

HTRI<sup>®</sup>

*The Exchanger*

November 2004

**Xfh<sup>®</sup>**

**Enhanced software for  
simulating and designing  
fired heaters**

HTRI adds *Xfh* to *Xchanger Suite 4.0*

**“Point-and-Click Engineering”**

Not a panacea

**Integrating CFD**

The latest uses in research

**Technical Tips**

For *Xace*, *Xfh*, and *Xist*

**Corporate News**

New Board members

## Representatives Appointed in China

*International Innotech, Inc. and Beijing Sunbridge SoftTech Ltd.*

Heat Transfer Research, Inc. (HTRI) is pleased to announce agreements with International Innotech, Inc. and Beijing Sunbridge SoftTech Ltd. to serve as our representatives in China. They join six other representatives and agents throughout the world who serve our growing customer base and promote HTRI products and services to prospective members.

International Innotech, Inc., led by Ricky Hsu, President, is teaming up with Beijing Sunbridge SoftTech Ltd. to assist us with sales and technical support in China. They bring extensive experience in process simulation and engineering software, which allows them to provide quality local support to our current customers and expand our membership base.

Fernando J. Aguirre, Vice President, *Business Development*, noted, "We look forward to working with these new partners of the HTRI global team to better serve our customers worldwide. Join us in welcoming International Innotech, Inc. and Beijing Sunbridge SoftTech Ltd. to our Asian operations."

International Innotech, Inc. and Beijing Sunbridge SoftTech Ltd. are based in Beijing, China and can be contacted at the following locations:

### **International Innotech, Inc.**

A-16F, Star City  
10 Jiu Xian Qiao Road, Chaoyang District  
Beijing 100016  
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+86-10-8456-2281 *voice*  
[ricky\\_hsu@innotech-inc.net](mailto:ricky_hsu@innotech-inc.net)

### **Beijing Sunbridge SoftTech Ltd.**

Rm 705 B - Tower Jinma Building  
Qinghua East Road, Haidian District  
Beijing 100083  
China  
+86-10-8283-8828 *voice*  
+86-10-8283-8829 *fax*  
[likw@sunbridge.com.cn](mailto:likw@sunbridge.com.cn)

## Safety is No Accident

HTRI is dedicated to providing a safe and healthy work environment for our employees. We have an established program which has proven effective in preventing accidents over the past twelve years of operation.

Safety meetings are held on a quarterly basis not only for the facility staff but also for the researchers who are involved with experimental work. We routinely inspect the research units; some inspections are conducted on a daily basis, others on a weekly or monthly basis.

Our preventive maintenance ensures that we are able to detect a potential problem before it endangers the staff and early enough to minimize damage that would be costly to repair.

As of October 11, 2004, the Research Facility reached a record 4877 days of accident-free operations. According to J. Mike Creagor, Manager, *Research Facility*, "This is a significant accomplishment considering the types of chemicals and processing equipment we work with on a daily basis."

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### **Notice**

The articles and opinions in this newsletter are for general information only and are not intended to provide specific advice.

### **Contact**

Submit all correspondence regarding *The Exchanger* to

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## “Point-and-Click Engineering”

R. Stanley Kistler, Vice President, Research and Software Development

A number of years ago, a wise man<sup>1</sup> coined a term to describe the new software interface that users wanted as the “Nintendo Interface.” At the time, engineers were very happy typing numbers in at a DOS<sup>2</sup> prompt, although they did miss the tangible sensation of holding a deck of 80-column punch cards. Since then, HTRI *Xchanger Suite*<sup>®</sup> has been created, allowing engineers to quickly and easily design all types of heat exchangers in a Nintendo Interface environment. Even fired heaters join the mix in *Xchanger Suite* 4.0.

As engineering practice evolved, business pressures have required engineers to do more and more in a shorter period of time. The revolution started slowly. At first, process engineers “threw heat exchanger specifications over the wall” to the heat transfer specialists. Paper specification sheets were the preferred information transfer medium. Then the transmission became electronic, with files being transferred.

As engineering practice evolved further, links or interfaces allowed heat exchanger software tools to “talk to” mechanical design software. Interface evolution resulted in tighter and tighter links with process simulators. Because we now must do even more in a shorter period of time, sometimes with less people power, interface evolution has continued. Thanks in part to CAPE-OPEN<sup>3</sup> support by process simulators and HTRI, most everyone will be able to quickly design a heat exchanger inside a flowsheet. In fact, you can do that right now with *Xist* and PRO/II 7 or HEXTRAN 9 or HYSYS.

This new capability is being described as “point-and-click engineering,” and it is here to stay. Engineers do not have enough time to do their jobs any other way. And yes, it is possible for someone to design an entire plant without looking at a physical property value.

Is this a problem? Absolutely.

Engineers tend to forget that a process simulator is just another complicated piece of software that only estimates values based on equations. It doesn’t actually know any vapor-liquid equilibria and, unlike us “live” engineers, can make no value judgments based on experience. Further, much of the available software doesn’t provide a good way of looking at the data.

Should engineers be concerned? Unquestionably.

Some systems, such as those with H<sub>2</sub> or phenols or even ammonia/water do not actually behave the way some equations think they should.<sup>4</sup>

So can we achieve results that are both fast and correct? Certainly – but we must look at the numbers.

Although many experienced engineers prefer to enter all the data by hand, our current reality is that doing so takes too much time. Graphical tools like those in all the *Xchanger Suite* components let you see exactly what those numbers look like so that you can decide if you believe the numbers or not and then design the exchanger with higher confidence.

Point-and-click engineering is not a panacea; it won’t solve all your design problems. But it can give you more time to study the numbers.



**R. Stanley Kistler**  
Vice President,  
Research and  
Software Development

<sup>1</sup> Joseph W. Palen, former HTRI Director of Research

<sup>2</sup> If you are not of sufficient age, DOS stands for *Disk Operating System*. To see DOS in the current version of Windows, open a command prompt.

