

Building Information Modelling (BIM) applications

V.S. Birajdar¹, Aditya Sarangi², Kartik Adam³, Avinash Konda⁴,

PROF. V.S. BIRAJDAR., Dept. of Civil Engineering, SES Polytechnic, Maharashtra, India.

Abstract - Building Information Modeling (BIM) is a modern digital approach that transforms the way construction projects are planned, designed, executed, and managed. It involves the creation of an intelligent 3D model that integrates both graphical and non-graphical data, including dimensions, materials, cost, time, and performance-related information. Unlike traditional 2D drawings, BIM provides a comprehensive and dynamic representation of a building, enabling better understanding and decision-making throughout the project lifecycle.

One of the major applications of BIM is in the design phase, where architects and engineers can create accurate and coordinated models. This reduces design conflicts through clash detection, where issues between structural, architectural, and MEP (mechanical, electrical, plumbing) systems are identified before construction begins. As a result, errors and rework at the site are significantly minimized, saving both time and cost.

BIM also plays a crucial role in project planning and scheduling. With the integration of time (4D BIM), construction activities can be visualized step-by-step, helping project managers to plan sequences efficiently. Similarly, cost estimation (5D BIM) allows accurate budgeting by linking quantities directly to the model. This ensures better financial control and reduces the chances of budget overruns.

Another important application of BIM is in construction management. It enhances collaboration among stakeholders by providing a shared platform where real-time updates can be accessed by all team members. This improves communication, coordination, and transparency in the project.

BIM also helps in site logistics planning, safety management, and resource optimization.

Furthermore, BIM supports sustainability by enabling energy analysis, material optimization, and waste reduction. It helps in designing energy-efficient buildings and promotes the use of sustainable construction practices. In the operation and maintenance phase, BIM provides valuable data for facility management, such as maintenance schedules, asset tracking, and lifecycle management of building components.

Key Words: Smart Construction, Sustainable Infrastructure, Construction Automation, Project Management, Smart Cities

1. INTRODUCTION

Building Information Modeling (BIM) is a modern technology used in the architecture, engineering, and construction (AEC) industry to improve the way buildings and infrastructure projects are designed, constructed, and managed. It is a digital process that involves creating a 3D model of a building along with detailed information about its physical and functional properties. This information-rich model helps professionals to visualize the project more clearly and make better decisions at every stage.

Traditionally, construction projects were planned using 2D drawings, which often led to errors, miscommunication, and delays. BIM overcomes these problems by providing a single integrated platform where all project data is stored and shared. Architects, engineers, contractors, and project managers can work together on the same model, improving coordination and reducing conflicts between different components such as structural, architectural, and MEP systems.

BIM is not only limited to 3D modeling; it also includes additional dimensions such as time (4D), cost (5D), sustainability (6D), and facility management (7D). These features help in better planning, scheduling, budgeting, and maintenance of construction projects. By using BIM, it is possible to detect design clashes early, estimate quantities accurately, and simulate construction processes before actual execution.

1.1 BIM RESARECH BACKGROUND

BIM technology is an essential tool in project management due to its effectiveness in managing design-phase issues saving construction costs and wasted time. The facilities and above technology enabled a digital visualization of the the modelling of the necessary engineering data involved in the project, which includes parameter function, material properties, tables, quantities, and specifications, which are all stored with the prototype (one model with details, documentation, and comprehensive data) to levels of transparency for stakeholders and at all stages of the project. Implementing this method provides several advantages for project stakeholders (visualization, analysis options, sustainability, verification of quantities, cost estimation, site selection, representation of the schedule in a 4D model, and maintenance). These studies provide an overview of this technique's purpose in construction planning. Then there are the following priorities



Fig -1:- Schematic diagram showing the applicability of BIM in different domains of the industry.

2. 2. AUTODESK REVIT

Autodesk Revit is a building information modeling software for architects, structural engineers, MEP engineers, designers and contractors. It allows user to design a building and structure and its components in 3D, annotate the model with 2D drafting elements, and access building information from the building model's database. Revit is 4D BIM capable with tools to plan and track various stages in the building's lifecycle, from concept to construction and later demolition.

