

Comparative Analysis of Aluminium Formwork Building and Conventional Formwork Building based on Duration by using Line of Balance (LOB) Technique

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Abstract – India is the developing country where rapid development in infrastructure sector is more important. For that purpose using advance construction technique over the old or traditional construction techniques is important. For that purpose use of aluminium formwork by replacing conventional formwork system in the construction of mass housing projects like multi storey buildings, row houses projects etc. Aluminium formwork system not only save the money but also save time and complete project as early as possible. So, the aim of this paper is to prove that aluminium formwork system not only save money but also save lots of time. For that purpose we are going to use line of balance technique to compare aluminium formwork system and conventional formwork system for multi storey building.

Key Words: infrastructure, conventional, aluminium, housing, LOB.

1. INTRODUCTION

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 formwork like timber formwork, aluminium formwork, tunnel formwork. Aluminium 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. but in developing country like India its use is to rare and generally adopted conventional formwork which is made from woods which not environment friendly as well as not speedy construction technique. So to compare the both formwork system there are many criteria's like its cost, time, its reuse etc. for comparing this criteria's there are many techniques like CPM method , life cycle cost calculation, estimation, LOB. Line of balance technique can use to calculate completion time of the given project for both the methods.

1.1 Aluminium formwork

Aluminium formwork is also known as MIVAN formwork system. The Aluminium formwork system was developed by W.J. Malone, a Canadian Engineer in the late 1970's as a system for constructing low-cost housing units in the developing countries. Aluminium Formwork System is a construction system for forming cast in place concrete structure of a building. It is also a system for scheduling and controlling the work of other construction trades such as steel reinforcement, concrete placement and mechanical and electrical conduits. Its speed of construction is high, good finishing, re-use of this formwork is 250 to 300 times, and scrap value is more. But its initial investment is more and economical only for mass housing projects.

1.2 Convectional formwork

It is traditional formwork which is made up by timber and plywood which is not ecofriendly. It can be used in concreting work like beam, column, slab etc. this is traditional method and in India it is mostly use in all type of construction works. But it is time consuming method, reuse max. 50 times, finishing not good, need plastering, skill labour required, scrap value is also low. Its initial cost is less and only suitable for small construction works. Timber is the most common material used for formwork. The disadvantage with timber formwork is that it will warp, swell and shrink. Application of water impermeable cost to the surface of wood mitigates these defects.

1.3 line of balance technique

Construction projects like construction of multi-storeyed building, row house project, roads, laying of pipelines projects contains repetitive activities. E.g. construction of row houses project involves repetitive activities like earthwork, foundation structure, super structure, fishing etc. go on repetitive on each row house. For such type of projects effective technique of 'line of balance' (LOB) is used. It is management control process of planning i.e. it shows duration, activity and place of work or length of the project or stage of the project. In simple words LOB is use to determine time required to complete project at each stage and completion time of project.

2. METHODOLOGY

- 1) Determine activity involve in the project and its completion time.
- 2) Prepare a logic diagram which shows different activities such as earthwork, foundation, etc. and its duration.
- 3) Select a buffer time for each activity against the risk of interference between operations and draw the logic diagram with buffer time.
- 4) Draw the duration on X-axis and project no. like no. of buildings on Y- axis
- 5) complete the 'line of balance' (LOB) scheduling

After drawing the LOB scheduling for both aluminium formwork and conventional formwork compare both with each other.

