Microchannel technology bodes well for ammonia as refrigerant

By James E. Kloeppep
News Bureau Staff Writer

Modern microchannel tube technology – widely used in the automotive industry for heat exchangers – offers an excellent opportunity to rethink the use of ammonia as a refrigerant, say scientists at the UI.

In a recent feasibility study, UI researchers used a commercially available microchannel heat exchanger to create a 15-kilowatt refrigeration system with the smallest ammonia charge in the world. A similar technique could be used to significantly reduce the amount of ammonia in large chillers.

Ammonia is widely accepted as the most efficient and environmentally friendly refrigerant. But its unpleasant odor and mild toxicity have limited its use to industrial plants away from heavily populated areas.

To reduce risk and expand applications in urban areas, the amount of ammonia required to charge refrigeration and air conditioning systems must be substantially reduced.

“New designs in microchannel heat exchangers allow much smaller refrigerant charges to be used than in conventional heat exchangers,” said Pega Hrnjak (pronounced PEG-ah HER-ni-ak), a UI professor of mechanical and industrial engineering and co-director of the university’s Air Conditioning and Refrigeration Center. “Charges in these systems could be hundreds of times smaller than in conventional systems.”

To explore the feasibility of using air-cooled condensers with microchannel tubes and ammonia as the refrigerant, Hrnjak and graduate research assistant Andrew Litch constructed an experimental chiller facility. The Laboratory facility consisted of a re-circulating calorimetric wind tunnel, an ammonia chiller test bed and a pumped glycol heat recovery loop.

The researchers then evaluated two similar sized aluminum condensers: one with a parallel microchannel tube arrangement and the other with a single serpentine microchannel tube. Measurements of heat transfer, pressure drop and charge were taken over a variety of operating conditions.

“The microchannel system significantly outperformed the conventional system,” Hrnjak said. “The amount of refrigerant was reduced several times, while significantly increasing the heat transfer capability.”

Using microchannel tubes, Hrnjak and Litch successfully reduced the refrigerant charge to 2.5 ounces of ammonia per ton of evaporator capacity – considerably lower than the 12.5 ounces per ton used in current air-cooled ammonia chillers. Further charge reduction would be possible through better design of the condenser headers and optimization of the heat exchanger as a whole, Hrnjak said.

“This is not only an excellent way to reduce refrigerant charge, but also to drastically reduce the condenser size,” Hrnjak said. “Chillers could be reduced to nearly one-third their present size.”

A paper discussing the researchers’ findings has been accepted for publication in the International Journal of Refrigeration.

Researchers from around the world who led the SoyFACE experiment called for a permanent dean of ACES.

Easter named ACES acting dean

Robert A. Easter has been named acting dean of the UI’s College of Agricultural, Consumer and Environmental Sciences. He will become interim dean, pending approval of the Board of Trustees at its meeting Sept. 13 in Chicago.

Easter, an expert in wine nutrition, has served as the head of the UI department of animal sciences since September 1996. He will continue to hold the rank of professor of animal sciences.

“I am delighted to announce that Professor Easter has agreed to serve as interim dean of ACES,” said Richard H. Herman, provost and vice chancellor for academic affairs. “I have heard a great deal of admiration and respect for his professional accomplishments as well as for his personal style and integrity. His outstanding service to animal sciences, the college and the campus is well known and admired.”

Easter replaces David L. Chicoine, who served as dean since April 1996. Chicoine was named July 12 as university vice president for economic development and corporate relations.

Easter joined the UI faculty in 1976. He earned his bachelor’s and master’s degrees in 1970 and 1972, respectively, from Texas A&M University in College Station, Texas, and a doctoral degree in 1976 from the UI.

A national search will be conducted to find a permanent dean of ACES.
Tax-refunded payroll deduction

New options for buying SURA service credit

Eligible employees now have a choice of payment options available for purchasing State Universities Retirement System (SURA) service credit. Employees can now choose to pay after-tax dollars or a rollover from a qualified plan to purchase this credit. A new option allows actively employed eligible SURA members to purchase the service credit, or repay SURA refunds, using tax-refunded payroll deductions.

