HEAT RECOVERY STEAM GENERATOR (HRSG) FUNDAMENTALS

January 29, 2016
Denver Marriott City Center
Denver, CO

Related Event

COMBINED CYCLE POWER PLANT FUNDAMENTALS
January 27-28, 2016
OVERVIEW

This course on HRSG Fundamentals is intended for those that want to know a little bit more about the HRSG and its use in combined cycle and cogeneration plants. Topics to be covered include types of HRSGs, heat exchangers, boiler circulation systems, components, heat management, controls, water chemistry, emission controls, associated equipment, and fabrication/construction. Key features include heat transfer, surface arrangements, design/operating considerations, and integration with combined cycles and cogeneration equipment. Steam conditions will also be discussed.

WHO SHOULD ATTEND

- New employees who work at or deal with heat recovery steam generators
- Engineering Staff
- Project Management
- Administrative staff who need a better understanding of HRSGs

LEARNING OUTCOMES

- Explain heat transfer and flow within HRSG
- Describe the function of the economizer, evaporator, superheater, reheater, and steam drum components
- Discuss saturated and superheated steam fundamentals, temperature and superheater controls
- Identify purpose of drains, vents, and safety valves
- Outline HRSG controls and protective trips
- Review HRGS construction

INSTRUCTOR

Carl R. Bozzuto / Member and Secretary Treasurer /
Board of Directors of the Council of Industrial Boiler Owners

Carl Bozzuto has more than 40 years of experience in combustion and boiler operations and research. He began his career as a research engineer, senior project engineer, manager, and director for Combustion Engineering Inc. Carl was named vice president of process technology for the company, where he was responsible for the development and commercialization of new boiler and power plant technologies, including advanced cycles, ultra supercritical boilers, alternative working fluids, fluid bed boilers, plant integration, and other plant component technology. Serving recently as vice president of technology for the Power Environment Sector at Alstom Power Inc., he was responsible for the development and implementation of new technology for boiler and environmental products on a worldwide basis.

Bozzuto holds 16 U.S. patents and membership in the American Institute of Chemical Engineers (AIChE), the Combustion Institute, and the American Society of Mechanical Engineers (ASME). He has authored more than 30 published technical papers and is editor-in-chief of the textbook Clean Combustion Technologies, published by Alstom Power in 2009. Bozzuto has earned Bachelor of Science and Master of Science degrees in chemical engineering from the Massachusetts Institute of Technology and a Master of Science degree in management from the Hartford Graduate Center.
AGENDA

Friday, January 29, 2016

8:00 – 8:30 a.m.  Registration and Continental Breakfast

8:30 – 9:00 a.m.  What is an HRSG?
• Recovers Heat Energy From Another Stream Or Process
• Waste Heat Boiler
• Examples
• Electric Generation vs. Cogeneration

9:00 – 9:30 a.m.  Heat Exchangers
• Basic Flows
• Heat Transfer
• Types of Heat Exchangers
• Key Parameters

9:30 – 10:00 a.m.  Types of HRSG’s
• Horizontal
• Vertical
• Supports
• Surface Arrangements
• Access

10:00 – 10:30 a.m.  Networking Break

10:30 – 11:00 a.m.  Circulation Systems
• Natural Circulation
• Forced Circulation
• Steam Drums
• Headers
• Saturated and Superheated Steam

11:00 – 11:30 a.m.  HRSG Components
• Economizer
• Evaporator
• Superheater
• Reheater
• Steam Drum
• Headers
• Entrance Duct
• Walls
• Linings
• Support Steel

11:30 a.m. – 12:00 p.m.  Heat Management
• High, Intermediate, and Low Pressure
• Gas Temperature Management
• Integration With The Steam Cycle
• Supplementary Firing
• Heat and Mass Balances
• Gas Path
• Water Path
• Cooling Tower
## AGENDA

