

BIM - Solution for Ease of Working on Projects (SS & BS)

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Abstract— In this paper different type of benefits, process and main function of Building Information Modeling is discussed. This is basically consisting of estimation, costing, time required, design & planning. It also consisting of LOD; LOD means “Level of Development”. In which combination of Level of Geometry and Level of Dimensions takes place which facilitate easy work flow. Different models are provided in BIM likely 3D, 4D, 5D, and so on. By providing models BIM can produce much better results to work with ease on site.

Key words: LOD, Cost, Time, Models, Design

I. INTRODUCTION

BIM is great visualization tool. BIM provides complete look of project before starting it practically. It also helps to overcome failures which are going to occur while working on project. The main function is to provide easy access for getting information about changed plan layout, reinforcement, scheduling or any activity which is related to project work. It is beneficial for many streams of Construction Field such as Architect Engineers and Contractors for deciding time limit and estimating cost, time and material requirement.

BIM is cloud base system so it is very useful to give better output. This paper presents all solutions and advantages provided by BIM for any small scale and big scale project. Instead of co-coordinating manually it is very easy to coordinate with any engineer by help of BIM. Basic aim of this paper is to give proper solution using various software's.

In this paper proposed plan is drafted and scheduled with BIM which is small scale project sponsored by German Company Matrix Structures. Estimated cost and scheduling is the main thing to discuss. Now a days BIM is highly used in Construction industry for big scale projects. In this paper various effects of using BIM for small scale projects also discussed.

II. LITERATURE REVIEW

Y. Arayici, P.coates, L. Koskela and M. Kagiolou in May 2007 studied that BIM adoption and implementation for architectural practices. Conclusion of their study is, while project is being studied 3 to 4 stages taken by it. The practice of implementing BIM with in project reduced risk of duplication mis-interpretation of design. Also BIM improves streamlining process, providing collaborating practice and ensuring control. Also ensuring shearing documentation.

Salman Azer, Michael Heini and Blalke Sktea in year 2014 of month august had studied on BIM Benefits, Risks and Challenges. Conclusion out come is BIM emerging as an innovative way to manage project. Improves performance and outcome of construction. Use of BIM is able to accelerate comprehension with project team.

Tatjana Baros studied in the application of BIM technology and its reliability in the static load analysis and paper published in year 2016. Study said that BIM is a tool

used as solution for all type of problems. Analysis is used for monitoring structural loading, safety or stability. Softwares used in BIM creates clear picture by visualizing the static loading of the analyzed building.

III. OBJECTIVES

Use of a sole construction specifications standard for BIM by the project designers and the construction manager or contractors.

- Integration of different softwares
- Linking of budget and schedule on scale platform
- To know limitations of BIM for small scale projects.
- To find best solution for small scale projects.
- To obtain completion of project in proposed time with help of BIM.
- To study BIM 360 conveniently, efficiently, easily to learn and manage

IV. RESEARCH & METHODOLOGY

Project oriented management and learning of software's is carried out as basic concept for workflow, involving three important phases:

- 1) Planning
- 2) Execution
- 3) Monitoring and Controlling

Now a day's civil engineering field is widely spreading. Lot of work has been done related to design and modeling of structure. BIM uses different levels to facilitate ease of modeling and design of whole project. For this project different software's used likely Revit, Auto-cad and Stadd pro.

Benefits of using or implementing BIM project in construction projects are variously discussed and documented by many researchers. Basic benefits of BIM are Collaboration of project team and labors. It also reduces rework hence reduces time required to correct project work. Ease of doing project is one of the most basic benefit of BIM. BIM increases productivity of project. It also avoids clashes during working. BIM reduces error occurs in design, modeling, load analysis and actual working on site. BIM also facilitate engineers to get changed in any plan or design on site because of cloud base system. The concept of cloud base system is known as BIM 360.

BIM 360 is work place where any architect engineer, structural engineer or draftsman can change in proposed design, and BIM 360 gives notification to site engineer via what's app, E-mail or by using other shearing devices or apps. As it is cloud base system everything can be stored in form of documentation.

In the delivery of large projects it is very easy to tell or understand where BIM adoption is beneficial and time saving also more commercial clients are requesting BIM process and model information directly insisting on the use of standard procedures. As compare to big scale projects

benefits of small scale projects may not be clear when considering experience and knowledge, level of risk, and necessity of advanced technology for comparatively simple data around project delivery. Large projects are able to provide the capacity to invest in BIM or can hire BIM specialists. Small project have limitations over capacity to invest in BIM so basic aim of this study is to find way to use BIM for small scale projects with minimum investment. Time limitation, manpower are more parameters which has been considered in it.

BIM consists of levels which are known as "LOD" means level of detailing or level of development.

