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PLANNING, DESIGNING AND ANALYSING OF COOLING TOWER

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ABSTRACT - Besides, temperature consideration is major constituents in an industry. However, the problem of over temperature of all is defying solution. The working of people faces more effects . Hence in order to overcome this problem construction process should be quick, tall and effective to accommodate people save as their life. So we have chosen this topic "PLANNING, DESIGNING AND ANALYSING OF COOLING TOWER"**.** This type of structure helps to build tall structure for haled the waste temperature. Hence the structure to reduce the increasing temperature in the steel plant. This structure to withstand the temperature load and other external loads. As that are highly efficient in taking the loads. Not only the temperature load but also earthquake load and wind load. This project is done based on STAAD-PRO8 from the result analysis that the given specification and loads are withstand .Hence we provide the design and following dimension.

1.INTRODUCTION

In 1977 the Electric Power Research Institute (VEIKI) commissioned the Department of Reinforced Concrete Structures, Technical University, Buda-pest to make "Theoretical Research on Engineering Mechanical Problems of Constructing Large-Size Cooling Towers, Structural Safety Problems." At the same time the Section of Technical Development of the lividity for Building and Urban Development commissioned this Department through the Design Office for Civil Engineering to elaborate building codes for the construction of cooling towers, involving the slip-form building method. The main trends of research based on these two commissions were: establishment of forces and reactions in the shell structure, the bracing rings, the columns and the annular base, theoretical investigation of static and dynamic stability and elaboration of methods of use for the design practice. Analysis of effects of transversal excitation by wind eddies, methods to determine natural frequency. A comprehensive geotechnical study of cooling tower foundations Safety of the structure during construction and in final state. The uncertain design values of wind load acting on tall structures affect the safety of the structure.The detailed investigation of the scope was the responsibility of the Department of Reinforced Concrete Structures with the co-operation of Department of Civil Engineering technique and of the Department of Geo technique .In addition, Department of Surveying made subsidence measurement son erected cooling towers and investigated movements due to unilateral insolation. The research work was essentially intended to develop - based on the analysis of Hungarian and foreign experience - possibly simple but reliable and relatively rapid procedures for the design practice.

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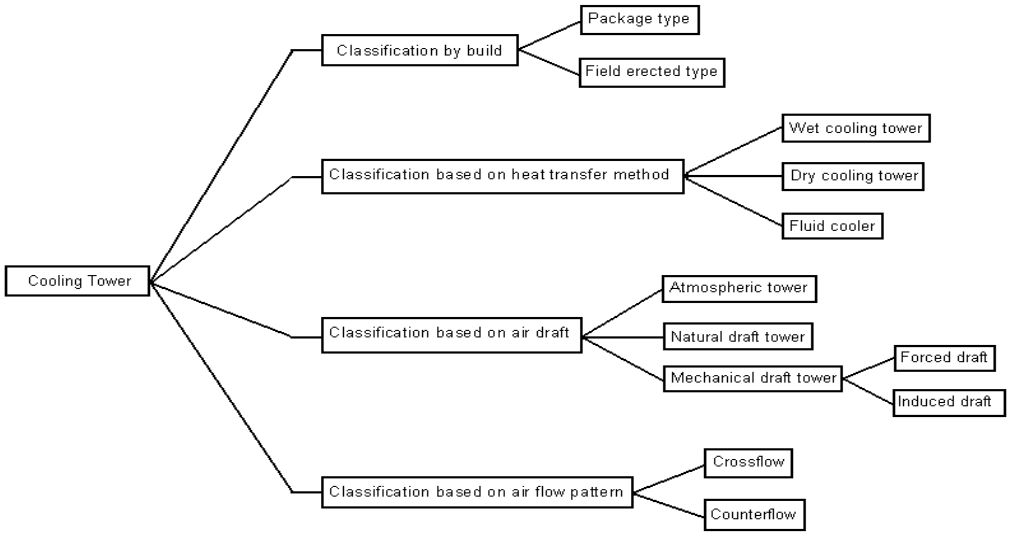
2. OBJECTIVES

- Assure public health and safety by preventing any potential risk associated with water-cooled air conditioning system.
- Achieve better maintain energy efficiency and operational performance of water-cooled air-conditioning system.
- Minimize nuisances caused by water-cooled air conditioning system to the public.
- Prevent pollution and mis-use of water.
- Assure occupational safety and health of the staff concerned.