<sup>3</sup> Information is available at [www.CO-LAN.org](http://www.CO-LAN.org).

<sup>4</sup> Input and suggestions from Bhim S. Bhalla (Shell Global Solutions International B.V.) are gratefully acknowledged.

## The Latest Roundup for *Xfh*

Nathan W. Kidd, Software Developer



Nathan W. Kidd  
Software Developer

Not everyone born and raised in Texas grows up to be a cowboy. Take me, for example. Though a native Texan, I am terrified of horses – you couldn't get me to ride a horse if you paid me. But I'll be the first (and probably only) person to say that if *Xfh*® were a horse, I would put on a ten-gallon hat, saddle up, and ride! "Why?" you might ask. Well, keep your chaps on, pardner, because I'm about to tell you.

### A Slick New Interface for Us City Slickers

Replacing FH 3.0, *Xfh* is a new component in HTRI *Xchanger Suite* 4.0 that simulates and aids in the design of fired heaters. Let's take a good look at this thoroughbred.

*Xfh* sports a sleek new user interface that conforms to the high standards set by the other *Xchanger Suite* components. What exactly does this mean?

It means that *Xfh* inherits an enormous amount of convenient capabilities. Red outlines indicate required and missing input, and you can drag-and-drop information between *Xchanger Suite* cases and even access property generators to help you input data even faster.



### *Xfh* Highlights

You can use *Xfh* to

- troubleshoot plant problems
- evaluate competing vendor designs
- evaluate proposed changes to revamp old heaters for a new service
- evaluate the addition of a heat recovery unit and/or air preheater to improve plant energy efficiency
- evaluate the effect of proposed changes in plant operating conditions on furnace operation, including the retirement life of tubes based on past and projected operations

### Cowboy language (or lingo)

**chaps**—leather coverings for the legs

**city slicker**—someone who lives in a city (sometimes referred to as a "dude")

**gallop**—to run at a fast pace

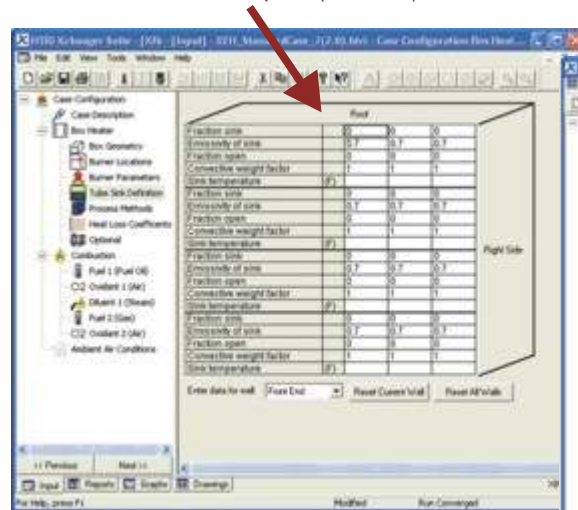
**lasso**—to throw a rope around an animal

**pardner**—friend

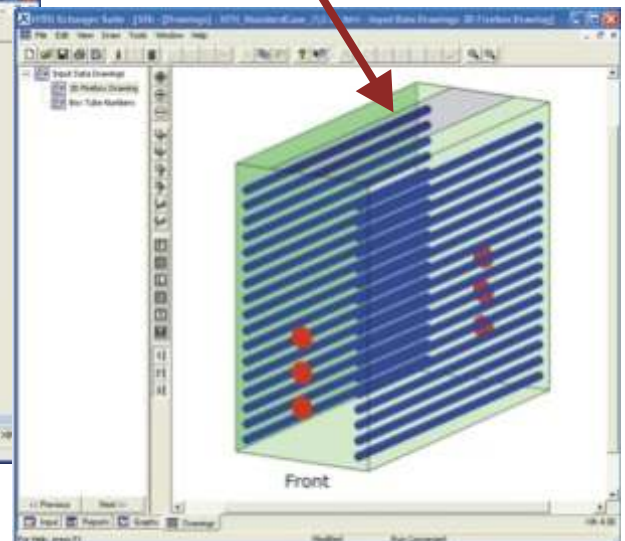
**ten-gallon hat**—typical headgear of a cowboy

**thoroughbred**—a horse with a proven bloodline or pedigree

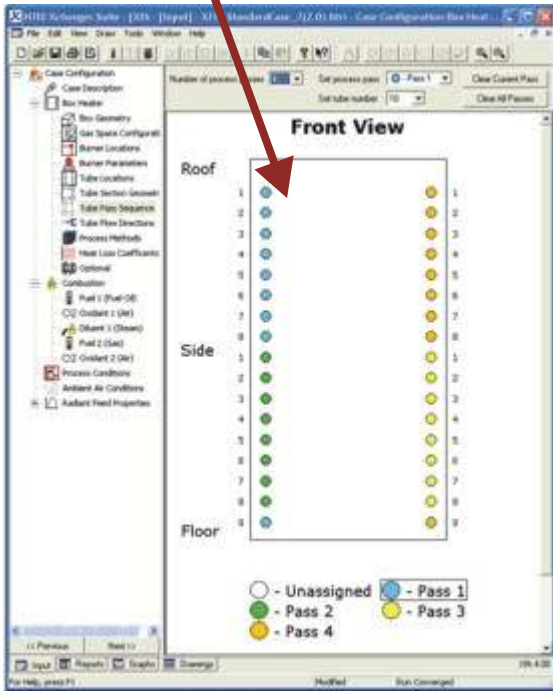
Directly specify radiative properties for every zone in a heater with the no-tubes option (FIGURE 1)



Visually verify geometry with a 3D drawing (FIGURE 2)



With an interactive drawing, just click to specify the tubepass sequence (FIGURE 3)



Xfl now includes the **API 560 pressure losses in the stack ducting and fittings**. Select the type of fitting from a list and add it to the stack. This functionality is extremely useful for building complicated stacks.

