

RESEARCH ARTICLE



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COMPARATIVE STUDY OF CONVENTIONAL TECHNIQUE AND ALUMINIUM FORMWORK TECHNIQUE CONSIDERING COST FACTOR

Dr. M.N. BAJAD¹, SWAPNIL C TEJALE^{2*}, RUSHIKESH SOLANKI³

^{1,2,3}Civil Engineering Department, Sinhgad College of Engineering, Pune, India



SWAPNIL C TEJALE

ABSTRACT

One of the major sectors of the Indian economy is Construction and also is an integral part of the development of Indian economy. There is an increase in the demand for housing in India as it has the second largest urban population in the world. This increase in demand has become a problem and to deal with this problem India should plan for rapid creation of housing units and acquisition of land. The complex process of construction basically involves the areas of Architectural planning, Engineering & Construction. For large housing projects, speed should be given greater importance. This leads to the reduction in the housing cost and is also essential for the faster turnover of equipment. Fortunately, some of the advanced technologies catering to faster speed of construction are already available in the country. For e.g. Prefabrication, autoclaved blocks, aluminium formwork etc. This paper describes the comparative analysis of conventional formwork and aluminium formwork on the basis of cost parameter.

KEYWORDS: Conventional technique, Aluminium Formwork technique, Cost effectiveness.

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I. INTRODUCTION

The progress made by the construction industry is considered as the index of development of that country. Further, the number of houses built in any country could be another index. Due to the rapid growth of population and urbanization in India there has been a rapid growth in demand of housing, the speed thereof has not kept pace with the rapid growth of population and urbanization. As a result, the shortage of accommodation is increasing continuously, especially in urban areas. The traditional mode of construction for individual houses would be totally inadequate for mass housing construction industry in view of the rapid rate of construction. It is necessary to have

innovative technologies capable of fast rate construction for undertaking mass housing works and are able to deliver good quality and durable structure in cost effective manner. Several systems are adopted at different places in the world. One technique which is gaining popularity due to its low cost and time effectiveness is Aluminium formwork.

II. ALUMINIUM FORMWORK

Aluminium Formwork is one of the most advanced formwork system. It is simple, adaptable and fast. It requires minimum maintenance and is useful when the prime consideration is durability. In this system the walls, columns and slab are casted in one continuous pour on concrete. Early removal of forms can be achieved by the air curing or curing

compounds. These forms are made strong and sturdy, fabricated with accuracy and easy to handle. The components are made out of aluminium and hence are very light weight. Large number of repetition are possible using aluminium formwork.(around 250)

Aluminium Formwork is highly suitable for load bearing wall construction whereas traditional formwork consisting of plywood and timber is not suitable to the high pressures of fresh concrete on the wall.

III. OBJECTIVES

1. To reduce the construction time of project.
2. To reduce the total cost of construction.
3. To improve the quality of construction projects.

