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 6 – 10, 2012

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

Course Objective

The objective 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*** 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. He is presently engaged in professional training/software development and served as a Principle Investigator in developing the 1010 EPRI *Heat Exchanger Analysis Guide* (EPRI 1021065).

Companies whose engineers have participated in Dr. Thomas' heat exchanger performance analysis courses over the past nineteen years include Alfa Laval, American Electric Power, AREVA, Arizona Public Service, Atomic Energy of Canada, Constellation Energy Group, Detroit Edison, Dominion Power, Duke Energy, Eastman Chemical Co., Entergy, EPRI, Exelon, Illinois Power, Nebraska Power, NY Power Authority, NRC, Ontario Power, Pacific Gas & Electric, Scientech, 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

TUBULAR EXCHANGERS **Day 2**

- Modern Heat Exchanger Analysis Methods
- Computer Workshop: Rating
- Shell-and-Tube Heat Exchangers
  - Shell-Side Performance Characteristics
- Computer Workshop: Rating
  - Retubing • Plugged Tubes

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
- Air-Coolers: Preliminary Design Perspective

APPLICATIONS **Day 4**

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

Course Material—Textbook

Heat Transfer—Professional Version
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

2nd edition "*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, Asst. Vice President, Nuclear Services
Division Manager, Alion Science & Technology, 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.
- Chairman, ASME PTC 12.5 Committee. Member, ASME OM-21 Committee; Co-author EPRI NP-7552.
- BSME and BSNE, OSU; MBA, Regis University.

Allen Gallaher, Project Manager
Anatec International Inc.

- BOP Heat Exchanger Inspection and Assessment.
- Thirty years experience in project management of heat exchanger inspection, eddy current testing, and assessment programs in industry.
- Extensive experience in BOP heat exchanger training.
- Eddy Current Level III NDE Inspector.
- BA/MA Math, Northeastern University.

Benjamin Scott, Supervisor-Engineering
Constellation Energy Nuclear Group

- Twenty years experience in design, testing, and evaluation of power plant heat exchanger applications.
- Extensive experience Navy & plant engineering training.
- Member of various EPRI working groups and recently served as Vice Chairman of the ASME PTC 12.5 Committee for *Single Phase Heat Exchanger Testing.*
- A Principal Investigator, 1010 EPRI *Heat Exchanger Analysis Guide* (EPRI 1021065).
- BSSE, Naval Academy; MSME, George Washington U.

Edwin Wiggins, Professor of Marine Engineering
Webb Institute, Glen Cove, NY

- Formally 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: $2175

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 $150
- Laptop rental option: add $80

Register on-line at
www.thermalea.com

or forward registration form and payment to

Thermal Engineering Associates
1424 Farrington Dr.
Knoxville, TN 37923
Phone: (865) 357-2002
lthomas@thermalea.com

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

Phone: (888) 428-8350

www.mainstaypigeonforge.com

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

Contact Dr. Thomas for On-Site Courses.