

## Study of Value Engineering On Blockwork

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**Abstract**— Amongst all the crucial challenges faced by the developing countries, competent shelter for all people is one of those. The main objective of our research is to decrease the cost of building by using economical and advanced materials like AAC (Autoclaved Aerated Concrete) blocks and without affecting the strength of the structures. During building construction masonry work and plaster work are considered as one of the major aspects to reduce the construction cost. It was studied that at present both the cost effective and conventional techniques are available in housing construction field. Among those, the cost-effective technology has the upper hand of economy in construction. So, it can be said that cost effective technology can be taken as a permanent solution to overcome the severe housing inadequacy in the country.

**Keywords**— Catia Software, Estimation, Design.

### I.INTRODUCTION

During the early 70s and before, the technologies or techniques used in construction industry were not very advance, while constructing any structure we generally used M15 grade of concrete and grade of steel used was FE250 also the binding material used was lime. We can observe that earlier structures are more durable and having more strength as well as the quality of construction was also very high as compare to the present structures. For example, nowadays, the grade of concrete and steel use on construction sites generally ranges from M25 to M60 and FE415 to FE700 respectively. With so much of high strength concrete and steel used in today's industry, the required quality of construction as well as the strength is not satisfactory as compare to earlier ones. Now we have advance equipment's more advance technology but us lagging in quality. The question here is "Quality can be achieved without

increasing the cost of the project?" and by this project we will try to find out the answer of this particular question.

While doing internship we observe various problems which will directly or indirectly affect the Quality. Problems such as faulty Workmanship, Wastage of materials, Wrong practice, Lack of knowledge. Major problem which is affecting the Quality, Cost & Time is having wrong or improper knowledge of actual practice or correct practice. What we identified was not having the knowledge of standard practice among the workers as well as junior or sometime senior engineer.

### II.AIM

To shed some light upon the topic by studying the current practices and provide innovative solutions to improve Quality, reduce cost and time.

To implement the Quality improvement techniques on site.

To improve the workmanship of labor and increase their skill set.

To provide safe working environment for all stakeholder.

### III.OBJECTIVES

1.To study the on-site construction procedure of the activities.

2.To prepare the Standard Operating Procedure (SOP) for various construction techniques in RCC Frame structure.

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4.To prepare the checklist of the activities to improve the quality of construction.

5.To Study the delay analysis and try to find out the ways to overcome it.

6.To provide innovative solutions to improve Quality, reduce Cost & Time.

#### IV.METHODOLOGY

In this study, the research method used is observing the on-site execution of various construction activities, preparing the standard operating procedure (SOP), checklist for the activity and identifying the area of improvisation which will affect the Quality, Cost and time. Working with quality and knowledge one can reduce the time of the project at the same time can achieve the economy.

Following steps to be taken for achieving the above objectives:

1. Observing the various construction activities on site.
2. Preparing the Standard Operating Procedure (SOP) of construction activities.
3. Preparing the checklist.
4. Estimation of the activity or cost analysis of the activity.
- 5.Suggesting the improvisation techniques which can be practically possible as per the working conditions of site.

#### V.STANDARD OPERSTING PROSEDURE

##### STEP 1

Surface where the block is to be laid is cleaned either by broom or by wire brush depending on the type of unwanted material present on the surface. After cleaning the surface, a layer of mortar is placed to ensure the proper bond between the block and the surface of slab area where the block work is to be done. Mortar consists of fine aggregate, cement and suitable amount of water as per the amount of cement and fine aggregate also the

temperature and climatic conditions plays a vital role in the water content to be taken.



Fig -1: Laying ground mortar

##### STEP 2

After placing of mortar, Blocks are placed on the mortar and the gap between the blocks is filled with mortar only. Now a days ready-made mix of cement and fine aggregate is available in the market in a bag of 20kg only we have to add sufficient amount of water in it to ensure the proper workability of the mortar



Fig -2: Laying of block

##### STEP 3

Binding chemical is prepared by mixing chemical into water and having mix proportion of 2.5 part of chemical to 1 part of water. After pouring chemical into water the paste is mix thoroughly with the help of mechanical mixer. Mixer is electrically operated, which should be cleaned every time after mixing.



Fig -3: Mixing of chemicals

STEP 4

Placing of blocks in series with chemical as binding material up to half the level of total height of block work then a layer of mortar is placed having a reinforcement of 10 or 12 mm dia bar.



Fig -4: Placing of block

STEP 5

While placing the mortar use the optimizing technique (Wooden tool) to form the uniform layer of mortar and it's also consumed the time period of working without disturbing further process.



Fig -5: Laying Mortar by using Optimization technique

STEP 6

Placing the blocks above the layer of reinforced mortar paste up to the slab level or beam bottom level.



Fig -6: Block wall

VI.OPTEMAZATIONTECHNIQUES TOOL

By using CATIA software we made 3D model of wooden tool which is used in optimization techniques. This model size is 600\*240\*150. It forms the 12 mm uniform layer of mortar it is easy for handling after one time filling it will cover up to 2 or 2.5 blocks this wooden tool is very cheap and no other special equipment's or skills are required to make this wooden tool. Hence it optimizes the number of labour and time of construction.



