COMPARATIVE STUDY OF STRUCTURE USING CONVENTIONAL AND DIFFERENT SOFTWARES

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ABSTRACT: STAAD. Pro and ETABS are the Present Day leading software's in the civil Engineering field. Many design companies using this ultimate encoded software. The main objective of this project is to analyse and design the G+3 institutional were made by hand calculations according to IS456 code and compare the results by using STAAD. Pro and ETABS. STAAD. Pro has a very interactive user interface which allows the user to analyse structural design while ETABS is also the ultimate integrated software package for the structural analysis and design of buildings. So, In this paper we can investigate the deflection, shear stress and bending moment results obtained from manual is compared with these software's.

KEYWORDS: analysis and design of structure, Indian standard code, STAAD.pro, ETABS.

1. INTRODUCTION

All structures are analysed and designed according to Codal requirements using manual calculations or by the use of many different analysis and design software's used in various design offices. In this paper we study the deflection, shear stress and bending moment of the structure. A conclusion is at the end by comparing the results drawn from their analysis and design. The results from these software's are then compared to the manual calculations.

1.1 NEED AND ADVANTAGES OF SOFTWARES

STAAD. Pro is a handy software for structural engineers to make accurate structural analysis and design. The program supports the analysis of different types of structural elements like bridges, structural beams, floodgates, and much more. Civil engineers with a structural background are suggested to learn supporting programs like STAAD. Pro.

ETABS is a 3D modelling software for any kind of structural analysis and design. ETABS allows user for graphic input and modification for the sake of easy and quick model creation for any type of structure. To analyse and design slab with any shape and mat foundation ETABS is integrated with safe allowing you to complete analysis and design of any type of slab.

1.2 OBJECTIVES

1. To check the behaviour of the building on software (STAAD. Pro and ETABS)
2. To understand the accuracy of software's for analysis and design.
3. To compare the results and behaviour of structures on both the software's.

1.3 LIMIT STATE METHOD

In this method, the structural elements are designed for ultimate load and checked for serviceability (deflection, cracking etc.,) at working loads so that the structure is fit for use throughout its life period. As in working stress method this method does not assume stress strain curve as linear. This method gives economical sections.

1.4 FEATURES OF STRUCTURE:

- Framed R.C.C structure

Materials used:

- **Cement:** 43 Grade (used for brick work and plastering).
- 53 Grade (used for R.C.C works)
- **Concrete:** M20 grade for R.C.C
- **Steel:** HYSD TMT rods
- **Brick:** 1st class bricks (19cm × 9cm × 9cm)

2. PROBLEM DESCRIPTION

S.NO	DESCRIPTION	DIMENSIONS
1.	Beam	0.23X0.30m
2.	column	0.30X0.45m
3.	Slab thickness	0.15m
4.	Support condition	Fixed
5.	Isolated footing	2.36X2.36m
6.	staircase	Rise =0.15m Thread=0.30m
7.	Grade of concrete	M20
8.	Grade of steel	Fe415

2.1 PLAN OF STRUCTURE

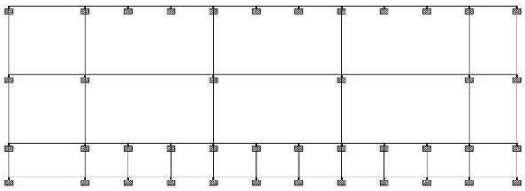
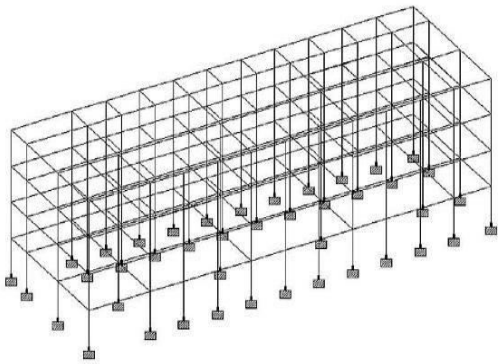