3. USES OF COOLING TOWER

- Cooling towers are primarily used for heating, ventilation, and air conditioning (HVAC) and industrial purposes.
- Cooling towers provide a cost-effective and energy efficient operation of systems in need of cooling.
- More than 1,500 industrial facilities use large quantities of water to cool their plants.
- They also help for reuse of heating water.
- They help to production of Electricity on the cooling process.

4. CLASSIFICATION OF COOLING TOWER



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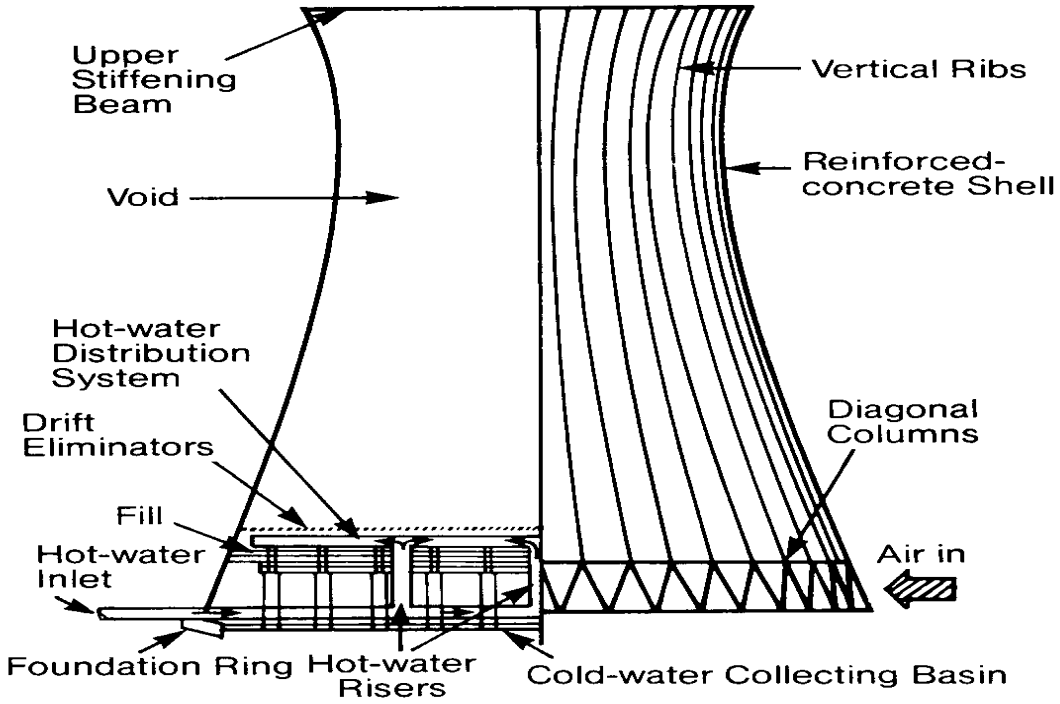
5. COMPONENTS OF COOLING TOWER



6. EARTHQUAKE LOAD

Earthquake Load = Dead Load *0.75

= 568816.5*0.75

= 426612.375KN

6.1 RESULT OF TOTAL LOAD ACTING ON COOLING TOWER

Dead load - 568816.5KN

Live load - 160944.5KN

Wind load - 16094.45KN

Earthquake Load - 426612.375KN

Total Load =745855.45KN

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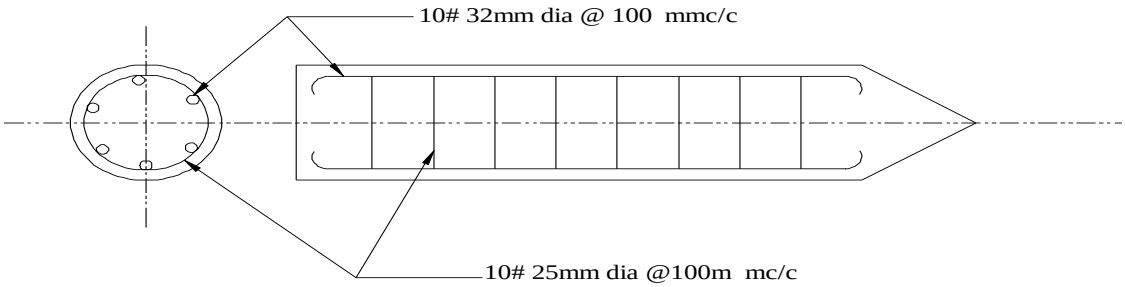