This program allows the UI to withdraw contributions from your salary on a before-tax basis. Additionally, it gives employees an option to budget for smaller monthly payments in lieu of making one large payment. Employees are required to make an irrevocable commitment to authorize payroll deductions over periods of one to four years. In the case of an employee’s termination, disability or death, alternatives for granting credits and repaying SURA refunds using after-tax dollars to pay the remaining balance will be available.

To be eligible, an employee must be a currently employed, actively enrolled university employee who has received at least nine months of earnings in the previous 12-month period, and enrolled in either the Traditional or Port-
Planning for your financial future
Credit union offers workshops
The UI Employees Credit Union is offering the follow-
ing free financial services workshops to UI employees (credit union members and non-members).

Aug. 30: Investment Fundamentals
Sept. 7: Retirement Planning
Oct. 11: Long-term Care
Oct. 25: Understanding Mutual Funds
All workshops begin at 7 p.m. and will be at the Credit Union, 2201 S. First St., Champaign. Reservations are required. Call 278-7768 or e-mail memfinsrv@uiucu.org.

CCSO and OIR
GradeBook workshops announced
Free hands-on workshops on Campus GradeBook are being offered for faculty members and teaching assistants. Campus GradeBook is a secure computer program that instructors can use to compute, maintain and publish their grades online. It was developed by the Computing and Communications Services Office (CCSO) and is main-
tained and supported by CCSO and the Office of Instruc-
tional Resources (OIR).

The schedule for the workshops:
Aug. 24-9:11 a.m., Undergraduate Library, Room 289
Aug. 28: 1-3 p.m., 146 Everitt Lab
Sept. 6: 10 a.m.-noon, 146 Everitt Lab
To reserve a space in one of the workshops, contact
OIR’s Division of Measurement and Evaluation at 333-
3490 or e-mail t-kehl@uiuc.edu. For more information about Campus GradeBook, visit www.uiuc.edu/ccso/ gradebook.

Free use of facilities offered
Campus Rec hosts Rec Expo
Campus Recreation will host a Rec Expo on Aug. 30 at the Intramural-Physical Education (IMPE) Building. This event will showcase the programs and services offered by Campus Rec. There will be booths in the IMPE lobby from 11 a.m.-6 p.m. for each programming area and a pool party from 5:30-6:10 p.m. with performances by local campus singing groups.

This event is open to all students and faculty and staff members. UI faculty and staff members will be allowed free use of the facility for the day and will receive a week
pass to return at a later time. For more information about the Rec Expo, check the Campus Rec Web site at www.campusrec.uiuc.edu or call 265-0779.

English as an International Language
English course for non-students
Any adult in the community who has limited English proficiency and who is not a UI student is eligible to apply for the Special English Class offered by the UI Division of English as an International Language during the fall se-

The 10-week course begins Tuesday, Sept. 25, meeting
from 1 to 2:50 p.m. Monday through Thursday each week
to December 6. There are no classes during Thanksgiving break, Nov. 19-23. There is a $50 fee for the course.

Course supervisors are Catherine Herg and Jill Knutson. Placement tests will be given from 1-2 p.m. Sept. 11, in G-13 Foreign Languages Building, and from 1-2 p.m. Sept.
13, in G-13 Foreign Languages Building.

Interested individuals can sign up at 3051 Foreign Languages Building, to take the test on one of these dates, or
call the Division office at 333-1506.

Laboratory and non-laboratory
Chemical safety training
The Chemical Safety Section of the Division of Envi-
ronmental Health and Safety (DEHS) is now offering three
chemical safety training workshops during the fall semes-
ter that address both laboratory and non-laboratory uses
of chemicals on campus. A fourth topic will address Depart-
ment of Transportation (DOT) regulations regarding the
shipping and receiving of hazardous chemicals. This DOT
HazMat Shipping Awareness class must be taken at least
once every three years if you receive (sign for) hazardous
chemicals directly from an outside vendor or if you need to
ship hazardous chemicals off-campus. Pre-registration is
required for these free classes. For detailed information on
the topics covered, class dates, or to register, visit
www.chs.uiuc.edu/~chem/train/train.html. If you need assistance in registering, call the DEHS office at 333-2755.

