



## SCIENTIFIC & RESEARCH PROJECTS

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### Project Title:

**Application of an Environmentally Optimum Cooling Water System Design in Water and Energy Conservation**

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### Abstract:

Recirculating cooling water systems are consisted of a cooling tower and heat-exchanger network which conventionally have a parallel configuration. However, reuse of water between different cooling duties enables cooling water networks to be designed with series arrangements. This will result in performance improvement and increased cooling tower capacity. Research on recirculating cooling water systems has mostly focused on the individual components.

However, a particular design method represented by Kim and Smith accounts for the whole system interactions. In this study, the Kim and Smith design method is expanded, and a comprehensive simulation model of recirculating cooling system was developed to account for the interaction between the cooling tower performance and the heat-exchanger network configuration. Regarding this model and considering cycle water quality through introducing ozone treatment technology, a modern methodology of recirculating cooling water system design was established and developed. This technique, called the integrated ozone treatment cooling system design, is a superior designed tool based on pinch analysis and mathematical programming. It also ensures maximum water and energy conservation, minimum cost and environmental impacts. Related coding in MATLAB version 7.3 was used for the illustrative example to get optimal values in cooling water design method computations. The result of the recently introduced design methodology was compared with the Kim and Smith design method.