

Columbus' Coil

Tank heating has never before
been as easy and efficient

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Clean and compact design that simplifies equipment transportation and installation

Significantly reduced installation works and lowered associated impact of the weldings on the tank and double-bottom coatings

Small footprint that makes the majority of the bottom of the tank free of any tank-heating equipment, providing simplified and improved tank cleaning and maintenance

Substantially improved heating efficiency that reduces the required heating coil area significantly

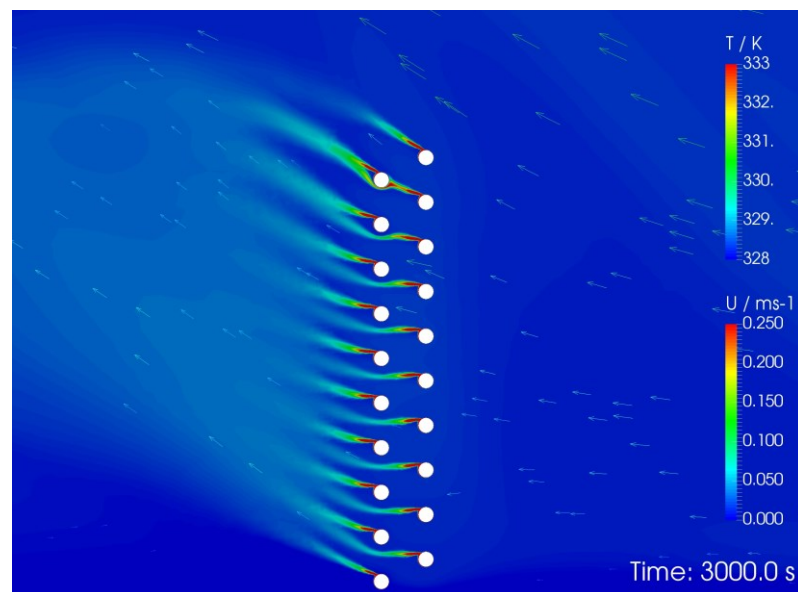
How does it work?

The working principle is determined by the position of the heating coils within the tank.

Contrary to traditional designs, in which the heating coils are uniformly extended over the bottom of the tank, Columbus'Coils are concentrated in the narrow area in the middle of the bottom of the tank, slightly asymmetrically positioned between the tank's inner and outer walls. In addition, the coils are vertically arranged, in a multitude of heating tube levels, making it a compact and convenient heating structure.

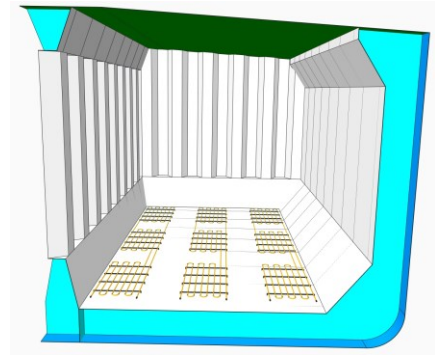
Arranged in that way, Columbus'Coils are characterized by the following features:

- They generate a large-scale heated fluid circulation about an axis parallel to the straight tubes' longitudinal axes;
- They enable a nearly horizontal cross-flow of the heated fluid through a void space surrounding the heating tubes; and
- They provide a more effective heat transfer mechanism by superimposing the large-scale circulation-driven forced convection on the buoyancy-driven natural convection.

