iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** XII **Month of publication:** December 2018

DOI:

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue XII, Dec 2018- Available at www.ijraset.com

Analysis of Lattice Tower in Zone IV

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Abstract: ***Transmission tower lines are one of most important life-line structures. Transmission line should be stable and carefully designed so that they do not fail during natural disaster. Transmission towers are necessary for the purpose of supplying electricity to various regions of the nation. The objective of this thesis is analysis of 220kv lattice tower in wind zone IV using STAAD.Pro. Vsi. Transmission towers are necessary for the purpose of supplying electricity to various regions of the nation. Transmission line should be stable and carefully designed so that they do not fail during natural disaster. The height of the tower is 50 m situated at outskirts of Delhi which lies in zone IV.***
Keyword: Four legged, Analysis, Moment, Shear Force, Displacement

I. INTRODUCTION

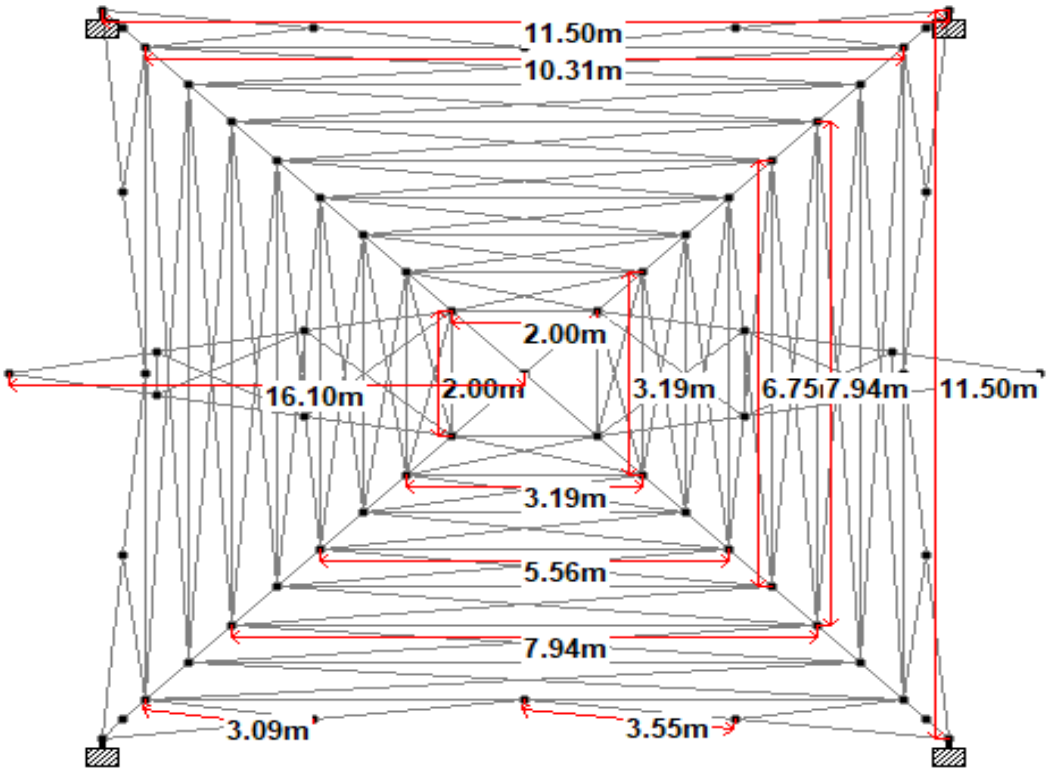
Transmission tower is a tall structure used to support an overhead power line. transmission tower is used in high voltage AC and DC system. lattice tower is generally design in various design and shapes. Typically, their height ranges between 15 to 55 m. A transmission tower structure set up for the purpose of transmitting and receiving power, radio, telecommunication, electrical and other electromagnetic signals. The aim of every designer is to design the best and optimum system. Most of the big transmission towers may be steel towers, smaller one may be wood, concrete or steel poles The component of transmission tower are peak, cage, cross arm, bracing, tower body.

