

HTRI®

*The Exchanger*

May 2005

HTRI

**HTRI's New Research and  
Technology Center**

Navasota, Texas, USA

**CAPE-OPEN**

Ensuring seamless design

**New Prototype Test Unit**

Team design approach

## New Task Force Seeks Volunteers

### Exchanger Design Margin Task Force

Expanding the knowledge of process heat transfer allows industries to reevaluate the way heat exchangers are designed. One area that warrants examination is the standard approach of using traditional fouling factors.

The actual values of these fouling factors have not changed in decades and still include uncertainty in the prediction of heat transfer coefficients, even though confidence levels for such prediction have increased dramatically. Continuing to use these values can result in heat exchangers that are larger than necessary.

In March 2005, HTRI organized an Exchanger Design Margin Task Force (EDMTF), asking member company representatives to participate. The goal of the EDMTF, as stated in its charter, is to develop the design philosophy for adding margins for process uncertainties and fouling to heat exchanger design based on the specific process instead of using blanket fouling factors.

The most immediate objective of the EDMTF is to produce a white paper that reviews current knowledge and

summarizes key steps to improve the application of heat exchanger design margins. This will be done by the end of 2005. In June 2006, the task force will define research projects that will improve confidence in the analysis of thermal design margins. Members of the EDMTF will include processors, vendors, and contractors along with HTRI staff so that the most relevant information can be used.

Active participation in the EDMTF requires communicating via e-mail, teleconference, and web conference. Meetings will be held no more than twice per year, generally in conjunction with another HTRI meeting.

Similar task forces on fired heaters and on fouling have produced impressive results. If you are interested in learning more about the EDMTF, please contact us at EDMTF@HTRI.net. The call for members remains open through June 2005.

## New Communication Committee in China

In December 2004, more than 30 member representatives from throughout China formed a new communication committee, CC-China.

Ms. Liping Gao (Sinopec Engineering Incorporation) serves as Chair, and Ms. Weiming Zhu (China Huanqui Contracting & Engineering Corporation) as Vice Chair.

HTRI welcomes the formation of this new group, which brings the number of CCs to thirteen.

These member-initiated and member-managed committees formalize and facilitate input, helping members in geographic proximity communicate their opinions and needs to HTRI. The CCs provide feedback on proposed software enhancements, while their information about operating exchangers and other field experiences assist us in shaping the future of our technical program.

For more information about forming a CC in your area, contact HTRI@HTRI.net.

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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.

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## Groundbreaking Held for New Research and Technology Center

Navasota, Texas, USA

HTRI has selected Navasota, Texas, USA as the site of its new research and technology center. In addition to housing HTRI's industry-leading proprietary experimental program, the center will provide state-of-the-art facilities for contract research, testing, and product evaluation.

On May 20, 2005, Claudette D. Beyer, HTRI President and CEO, met with Navasota officials to complete the purchase of 10 acres of land on the north edge of Navasota, where the new facility will be constructed. Later that day, a groundbreaking ceremony was held on the site to officially recognize the transfer of ownership of the land and to celebrate this major step in HTRI's history. Participants in this event included representatives of consortium member companies KBR (Larry G. Hackemesser), Eastman Chemical Company (Michael G. McMillion), and S & B Engineers and Constructors, Ltd. (Bill G. Ashenhart), who were joined by officials and dignitaries from the City of Navasota and from Grimes County, as well as the HTRI staff from the corporate headquarters in nearby College Station.

During the brief ceremony, Hackemesser, Chair of the HTRI Board of Directors, and Ashenhart, Chair of the HTRI Technical Committee, noted that this new facility marks HTRI's commitment to serving its members. *The full text of their comments appears on page 5.*

Beyer remarked, "This groundbreaking is the beginning of a new era for HTRI. Our members will benefit from increasingly accurate data and new technological breakthroughs made possible in part because of this facility." She went on to thank the HTRI members, the Board of Directors, and the Technical Committee for their confidence in the management of HTRI and their continuing support of the consortium. Beyer also

acknowledged the efforts of J. Michael Creagor, Research Facility Manager, for his efforts in identifying the property and handling the pre-purchase inspections and approvals, and Susan M. Edwards, Contract Officer, for her work in preparing the necessary legal documents.

Creagor has served as the chief liaison between HTRI and local area representatives, taking the lead in locating property for the new facility. He said that he is enthusiastic about the move because it greatly expands our research and testing capability while allowing the research technicians to devote more time to conducting research rather than required maintenance and regulatory testing.



Creagor noted, "At our current facility, when it rains (and it does quite often), at least two technicians spend a day to run the environmental tests required for our storm water permits. At the new facility, the test rigs will be inside, eliminating that requirement and freeing our technicians to spend more time assisting the engineering staff with member and proprietary research and testing." Creagor, who has considerable general construction and plant experience, will act as the General Contractor for the new facility construction.

Cover photo:  
Rendering of new  
HTRI Research and  
Technology Center  
(Williamson Group Architects  
Bryan, Texas)

Navasota and Grimes County officials, HTRI Board of Directors, Technical Committee, and staff break ground for new facility

Left to right:

Pat Gruner

Ed Broussard

Mike Harris

Bill Miller

Bill G. Ashenhart

Claudette D. Beyer

Larry G. Hackemesser

Michael G. McMillion

R. Stanley Kistler

Fernando J. Aguirre

J. Michael Creagor

Thomas G. Lestina

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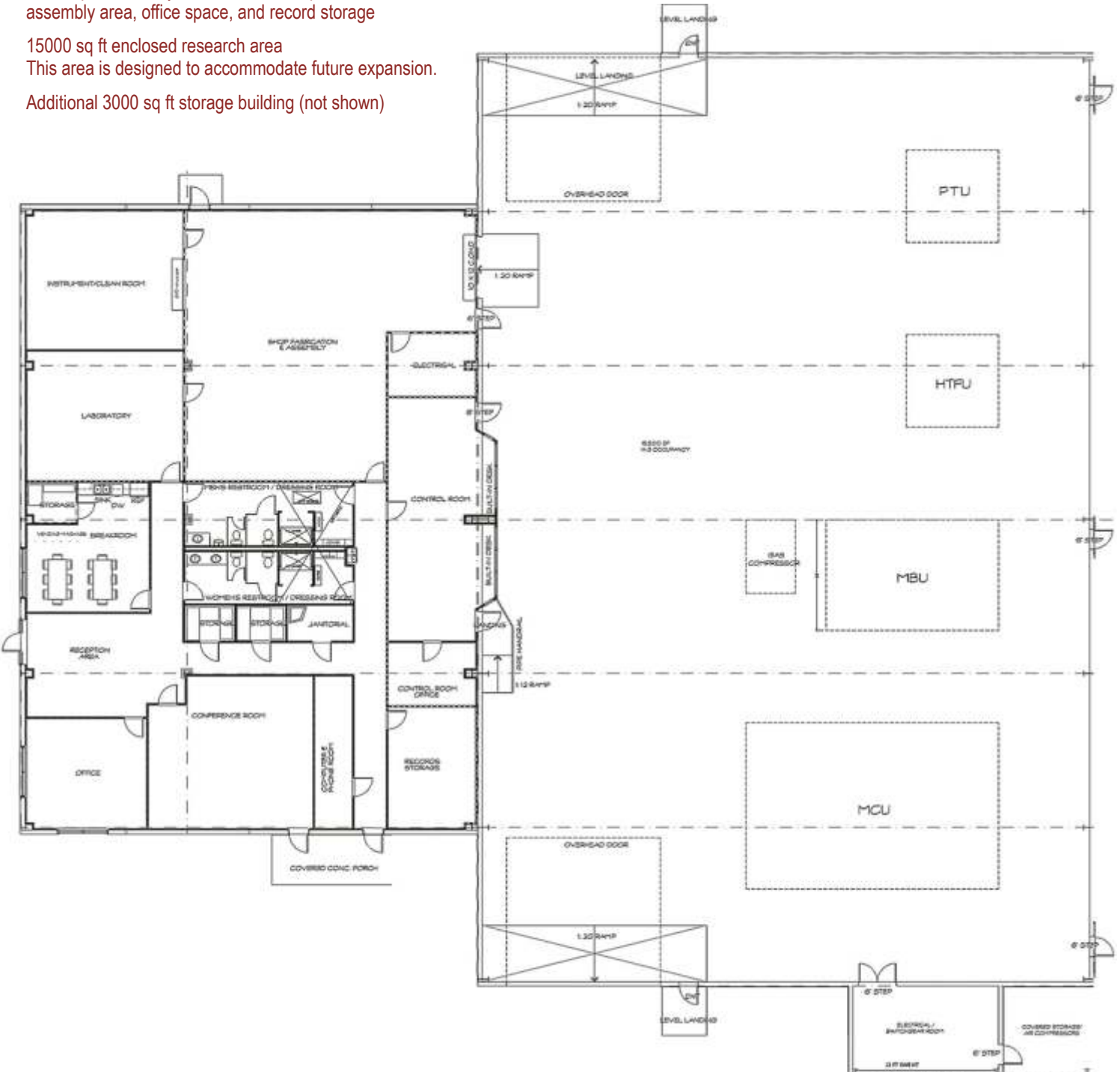
## Groundbreaking Held for New Research and Technology Center Navasota, Texas, USA

Floor plan  
(Williamson Group Architects)

7500 sq ft laboratory, control room, shop fabrication, assembly area, office space, and record storage

15000 sq ft enclosed research area  
This area is designed to accommodate future expansion.

