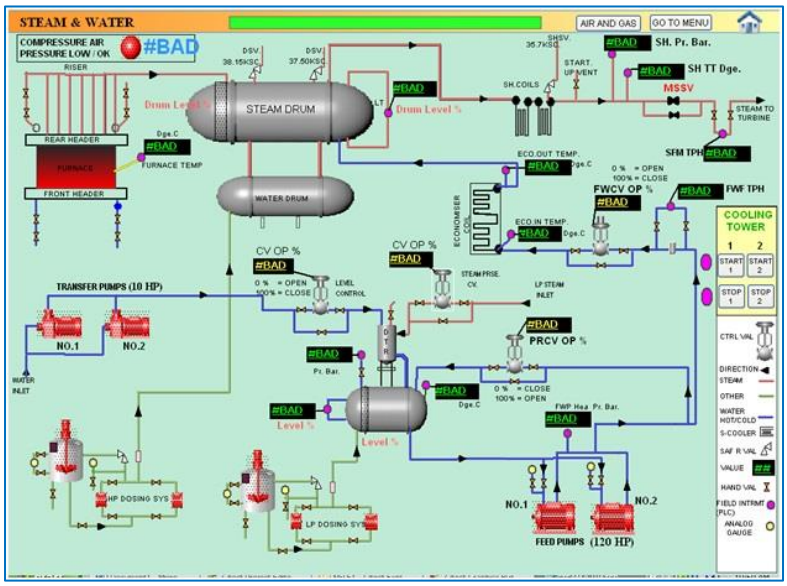
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IE059:

Boiler Control and Instrumentation for Engineers & Technicians

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Training Description:

This five-day intensive course introduces the practices of controls systems and safety controls for industrial steam generating boilers.

It focuses on the control and safety requirements applicable to most types of boilers from small gas-fired units to large multi-fuel installations. The course will provide training in how control and instrumentation is designed to manage the main variables such as drum water level, furnace draft, combustion fuel and air conditions.

Burner management systems are introduced with their principal features including flame safety systems. The essential safety requirements for boilers and burners are identified and the corresponding safety interlocks are explained as practical solutions in accordance with the latest safety standards.

The training includes a study of the basic principles of burner management systems and includes the measures used to support furnace safety through the enforcement of start-up procedures and purge sequences. The requirements for burner management systems to be engineered as safety instrumented systems to IEC 61511 are examined and the implications for equipment design are discussed.

The training modules in this course are supported by a series of practical study exercises with answers provided to assist the understanding of key issues.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the objectives of the principal boiler control functions
- ✓ Recognize and understand typical boiler control diagrams and their design intentions
- ✓ Contribute to the setting up and tuning of boiler control loops
- ✓ Identify principles and design concepts governing:
  - ➢ Boiler feed water control
  - ➢ Flue gas analysis and fuel combustion trimming controls
  - ➢ Importance of boiler safety control and start-up interlocks
  - ➢ Explore advanced control strategies for improved boiler plant efficiency
  - ➢ Furnace draft measurement and control
  - ➢ Steam demand and firing rate control
  - ➢ Main steam and reheat steam temperature control

Training Designed for:

This course is intended for all Senior Boiler Plant Operators, Repairers and Installers, Control System Engineers, Instrumentation Engineers and Technicians, Boiler Plant Commissioning Engineers, Operation, Maintenance, Inspection and Repair Specialists, Mechanical Engineers and Technicians, Design Engineers, Consulting Engineers.

Training Program:

DAY ONE:

- ❖ Pre-Test
- ❖ Introduction
  - Hazards of boiler operations

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- The main control functions in boilers and furnaces

❖ Review of Process Control and Instrumentation Relevant to Boilers

- Principles of sensors and transmitters with examples for boilers
- Closed loop control principles including feedback, feedforward, ratio and limiting
- Control system hardware and software tools
- Safety instrumented controls and the impact of IEC 61511
- Instrumentation diagrams and symbols per ISA and SAMA
- Distributed control systems and the separation of safety systems

DAY TWO:

❖ Feedwater and Drum Level Control

- Performance requirements: level, quality, stability
- Characteristic responses of drum level
- Level control solutions, 1, 2 and 3 element types
- Level measurement problems and practices
- Drum level safety systems

❖ Furnace Air and Draft Controls

- Performance requirements; pressures and temperatures
- Characteristic responses and means of control
- Pressure measurement methods and the pressure profile
- Temperature control and the impact of dew point
- Protection against implosion

DAY THREE:

❖ Combustion Controls

- The combustion process and its requirements for efficiency and safety
- Coal, oil and gas firing types
- Stoichiometric air and excess air requirements
- Fuel-air ratio control and its measurements
- Firing rate controls and cross limiters for improving dynamic response
- Methods for measurements of boiler efficiency using analysers
- Application of optimising controllers

DAY FOUR:

❖ Burner Management Systems

- Safety and performance requirements of pulverisers, burners and igniters
- Furnace safety standards and regulations
- Flame monitors and flame failure detection
- Start-up protection and sequencing
- Furnace supervisory controls and shutdown systems
- Steam temperature control
- Superheater and attemperator arrangements
- Essential control requirements
- De-superheater controls

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DAY FIVE:

- Steam Pressure and Boiler Load Controls
  - Pressure and flow response characteristics
  - Single boiler load control
  - Multiple boiler installations and load sharing controls
- Course Conclusion
- Post-Test and Evaluation

Training Requirements:

"**Hands-on practical sessions, equipment** and **software** will be applied during the course if required and as per the client's request."

Please note that the above topics can be amended as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:
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Training & Career Development Department