

## Thermal and Hydraulic Design of Shell and Tube Heat Exchangers

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**Abstract :** Heat exchangers are devices used to transfer heat between two fluids. These devices are utilized in many engineering and industrial applications such as heating, cooling, condensation and boiling processes. The fluids might be in direct contact (mixed), or they separated by a solid wall to avoid mixing. In the present paper, interactive computer-aided design of shell and tube heat exchangers is developed using Visual Basic computer code as a framework. This design is based on the Bell-Delaware method, which is one of the very well known methods reported in the literature for the design of shell and tube heat exchangers. Physical properties for either the tube or the shell side fluids are internally evaluated by calling on an enormous data bank composed of more than a hundred fluid compounds. This contributes to increase the accuracy of the present design. The international system of units is considered in the developed computer program. The present design has an added feature of being capable of performing modification based upon a preset design criterion, such that an optimum design is obtained at satisfying constraints set either by the user or by the method itself. Also, the present code is capable of giving an estimate of the approximate cost of the heat exchanger based on the predicted surface area of the exchanger evaluated by the program. Finally, the present thermal and hydraulic design code is tested for accuracy and consistency against some of existed and approved designs of shell and tube heat exchangers.

**Keywords :** bell-delaware method, heat exchangers, shell and tube, thermal and hydraulic design

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