IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 4, April 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 4, April 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1004105|

Comparative Study of Analysis & Design OG RCC Building by Manual Method and STAAD Pro

Chavan Asmita Dhananjay[1], Mane Radhika Ramesh[2], Joshi Shruti Sunil[3], Jadhav Saishree Sunil[4]

Final year Student, DKTE Society Yashwantrao Chavan Polytechnic, Maharashtra, India

Abstract: In this project we want to show the comparison of structural analysis and design by both methods.

- Our aim for this project is in structural analysis and design is to construct a structure capable of overcoming all applied loads without failure during it's intended life.
- The process of structural design involves many steps such as computation of loads, member design, detailing and many more.
- Computer aided design of residential building by using STAAD Pro.
  Includes- 1) Creating structural framing plan

  2) Getting model

  3) Analysis of structure.

  4) Design of structure.

I. INTRODUCTION

STAAD Pro.has a state of art user interface, tools for visualization, well built analysis and design software with advance finite element and capable of dynamic analysis. From generation of model, analysis and design to visualization tools and results will be verified. STAAD PRO is a common choice for steel, concrete, aluminum and cold-formed steel design of multistory buildings, factories, tunnels, bridges and much more.

Objectives-

1. Generation of structural framing plan

2. Creation of model of structure in STAAD Pro.

3. Application of various loads combinations on the member

4. Analysis of the structure

5. Design of the structure

II. METHODOLOGY

A) To model the residential building using STAAD Pro software and analyze the same structure using STAAD Pro.
B) To analyze the residential building and structural elements like beams, stairs, columns, slabs
C) To design the residential building using STAAD Pro – To design the structural elements like beams, stairs, columns, slabs using software

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III. LITERATURE REVIEW

1. **To study analysis and design of Multi storey building using STAAD Pro. And comparing with manual calculations. (VaishanviDeshmukh published in 26May 2020)**
   The author states that Analysis and design of G+4 story residential building structure by using IS code method.

From this paper we understand that how to plan a residential building properly in accordance with National building code of India.

In this project, the design of slab, beam, column, staircase, etc. is calculated by "limit state method" using IS: 456-2000 code book. Different load active on the member are consider according to IS: 875-1987 (part 1, part 2, part 3).

2. **Comparative study of design of multi-storey Residential building by manual and STAAD Pro software Analysis case of G+3 (NirajRanpara published in 30April 2021)**
   The author states that In both methods where will be the actual comparison made.

To refer this paper we will know the actual comparison will be made on the shear, bending moments, steel areas.

To give a safe, serviceable and durable structure there are some basic working principle element of an RC building frame:

1) Slabs to cover a big portion.

2) Beams to support slabs and walls.

3) Columns to support Beams, etc.

3. **Analysis, Design of Multi-storey building by using STAAD Pro V8i (published by A. D. Bhosale in April 2018)**
   The author states that In STAAD Pro software design of RCC and steel both are done and it is easy to use for analyze and design any structure for more accuracy.

To refer this paper we will know STAAD Pro is fast and accurate structural design software. It also provide economical design of the structure. And the difference in steel error is due to human error.

Because of increase in population it is necessary to construct the high rise building. We also use only manual method for design but it leads to human error, So it is necessary to use of software for getting more accurate result.

4. **Analysis and design of a Multi-storey building by using STAAD Pro. (published by Adhiraj A. Wadekar in April 2020)**

Author states that STAAD Pro gives a detailed value of shear force, bending moment and torsion of each element of the structure which is within IS code limits.

To refer this paper we will know that For the planning of the structure, the self-weight, imposed load, load due to wind and seismic load are considered with load combination and To analysis of building is figured by manual also simultaneously it has been checked through STAAD Pro.

Due to huge population growing and the absence of land, people have shifted from rural to urban areas and are currently building large-scale houses in small areas. So we have to use the standards to improve safety and to ensure the balance between economy and safety. A structural style creates a structure that is safe, functional and durable, technical, economical and simple. To be able to carry out a precise analysis, the structural loads, the support conditions and the intensive properties must be determined.

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5. **Analysis and design of Residential building (G+1) using STAAD Pro. (published by AnkurChauhan in Oct-2020)**

In this paper the planning of residential building is completed by limit state Analysis. Author wants to find the structure safe in deflections, stresses, loads and Moments. And also states the different loading conditions with different cases.

To refer this paper we will know that the practical knowledge is an important and vital skill required by every engineer. And also study the different loading conditions with different cases.

6. **Analysis and design of g+7 residential building using STAAD Pro software (Published by Mahesh Pawar in 2021)**

The author states that a complete design of main structural elements of a multi-storied building including slabs, beams, columns and footing.

To refer this paper we will know that short term deflection of all horizontal members is within 20mm and the structural components of building are safe in shear and flexure.

