

## ThermalEA

4-Day Short Course  
*Opportunity for review and growth*

### HEAT EXCHANGER ANALYSIS BASICS

Dr. Lindon Thomas  
*with Special Sessions by*

Mr. Bill Closser  
Mr. Allen Gallaher  
Mr. Benjamin Scott  
Dr. Edwin Wiggins

### Thermal Engineering Associates

August 2 – 6, 2010

1:00 p.m. Monday to 12:00 p.m. Friday  
MainStay Suites  
Pigeon Forge, Tennessee

### Course Objectives

The purpose of this course is to provide a review of basic principles of heat exchanger analysis and fresh perspective on practical performance evaluation associated with rating, testing, monitoring, and problem assessment.

### Who Should Participate

Practicing engineers and other professionals who are involved in heat exchanger operation, testing, design, or manufacturing should consider taking this course.

### Special Benefits

Participants receive *Heat Transfer—Professional Version*<sup>2e</sup> and *HX Windows: Basics* performance analysis software. The course notes are coordinated with ASME and EPRI Test Guidelines.

### Course Coverage

- Summary of basic heat transfer principles
- Modern heat exchanger analysis methods
- Performance Analysis: *Single-Phase Processes*
  - change in operating conditions
  - plugged tubes • retubing
  - testing • uncertainty
- Testing and Monitoring
- Problem Assessment
- Preliminary Design Perspective

featuring *lecture-computer workshop sessions, practical examples, test code case studies, and plant applications using Dr. Thomas' textbook, ThermalEA heat exchanger analysis software, and course notes.*

### Instruction

Dr. Thomas earned his degrees in mechanical engineering at Tulsa University (BS) and Kansas State University (PhD) and has served on faculties of Akron University, University of Tennessee, and King Fahd University of Petroleum and Minerals. His professional contributions include textbooks on heat transfer and numerous journal and conference publications, and he is presently engaged in professional training and software development.

Companies whose engineers have participated in Dr. Thomas' heat exchanger performance analysis courses over the past eighteen years include Alfa Laval, American Electric Power, AREVA, Arizona Public Service, Associated Electric, Atomic Energy of Canada, Constellation Energy Group, Detroit Edison, Dominion Power, Duke Energy, Eastman Chemical Co., Entergy, EPRI, Exelon, General Dynamics Electric Boat, Illinois Power, Nebraska Power, NY Power Authority, Northrop Grumman Shipbuilding, NRC, Ontario Power, Pacific Gas & Electric, Sciencetech, Southern Company, TVA, Virginia Power, Westinghouse Electric, Wisconsin Electric, Wolf Creek Nuclear, Yankee Atomic Electric, and others.

### Course Schedule

#### Heat Exchanger Analysis Basics

#### PRACTICAL ANALYSIS APPROACH Day 1

- Basic Heat Transfer Principles: Review
  - Conduction Basics
  - Practical Analysis of Convection
- Practical Analysis of Heat Exchangers
  - Overall Coefficient of Heat Transfer
  - Fouling Resistance
  - Rating, Testing, and Design
  - Modern Heat Exchanger Analysis Methods

#### TUBULAR EXCHANGERS Day 2

- Shell-and-Tube Heat Exchangers
  - Shell-Side Performance Characteristics
  - Computer Workshop: Rating
    - Retubing • Plugged Tubes
- Air-Coolers: Preliminary Design Perspective

#### APPLICATIONS Day 3

- Computer Workshop: Rating and Testing
  - Shell-and-Tube (Water to Water)
    - 1-1 and 1-2 E Shell-and-Tube Arrangements
    - Other Type Shell Arrangements
  - Oil Coolers • Plate Exchangers

#### APPLICATIONS Day 4

- Heat Exchanger Testing/Monitoring Practice: Introduction
- Heat Exchanger Problem Assessment Practice: Introduction
- Heat Exchanger Uncertainty Analysis: Introduction
- Lecture - Computer Workshop Case Studies — Performance Testing

## Course Material—Textbook

### Heat Transfer—Professional Version<sup>2e</sup>

Lindon Thomas

Capstone Publishing Corporation

The *Textbook*,

- is *easy to read* and *comprehensive*, covering basic concepts on conduction, radiation, and convection;
- features a *unique approach to the study of convection* heat transfer that features the practical analysis approach;
- provides *extended coverage of heat exchanger analysis*.