Additional 3000 sq ft storage building (not shown)



R. Stanley Kistler, HTRI's Vice President for Research and Software Development said of the new capabilities, "This facility will be unmatched anywhere in the world in terms of our ability to conduct research that is relevant and directly usable by our global membership. Whether conducting research for the HTRI consortium, or providing confidential product evaluation and testing on a contract basis, this new center will help us redefine the state of art."

He continued by noting that locating test units inside adds the capability of taking research data year-round. "Currently, we are prevented from running some tests when the weather is either too cold or too hot. Further, we will be able to use advanced instrumentation like laser-Doppler velocimetry which cannot be used outside. This is a new and exciting era for HTRI. The best research is truly yet to come."



**Left to right:**  
Mike McGarvey, *Research Technician*  
Z. H. "Frank" Yang, *Senior Project Engineer, Research*  
Becky Glover, *Research Technician*  
Tom Heck, *Research Technician*  
Steve Buckley, *Research Technician*

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**Remarks of Larry G. Hackemesser, KBR  
Chair, HTRI Board of Directors**

For the past 40-plus years of HTRI's research work, the location for the test site has been leased property. It is this research which provides the high confidence level which our members have with HTRI software and design methods. Taking this step to own the facility is evidence of HTRI's commitment to retain and emphasize the importance of continued research for our members.

On behalf of over 550 global HTRI member companies and participating affiliates, I would like to thank Claudette and her staff who have worked so hard on the research and planning that has made this moment possible. Several potential sites were considered, and it soon became apparent that this site in Navasota provided what we were looking for. While making this moment possible is a significant achievement and step in accomplishing our goal of building a new research center, there remains significant planning and work ahead in completing this effort. I urge all involved to keep up the hard work and within the next few months, we should be able to see significant physical progress in achieving our goal.

I would also like to thank the representatives from Navasota for their efforts which have led to this moment. Your turnout today and warm welcome is representative of Texas hospitality; we look forward to being a part of the Navasota community.

**Remarks of Bill G. Ashenhart,  
S & B Engineers and Constructors, Ltd.  
Chair, HTRI Technical Committee**

I was thinking about what I could say today that wasn't a cliché, that wasn't just words. In this instance, I finally realized how difficult that task is. So this is from my heart – it is how I feel.

First, in the past few years, there have been news articles about how companies need to change and in the future become more customer-oriented. Talk about being ahead of the curve! For 43 years, HTRI has been customer-oriented because of our unique structure where the customers are also the company owners. We guide the direction of the research, and we directly benefit from the information and tools derived from that research. As a customer, I ask for the impossible. Somehow, HTRI delivers that impossible bit of information and gives me the future today.

Second, this facility is not the future of HTRI. This is just a piece of land, some concrete, and sheet metal. What is our future are the people working in this facility. What is our future are the people in this community that support and welcome this facility. What is our future are the people around the world who use the results of this facility.

Claudette, Stan, Fernando, Breaux, Mike, Tom, and the entire staff – thank you for making HTRI what it is today and what it will be in the future.

Navasota and Grimes County – thank you for allowing us to be a part of your future.

### Groundbreaking Held for New Research and Technology Center Navasota, Texas, USA

In addition to providing a permanent home for HTRI's experimental research program, the world's longest-running proprietary program of its kind, the new center will allow enhanced proprietary contract research, testing, and product evaluation services. Thomas G. Lestina, Director of Engineering Services, is already working with companies to leverage the advantages this new facility will provide.

Beyer closed the ceremony saying, "We are proud to share this day with the City of Navasota and with Grimes County. Their pro-business attitude and enthusiasm for this

project reinforces a forward-looking vision that will facilitate positive growth in the region. As the anchor tenant of the Navasota Business and Industrial Park, we pledge to be good stewards of this new Park. We will work diligently to establish a positive and mutually beneficial relationship over the coming decades."

For 43 years, HTRI has been in the business of research—but never on property it owned. This investment will provide value to all HTRI members. Construction will commence soon with the site fully operational in January 2007, the year of HTRI's 45th anniversary.



On March 10, 2005, during the HTRI Board of Directors and Technical Committee meetings, a ceremony was held to officially announce the decision to locate a new HTRI Research and Technology Center in Navasota, Texas, USA. In attendance were officials from the city of Navasota and from Grimes County, as well as most members of HTRI's Board of Directors, Technical Committee, and management.

In welcoming HTRI to their community, Navasota and Grimes County officials said the following:

**Bill Miller**, Chairman of the Grimes County Chamber of Commerce's Economic Development Committee, noted that "HTRI is a magnificent addition to the Navasota and Grimes County economic base. It is a major diversification for our community and just the beginning of our growth in technology-based industries."

"We are excited about HTRI's investment in Navasota and the business park," said **Ed Broussard**, City Manager. "This is the type of industry and community partner that will benefit the entire area. HTRI's facility will enhance the city's northern entrance, give Navasota world-wide recognition with a state-of-the-art engineering research center, and provide a clean, hazard-free anchor to the new business park."

Navasota Mayor **Pat Gruner** said, "This is a win-win for the city of Navasota, the Navasota Economic Development Corporation, and HTRI. It's exciting to see growth, and we look forward to being good business partners."



**Left to right:**  
 Bill Miller, *Chairman, Economic Development Committee - Grimes County Chamber of Commerce* and  
 J. Michael Creagor, *Manager, Research Facility*  
 speaking with Gary Johnson, *Public Works Director for the City of Navasota*



Representatives of Navasota and Grimes County  
 at March 2005 announcement



**Left to right:**  
 Thomas M. Rudy, *ExxonMobil Research and Engineering Company*,  
 William M. Boyle, *The Dow Chemical Company*, and  
 Takao Ogawa, *Toyo Engineering Corporation*



Existing HTRI Research Facility  
 (experimental units in photo above)  
 in College Station, Texas—  
 operational in 1991

## Corporate Bylaws Revised

At their March 11, 2005 meeting, the HTRI Board of Directors approved revisions to the Corporate Bylaws. Last amended in July 1999, the Bylaws did not reflect practices implemented in the intervening years; in addition, changes were needed to serve HTRI corporate operations today and into the future.

### Term Limits

Among the key changes is the establishment of a term limit of twelve (12) consecutive years for Board members. Effective with the July 2005 election, the terms of the Chair and Vice Chair will be reduced from four to three years, matching those of the Technical Committee. To accommodate the ever-evolving needs of HTRI and member concerns about length of commitment, the Bylaws now expressly confirm that the Vice Chair does not automatically ascend to Chair.

### Proxy

Because only a small percentage of stockholders respond to annual election notices or other matters requiring member approval, the proxy of members who do not vote will be held by the Chair of the Board of Directors, thus ensuring the majority necessary to conduct business. By holding the proxies – but not voting them – the Chair cannot change the outcome of the balloting; the results of any matters put forward will be

controlled by those who vote – no matter the size of that group. Going forward, a simple majority will determine the outcome of any election or other matters requiring stockholder approval.

### Board Membership

In 1997 the Board passed a resolution requiring that all of its members must be full-time employees of member companies or their participating affiliates. This provision is now codified in the Bylaws.

HTRI elected its first non-member company representative as an Advisory Director in Fiscal Year 2005. The revised Bylaws explicitly provide for up to three advisory directors and clarify the types of candidates HTRI seeks: individuals who have influence, business expertise, and/or unique technical skills that support the needs of the corporation.

To make the document more readable and more easily understood, much of the legal wording was translated into *plain English*; the amended Corporate Bylaws are posted on the HTRI secured website ([www.HTRI.net](http://www.HTRI.net)).

Claudette D. Beyer, President and CEO, thanked the Board for their support of these changes, which will streamline operations, facilitate member participation, and help ensure future corporate viability.

### *HTRI Board of Directors (May 2005)\**

---

Larry G. Hackemesser, Chair  
*KBR*

Donald W. Meyer, Vice Chair  
*Burns & McDonnell Engineering Co., Inc.*

William M. Boyle  
*The Dow Chemical Company*

Naoki Dohi  
*Mitsubishi Chemical Engineering Corporation*

Martin J. Gough  
*Cal Gavin Limited*

Michael G. McMillion  
*Eastman Chemical Company*

Takashi Noto  
*Chiyoda Corporation*

T. Michael O'Connor  
*O'Connor Ventures, Inc.*

Jinn H. Wang  
*UOP LLC*

\* G. E. "Buddy" Kluppel, recently retired from *Hudson Products Corporation*, served on the Board until March 2005.