LOD is basically formation of "LOG+LOI" i.e. Level of Geometry and Level of Information. The basic concept of BIM levels is to adopt and go forth in a journey that has taken industry from drawing board to computer aided drawings and ultimately into the digital age. LOD is discovered by "Srin Soft" and it offers 6 numbers of LOD namely as Level 100, Level 200, Level 300, Level 350, Level 400, Level 500. Using LOD levels as industrial guide projects 3D model is done. And also analysis of the project is done. Basically animated or walkthrough of how project will look like and also how it will be going to work with in each stage of construction can be denoted.

In LOD different levels ranging from 100 to 500 are also known as follows:

- 1) Concept Design (level 100)
- 2) Schematic Design (level 200)
- 3) Detailed Design (level 300)
- 4) Construction Documentation (level 350)
- 5) Fabrication & Assembly (level 400)
- 6) As-Built (level 500)

1) *Concept Design - Level 100:*

As name indicates the basic concept of structure is figured out in this level. Basic Auto-Cad drawings and 3D models created for representation of project base stage in which parameters like Area, Height, Volume, Location and Orientation these topics discussed. Plan of proposed building is carried out with electrical, plumbing, structural, architectural drawings in AUTO-CAD.

2) *Schematic Design- Level 200:*

In this level elements of structure are modeled with approximate quantity. This work is done on the basis of area, height, volume, location and orientation. Non geometric quantities added. This work is done with help of Auto-Cad and Revit. Basic plinth beam and footing structure (layout plan) is carried in Auto cad which is then modified in 3D in Revit. In Revit PCC, Foundation, Plinth, Slabs, Beams and Columns are drawn. Also walls and excavation is shown.

3) *Detailed Design- Level 300:*

In this level accurate modeling is done. Level 200 and 300 carried out at same time. With help of accurate size and shape of each element 3D model of building is carried out. And each element is placed on their position with accurate size and shape. This whole work takes few weeks to complete.

4) *Construction Documentation - Level 350:*

As soon as level 300 completes level 350 starts. In this level whole work done on different software's is documented and stored to cloud of BIM 360's account where any engineer can change his drawings if necessary and also able to print document for field work.

5) *Fabrication and Assembly - Level 400:*

This level is basically for Industrial Buildings where fabrication takes place. In this level each small thing of element is mentioned. For fabrication work drawings are given to fabricators having weld thickness, length, element size shape, location of element. Each element is specified by number showing different levels work and position on plan and elevation. So it helps to worker and engineer to work easily on field.

6) *As-Built - Level 500:*

As said in above levels whole work is handover to site engineer for actual construction work and after this the whole site is given to owner.

B. *SCHEDULING:*

1) *LOD 100:-*

- 1) Line Plan
- 2) Layout Plan
- 3) Electrical Plan
- 4) Drainage Plan

2) *LOD 200:-*

- 1) Basic 3D modeling in Revit

3) *LOD 300:-*

- 1) Foundation Plan
- 2) Structural Plan
- 3) 3D Modeling and Analysis in Stadd pro
- 4) Designing of Frame Structure and Detailed Modeling in Revit

4) *LOD 350:-*

- 1) Documentation of all plans
- 2) Documentation of every detail drawing
- 3) Sanctioning of plans and approved documents

5) *LOD 400:-*

- 1) Application of ready mix
- 2) Paint
- 3) Assembly of Glass and Doors on field
- 4) Steel
- 5) Insulation
- 6) Walk-trough

6) *LOD 500:-*

- 1) Work is handover to owner

7) *SOFTWARE USED:*

- 1) Auto-Cad
- 2) Revit
- 3) Stadd Pro

8) *Auto-Cad:*

This is the first basic product of CAD Company which helps to design and draft. As BIM 360 is cloud base web service which provides teams access to data to improve decision making and to avoid expensive delays. Tool lets you to manage entire project until end. Autodesk BIM 360's main features include a controlled work sharing environment, design review and deliverable coordination. Auto-Cad 360 lets you access everything within decided team members.

9) *REVIT:*

Basically this tool is used by Architectural designer and MEP engineers. Also by contractors and builders uses this. It is one of the most popular software developed by the Autodesk. It is very useful for planning, designing. Most of the work is done on Revit of BIM 360. It is user friendly and provides better views, materials and designs. It also minimizes risk of errors

caused by miscommunication as all process goes through a single system.

