HTRI
A quarterly newsletter from Heat Transfer Research, Inc.

The Exchanger

Vol. IV, No. 1
Spring 1996

HTRI is online! See story page 3

IST Feature Set Ahead of Schedule

HTRI will release IST, our next-generation heat exchanger design and rating software, at the 1996 Annual Meeting of Stockholders in Colorado Springs, Colorado. Special presentations are planned, and the first IST workshops will be offered. (See "New IST Workshop", page 6.)

Features ahead of schedule…

A member task force guided the development of the original IST release schedule and feature sets. The schedule called for three releases over a period of four years with each release adding new features. To provide members with even more functionality, HTRI staff accelerated the development of the program, incorporating some features up to four years ahead of schedule.

Contents

> Some features in IST are four years ahead of schedule.

The following features, originally intended for later versions, are included in Release 1 of IST.

Features from Release 2

- Improved profile interpolation
- Ability to specify up to 25 components
- Physical property profile plotting
- Annular distributors
- Unknown duty
- Rigorous tubecount
- Temperature and pressure profile plotting
- Single-phase annulus double pipe

Features from Release 3

- Single-phase/single-phase heat exchangers

Commitment to our customers

As part of our commitment to provide customers with high-value products and services, we continue to look for ways to incorporate even more IST features ahead of schedule. Future upgrades include moving full thermosiphon capability to Release 2 and further improving the user interface.

Welcome new members!

Wellman Graham Limited
Gloucester, England

Alpha Project Services Private Limited
Baroda, India

Contact

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Corporate News

A Message From The President

Marketing & Training Director Appointed

F. J. Aguirre

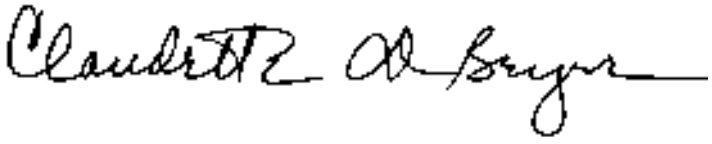
Our recent strategic planning efforts confirm that the time is right for HTRI to expand our marketing program. In response, we have created the position Director of Marketing and Technical Training. This will allow us to focus on member retention and recruitment, to provide new training options, and to leverage HTRI resources by exploring additional proprietary contract opportunities.

On behalf of the Board of Directors, I am pleased to announce that Fernando J. Aguirre, currently Director of Research, has accepted this new position. Given his previous responsibilities in HTRI research and software development, and his background in both industry and academia, Fernando is uniquely qualified to fill this role. He will continue to serve as Director of Research until his successor is named. (See position advertisement, page 6.)

During the strategic planning sessions and in meetings with members, there was a consensus that HTRI needed to expand its marketing and training efforts. Our expanded product line and global membership have resulted in an increased demand for on-site and regional training. The new fee structure (see related story page 3) enables HTRI to recruit new members in the large processor category, and attract smaller companies who qualify for the new membership categories.

Membership growth will provide a broader customer base and additional revenues to support our research and development efforts, maintain our competitive edge, and protect member investments of nearly 35 years. HTRI is committed to meeting your needs.

I appreciate your support of this important endeavor and hope you will join me in congratulating Fernando.



HTRI-Net™ Hits the Web

Welcome to HTRI-Net! HTRI has published a web site at the following address: `WWW.HTRI-Net.com/HTRI`

HTRI-Net gives us the opportunity to provide a great deal of information about HTRI and the heat transfer industry including

- *The Exchanger Online* - an electronic version of HTRI's newsletter
- *The Q Zone* - abstracts of articles in *Q*, HTRI's technical bulletin
- a list of HTRI members
- descriptions of HTRI products and services
- upcoming events
- the 1995 Annual Report
- a virtual tour of the Research Facility
- links to related sites

To get the most from the site, we encourage you to access HTRI-Net with a graphical web browser such as Netscape Navigator or Mosaic. For those using a text-based browser such as Lynx, a site with minimal graphics is available from a link on the home page.

If you would like to have a link to your company's site from HTRI-Net, or if you know of a web site that would be useful to other HTRI customers, please send e-mail to `Webmaster@HTRI-Net.com`.

See you on the net!