## HTRI Meetings around the World

For the latest information about HTRI meetings and training, view Upcoming Events at [www.HTRI.net](http://www.HTRI.net).

### North American Meeting

September 12-16, 2005  
Hyatt Harborside Hotel  
Boston, Massachusetts USA  
Advanced Thermosiphon Reboilers  
Advanced *Xist*

### European Meeting

October 10-14, 2005  
Killarney Park Hotel  
Killarney, Ireland  
Advanced Thermosiphon Reboilers  
Designing Exchangers for Fouling Service

### Asian Meetings

October 25-28, 2005  
Chengdu, China  
Advanced *Xist*  
*Xfh*  
*Xphe*

November 1-4, 2005

Seoul, Korea  
Advanced Thermosiphon Reboilers  
Advanced *Xist*  
Heat Exchanger Troubleshooting

November 7-10, 2005

World Business Garden  
Chiba, Japan  
Advanced Thermosiphon Reboilers  
Advanced *Xist*

December 6-9, 2005

Singapore  
Advanced *Xist*  
*Xchanger Suite* Essentials  
*Xvib*

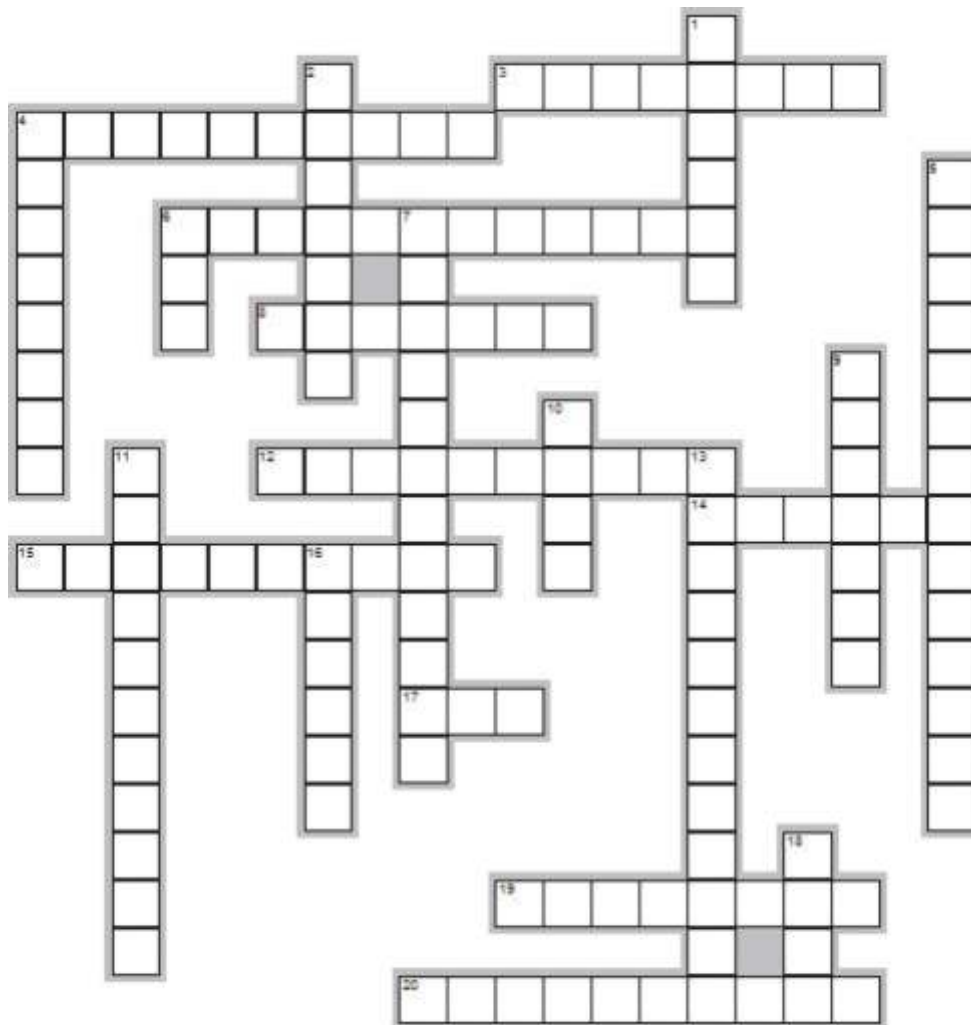
## Enhanced Shell-and-Tube Technology Puzzler *(Answers on page 19)*

### Across

3. Fin less than 0.5 mm high
4. Fin performance parameter
6. Fin-type common in hairpin exchangers
8. Baffles that induce spiral flow
12. Condensation method for horizontal low-finned tubes
14. Non-stick coating that promotes dropwise condensation
15. \_\_\_ retention
17. Enhanced heat transfer software
19. Boiling regime enhanced with porous coating
20. Intube turbulence promoter

### Down

1. Inside and outside tube enhancement
2. Augmentation heat transfer researcher
4. New baffle type in *Xist* 4.0
5. Pressure drop parameter increased by roughness
6. Common name for integral fin
7. \_\_\_ promote vaporization in mist flow regime
9. \_\_\_ increases with wall temperature and decreases with velocity
10. Tube enhancement that adds heat transfer area
11. FPI
13. Family of tube inserts that promote laminar heat transfer
16. Gas injection to enhance boiling
18. Aluminum insert sometimes used in refrigerant vaporizers



## Technical Committee Shares Expertise

In March, with eleven of twelve members present, the HTRI Technical Committee (TC) met for two days at the College Station, Texas, USA office. Bill G. Ashenhart, Chair, S & B Engineers and Constructors, Ltd., presided. The meeting opened with Claudette D. Beyer presenting an update on corporate affairs.

Beyer thanked Ashenhart for his effective leadership of the past two-and-a-half years and acknowledged the contributions of Thomas M. Rudy, ExxonMobil Research and Engineering Company in his role as Vice Chair.

Fernando J. Aguirre discussed HTRI's membership growth and shared information about ongoing activities related to interface agreements and business alliances.

Thomas G. Lestina presented an overview of HTRI's latest contract work, as well as of our expanded training offerings. Both the number of available courses and the training volume continue to increase. Feedback confirms that training and technical support receive high marks from customers.

R. Stanley Kistler reported on the status of current research and software development projects as well as proposals for the Fiscal Year 2006 Technical Operating Plan. The TC then reviewed the Mid-Year Progress Report and discussed the proposed plan for FY 2006.

Following the meeting, the group held "breakout sessions" with the staff. This forum, begun last year, provides a valuable means for TC members to share their technical expertise and field experiences, exchanging ideas with the HTRI researchers and software developers who are responsible for bringing the latest heat transfer technology and design tools to members.

We are indebted to the members of the Technical Committee for their generosity in giving their time and sharing their knowledge to benefit all members of the HTRI consortium.

### Breakout Session Topics

- Non-Newtonian Flow
- Field Test Capability
- Design Margins
- User Case Studies on the Web
- Heat Exchanger Selection Tool
- Fouling in the Chemical Industry
- Two-Phase Distribution in Inlet and Return Tubesheet(s)
- New Features in Software
- Condensation
- Boiling

### HTRI Technical Committee (May 2005)

Bill G. Ashenhart, Chair  
*S & B Engineers and Constructors, Ltd.*

Thomas M. Rudy, Vice Chair  
*ExxonMobil Research and Engineering Company*

Jean Jacques Delorme  
*Technip*

Bennat J. Drazner  
*Alfa Laval Inc.*

James J. Grant  
*E.I. du Pont de Nemours & Company, Inc.*

Robert P. Hohmann  
*ChevronTexaco Energy Technology Company*

Stephen W. Johnston  
*Shell Global Solutions (US) Inc.*

Michael D. Kindschi  
*Hughes-Anderson Heat Exchangers, Inc.*

David C. King  
*BP p.l.c.*

Robert Lee  
*BSF China Company, Ltd.*

Takao Ogawa  
*Toyo Engineering Corporation*

Jack J. Piparia  
*Ecodyne MRM, Inc.*

## “R ≡ Research”

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

Recently at a training session when a group was discussing how to use *Xchanger Suite* most effectively, I was asked a simple question that surprised me: “Does HTRI do research?” This engineer had heard that we stopped doing research and “only” wrote software. That is absolutely not the case.

Nonetheless, I certainly can understand why he asked the question. Research is an expensive undertaking. With many multi-billion dollar corporations abandoning their research efforts simply because they cost too much and do not add revenue in the short term, how can a small (less than \$10 million) company like HTRI possibly have a **meaningful** research program?

Yet HTRI is actively engaged in research, and we do it in part using the power of our consortium. In fact, HTRI is now devoting more resources to experimental and analytical research than at any other time during the thirty-two years that I have worked here.

Our new Research and Technology Center, under construction in Navasota, Texas, demonstrates more than our continuing growth as a company. It emphasizes our dedication to the *idea* of research itself—the continuous expansion of what we know—in order to maximize what we can do. It is our dedication to the *R* in HTRI.

