

Scheduling of Steel Structure Through Bim Modelling Using Softwares: A Review

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Abstract- A “BIM” characterizes the geometry, spatial relationship, geometric information, quantities and properties of building elements, cost estimation, material inventories, project schedule model describes the entire building life cycle. As a result, quantities and readily material can be extracted. Construction documents such as drawing, procurements details, submittal processes and other specifications can be easily interrelated.

It is important to note that BIM is not just software; it is also process and software BIM means not only using 3D intelligent models but also making changes in work flow and delivery process. BIM represents new paradigm, one that encourages integration of roles of all stakeholders on a project. It has the potential to promote greater efficiency and harmony among players who, in the past, saw themselves as adversaries. BIM also supports the concept of integrated project delivery approach to integrate people, systems, and business structures and practices into a collaborative process to reduce waste and optimize efficiency through all phases of project life cycle.

Keywords- Earthquake, Elevated water tank stand, Non-linear Time history analysis, Seismic analysis, Seismic demand, Tekla.

I. INTRODUCTION

The construction industry has experienced a gradual decrease in its labour productivity since 1960's. In a meantime, non-farm industries such as manufacturing industry have increased their labour productivity. The reduction of labour productivity in construction industry requires more labour hours per contract amount. This indicates construction industry is lacking the development for labour saving ideas.

The main cause of lack of productivity in construction industry are related to its fragmented nature due to tradition projects delivery, approach, traditional use of 2D Computer Aided Drafting (CAD) technology and size of construction firms. The traditional construction projects delivery approach, Design – Bid – Build, roles of participation

during design and construction phases. The architectural, structural engineers have long techniques to decrease the project costs and increase productivity and quality and reduce delivery time BIM simulates the construction projects in virtual environment. With BIM technology, an accurate virtual model of building is digitally constructed. When completed, BIM contains geometry and relevant data needed to support the design, procurement, fabrication and activities required to realize the building. After completion, it can be used for maintenance purpose.

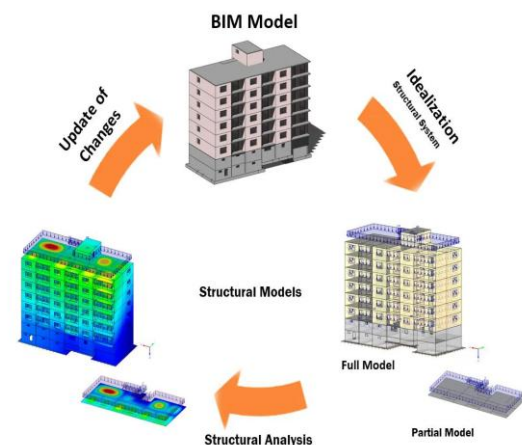


Fig 1: BIM Model

II. LITERATURE REVIEW

Abhijeet Dhalwar and S.P. Tak (2022) objective of the research paper was to investigate the seismic behavior of vertical irregular steel structures with various seismic resilience. Setback vertical irregular Multistorey steel structures were consider for the Nonlinear Time-history analysis as per seismic zone V. The multistorey pre-engineered steel structure was evaluate by analytical by using software SAP 2000 v23. Nonlinear time history analysis was suitable for these multistorey complex structures. Peak ground acceleration (PGA) data was required for the evaluations.

Seismic Analysis Multistorey Steel Buildings with geometric irregular without any resilience show variation in the results base reaction and Joint displacement in a structure

where the area of the floor is changed. Conclusion stated that the efficiency of the vertical irregular steel structure is increased in structure with with base isolation, base isolation is suitable of structure in zone-V.

Aradhya Anna Alex and Chaithra S (2022) research paper illustrated the effect of new bracing configuration with existing x bracing configuration. The seismic analysis of the structure has been carried out using ETABS Software. Steel building of 25 storeys (G+25) with the same floor plan of 6-6m bays along the longitudinal direction and 6-6m bays along the transverse direction is modelled without bracing, with x bracing configuration and with crisscross bracing. Response Spectrum Analysis was performed by using the ETABS software.

Results stated that a proper lateral load-resisting system is required to increase the lateral strength and stiffness of high-rise buildings. Two types of bracing ie. X-bracing and crisscross bracing are used as a lateral load-resisting system which reduced lateral displacement from 196.7 mm in the bare frame to 23.4 mm but increased base shear from 1056 KN to 1683 KN which is not a desirable situation. In an overall comparison of the bare frame and bracing system, the frame provided with a crisscross bracing configuration has good structural performance as compared to other systems.