A **single-zone radiant section method** reduces the complexity of a multiple gas zone model. Xfl can calculate the radiant duty, outlet flue gas temperature, and thermal stirring factor at the drop of a ten-gallon hat.

A **no-tubes option for box heaters** has been added (FIGURE 1). Instead of specifying process tubes, you can define the surface zone radiative properties directly.

## What Else Can It Do?

Beyond these new calculation options Xfl has some great new visual features. (This is my favorite part.) Xfl now gives you the ability to quickly troubleshoot the input geometry with drawings.

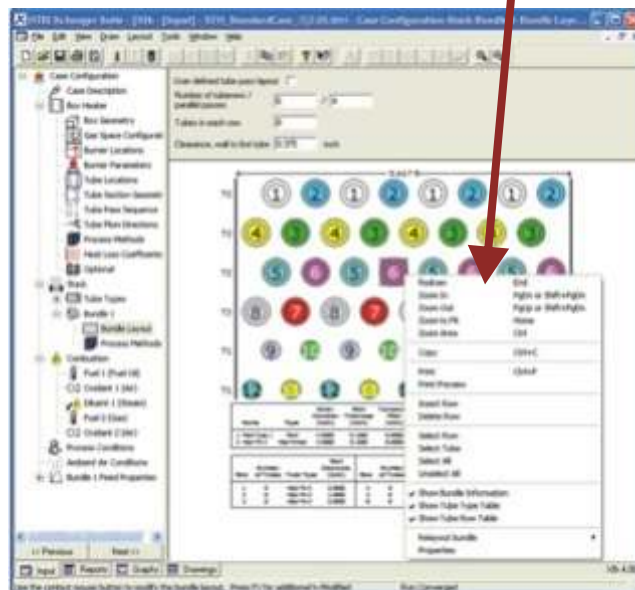
Check out this 3D drawing of the radiant section of the box heater (FIGURE 2). With this drawing we can easily tell if the burner locations and tube geometries are correct.

The new Tubepass Sequence panel (FIGURE 3) greatly simplifies specifying the process flow path through box heaters. This interactive drawing allows you to quickly define the flow path through the heater and verify it at the same time.

Convection section bundle layouts are now fully customizable using the bundle layout tool (FIGURE 4). Xfl users now have ultimate flexibility in creating convection section bundles. Right-click on any tube, and change its properties or pass number.

Graphs of the calculated output values help you gallop quickly through the results and gain valuable insight into the operation of the fired heater equipment you are simulating.

Right-click the bundle layout to access tube properties (FIGURE 4)



Continued on page 7

## Integrating CFD as a Research Tool

Kevin J. Farrell, Project Engineer, Research



Kevin J. Farrell  
Project Engineer,  
Research

Most engineers remember that first week on the job—getting acquainted with new colleagues, discovering where to access the information you need on the corporate intranet, and familiarizing yourself with the tools required for success. One of the more recent, high-tech tools appearing in the HTRI box is computational fluid dynamics (CFD).

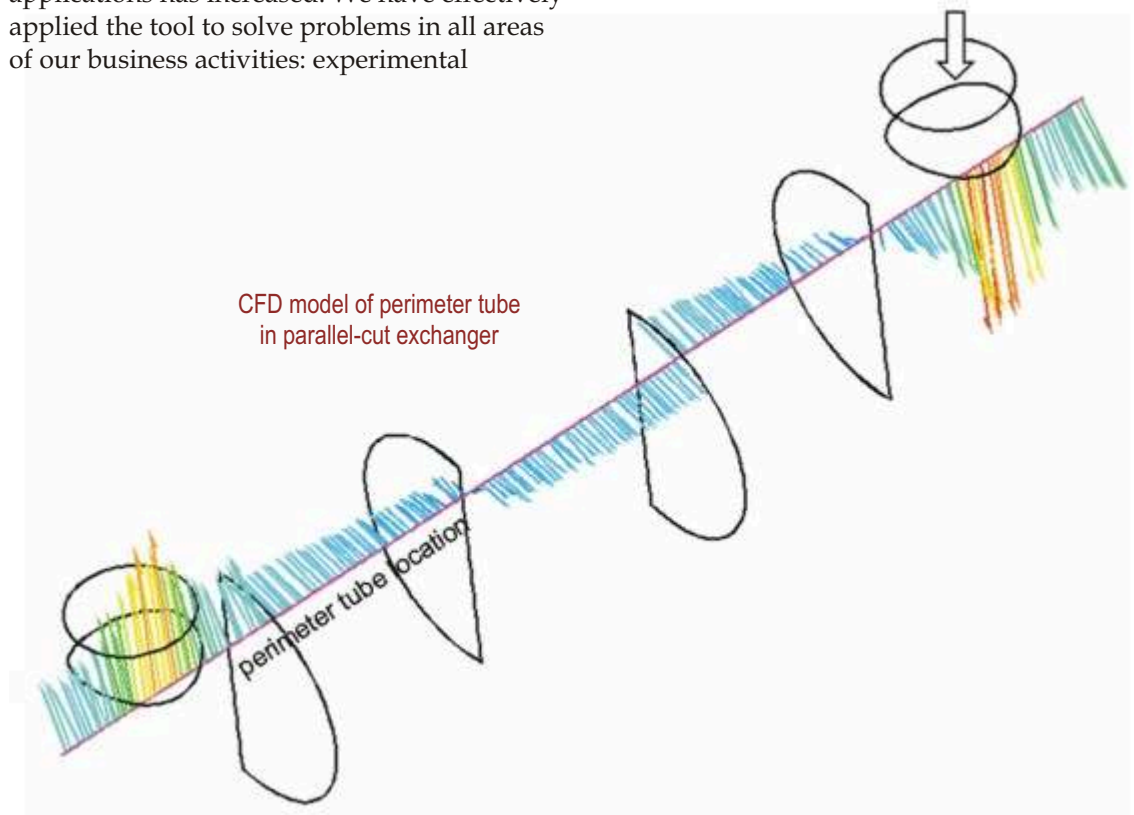
CFD clearly has tremendous potential, but many engineers find the learning curve steep and frustrating. Indeed, while commercial developers continue to improve ease of use, the successful application of CFD does require some proficiency in underlying multiphysics models, as well as the numerical algorithm and meshing techniques. Acknowledging the technical benefit of this high-level skill set, in August 2004 HTRI provided four days of intensive onsite training for all technical staff. Trainers from Fluent, Inc. discussed their Navier-Stokes solver FLUENT® and grid generation tool GAMBIT™ while providing many hands-on tutorials.

