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2D ROOF TRUSS CONFIGURATION COMPARATIVE ANALYSIS

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Abstract
The structural steel business dominates the building sector all over the globe since steel is a durable material that can be shaped into any desired form to give a project an ultimate and beautiful appearance. Steel trusses are available in a variety of geometries and sections, including Type, Pratt type, Howe truss, Warren type, and others. They are also available in a variety of sections, including tubular section, square hollow section, and rectangular hollow section. In this paper, a comparative analysis of various kinds of trusses, such as the Warren type, the Howe type, and others is presented. The construction of Pratt type and K type trusses for a span of 36m and for various rises has been completed. The hollow parts are used in lieu of the solid sections. Sections that are standard The Staad pro v8i programme is used to do the analysis. Following a comparison, the steel truss constructions with the lowest costs the weight will be determined, and it will be determined that it is the most cost-effective.
Key Words - truss configuration, hollow sections, truss design, lowest weight

I. INTRODUCTION

Trolley trusses are triangular frame structures in which the members are subjected to essentially only axial forces as a result of an externally applied load. The efficiency of steel members subjected to axial forces is generally higher than the efficiency of steel members in flexure because the cross section is stressed nearly uniformly. Trusses, which are made up mostly of axially loaded components, are very effective at withstanding external stresses because of this. They are widely used for a variety of purposes. a greater range of spans Due to the fact that truss systems consume less material and require more labour to construct when compared to other systems, they are more affordable. In the Indian setting, this is especially appropriate. Trusses are classified into two categories: plane truss and space truss.

Plane trusses are trusses in which the members are parallel to each other. Are aligned in two dimensions and all of them are located on the same plane Furthermore, the forces acting on the truss are all located on the same plane. While in orbit, truss is used to support objects. Three-dimensional orientation of the components allows for the application of forces from any direction. Plane trusses may be broadly classified into three types: a) Pitched roof truss, parallel chord truss, and trapezoidal roof truss are all examples of roof trusses.

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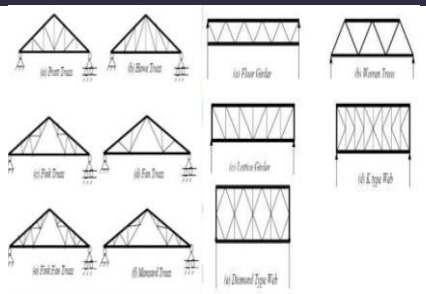


Figure 1.1 Pitched roof trusses Figure 1.2 Parallel chord trusses

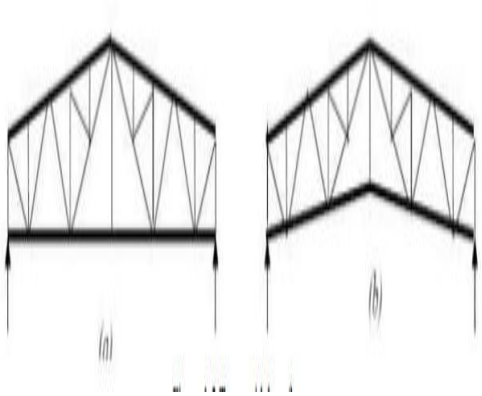


Figure 1.3 Trapezoidal roof trusses

II. STRUCTURAL MODELING STEPS & DETAILS

The step by step procedure for this study is as under:

1) Generate Geometry of Standard truss configuration

2) Calculate Dead load, Live load and Wind load.

3) Create Staad file from basic input and perform analysis.

4) Create steel design command to perform steel design.

5) Call Staad result and result interpretation.

Our main objective is to find out the truss configuration which has minimum weight for the same loading. In this work the rise and section vary for different configuration of the truss. The different values required for the load calculation and for the modelling in the software are shown in the table 2.1.

Table 2.1 Geometry and design data

Criteria	Values
Span	36
Rise	Between 1/12 to 1/48
Bay Spacing	4 m
Height up to eaves level	12m
Total Dead Load (Sheeting + Purlin + Fixing + Service)	Varies with geometry
Total Live Load	Varies with geometry
Basic Wind Speed	44m/s (Surat)
Life of structure	50 years
Wall Opening	5 to 20%
Wt. of Purlin in N/m^2	90
Wt. of Wind Bracing in N/m^2	15
Wt. of GI sheets in N/m^2	130
Yields strength of steel	310 N/mm^2

III. RESULTS

3.1 Summary of Truss Weight for Different Section

i. Pipe Section i

i. Rectangular section

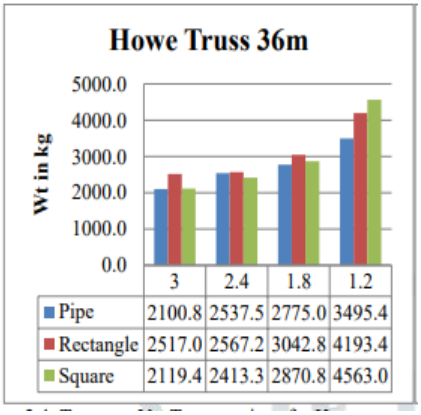
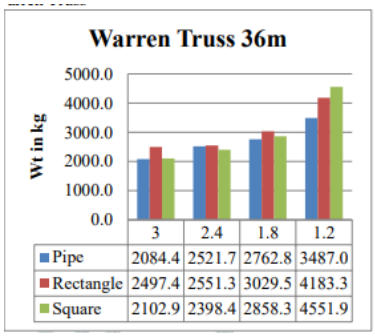


