BAYUBALI LEARNING SOLUTIONS

STEAM PLANT ENERGY AND COST SAVINGS COURSE

Training Dates:	As per schedule	**Training Venue:**	Kuala Lumpur, Malaysia.
Basic Fee:	RM3,450.00 + SST per participant (this includes course materials, meals, refreshment and attendance certificate)		

DURATION

21 hours (Three (3) days)

TARGET GROUP

Plant Managers, Energy Managers, Plant Technologist, Supervisors, Engineers and Operating personnel who are responsible for steam plant operation and energy efficiency improvements in power plant, oil and gas, petrochemical plants, and other industries that using steam for power and heat transfer processes.

TARGETED INDUSTRY/INDUSTRIES

Oil and Gas, Petrochemicals, Power Plant, Renewal Energy Plant, Co-Generation Plant, and other industries that are using steam boilers and steam systems.

CERTIFICATION

Not applicable.

COURSE OVERVIEW

Steam is largely used for the purpose of process heating and mechanical drives (power generation, pumps, and compressor). Using steam offers multiple benefits over other heating media and numerous benefits, simplicity of the system efficiency and reliability make steam become the first choice for process heating.

This training course is to gain knowledge and skills to all personnel that are working with steam plant on the importance of the energy and cost savings management.

COURSE OBJECTIVE

The objective of this training program is to provide a comprehensive review on various aspects on steam plant system that can ultimately contribute to their Operation Expenditures (OPEX) such as fuels, combustion, water make-up, internal steam use, chemical injection, and condensate recovery.

The steam plant energy and cost savings are the main driver for sustainable business and profitability. This can be achieved by optimizing the operation and maintenance of steam boiler and steam systems.

COURSE OUTCOMES

At the end of the training course, the participant will be able to: -

- Understand the potential of energy and cost savings in steam plant systems and its applications.
- Select the best available up-to-date technology for steam plant systems.
- Calculate and estimate the steam boiler efficiency.
- Calculate the energy used for heat transfer and mechanical drive equipment.
- Optimize the correct heat transfer equipment for their applications.
- Identify and calculate the steam plant energy and cost savings.
- Develop a comprehensive strategy on implementing the steam plant energy and cost savings initiatives.

TRAINING METHODOLOGY

- Lecture
- Classroom discussions
- Short video presentation
- Case study

COURSE CONTENTS

Overview of STEAM ENERGY Program

- Overview of Steam Energy Efficiency
- Steam System Basics
    - Why Steam
    - Steam System Operation
        - Generation
        - Distribution
        - End Use
        - Recovery
- Economics of Energy
    - Fuel Cost
    - Steam Cost

STEAM BOILERS and Its ENERGY

- Type of Steam Boilers
    - Firetube Boiler
    - Watertube Boiler
- Selection of Steam Boilers
- Types of Steam
    - Saturated Steam
    - Superheated Steam
- Definition of Steam Enthalpy
- Temperature–Specific Entropy Diagram (T–s diagram)
- Applications of Various Types of Steam Pressures and Temperatures

Optimizing COMBUSTION Process and Controls

- Purposes of Burning Fuels
- Characterization of fuels
- Combustion Efficiency
- Components of Process Heating Systems
- Process Heating Energy Consumption
- Potential for Savings
- Incentive for Optimizing Heat Process Systems
- Seven Ways to Optimize Your Process Heat System
- Emerging process heating technologies
- Check Burner Air to Fuel Ratios
- Factors affecting excess air level requirements
- Preheated Combustion Air

Optimizing the COST and USAGE of Steam

- Steam Generation
- Cogeneration
- Opportunities for Improvement
- Boiler Systems Efficiency and Its Performance
    - Boiler Efficiency
    - Factors Affecting Boiler Efficiency
- Opportunities For Improving Steam Generation Systems
- Boiler System Fouling and Corrosion
- Automatic Boiler Water Management System
- Boiler Feed Water Economizers
- Boiler Efficiency Design Features
- Steam Use
- Steam Trap
- Steam Recovery
    - Eliminate Condensate Losses
    - Optimize Deaerator Performance
- Steam Distribution
- Heat Recovery System
    - Conventional Economizer
    - Air Preheat
    - Blowdown
    - Vent Condenser
- Optimizing Steam System
    - Optimize Steam Pressure
    - Optimize Boiler Loading
    - Optimize Fuel Atomization
- Economic Justification for Steam Improvement Projects
- Maintenance and Inspection Procedures

Optimizing <u>STEAM CONDENSATE</u> System

- Introduction to Condensate Recovery
  - What is Condensate Recovery?
  - The Benefits of Condensate Recovery
    - Reduced Fuel Costs
    - Lower Water-related Expenses
    - Positive Impact on Safety and the Environment
- Returning Condensate and When to Use Condensate Pumps
  - Using Trap Inlet Pressure
    - Gravity Return
    - Elevated Return
  - Using a Pump to Overcome (Return Line) Backpressure
- Condensate Recovery: Vented vs. Pressurized Systems
  - Vented vs. Pressurized Condensate Recovery
    - Selecting Between a Vented or Pressurized System
  - Pros and Cons of Vented and Pressurize Recovery Systems
- Condensate Recovery Piping
  - Piping for Two-Phase Flow
  - Steam Present in Condensate Recovery Piping
  - Design Methods for Condensate Recovery Piping

Study Case on <u>STEAM PLANT IMPROVEMENT</u> Project

- Boiler Efficiency (Steam-to-Fuel) Calculation
- Fuel Consumption
- Boiler Feedwater Temperature Improvement
- Steam Plant Savings: -
  - Fuel Saving
  - Make-up Water Saving
  - Motive Steam Saving

ABOUT THE INSTRUCTOR



Ir. Mohd Normarzuki bin Ya'acob**,** has graduated with Bachelor (Honors) in Mechanical Engineering from the University of Malaya.

He is a registered Professional Engineer with Practicing Certificate (Mechanical) with Board of Engineer, Malaysia, a Corporate Member, The Institution of Engineers, Malaysia and a Member of American Society of Mechanical Engineers (ASME). He is a certified First Grade Engineer (Steam Boiler and Internal Combustion Engine) by the Department of Occupational Safety and Health (DOSH).

He had working experiences with several company such as Equator Engineering Sdn Bhd, Tenaga Nasional Berhad, Petronas Gas Berhad (Gas Processing Plant 5/6 and Centralized Utilities Facility), Qatar Petroleum (Head of Short Technical Training) and currently, he is working with Bayubali Engineering Sdn Bhd as a Managing Director.

Throughout his carrier, he has extensive field experiences in steam boiler operation, trouble-shooting, inspection, maintenance and repair. He has also experience in project management, design, selection, specification, installation, maintenance, operation, plant optimization and trouble-shooting of utility facilities in the oil and gas industry.

He is the co-author for "An Introduction to Steam Machinery" book published by University of Malaya Publisher.