International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 08 | Aug 2020 www.irjet.net p-ISSN: 2395-0072

Analysis of 3D Roof Truss Frame for Wind Load

Sayali P. Palamkar[1], V. G. Jadhav[2]

[1]*M.Tech Student, Dept. of Civil Engineering, MGM's Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra, India*
[2]*Assistant Professor, Dept. of Civil Engineering, MGM's Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra, India*

Abstract – *A roof truss for an industrial building is a structure that built only from two-force elements (truss members) connected at the ends one to another (joints) in order to create a desired shape. Trusses are built to support external loads and prevent any movements. There is use of principles of equilibrium of forces and moments to find forces acting in each member of a structure. Analysis of the steel roof truss frame under the wind load according to Indian Standard Code IS: 875(Part 3)-1987, in which, intensity of wind load is calculated considering different conditions of class of structure ,Terrain, height and structure size factor, topography factor, permeability conditions. Analysis of trusses called A roof truss is basically a composite frame structure formed by concrete columns and steel truss (Howe truss). The analysis is done by the software Staad pro. For checking the behavior of truss members as an individual and as a frame also with respect to different load combinations for wind loads.*

Key Words: Howe truss, composite frame structure, Wind load combinations, Staad pro.

1. INTRODUCTION

The steel truss structure is designed and analyzed by the dead loads, live loads and wind loads and the combination of these with the earthquake load if it is necessary accordingly with the zone. The wind velocity or the wind pressure is the main concern which is the main factor causing the movement of truss frame and generates the dynamic changes in the structure. The analysis of which is to be done by the methods of analysis of truss frame and by using analytical software Staad Pro. The codal provisions for the dead load, live load and wind loads are IS 875 part I, II and, III respectively. And for earthquake loads the IS 1893 is used.

1.1 wind load on roof truss frame

The wind loads are the naturally generated, frequent, continuous, and dynamic form of load, causing deflection and bending effect in most of the roof trusses. The wind load values depend on the shape of roof truss, wind direction and location of the building. For lightweight roof structures and cover materials, the wind load is the most important load. While considering whole truss frame the wind effects are considered for the entire frame and not only for the truss members. Column supports, which are fixed to the ends of truss are the very important part of frame so entire truss frame is affected by the wind load acting over it.

2. MODELLING

A composite truss frame in which steel roof truss is fixed on concrete columns and it is analyzed in XY plane direction and for dead load, live load and wind load according to IS: 875(Part1,2,3)-1987respectively.

Table -1: Necessary data for modeling

Type of frame	composite
Dimensions	12*60*11m
Spacing of bays	6m
Roof slope θ	18.43^0
Column height	9m
Material properties	Steel fe415 concreteM25
Sectional properties	Columns 0.4*0.5m steel members ISA 100*100*10

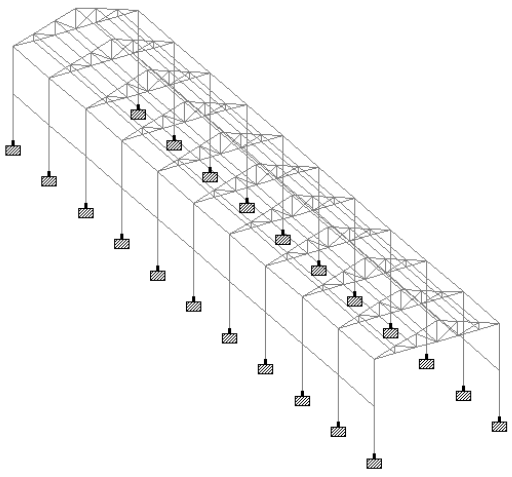

fig -1: Truss frame model

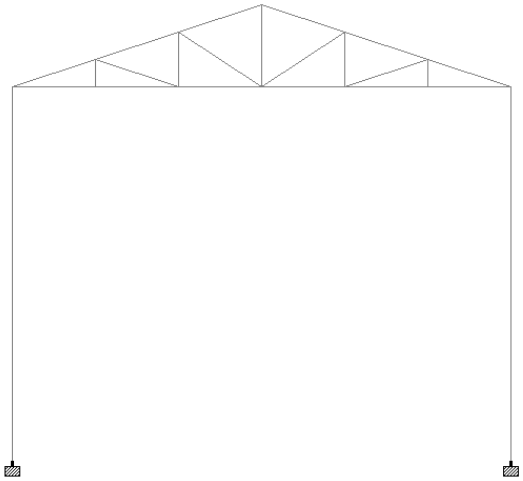

fig -2: Single Truss frame model

The truss frame composite structure is analysed for the 10 bays and the variations are made in designing for the different locations as per the variations in wind speed and wind pressure.

3. CONCLUSIONS

After analyzing the 3D roof truss frame for wind load following conclusions are made.

1. There is major effect of wind on delection of entire frame and in individual truss members.

2. Different load combinations gives change in behavior and nature of Shear force Diagram and Bending Moment Diagram, which results in safe and economical designing.

REFERENCES

1. Dr. S.K. Dubey, Prakash Sangamnerkar, Prabhat soni,"Analysis of steel roof truss under normal permeability condition IJAERS/vol.I/IssueIV/july-sept 2012/08-12.

2. Tejas D. Parekh, Disha Parmar, Yati tank "Analysis of Howe Roof Truss using Different Rise and Span" International Journal of Engineering Trends and Technology (IJETT) – Volume 47 Number 3 May 2017]

3. Yash Patel Yashveersinh Chhasatia "Analysis and design of conventional industrial roof truss and compare it with tubular industrial roof truss"IJSTE – the international journal of science technology & engineering volume 2 Issue 10 April 2016.

4. Manoj Nallanathe, Ramesh Bhaskar, Kishore "Efficiency study of different steel truss using (staad.pro)" Volume 119 No. 17 2018, 3095-3101.

5. Anisha Goswami, Dr. Tushar Shende "Pre-Engineered Building Design of an Industrial Warehouse" International research journal of engineering and technology (irjet) Volume: 05 issue: 06 ,june 2018.

6. Gaurav Shinde, Nikhil Pitale "study of various types of roof trusses for same span" IRJET Volume: 06 Issue: 04 | Apr 2019.

7. Duggal S.K, "Limit State Design of steel Structural" Tata McGraw Hill education private limited, New Delhi, (2010).

8. IS: 875 (Part 1) – 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures (Dead Load)

9. IS: 875 (Part 2) – 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures (Imposed Load)

10. IS: 875 (Part 3) – 1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings And Structures (Wind Load)