At HTRI, the number and diversity of CFD applications has increased. We have effectively applied the tool to solve problems in all areas of our business activities: experimental

research, software development, and technical services. From our initial simulations of isothermal single-phase flows, we have moved to conjugate heat transfer and multiphase flows.

As an example, CFD has enabled us to improve our vibration assessment of a perimeter tube in the parallel-cut exchanger illustrated. This tube experiences true three-dimensional excitation as the flow changes in direction from the inlet zone to the interior zones and finally to the exit zone. The CFD results shown are postprocessed to show a vector plot with the magnitude and direction of the crossflow. (Colored fluid dynamics is not entirely a misnomer!) We can enter this crossflow velocity information in two perpendicular planes in *Xvib* to provide a more precise assessment of the vibration potential of this tube—both fluidelastic instability and vortex shedding amplitude.

Our staff are now tackling new physical models in radiation, condensation, and combustion in various types of equipment like plate heat exchangers, box heaters, air coolers, and reflux



## The Latest Roundup for *Xfh*

continued from page 5

condensers—clearly not beginner problems! To maximize the benefit of our corporate experience, we have established our own internal users' group.

By integrating CFD across our staff and business activities, HTRI is well on the way to making CFD an effective and frequently used research tool. Many future and ongoing technical developments at HTRI will likely be traced back to our emerging expertise in CFD analysis.

### Recent CFD models

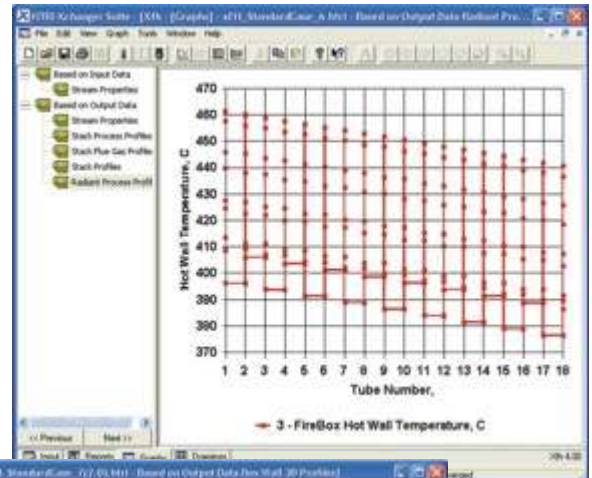
Among the varied applications HTRI has modeled are

- serpentine test section of the Multipurpose Boiling Unit (MBU)
- new test section design for the High Temperature Fouling Unit (HTFU)
- improved flow distribution in the Multipurpose Condensation Unit (MCU)
- flow distribution in TEMA X-shells
- flow distribution in annular distributors
- crossflow velocity distributions for higher fidelity tube vibration analysis
- liquid dropout in turnaround headers
- conjugate heat transfer in a fired heater tube with two-phase flow
- shell-and-tube end zone thermal efficiency
- longitudinal pitch effect in inline and staggered air cooler bundles

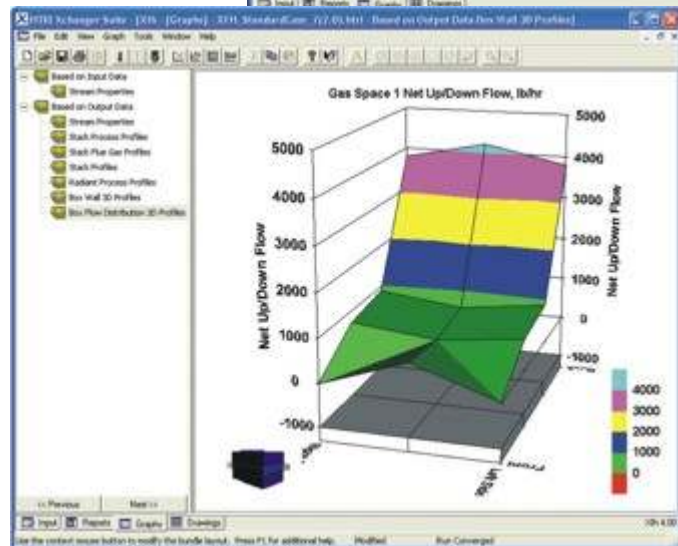
For example, you can easily determine where the hot and cold spots on the tubes are located (FIGURE 5).

3D profile graphs illustrate several aspects of the case. For instance, view the flue gas flow distribution inside the heater (FIGURE 6).

Review the wall temperature graph (FIGURE 5 at right) to identify hot and cold spots



Examine a 3D graph of flue gas flow distribution (FIGURE 6 below)



### Add This One to Your Stable!

So even if *Xfh* were a horse, I would like this latest component in *Xchanger Suite*. I assure you, I don't make this statement lightly. And to all our partners out there, get your lasso ready to rope this fiery steed—here comes *Xfh*!

