26 - 28 JUL 2017 | 9:00AM TO 5:00PM | WWW.SEAS.ORG.SG

MASTERCLASS ON STEAM SYSTEM OPTIMIZATION (SSO) TRAINING

COURSE OVERVIEW

This 3-day workshop will provide more in-depth technical information on undertaking an industrial steam systems. The training includes hands-on training for using all the United States Department of Energy (US DOE) Advanced Manufacturing Office's Steam System Best Practices software tools. Attendees for this training will be working on actual data gathered from the field by the international expert. There will be significant time spent on modeling and analysing industrial projects for improving overall steam system energy efficiency. Attendees will be bringing their own laptop and using the US DOE software tools during the hands-on student exercises all throughout the 3-day training class.

COURSE OBJECTIVES

At the completion of the 3-day Training on SSO, attendees will be able to:

- Understand the need of using a Systems Approach to accurately evaluate steam systems and optimization opportunities
- Identify the measurements required to manage steam generation efficiency
- Measure individual boiler and overall plant generation efficiency
- Estimate the magnitude of specific steam generation losses
- Identify and prioritize areas of potential boiler and overall plan generation efficiency improvement
- Recognize the impacts of fuel selection
- Characterize the operational impact of backpressure and condensing steam turbines
- Identify areas of end-use efficiency improvements including but not limited to , heat exchanger effectiveness, waste heat recovery, thermocompressor applications, etc
- Recognize the requirements of an appropriate steam trap management program
- Evaluate the effectiveness of system insulation
- Evaluate the primary economics impact of condensate recovery
- Calculate the energy costs associated with steam systems operation
- Refer and/or use a good set of software tools that can model the steam system and identify performance improvement opportunities
- Use the ASME Steam System Energy Assessment Standard (ASME-EA-3-2009) and undertake field work to do steam system assessments
- Identify gaps and deficiencies in energy efficiency in industrial steam systems
- Ask for specific field data and measurements required to undertake a steam system assessment
- Develop and model simple steam system projects using the fundamental laws of physics, thermodynamics and heat transfer
- Proficiently use the US DOE Steam Best Practices software tools (SSST, Steam System Modeler and 3EPlus) and/or other resources to evaluate steam systems, identify optimization opportunities in industrial plants and conduct and impact-level analysis
- Create a preliminary report that summarizes the findings from the steam system energy assessment

TARGET AUDIENCES

It is expected that the attendees have some minimum education and steam system exposure. That minimum criteria required is provided below:

- Bachelors degree in enginnering or a minimum of 3-year technical degree course with relevant engineering experience
- Demonstrate exposure and/or understanding of industrial and/or institutional steam systems energy usage and Best Practices
- Proficient in English
- Proficient with computers, especially using spreadsheet type programs such as Microsoft Excel and online data entry, etc

SCEM-PDUs & PEB-PDUs TO BE AWARDED

PENDING E2I FUNDING APPROVAL

APPLICABLE FOR PRODUCTIVITY AND INNOVATION CREDIT (PIC)

SEAS
Sustainable Energy Association of Singapore

26 - 28 JULY 2017
9:00AM - 5:00PM

SEAS Training Centre
TBA

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PROGRAMME OUTLINE

Day 1 - Morning
- Introduction & Welcome
- Introduction to "Systems Approach"
- Review of steam system fundamentals - thermodynamics
- Review of the US DOE Steam System Scoping Tool (SSST)
- Student exercise - Evaluation of an industrial plant steam system using the SSST and identifying potential areas of energy savings
- Group discussion to come up with consensus on the results of SSST
- Calculation of boiler efficiency using field data
- Evaluation of boiler plant efficiency (multiple boilers)
- Identification of impact boiler - examples from industrial plants

Day 1 - Afternoon
- Review of the US DOE's Steam System Modeler Tool (SSMT)
- Student exercise - Complete boiler plant analysis undertaken earlier but now by using SSMT and compare the results
- Develop a Steam System Model using SSMT
- Student exercise - Complete SSMT model for the industrial steam system being evaluated
- Thermodynamics and fundamentals of steam turbines
- Calculations of steam turbine efficiency and steam rate
- Understanding marginal steam cost in a cogeneration system
- Adjourn

Day 2 - Morning
- Review Day 1 material
- Q&A on material covered on Day 1
- Review of boiler blowdown - controls and heat recovery
- Student exercise - Complete boiler blowdown analysis using SSMT and compare different energy and cost saving options
- Fundamental analysis of boiler efficiency improvement opportunities
  - Heat recovery
  - Excess air control & management
- Review of opportunities and BestPractices in steam distribution systems
  - Steam leaks
  - Steam traps
  - Insulation
- Review of the 3E Plus insulation evaluation software
- Student exercise - Complete examples on energy and cost savings by insulating hot surfaces and compare results with 2 different methods (3EPlus and SSAT Software tools)