II. STAAD.PRO SOFTWARE MODELLING

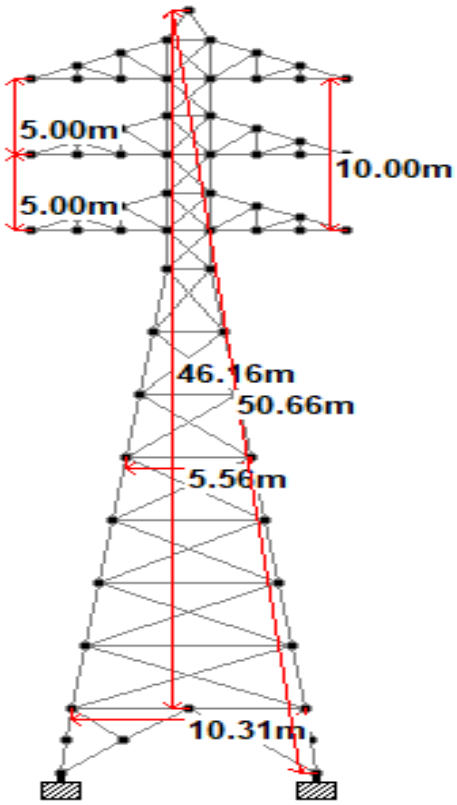
The load calculation are performed manually but the analysis and design are done by STAAD.Pro V8i. The software is used modelling.it is user friendly and is also offer a wide feature like dynamic and static analysis etc. **STAAD. Pro** is a structural analysis and design computer program originally developed by Research Engineers International at Yorba Linda, CA in year 1997. In late 2005, Research Engineers International was bought by Bentley Systems.

Configuration details of tower

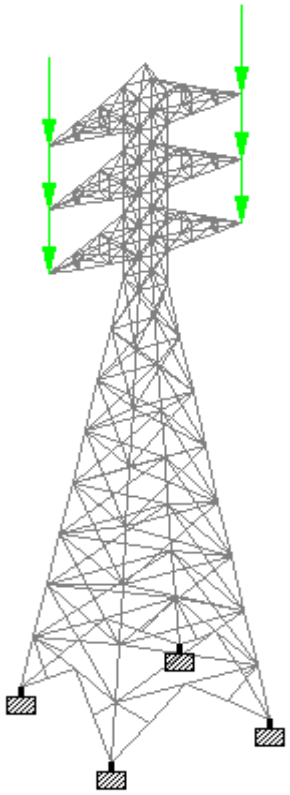
Type of tower	220 KV lattice tower
Height of tower	50m
Base width of tower	11.50 m square base
Length of cross arm	17 m
Type of bracing	Diamond bracing
No of cross arm	3
Conductor material	ACSR
Vertical spacing between conductors	5 m



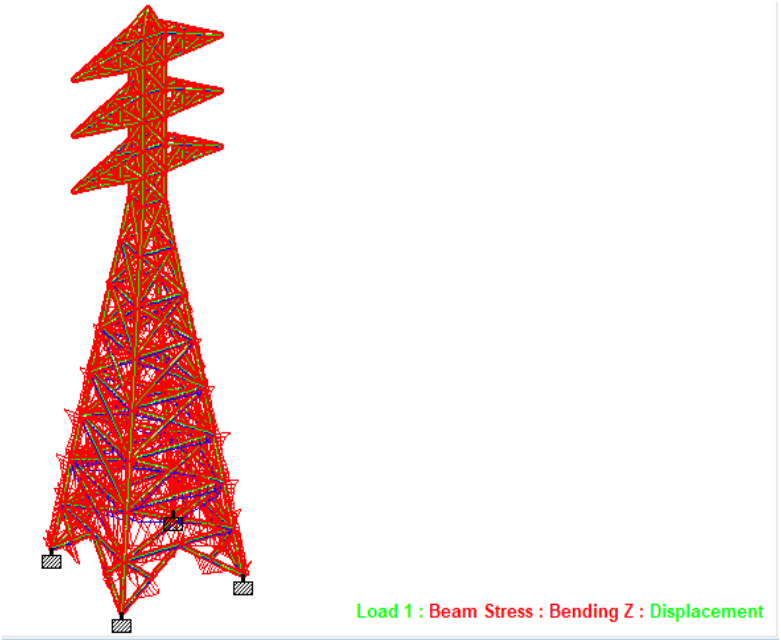
Plan of Tower



Dimension of Tower



WIND LOAD



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III. ANALYSIS DETAILS

After assigning the loading analysis done to evaluate the bending forces, shear force, axial force, displacement and steel take off. Summary of details for the analysis done

Table : 1

S.NO	POINTS	NUMBERS
1	No of nodes	148
2	No of elements	448
3	Highest node	148
4	Highest beam	478
5	No of combination of loads	7
6	Number of supports	4

Table: 2

S.NO	MATERIAL	Quantity
1	Prismatic steel	23119.154
2	Total volume of prismatic steel section	300.95 Cubic meter