Chart 3.4: Truss wt. Vs. Truss sections for Howe truss Chart



3.5: Truss wt. Vs. Truss sections for Warren truss with change in rise

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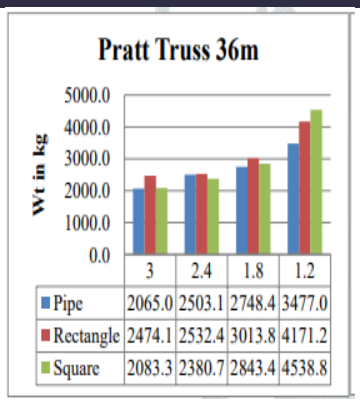
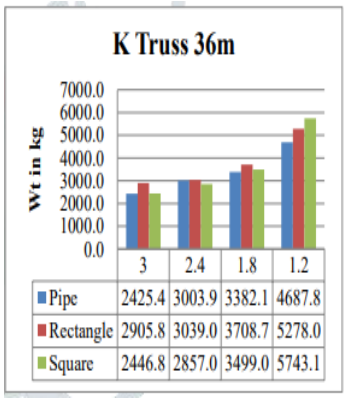


Chart 3.6: Truss wt. Vs. Truss sections for Pratt truss Chart



3.7: Truss wt. Vs. Truss sections for K truss with change in rise

IV. CONCLUSIONS

a) For all the span of 36m, Pratt truss configuration is the most economical truss than Howe truss, Warren truss and K truss.

b) The economy of truss using the different section for different rise of the truss is different. For 3m rise of the truss Pipe section is more economical in all the cases. But there is an exception for 2.4m rise in which square section is more economical in the entire truss configuration.

c) In the entire truss configuration and for all the spans 3m rise is more economical than 2.4m, 1.8m and 1.2m rise

REFERENCES

[1] Upendra Patkak and Vivek Garg, "Optimization and Rationalization of Truss Design," International Research Journal of Engineering and Technology, vol. 02, Issue 05, pp. 624–636, Aug 2015.

[2] Vaibhav b. Chavan, Vikas N. Nimbalkar, Abhishek P. Jaiswal, "Economic Evaluation of Open and Hollow Structural Sections in Industrial Trusses," International Journal of Innovative Research in Science, Engineering and Technology, vol. 03, Issue 02, pp. 9554–9565, February 2014.

[3] M.G. Kalyanshetti and G. S. Mirajkar, "Comparison between Conventional Steel Structures and Tubular Steel Structures," International Journal of Engineering Research and Application, vol. 02, Issue 06, pp. 1460–1464, November December 2012.

[4] Pradeepa S. and Monika N.R, "Design and Comparison of Various Types of Long Span Roof Trusses," International Journal of Science and Engineering Research, vol. 03, Issue 10, October 2015.

[5] Dhruv S. Agarwal and Ankit C. Chhatwani, "The Economic and Structural Analysis of Hollow Structural Sections," International Journal on Recent and Innovation Trends in Computing and Communication, vol. 03, Issue 02, pp. 57-62, February 2015.

[6] Vrushali Bahadure and R.V.R.K. Prasad, "Comparison Between Design and Analysis of Various Configuration of Industrial Sheds," International Journal of Engineering Research and Application, vol. 03, Issue 01, pp. 1565–1568, January-Feburary 2013.

[7] Yash Patel, Yashveersinh Chhasatia, Shreepalsinh Gohil and Het Parmar,

"Analysis and Design of Conventional Industrial Roof Truss and Compare it with Tubular Industrial Roof Truss," International Journal of Science Technology and Engineering, vol. 02, Issue 10, pp. 943-948, April 2016.

[8] Vrushali Bahadure and R.V.R.K. Prasad, "Comparison Between Design and Analysis of Various Configuration of Industrial Sheds," International Journal of Scientific Development and Research, vol. 01, Issue 07, pp. 208–213, July 2016.

[9] Sagar D. Vankhade and P.S. Pajgade, "Design and Comparison of Various Types of Industrial Building," International Referred Journal of Engineering and Science, vol. 03, Issue 06, pp. 116-118, June 2014.

[10] N.Subramanian, "Design of Steel Structures", Oxford University Press.

[11] P.Dyaratnam, "Design of Steel Structures" S.Chand Publication.

[12] R.P.Rethaliya, "Steel Structures", Atul Prakashan.

[13] S.K. Duggal, "Limit state Design of Steel Structures", Tata McGraw Hill Education Private Limited. [14] IS 1161:2014 Steel Tubes for Structural Purpose – Specification?

[15] IS 4923:1997 Hollow Steel Sections for Structural use – Specification