e-ISSN:2582-5208
International Research Journal of Modernization in Engineering Technology and Science
Volume:03/Issue:06/June-2021 Impact Factor- 5.354 www.irjmets.com

ESTIMATION AND CLASH DETECTION OF COMMERCIAL BUILDINGS USING MSP AND REVIT

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ABSTRACT

BIM (Building Information Modelling) is an astute 3D model-based procedure that gives engineering, building, and development experts the knowledge and apparatuses to all the more proficiently plan, structure, build, and oversee structures and foundation. It has become a highly efficient solution for information management Architecture, Engineering and Construction (AEC) industry. BIM is used to design and document building and infrastructure designs. Every detail of a building is model in BIM. This technology helps in the effective organizing, rebuilding and Infrastructure the leading body of old city and structures through various BIM Techniques like Infraworks 360, Navis work, Revit, etc. The important BIM applications in various phases of the building lifecycle include design/modelling, clash detection, construction scheduling and cost estimation. In this paper we try to focus on the methodology involved in Estimation and Clash Detection using Building Information Modelling Technology meeting the following objectives:-

1. Understand BIM flow process for effective coordination with contractors, structural consultant and architects.
2. Prepare 6D model for G+6 Commercial Building which includes cost, quantity and schedule.
3. Check BIM process for quality management of Construction Industry.

This research involves case study of Commercial Building which consists of architectural and structural BIM models. In this case study commercial software like Autodesk Revit, Microsoft Project (MSP) are used and also focuses on simplifying and standardizing the process of BIM coordination using Autodesk Navisworks Software.

Keywords: Building Information Modeling, Clash Detection, Estimation, Quality Management, Aec Industry.

I. INTRODUCTION

A building information model is consisting of the 3D models of the project with links to all the required information connected with the projects planning and construction or operation. BIM is a 3D modeling which may involve 4th dimension as time (4D), 5thdimension of cost (5D) and information database of the project , 6D dimension is related to Facilities Management (FM) & 7D dimension is related Sustainability.

1.1 Need Of BIM-

In India, Lots of the architectural and engineering firms in India still depend on upon two- dimensional Computer-Aided Design i.e. CAD drawings. This usage of traditional methods neither expresses that the Indian designers are uninformed about BIM technology and its capacity, because of unskilled BIM users in the Indian AEC industry. In traditional method of clash detection when BIM wasn't around, AEC professionals used to burn mid-night oil for identifying mistakes in the 2D drawings. But even after doing a lot of hard work in detection of clashes before the starting of construction, architects and engineers used to find out design problems of high magnitude during final building procedure. Due to the failure of traditional method it is necessary to bring about a new way of working and thinking within the construction industry So that it requires implanting modern technology like BIM to improving in clash detection instead of traditional method.

1.2 Clash Detection-

In clash detection test it detects the conflicts between different elements within 3D Building Information Model before actually construction starts, and therefore time optimization in the construction schedule, reduce costs and change orders. By using clash detection application in AEC industry increase the productivity of design and construction project.

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1.3 Scheduling and Cost Estimation-

Accurate cost estimate and effective cost monitoring and control are essential elements to construction project success. As project progress, the process of construction monitoring and control gets more sophisticated, complex and challenging due to the huge amount of information that need to be measured and analyzed. An effective monitoring and control system should include a data management system to cover the large sets of data associated with the different project components. The complexity in the cost estimation and scheduling can be reduced and productivity and accuracy in work can be increased by using Microsoft Project (MSP) and Revit. This also eliminates the wastage of construction materials and helps achieve economy.