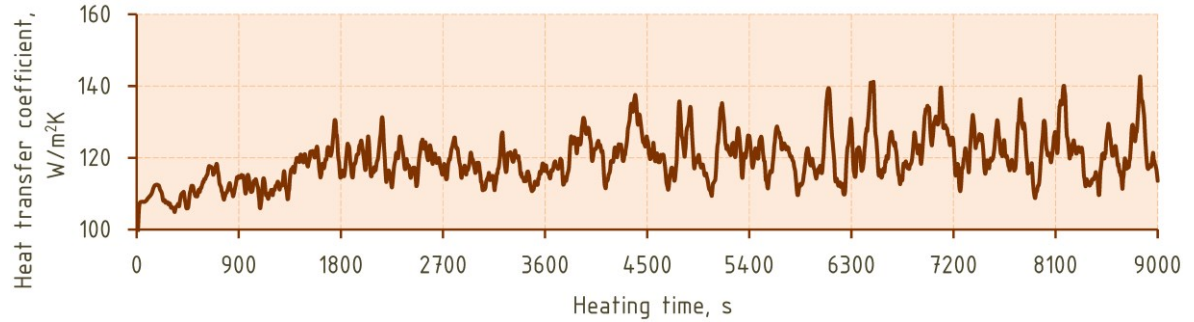


Columbus'Coil in action

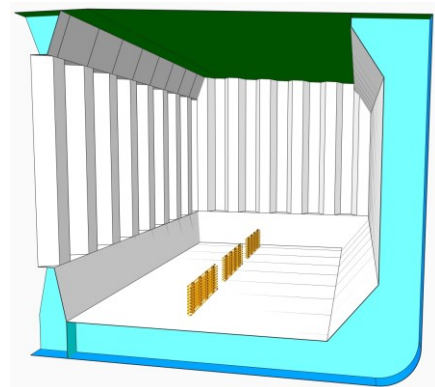
Conventional



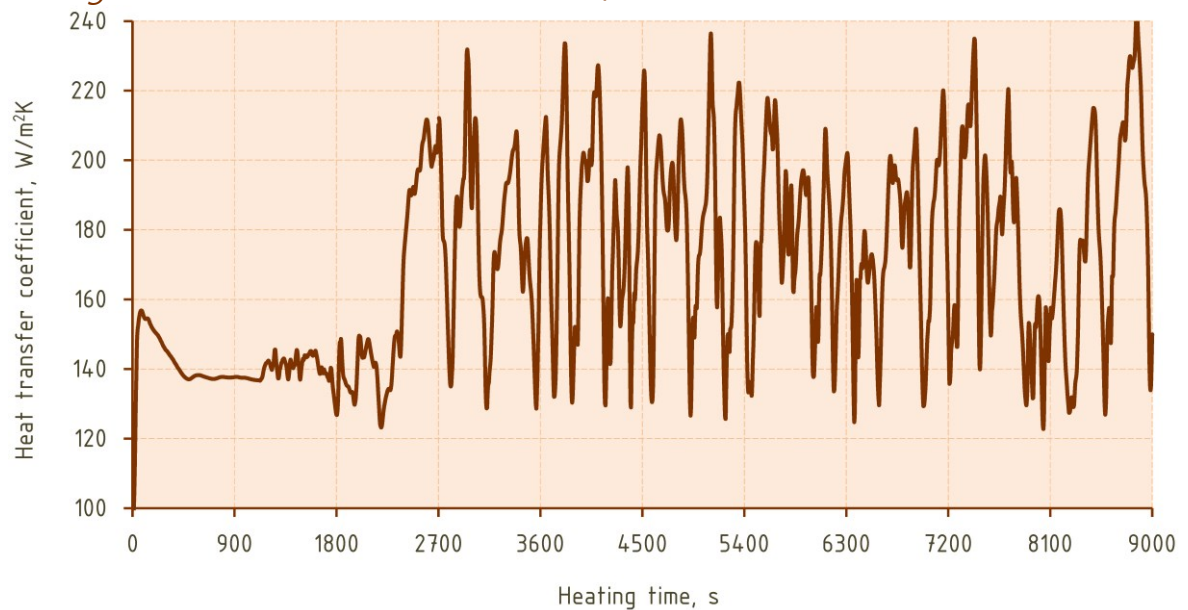
Average heat transfer coefficient = 121 W/m²K



Columbus'Coil



Average heat transfer coefficient = 178 W/m²K



Patents

The Columbus'Coil patent has been granted by the Korean Intellectual Property Organization (KIPO) in 2020. Afterward, in 2021, both Japan Patent Office (JPO) and China National Intellectual Property Administration (CNIPA) granted patents, too.

More information may be found in the records of the World Intellectual Property Organization (WIPO).

Research papers

Multi-level coil bundle for efficient cargo tank heating

Journal of Marine Science and Application 20(2021), 467-476.
[https://doi.org/ 10.1007/s11804-021-00215-0](https://doi.org/10.1007/s11804-021-00215-0)

Circulation-enhanced tank heating using shallow profile coil bundles

Journal of Marine Science and Application 19(2020), 234-245.
<https://doi.org/10.1007/s11804-020-00149-z>

Vertical arrangement of coils for efficient cargo tank heating

International Journal of Naval Architecture and Ocean Engineering 11(2019), 662-670.
<https://doi.org/10.1016/j.ijnaoe.2019.02.004>

Cargo tank heating using vertically arranged heating coils

23rd Symposium on Theory and Practice of Shipbuilding SORTA 2018, Split, 27-29 September 2018, University of Split, FESB.

More information

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The numerical results provided herein are based on the following input data: a residual fuel oil with a 991 kg/m³ nominal density, 585 mm²/s (585 cSt) nominal kinematic viscosity, and 55°C temperature; 50A steel heating coils fed by an 8 bar (abs.) steam; and environmental conditions comprising 2°C air temperature and 5°C sea temperature.