Industrial Training Overview
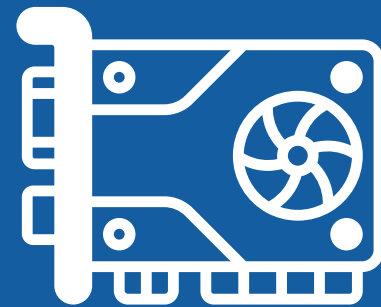
Ashna Sanjay Gaude

Overview
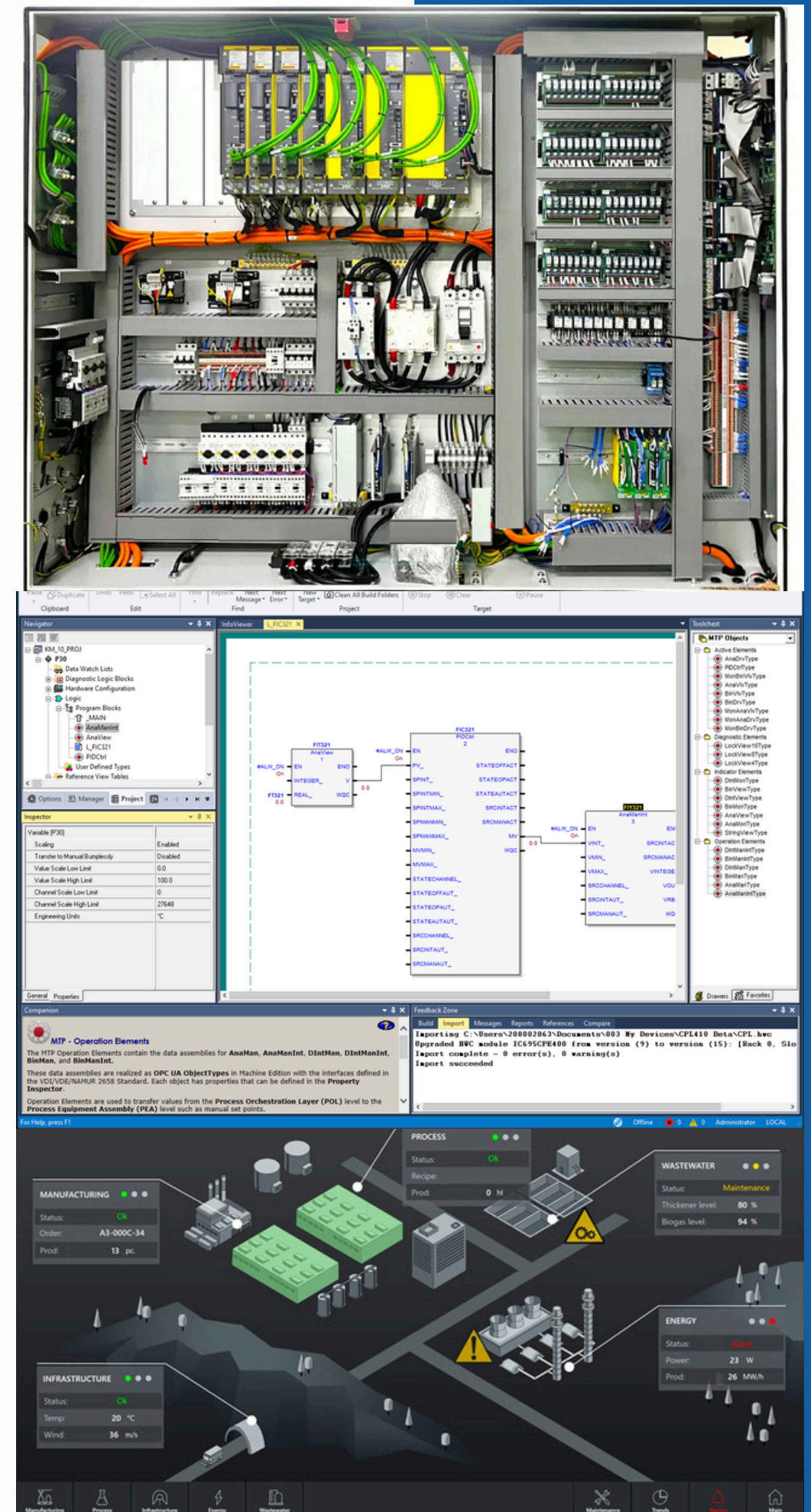
Introduction

Emerson Automation Solutions
Intelligent Platforms

Duration : 2nd June 2025 to
18th July 2025

To explore real-world industrial automation systems and gain exposure to PLCs, HMI design, and process control at a leading automation company.