So how can we afford to do research? Quite simply, *we cannot afford NOT to do research*—it is what defines us as an organization. Although incorporated as a for-profit company, we do not pay stock dividends and do not operate to make a profit. Membership fees are invested in research and software development. The “dividend” that members receive comes in the form of research data collected and used to develop methods that solve engineering problems in heat transfer and fluid flow.

Our current research projects include

- longitudinal pitch effect in high-finned tubes
- prediction and mitigation of crude oil fouling
- shellside condensation in horizontal crossflow
- shellside condensation in vertical crossflow
- tubeside boiling of immiscible liquids
- tubeside boiling in up- and down-flow

Without our research, HTRI *Xchanger Suite* would be—borrowing a phrase from Bill Gates—*just software*. We are committed to the *R* in HTRI. Research is the reason HTRI was founded and the reason our products are the best in the world.

After that training session, I came away with a renewed understanding of the importance of emphasizing that our technology is based on a long-standing and ongoing commitment to research—a fact too easily and too often overlooked. I hope that those who participated in the session have a better understanding of the methods developed as a result of our research.

HTRI workshops and short courses provide you an opportunity to learn how to use our engineering products more effectively, thus maximizing their value. Join us at an upcoming training session; my latest experience proves, once again, that there is always more to learn.



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

## HTRI Xchanger Suite 4.0

### What's New and What's Next

#### Xchanger Suite 4.0 Modules

- Xace* Air coolers and heat recovery bundles
- Xfh* Fired heaters
- Xhpe* Hairpin heat exchangers
- Xist* Shell-and-tube heat exchangers
- Xjpe* Jacketed-pipe heat exchangers
- Xphe* Plate-and-frame heat exchangers
- Xtlo* Tube layout
- Xvib* Vibration analysis

Every version of HTRI *Xchanger Suite* includes many new features and modifications, and *Xchanger Suite 4.0*, issued in December 2004, is no exception. Here are some highlights.

#### New Exchanger Types

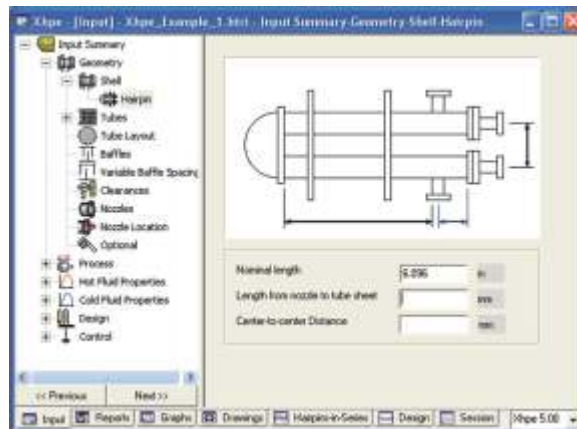
As engineers and software developers, we just can't help adding capabilities for new exchangers. *Xchanger Suite 4.0* incorporates modules for fired heaters\*, hairpins, and jacketed-pipe heat exchangers. With these additions, you can easily evaluate a large selection of heat transfer equipment types.

*Xhpe* and *Xjpe* allow you to easily model hairpin and jacketed-pipe exchangers. The modules call a modified version of the shell-and-tube calculation engine, but each has customized input and output panels, making these exchanger types much easier to model (see Figure 1).

#### Enhancements to Design Capabilities

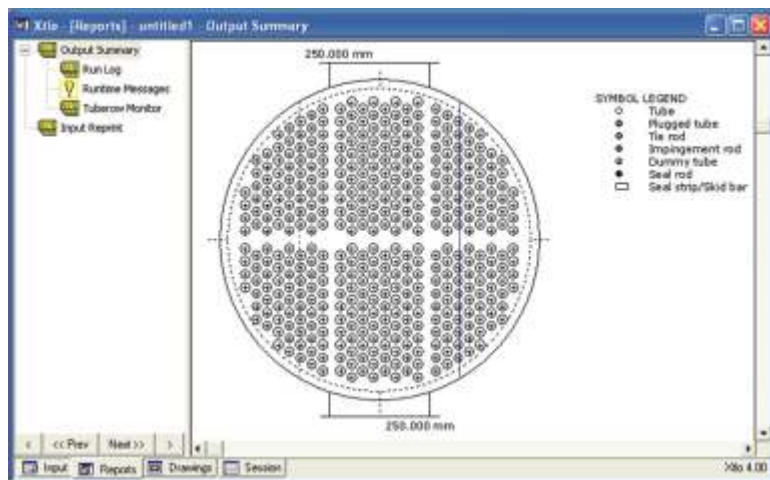
*Xphe* now allows the specification of up to five plate types, increasing your ability to customize a plate pack for a given process.

*Xtlo* works with rotated layouts (Figure 2) and has additional options you can use to control the location of passlanes and the effects of bypassing. This enhancement also appears in *Xist*, along with many other new features.



Hairpin heat exchanger design with *Xhpe* (FIGURE 1)

Let's start with the additional baffle types available in *Xist*. As if single-segmental, double-segmental, segmental/no-tubes-in-windows, RODbaffles®, and unbaffled exchangers weren't enough, *Xist 4.0* supports Embaffles®, both full and segmental. Still not enough? Not to worry — we added helical and double-helical baffles as well



Rotated layout with *Xtlo* (FIGURE 2)

*Xist* also supports Wieland GEWA KS doubly enhanced tubes. And if you need to block tubes, you can graphically specify the location of any plugged tubes. The calculations consider the effect of the increase in tubeside velocity by plugging tubes.

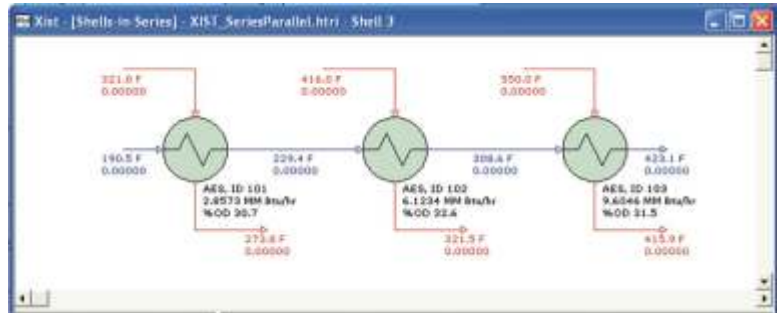
In addition to existing support for trains of shells in series, *Xist* lets you specify series/parallel arrangements (Figure 3). You can specify which side (hot or cold) is in series and which is in parallel.

*Xace* includes some significant improvements, including flow regime maps. With *Xace*, you can see what's happening inside the tubes in your air cooler. In addition to the tubeside monitors, *Xace* now displays a flow regime map for your two-phase tubeside flow.

\* "The Latest Roundup for *Xfh*" in the November 2004 issue of *The Exchanger* (available online at [www.HTRI.net](http://www.HTRI.net)) discussed the new module for fired heaters.

Other enhancements to *Xace* include a dehumidification option for handling water condensing on high-fin tubes, a high-fin approximation method for handling condensation of fluids other than water, and multiple services.

Figure 4 provides a glimpse at multiple services. *Xace* automatically balances the air flow through the multiple services to equalize the airside pressure drop. And check out the drawings, enhanced to handle multiple services as well.



Series/parallel arrangements with *Xist* (FIGURE 3)

### Additions to Functionality and Usability

The purpose of a suite of software design tools is to provide common functionality and usability across a range of products. And *Xchanger Suite* 4.0 embodies significant enhancements to its ability to transfer data between modules as well as between our software and other packages.\*\*

With the increasing abilities of the Property Generator, it's easier than ever to generate accurate physical properties in a flash (pun intended). And because it's so fast, we increased the number of temperature points that can be generated in a single pressure profile. For those tricky fluids that keep moving around, you can now have up to 30 temperatures per pressure profile.

A convergence panel in *Xist* and *Xace* allows you to adjust all the various convergence tolerances to get things just the way you want them. Look for this panel to spread to other modules in future releases.

To aid our international users, we added the ability to generate output reports in multiple languages. In Version 4.0, we started with French; future versions will include other languages. And in the meantime, you can add more languages yourself by simply translating label files in a text editor.

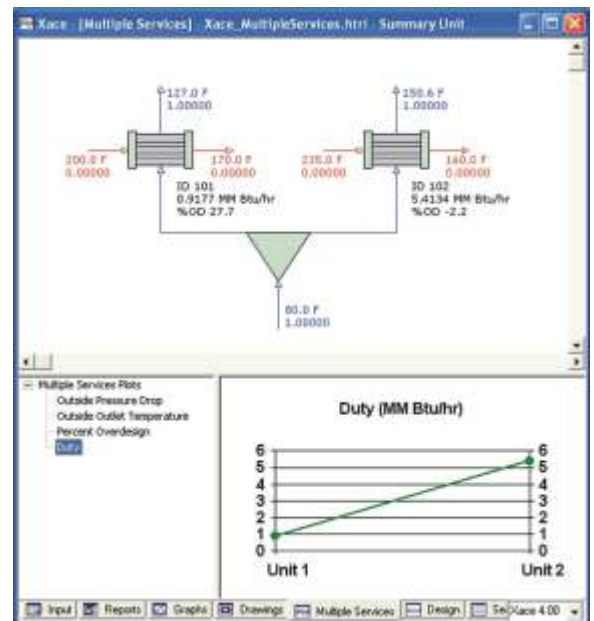
*Xchanger Suite* has also become more fluent in the language of unit conversions. In addition to the standard unit sets that change with a single click, you can now create any desired combination of units. Custom unit sets affect both input and output views.