Fee Structure Changes

In response to stockholders' requests and the changing business environment, a Fee Structure Task Force composed of Board, Technical Committee and HTRI staff representatives was established and charged with reviewing the current membership fees to determine a fair market value for our products and services.

The task force's deliberations resulted in the

- addition of two categories to the fee structure
- revision of fees for the existing three categories to reflect current industry use and product value, and to improve our competitive position
- development of an improved security policy to protect member investment
- elimination of the initial fee for new members
- modification of contract period to provide flexibility
- revision of product availability based on new fee structure
- establishment of a Participating Affiliate registration fee for member subsidiaries with ownership of more than 50% and less than 100%.

At the Winter Meeting, the Board approved the Fee Structure Task Force recommendations. Member representatives were informed of the decisions in a special session, and a general announcement will be mailed to the entire membership in April.

The revised fee structure is effective April 1, 1996, for new members, and at the date of renewal, starting August 1, 1996, for existing members. The task force agreed to monitor the impact of these changes and consider further changes as needed.

Using Default Files

Have you ever wished you could change the default values used by HTRI software? By editing the defaults file used by the PC versions of ACE, CST, PHE, RKH, and ST, you can! The defaults file for each of these programs is located in the same directory as the executable file and has the file extension .def. For example, `ACE.DEF` is the defaults file for ACE.

Because the defaults file follows the standard HTRI data record format, it can be easily customized:

1. Start one of the programs listed above.
2. Select "Enter New Case" from the file menu.
3. Enter new default values. For example, if you prefer to work in SI units, change the units system value to "SI."
4. After making your desired changes, save the data record as `XXX.DEF`, where XXX is the name of the program (example: `ACE.DEF` for ACE).

Any new cases started from the main menu will now use these defaults. Be careful to enter or change only those values that you want as defaults. For example, if you enter values into the tube length field, all future cases will automatically have that tube length value. If you accidentally save a defaults file with values you don't want, simply start a new case, delete the unwanted values, and save over the old defaults file.

Any valid data record may be used in the defaults file — even an entire exchanger! Customization of HTRI's software is a powerful feature to save time and unnecessary work. If you have any questions about using defaults files, please contact HTRI Technical Support.

SimSci–HTRI Interface

Simulation Sciences, Inc. has developed an interface program that allows users of HTRI programs to import high quality physical property profiles from the PRO/II process simulator. This interface program operates under MS-DOS or an MS-DOS prompt in MS-Windows. From a PRO/II simulation, the interface program generates HTRI standardized data records that can be merged into any ACE, CST, PHE, RKH, or ST input file. The data record is also compatible with IST.

The interface generates U.S. Customary, SI, or MKH data records from a simulation made in any unit set. With this interface, HTRI members may obtain physical property profiles with PRO/II and use them in HTRI programs without having to reenter any data. The interface is available directly from SimSci.

HTRI/HTFS Collaboration

The HTRI/HTFS Collaborative Steering Committee met in College Station on February 9, 1996. S. Curl made an informative presentation about AEA Technology and HTFS, including recent and anticipated changes in ownership and operation. HTRI and HTFS continue to jointly fund falling film evaporator research at Lehigh University. Additionally, HTFS and HTRI continue, along with B-JAC, to help the pdXi consortium establish standards for heat exchanger data files.

HTRI President and CEO Claudette D. Beyer described the meeting as "a positive and productive session." HTFS will host the next meeting in Glasgow, Scotland allowing a tour of the National Engineering Laboratory facilities.

Continues… See "HTFS" on page 5

Film & Transition Boiling in Over-Surfaced Reboilers

Recent customer inquiries illustrate an important point about reboiler design and operation. More is not necessarily better! Excess surface area or excess MTD (mean temperature difference) can lead to serious problems.

Background and Case Study

Reboilers with large excess areas may operate in the film boiling regime due to excess vaporization or extreme boiling-side temperature differences. In stable film boiling, vapor completely blankets the tube wall, causing a large increase in heat transfer resistance compared to the preferred nucleate boiling regime (where discrete bubbles form directly on the tube wall).