Table: 3

S.NO	BEAMS	Moment KN m	Shear FORCE
1	Beam 1	16.34	11.801
2	Beam 2	16.44	11.893
3	Beam 190	-9.238	-3.274
4	Beam 235	-27.912	-8.119
5	Beam 466	6.42	17.459

IV. CONCLUSION

In this paper a transmission tower of 220 KV of 50 m height with diamond bracing is designed and analysis is done by using STAAD.Pro V8i. in wind zone IV at delhi. The vertical members are more leading in loading as compare to diagonal or horizontal members. The overall design of a lattice tower is very closely connected with the user's functional requirements. The vertical members are more leading in loading as compare to diagonal or horizontal members. The tower with angle section and diamond bracing has grater reduction in weight after optimization.

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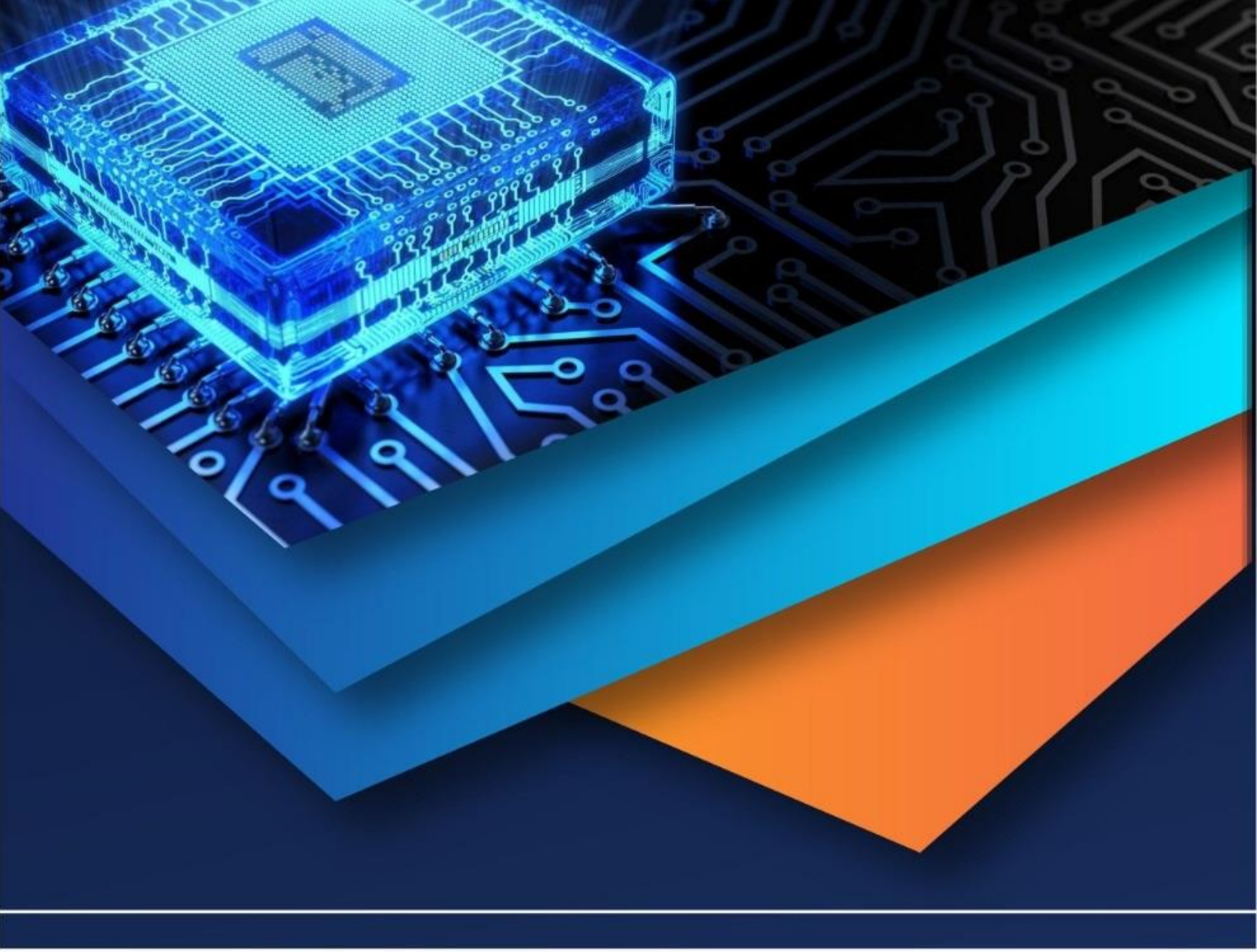

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