#### Outstanding Academic Title Choice, American Library Association

*“An extremely useful and highly recommended reference book for all levels, from introductory to advanced applications. Undergraduates and graduate students; professionals; ...”*

**Dr. R. Darby. Texas A & M University**

## Course Material—Software

**HX Windows: Basics** was designed specifically for participants of **ThermalEA** heat exchanger analysis short courses.

The *Heat Exchanger Performance Analysis Software*

- is *easy to use*; and provides
- *quick and reliable* calculations for *shell-and-tube* and *double-pipe* heat exchangers; and options for
- evaluation of *shell-side convection coefficients* by *back-calculation* or *direct-calculation* using Bell-Delaware method and simple methods;
- *performance rating* calculations;
- *performance test* calculations;
  - five- and six-point options
  - hot and cold stream heat rates
  - EPRI test validation
  - test-fouling resistance
- *basic uncertainty* calculations.

## Instruction

### Bill Closser

- President of NuClear Services Group, Inc. Provides consulting, testing and support services to the utility industry. Extensive experience in the areas of condition monitoring, plant performance, equipment reliability.
- Eight years experience with EPRI. Program Manager, Nuclear Applications and Services; Director of Nuclear and International Services, EPRI Solutions.
- Member of ASME OM-21 and ASME PTC 12.5 committees, and co-author of EPRI NP-7552.
- BSME and BSNE, OSU; MBA, Regis University.

### Allen Gallaher

Project Manager – BOP Heat Exchanger Inspection and Assessment, Anatec International Inc.

- Over thirty years experience in project management of heat exchanger inspection, eddy current testing, and assessment programs in the nuclear and fossil power, chemical, and processing industries.
- Extensive experience in BOP heat exchanger training.
- BA/MA Math, Northeastern University.

### Benjamin Scott

- Senior engineer at Constellation Energy with 20 years experience in design, testing, and evaluation of power plant heat exchanger applications.
- Extensive experience in US Navy and plant engineering training.
- Member of various EPRI working groups and is presently serving as Vice Chairman of the ASME PTC 12.5 Committee for *Single Phase Heat Exchanger Testing*.
- BSSE, Naval Academy; MSME, George Washington U.

### Edwin Wiggins

- Mandell and Lester Rosenblatt Professor of Marine Engineering at Webb Institute in Glen Cove, NY.
- Head of the Department of Engineering at the US Merchant Marine Academy (5 years) and Texas A&M University at Galveston (3 years).
- Special interest in the area of thermal system design.
- Evaluation team member and formerly on the board of directors of the *Accreditation Board for Engineering and Technology* (ABET).
- BSChE, MSNE, and PhD ME Degrees at Purdue.

## Registration

### Short Course Registration Form

#### *Heat Exchanger Analysis Basics*

Course Date \_\_\_\_\_  
Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
Phone/Fax \_\_\_\_\_  
E-mail \_\_\_\_\_

#### Course Fee: \$1975

Includes PV book/disk package, performance analysis software, course notes, certificate of training, and refreshments. *Please bring a laptop computer if possible.*

- If copy of book is not required: deduct \$100
- Laptop rental option: add \$80

Register on-line at  
[www.thermalea.com](http://www.thermalea.com)

or forward registration form and payment to

**Thermal Engineering Associates**  
1424 Farrington Dr.  
Knoxville, TN 37923  
Phone/Fax: (865) 357-2002  
[lthomas@thermalea.com](mailto:lthomas@thermalea.com)

Contact MainStay Suites for room reservations.  
A special rate applies for course participants.

Phone: (888) 428-8350

[www.mainstaypigeonforge.com](http://www.mainstaypigeonforge.com)

*Pigeon Forge is a family resort area  
in the foothills of the Smoky Mountains.*

Contact Dr. Thomas for on-site courses.