The transition region between stable nucleate boiling and stable film boiling can lead to unstable operations and can reverse plant control characteristics. A recent case received by HTRI Technical Support illustrates how our software can remedy these problems. An automatic control system had increased the steam pressure and caused loss of circulation in a horizontal thermosiphon. With RKH, the user was able to predict the transition boiling problem and model the steam pressure reduction necessary to restore stable nucleate boiling.

HTRI Software Models for Transition and Film Boiling Prediction

Engineers commonly specify a required duty in RKH (for kettles or horizontal thermosiphons) or RTF (for vertical thermosiphons or other tubeside boiling cases) when check-rating a reboiler. The Final Results printout indicates whether the reboiler is too large or too small to meet the specified duty. RKH prints a "percent over design" (line 27, right side), and both programs print a "differential resistance" (RKH line 29 right; RTF line 14 right).

Both RKH and RTF also issue warning messages and reduce the predicted boiling coefficient when the maximum nucleate boiling heat flux is exceeded. However, this prediction may be blocked if the specified duty is significantly less than the predicted capacity of the reboiler at the given process conditions. A large positive over design or differential resistance marks such cases. Large fouling factors can also block the film boiling prediction since these imply a false low boiling side temperature gradient.

To check for film boiling, remove the specified duty and allow RKH or RTF to compute the true duty and boiling side temperature gradient from the given inlet conditions. Also delete any specified fouling factors to check for film boiling at clean (startup) conditions. A reduced heating medium temperature at startup should be considered if the clean case indicates film boiling.

To avoid film boiling in RKH or RTF design runs, allow the program to reduce the hot stream temperature to restore nucleate boiling (RKH Screen REBO; RTF Card 1).

HTFS (continued from page 4)

Attendees were

HTFS

- S. Curl, Chief Executive
- R. Brogan, General Manager

HTRI

- F. J. Aguirre, Director of Research
- F. D. Berkeley (Graham Corporation)
- C. D. Beyer, President & CEO

Joint HTRI/HTFS Members

- M. Gough (Cal Gavin Limited)
- W. M. Boyle (The Dow Chemical Company)

Guests

- S. B. Daniel, HTRI Director of Human Resources
- R. S. Kistler, HTRI Director of Software Development

New IST Workshop

In conjunction with the release of IST, HTRI will offer a workshop designed to help users get the most from our newest software package. This two-day course provides a comprehensive review of IST's ability to rate the performance of geometrically specified shell-and-tube exchangers. Special emphasis will be placed on using the new Microsoft Windows graphical user interface (GUI) effectively. Example cases will be presented to illustrate IST's ability to predict condensing, boiling and single-phase heat transfer and pressure drop in all common TEMA shell styles. Participants will gain valuable "hands-on" training by solving an actual problem in the workshop.

Engineers who design and rate shell-and-tube heat exchangers will benefit from the opportunity to interact with the IST development staff and become familiar with our newest program. Although no prior experience with HTRI software is assumed, current users of ST and CST will benefit from a practical overview of how IST can be used with or in lieu of other HTRI programs. A working knowledge of Microsoft Windows™ is helpful but not required.

Workshop Offerings:

July 28-29, 1996
Antlers Doubletree Hotel
Colorado Springs, Colorado, USA

August 2-3, 1996
Antlers Doubletree Hotel
Colorado Springs, Colorado, USA

September 24-25, 1996
Hotel Eden au Lac
Montreux, Switzerland

Meeting and workshop registration brochures will be mailed in May.

Director of Research

Heat Transfer Research, Inc. (HTRI), an international research consortium founded in 1962 is now accepting applications for Director of Research. Located in College Station, Texas, HTRI provides proprietary research data and software to 170+ industry members. The research is applications-oriented in the field of heat transfer and associated fluid flow and is conducted at its industrial-scale experimental facility. HTRI's software modeling and simulation tools are accepted as the international standard for designing and rating heat exchangers.

The Director of Research is responsible for planning and directing the research program and associated activities, including formulation of the annual research proposals, related budgets, and long-range programs. The Director serves on the management team, executes specific projects related to heat transfer technology, and oversees the activities of a team of research engineers, the research facility manager, and consultants. The Director also reviews and approves the technical content of all research related publications prior to release. Extensive interaction with various committees composed of HTRI customers is required to plan and prioritize the research activities.

