed 08-11-2	Thu 16-11-23	13
14th Slab	8 days	Fri 17-11-23	Fri 24-11-23	14
15th Slab	8 days	Sat 25-11-23	Sat 02-12-23	15
16th Slab	8 days	Sun 03-12-23	Sun 10-12-23	16
17th Slab (Terrace level)	8 days	Mon 11-12-23	Mon 18-12-23	17

Fig. 7. Schedule of Aluminium formwork

Aluminium Cycle:



Conventional Cycle:



4. Findings from the Study

- Aluminium formwork is not profitable of buildings who has changes in structure and are not typical, as modification of panels are expensive and time consuming.
- Conventional formwork work best for repetitive structures.
- But if time an important constraint them aluminium formwork should be preferred.
- Quality offered by aluminium formwork is higher than the conventional.

5. Conclusion

- Aluminium formwork offers high quality construction and low maintenance at minimum cost.
- For residential buildings with more repetitions, aluminum formwork saves time and costs of finishing and shuttering.

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