### Noncondensable Gases Can Improve Boiling Process

HTRI's most recent boiling studies using n-pentane/nitrogen, p-xylene/nitrogen, and n-pentane/p-xylene/nitrogen indicate that introducing a noncondensable gas can improve the boiling process in several ways:

- *Improve thermosiphon circulation*  
Eliminating the liquid zone and the lowered average two-phase density promote thermosiphon circulation.
- *Lower boiling point*  
The noncondensable gas lowers the boiling temperature at the vapor-liquid interface because the partial pressure of the boiling components is reduced. It also lowers the wall superheat needed for nucleation because of the dissolved gases in the liquid film at the wall. Both results promote evaporation of the boiling components. The evaporation process starts at the inlet of the heat exchanger even though the boiling temperature of the components can be much lower than their saturation temperature.
- *Enhance two-phase convection*  
A low-density gas increases shear at the wall and the vapor-liquid interface, thereby increasing the convective two-phase heat transfer coefficient.

Designers can use sparge gas to increase thermosiphon circulation and improve heat transfer. However, a high concentration of the noncondensable gas significantly increases the variation of two-phase equilibrium temperature across a heat exchanger. As more vapor is generated within a heat exchanger, the partial pressure of the boiling components in the vapor phase increases, as does the two-phase equilibrium temperature. Some heat duty is required to heat the vapor-gas mixture, which introduces additional thermal (or vapor-phase) resistance.

Although the vapor-phase resistance is much lower for boiling than for condensation, our latest data indicate that it can be as high as half of the total boiling-side thermal resistance if the noncondensable concentration is high.

### Improved Accuracy for Reflux Condenser Design

Typical applications for reflux condensation include distillation column overhead condensers, vent condensers, and the vent cooling section of air-cooled steam condensers. Because vapor enters vertical or inclined tubes at the bottom of a condenser and flows upward while the condensate formed flows downward under the influence of gravity, the two-phase flow pattern and heat transfer process are significantly different. Recent HTRI experimental work further confirms that flooding results in an unstable condensing process with high pressure drops and liquid entrainment during the total or partial reflux condensation process. Thus, reflux condensers must be operated below critical flooding conditions.

We have modified our pressure drop methods for partial reflux condensation under high outlet vapor fraction conditions. *Xist* 3.0 Service Pack 3 predictions now cover a wider range of outlet vapor fractions. We validated the improved methods using available HTRI data, inquiry cases, and parametric studies, as well as used a literature method to calculate a critical exit velocity for droplet entrainment. The updated methods provide improved accuracy for the design and rating of tubeside reflux condensers.

#### Field Data Welcomed

HTRI encourages members to submit *Xchanger Suite* cases with field data. Expanding our data banks helps us validate, extend, and/or enhance our methods so that you have the most versatile and accurate design tools.

To submit cases and field data, contact

**Support@HTRI.net**

## How to...

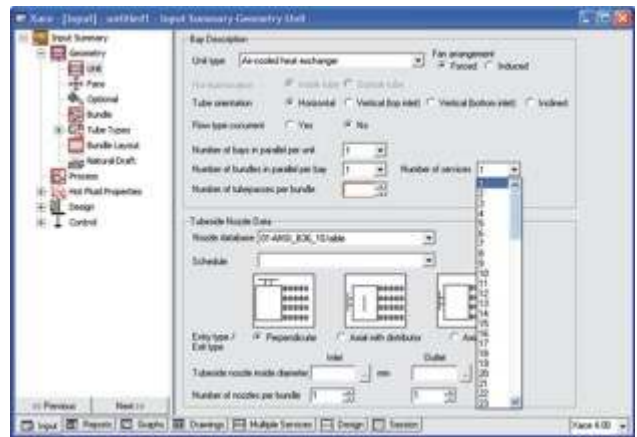
Open an FH file (created prior to *Xchanger Suite 4.0*) in *Xfh 4.0*

1. Open *Xchanger Suite 4.0*.
2. Select **File > New Fired Heater** > any one of the four new case types.
3. Select **File > Import Case...** > the desired file.

Specify multiple services in parallel for *Xace 4.0*

With this option you can have multiple bundles in a bay with each bundle servicing a different process fluid.

1. Create or open an *Xace 4.0* file.
2. Navigate to the Geometry/Unit panel.
3. Select the number of services from the drop-down list.
4. Specify the bundle geometry and outside process conditions as you normally would.
5. Choose **Unit ID 101 Bundle 1** from the Unit ID 100 Summary Unit drop-down list located at the top left corner of the *Xace* GUI.
6. Specify the tubeside process condition.
7. Repeat Steps 6 and 7 for the additional bundles.

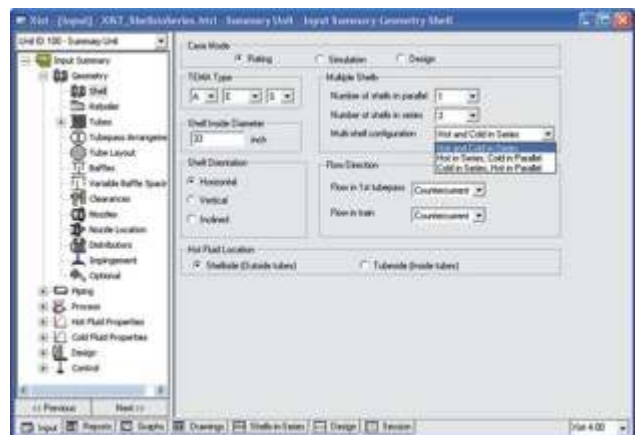


Specify different process fluids for multiple bays

Specify shells-in-series with one stream in parallel for *Xist 4.0*

This option allows you to have multiple process fluids on each shell or simply divide a single process stream between different shells.

