

**“Steam Boilers Operation, Maintenance & Control System”
Training Program
(English Material)**

Course Length: 25 Hours @ 5 days

OBJECTIVES:

Upgrade the knowledge and skills of participants in operation and maintenance of the various types of steam boilers

DESIGNED FOR:

Maintenance Engineers , Senior technicians senior Operators and specialists

Outlines:

1-Introduction:

- i- thermodynamic systems and energy conservation equations.
- ii- steam tables and charts.
- iii- modes of heat transfer (conduction, convection and thermal radiation).
- iv- heat transfer from extended surface.
- v- fuel and combustion.

2- Classifications of boilers:

- i- fire tube boiler.
 - ii- water tube boiler
- 1- O type.
 - 2- D type.
 - 3- A type.

3- Boiler design and efficiency:

- i- boiler efficiency.
- ii- boiler performance.
- iii- boiler tests.

4- Burners:

- i- introduction.
- ii- burner components.
- iii- gas burners.
- iv- oil burners.
- v- low NO_x emissions burners.
- vi- safe starting up sequence of operation.
- vii- how to select burners.

5- Draught system:

- i- importance of draught system on the combustion efficiency.
- ii- natural draught and determination the proper chimney dimensions.
- iii- mechanical draught.
- iv- Fan selection

6- boilers operation:

- i- start up procedures
- ii- normal operation.
- iii- boiler shutdown procedures.

7- Instrumentation & control system:

- i- pressure, temperature, and flow rate instruments.
- ii- measurement of exhaust gas concentration.
- iii- oxygen trim.
- iv- water level control.
- v- steam pressure control.
- vi- control of combustion system.
- vii- measurements and control of steam flow rate.

8- Safety of boiler:

- i- safety relief valves.
- ii- low water fuel cutoff.
- iii- flame detection devices.

9- Boiler water treatment:

- i- harmful effects from improper treatment.
- ii- cycles of concentration.
- iii- external and internal water treatment
- iv- boiler deposits & blowdown control.

10- Troubleshooting & preventive maintenance:

- i- combustion system troubleshooting.
- ii- water treatment system troubleshooting
- iii- daily & weekly maintenance & inspection.
- iv- monthly & annually maintenance & inspection.