### Multiple Versions at One Time

Does this situation sound familiar? You're in the middle of a big project when a new release of *Xchanger Suite* arrives at your door. You want to install it because you know there's something new that you just have to have. But you need to finish your current project at the same time without worrying about how the new version will impact your design.

Stop worrying! Starting with *Xchanger Suite* 4.0, you can install the new version to access all the exciting new features and still use the previous one to finish that project.

These new features include big and small changes that will make your job easier and you more productive. If you have other suggestions for the software, just let us know. Version 5.0 is in the works!



Multiple services with *Xace* (FIGURE 4)

\*\* Refer to "Comprehensive Physical Properties Available with *Xchanger Suite* 4.0" in the May 2004 issue for a discussion of the new VMGThermo property package and to the VMGSim and CAPE-OPEN articles in this issue.

## CAPE-OPEN: Ensuring Seamless Designs

Joseph W. Holmes, Manager, Software Projects



Joseph W. Holmes  
Manager, Software Projects

More and more we expect our tools to interoperate seamlessly. We have to. There's no time for anything less. With every release, HTRI *Xchanger Suite* has increased the number of physical property interfaces you can use to transparently generate fluid physical properties.

But what about working from the other direction? What if you want to use *Xchanger Suite's* rigorous calculations from within your favorite process simulator?

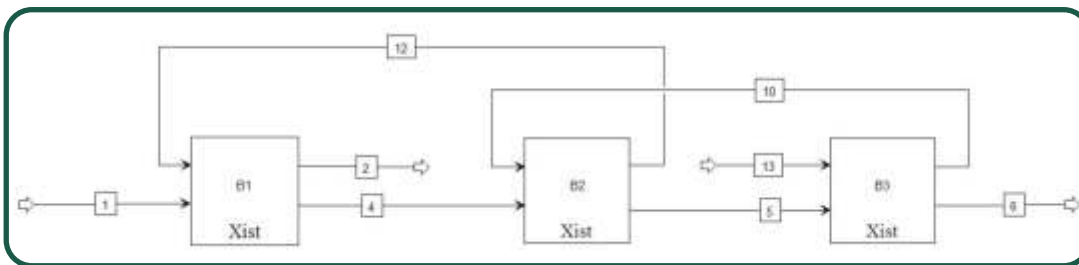
That's where CAPE-OPEN comes in. CAPE-OPEN is an international standard for interfacing physical property and unit operation modules to compliant process simulators.

HTRI has been involved with the CAPE-OPEN efforts for several years through CO-LaN ([www.colan.org](http://www.colan.org)), the organization responsible for maintenance of the standard. With the release of Version 4.0, *Xchanger Suite* conforms to the CAPE-OPEN Unit Operation 1.0 interface.

So how might this affect the way you work?

### Cases in Point: CAPE-OPEN, Aspen Plus, HYSYS, and *Xchanger Suite*

*Xchanger Suite* can model multiple units in series and in series/parallel, but process simulators can set up networks of arbitrary configurations. For the Figure 1 case depicted below, I used the Aspen Plus process simulator to model a train of three *Xist* units in series with an internal recycle.

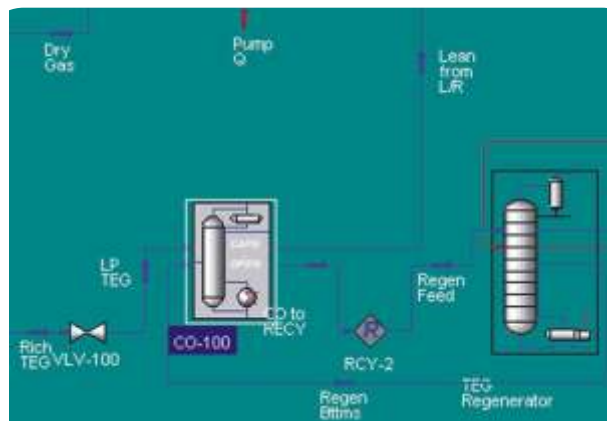


Three *Xist* units in series with internal recycle in Aspen Plus (FIGURE 1)

An obvious benefit of this approach is that it allows you to embed an HTRI *Xchanger Suite* unit directly in a process flowsheet. Rating or simulation of the unit is then part of the total process. Figure 2 illustrates an *Xist* unit embedded in a glycol dehydration system, using the HYSYS simulator.

With the release of HTRI *Xchanger Suite* 4.0, the CAPE-OPEN Unit Operation 1.0 interface is supported for shell-and-tube exchangers (*Xist*), air-cooled exchangers and heat recovery bundles (*Xace*), and plate-and-frame exchangers (*Xphe*). We have successfully tested *Xchanger Suite* with HYSYS 3.2, Aspen Plus 12.1, and Aspen Plus 2004 as well as with a developmental version of PRO/II 7.1. Future support of other process simulators is in progress.

The online help in *Xchanger Suite* provides a quick tutorial on using CAPE-OPEN with HYSYS and Aspen Plus. Take a look at this addition to your toolkit and see if it makes your job that much easier.



*Xist* unit in HYSYS glycol dehydration (TEG) unit (FIGURE 2)

# VMGSim Automation Link to HTRI *Xchanger Suite* Released in VMGSim Version 2.4

Virtual Materials Group has released a comprehensive set of interfaces and automation links from their process simulator, VMGSim Version 2.4 to *Xchanger Suite*.

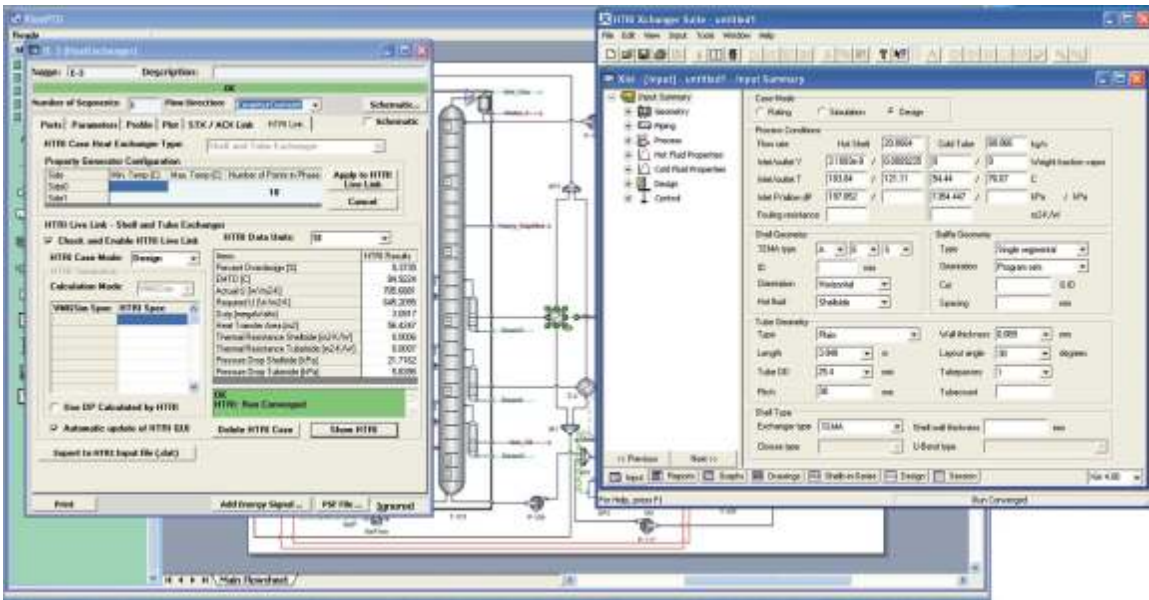
VMGSim users can perform *Xchanger Suite* ratings and designs directly from a VMGSim simulation model without manually transferring data between the process model and without leaving the process model. In addition, users can click a button to embed *Xchanger Suite* exchanger simulations into a VMGSim case, enabling rigorous prediction of exchanger output conditions and pressure drops in VMGSim models.

From any heat exchanger operation in the VMGSim simulation model, users can click the HTRI tab to access *Xchanger Suite's* design, rating, and simulation capabilities. Clicking the HTRI Live link button will automatically connect the process model to *Xchanger Suite*; the required information, including physical properties and stream inlet and outlet conditions, are passed to *Xchanger Suite*.

At any time, users may view and work in the *Xchanger Suite* interface and the VMGSim interface. In addition to the rating, design, and simulation live links, the option to create a separate input file for *Xchanger Suite* is also provided.