IV. ADVANTAGES OF ALUMINIUM FORMWORK

1. It 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.

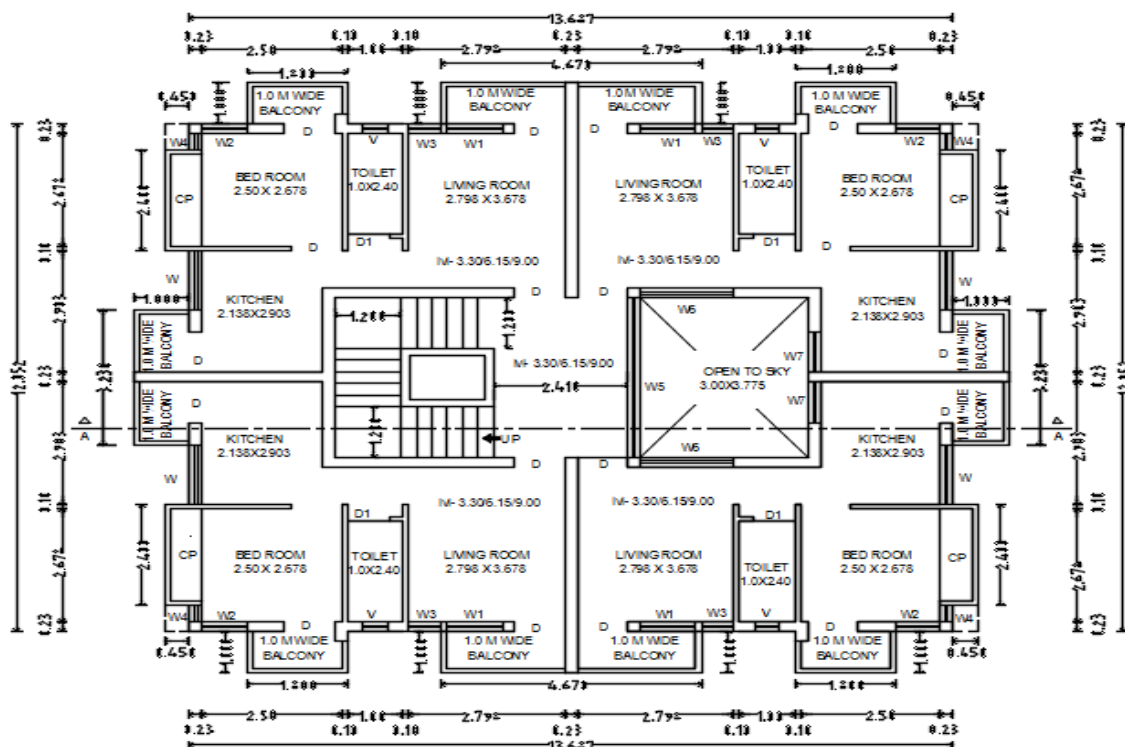
4. Custom designed to suit project requirements.
5. Unsurpassed construction speed.
6. Panels can be reused up to 250 time

V. LIMITATIONS OF ALUMINIUM FORMWORK

1. Because of small sizes finishing lines are seen on the concrete surfaces.
2. Concealed services become difficult due to small thickness of components.
3. It requires uniform planning as well as uniform elevations to be cost effective.
4. Modifications are not possible as all members are caste in RCC.

VI. CASE STUDY

Sayantara, Ahmednagar is based on conventional formwork construction. Total numbers of flats in Sayantara are 20 and total number of floors are 5. Out of 5 floors, 3 are of 1BHK flats and 2 are of 1RK flats. G+4 storey building is constructed. Total area for 1 floor is 1775 sq feet. 4 flats are constructed on each floor. Formwork design is for 1 floor only. After completion of first floor, same is going to repeat for next floor.



VII. ESTIMATION OF QUANTITIES

Concreting-Approximately 4500 cum concrete is required for 1,00,000 sq ft of built up area. The thumb rule to follow is 0.045 cum of concrete per sq ft of built up area.

$$\begin{aligned} \text{Concreting} &= 0.045 \times \text{Area} \\ &= 0.045 \times 1775 \\ &= 79.875 \text{ cum} \end{aligned}$$

Steel- Approximately 540 tons of steel is required for 4500 cum of concrete. The thumb rule to follow is 120 Kg of steel per cum of concrete.

$$\begin{aligned} \text{Steel required} &= 120 \times \text{cum of concrete} \\ &= 120 \times 79.875 \\ &= 9585 \text{ kg.} \end{aligned}$$

Table 1. Details of site

Description	Quantity
Area of each floor	1775 Sq ft
Quantity of concrete	79.875 Cu m
Quantity of steel	9585 Kg
Plant operation	8 Nos.
Labour for centering	43 Nos.

VIII. DATA ANALYSIS

Comparison of Aluminium Formwork and Conventional Techniques

Table 2. Construction with Conventional Techniques

Item	Quantity	Rate	Cost
Concrete M25	79.875 Cu m	3500	2,79,562
Steel	9585 Kg	55	5,27,175
Wall	51.33 Cu m	3500	1,79,655
Formwork	3360.68 Sq ft	35	1,17,624
Labour	135 Nos.		44,670
Total			13,28,341

Table 3. Construction with Aluminium Formwork.