3. LOB SCHEDULING

3.1 LOB scheduling for aluminium formwork

Following activities carried out in aluminium formwork

EARTHWORK

Site clearance

Line out

Excavation

FOUNDATION

Foundation reinforcement fixing

Formwork erection

concreting

plinth work

plinth filling

SUPER STRUCTURE

wall, column and slab reinforcement fixing-

formwork erection

checking and concreting

DE shuttering after

FINISHING

Flooring

Coloring

LOB FOR ALUFORM TECHNOLOGY



Fig -1: A Logic Diagram



Fig -2: A Logic Diagram With Buffer Time

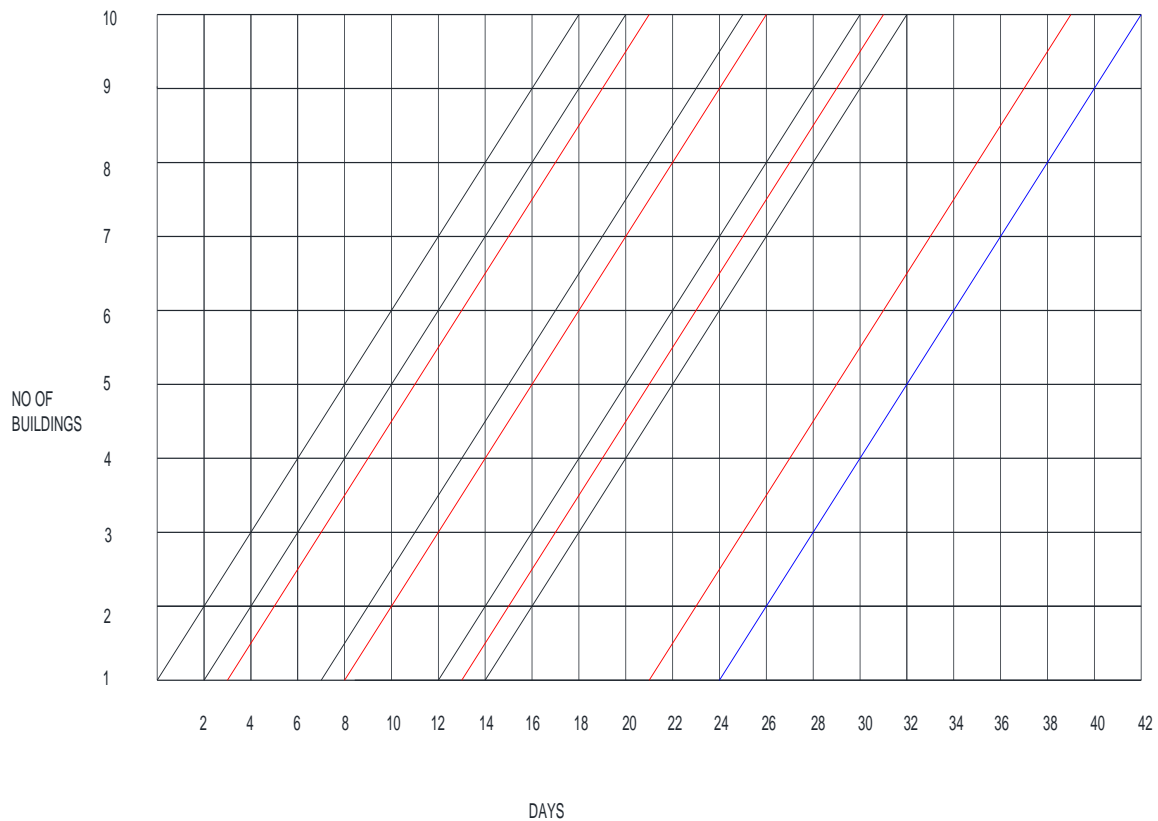


Chart -1: Lob Graph For Alu-Form Technology

Table -1: Duration Calculation For Each Activity For Aluform

Activity	START OF ACTIVITY(DAY)	END OF ACTIVITY(DAY)
Earthwork	1	21
RCC Erection	7	26
Formwork Erection	12	31
Concreting	21	37
Flooring	24	42

