TC 08.05 RESEARCH REPORT – JAN 2007 / DALLAS

1205-RP: Water-side Fouling Inside Smooth and Augmented Copper Alloy Condenser Tubes in Cooling Tower Applications. *PI: Louay Chamra, Mississippi State Univ. PMS chair: Art Fovargue. Status: PI stopped work (end date 31-May-06).*

The PI submitted a final report to MORTS on 02-Nov-06. The PMS members (Art Forvague, Keith Starner, Kash Oza, James Bryan, Bill Pearson, and Axel Kriegsmann) have reviewed the report. The following is their unanimous recommendation to the TC:

> "No, the Final Report is not acceptable. The primary reasons for this are that no Phase III test results were included for the average & high fouling potential water chemistries, and because documentation for the time history of test operating conditions were never provided to the PMS as requested. This is not saying that there are not other deficiencies in the report. It is noted that this report does serve as a record of some of the accomplishments of RP1205. To have this on file is appreciated."

A motion was made for the committee to accept the recommendation of the PMS. The motion was seconded and passed unanimously [8/for – 0/against – 0/abstain – 3/absent]. The research chair will forward this on to MORTS. This closes this project from TC 8.5's perspective.

1316-TRP: Experimental Evaluation of the Heat Transfer Impacts of Tube Pitch on a Highly Enhanced Surface Tube Bundle. *PI: Bruce Babin, Kansas State Univ. PMS chair: Petur Thors. Status: active. (start date: Jan-06. original/expected completion date: Jul-08)*

Construction of the bundle test shell is well underway and is expected to be completed by March. The shell for the single-tube pool boiling tests is also nearly complete. Supporting facilities are in place. Wolverine has provided the tubes for testing (Turbo-BIIHP for R134a & Turbo-BIILP for R123). A detailed analysis of the impact of water-side temperature measurement errors has been run. As a result, the contractor has chosen to use seven RTDs calibrated to ±0.025°C along the length of each tube. The contractor showed evidence of the ability to achieve this level of measurement certainty. This keeps the uncertainty in shell-side heat transfer coefficient due to water temperature measurement uncertainty to ~±4% (uncertainties in water flow rate and refrigerant temperature will increase this).

By the next meeting, results of the literature review will be presented, pool boiling tests with the first refrigerant (R134a?) should be complete, and maybe some initial bundle test data will be available. The student has decided to use this project for his PhD work.

It was requested that the PI submit the presentation material to the PMS prior to the research review meetings in the future.

Louay Chamra was a member of the PMS, but has now resigned from TC 8.5. He was replaced on the PMS by Axel Kriegsmann. The other PMS members are Satheesh Kulankara and Ben Dingel.

1324-RFP: Study of Single and Two-Phase Flow-Induced Tube Vibration in Shell and Tube Heat Exchangers. *author: Mahesh Valiya Naduvath*

This project went out for bid on 15-Oct-06. No bids were received, however. Ben Dingel volunteered to follow up with several of those on the prospective bidders list to see why a bid was not submitted. MORTS should also be following up with those on the prospective bidders list. We will discuss direction for this project again in Long Beach (Jun07).

1345-RFP: Waterside Fouling Performance of Brazed-Plate Type Condensers in Cooling Tower Applications. *author: Jim Bogart*

This project also went out for bid on 15-Oct-2007. Also, no bids were received. An inquiry of interest was received from HTRI after the submission deadline. Ken and Jim will follow up with HTRI on that interest and will discuss with the liaison (Ron Bailey) and MORTS what options are available for proceeding. ARI has offered to provide $47K in cofunding for this project.

1394-WS: Study of Carbon Dioxide Condensation in a Chevron Angle Plate Geometry Exchanger. *author: Zahid Ayub*

This work statement was conditionally accepted by RAC. Zahid addressed the questions and comments from RAC. The research liaison (Ron Bailey) has approved Zahid's response. This project will very likely go out for bid this spring.

Fouling of Tube-in-Tube Type Condensers

This is the only remaining topic on TC 8.5's research priority list. HTRI has expressed interest in doing this project. ARI has indicated cofunding might also be available for this project.

1444-URP: Experimental Evaluation of Two-Phase Pressure Drops and Flow Patterns in U-Bends for R-134a, R-410A, and Ammonia. *submitted by John Thome, EPFL*

TC 1.3 is taking the lead on review of this project. The TC 1.3 PES review was quite favorable, although several questions were raised. The TC 1.3 PES will follow up with the submitter to have those questions addressed. They will also suggest that the proposal be edited to explicitly identify how the proposal fits with ASHRAE's Research Strategic Plan. TC 1.3 expects this to proceed quite quickly and will conduct an email vote after the questions have been addressed. Once TC 1.3 has approved passing the URP on to RAC, TC 8.5 will conduct an electronic discussion and vote on whether or not to cosponsor the project. Target submission date to RAC is 15-May-07.

