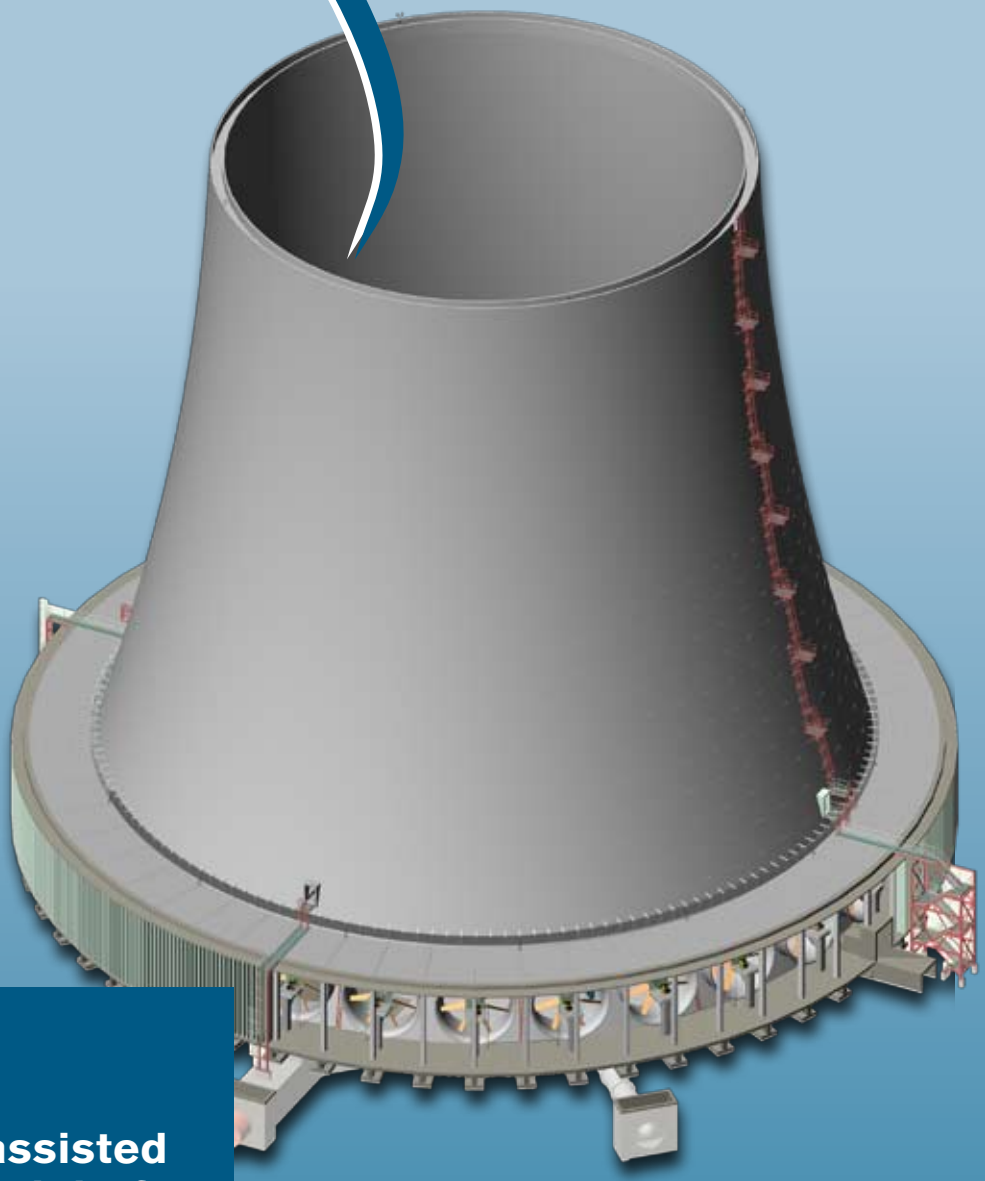
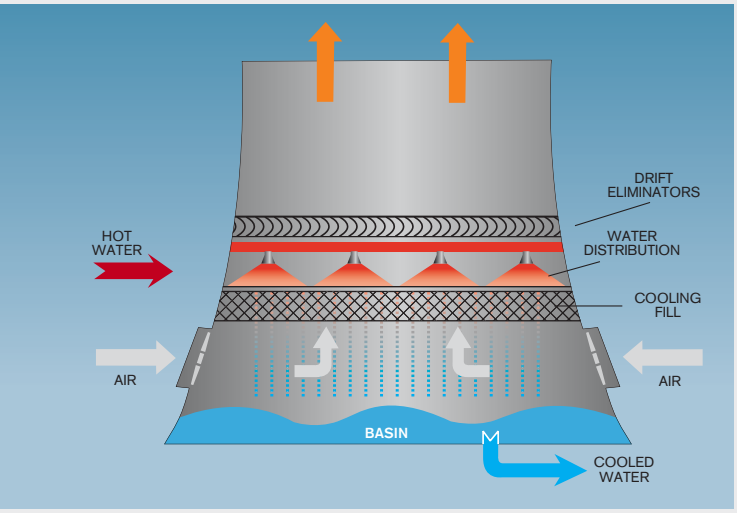
Hamon Wet Cooling Systems



Fan assisted natural draft cooling towers

HAMON

Fan assisted natural draft



The Fan Assisted Natural Draft cooling tower (FAND) combines the advantages of natural draft cooling towers with those of the cell type and represents for some applications the best available technology.