1. Create or open an *Xist 4.0* file.
2. Navigate to the Geometry/Shell panel.
3. Select the number of shells in series from the Number of shells in series drop-down menu.
4. From the Multi-shell configuration drop-down menu, select the stream that is in parallel.
5. Enter the geometry and process conditions for the fluid in series as you would normally.
6. Select the individual shells from the Unit ID 101 Shell 1 drop-down menu, and specify the corresponding process conditions.



Divide single process stream between multiple shells

## Technical Support

To ensure that your message reaches an available staff person, e-mail technical inquiries to

**Support@HTRI.net**

Technical support is available from all HTRI offices, as well as from representatives in China, France, India, Italy, and South Africa. Further information appears on page 16.

## HTRI Board of Directors and Technical Committee

FY 2005

### Annual Meeting of Stockholders 2004

After serving the full term of four years as Chair of the HTRI Board of Directors, William M. Boyle relinquished the position. We appreciate the time and effort Boyle devoted to the position and the commitment of all active volunteers, as well as the support of the many member companies that allocate corporate resources to allow these volunteers to participate.

The newly elected Chair, Larry G. Hackemesser, thanked Boyle for his contributions of the past four years and introduced the FY 2005 Board of Directors to the attendees.



### HTRI Board of Directors

Front row (left to right): Jinn H. Wang, William M. Boyle, Larry G. Hackemesser (Chair), Naoki Dohi, and Takashi Noto

Back row (left to right): Donald W. Meyer (Vice-Chair), Martin J. Gough, T. Michael O'Connor, G. E. (Buddy) Kluppel, and Michael McMillion

Larry G. Hackemesser, Chair  
Donald W. Meyer, Vice-Chair  
William M. Boyle  
Naoki Dohi  
Martin Gough  
G. E. (Buddy) Kluppel  
Michael McMillion  
Takashi Noto  
T. Michael O'Connor  
(Advisory Director)  
Jinn H. Wang

Kellogg Brown & Root, Inc.  
Burns & McDonnell Engineering Co., Inc.  
The Dow Chemical Company  
Mitsubishi Chemical Engineering Corporation  
Cal Gavin Limited  
Hudson Products Corporation  
Eastman Chemical Company  
Chiyoda Corporation  
O'Connor Ventures, Inc.  
  
UOP LLC

Bill G. Ashenhart, Technical Committee (TC) Chair, presented the final revisions of the Technical Operating Plan, announced the re-election of all the TC members, and introduced them.

Bill G. Ashenhart, Chair  
Thomas M. Rudy, Vice-Chair  
Jean Jacques Delorme  
Bennat J. Drazner  
James J. Grant III  
Robert P. Hohmann  
Stephen W. Johnston  
Michael D. Kindschi  
David C. King  
Robert Lee  
Takao Ogawa  
Jack J. Piparia

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Hughes-Anderson Heat Exchangers, Inc.  
BP p.l.c.  
BSF China Company, Ltd.  
Toyo Engineering Corporation  
Ecodyne MRM, Inc.

## HTRI Meetings around the World

Starting in September each year, HTRI holds meetings with its members around the globe. The 42<sup>nd</sup> Annual Meeting of Stockholders was held in September in conjunction with the North American Meeting in San Diego, California, USA. In October the European meeting was held in Strasbourg, France, and the first of our Asian meetings was held in Kyoto, Japan, in November.

The December schedule includes sessions in Shanghai, China. India will be the site of a meeting in early February 2005.

## Technical Committee

Front row (left to right): Jack J. Piparia, Michael D. Kindschi, Takao Ogawa, James J. Grant III, and Robert Lee

Back row (left to right): Bennat J. Drazner, Jean Jacques Delorme, Bill G. Ashenhart (Chair), Stephen W. Johnston, Robert P. Hohmann, and Thomas M. Rudy (Vice-Chair)

Not pictured: David C. King



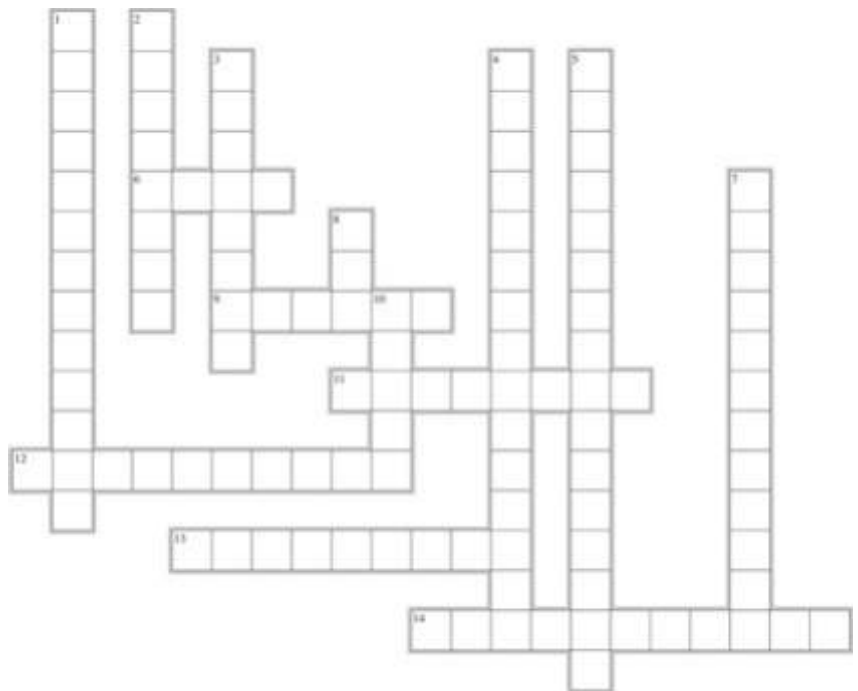
## Reboiler Puzzler *(Answers on page 14)*

### Across

6. An undesirable boiling regime.
9. Pressure drop through outlet piping should be less than \_\_\_% of total pressure drop.
11. Maximum heat flux for wet-wall conditions.
12. Wet-wall boiling contribution that increases with increasing flow rate.
13. The boiling fluid is typically on the \_\_\_ for horizontal thermosiphons.
14. Undesirable liquid at kettle outlet.