Future Research Projects

Prior to the meeting, Ken circulated a research idea related to secondary coolants. The objective is to identify new secondary coolants being used, collect property information for the handbook, determine material compatibility issues, and verify performance predictions. Ken discussed this idea with the TC 3.1 (Refrigerants and Secondary Coolants) chair and research chair. TC 3.1 currently is working on an RTAR directed at evaluating secondary coolant systems as an alternative to direct expansion systems in supermarkets. Collection of secondary coolant information is implicitly included in this project. Given this, a specific project by TC 8.5 on this topic would be redundant.

No other new topic ideas were presented. Members are encouraged to continue thinking of topics that will enhance knowledge and spark new developments that benefit the ASHRAE community.

Based on recent experience, several strategies were discussed to improve the prospects of receiving responsive bids to RFPs. These include managing the scope of proposed work and estimating resources and costs more accurately. Identifying prospective bidders by direct contact early in the work statement process is allowed and encouraged. ASHRAE's policy of heavily favoring selection of the lowest cost "responsive" bid was said to be a discouragement for other qualified prospective bidders.

Thorough and careful evaluation of proposals/bids is encouraged. A PES can go back to bidders for more information if there are questions that need to be addressed. Proposals can be rescored based on this new information.

Summary of Research Chair Breakfast

- Zahid Ayub received the "Service to ASHRAE Research Award" for his long and dedicated participation on RAC. In particular, he served as a champion for refrigeration in an organization that sometimes forgets the "R" in ASHRAE and HVAC&R.
- A reminder that President Terry Townsend's agenda is focused on: 1) sustainability. 2) obtaining baseline building performance data. 3) continuing on the path toward net zero energy buildings. These areas present significant opportunities for research.
- USGBC (US Green Building Council) is developing a research agenda. Look for a draft plan to come out this summer. Opportunities for collaborative research should exist.
- The California Energy Commission (CEC) is also developing an applied research agenda. Martha Brook heads the Buildings Program of the Public Interest Energy Research (PIER) Program in the governor's office. CEC has created a grant program to provide up to $50K of co-funding for ASHRAE research projects. PIER's focus is applied research that will have short-term impacts on California energy efficiency standards, utility energy efficiency incentive programs, or provide direct benefits to California consumers. PIER Buildings staff will work directly with RAC to identify appropriate projects and are willing to work with TC's to identify areas of mutual interest. Further information can be found at http://www.energy.ca.gov/contracts/pier_berg/solication.html.
- The Research Manual is being updated, a draft should be ready in June.
  - Links to current RTAR and WS forms can be found on the ASHRAE Research webpage, http://www.ashrae.org/technology/page/39; the templates in the Research Manual are out-of-date.
  - When RAC gives conditional approval to an RTAR or WS, the research liaison (RL) decides whether the changes made are significant enough to require a new TC vote or not.
  - Repeat of policies – selection of contractor:
    - Expect lowest cost responsive bidder (score > 70) to be selected.
    - If wish to recommend an other, the following three criteria must be met:
      - 2/3rds of PES members must score the proposal higher than the lowest cost bid.
      - The score must be higher by more than 5 points.
      - The ratio of cost/score ($/pt) must be lower or score/cost (pt/$) must be higher.
    - PESs can request more information from bidders regarding proposals. Rescoring of proposals in light of new information is allowed.
  - Repeat of policies – potential bidders authoring work statements:
    - Trying to balance conflicts of interest with having knowledgeable people as authors.
    - Potential bidder can be an author of a work statement as long as:
      - There are at least three authors to the work statement.
      - The author's bid must be within 10% of the work statement estimate.
      - The author must not have unique facilities or capabilities not identified in the work statement.
  - When RAC gives conditional approval to an RTAR or WS, the research liaison (RL) decides whether the changes made are significant enough to require a new TC vote or not.
  - When no bids are received for an RFP, MORTS follows up with those on the prospective bidders list that was supplied by the TC through the work statement cover sheet. *(Do those comments get back to the TC and WS authors?)*
- ASHRAE currently is flush with research funds and has a shortage of RTARs and WSs. The 06-07 research budget is $2.5M, the draft 07-08 budget is $2.2M. Projects have been averaging 20-25/yr @ ~$100K/ea. There are 99 TCs and TGs. RAC evaluated 21 RTARs at the Jun06 meeting: 13 (62%) were accepted, 7 (33%) were returned with questions and comments, and 1 (5%) was rejected. Of those returned, 60% were first submissions. So, emphasis on doing homework and following the guidelines outlined in the Research Manual was encouraged; make sure the research fits with ASHRAE's Research Strategic Plan. Work with your liaison all through the process. *(Electronic copies of preso's and handouts are stored in folder with this file.)*