DETAILS OF PRE -STRESSED CONC RETE PILE

7. DIMENTION OF COOLING TOWER

Base Diameter	-	75m
Throat Diameter	-	40m
Top Diameter	-	45m
Height of Tower	-	100m
Thickness of Tower	-	1m

8. ARRAGEMENT OF STEEL

- Arrange main steel as beam in x-x and y-y direction provide 15 nos of 10 mm diameter bar circumferentially around main rod extended to top of pile cap.
- Provide 10mm diameter rod spiral at a pitch of 30mmc/c for a length 1000mm near pile head.
- Provide 10mm diameter rod spiral at a pitch of 100mmc/c for a length 1000mm near pile end the spiral is enclosed inside of the main reinforcement.
- Provide spacer in pair of steel using 32mm dia bar spacer at 3000mm centers Provide 32mm diameter holes at3000mm from pile end.

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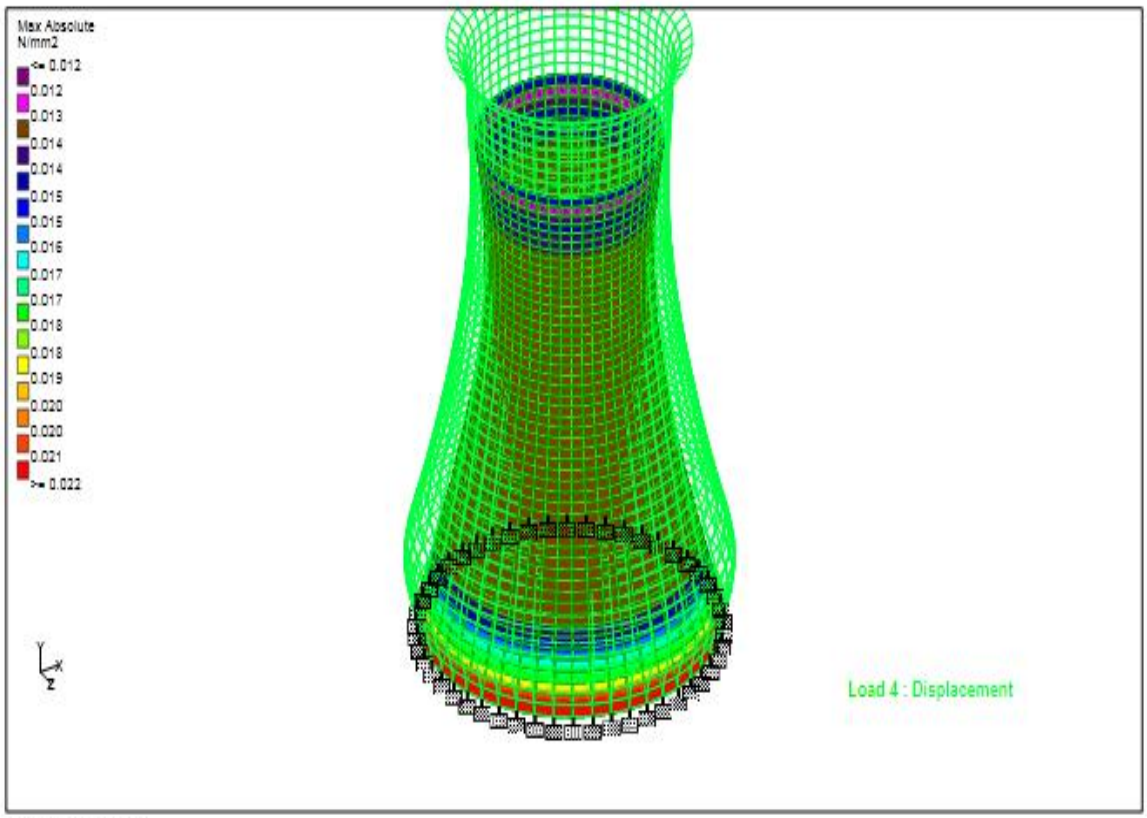