Process description

The water to be cooled enters the process section via a central riser duct which feeds the water distribution system of the different sectors. The cooling process is the same as that of every other type of cooling tower: The water is distributed over a large area and flows down through the cooling fill and finally rains down into the basin. The cooling air passes through the fill in counterflow to the water and removes the heat of the water by means of convection and evaporation. The air is pushed through the tower using forced draft fans which are arranged around the perimeter of the tower. Drift eliminators arranged above the water distribution reduce the drift of water droplets moving with the air. The humidified air leaves the tower at high elevation and forms a strong and compact stream which moves further up to higher elevations.

Construction features

Depending on size and requirements the cooling tower can be divided into 2, 4, or 8 sectors which operate independently from each other like the cells of a conventional cooling tower. This provides flexibility in operation and the required operational safety. The sectors are divided by partition walls from the basin up to the drift eliminators. The fans within one sector are operating simultaneously so that air entering the tower is not leaving through the next fan opening. The water of the sectors could be collected in individual basins or in a common one but we recommend for construction reasons not to use more than four. Each basin has an outlet which leads to the pump chambers.

The height of this type of cooling tower is typically between 40 to 100 m.

For applications in dry areas like the Middle East a wind wall should be arranged around the tower to protect the mechanical equipment against sandstorms.

This cooling tower can be located close to residential areas by using silencers and low noise equipment.

During the last 40 years this type of cooling tower has shown reliable and safe operation!

Typical application

- cooling circuits of 25,000 m³/h – 200,000 m³/h
- power-, steel-, chemical-, and petrochemical plants
- centralised cooling to serve several plants
- locations with limited space
- if overall height is limited
- cooling circuits using seawater
- winter, normal and desert climates
- locations near to residential areas

Advantages versus cells

- compact circular arrangement
- power saving due to natural draft
- plume leaving the tower at higher elevation and in consequence of this no plume and humidity disturbance in the near and far vicinity
- no deposition of salinity in the neighbourhood and good dilution of salinity in the air if operated with seawater; as a result of this potential corrosion is avoided in the neighbourhood.
- zero or reduced disturbance on neighbouring properties
- no recirculation (humid air entering back into the air inlet and influencing the performance)
- always a good alignment considering wind directions
- cooling by natural draft in case of electricity shortage

Advantages versus natural draft cooling towers

- reduced height (the implementation into the neighbourhood is easier and in consequence it could facilitate the governmental approval process)
- less space requirement
- better cooling characteristics during summer season because the air is forced by fans through the cooling tower instead of using weak natural draft
- higher operational flexibility and easier adjustment to performance fluctuations

References

The FAND is very sophisticated with regard to cooling equipment and civil structures and requires experienced and knowledgeable engineers who are provided by Hamon. The equipment is Hamon original supply with tested and proven equipment from reliable component suppliers. Computerised fluid models serve to optimise the process.

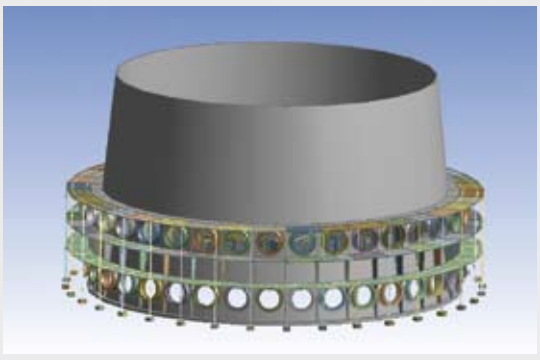
Hamon has built wordwide more than 300 natural draft cooling towers and are presently constructing the FAND cooling tower for the 912 MWe RDK8 power station of EnBW in Germany. This coal fired power plant is located within the city of Karlsruhe. The 82,000 m³/h circuit water are from river Rhine.