Day 2 - Afternoon
- Optimizing steam end-use in industrial plants
- Student exercise - Complete examples on steam end-use demand reduction and/or increase using the SSMT software tool
- Review condensate recovery systems; flash condensate to produce lower pressure steam and heat recovery opportunities
- Student exercise - Complete examples on condensate recovery and understand the cost impacts using the SSMT software tool
- Evaluation of cogeneration systems with back-pressure steam turbines
- Student exercise - Complete examples on steam turbines and parametric analysis for variables affecting cogeneration systems using the SSAT software tool
- Review condensing turbines performance vs electric grid power
- Overview of the ASME Standard (ASME-EA-3-2009) that describes the methodology of doing an industrial steam system energy assessment
- Typical Steam System Energy Assessment Report
- Conclusions and summary of key concepts
- Information about additional steam system optimization resources
- Q&A from Day 1 &2
- Adjourn

Day 3
Use site-based information from attendees to do interactive modeling of steam systems and evaluation and quantification of possible identified steam system optimization projects

***Day 3 will require significant preparation efforts*

ABOUT THE TRAINERS

Mr. Riyaz Papar is currently Director, Global Energy Services at Hudson Technologies Company, USA. He has almost 25 years of experience in Industrial Energy Systems and BestPractices. Mr. Papar is a United States Department of Energy (US DOE) Steam BestPractices Senior Instructor and a US DOE Steam Energy Expert. Mr. Papar is also a Steam, Waste Heat Recovery & Refrigeration/Chiller System Expert, both in the US and internationally, to private companies, state government organisations and United Nation Industrial Development Organisation (UNIDO). Mr. Papar has worked and/or provided energy consulting services in 150+ industrial plants in the US and internationally. He has also provided BestPractices training to over 5,000 plant personnel.

Mr. Papar is the Lead Steam System International Expert for UNIDO's Industrial Energy Efficiency Project (IEEP). He is responsible for the development and delivery of capacity building, energy assessments and project implementation for industrial steam system optimization in the IEEP. Mr. Papar has worked in several countries including South Africa, Thailand, Indonesia, Vietnam, Malaysia, Philippines and Egypt on IEEP missions.

Mr. Papar is a Member of US DOE Steam BestPractices Technical SubCommittee and is very experienced in client relations and project development. Mr. Papar has Project Engineering, Design, Development and Management experience for Process Evaluation, Operation & Optimization experience with Industrial Steam systems, Heat Recovery, Refrigeration, Chillers, Cogeneration, Motors, Pumps, Fans, Air Compressors & VFDs. Mr. Papar has been the past Chair of American Society of Mechanical Engineers (ASME) Profess Industries Division and is past Chair of American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Technical Committees 8.2 (Centrifugal Machines) and Technical Committee 1.10 (Cogeneration Systems).

Mr. Papar is a registered Professional Mechanical Engineer, a Certified Energy Manager and an ASHRAE Fellow. His graduate-level education specialised in the area of thermal engineering (heat transfer, energy conversion, refrigeration, etc). Mr. Papar also completed Ph.D. level coursework with a research emphasis on optimization of operation of energy assets (boilers, turbines, chillers, etc) in industrial plants. Lastly, he is the author of more than 40 Technical Publications in Journals, Conference Proceedings & Trade Magazines.

RATES

EARLY BIRD (before 31 May)	NORMAL FEE	GROUP FEE
SEAS Member: S$2,400 Non Member S$2,600	SEAS Member: S$2,600 Non Member S$2,800	S$2,200.00 (4+ delegates from 1 orginization)

*** Fees inclusive of GST**

*** SEAS reserves the right to make changes to the trainer, programme, venue, cancel or reschedule the programme if necessary or warranted by circumstances beyond our control**

*** Payment to be made by the early bird closing date to enjoy early bird rate**

*** Enjoy group discount for 4 or more delegates registered at the same time from the same organisation and same billing source**

*** Payment to SEAS & Address:** Please send a crossed cheque to:
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REGISTRATION FORM

☐ Yes! I would like to register for this programme ☐ I am unable to attend but please put me on your mailing list

PARTICIPANT'S DETAILS	Number of Delegates	Fees Payable		
1	Name (Dr/Mr/Mrs/Ms)		NRIC No	Designation
	HP No	Email		PEB ☐ SCEM ☐
2	Name (Dr/Mr/Mrs/Ms)		NRIC No	Designation
	HP No	Email		PEB ☐ SCEM ☐

ORGANISATION'S DETAILS

Company Name

Company Address

Contact Name	Tel
Email	Fax