C. The Benefits of Revit:

- 1) Interoperability: it functions together with members of an extended project team.
- 2) High impact 3D Visuals: the communication of ideas and design intent is delivered to teams and project members.
- 3) Multi Discipline Solution: built for disciplines such as architects, structural engineers, MEP engineers and construction professionals. \

V. OUTCOME:

A. 3D views of Plinth Filling and plinth beam structure in Revit:-



B. 3D view of internal portion of building in Revit:-



C. Plan of building in Auto-Cad:

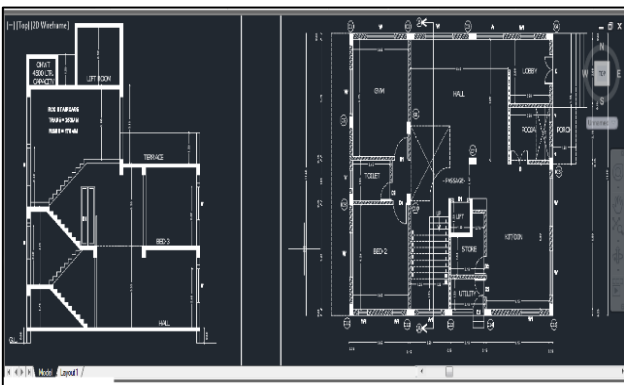


Fig. 5.4: Structural Plan of building in Auto-Cad:

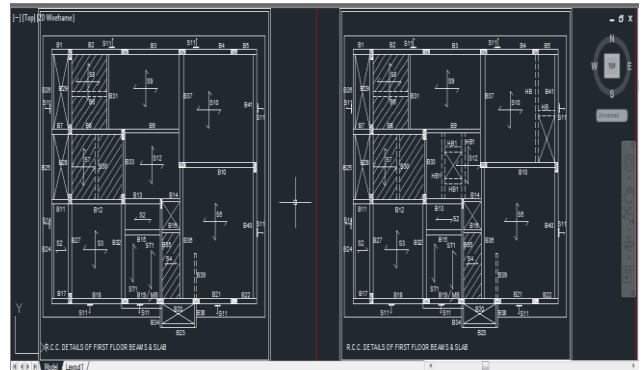
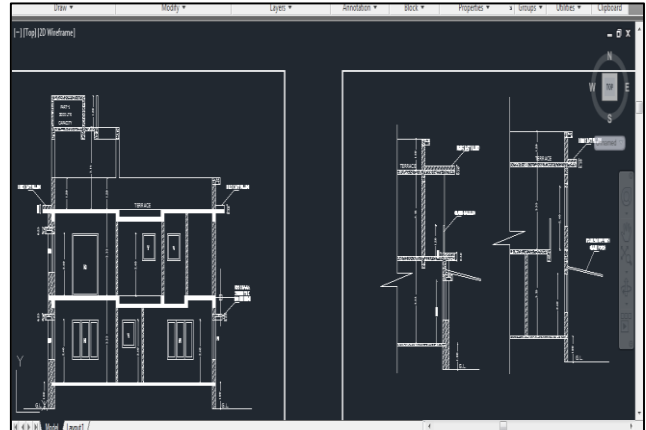
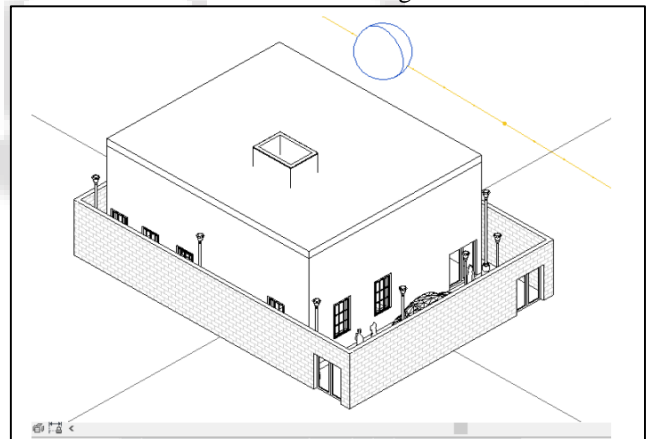


Fig. 5.5: Elevation of building in Auto-Cad:



5.6: 3D Model Rendering Process:-



VI. CONCLUSION

BIM helps to develop productivity in construction industry. At starting phase of any construction BIM reduces number of errors occurred during execution of project. Design and drafting level is increased. Ease of working with different teams like labors, engineers, designers. Using BIM active documentation can be done which is re-corrected whenever we want and no need to wait for update due to cloud base system. As it is cloud base system change in design is directly notified to supervisor engineer and Project Managers and to their team members. For Big scale projects BIM is widely used by many Architectural Engineers, Structural Engineers.

Also for small scale project BIM can be applicable but it has limitation of cost. As per survey engineers who are investing more than 30lakh are in favor of working on BIM. To implement BIM below this cost is not possible and may increase cost of project. As one engineer is to be on site for

whole time it is able to improve productivity and reduces time required to complete the project. Supervision and work can be done easily. Also material can be supplied in time as per scheduled.

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