Development of reticulated steel cooling towers

Autor(en): **Kollár, Lajos / Cholnoky, Péter**

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Development of Reticulated Steel Cooling Towers

Développement des tours de refroidissement en treillis d'acier

Entwicklung von Stahlfachwerk-Kühltürmen

Lajos KOLLÁR
Dr. techn.
IPARTERV
Budapest, Hungary

Péter CHOLNOKY
Civ. Eng.
IPARTERV
Budapest, Hungary

Although most cooling towers are made of reinforced concrete, special circumstances /such as poor transportation facilities to remote areas, harsh climatic conditions, high seismic forces etc./ may render steel structures also competitive.

To the authors' knowledge, the first reticulated cooling tower has been built in Japan in the sixties, with a height of 45 m, having the shape of a double cone, erected with a truck-crane of the same height. The individual bars of the double-layer structure were tubes with diameters 76.3 and 114.3 mm, connected by bolts to hemispherical joints [1] .

Greater dimensions and, above all, greater heights were made possible by changing the shape of the tower to a cylindrical one and applying the principle of the "sliding shuttering" of reinforced concrete silos to the steel tower /Fig. 1/.

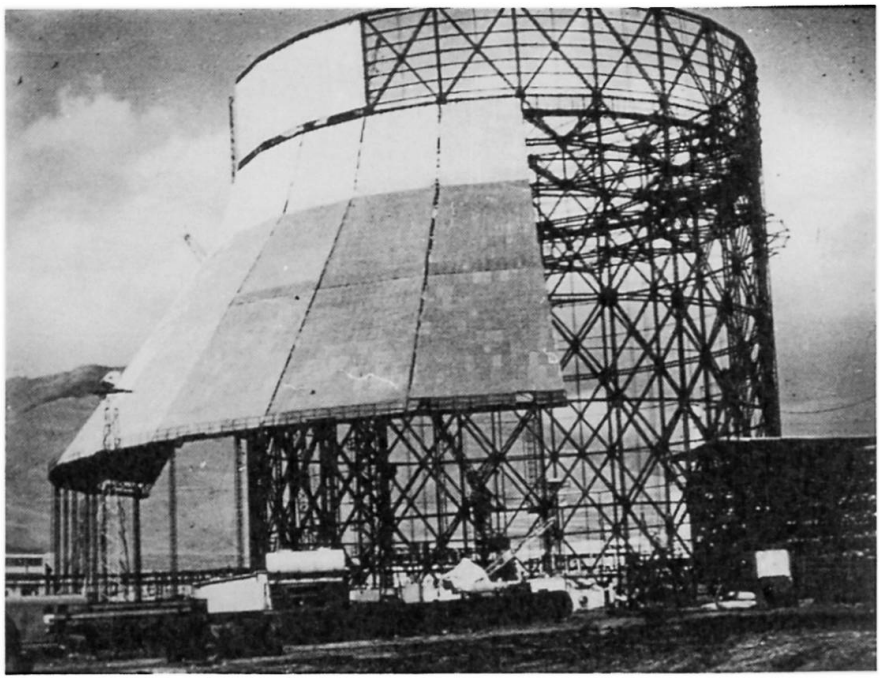

Fig. 1 Cooling tower during erection

Using the upper stiffening ring as a working platform, the panel elements of the structure could be lifted into place by assembly crane which moved around the ring. After one row of panels had been completed, the stiffening ring was lifted by hydraulic jacks, supported on the assembled panels, to the upper edge of the structure.

In order to save material, the individual bars were trusses themselves,

consisting of four angle sections as chords and four sets of bracing bars /Fig. 2/, constituting a double-layer space grid of wall thickness 610 mm.

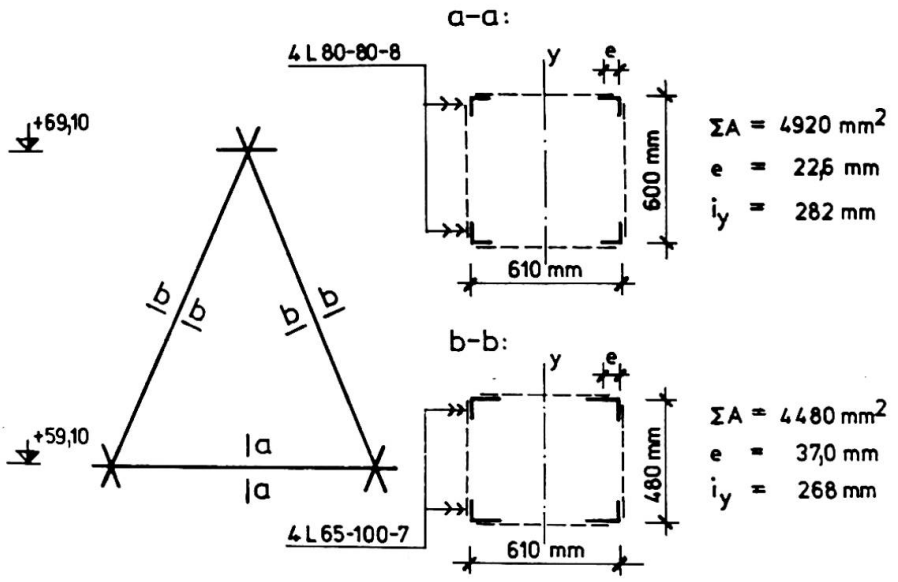

Fig. 2 Characteristic bar cross section

The individual bars were manufactured in the factory, they were connected on site to panels, of which the structure was built. All connections were welded. The towers built with this method had the heights of 120 and 150 m [2].

Further saving of material can be achieved if the lower part of the cylinder is replaced by a conical structure. However, experience showed that the inconveniences of this solution, above all the use of a high crane for assembling the conical part, do not make up for the reduction of the weight.

Similarly, although the bar cross section shown Fig. 2 is very economical in material consumption, labour costs may render it more expensive than making the individual bars of one large section. The maximum height of towers that can be erected with the greatest angle sections available lies at about 160 m. All these consideration lead to a reticulated structure consisting of bars one tube each with a large diameter. We intend to proceed in this direction when designing large steel cooling towers in the future.

REFERENCES

1. SUZUKI E. & KITAMURA H., The design and construction of a cooling tower. In: Space Structures /DAVIES R. M. ed./ Blackwell Scientific Publications, Oxford and Edinburgh, 1967. pp. 656-664.

2. KOLLÁR L., Large reticulated steel cooling towers. Engng Struct., 1985. Vol. 7. pp. 263-267.