MATRIX QUANTUM SDN. BHD. 202201044306 (1490003-X)
Lot 180, Jalan 1A, Kampung Baru Subang,
40150 Shah Alam, Selangor Darul Ehsan.
Tel: 03-58926806 Email: matrixquantum88@gmail.com

TRAINING SCHEDULE & OUTLINE

Course Tittle	**Boiler Operator Essentials: Fundamentals, Safety, and Control**
Training Provider	**Matrix Quantum Sdn Bhd**
Duration	**2 Days**
Date	**TBA**
Speaker	**Mohd Fauzi bin Mat Rasid – Boiler Engineer Grade (JKKP 2025/JS01/1590)**

Training Outcomes:

Upon completion of this training, participants will be equipped to immediately implement best practices and:

1) State the purpose of and basic operating principles of a steam boiler
2) Differentiate between common steam boiler types
3) Recognize common industry terminology related to steam boiler
4) Identify the main functional groups of steam boiler components
5) Explain the function of critical components like the burner, drum, and superheater.
6) Locate and describe the function of key safety fittings.
7) List the necessary pre-start checks to ensure safe operation
8) Follow the step-by-step procedure for a safe boiler light-off.
9) Interpret basic steam boiler control panel indicators and alarms
10) Execute a safe, controlled normal shutdown procedure.
11) Identify the symptoms of key operating problems and initiate corrective action.
12) Explain the function of all major safety and protection devices.
13) Identify the contaminants in boiler feedwater and their negative effects
14) Explain the purpose of both external and internal water treatment
15) Interpret basic water test results and adjust blowdown accordingly

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	TIME	DESCRIPTION	REMARK
DAY 1	8.30-8.45	REGISTRATION DAY 1	
	8.45-9.00	INTRODUCTION AND ICE BREAKING	
	9.00-10.30	MODULE 1	
	10.30-11.00	TEA BREAK	
	11.00-12.30	MODULE 2	
	12.30-14.00	LUNCH AND ZOHOR PRAYER BREAK	
	14.00-15.30	MODULE 3	
	15.30-15.45	TEA BREAK	
	15.45-17.15	MODULE 4	
	17.15	ADJOURN DAY 1	
DAY 2	8.30-8.45	REGISTRATION DAY 2	
	8.45-9.00	RECAP OF PREVIOUS DAY LESSONS	
	9.00-10.30	MODULE 5	
	10.30-11.00	TEA BREAK	
	11.00-12.30	MODULE 5	
	12.30-14.00	LUNCH AND ZOHOR PRAYER BREAK	
	14.00-15.30	MODULE 6	
	15.30-15.45	TEA BREAK	
	15.45-17.15	MODULE 6	
	17.15	END OF COURSE	

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MODULE OUTLINE DETAILS

1. **MODULE 1 – INTRODUCTION TO STEAM BOILER**
   - A. **Boiler Fundamentals & Purpose**
     Heat transfer and steam generation.
   - B. **Basic Principles**
   - C. Pressure, temperature, and phase change.
   - D. **Types of Boilers**
     Firetube vs. Watertube (advantages/disadvantages).
   - E. **Energy Cycle**
     Overview of energy conversion (chemical to thermal).

2. **MODULE 2 – STEAM BOILER COMPONENTS & PARTS**
   - A. **Boiler Shell/Drum**
     Circulation, separation.
   - B. **Heat Transfer Surfaces**
     Tubes, furnace, economizer.
   - C. **Combustion System**
     Burner, air damper, fuel supply, stack.
   - D. **Fittings & Mountings**
     Safety valves, water gauge glass, pressure gauges, steam stop valve.

3. **MODULE 3 – STEAM BOILER START UP**
   - A. **Pre-Start Checklist**
     Water level, fuel supply, interlocks, venting.
   - B. **Safety Interlocks Check**
     Confirming low water cut-offs are functioning.
   - C. **Purge Cycle**
     Explaining minimum volume and timing for safety.
   - D. **Light-Off Sequence**
     Ignition, flame establishment, and smooth firing rate control.

4. **MODULE 4 – STEAM BOILER CONTROL**
   - A. **Combustion Control:** Maintaining optimum air/fuel ratio for efficiency.
   - B. **Water Level Control:** Single, two, and three-element control systems.
   - C. **Steam Pressure Control:** How the firing rate responds to load changes.

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5. **MODULE 5 – STEAM BOILER SHUTDOWN & PROTECTION**
   - **A. Normal Shutdown**
     Procedure for taking the boiler offline
   - **B. Emergency Shutdown**
     Immediate steps for critical failures (loss of flame, tube failure).
   - **C. Protection Devices**
     Detailed focus on safety valves, high-pressure/temperature cut-outs, and low water cut-offs.
   - **D. Troubleshooting**
     High water level, unstable pressure, nuisance burner trips.

6. **MODULE 6 – STEAM BOILER SHUTDOWN & PROTECTION**
   - A. **Contaminant Effects:** Scale, corrosion, carryover, foaming
   - B. **External Treatment:** Softening (Ion Exchange) and its limitations.
   - C. **Internal Treatment:** Oxygen scavengers, sludge conditioners/polymers, and alkalinity control.
   - D. **Blowdown Management:** Purpose and procedures for manual and continuous blowdown to control Total Dissolved Solids (TDS).
   - E. **Water Testing:** Key parameters (TDS, pH, Hardness) and recommended ranges.