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Static and Dynamic Analysis of Transmission Line Tower

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***Abstract:** The towers of the to the most powerful life-line buildings that support electrical transmission line are peculiar transmission. Transmission towers are essential for providing energy to various parts of the nation. The transmission line should be stable and carefully structured with the objective that they do not fizzle in the midst of a cataclysmic event and adapt to the national and universal standard. This present paper manages the investigation of static and dynamic examination of transmission line tower . A run of the mill sort of transmission line tower is picked as contextual analysis . The examination and displaying of pinnacle is done utilizing FE based ANSYS programming. The heaps following up on the pinnacle reflected are numb burden, live burden and dynamic burdens .in this Paper the most extreme twisting joined anxieties and characteristic frequencies ,bowing minute shear constrain are gotten.*

***Key words;** static analysis, dynamic analysis, ANSYS, transmission tower*

I. INTRODUCTION

The want of electric power utilization has kept on expanding in each nation, the speed of interest being more prominent in the creating nations. The towers of the transmission line are some of the most important life-line buildings that assist spread electrical power. Transmission towers are essential for providing authority to the country's various districts. In the current scenario, the structure of intensity stations increases and consequently increases the power transmission lines from the generating stations to the distinguishing angles.Interconnections between frameworks are likewise expanding to upgrade dependability and economy. The present examination manages normal frequencies, methods of vibration, diversion design exposed to live load and wind load following up on pinnacle And static and dynamic investigation of transmission line tower.

II. NECESSITY OF TRANSMISSION LINE TOWER

The transmission line tower is progressively fundamental now daily since entire world utilizing most extreme measure of power. without power no any organization will run. Every single MNC need the power to run their work.

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The reason for a transmission line tower is to assist conveyors transmitting electrical power and a few ground cables at suitable separations above ground level and from each other. The transmission line towers cost about 35 to 45% of the transmission line's total price. A tower for transmission is a space aid and an unclear structure. The transmission line tower provides high present voltage. We need a transmission line tower to offer elevated present voltage. A high-voltage transmission line tower is the most perfect method to supplying high present voltage.

Objective of this paper

- To determine Deflection profile and member forces
- Arrive Natural frequency, Bending moment and Deformation

Input geometric data

- Height—40m(base level)
- Length—20m(base level)
- L-type bracing system

Properties of stainless steel

- L-type of cross section
- Width of L section= 0.1m
- Thickness of L section= 0.01m

Loads apply on tower

UDL(uniformly distributed load)= -500N

Wind loads = -50N

About ANSYS

ANSYS V.18.1 is a coordinated pre-and post-processor plan investigation device based on the FEM created by ANSYS. The ANSYS item documentation is beautiful and includes reference instructions; guiding, displaying and fitting aid operations; controlling vital research strategies; managing driven exams; component reference; hypothesis reference; auxiliary examination manage; warm investigation direct; electromagnetic fields investigation manage; liquid elements manage; and coupled field investigation direct.

Taken together, these manuals describe the techniques, instructions, elements and hypothetical subtleties that the ANSYS program is supposed to use. ANSYS is used to check the transmission line tower.

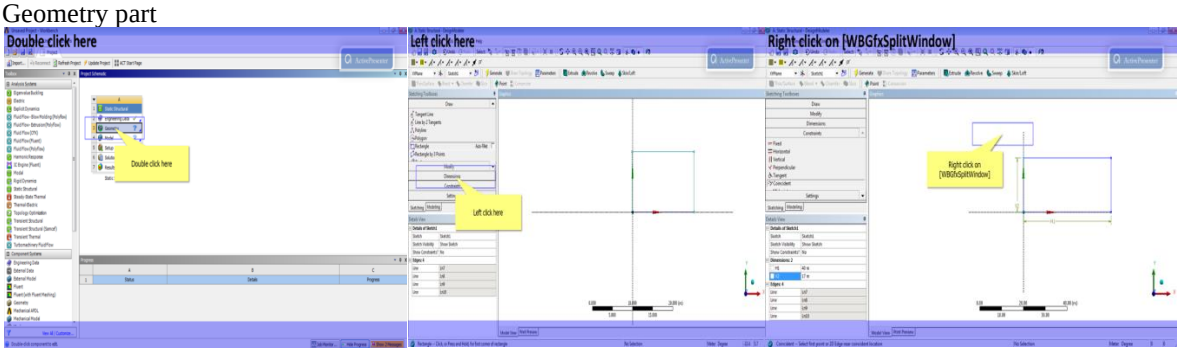
Apart from the ANSYS hypothesis reference, most of the above manuals are available online via the ANSYS help framework, which can be accessed either as an independent framework or from within the ANSYS program. ANSYS is a completed programming set of FEA reproduction produced by ANSYS Inc-USA. Dr. JOHN SWANSON founded the organisation in 1970 and originally named Swanson Analysis Frameworks; Inc.

