

TC 08.05 RESEARCH REPORT – JAN 2006 / CHICAGO

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: active (end date extended to 31-May-06).

Since the Denver meeting (Jun 2005), difficulties have arisen between the PI and the PMS. The PI is refusing to work with the current PMS as a consequence. Because of the situation, no report was given at the Sunday research subcommittee meeting (held jointly with TC 1.3).

The situation was discussed at the TC 8.5 main meeting. The PI (Louay Chamra) and several members of the PMS were present (James Bryan, Kosh Oza, Axel Kriegsmann); the PMS chair (Art Fovargue) and several other members (Keith Starner, Amanda Meitz) were not present. Mike Vaughn (MORTS) was also present for the discussion.

The Chair (Jim Bogart) first asked that the PMS members present leave the session and then allowed the PI to present his side of the story. This project began in Jun 2001. The first difficulties began when the initial water quality survey received very little feedback. The survey was repeated at the request of the PMS. Eventually, the limited results from the surveys were combined with results obtained previously under Webb's work. In Oct 2003, the PI submitted recommendations for the low, medium, and high fouling potential water chemistries for the testing phase. The PMS reviewed the recommendations and did not concur. The PI contends that the PMS erred in its evaluation and contends that the water quality expert (Hal Roth) working with the PMS at this point tried unsuccessfully to steer the PMS in the proper direction (toward a "water cycling" concept). After a period of time, a new water quality expert (Bill Pearson) joined the PMS and was successful in directing the PMS toward the concept of "water cycling". The PI contends that the latest water chemistries to be used in testing are very similar to the chemistries the PI proposed some two years back.

The Chair then asked the PI to leave the session and the PMS members to return. The PMS agreed that it did not fully understand the water chemistry issue at the beginning of the project. However, that has been rectified now with Bill Pearson's input. The PMS noted that there have been problems with the experimental aspects of the project. The first round of low fouling data was taken at conditions not consistent with those defined in the work statement and by the PMS. The tests were rerun with little evidence of fouling (as expected). It also appears that tests are being run without much day-to-day monitoring. This has allowed variations to occur in operating conditions and in water chemistry. The PMS developed a spreadsheet that was meant to assist the PI in monitoring and data analysis. The PI apparently saw this as extra work and as an intrusion.

Although there continues to be some question as to the quality of the data being generated in this project, it was the consensus of the PMS members present that the work should be allowed to continue. The following motion was made and approved by a vote of 6-0-4:

"The Principal Investigator is asked to proceed with tests using medium and high fouling potential water chemistries that have been previously agreed upon. The Principal Investigator is asked to review all data weekly. A graph of fouling versus time should be provided by the PI on a biweekly basis. All communication is to be handled through the TC8.5 Research subcommittee chair who will act as a liaison between the PMS, PI, and committee at large."

Of the four abstentions, three were due to conflicts of interest (either a member of the PMS or the PI) and one was due to an absence during the latter half of the meeting.

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.

The contract for this project was finally initiated on 01 Dec 2005. So, work has just begun. The PI presented an overview of the project along with a rough concept for the test rig design. A question about what tubes should be used was raised. The PI was thinking of using the same tubes for both R134a and R123 tests. It was recommended that tube surfaces designed for the specific refrigerants be used. The PI will need to factor this into the rig design.

The range of tube pitches to be investigated was also discussed. The PI showed that covering the full range of P/D ratios listed in the work statement would require an excessive capacity range. Establishment of the final test matrix needs further discussion with the PMS.

Ben reminded the contractors that the objective of the project is to obtain *local* heat transfer performance data – not bundle average. Data collection and analysis need to be consistent with existing (ie, Thome's) work.

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

Bids received last spring were reviewed prior to the Denver (Jun05) meeting and judged to not meet the scope of the work statement. At the direction of the committee, Mahesh has modified the work statement. The work statement now allows the use of alternate fluids (eg, air/water in place of refrigerant) if the bidder can demonstrate that data obtained with alternate fluids can be applied to refrigerants.

The revised work statement was circulated to committee members just prior to the meeting. There was not time during the main meeting for further discussion. The research chair will send out a schedule for review and email ballot. The next submission deadline to ASHRAE for possible spring bidding is 01 Mar 2006.¹

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

Again, there was not time for discussion of this during the main meeting. The work statement was conditionally approved by RAC in Nov05. Jim will work with our research liaison (Ron Bailey, rl8@ashrae.net or ron@baileyeng.com) to resolve the questions and comments. The next submission deadline to ASHRAE for possible spring bidding is 01 Mar 2006. This project has cofunding from ARI.