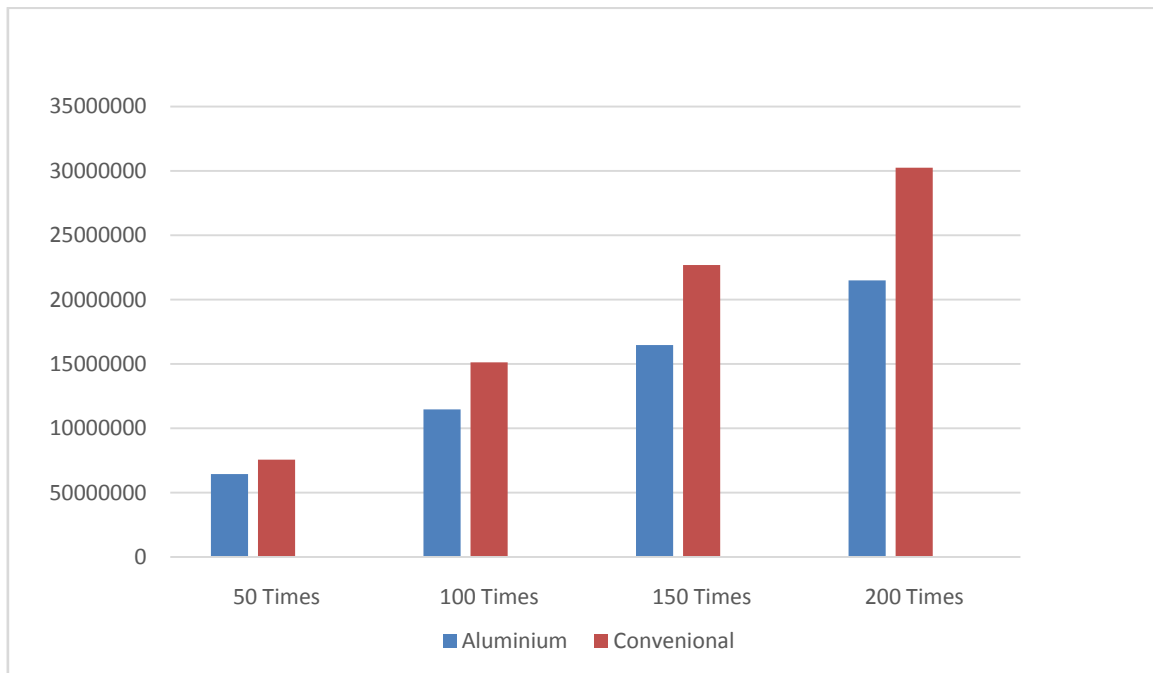
Item	Quantity	Rate	Cost
Concrete M25	79.875 Cu m	3500	2,79,562
Steel	9585 Kg	55	5,27,175
Wall	51.33 Cu m	3500	1,79,655
Formwork	3360.68 Sq ft	4200	1,41,14,856
Labour	105 Nos.		24,900
Total			1,51,19,373

Generally Aluminium Formwork can be cost effective applied after 100 time.

IX. RESULT

Table 4. Cost comparison of conventional technique and aluminium formwork technique after repetition of cycle for number of time.

Techniques	50 times	100 times	150 times	200 times
Conventional	6,64,17,050	13,28,34,100	19,92,51,150	26,56,68,200
Aluminium	6,43,40,706	11,45,66,556	16,47,92,406	21,50,18,256
Percentage	3.13%	13.75%	17.30%	19.06%



X. CONCLUSION

Based on above study, following conclusions are drawn:

1. Selection of Aluminium formwork in construction depend on the project type and project requirements.
2. Aluminium formwork construction technique is cost effective for the repetitive projects.
3. Aluminium formwork construction is rapid construction technique.
4. Aluminium formwork construction is offering high quality of construction and low maintenance at the minimum cost.

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