ANSYS is the company items ' first name. ANSYS has a large group of products that are developed to handle unusual problems of reason.

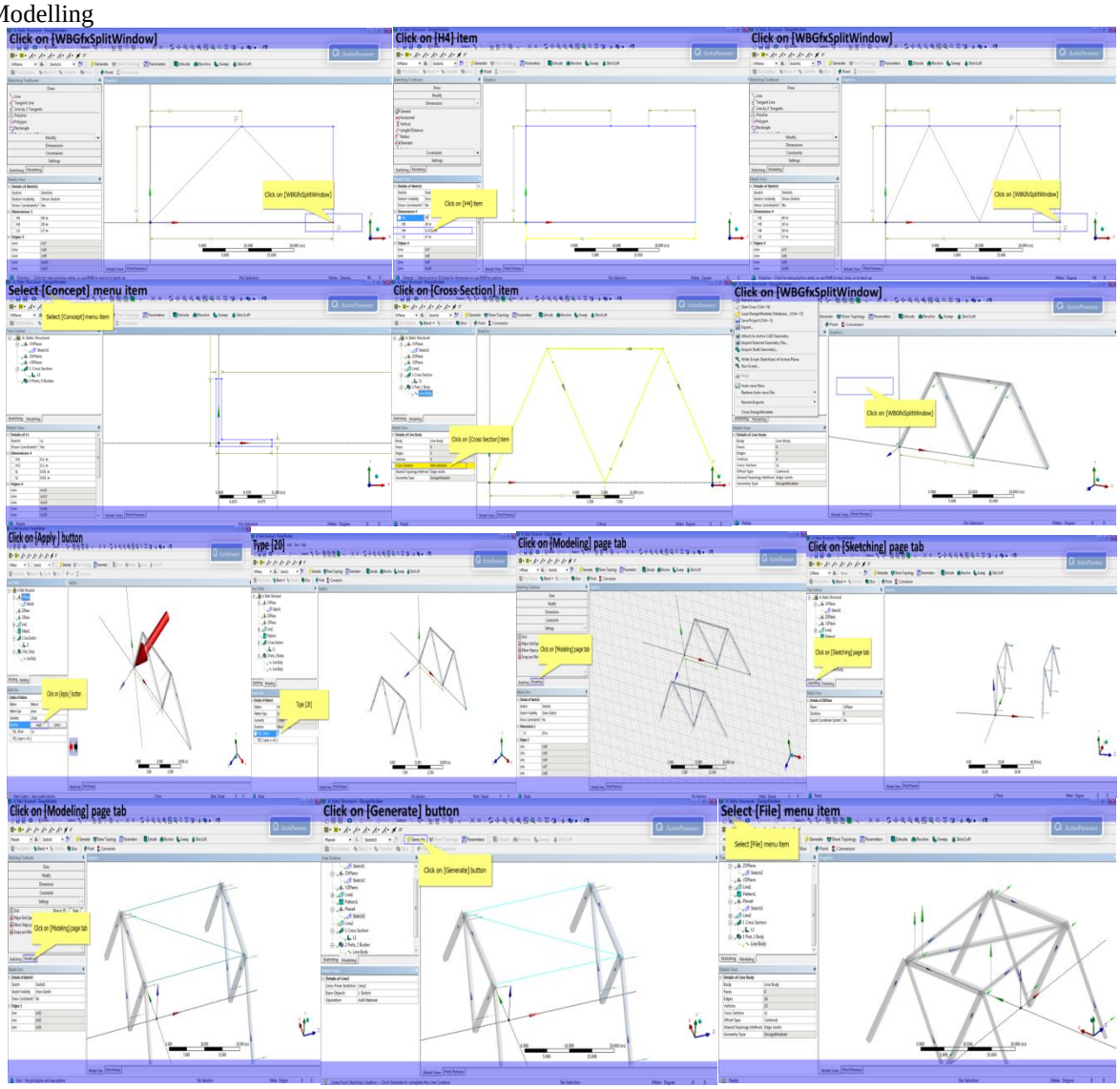
III. METHODOLOGY, PROCEDURE AND DATA OBSERVATION

