

# Study and Analysis of Aluminium Formwork Shuttering System for Efficient Construction

S. K. Pawar<sup>1</sup>, P. R. Badgajar<sup>2</sup>, N. R. Borase<sup>3</sup>, Chaudhari Drashan D<sup>4</sup>, Chaudhari Jayesh S<sup>5</sup>  
Chaudhari Tushar V<sup>6</sup>, Borse Vaibhav V<sup>7</sup>, Borse Yogita K<sup>8</sup>

<sup>1,2</sup>Assistant Professor, Civil Engineering Department, NESS'S Gangamai College of Engineering, Nagaon

<sup>3</sup>Professor, Head, Civil Engineering Department, NESS'S Gangamai College of Engineering, Nagaon

<sup>4,5,6,7,8</sup>UG Student, Civil Engineering Department, NESS'S Gangamai College of Engineering, Nagaon

**Abstract**—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. When considering a construction projects both the client and contractor want to finish the job early as the client wants to use the building for the intended purpose as soon as possible. The contractor wants to finish the construction as soon as possible to gain a higher profit. The most efficient way to speed up the work in mass housing construction is by achieving a very short floor cycle. The floor cycle of a building mainly depends on the formwork type, as it is the main time factor of a building project. The aim of our study is to present about the existing formwork system used in mass housing construction in Tamil nadu and to show how each one will affect the project duration, project cost and the quality of the work. For that, research has been carried out and the results will present in this paper.

**Index Terms**—Aluminium Formwork, Shuttering System, Modern Construction Techniques, Mass Housing, Sustainable Construction.

## I. INTRODUCTION

Formwork is a temporary structure, which supports fresh concrete until it becomes strong enough to sustain its own weight. Formwork system has

significant role in the construction process, making the right decision by choosing the appropriate formwork system could lead to response to sustainable construction. Different systems have their own advantages but one needs to choose a formwork which best supports individual project requirement Shortage/non availability skilled and semi-skilled workers results in problems of cost and time over-runs, inferior construction, poor finishes leakages, corrosion of structures etc. this can be avoided by adopting modern formwork systems. This also avoids repairs and rehabilitation of structures before its expected life span.

## II. OBJECTIVE

1. To reduce construction time of project
2. To minimize construction total cost (Direct cost and indirect cost) of project.
3. To measure and improve the quality of construction projects
4. To Explore the Modern methods of Formwork

## III. NEED FOR STUDY

The disparity between the supply and demand for affordable housing is tremendous. Rapid urbanization has resulted in a geometric increase in the housing demand, which cannot be fulfilled using conventional materials and methods of construction. The traditional or conventional method of construction for mass housing is comparatively, a slow process and has limited quality control, particularly when a large size project is involved. It is therefore obligatory to

work out a method or a scheme where the speed and quality of construction are controlled automatically by a systematic approach. Therefore, Aluminium Formwork System (AFS) identified to be suitable for Indian conditions for mass housing construction where quality and speed can be maintained at a reasonably high level. It is adoptable for any design of a building and establishes a kind of assembly line production. The methodology of using aluminium formwork takes in to consideration on the following important parameters such as the number of housing units and the time that is available and works out the component of input as formwork. The whole structure is constructed with cast-in-situ load bearing walls by using pre-engineered aluminium forms with form-finished concrete and no plaster on any face.

#### IV. LIMITATIONS

- Services after completion become somewhat difficult due to the small breadth of components.
- It requires consistent planning as well as consistent elevations to be cost-effective.
- Due to box-type construction, shrinkage cracks are possible.
- It is set in design once placed, as any change later becomes difficult.

#### V. SCOPE

- The aluminum formwork method is used for commercial, residential project etc.
- In this method no need of brickwork, plastering.
- Aluminum formwork method saves the times of construction.
- Modifications are impossible as parts are cast in RCC.
- This type of method is not used in chimney, bridge, dam construction etc.
- High grade of concrete this type of structure is not used.

#### VI. LITERATURE REVIEW

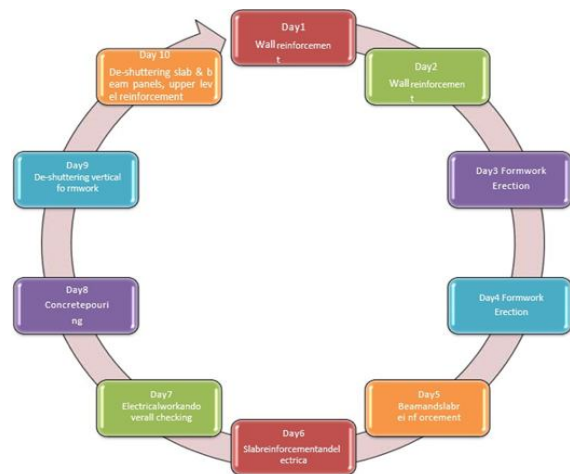
Prof. R. B. Bajare, Shubham Deshmukh, Ashwin Mahajan, Roohi Karnataki and Indrayani V. Patil (2017) have mentioned the remedies to common faced in the Mivan Technology. They have studied

on the deficiencies like Honey-combing, Cracks due to shrinkage in the concrete and segregation. Objectives of this study to increase workability of concrete, increase strength of concrete and reduces cracks due to shrinkage of concrete.