In this project STAAD Pro software is used because of its advantages easy to use interface, confirmation with the Indian standard codes, versatile nature of solving any type of problem, accuracy of the solution, etc.

7. **Analysis and design of G+10 Apartments building using STAAD Pro. (Published by Department of chemical engineering, University of port Harcourt, Port Harcourt, Nigeria in 2021)**

Author states that the main objective of this project is to analyze and design a G+10 multi-stored building using STAAD Pro.

To refer this Paper we will know that the dimensions of structural members are specified and the loads such as dead load, live load, floor load, seismic load, wind load and Earthquake load are applied. Deflection and shear test are checked for beams, columns and slabs.

IV. RESULT

BEAM:

SR.NO	METHOD	LOAD	Ast	SPACING
1	STAAD PRO	13.925	459.0	125
2	MANUAL METHOD	9.568	284.832	258

COLUMN:

SR.NO	METHOD	LOAD	Ast	SPACING
1	STAAD PRO	350	135	195
2	MANUAL METHDO	480	175.60	190

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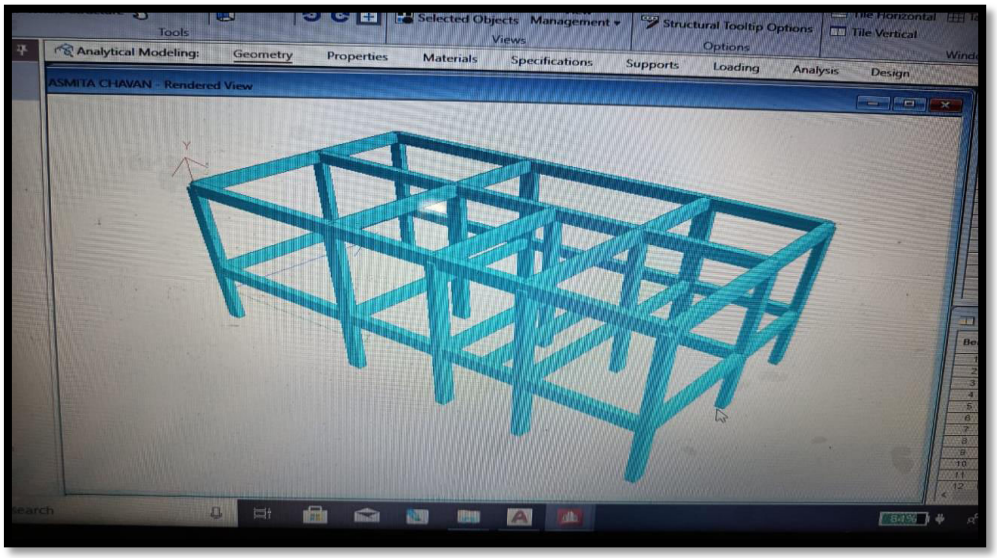

Fig. 1- Grid of RCC building

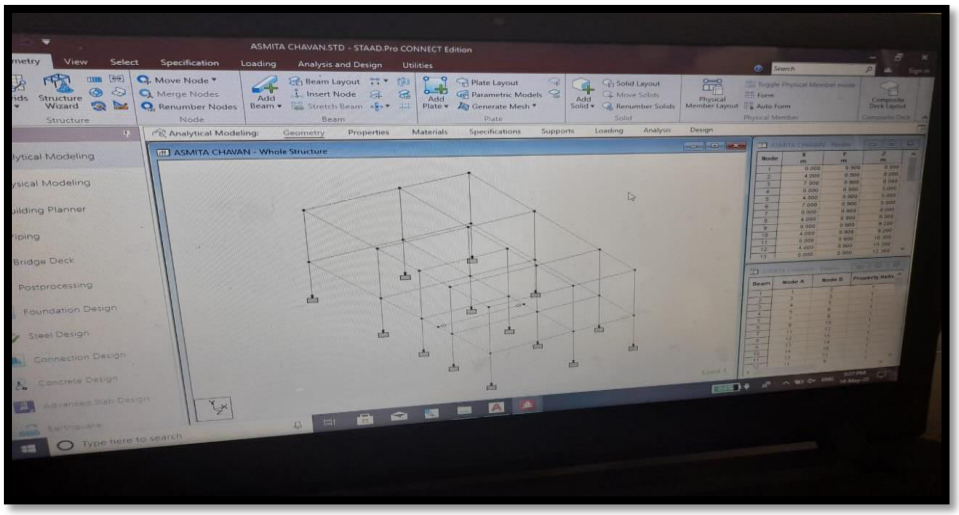

Fig. 1- frame generation

IV. CONCLUSION

1. How to plan a residential building properly in accordance with national building code of India.
2. The actual comparison will be made on the shear bending moments, steel areas.
3. The difference in steel error is due to human error.
4. The structural components of building are safe in shear and flexure.

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INNO SPACE
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Impact Factor: 8.165

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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