All were presented in figurative way

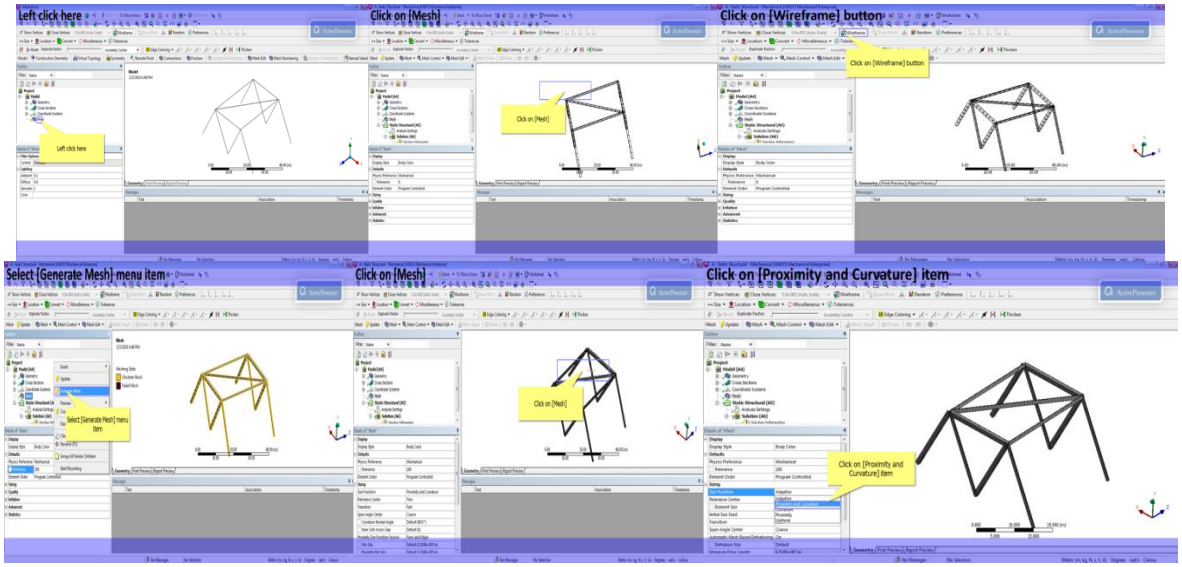
Step 1 Geometry part



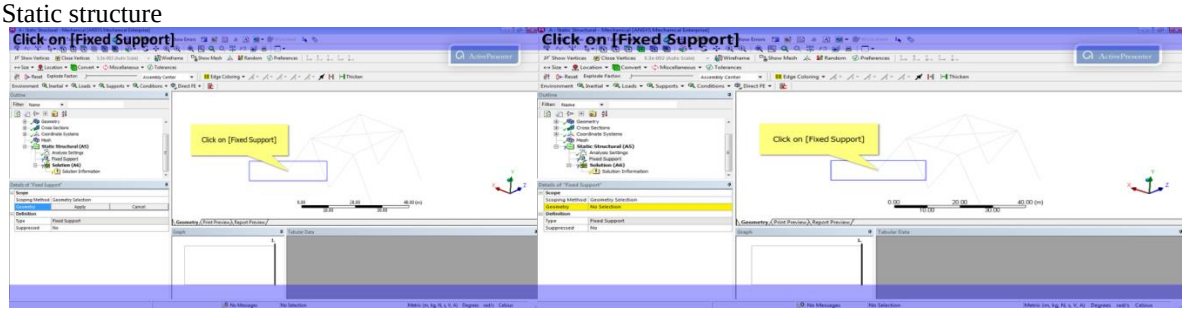
Step 2Modelling



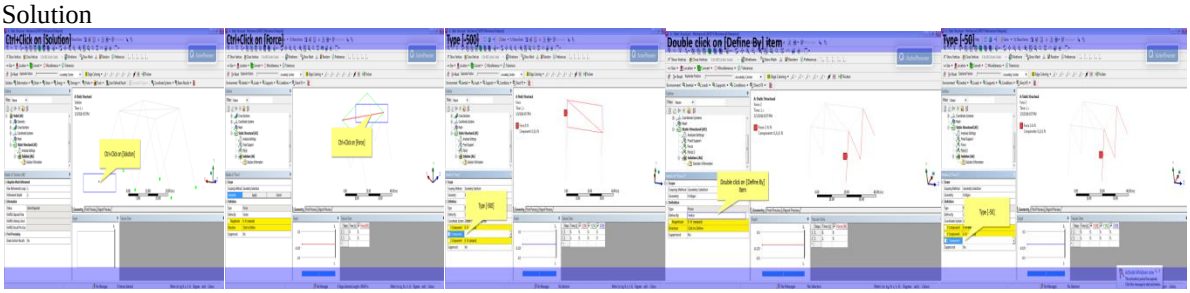
Step 3:Meshing



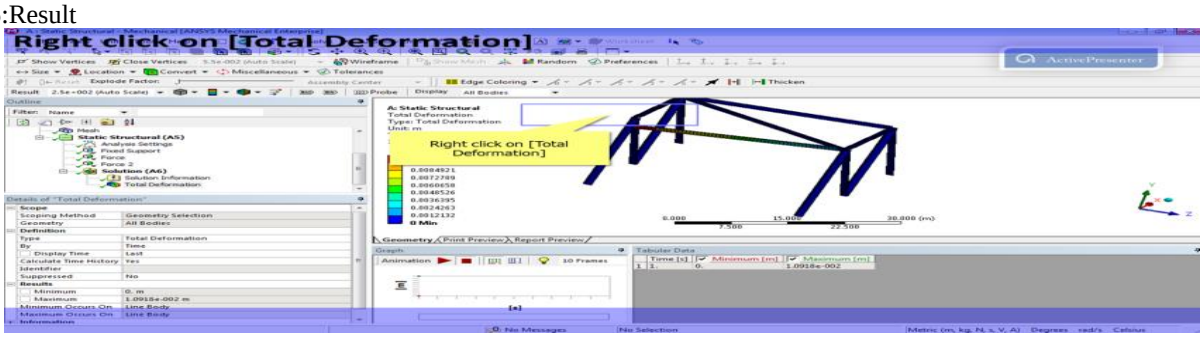
Step 4:Static structure



Step 5:Solution



Step 6:Result



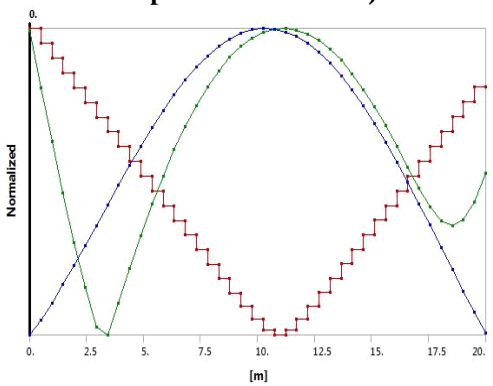
IV. STATIC STRUCTURE

A static structural analysis fixes the shear force, bending moment & displacements in structures or constituents affected by loads that do not prompt major inertia and damping things. UDL and wind load are anticipated; that is, the loads and the structure's retort are presumed to fluctuate gently with respect to time. A static structural load can be executed using the ANSYS. The following tables shows the result of Shear force, Bending moment &displacement of tower

Table 1 Sample of Result of Shear force, Bending moment & Total displacement)

Length [m]	Total Shear Force [N]	Total Bending Moment [N.m]	Total Displacement [m]
0.	64.217	240.52	5.3852e-008
0.48766	61.966	209.81	2.4202e-007
0.97532	59.714	180.38	4.5146e-007
1.463	57.462	152.32	6.79e-007
1.9506	55.21	125.77	9.2266e-007
2.4383	52.959	101.	1.1803e-006
2.926	50.707	78.596	1.4495e-006
3.4136	48.455	59.786	1.7279e-006
3.9013	46.203	47.218	2.013e-006
4.3889	43.952	44.579	2.3025e-006
4.8766	41.7	51.953	2.5939e-006
5.3643		64.991	2.8849e-006