2.3 PROCEDURE

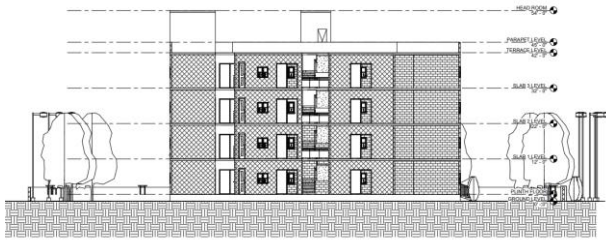
- 1.Starting a New Project in Revit
2. Setting Up Project Units
3. Creating Levels (Floors)

Steps:

- i. Go to Elevation View
- ii. Select Level Tool
- iii. Draw horizontal lines
- iv. Rename levels:

Ground Floor

First Floor



4. Creating Grid Lines

5. Drawing Walls

Steps:

- i. Go to Architecture
- ii. Select Wall Tool
- iii. Choose wall type
- iv. Brick wall
- v. Draw walls using:

- a. Line
- b. Rectangle

6. Adding Doors

Steps:

- i. Select Door Tool
- ii. Choose door type
- iii. Click on wall to place door

Adjustments:

Width

Height

Position



7. Adding Windows

Steps:

- i. Select Window Tool
- ii. Choose window type
- iii. Place on walls

Important Points:

Maintain proper height (sill level).

Ensure ventilation.

8. Creating Floors (Slabs)

9. Adding Roof

10. Creating Stairs

11. Adding Columns

Steps:

- i. Select Column Tool
- ii. Choose structural column
- iii. Place at grid intersections

12. Applying Dimensions

13. 3D View Creation

Steps:

- i. Click 3D View
- ii. Rotate model
- iii. Visualize building

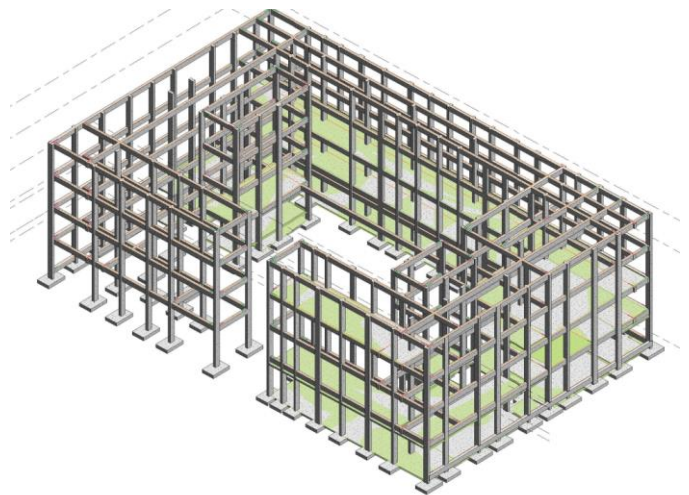


Fig -2:- Column and Beam

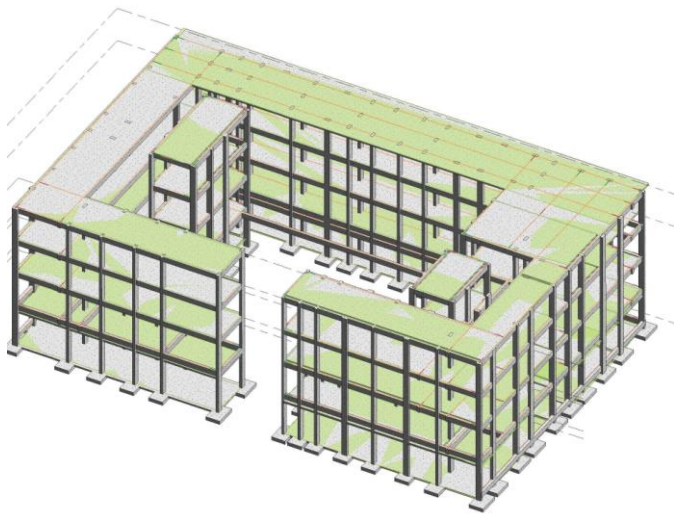


Fig -3:- Slab



Fig -3:- Final View

3. CONCLUSIONS

This research has explored the profound impact of Building Information Modeling (BIM) and modern civil engineering, highlighting their collective role in driving digital transformation, enhancing project outcomes, and addressing industry-wide challenges.

REFERENCES

[1] **Eastman et al. (2011)** defined BIM as a digital representation of the physical and functional characteristics of a building. According to them, BIM provides a shared platform where all stakeholders

can access and update project information. This improves coordination and reduces misunderstandings among project participants.

[2] **Succar (2009)** explained that BIM is not just a software tool but a complete process that enhances collaboration among architects, engineers, and contractors. He emphasized that BIM helps in sharing accurate information throughout the entire lifecycle of a project, from design to construction and maintenance.

BIOGRAPHIES

	<p>Aditya .K. Sarangi. Dept :- Civil Engg</p>
	<p>Kartik .A. Adam Dept :- Civil Engg</p>
	<p>Avinash .G. Konda. Dept :- Civil Engg</p>