Sreenath. V, B. Prakash Rao, Anup Wilfred Sebastian and Chengappa K.K (2018) have studied on the analysis the suitability of modular aluminium formwork technology in a framed structure by considering the quality, speed of construction, labor requirement, cost of construction and other factors. They have conducted study on a project in Bangalore, Karnataka, India namely Salarpuria Sattva Divinity which comprises of a commercial (2B+G+5) and ten residential towers (G+21). A comparative study in between the Conventional RCC Framed Structure, Aluminium Formwork on RCC Framed Structure and Mivan Structure. The research defines the advantages and limitations of using modular Aluminium Formwork.

SS. Asadi and PV. Parneeth (2017) have done a comparative study on different types of formwork utilized in construction industry. This study shows advantages and disadvantages of different type of formwork used construction project. This study gives the method of selecting the best suitable formwork for the building. A questionnaire survey conducted in 22 major companies like L&T, SPRE, GDCL, NCC etc. Comparative study of formwork is based on various factors like Cost, Quality, Safety, Cycle Time etc in different regions like Mumbai, Chennai, Hyderabad, Banagalore and Pune.

#### VII. ALUMINIUM FORMWORK- PROJECT CYCLE



## VIII. METHODOLOGY

The methodology adopted in this study involves understanding the aluminium formwork system through design analysis, construction procedures, and review of practical applications.

### A. Components of Aluminium Formwork

- Wall panels
- Deck panels
- Beam and column panels
- Pins and wedges
- Brackets and props

### B. Construction Process

1. Preparation: Cleaning, oiling, and checking formwork panels
2. Erection: Assembly of wall, column, beam, and slab panels
3. Reinforcement Placement: Fixing reinforcement within formwork
4. Concreting: Pouring concrete using pumps
5. Dismantling: Removal of panels after achieving required strength

This systematic process enables rapid construction with consistent quality

## IX. ENVIRONMENT AND ECONOMIC ASPECTS

Aluminium formwork contributes to sustainable construction by minimizing material wastage and reducing the use of timber. Although the initial cost is high, the cost per use becomes significantly lower over multiple repetitions. Reduced construction time also leads to indirect cost savings, making aluminium formwork economically viable for large-scale projects.

## X. CONCLUSION

This study concludes that aluminium formwork shuttering is an efficient, cost-effective, and sustainable construction technique, particularly suitable for mass housing projects. It significantly reduces construction time, improves quality, and ensures uniformity in construction. While the initial investment is high, long-term benefits such as durability, reusability, and reduced labor costs make

aluminium formwork a superior alternative to conventional shuttering systems. The adoption of aluminium formwork represents a progressive step toward modern and sustainable construction practices.

## REFERENCES

- [1] K.Loganathan, K.E. Viswanathan, "on a study report on cost, duration and quality analysis of different formworks in high-rise building." International Journal of Scientific & Engineering Research, Volume 7, Issue 4, pp. 190- 195, ISSN 2229-5518. April-2016.
- [2] Nareshkumar Prajapati, Jayeshkumar Pitroda, Prof. Chetna M. Vyas, on " A Critical Literature Review On Integrated Framework For Assessing factors Affecting Human Resource Management In Construction," Journal Of International Academic Research For Multidisciplinary, Issn: 2320-5083, Volume 2, Issue 12, pp. 114-123. January 2015
- [3] Sandip.P.Pawar, P.M.Atterde, "on Comparative Analysis Of Formwork In Multistory Building, URET: International Journal of Research in Engineering and Technology. ISSN: 2319-1163, Volume: 03, Special Issue: 09, NCETCE-2014, pp. 22-24, June-2014.
- [4] Aniket S.Kadam, Akshay T. Kokare, Sanket B. Samukhrao, Sanman N. Sawant, Miss. Pritee Mistry, "on Cost Comparison & Effectiveness of Mivan Formwork over the Conventional Formwork." International Journal on Recent and Innovation Trends in Computing and Comunication, Volume: 4 Issue: 4, ISSN: 2321-8169, pp. 318-319, April 2016.
- [5] Miss. Patil Dhanashri Suryakant, Prof. Desai D B. "on Emerging Trends in Formwork Cost Analysis & Effectiveness of Mivan Formwork over the Conventional Formwork," IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), ISSN: 2278-1684, PP: 27-30.