TEMPERATURE

9. CONCLUSIONS

In 1965 three cooling towers of the Ferry-bridge *Power Station* collapsed. Catastrophes occurring ever since and the increase in cooling tower dimensions induced to start an intensified research and development work, chiefly in European countries. This is the first time that a comprehensive study was carried out in this scope in Hungary of course, results obtained by research work of hardly more than a year are not comparable to those in other countries with ten to fifteen years of Research experience. Nevertheless some important problems concerning towers of hyperbolic directory seem to be cleared and the results are likely of direct use in design. It can be stated that up-to-date, economical and safe methods are available for the design and construction of big cooling towers. Research on thermal effects, on foundations, on the stability of shell supports and on forces and reactions of the foundation ring resulted in savings in building materials and in expenses compared to earlier, known solutions.

In the short survey of the research results, development possibilities were pointed out. For the further analysis of almost all problems, computer methods seem essential in evaluating the theoretical results, in further investigations as 'well as in up-to-date, economical design. In possession of computer methods some effects -will be accessible to analysis; research can be started on e.g. shell form optimization. This research would require, however, the same volume of intellectual and financial expenditure as that described above.

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There is a real possibility to develop a practical method for the theoretical analysis of the dynamic behavior of shells and to check it experimentally on an erected structure, further, to develop computer subroutines for separate structural members.

10. REFERENCE

[1] Abel, J.F. and Gould, P.L. 1981. *Buckling of Concrete Cooling Towers Shells,* ACI SP-67, American Concrete Institute, Detroit, Michigan, pp. 135-160.

[2] ACI-ASCE Committee 334. 1977. Recommended Practice for the Design and Construction of Reinforced Concrete Cooling Towers, *ACI J.*, 74(1), 22-31.

[3] Gould, P.L. 1985. *Finite Element Analysis of Shells of Revolution,* Pitman.

[4] Gould, P.L., Suryoutomo, H., and Sen, S.K. 1974. Dynamic analysis of column-supported hyperboloidal shells, *Earth. Eng. Struct. Dyn.*, 2, 269-279.

[5] Gould, P.L. and Guedelhoefer, O.C. 1988. Repair and Completion of Damaged Cooling Tower, *J. Struct. Eng.*, 115(3), 576-593.

[6] Hayashi, K. and Gould, P.L. 1983. Cracking load for a wind-loaded reinforced concrete cooling tower, *ACI J.*, 80(4), 318-325.

[7] IASS-Recommendations for the Design of Hyperbolic or Other Similarly Shaped Cooling Towers. 1977. Intern. Assoc. for Shell and Space Structures, Working Group No. 3, Brussels.

[8] Kr¨atzig,W.B. and Zhuang, Y. 1992. Collapse simulation of reinforced natural draught cooling towers, *Eng. Struct.*, 14(5), 291-299.

[9] Kr¨atzig,W.B. and Meskouris, K. 1993. Natural draught cooling towers: An increasing need for structural research, *Bull. IASS*, 34(1), 37-51.

[10] Kr¨atzig,W.B. and Gruber, K.P. 1996. Life-Cycle Damage Simulations ofNatural Draught Cooling Towers in*Natural Draught Cooling Towers*,Wittek,U. andKr¨atzig,W., Eds., A.A. Balkema, Rotterdam, 151-158.

[11] Minimum Design Loads for Buildings and Other Structures. 1994. ASCE Standard 7-93, ASCE, New York.

[12] Mungan, I. 1976. Buckling stress states of hyperboloid shells, *J. Struct. Div.*, ASCE, 102, 2005-2020.

[13] VGB Guideline. 1990. Structural Design of Cooling Towers, VGB-Technical Committee, “Civil Engineering Problems of Cooling Towers”, Essen, Germany.

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