### Down

1. Ratio of total flow rate divided by feed rate for kettles.
2. In horizontal reboilers, a weight fraction vapor exceeding 0.6 can result in \_\_\_.
3. Boiling mechanism that occurs at small surface imperfections where bubble formation occurs.
4. Film breakdown in falling film reboilers due to a surface tension gradient.
5. Distance between the liquid level in the column and the bottom of the reboiler bundle.
7. Applied in the HTRI mixture correction factor for the boiling heat transfer coefficient.
8. Theoretical Boiling Range Method.
10. Minimum recommended number of *X<sub>ist</sub>* reference pressures for thermosiphons.



### New Chair and Vice-Chair of Board of Directors

#### Biographical Information



Larry G. Hackemesser

**Larry G. Hackemesser**, Chair, has served on the HTRI Board of Directors since 1999 and as Vice-Chair since 2000. Hackemesser has engineering experience in both furnace and exchanger technology. As Chief Technology Engineer at Kellogg Brown & Root, Inc., Houston, Texas, USA, he is now responsible for analytical and mechanical exchanger activities of the Exchanger Technology group.

**Donald W. Meyer**, Vice-Chair, is Principal Chemical Engineer with Burns & McDonnell Engineering Co., Inc., Kansas City, Missouri, USA. He previously served on the Board of Directors Audit Committee and as Board Treasurer. Meyer brings to the Board over thirty-five years of engineering experience, including specialized work in distillation, crystallization, and process simulation.



Donald W. Meyer

### New Board Members Elected

Four new volunteers broaden our geographic and industrial base, as well as provide new expertise and a dash of independence.



Naoki Dohi

**Naoki Dohi** brings over twenty years of experience in plant engineering and construction, as well as plant maintenance. As Deputy General Manager of the Process Design Department in the Engineering Division of Mitsubishi Chemical Engineering Corporation, Ibaraki, Japan, Dohi has been responsible for process and equipment design, as well as cost engineering for petrochemical,

chemical, and life science industries. In addition he has worked on numerous projects including the Process Equipment Reliability Database (PERD) and CAPE-OPEN.



Martin J. Gough

With the election of **Martin J. Gough**, the spirit of entrepreneurship materializes. As Chairman and Managing Director of Cal Gavin Limited, Alcester, Warwickshire, United Kingdom—a company he founded in 1980—Gough continues to lead new product design and engineering activities. He is also founding director of Process Kinetics Ltd., a firm focused on the development

and commercialization of high intensity rotating reactor systems for the process industry. Gough has also served as the chair/organizer of several international conferences and exhibitions.

For over 30 years, **Michael McMillion** has been employed at Eastman Chemical Company. His experience includes process design and improvement, project management, and engineering computer applications. Although McMillion, a Heat Transfer Specialist, is based at their facility in Longview, Texas, USA, he provides corporate support for heat transfer and fluid flow applications in Eastman's production plants worldwide. McMillion has been active in HTRI since 2001.



Michael McMillion

The selection of **T. Michael O'Connor** to serve as the first Advisory Director re-involves the once active Technical Advisory Committee representative. In 1995, he established the Mary Kay O'Connor Process Safety Center at Texas A&M University, College Station, TX, USA where he currently serves as a Research Associate, as well as on the Executive Forum, Steering Committee, and Technical Advisory Committee of the Center. In addition to process safety, his primary interests are heat transfer in high temperature heat exchangers and furnaces, as well as metallurgy associated with these applications. He is President of O'Connor Ventures, Inc. in Katy, Texas.



T. Michael O'Connor

**Thomas G. Lestina, PE**  
*Director of Engineering Services*

To reflect the increased demands for engineering services and the growth in contract activity, training, and technical support, HTRI has promoted Thomas G. Lestina to the newly created position of Director of Engineering Services. *Engineering Services* more appropriately defines the myriad duties with which Tom and his staff are now engaged.

Since joining HTRI in July 2001, Tom has reorganized and expanded the traditional technical services activities to provide improved value to the entire membership. He also has taken a leadership role in the quality assurance process and been instrumental in identifying emerging areas of interest that mesh with HTRI's existing technology or that afford opportunities for HTRI to enter new markets.

Tom's emphasis on expanding our experimental, analytical, and software development contract and consulting work provides a mechanism not only for performing a valuable service for our members but also for

attracting clients from traditionally underserved areas. Under his direction, membership surveys and ad hoc working groups have helped us identify other ways we can provide support to our customers worldwide.

Tom joined HTRI with twenty years of broad-based project management experience at MPR Associates, Inc., Alexandria, Virginia, USA, which he quickly transferred to addressing the challenges of his position at HTRI.

Tom earned a B.S. in Mechanical Engineering from Union College, Schenectady, New York (NY), USA, and an M.S. in Mechanical Engineering from Rensselaer Polytechnic Institute, Troy, NY, USA. He is a member of ASME, chairing the technical committee for the ASME Performance Test Code 12.5, Single Phase Heat Exchangers. Lestina is a licensed Professional Engineer (PE) in Texas, USA. His wife, Diane, is a professional chef; they have two children, Jack and Abby.



**Thomas G. Lestina**  
*Director of Engineering Services*

### Holiday Schedule

Our USA and European offices will be closed

December 24, 2004 -  
December 31, 2004

Our Asian office will be closed

December 29, 2004 -  
January 4, 2005

During this time, we will monitor the technical support e-mail and telephone for messages.

The USA and European offices resume business on Monday, January 3, 2005; the Asian office, on Wednesday, January 5, 2005.