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

Zahid has prepared a draft work statement for committee review. The research chair will circulate the work statement by email following the meeting.

Fouling of Tube-in-Tube Type Condensers

ARI has requested a study of fouling in tube-in-tube condensers. With this study and those listed above, fouling in condensers would be covered for a wide range of condenser types. Jim Bogart will prepare an RTAR for committee review.

¹ Per 06 Feb 2006 email from Donna Daniel.

Miscellaneous Info (from Research Subcommittee Chair workshop)

RAC has settled on new guidance on two topics:

- Procedure if the lowest priced responsive bid is NOT selected:
(written and documented, approved by Tech Council)
 1. It is intended that ASHRAE obtain the best value for its research funds expended.
 2. In general, it is expected that the TC PES will recommend the lowest priced responsive bidder. To be responsive, a bidder must receive an average score of 70 or above.
 3. A PES may recommend for selection a contractor other than the lowest priced responsive bidder in cases where all three of the following conditions are met:
 - Two-thirds of the individual PES members score the higher priced proposal higher in points than the lower priced proposal.
 - The average PES score of the higher priced proposal is 5.0 or more points above the lower priced bid.
 - The \$/point ratio of the higher priced bid is less than the ratio for the lower priced bid.
- Procedure for avoiding actual or perceived conflicts of interest:
(proposal – waiting for approval by Tech Council)
 1. It is the intention of ASHRAE that there are no actual or perceived conflicts of interest in the research bid process.
 2. In general, it is expected that the PES will recommend a bidder who was without involvement in the development of the work statement.
 3. A PES may recommend a bidder who participated in the development of the work statement in those cases where all four of the following conditions are met:
 - There were a minimum of three (3) authors who actively participated in the development of the work statement.
 - At least three responsive bids were received.
 - The work statement author's bid attractiveness is not the result of his/her having a unique facility, equipment, or capability that is not explained and/or identified in the work statement and reasonably available to other bidders.
 - The work statement author's bid total cost is within 10% of the TC cost estimate provided in the work statement

The 2005-2006 "Service to ASHRAE Research Award" was given to John Mitchell (University of Wisconsin). John served as the first chair of the Research Advisory Panel (RAP), establishing its role and responsibilities. He also spearheaded the development of the 2005-2010 ASHRAE Strategic Plan for Research.

The "electronic" version of the **ASHRAE Research Manual** is under development. It appears to simply be an Adobe PDF document with links from a table of contents to individual headings/chapters. (I was hoping for something more "web"-like.) The goal is to be online by the Quebec City (Jun06) meeting.

Research expenditures are projected as follows:

- 2005-2006 research budget: **\$2,160,900**.
- Obligations previously made for the year: **\$1,345,153**.
- Funds available to obligate to new project payments in FY 05-06: **\$815,747**.
- **Nine** new projects totaling **\$1,092,097** were started that result in **\$362,837** in additional payments during FY 05-06.
- This leaves **\$452,910** in payments that can be allocated to new projects this year.
- All thirteen TRPs that are bidding now and all six pending URPs would need to be funded at the Winter meeting in order to expend the remaining funds this year.
- Current commitments for FY 06-07: **\$1,103,748**.
- If all thirteen TRPs that are bidding now are under contract at the start of FY 06-07, we will incur **\$774,625** in additional payments for that year for a total of **\$1,878,373**.
- If the three most likely URPs are also under contract at the start of FY 06-07, we will incur an additional **\$147,989** in commitments for a total of **\$2,026,362**.
- The draft FY 06-07 budget for projects and grants is **\$2,215,700**. This would leave us with approximately **\$200K** in uncommitted funds that can be allocated to new project payments started in FY 06-07.
- On the plus side, contributions are up **12%** for the year to date and some of the TRPs that are bidding now may be delayed in starting or require rebid, which would increase the amount of uncommitted funds for next year.
- We will need to prioritize TRPs and URPs for funding in the coming year as we have done in the past.

(That is, it looks a bit tight in getting more than one work statement out for bid this spring.)