– Virtual Materials Group

The *Xchanger Suite* link in VMGSim and the *Xchanger Suite* window



## 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 24.

## Stitching Together a Mechanical Design?

### Try These Interfaces

HTRI is dedicated to delivering accurate and reliable heat transfer analysis technology to our consortium members. Because actual construction of heat transfer equipment requires a complete engineering cycle of process engineering, thermal analysis, and mechanical design, we strive to provide an ever-increasing number of interfaces with other design programs.

Our partnerships with companies that provide heat exchanger mechanical design software allow you to build “best of breed” solutions, ensuring the greatest possible flexibility in achieving your engineering solutions.

We recently surveyed mechanical design program vendors that offer interfaces with HTRI *Xchanger Suite*. The table below summarizes the results.

Survey questions covered data transfer, design codes, calculation features, and graphics capabilities. The data transfer direction indicates that data transfer is one-way only (data transfers only *from* HTRI software *to* the mechanical design program), whereas future versions may allow bidirectional data transfer (data moves in both directions). Calculation features include the types of exchangers that can be designed and the ability to generate a bill of materials, cost estimate, and tube layout.

Comparison of Mechanical Design Interfaces	Aspen Teams	Compress Exchanger	Microprotol	MT MECH
<b>Vendor</b>	Aspen Technology, Inc.	Codeware, Inc.	EuResearch, S.A.	Micro Techno
<b>Unit Types</b>				
Air coolers			●	
Shell-and-tube exchangers	●	●	●	●
<b>Data Transfer</b>				
Direction	From HTRI	Under development	From HTRI	From HTRI
Mechanism	DBO files		DBO files	DBO files
<b>Design Codes</b>				
AD Merkblaetter	●		●	●
API 661			●	
ASME	●	●	●	●
PD5500 (BS5500)	●		●	
CODAP	●		●	
ISPESL-VSR	●			●
PED	●		●	●
TEMA	●	●	●	
<b>Features</b>				
Bill of materials	●		●	●
Cost estimation	●		●	
Tube layout	●	●	●	●
<b>Graphics</b>				
2D drawings	●	●	●	●
3D solid models	●	●	●	
Formats	AutoCAD® DWF/Inventor, IGES, SAT, STEP, XGL, ZGL	AutoCAD DWG/DXF	AutoCAD DWG/DXF, IGES, Intergraph PDS, Microstation, Smartsketch	AutoCAD
<b>Languages</b>				
English	●	●	●	●
Finnish				
French	●		●	
German	●		●	
Italian	●			●
Polish			●	
Portuguese			●	
Russian				
Spanish	●		●	
Turkish				

Please send feedback or questions regarding the interfaces between mechanical design software and HTRI *Xchanger Suite* to Fernando J. Aguirre, Vice President, Business Development at FJA@HTRI.net.

Each mechanical design program interface is developed and managed by the HTRI partner. HTRI encourages you to contact the vendor directly for additional information.

**Aspen Technology, Inc.**  
www.aspentech.com

**Coade, Inc.**  
www.coade.com

**Codeware, Inc.**  
www.codeware.com

**EuResearch, S. A.**  
www.microprotol.com

**Heat Transfer Consultants, Inc.**  
www.snapcad.com

**Micro Techno**  
www.microtechno.net

**OhmTech a.s.**  
www.ohmtech.no

**Sant'Ambrogio Servizi Industriali s.r.l.**  
www.santambr.it

**SSE GmbH (SCHELL Software & Engineering)**  
www.schell-software.de

Comparison of Mechanical Design Interfaces	PVElite	STEMEC	SnapCAD	Visual Vessel Designer	WIN_SHELL
<b>Vendor</b>	Coade, Inc.	Sant' Ambrogio Servizi Industriali s.r.l.	Heat Transfer Consultants, Inc.	OhmTech a.s.	SSE GmbH (SCHELL Software & Engineering)
<b>Unit Types</b>					
Air coolers					
Shell-and-tube exchangers	●	●	●	●	●
<b>Data Transfer</b>					
Direction	Under development	From HTRI	From HTRI	From HTRI	From HTRI
Mechanism		DBO file	DBO file	DBO file	DBO file
<b>Design Codes</b>					
AD Merkblaetter					●
API 661					
ASME	●	●	●	●	●
PD5500 (BS5500)	●			●	●
CODAP					
ISPESL-VSR					
PED	●			●	●
TEMA	●	●	●	●	●
<b>Features</b>					
Bill of materials	●	●	●	●	●
Cost estimation		●	Under development	●	●
Tube layout		●	●	●	●
<b>Graphics</b>					
2D drawings	●	●	●	●	●
3D solid models	●		●	●	●
Formats	Hoops	AutoCAD DXF	AutoCAD DXF	AutoCAD DWG/DXF	AutoCAD DXF, AutoCAD automation server
<b>Languages</b>					
English	●	●	●	●	●
Finnish				●	
French				●	●
German				●	●
Italian		●		●	
Polish				●	●
Portuguese					
Russian					●
Spanish					
Turkish				●	

# leveraging technology

## New Prototype Test Unit Team Design Approach Leads to Success

*We appreciate Brown Fintube Company's support of the HTRI research initiatives and look forward to future testing that will benefit all members.*

The excitement about relocating the HTRI research facility has sparked new ideas and plans for expanding our research capability. To better meet the demand for testing prototype exchangers under proprietary contracts, and to match the rising demand for testing enhanced heat exchanger technologies, we have designed a new rig.

Constructed by Brown Fintube Company, this prototype test unit (PTU) was recently installed at our facility. After a period of dedicated testing with Brown Fintube exchangers, we will own and operate the rig for member research.

Working together, Brown Fintube and HTRI designed the PTU. This team design approach helped ensure that the test unit meets both Brown Fintube's current requirements as well as HTRI's future research needs.

The new rig will accelerate our testing of exchanger geometry attributes. In the current business environment that expects higher capacity from existing exchangers, increasingly important are the improved accuracy of traditional shell-and-tube analysis methods as well as the development of newer enhanced heat transfer technologies.

Installation of PTU

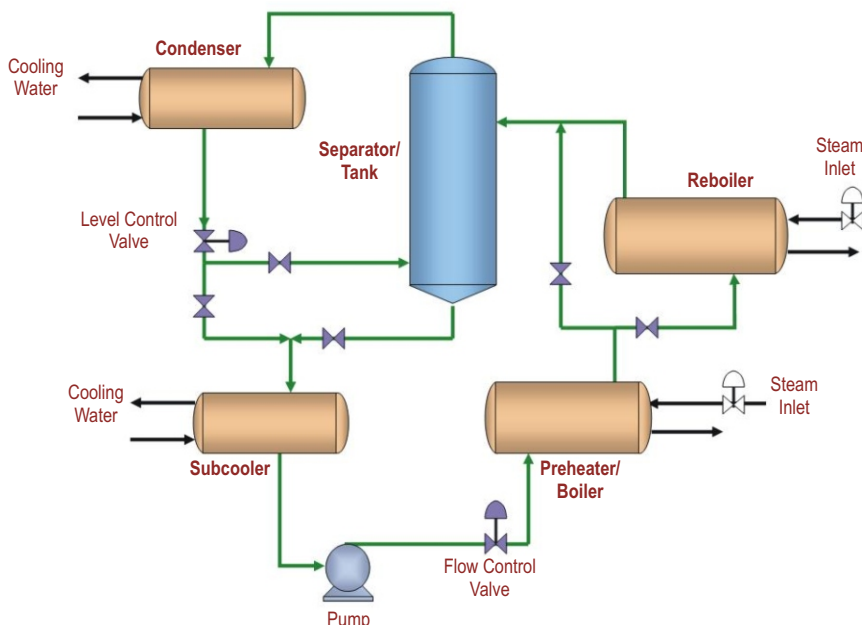


We can use the PTU along with our computational fluid dynamics (CFD) analysis to improve our window-flow model and stream analysis. Furthermore, the rig facilitates the testing and development of analysis methods for alternatives to segmental baffles, enhanced tubes, and compact exchangers. One major benefit is that we can test four exchangers simultaneously, thus speeding up our research with different geometries. We are also planning to use the PTU to test kettles and thermosiphon reboilers.

The PTU, acquired via a collaborative contract with Brown Fintube, provides HTRI with enhanced testing and research flexibility, as well as increased capabilities. We appreciate Brown Fintube Company's support of the HTRI research initiatives and look forward to future testing that will benefit all members.

### Features of PTU

- Water-based and hydrocarbon-based test fluids
- Simultaneous testing of four prototype exchangers (two single-phase, one boiling, and one condensing)
- 400 psig design pressure
- Overall dimensions 12' x 12' base, 24' height
- 50 gpm pump capacity



## Vaporization of Light Hydrocarbons Remains Challenging

Accurate prediction of boiling heat transfer coefficients for vaporizing light hydrocarbons from a nonvolatile component remains challenging. HTRI recently conducted extensive experimental research with n-pentane/1-tetradecene and n-pentane/polybutene mixtures as test fluids. The data cover wide ranges of liquid Reynolds numbers, Prandtl numbers, weight fraction vapor, heat fluxes, and concentrations of n-pentane.