**Friday, October 30, 2015 (Continued)**

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<th>Time</th>
<th>Session</th>
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<tr>
<td>12:00 – 1:00 p.m.</td>
<td><strong>Group Luncheon</strong></td>
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<td>1:00 – 1:30 p.m.</td>
<td><strong>Integration with the Combined Cycle</strong></td>
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<td>• Hot Gas Source</td>
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<td>• Steam Turbine</td>
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<td>• Condenser</td>
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<td>• Cooling Tower</td>
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<td>• Feedwater Train</td>
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<td>1:30 – 2:00 p.m.</td>
<td><strong>Water Chemistry</strong></td>
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<td>• Requirements</td>
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<td>• Water Treatment</td>
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<td>• Potential for Internal Corrosion</td>
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<td>2:00 – 2:30 p.m.</td>
<td><strong>Emissions Control</strong></td>
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<td>• Source of Emissions</td>
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<td>• CO Catalyst</td>
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<td>2:30 – 3:00 p.m.</td>
<td><strong>Networking Break</strong></td>
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<td>3:00 – 3:30 p.m.</td>
<td><strong>Balance of Plant Equipment</strong></td>
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<td>• Pumps</td>
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<td>• Instrumentation</td>
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<td>• Compressed Air</td>
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<td>3:30 – 4:00 p.m.</td>
<td><strong>Controls</strong></td>
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<td>• Desuperheater</td>
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<td>• Drum Level</td>
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<td>• Water Chemistry</td>
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<td>• Start Up</td>
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<td>• Isolated Economizers</td>
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<td>• Feedwater Storage</td>
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<td>• Drain and Vent Systems</td>
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<td>• Blowdown</td>
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<td>4:00 – 4:30 p.m.</td>
<td><strong>Fabrications and Construction</strong></td>
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<td>• Materials</td>
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<td>• Harps</td>
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<td>• C-Sections</td>
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<td>• Design Considerations</td>
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<td>• Tube Restraints</td>
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<td>• Casing Design</td>
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<td>4:30 – 5:00 p.m.</td>
<td><strong>Review</strong></td>
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INSTRUCTIONAL METHODS

Case studies, PowerPoint presentations and group discussion will be used in this course.

REQUIREMENTS FOR SUCCESSFUL COMPLETION OF PROGRAM

Participants must sign in/out each day, be in attendance for the entirety of the course to be eligible for continuing education credit.

CREDITS

EUCI has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, EUCI has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.

EUCI is authorized by IACET to offer 0.7 CEUs for the course.

EVENT LOCATION

A room block has been reserved at the Denver Marriott City Center, 1701 California Street, Denver, CO 80202, for the nights of January 26-29, 2016. Room rates are $209, plus applicable tax. Call 1-303-297-1300 for reservations and mention the EUCI course to get the group rate. The cutoff date to receive the group rate is January 5, 2016, but as there are a limited number of rooms available at this rate, the room block may close sooner. Please make your reservations early.

PROCEEDINGS

The proceedings of the course will be published, and one copy will be distributed to each registrant at the course.

REGISTER 3, SEND 4TH FREE

Any organization wishing to send multiple attendees to these conferences may send 1 FREE for every 3 delegates registered. Please note that all registrations must be made at the same time to qualify.
Please make checks payable to: “PMA”

**EVENT LOCATION**

A room block has been reserved at the Denver Marriott City Center, 1701 California Street, Denver, CO 80202, for the nights of January 26-29, 2016. Room rates are $209, plus applicable tax. Call 1-312-595-0000 for reservations and mention the EUCI course to get the group rate. The cutoff date to receive the group rate is January 5, 2016, but as there are a limited number of rooms available at this rate, the room block may close sooner. Please make your reservations early.


☐ HEAT RECOVERY STEAM GENERATOR (HRSG) FUNDAMENTALS COURSE JANUARY 29, 2016: US $895 EARLY BIRD ON OR BEFORE JANUARY 15, 2016: US $795

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How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

Print Name [ ] Job Title [ ]

Company [ ]

What name do you prefer on your name badge? [ ] Address [ ]

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Telephone [ ] Email [ ]

List any dietary or accessibility needs here

**CREDIT CARD**

Name on Card [ ] Account Number [ ]

Billing Address [ ] Billing City [ ] Billing State [ ]

Billing Zip Code/Postal Code [ ] Exp. Date [ ] Security Code (last 3 digits on the back of Visa and MC or 4 digits on front of AmEx) [ ]

OR Enclosed is a check for $ [ ] to cover [ ] registrations.

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All cancellations received on or before December 25, 2015 will be subject to a US $195 processing fee. Written cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event or publication. This credit will be good for six months. In case of event cancellation, EUCI’s liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices at (201) 871-0474.