Qualifications include

- Ph.D. in chemical or mechanical engineering
- Ten years related experience in academia or industry
- Proven success in planning and directing a research program
- Demonstrated ability to evaluate the technical merit of research proposals
- Excellent managerial, interpersonal and communications skills
- Familiarity with HTRI research and software preferred

Qualified applicants should forward a resume, letter of application detailing related work experience and interests, and a sample publication by May 31, 1996.

Breaux Daniel, Director of Human Resources
Heat Transfer Research, Inc.
1500 Research Parkway, Suite 100
College Station, Texas 77845
Fax: 409-268-0143

HTRI™

PHE Data Book Available

HTRI is pleased to announce the availability of *Plate Heat Exchanger Data Book - Volume 1*.

The data book summarizes the plate heat exchanger (PHE) data gathered by HTRI from 1986 through 1992. Data were collected on Alfa-Laval P-31 and P-32 plates using water and p-xylene as working fluids. Additional data were taken on APV SR-2 and SR-3 plates with water as the working fluid. More than 300 data runs were compiled and reduced to data tables. HTRI used the data to test and develop correlations for heat transfer and pressure drop in the PHE computer program. The data book provides

- a description of the facilities used to acquire the data
- detailed geometrical specifications of each plate and plate packing
- a description of how the data were collected
- tabulated data

To order a copy of this data book contact Product Sales and Distribution. (See page 8.)

New Minutes Policy

Since HTRI bylaws do not require distribution of Board, Technical Advisory Committee, or Technical Committee meeting minutes to members, it was the consensus of the HTRI Board distribute minutes only to the Board, Technical Committee and Subcommittee Chairs. This measure will result in cost-savings of several thousand dollars annually.

Members may still receive copies upon request.

Horizons Conference a Success

On February 12, 1996, HTRI held a one-day symposium entitled "Horizons: Emerging Non-Tubular Heat Exchanger Technologies." The symposium brought together users, contractors, manufacturers, and researchers from industry and academia to identify and discuss these technologies.

HTRI would like to thank the National Science Foundation for supporting this conference.

The presentations focused on five important non-tubular heat exchanger technologies: plate heat exchangers, spiral plate heat exchangers, printed circuit heat exchangers, circular plate and shell heat exchangers, and plate-fin heat exchangers. The objectives of the symposium were to

- inform the participants about emerging non-tubular heat exchanger technologies
- identify and discuss common experiences (pro and con) with these technologies
- educate industrial participants about current and potential applications of these technologies
- identify the advantages/disadvantages of these technologies relative to traditional shell-and-tube exchanger technologies
- identify immediate and future research needs

The 135 registered participants reacted very favorably to the symposium content and organization. The proceedings, due to be published this summer, will include the presentation overheads accompanied by short summaries.

HTRI would like to thank the National Science Foundation for providing partial support for this conference.

Upcoming Events

Heat Exchange Engineering Exhibition '96
National Exhibition Center
Hall 10, Booth HE309
Birmingham, UK
April 16-18, 1996

1996 Annual Meeting of Stockholders
Antlers Doubletree Hotel
Colorado Springs, Colorado, USA
July 29-August 2, 1996

1996 European Meeting
Hotel Eden au Lac
Montreux, Switzerland
September 23-27, 1996

1997 Winter Meeting
Houston, Texas, USA
Dates to be announced

1997 Annual Meeting of Stockholders
35th Anniversary Celebration
The Ritz-Carlton Huntington Hotel
Pasadena, California, USA
July 28-August 1, 1997

For information on meetings held in the United States, contact Susan Edwards at 409-260-6203
For information on meetings held outside the United States, contact Catherine Meyer at 409-260-6204
Information on any meeting can also be obtained by faxing 409-260-6249 or sending e-mail to HTRI@acs.tamu.edu.

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Current Software

ACE-2	1.30-1.30
CST-2	0.40-1.30
FH-0	0.00-0.00
PHE-1	0.21-1.30
RKH-3	0.10-1.30
RTF-2	7.21-1.30
ST-5	0.50-1.30
TWALL	0.12
VIB-0	0.00-0.00

To order an update for any HTRI computer program, contact Product Sales and Distribution