II. MATERIAL AND METHODS

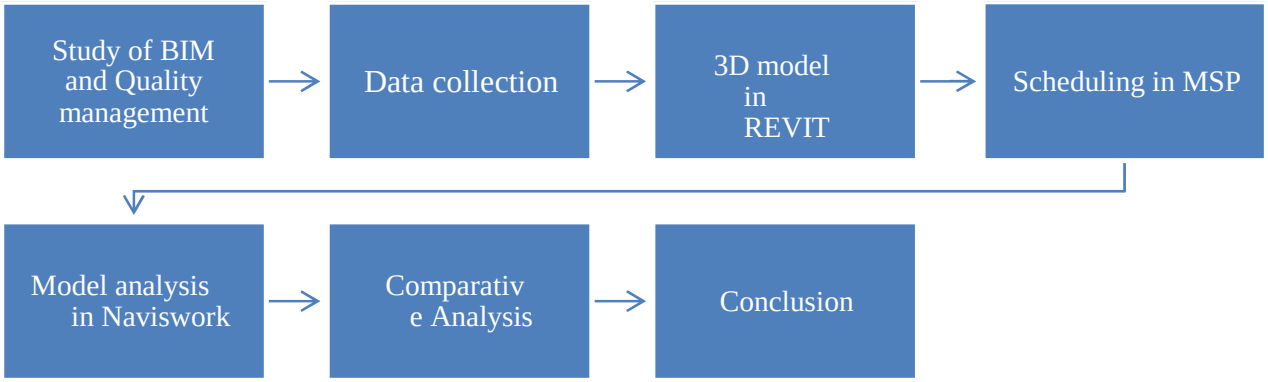

Fig.1 Flow Chart of Methodology

2.1 Data Collection-

In the case study, a G+6 Commercial building is taken under consideration which is located at Wakad, Pune and named as PRIDE PURPLE SQUARE. All the essential data like Office Floor Plan, Shop Floor Plan, all the amenities provided are collected. This collected data is further used for model preparation and scheduling as well as model analysis.

2.2 Preparation of 3D model in Revit-

1. Based on the data collected, the 3D model is prepared in REVIT using following steps- 1.Draw plan in Revit Architecture in Level 1.
2. Creating floor up to 6th level.
3. Draw plan in Revit Architecture in level 2 with column layout in 3D view. 4.3D view with wall, windows.
5. Final Elevation.
6. Render 3D view.

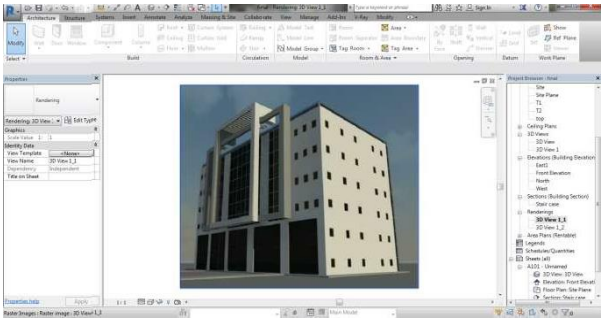

Fig.2 Final Rendered 3D model

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2.3 Scheduling in MSP-

Microsoft Project is the most commonly and efficient tool used for scheduling. The format of a Microsoft Project file is .mpp. It is one of the most commonly used PC-based project management tools, and is designed to assist managers in tasks such as:

1.Drawing Plans 2. Defining Resources 3. Assigning Task 4. Monitoring Workloads 5.Scheduling meetings

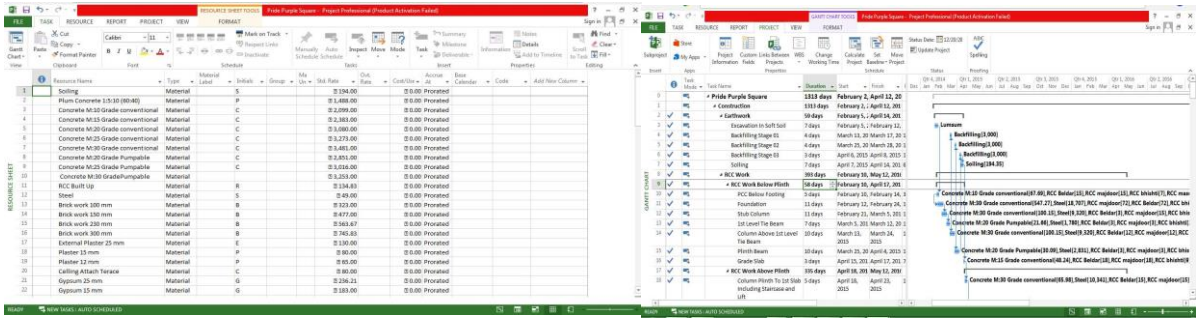


Fig.3 Preparing schedule in MSP **Fig.4** Resources in MSP

2.4 Clash Detection in Navisworks-

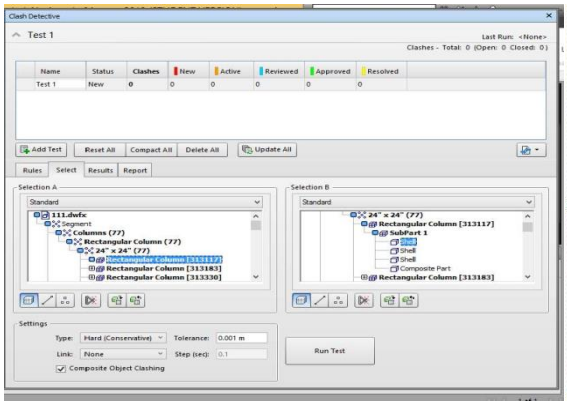
Autodesk Navisworks is used for analysis, simulation and coordination of project information. Following are the steps used for 6D modelling in Navisworks-