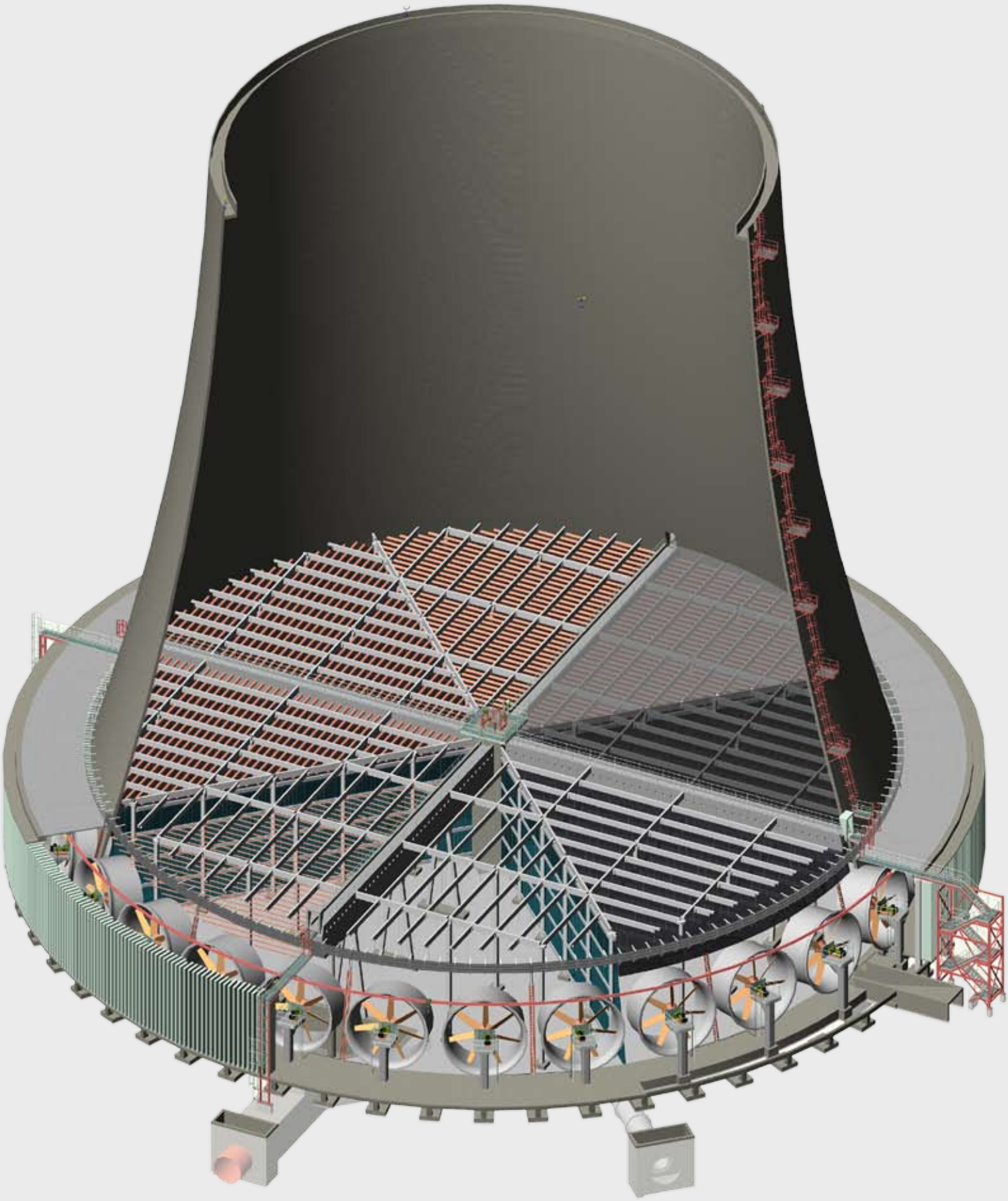
Other FAND references of Hamon are:

- 1 FAND for the Sabic plant at Wilton in UK (40,000 m³/hr)
- 1 FAND for Teeside in UK (57000 m³/h)
- 2 FAND for RWE's NPP Biblis, Germany (190,000 m³/h)
- 1 FAND for E.on's power plant Irsching, Germany (49,000 m³/h)
- Round plume abated cooling tower for Vattenfall's Moorburg plant (152,000 m³/h) *see below and pictures*

Round hybrid cooling tower

The FAND cooling tower can be built as a round hybrid (plume abated) tower combining the dry and wet cooling processes to avoid the visible plume for the majority of the year. The dry section is placed above the wet section and is served by separate fans which are also arranged at the perimeter. The airflow of both sections merges within the shell and exits the cooling tower plume free. Hamon are delivering such a cooling tower for the two 800 MWe blocks for Vattenfall's Moorburg coal fired power plant at Hamburg, Germany, cooling 152,000 m³/h of water from the river Elbe.





BELGIUM
HAMON THERMAL EUROPE (BE)
Rue Emile Francqui, 2
1435 Mont-St-Guibert
Tel: +32 10 39 05 00
Fax +32 10 39 05 01
info.hteb@hamon.com

FRANCE
HAMON THERMAL EUROPE (FR)
Perspective Seine
84, rue Charles Michels
Bâtiment C
93284 Saint-Denis
Tel: +33 1 55 87 78 78
Fax: +33 1 55 87 78 79
info.htef@hamon.com

ITALY
HAMON THERMAL EUROPE
Italian Branch
Via G. Durando, 38
20158 Milano
Tel.:+39 02 39325888
Fax: +39 02 39316046
info.htei@hamon.com

GERMANY
HAMON THERMAL GERMANY GmbH
Alte Wittener Strasse 30
44803 Bochum
Postfach 1106
44711 Bochum
Tel: +49 234 93550
Fax: +49 234 9355111
info.htg@hamon.com

UNITED KINGDOM
HAMON UK LTD.
Units 1 & 2, Ropery Park
Alfred Street
HU3 2DF Hull
Tel: +44 1482 787 767
Fax: +44 1482 706 151
info.huk@hamon.com

www.hamon.com