



## Review on Building Information Modeling (BIM) for Structural Design

Priyanka P <sup>a</sup>, KRP Satheesh Kumar <sup>b</sup>

<sup>a</sup> Student, Kumaraguru College of Technology, Coimbatore, India.

<sup>b</sup> Assistant Professor II, Kumaraguru College of Technology, Coimbatore, India.

### ABSTRACT

This study reports and discusses a quick review of the literature on how building Information Modeling BIM is useful on Structural design concept and their methods of execution, also studies on implementation of architectural model to Structural design model and their difficulties in execution. These literature for BIM in structural design is discussed.

**Keywords:** BIM model, Revit software, Model transfer, potential error, data transfer using plugin, connections.

### 1. Introduction

Building Information Modeling (BIM) is an intelligent, 3D model- grounded process that helps structural professionals to design, detail, document, and fabricate structural systems. BIM enables project teams to work more collaboratively—helping to optimize designs, improve accuracy, and connect design to fabrication to deliver projects faster and more efficiently. Using BIM, structural engineers can make more informed design decisions, automated construction documentation and produce more accurate, constructive design. BIM helps structural engineers optimize and automate designs, reduce errors and risk, and improve accuracy and constructability, while improving overall project delivery.

### 2. Previous Studies on Building Information Modeling

**Tofigh Hamidavi, Sepehr Abrishami, et. al, (2020)** This paper works with linking architectural models with those of structural masterminds remains labour- ferocious and clumsy. It provides an automated procedure, computational details and the configuration of toolsets in the form of a evidence of conception( PoC) prototype that, binds architectural models with structural bones for altitudinous structure. Designed for altitudinous structure to incorporate immense complexity, the result acts as a design in developing analogous system for simpler structures.

**Alcnia Zita Sampaio, Tomas Farinha, et. al, (2021)** This paper study aims to estimate the degree of interoperability between the BIM- grounded platforms, ArchiCAD (Graphisoft), Revit( Autodesk). The study analyzes the processes of generation, transposition, and verification of the structural BIM model, throughout different stages of the design development.

**Juan Carlos Vielma, Rodrigo F. Herrera, et. al, (2019)** This paper works on the conditions for the relinquishment of BIM have been detailed and BIM- concentrated workflow, protocols, and other specific rudiments necessary for the success of the perpetration, this paper shows how BIM should be enforced in methodological terms, given that it's considered essential in the success of the objectification of BIM.

**Augusto M. Gomes, Alcnia Zita Sampaio, et. al, (2022)** The study demonstrates that BIM can be used in the development of a structural design, with applicable positive benefactions. The analyses of the interoperability limitation associated with software used. The BIM model contains parametric objects with several attributes, and this fact allows the manipulation and association of information in order to gain delineations and the birth of amounts. In addition, whenever there's a change in design, all the information is streamlined, and no primer revision is demanded.

**Bedilu Habte, Eyosias Dawit Guyo, (2021)** The study demonstrates how all structural design conditioning can be integrated with each other and how cross- discipline collaboration with the engineers can be achieved through the relinquishment of BIM. As a demonstration, a sample structure is modelled using Revit along with conventional structural software packages ETABS and SAFE. Modelling, analysis, design and disaccord findings were eased by applying BIM.

**Guidlines of ISO19650(2018) Part-1** Organization and Digitization of Information about buildings and civil engineering works, including building information modelling (BIM)-Information management using building information modeling. Part-1 explains about concepts and principles about BIM in International standards. This document is applicable to the strategic planning, initial design, engineering, development and also to address the implementation.

**Erhan Cekin, Senem Seyis, (2020)** The exploration ideal of this study is to develop and apply a BIM prosecution plan( BEP) grounded on BS EN ISO 19650- 1 and BS EN ISO 19650- 2, and identify the benefits of using BS EN ISO 19650 norms in the BIM- grounded construction systems. This study

makes a significant donation to the AEC literature and assiduity by presenting the development and perpetration process of a BIM prosecution Plan grounded on BS EN ISO 19650- 1 and BS EN ISO 19650- 2 norms, and benefits of BS ISO 19650- grounded BIM systems. This study will promote the use of ISO 19650 norms in the BIM- grounded construction systems.

---

### 3. Observation from Literature Review

These Literature mainly focus on demonstration of BIM that can be used in Structural design and its benefactions. It provides an automated procedure, computational details and the configuration of toolsets in the form of a evidence of conception( PoC) prototype that, binds architectural models with structural model for altitudinous structure. The focus of implementing Architectural design to Structural design model in order to make it more convenient as it can collaborate with different software used for designing and detailing.

#### *Building Information Modeling for Structures*

It integrates multi- disciplinary data to create detailed digital representation and are managed in Open Cloud Platform for real time collaboration. It is the CDE that is the key to the collaborative production of an information model, as it allows graphical models, asset data and documentation to be coordinated and managed effectively throughout the life of the asset. The structure model is used for the complete product of construction documents and (since it's computable) can be used for different types of analyses. The value of using BIM for structural design becomes clear when comparing and differing the traditional structural workflow and a workflow supported by a structure information model.

The paper works to explore current practices and identify the critical effects of BIM on collaborative design and construction, understandings of BIM perpetration on collaborative design and construction and adopted the grounded theory to analyze the qualitative data.

---

### 4. Conclusion

We can conclude from some of the explanation in this document.

- To address the challenges with implementing BIM to the structural design concept and their difficulties in executing and documenting the details of structural design model.
- Effectively transferring model and managing its document coordination throughout the life of asset. It analyzes the processes of generation, transposition, and verification of the structural BIM model, throughout different stages of the design development.

### References

---

- [1]. Tofigh Hamidavi, Sepehr Abrishami, et.al, "Towards Intelligent Structural Design of Building: A BIM-based solution."., Journal of Building Engineering, July 2020.
- [2]. Alc nia Zita Sampaio, Tomas Farinha, et.al, "BIM Methodology Applied in Structural Design: Analysis of Interoperability in ArchiCAD/ETABS Process" Journal of Software Engineering and Applications, 2021, 14, 189-206.
- [3]. Juan Carlos Vielma, Rodrigo F. Herrera, et.al, "Methodology for Building Information Modeling (BIM) Implementation in Structural Engineering Companies (SECs)" Advance in civil engineering 2019(13):1-16.
- [4]. Augusto M. Gomes, Alc nia Zita Sampaio, et.al, " BIM in Structural Project: Interoperability Analyses and Data Management" advance in civil Engineering, 2022.
- [5]. Bedilu Habte, Eyosias Dawit Guyo, " Application of BIM for Structural Engineering: A case study using REVIT and Customary Structural Analysis and Design Software" Journal of Information Technology in Construction ,2021- ISSN 1874-4753.
- [6]. Guildlines of ISO19650(2018) Part-1
- [7]. Erhan Cekin, Senem Seyis, "BIM execution plan baesd on BS EN ISO 19650-1 and BS EN ISO19650-2 standards" 6<sup>th</sup> International project and Construction Management conference at Turkey, 2020.
- [8]. Cesar Augusto Hunt, et.al, " The Benefits of Using Building Information Modeling in Structural Engineering" Utah State University Libery, 2013.
- [9]. Tatjana Vilutiene, et.al, "Building Information Modeling (BIM) for Structural Engineering: A Bibliometric Analysis of the Literature", Advance in Civil Engineering, volume-2019.
- [10]. Structure Design supported by BIM Methodology: Structural analysis and Detailing of Reinforcement , Borges, 2018.