Figure 1 show Shear force, Bending moment & Displacement of tower)



Minimum = 1.0837 N @ 14.142 m
Maximum = 64.217 N @ 0 m
Bending moment value Minimum value = 44.425 N-m @ 23.895 m
Maximum value = 240.52 N-m @ 0 m
Displacement Minimum value = $5.7026e^{-8}$ @ 28.284 m
Maximum value = $1.1803e^{-6}$ @ 2.4383 m

Shear force value

Vibration analysis:

Vibration scrutiny is a method of eyeing for glitches and checking change from the customary vibration signature of a system. The vibration of every piece in motion is described by deviations of amplitude, intensity, and frequency. All are represented in Table and figures

Table 2 show Total deformation 1,2 and 3

Mode	Frequencies (Hz)		
	1	2	3
1.	1.398	1.398	1.398
2.	4.0215	4.0215	4.0215
3.	4.6728	4.6728	4.6728
4.	5.6113	5.6113	5.6113
5.	5.8862	5.8862	5.8862
6.	6.0139	6.0139	6.0139
7.	6.027	6.027	6.027
8.	6.0859	6.0859	6.0859
9.	6.2165	6.2165	6.2165
10.	6.3765	6.3765	6.3765

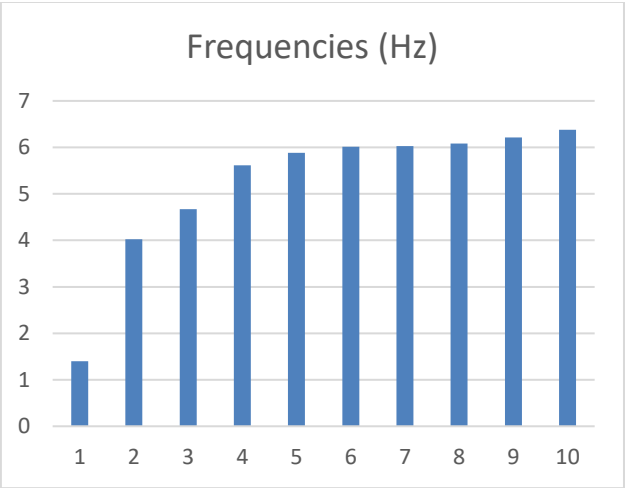


Figure 3 Corresponding Frequency

Table 3 Results of deformation

Object Name	Total Deformation	Total Deformation 2	Total Deformation 3	Total Deformation 4	Total Deformation 5	Total Deformation 6	Total Deformation 7	Total Deformation 8	Total Deformation 9	Total Deformation 10
State	Solved									
Scope										
Scoping Method	Geometry Selection									
Geometry	All Bodies									
Definition										
Type	Total Deformation									
Mode	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Identifier										
Suppressed	No									
Results										
Minimum	0. m									
Maximum	2.1614e-003 m	7.2749e-003 m	5.8554e-003 m	2.985e-003 m	3.0802e-003 m	4.5096e-003 m	3.4908e-003 m	2.8406e-003 m	3.6705e-003 m	3.1402e-003 m
Minimum Occurs On	Line Body									
Maximum Occurs On	Line Body									
Information										
Frequency	1.398 Hz	4.0215 Hz	4.6728 Hz	5.6113 Hz	5.8862 Hz	6.0139 Hz	6.027 Hz	6.0859 Hz	6.2165 Hz	6.3765 Hz

V. SUMMARY AND CONCLUSION

The static and dynamic examination of transmission line tower (L-kind of cross area) An endeavor has been made in investigation and demonstrating of transmission line tower utilizing limited component and on based ANSYS programming. The models made by utilizing ANSYS workbench programming. The connection component is utilized for the displaying. In the present investigation the social changes because of diversion and worries of transmission line tower against static and dynamic loadings is completed. Following are the ends drawn from the examination.

- The Value of Maximum miss happening got on account of static investigation is 7.2749e-003 (m)
- In free vibration investigation of existing transmission line tower of L-kind of cross area.
- As the quantity of mode is expanded, the estimation of normal frequencies progressively
- increments. For initial three modes, the regular recurrence remains practically steady and from that point increments in higher modes.

The investigation completed utilizing limited component examination (ANSYS programming) gives fitting arrangements including nodal, component, and part arrangements

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