In addition to expanding our data bank, we can now provide better guidelines and methods for rating or designing heat exchangers using such mixtures. Our recent studies show that the dominant boiling mechanism for such mixtures is convective boiling with negligible, if any, nucleate boiling contribution.

## Intube Flow Boiling of Immiscible Mixtures Is Tested

HTRI is currently conducting flow boiling experiments in the Multipurpose Boiling Unit. The test fluids are mixtures of n-pentane/water and p-xylene/water for a wide range of concentrations of water. The data will be used to verify our current flow boiling methods when they are applied to such mixtures. We will also develop guidelines for users when they design or rate heat exchangers using similar fluids.

### 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**

## Resistance Proration Method Update Improves Accuracy

To improve the prediction accuracy of heat transfer and pressure drop for condensation over a wide range of industrially significant operation conditions, HTRI recently updated the Resistance Proration Method (RPM). Improvements were made for condensation of mixtures and pressure drop for condensation under deep vacuum.

In mixture condensation, molecules of the heavy and light components travel from the bulk to the vapor-liquid interface to condense. The light molecules tend to concentrate near the vapor-liquid interface, lowering the interface equilibrium temperature and decreasing the heat transfer driving force. A correction factor accounts for the effect of mass transfer on the non-linear temperature profile from the bulk to the vapor-liquid interface; this correction factor has been modified based on a theoretical analysis of the fundamental mechanism involved.

In vacuum condensation, not all of the theoretically possible momentum pressure increase is actually recovered. To accurately predict vacuum condensation pressure drop, you must determine how much of the maximum possible pressure recovery can be realized in the condenser. After reviewing the momentum pressure drop method for condensation under vacuum conditions, we modified the momentum recovery factor for tubeside condensation, especially for condensation under deep vacuum conditions ( $P < 3.45$  kPa).

These updates have been implemented in the RPM in *Xist* 4.0 and greatly improve prediction accuracy for the design and ratings of condensers. As a result of these changes, you may see higher condensing coefficients for some cases and slightly higher pressure drops for vacuum operation.

## recognizing staff

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**June Elliott Hardy**  
*Membership Representative*

### **June Elliott Hardy** *Membership Representative*

With more than thirty years of administrative experience in research and technical environments, June brings proven organizational and customer relations skills to her position in Membership Services.

Prior to joining HTRI, June worked at ProdiGene, Inc., a local biotechnology firm, and at Atomic Energy of Canada Limited (AECL), a national nuclear laboratory in her hometown of Chalk River, Ontario, Canada. In these positions, she had responsibilities in sales and marketing, intellectual property rights, contract administration, and regulatory compliance. Reporting to Carol J. White, the Manager of Membership Services, June will provide accounting and administrative support for membership activities.

June is married to John C. Hardy, a physics professor at Texas A&M University in College Station, Texas, USA; they have two college-age children, Ben and Samantha.



**Jessica Cessna**  
*Administrative Assistant*

### **Jessica B. Cessna** *Administrative Assistant*

After working several years in the local area as an administrative assistant for the Texas A&M University System, Bryan Research & Engineering, and NeoDyme Technologies Corp., Jessica has joined HTRI. A native of Florida, Jessica and her husband also owned and operated a local travel agency for ten years.

Her varied work experiences, especially those in an engineering environment, as well as her word processing, bookkeeping, and recordkeeping skills, provide her with an excellent foundation to support the HTRI technical staff. Jessica will report to R. Stanley Kistler, Vice President, Research and Software Development.

Jessica is married to Robert R. Cessna, Sports Editor for the local newspaper, *The Eagle*. They have three school-age (senior and junior high) children, Cassandra, Kimberly, and Robert, Jr.



**Eva Dorman**  
*Membership Representative*

## **Additional Staff Changes**

**Eva Dorman**, who joined HTRI five years ago as Administrative Assistant in Research and Software Development, has transferred to the open position of Membership Representative. In her new role, she will maintain the member and prospective member databases and files, prepare membership-related reports and documents, and provide administrative support to Carol J. White, Manager of Membership Services and Fernando J. Aguirre, Vice President, Business Development.

Eva, who has lived in Texas most of her life, is a graduate of Texas A&M University, College Station, Texas, USA, with a B.B.A. in Management. She is married to Patrick Dorman, currently a full-time Texas A&M student, who is a licensed Master Electrician.



**Kenneth Scholz**  
*Staff Assistant*

**Kenneth Scholz**, Staff Assistant, is now providing full-time administrative support to Engineering Services. In his new position, Kenneth will provide support to Thomas G. Lestina, Director of Engineering Services, and Susan M. Edwards, Contract Officer, in preparing training materials, processing meeting and training registrations, and maintaining contract, training, and technical support databases. He will also continue to assist Peter A. Newman, Manager of Information Systems with software media production.

Kenneth joined HTRI in 1992 as an Accounting Assistant; he accepted a full-time position in 1997 working with staff in accounting, contracts, and information systems. Kenneth, a native Texan, grew up in the local area and attended Texas A&M University.

## Report AC-14

*Longitudinal Pitch Effect on Pressure Drop and Heat Transfer in High-Finned Tubes*

April 2005

Users of *Xace* might have noticed that, when the longitudinal pitch is increased, the results do not appear reasonable past a longitudinal pitch divided by an over-fin diameter greater than 2.0. In the past, HTRI would have designed a research program, obtained data, and improved the correlations, taking several years and potentially costing almost a million dollars. In the meantime, any design would face additional performance risks.

However, we now can use computational fluid dynamics (CFD) very effectively in a shorter time to understand trends, fill in missing data, or reveal some underlying physics. Report AC-14 describes how validated CFD simulations of in-line and staggered high-finned tube bundles reveal the behavior of pressure drop and heat transfer for large longitudinal pitch—spacings well beyond the range of test data. These new insights will be incorporated into *Xace* to improve its extrapolation capability.

## Report BT-32

*Vaporization of Light Hydrocarbons from Nonvolatile Components*

April 2005

Are you having difficulties designing or rating heat exchangers vaporizing light hydrocarbons from nonvolatile components? Do you need to model an evaporator with a nonvolatile viscous component or to know how composition changes in boiling affect the predictions of heat transfer coefficient and two-phase pressure drop?

Report BT-32 documents HTRI's most recent experimental and theoretical research on boiling a light hydrocarbon from a nonvolatile component. Our recently completed studies show that the dominant boiling mechanism for such mixtures is convective boiling. The report discusses how to use our flow boiling model to design an effective exchanger and provides guidelines for designing or rating heat exchangers with such mixtures. It also proposes improved methods for convective boiling and two-phase pressure drop.

## Report FH-4

*Radiative Heat Transfer to Shock Tubes in Box Heaters*

May 2005

Do you ever wonder how much direct radiant heat transfer occurs between the first convection bundle and the firebox? The radiant energy that leaves the firebox impacts many operating and design considerations of fired heaters. Report FH-4 describes the method implemented in *Xfh* 4.0 to calculate the radiant energy leaving the firebox and entering the convection section. One of the significant improvements is a more accurate bridge wall temperature. FH-4 also discusses how much energy can normally be expected to transfer by radiation from the firebox to the convection section.

## Technical Documents Issued

*November 2004 – February 2005*

- BT-31 Intube flow boiling of fluids with noncondensable gases
- CT-18 Modifications to pressure drop method for partial reflux condensation inside vertical tubes
- Q 8.2 Condensation under deep vacuum
- Q 9.1 Contributions enhance tube vibration data bank
- Q 9.2 Modeling flooded refrigerant evaporators in *Xist*
- STG-15 Preventing freezing in heat exchangers
- STG-16 Heat transfer and pressure drop methods for longitudinal flow over low-finned tubes

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**.

# recognizing members

October 2004 – April 2005

## Renewing Members

AEL Apparatebau GmbH Leisnig  
Alloy Fab Ltd.  
ALZ GmbH  
Ambassador Heat Transfer Company  
Ambitech Engineering Corporation  
APEMA - Aparelhos, Peças e Máquinas Industriais Ltda.  
Applied Engineering Pte. Ltd.  
Belleli Energy Srl.  
Bos-Hatten, Inc.  
Brown Fintube France S.A.  
Carmagen Engineering, Inc.  
Caterpillar Inc.  
Colt Engineering Corporation  
D. C. Fabricators, Inc.  
Davy Process Technology Limited  
DongHwa Entec  
DynaMcDermott Petroleum Operations Company  
EQUITHERM

FUNKE Wärmeaustauscher Apparatebau GmbH  
GEA Aircooled Systems (Pty) Ltd.  
High Performance Tube, Inc.  
Holtec International  
Hualu Engineering and Technology Co., Ltd.  
Hyundai Heavy Industries Co., Ltd.  
Idemitsu Engineering Co., Ltd.  
Indian Oil Corporation Limited  
Industrial Design Consultants s.n.c.  
INPPA S.A.  
Intercambiadores y Serpentes Especiales, S.A. de C.V.  
KAPP Nederland B.V.  
KH-Engineering b.v.  
MI-E Chemical Machinery Co., Ltd.  
Nichiyo Engineering Corporation  
Norbert Karasek GesmbH  
PETROBRAS - Petróleo Brasileiro S.A.