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the United Kingdom, National Research Council of Florence, Italy, and University of Guelph in Canada will be collecting data for their own research.

The U.S. Department of Agriculture-Agricultural Research Service and Noviski State Water Survey, Argonne National Laboratory and the U.S. Department of Energy also have scientists or student researchers on site this summer.

Tai Tran, an UI undergraduate student in crop sciences, designed the ozone system with a grant from the UI Environment Council, a program that coordinates and supports environment-based research, teaching and public service. Tran received the campus Procter & Gamble Undergraduate Student Research Award for 2001 in competition with other UI entries in the life sciences.

In all, 15 undergraduate and graduate students are involved in SOYFACE this summer. Among the students are Emily Heaton and Lisa Ainsworth, both in the department of crop sciences. Heaton, an undergraduate, will monitor growth changes with a grant from the Environmental Council, and Ainsworth is participating under a Graduate Research Fellowship for the work.

More information about SOYFACE is available at www.soyface.uiuc.edu/index.htm.

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Nation’s oldest research plots featured

A ceremony honoring the 125th anniversary of the Morrow Plots — the nation’s oldest continuously used agricultural research area — will take place at mid-day on Aug. 23, during the UI’s Celebration of Agronomy Day.

Headquarters for the 45th Agronomy Day, which begins at 7 a.m., will be the Crop Sciences Research and Education Center, located south of the Union on the 160-acre University Research Farm, located south of the Union on the 160-acre University Research Farm. Tours will leave at noon.

The main Agronomy Day program will feature four hour-long wagon tours of research plots. The tours repeat every 30 minutes when groups are available.

The program celebrating the anniversary of the Morrow Plots will begin at noon near the main registration tent. After the ceremony, buses will be available to take visitors to the plots for a guided tour.

Admission and parking at the research and education center are free. Lunch will be available at a nominal charge.

TAB/ProvoT

Teaching excellence workshop

Joseph Lowman, a professor of clinical psychology at the University of North Carolina, will give a free workshop on exemplary teaching Aug. 25 at the Heritage Room of the ACES Library. His presentation, “Exem- plary College Teaching and Student Learning,” will be from 2:30-4 p.m. Lowman has developed characteristics of effective instruction. He is the author of “Mastering the Techniques of Teaching” and many journal articles on the subject.

The workshop, which is open to faculty and staff members, is sponsored by the UI Teaching Advancement Board and the Office of the Provost.

Campus Curriculum for Instructional Excellence

Workshop to offer insight into teaching large classes well

A part of the Campus Curriculum for Instructional Excellence, a four-part workshop on improving teaching and learning in classes with enrollments of 100 or more will be offered during September.

“Improving Pedagogy in Large Enrollment Courses: Sharing Best Practices” is being presented by Shelly Schmidt, 2001 Distinguished Teacher/Scholar and a professor of food chemistry in the department of food science and human nutrition. All faculty are invited to participate in the seminars.

The program is supported by the Teaching Advancement Board and the Campus Curriculum.

The seminars will be on four consecutive Thursdays from 11:30 a.m. to 1 p.m. beginning Sept. 6. Lunch and background resources will be provided.

Sept. 6: “Teaching Large Classes Well,” Shelly J. Schmidt, 2001 Distinguished Teacher/Scholar, professor of food chemistry Location: 209 Illini Union

Sept. 13: “Helpful Tips for Teaching Large Classes From the Performing Arts,” James Zager, professor of theater Location: 209 Illini Union


Sept. 27: “Constructing and Analyzing the Results of Exams,” Cheryl D. Bullock, adjunct professor, and Chris Migotsky, special assistant in education, Office of Instructional Resources Location: 209 Illini Union

Registration is required. Participants should register no later than Sept. 1 by contacting Lisa Ochoa, at 333-2553 or l-ochoa@uiuc.edu. Space is limited and participation is on a first-come, first-served basis.

To find out more about the seminar series, contact Schmidt at sjc@uiuc.edu.

A workshop will appear in the next Inside Illinois about the Campus Curriculum for Instructional Excellence, with details about the other workshops being offered.