

TC 08.05 RESEARCH REPORT – JAN 2011 / LAS VEGAS

ACTIVE PROJECTS

There are currently only two active research projects under the purview of TC 8.5. One project should be completed by the next meeting (Jun11 in Montreal) and the other should be completed within the next year (by Jan12 in Chicago).

1316-RP: Experimental Evaluation of the Heat Transfer Impacts of Tube Pitch on a Highly Enhanced Surface Tube Bundle. *PI: Steve Eckels, Kansas State Univ. PMS: Petur Thors (chair), Ben Dingel, Satheesh Kulankara, Axel Kriegsmann. Status: active (start date: Jan-2006. original target completion date: Jul-2008. extension #1 granted Salt Lake City mtg, Jun08: Jul-2009. extension #2 granted Louisville mtg, Jun09: Jul-2010. extension #3 granted Albuquerque mtg, Jun10: Apr-2011. extension #3B granted Las Vegas mtg, Jan11: Jun-2011.)*

Data collection for both refrigerants (R134a and R123) in the three bundles ($P/D = 1.167, 1.33, \text{ and } 1.50$) has now been completed. The dominant effect on bundle performance is heat flux. In R134a, the shell-side heat transfer coefficients for the 1.33 and 1.50 pitches are similar to the pool boiling curve. The h_o 's for the 1.167 pitch are significantly lower. In R123, all three pitches show performance similar to the pool boiling curve. It was noticed that the h_o 's for the tightest pitch drop down to smooth tube levels when heat flux is high and quality is greater than 60%.

Data analysis continues. The final report is expected to be submitted by May.

1345-RP: Waterside Fouling Performance of Brazed-Plate Type Condensers in Cooling Tower Applications. *PI: Lorenzo Cresmaschi, Oklahoma State Univ. PMS: Jim Bogart (chair), Art Fovargue, Axel Kriegsmann, Ken Schultz, Xudong Wang (ARTI cofounding). Status: active (start date: May-2008. original target completion date: Oct-2010. extension #1 granted Albuquerque mtg, Jun10: Oct-2011.)*

Measurements of fouling resistance and pressure drop have now been completed for the four geometries with high fouling potential water. Measurements have also been completed on two of the geometries at the standard (105°F) and elevated (120°F) saturation temperatures.

Fouling resistances were roughly an order of magnitude lower for the "hard" angle geometries than for the "soft" angle geometry. The higher saturation temperature resulted in higher fouling resistances. The pressure drop measurements continue to suggest localized precipitation might be occurring at is causing blockage of the water flow channels.

Attention will now be turned to running tests with the medium fouling potential water.

NEW PROJECTS

Jim Bogart (via second-hand) said he is willing to begin work on an RTAR for studying fouling in tube-in-tube heat exchangers. At one time, AHRI had indicated they would consider co-funding this work; will need to check with them to see if they have continued interest and resource.

Satyam Bendapudi volunteered to begin writing an RTAR to revisit our work on fouling in enhanced chiller tubes. Justin Kauffman and Ben Dingel also expressed interest in helping with this. Previously, we have discussed adding a task to review how fouling is modeled/described today for chiller tubes and to recommend a revision if warranted. TC 8.2 (Centrifugal Machines) has also discussed sponsoring a project along these lines. TC 3.6 (Water Treatment) should also be a potential co-sponsor to any of our fouling studies.

In previous meetings, both TC 8.5 and TC 1.3 had discussed beginning to look at the new low GWP refrigerants being proposed by the chemical companies. This area continues to gain momentum. Joe Huber, TC 1.3 research chair, had made an initial attempt to contact other TC's (3.1 – Refrigerants and Secondary Coolants, 8.4 – Air-to-Refrigerant Heat Transfer Equipment, and 8.11 – Unitary and Room Air Conditioners and Heat Pumps) that also have a vested interest in this topic. Joe acknowledged being tied up with other tasks (eg, Standards 22 and 181P, among others). Ken Schultz volunteered to pursue collaboration among the various TC's and develop a roadmap of potential projects in this area.

TC's 8.1 (Positive Displacement Compressors) and 8.2 are working on a RTAR to study the safety issues related to applying "2L" (mildly flammable) refrigerants in HVAC&R equipment.

The next RTAR submission deadline is 15-May. To be submitted, RTAR's must be approved by a vote of the committee. To provide sufficient time for reviewing, making revisions, and conducting an email ballot prior to the submission deadline, I'd suggest that any draft RTAR's should begin circulating by 15-April. Otherwise, circulation of a draft RTAR by, say, 15-Jun would provide an opportunity for face-to-face discussion at the Montreal meeting with a submission deadline of 15-Aug.

MISCELLANEOUS NOTES

This year's "Service to ASHRAE Research" award went to Steve Taylor, a very active member on TC 4.3 (Ventilation Requirements and Infiltration).

ASHRAE granted 22 (out of 66 applications) "Grants-in-Aid" this past year - \$10K scholarships for graduate research. "New Investigator Awards" provide \$50K to support and encourage new researchers within five years of receiving their PhD to work in the HVAC&R field. The "Homer Adams Award" provides \$5K to a former graduate student who made a substantial contribution to research and publications.

Funding available for new research in 2011-2012 fiscal year is \$1.3M. There are currently 25 tentative research projects (TRP's). 17 will be released for bid in Spring 2011. The remaining 8 will be held for bidding in Fall 2011.

ASHRAE is encouraging the formation of "Multi-disciplinary Task Groups" (MTG's) that would have a broader mandate than TC's. The idea is that MTG's could more easily develop larger strategic research projects and more actively pursue funding outside of ASHRAE. An example is the recently awarded project 1596-RP, "Ventilation and Indoor Air Quality in Retail Stores". ASHRAE solicited a \$1.5M grant from NIST to make this happen. The project went out for bid through the standard process. Five bids were received with the Univ of Texas – Austin selected to do the work.