Abhijeet S. Kulkarni et.al (2021) objective of the research paper was to understand the uses and benefits of BIM for construction managers and examine BIM based scheduling. There were two objectives to this project. First was to identify the current uses of BIM in the Architectural / Structural / Engineering / Construction / Facility Management industry to better understand how the BIM- based “build to design” and “design to build” concepts can be used by construction managers under the Construction Management at Risk project delivery system. Secondly focus was placed on analyzing 3D BIM as well as BIM based scheduling.

The conclusion concentrated on the deployment of the model to support planning, scheduling of the operation in India. BIM save our time and money, not only during the design and construction of building, but through its entire lifecycle. BIM as its core, is not just software but a human activity that ultimately involves broad process changes.

G. Khandeshe and Dr. S. S. Angalekar (2021) in the research paper, 15 storey steel building model was used with same configuration with different bracing systems such as X brace, V brace, K brace, Knee brace and O grid brace. A commercial software ETABS 2015 was used for analysis purpose. Results were obtained by considering the parameters

base shear, fundamental time period and top floor displacements of steel structures.

Results stated that the type of bracing, weight of frame, number of floors and site condition affect the base shear values. Base shear of building with bracing system increased as seismic weight of building is increased. Results concluded that bracings are a good solution to decrease the roof displacements of frames. X-bracing system has high elastic stiffness and low displacement and MRF has low elastic stiffness and high displacement. Knee bracing system has showed high displacement. The new O Grid bracing systems have appropriate vibration period, appropriate elastic stiffness and appropriate displacement.

Harish K Singh and Ganesh Jaiswal (2021) objective of the research paper was to analyze the seismic behavior and performance of the g+30 story steel structure (building) and compare with the best performance with x-bracing and shear wall. In order to find out its viability for high-rise construction. In this structural analysis of G+30 story steel frame, with two other frame using x-bracing at all faces at corner, in one steel frame and shear wall at corner on other steel frame. All the members of the framed section was designed as per IS456:2000, IS800:2007 and load combination for seismic force were considered as per IS1893(Part-1):2016 and the modelling and analysis was done using TEKLA.

Results stated that maximum story displacement and story drift of the structure lies within the permissible value as per IS1893(Part-1):2016. While comparing the specified parameters, it was found that the shear wall and X-bracing frame structure performing better than the simple framed structure and xbracing frame structure thus it can be consider to be more effective for high rise construction. From all the four-models shear wall and X-bracing structure gives less required value of story displacement and story stiffness compare to other models.

K. H. Prasad et.al (2021) 3E-Analysis (Edifice-Energy-Estimate) is start ball rolling in the analysis along with BIM application. Importance of Laminated glass windows, Wood-plastic composites, Autoclaved Aerated Concrete blocks were utilized in the project and the estimation for the construction G+1 building in the zone of Andhra Pradesh, southern India was explained. Due to the hot climatic zone, scantiness of water is another major issue addressed, so the water harvesting for the building is also essential along with the installation of a solar power panel to use the optimized sunlight energy for the building. Design of structure & Estimation of quantity of material and it is cost of the Building will be done in REVIT SOFTWARE [1-2] a BIM Tool.

Results stated that design cost of building was overall 45Lakhs. At the day of a head, it was helpful to economical charges was reduced for the building in day to day of life.

Ni Zhandong (2021) in the research paper, the beam end supporting conditions of steel frame nodes are regarded as elastic supports, and the energy method and finite element analysis methods are used to study the overall stability of steel frame beams under various load conditions. The article verifies the performance of the proposed BIM-based node stability analysis method only through the structural node model and an actual project, and the results are good, which can effectively reduce the conservative ultimate bearing capacity of the fabricated high-rise steel structure. Calculation amount and calculation time. When the horizontal load is increased, the horizontal displacement of the structure occurs, and with the continuous increase of the load, the corresponding horizontal displacement of the node gradually shows a linear increase trend until it reaches the limit state.

IV. CONCLUSION

The logical research papers were identified and summarized who have primarily focused on analysis of steel structure considering different analytical applications where different parameters were considered for the analysis namely base shear, storey shear, bending moment, axial force and storey displacement. Implementation of softwares is found beneficial in order to develop a relation between software and practical condition.

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