

Simulation-Based Design Method Proves Effective for Coil Design Using MicroGroove Technology, Says International Copper Association

Joint Paper with SJTU at the International Congress of Refrigeration in Prague Describes Optimization of Residential Air Conditioners with Smaller Diameter Copper Tubes

New York, NY (August 12, 2011) — The International Copper Association today announced joint research with Shanghai Jiao Tong University on the optimization of coil designs made with smaller diameter copper tubes. Simulation-based design methods were applied to minimizing total system costs of a unit with a nominal cooling capacity of 3450 watts. Costs were reduced by 17 percent compared to systems made with larger diameter tubes.

The design goal was to minimize the total cost (including costs of materials, processes and labor) for manufacturing an air conditioner of a given capacity. The parameters to be optimized included heat exchanger length, fin pitch, number of paths and other physical and geometrical design factors. System cooling capacity did not vary by more than one percent. “The simulation-based design method allows for many heat exchanger designs to be explored more efficiently than traditional cut-and-try methods,” explained Wenson Zheng, Deputy Director of Technology for ICA. A paper titled “Simulation-Based Design Methods for Room Air Conditioners with Smaller Diameter Copper Tubes” is slated for presentation at 9:00 am on Wednesday, August 24 at the International Congress of Refrigeration in Prague. Coauthors include Professor G.L. Ding and T. Ren of the Institute of Refrigeration and Cryogenics at Shanghai Jiao Tong University (SJTU) in Shanghai, China; and Wenson Zheng and Frank Gao of the International Copper Association.

The design methodology encompasses a heat-exchanger simulator as well as a knowledge-based evolution method (KBEM). The simulator performs heat exchange calculations to determine system performances based on physical properties and geometrical design parameters, while the KBEM eliminates unfeasible or impractical designs, before the simulations are performed, allowing for a more efficient sampling of the design space.

In a case study using the design method, optimized coils were designed using smaller diameter inner grooved tubes. System costs were lowered by 17 percent compared to designs that used larger diameter tubes. The design method and case study will be discussed at the presentation in Prague. For more information about MicroGroove technology and technical papers, visit www.microgroove.net.

About ICA

The International Copper Association, Ltd. (ICA) is the leading organization for promoting the use of copper worldwide. ICA’s mission is to promote the use of copper by communicating the unique attributes that make this sustainable element an essential contributor to the formation of life, to advances in science and technology, and to a higher standard of living worldwide. Visit www.copperinfo.com for more information about ICA.

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