2.4.1 Convert 3D model of REVIT in .DXF file.

2.4.2 Open that .DXF file in Navisworks Manage.

2.4.3 Add schedule activities in time linear.

2.4.4 Clash Detection for different levels.



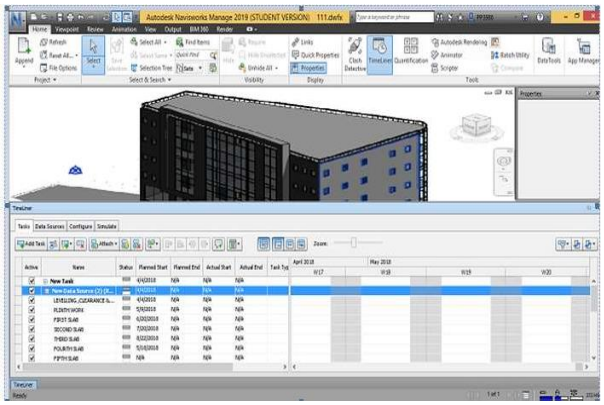
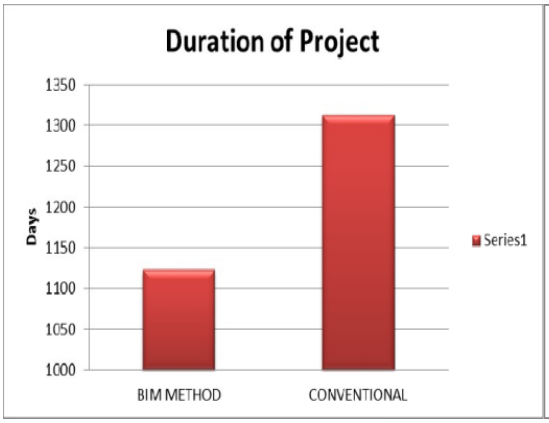


Fig.5 Naviswork Clash Detection **Fig.6** Naviswork Time liner



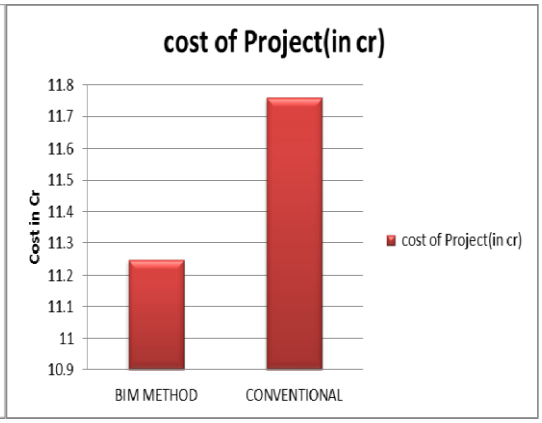


Fig.7 Duration of project **Fig.8** Cost of project

III. RESULTS

It is found that the duration of project was less when BIM methods implements as compared to conventional method. It saved approximately 190 days of construction. It is observed that cost of project when BIM method is implemented is less as compared to conventional method. It saved around Rs. 26 lakhs construction cost.

- It is found that the building is set out correctly on the site.(Demarcation with respect to layout plan).

IV. CONCLUSIONS

- A 6D model of G+6 building is prepared as per methodology of BIM as mentioned which includes 3D models, scheduling, quantity and costing.
- BIM process for quality management of Construction Industry is checked. It is concluded that it improves the management and quality of construction and the quality norms are satisfied.
- By understanding the BIM flow process it can be concluded that use of BIM makes the construction of modern day complex project much more convenient by reducing the complexity. Higher accuracy is achieved along with lesser construction period as well as lesser construction cost.

ACKNOWLEDGEMENT

We wish to express our deepest thanks to our project guide and lecturer **Asst. Prof. Sachin Nalawade Sir** for helping us with his valuable advice and ever ready support during making of this project. Without his counsel, keen insight and positive reinforcement, we wouldn't have been able to deliver our very best.

We Would also like to thank our Head of Civil Engineering Department **Ms. Amruta Kulkarni ma'am and** Principal **Dr. A.V. Patil ma'am** for the immense amount of support and showing faith in us.

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