RAMAB Rör och Apparatmontage AB  
Reliance Engineering Associates (P) Limited  
Serck Services (Gulf) Limited  
SK Engineering & Construction Co., Ltd. (SKEC)  
SSE GmbH (SCHELL Software & Engineering)  
Steeltek, Inc.  
Syntroleum Corporation  
Tesoro West Coast Company  
Thermal Technologies International  
Thermal-Korea Technical Service  
Thronson Internacional de Venezuela, C.A.  
Tranter PHE, Inc.  
Valdel Engineers & Constructors Pvt. Ltd.  
Venezolana de Proyectos Integrados Vepica, C.A.  
Vicoma B.V.  
WorleyParsons Services Pty Ltd (Brisbane)  
Y. W. Galil Engineering Ltd.  
Zetterströms Rostfria AB

## New Members

**ACM (Ateliers de Chaudronnerie de Monplaisir)**  
Saint-Priest, France  
**Air Industrie Thermique**  
Rueil Malmaison, France  
**Air Liquide Engineering**  
Champigny-sur-Marne, France  
**AS Tallinna Masinatehas**  
Tallinn, Estonia  
**Aztech Heat Exchangers Pte Ltd**  
Singapore  
**Chicago Bridge & Iron Company**  
Plainfield, Illinois, USA  
**Hantech Ltd.**  
Ulsan, Korea

**Hayden Industrial Products**  
Corona, California, USA  
**Heat Transfer ABC**  
Leiderdorp, The Netherlands  
**INVISTA Textiles (UK) Limited**  
Wilton, Redcar, United Kingdom  
**Jiangsu Shuangliang Air-Conditioning Equipment Co., Ltd.**  
Jiangyin, Jiangsu Province, China  
**Petrochemical Corporation of Singapore Pte. Ltd.**  
Singapore  
**Petrojet**  
Cairo, Egypt

**SINOPEC Shanghai Engineering Co., Ltd.**  
Shanghai, China  
**Spectra Dynamics Limited**  
Vadodara, India  
**Sulzer Chemtech USA, Inc.**  
Tulsa, Oklahoma, USA  
**Tex-Fin, Inc.**  
Houston, Texas, USA  
**Triune Projects Pvt. Ltd.**  
New Delhi, India  
**Wuhan New World Refrigeration Industrial Co. Ltd.**  
Wuhan, China

## New Participating Affiliates

**Albian Sands Energy Inc.**  
Fort McMurray, Alberta, Canada  
**Alfa Laval (Malaysia) Sdn Bhd**  
Shah Alam, Malaysia  
**BP Köln GmbH**  
Köln, Germany  
**BP Oil Refinería de Castellón S.A.**  
Castellón, Spain  
**CB&I Howe-Baker Engineers, Ltd.**  
Tyler, Texas, USA

**CB&I John Brown Limited**  
London, United Kingdom  
**Confab Industrial S.A.**  
Pindamonhangaba - SP, Brazil  
**Fluor Arabia Limited**  
Al-Khobar, Saudi Arabia  
**ICD (Asia Pacific) Pty Ltd**  
Pendle Hill, New South Wales, Australia  
**Invensys Process Systems (China) Co., Ltd.**  
Beijing, China

**Nippon Petrochemicals Company, Limited**  
Kawasaki, Japan  
**Shell Refining (Australia) Proprietary Limited**  
Corio, Victoria, Australia  
**Techint - Compañía Técnica Internacional S.A.C.I.**  
Buenos Aires, Argentina

Staff Presentations

F. J. Aguirre, Procesos de transferencia de calor – Avances y desafíos, Invited plenary session at XXI Interamerican Congress of Chemical Engineering, Lima, Perú (April 25, 2005).

This presentation describes the evolution of process heat transfer technology and highlights the importance of fouling as a remaining challenge to make significant additional progress.

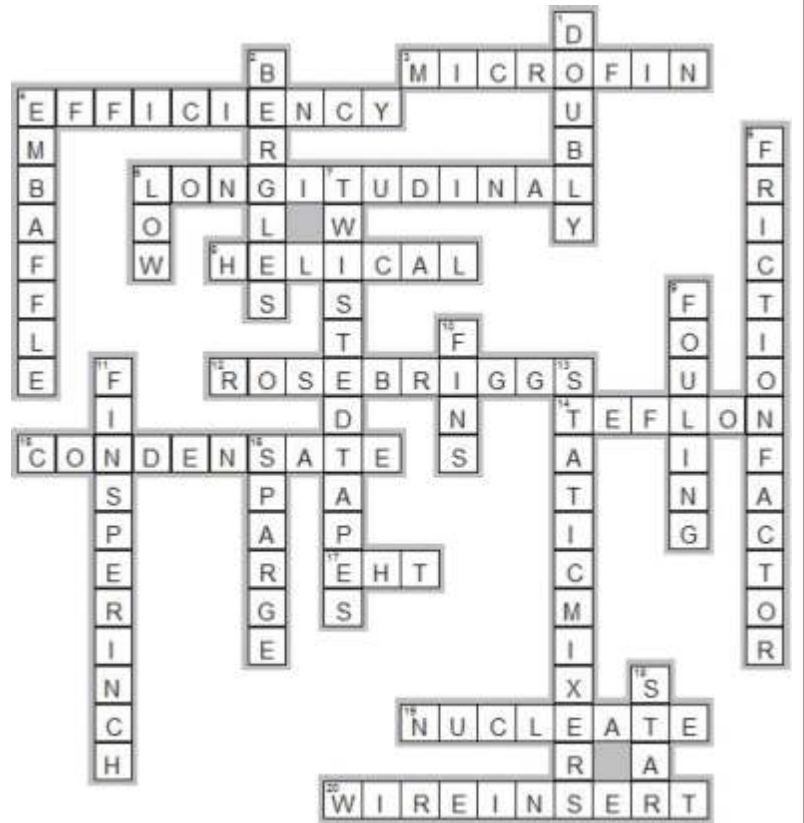
F. J. Aguirre, Property generation in HTRI *Xchanger Suite* using CAPE-OPEN, 2nd Annual U. S. CAPE-OPEN Meeting, Morgantown, West Virginia, USA (May 26, 2005).

This presentation demonstrates the use of the CAPE-OPEN thermodynamic interface within a development version of *Xchanger Suite* to access physical properties from three external property packages (Aspen Plus, Simulis, and PPDS).

J. W. Holmes, Embedding HTRI technology in process simulators using CAPE-OPEN, CO-LaN Annual Meeting, Como, Italy (February 17, 2005).

HTRI has developed an interface between process simulators and HTRI *Xchanger Suite* using the CAPE-OPEN interface. This interface allows embedding of HTRI rigorous heat exchangers as unit operations in CAPE-OPEN compliant simulators. When the flowsheet is run, the embedded unit operations call HTRI calculation routines transparently. HTRI *Xchanger Suite* 4.0 supports version 1.0 of the CAPE-OPEN standard for shell-and-tube exchangers (*Xist*), air coolers (*Xace*), and plate-and-frame exchangers (*Xphe*). The interface was demonstrated using the Aspen Plus and HYSYS process simulators.

Enhanced Shell-and-Tube Technology  
Puzzler Key



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Title \_\_\_\_\_ Fax \_\_\_\_\_

Company \_\_\_\_\_ E-mail \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ Mail to Heat Transfer Research, Inc.

\_\_\_\_\_ 150 Venture Drive

\_\_\_\_\_ College Station, Texas 77845 USA

\_\_\_\_\_ Fax to +1-979-690-3250

\_\_\_\_\_ E-mail to Newsletter@HTRI.net

# contacting HTRI

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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>

HTRI e-Library .....1.2

*Software distributed  
by HTRI*

EHT .....2.1

To order HTRI software updates,  
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## upcoming events

*July 2005 – December 2005*

**7th World Congress of  
Chemical Engineering**  
July 10-14, 2005

The Scottish Exhibition and Conference  
Centre  
Glasgow, Scotland

**HTRI North American Meeting**  
September 12-16, 2005  
Boston, Massachusetts

**WTT-EXPO 2005**  
October 4-6, 2005  
Karlsruhe, Germany

**HTRI European Meeting**  
October 10-14, 2005  
Killarney, Ireland

**HTRI Asian Meetings**  
October 25-28, 2005  
Chengdu, China

November 1-4, 2005  
Seoul, Korea

November 7-10, 2005  
Chiba, Japan

December 6-9, 2005  
Singapore

**Inchem Tokyo 2005**  
November 15-18, 2005  
Tokyo Big Site  
Tokyo, Japan

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