Fig 1. Layout of plan in STAAD. Pro



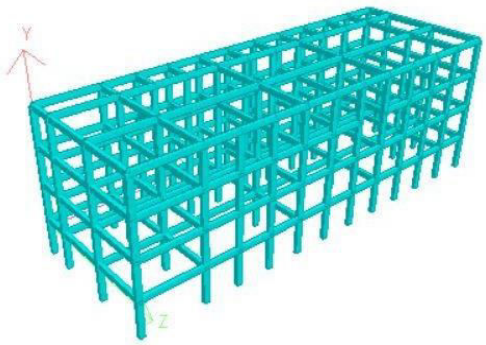


Fig 2. Structure model in STAAD. Pro

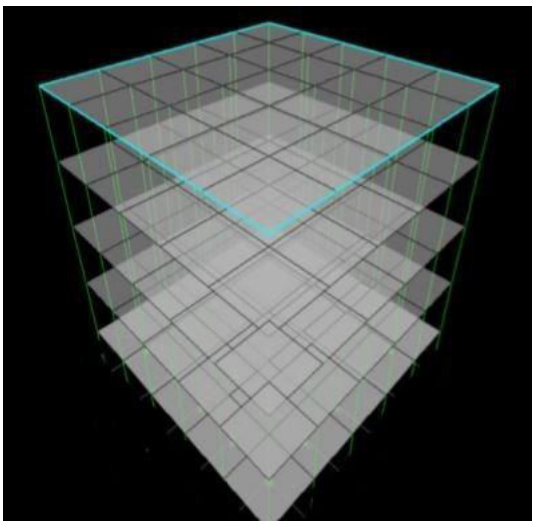


Fig 3. Structure model in ETABS

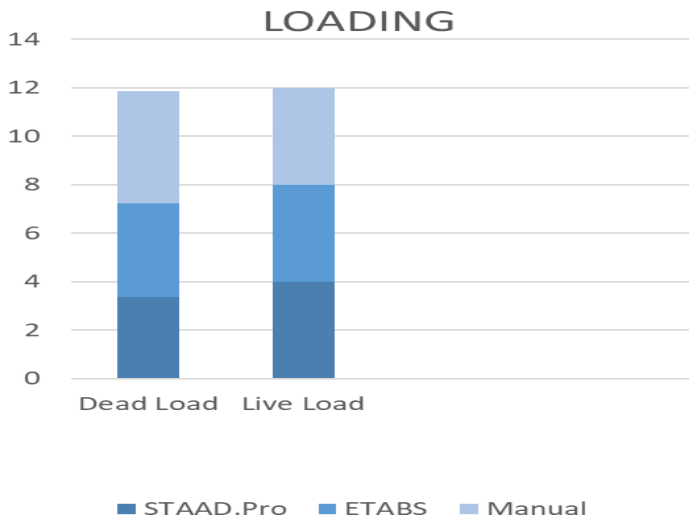
2.2 LOAD PATTERN CONSIDERATION:

Loads acting on the structure are dead load (DL) and Live Load (IL)

DL: Self weight of the structure, Floor load and Wall loads

Type of loading	STAAD. Pro	ETABS	Manual values
Dead load	3.375KN/m^2	3.85KN/m^2	4.625KN/m^2
Live load	4KN/m^2	4KN/m^2	4KN/m^2

Combination load=1.5(DL+LL)



3. RESULTS AND DISCUSSIONS

Table 1. Maximum Deflection at the structure

Loading	STAAD. Pro	ETABS	Manual
Dead load	432.55KN	454.32KN	495.63KN
Live load	78.62KN	78.93KN	85.69KN

Table 2. Maximum shear force at the structure

Loading	Forces	STAAD. Pro	ETABS	Manual
Dead Load	F_x	435.30KN	448.63KN	459.24KN
	F_Y	7.76KN	7.52KN	8.884KN
	F_z	7.76KN	7.52KN	8.884KN
Live Load	F_x	63.22KN	63.98KN	71.42KN
	F_y	2.421KN	2.23KN	3.12KN
	F_z	2.421KN	2.23KN	3.12KN

Table 3. Maximum bending moment at the structure

Loading	Forces	STAAD. Pro	ETABS	Manual
Dead Load	F_x	0.000KN	0.000KN	0.000KN
	F_y	8.888KN	8.306KN	8.932KN
	F_z	8.888KN	8.306KN	8.943KN
Live Load	F_x	0.000KN	0.000KN	0.000KN
	F_y	3.542KN	3.237KN	3.632KN
	F_z	3.542KN	3.237KN	3.632KN

Total reinforcement in beam and column(mm^2)

	BEAM	COLUMN
STAAD. Pro	550	852
ETABS	545	783
Manual	562	930

4. CONCLUSION

The design of the structure using STAAD. Pro and ETABS was done and it was compared to the manual calculation. It gives a conservative results of the design. Comparison of both software STAAD PRO and ETABS, the design result obtain gave lesser area of required steel as compared to STAAD PRO for the beam design result. Correspondingly the column design result also area of required is lesser in STAAD PRO software as compare to ETABS. Consequently, the final accomplish ETABS provide lesser area of steel as compare to STAAD PRO in both cases.

5. REFERENCES

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