**HXSIM 3.0 IS A POWERFUL TOOL FOR SIMULATING MICROGROOVE COILS**

*User-Friendly Platform Predicts Performance from Versatile Database of Design Parameters*

**Montreal, Quebec (26 August 2019)** –The International Copper Association announces the release of HXSim "Small Diameter Copper Tube Air Conditioning Heat Exchanger Simulation Tool" Version 3.0.

This software tool allows one to design a MicroGroove coil from the most basic elements and then predict its performance in intricate detail. HXSim accommodates a wide range of design criteria, Simulations can be run on a desktop computer via a user-friendly graphical user interface (GUI). The main function of HXSim is to give accurate calculation results for predicting the capability of small-diameter copper-tube air conditioning heat exchangers in steady state conditions.

Once the user inputs the coil design parameters, the software calculates such quantities as heat exchange capacity, refrigerant-side pressure drop, and airside pressure drop; and it displays the results in easy-to-understand graphic or tabular formats.

**Version 3.0 in 2D and 3D**

The development and documentation of the software was supported by the International Copper Association. The manual is available for downloading from the technical literature webpage of the microgroove.net web site. <https://microgroove.net/technical-literature>

Both 3D and 2D user interfaces are available in the latest version of the simulation software. The graphical user interface (GUI) makes it easy to enter data and observe simulation results.

HXSim can simulate fin-and-tube heat exchangers for a variety of refrigerants and types of heat exchangers. The user can vary the tube size, fin design and tube circuitry as well as many other parameters. The tool gives the heat exchanger engineer deep insights into the interrelationships between various coil design parameters.

When using the program to design a MicroGroove heat exchanger, the most basic input has to do with the type of refrigerant, the type of heat exchanger and the heat exchanger dimensions. The three main "Types" of heat exchanger blocks are the I-Type, L-Type and C-Type. (The most basic block shapes roughly corresponding to the shapes of the letters (I, L or C).

HXSim allows designers to input the row spacing and the column numbers for the tube locations. Then the fin-type can be selected and data can be entered on the joints. The "Connect Tubes" function is a vital step, which can also be accomplished through the easy-to-use 2D or 3D graphical user interface.

The program allows the user to select the inlet airflow, which does not need to be uniform across the heat exchanger. A number of variables are available with respect to the inlet airflow.

A database of tube types as well as fin types is available for use. The outer diameter of the MicroGroove tubes and the tube wall thickness as well as the inside-the-tube enhancements can also be varied.

In summary, users can input parameters such as dimensions of heat exchanger, tube and fin geometry, refrigerant circuitry and operating conditions through the interactive GUI. The details of block, tubes, fins, refrigerant and air-flow are entered via data input dialog windows. Clicking the "Ok button" checks the values and closes the window. A warning dialog shows if the input data entered into some edit box is not apropos.

**Outputting the Performance Results**

Once all the inputs have been provided the user is ready to run a simulation. Figure 1 shows how simulation results can be presented as a three-dimensional colored graph. Actually, a much finer analysis is available with steady-state values of temperature and pressure available at practically any point in the path of the refrigerant.

The simulation package will output calculated quantities such as heat exchange and outlet conditions of both refrigerant and air. The calculated results can be displayed in tables and charts as well as 3D colored visualization of the properties at every location in the coil. It is also possible to print 2D and 3D heat exchanger graphs. Results can be saved and files can be serialized allowing for the application of various optimization algorithms.

The following menu items are available only after the simulation of heat exchanger is accomplished.

* "Chart" provides an access to see both inlet and outlet state parameters of air/refrigerant in every control volume of every tube through a selected refrigerant path in charts.
* "Table" provides an access to see both inlet and outlet state parameters of air/refrigerant in every control volume of every tube through a selected refrigerant path in a whole table.
* "Graph" provides an access to a window that shows the simulation results in three dimensions. For example, color gradients can help the user visualize temperature gradations in an L-Type heat exchanger in three dimensions.

Additionally, the menu item "Cost" provides an access to open the cost window which shows the heat exchanger cost. This menu item is available independently of the simulation results.

**ICA and SJTU**

This powerful software tool was developed at Shanghai Jiao Tong University (SJTU) for many years under the auspices of the International Copper Association. The project was overseen and coordinated by the renowned Professor Guoliang Ding of the Institute of Refrigeration & Cryogenics in Department of Power & Energy Engineering at SJTU.

Professor Ding led the industry in the development of heat exchangers using smaller diameter copper tubes in a variety of air conditioning and refrigeration products as well as heat pumps. HXSim represents the next big step in simplifying the design of advanced MicroGroove heat exchangers.

The International Copper Association wants you to become an expert in the design of heat exchangers made from smaller-diameter copper tubes. The HXSim software package makes it easier than ever to grasp the relationship between various design parameters. It helps to strike and perfect balance between cost limitations and performance objectives.

Running HXSim simulations on proposed designs allows one to accurately predict the performance of the coils before building and testing prototypes and investing in the tooling to manufacture coils in volume.

Of course, many coil manufacturers and heat transfer engineers have developed their own specialized software programs for simulating the performance of heat exchangers. ICA has supported the development of tube correlations through contracts with many universities and research laboratories.

Additionally, ICA has co-funded optimization studies through Optimized Thermal Systems, along with numerous OEMs. See for example, information about the OTS-ICA educational outreach program and webinar series. <https://microgroove.net/ots-ica-educational-outreach>

In conclusion, the HXSim platform is an easy-to-use and inexpensive, yet powerful and accurate, tool for the design and simulation of MicroGroove coils. For more information on HXSim, contact Wenson Zheng who is the Initiative Leader for Appliance & Technology Asia at International Copper Association's China Shanghai Office. [www.copperalliance.asia/?lang=en](http://www.copperalliance.asia/?lang=en)

**About ICA**

ICA brings together the global copper industry to develop and defend markets for copper and to make a positive contribution to society’s sustainable-development goals. Headquartered in New York, the organization has offices in four primary regions: Asia, Europe and Africa, Latin America and North America. Copper Alliance® programs and initiatives are executed in nearly 60 countries through its regional offices. For additional information please visit copperalliance.org.

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