

A Review on Analysis and Design of transmission tower And Monopole by Using Manual Calculation and Software

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Abstract: This research work is focused on comparison of transmission tower and monopole tower for different parameters viz. different height and different loading combinations. The comparative analysis is carried out with respect to axial force deflection maximum sectional property and critical load conditions. The transmission tower and monopole are design by manually by using limit state method based on IS 800, IS 802 IS 875 and gust factor method. Based on steps and formulas involved, a design program will be prepare in MS-EXCEL. The veracity of program will be check by first designing the manually designed transmission tower and monopole using the software and compare results. Wind analysis is carried out using standard codes and software. The behaviour of tower and pole is analysed for different load combination. The maximum displacement values, shear forces and bending moments are obtained. Therefore, transmission tower and monopole should be designed considering both structural and electrical requirements for safe and economical design as per Indian code. It is concluded from past study that transmission tower have lower lateral displacement as compared to monopole. This is because they have higher stiffness. Transmission tower carry heavy electrical transmission conductor at sufficient and safe from the ground than monopole The idea is to reach a definite conclusion regarding the superiority of two structure.

Keywords – Transmission tower, monopole, manual design

I. INTRODUCTION

In last several studies have been performed in the area of analysis and design of metallic towers. The electric transmission is the process by which large amounts of electricity produced at power plants is transported over long distances for use by consumers. Usually steel transmission towers and monopoles are used to transmit the electric power. This is in view of non-availability of adequate land for installation of conventional lattice type tower. To overcome these practical difficulties, a new concept of transmission line is being used world-wide, called monopole. The cost of transmission tower constitutes about quarter to half of the cost of transmission line and hence optimum tower design will bring in substantial savings. The transmission tower are designed and constructed in wide variety of shapes, types, sizes, configuration and material. The supporting structure type used in transmission line generally fall into one of the three categories: lattice, pole guyed. According to IS 800-07, the wind forces are much prominent on the tower, conductors and insulators, besides the self weight. Tower structural calculations include applied loads like wind load, dead load, seismic load and design strength of structural steel member on superstructure including connection and foundation. From safety considerations, along the route of the transmission line clearances above open countries, roads, rivers, railway tracks, tele-communication lines, other power lines, etc. up to conductor needs to be maintained. The basic function of the tower is to isolate the conductors from their surroundings, including other conductors and the tower structure. An alternative to the transmission tower, the monopole tower, is also used in this power corridor. In this case, the monopole supports much lower voltage conductors for distribution to industrial customers and substations. The voltages required for economical transmission of electric power exceeds the voltages appropriate for distribution to customers.



Figure. 1 showing transmission tower



Figure. 2 showing monopole

II. REVIEW OF LITERATURE :

There are several studies done on the design and analysis of transmission tower and monopole by using software. This literature review reveals the amount of research work done in India.

Sai Arinank, and Rajasekhar Analysis and design of transmission tower by using Staad.Pro.v8i, this work is focused in optimising the transmission tower with employing the X and K bracings, and by varying the sections, using static analysis. They concluded that the

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Environmental Wind Engineering and Design of Wind Energy Structures Charalambos Baniotopoulos, Claudio Borri, Theodore Stathopoulos, 2011-12-01 The book presents a state of the art in environmental aerodynamics and the structural design of wind energy support structures particularly from a modern computational perspective Examples include real life applications dealing with pollutant dispersion in the building environment pedestrian level winds comfort levels relevant legislation and remedial measures Design methodologies for wind energy structures include reliability assessment and code frameworks

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Energy Research Abstracts ,1990 **Chemical Engineering Progress** ,1985 **Proceedings of the NPL Conference Chemical Thermodynamic Data on Fluids and Fluid Mixtures** National Physical Laboratory (Great Britain),1979 **Survey, Design, and Construction of Trail Suspension Bridges for Remote Areas** ,1983 Solar Energy Update ,1979 *Navy Civil Engineer* ,1964 Random Packings and Packed Towers Ralph F. Strigle,1987

Process Energy Conservation Manual F. William Payne,1983 *Liquid Manure Application Systems Design Manual* Mark Dougherty, Larry D. Geohring, Peter Wright,1998 **Steel Structures** Jerome S. B. Iffland,1989 Proceedings of sessions at Structures Congress 89 held in San Francisco California May 1 5 1989 One of five volumes with proceedings of Structures Congress 89 This collection contains 78 papers on steel structures Topics include applications of cable and membrane tension structures techniques for assessing the reliability and new concepts in design of transmission line structures stability considerations in design analysis and structural optimization problems in steel structures bridge and tension structure aesthetics member design including bracing members compression members steel connections in seismic design and effects of fabrication on deformation of steel beams Papers on applications examined latticed structures cold

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helps solve your field engineering problems with its hundreds of common sense techniques shortcuts and calculations In
addition this convenient volume reflects the latest developments in geographic information systems process safety
management and pipeline toughness **Cooling Towers; a Bibliography** ,1976

Unveiling the Magic of Words: A Report on "**Manual Calculation For Tower Design**"

In some sort of defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their ability to kindle emotions, provoke contemplation, and ignite transformative change is actually awe-inspiring. Enter the realm of "**Manual Calculation For Tower Design**," a mesmerizing literary masterpiece penned with a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve to the book is central themes, examine its distinctive writing style, and assess its profound affect the souls of its readers.

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