Fig -7: Wooden tool (Optimization tool)

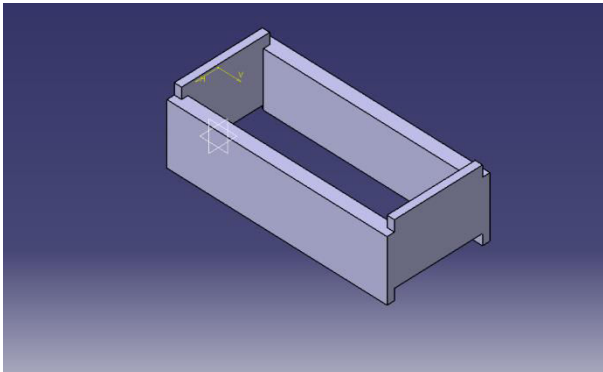


Fig -8: Upper diagonal view

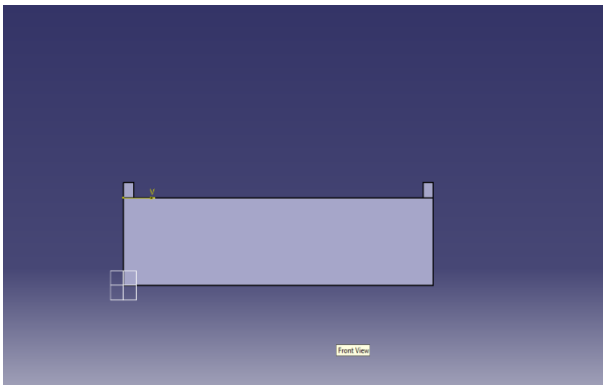


Fig -9: Front view

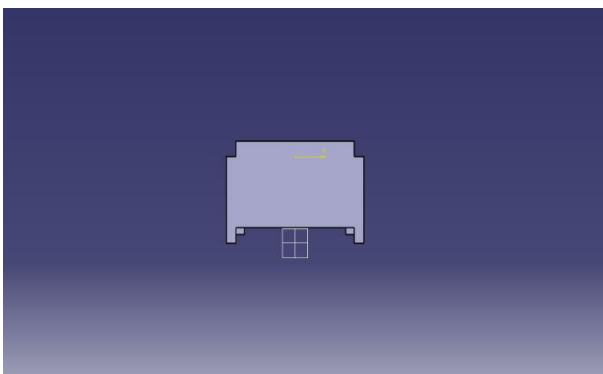


Fig -10: Side view

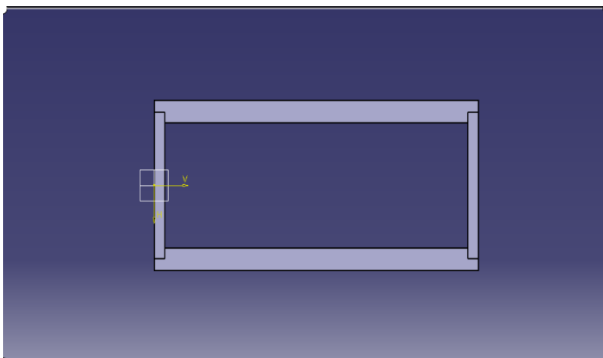


Fig -11: Up View

## VII. ESTIMATION OF BLOCKWORK

Size of block = 640\*240\*150

Cost of one block = 50 rupee/block

Area covered by each block =  $0.64*0.24 = 0.1536$  square meter

No of blocks required to completely empty one bag of chemical = 50 – 55 blocks

One mason can lay 120-130 blocks in a day

His working hour is from 9am to 6pm which is 9 hours a day in which reduce 1 hour of lunch and another 30min for his own stuffs. Now he has 7 hours and 30 min in a day (450 min a day).

Suppose he is laying 120 blocks in a day then the average time required to lay a brick is 3 min.

Area covered by one mason =  $120*0.64*0.24 = 18.432$  square meter.

Wage of a mason and a labor = 500+400 = 900 rupee

Chemical bag required for laying 120 blocks =  $120/50 = 2.4$  bags

From above data we can conclude that for 18 m<sup>2</sup> we are investing 900 rupees.

For 1 m<sup>2</sup> =  $900/18 = 50 = 50$  rupee

But if we increase one more mason, one labor can serve two masons easily. Our dead cost will increase to  $900+500 = 1400$ , our area covered will be doubled = 36 m<sup>2</sup>.

Now by increasing one mason our 1 m<sup>2</sup> cost will be =  $1400/36 = 39 = 39$  rupee.

**VIII. CHECK LIST FOR BLOCKWORK**

PRE-BLOCK MASONRY CHECKS				
Sr. no	Activity	Yes	No	Remarks
1	Has the contractor cleaned the slab surface before the center line of block work			
2	Center line marked is as per the architectural drawing			
3	Size of blocks as per the requirement			
4	Availability of chemical bag in sufficient no.			
5	Availability of mechanical mixer and supply of electricity is possible			
6	All concrete surface (beam and column) coming in contact with block work is to be hacked			
7	Proper arrangement is made to ensure the chemical – water ratio of mix			

During block masonry check				
1	Chemical mix prepared is as per standard and have optimum workability			
2	Block which is laid is crack free			
3	1 <sup>st</sup> layer is of mortar			
4	Block work should be in proper alignment with a systematic bond			
5	Dimension of room is checked once after laying of first layer.			
6	All the vertical joints must be staggered			
7	Sill level and lintel level is marked on the adjoining column			
8	Provision of door and window is made as per the drawing			
9	Construction of block work in one go should not exceed 1.5 m or half of floor-to-floor height			
10	Vertical plumb should be checked			
11	Reinforced mortar is placed after the half height of wall is constructed			
12	Size of windows and doors is as per drawing			



## IX. CONCLUSION

- To summarize, Standard Operating Practices (SOPs) is the most important document designed to provide proper control over all activities that will be executed by people who are engaged in every small activity of construction process from design to delivery stage.
- Through the SOPs we make an attempt to deliver quality workmanship with timely completion of project.
- As an indirect effect it helps to keep control on “over run of cost” due to delay in project. People who follow such established procedure have more confidence in their outcome that is expected.

## X. REFERENCE

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