**From all of us at HTRI...**

*Happy Holidays*

**Maribel Anaya**  
*Administrative Assistant*

With six years as a Classified Marketing Consultant with the local newspaper, *The Bryan-College Station Eagle*, Maribel brings extensive customer service experience to her position in Membership Services. In addition to her work in the journalism sector, Maribel has performed bookkeeping and other recordkeeping duties in both retail and business office environments. These skills, along with her bilingual abilities, will serve her well as she provides administrative support for the myriad HTRI membership-related activities. Maribel is a native of the area, graduating from Bryan High School, Bryan, Texas, USA, in 1993.



**Maribel Anaya**  
*Administrative Assistant*

## Report AC-13

### Condensation of Vapors from a Gas Stream Outside High-Finned Tubes

Challenged by modeling dehumidification in a high-finned tube bundle? **Cut costs** by avoiding the additional surface that results when condensation in the gas stream is ignored.

Report AC-13 describes two new modeling methods that will be available in *Xace* 4.0. The first method is a mass transfer or Colburn-Hougen-type approach appropriate for condensing water from an air stream. The second method is a modified Resistance Proration Method, recommended for other dehumidification services.

HTRI reports are available on [www.HTRI.net](http://www.HTRI.net) for all Level 3 (category III, IV, and V) HTRI members. Access requires the installation of HTRI e-Library and an Internet connection. For information on upgrading your membership, please contact

**Membership@HTRI.net**

If you have installed HTRI e-Library and are having trouble accessing [www.HTRI.net](http://www.HTRI.net), please contact **Support@HTRI.net**.

## Staff Publications/Presentations

F. J. Aguirre, L. Huang, Z. H. Yang, and H. Uozu, New advances in heat exchanger design software, AchemAsia 2004, Beijing, China, May 14, 2004.

This presentation describes the key features of *Xchanger Suite* and the three-dimensional incrementation technique used in the calculation of shell-and-tube heat exchangers.

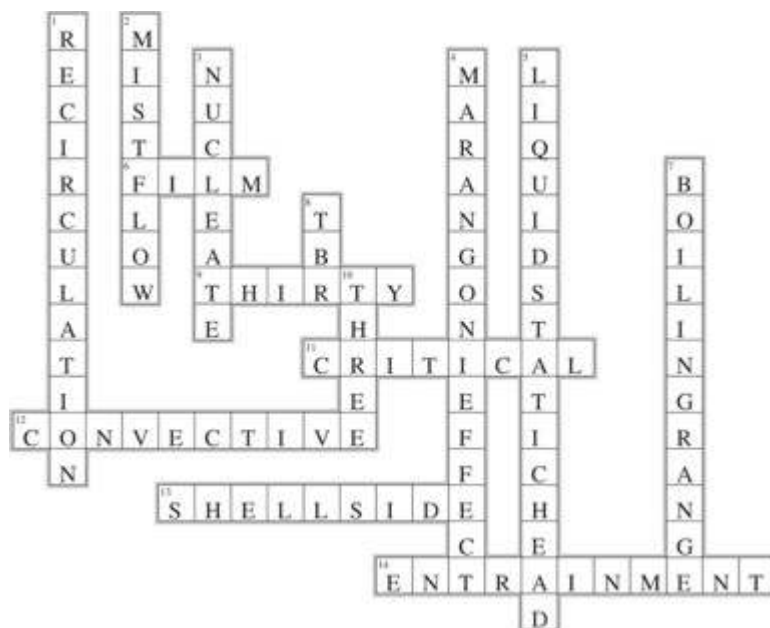
C. A. Bennett, R. P. Hohmann, H. M. Joshi, D. C. King, T. Y. Lam, T. M. Rudy, and S. E. Stomierowski, Industry-recommended procedures for experimental crude oil fouling research, *The 5th International Conference on Petroleum Phase Behavior and Fouling*, Banff, Alberta, Canada (June 14 – 17, 2004).

In this presentation and accompanying paper, the HTRI Crude Oil Fouling Task Force recommends standards for crude oil fouling experimental design and data analysis. Implement these suggestions to ensure optimal research resource allocation and unequivocal comparison of non-proprietary data.

J. Nesta and C. A. Bennett, Reduce fouling in shell-and-tube heat exchangers, *Hydrocarbon Processing* 83(7), 77 – 82 (2004).

Strategic heat exchanger design minimizes, and often eliminates, fouling. This paper summarizes HTRI fouling mitigation methods and provides detailed instructions for non-fouling heat exchanger design. These theoretically sound techniques are field proven for multiple problematic services, including the crude oil preheat train.

## Reboiler Puzzler Key





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# current software

HTRI *Xchanger Suite* .....4.0

<i>Xace</i>	<i>Xfh</i>
<i>Xhpe</i>	<i>Xist</i>
<i>Xjpe</i>	<i>Xphe</i>
<i>Xtlo</i>	<i>Xvib</i>

ST Educational .....1.1

HTRI e-Library .....1.2

## Software distributed by HTRI

EHT .....2.1

To order HTRI software updates,  
e-mail [Orders@HTRI.net](mailto:Orders@HTRI.net)

# upcoming events

December 2004 – May 2005

## Asian Meetings

December 6 – 9, 2004  
Regal International East Asia Hotel  
Shanghai, China

- HTRI *Xchanger Suite* Essentials Workshop
- Boiling & Condensation
- Vibration Analysis

February 9 – 11, 2005

The Leela Kempinski Mumbai  
Mumbai, India

- *Xist* and *Xace* Workshop
- *Xfh* Workshop

## College Station Training

January 12 – 14, 2005

- *Xfh* Workshop
- Advanced Vibration Analysis

## European Training Week

April 4 – 8, 2005

Crowne Plaza Maastricht  
Maastricht, The Netherlands

For more details, see  
Upcoming Events at [www.HTRI.net](http://www.HTRI.net)