3.2 LOB scheduling for conventional formwork

Following activities carried out in conventional formwork

EARTHWORK

Site clearance

Line out

Excavation

FOUNDATION

Foundation reinforcement fixing

Formwork erection

concreting

plinth work

plinth filling

SUPER STRUCTURE

column reinforcement fixing , formwork erection and concreting

beam and slab reinforcement fixing , formwork erection and concreting

wall brickwork

Curing & DE shuttering after

FINISHING

Flooring

External and internal Plastering

Wall putty

Coloring

LOB FOR CONVENTIONAL FORMWORK



Fig -3: A Logic Diagram



Fig -4: A Logic Diagram With Buffer Time

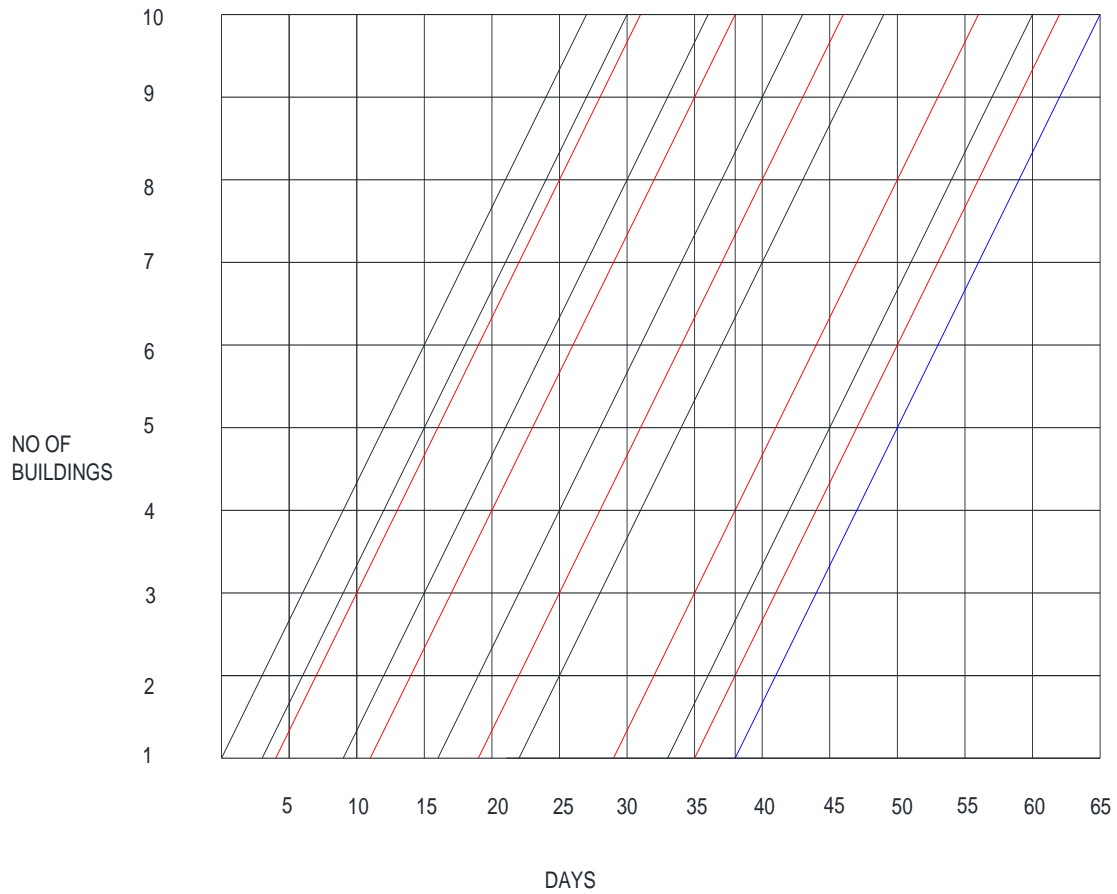


Chart -2: LOB Graph For Conventional Formwork Technology

Table -2: Duration Calculation For Each Activity For Conventional Formwork

ACTIVITY	START OF ACTIVITY(DAY)	END OF ACTIVITY(DAY)
Earthwork	1	31
Plinth And Foundation Work	9	38
Brickwork	16	46
Slab	24	56
Plastering	33	62
Flooring	36	65

Table -3: Duration Comparison Between Aluform And Conventional Formwork

	No. of buildings to be constructed	Completion time in days
Aluminium formwork	10	42 days
Conventional formwork	10	65 days

4. CONCLUSIONS

Formwork system plays a very important role in successful and timely completion of construction project. From the above comparative analysis it's clear that, Aluminium formwork is not only Cost effective but also time saving technology in comparison with Conventional Formwork. Aluminium formwork is better for use in the constructions, where Time saving formwork is necessary, than Conventional Formwork (specially mass housing projects). It can be useful in the developing country like India where repetitive type of mass housing projects is constructed.

So, from above table we identify that aluminium formwork complete the 10 houses project in 42 days and conventional formwork takes about 65 days. From above analysis it's clear that use of aluminium formwork is more time saving than the conventional formwork system.

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