Hardware

Pac Machine Edition

Movicon
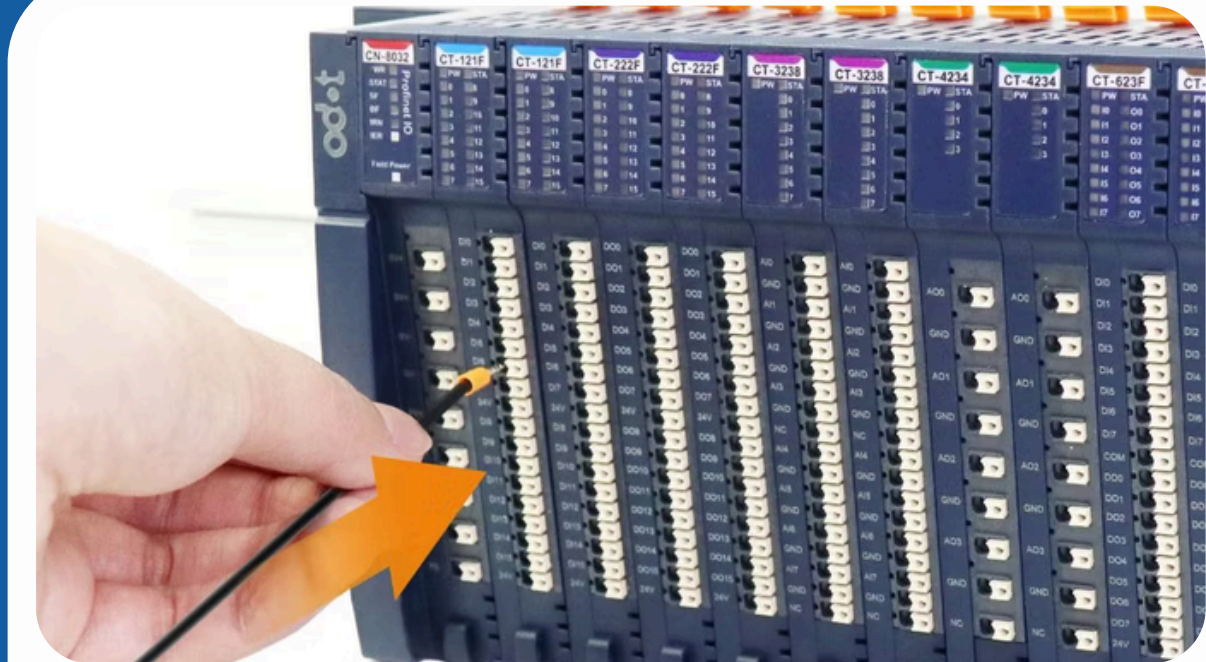
Hardware

Panel Components
Learned about the internal layout of control panels and identified key components like controllers, power supplies, terminal blocks, relays, and I/O modules. Understood how each component contributes to the overall functioning of industrial control systems.

Assembly Name	PC Desk
Assembly Number	PC-51
Assembly Revision	May-24
Date of Approval	May-24
Total Piece	34
Total Cost	$ 66.60

PM ProjectManager

BOM Level	Raw Materials, Parts or Components	Part Number	Unit Cost		Quantity	Total Cost	
1	PC Desk						
2	Desktop						
3	Wood board natural finish (4-ft x 25-in x 1.5-in)	WB1	$	50.00	1	$	50.00
2	Steel frame						
3	Steel square tube (3/4-in x 4-ft)	ST4	$	12.00	2	$	24.00
3	Steel square tube (3/4-in x 2.5-ft)	ST2	$	6.00	4	$	24.00
3	Steel square tube (3/4-in x 1-ft)	ST1	$	3.00	4	$	12.00
4	1/4-in- 20 x 1-in Allen-Drive Cap Screws	P15	$	0.40	12	$	4.80
4	1/4-in x 20 Steel Hex Nut	P20	$	0.15	12	$	1.80
						$	-
						$	-
						$	-
						$	-
						$	-
		Total			34	$	66

GAPD and BOM
Understood how GAPD diagrams and Bills of Materials are prepared for automation panels and observed how they guide panel assembly. Gained insight into how accurate documentation ensures smooth installation and maintenance.

PD and IO testing
Observed and practiced I/O testing procedures, including digital and analog signal checks using PME and standard testing tools. Learned to verify hardware functionality by simulating real-world input and output conditions.

PAC Machine Edition 10.6

Explored Emerson's PAC Machine Edition software used for programming, configuring, and testing PLCs.
Learned to develop and simulate control logic using Ladder Diagrams (LD) and Function Block Diagrams (FBD).

01 Hardware Configuration

Learned to create a virtual PLC system in PME by selecting components to match the actual hardware and configuring them accordingly. Assigned target and Ethernet IPs to establish communication between the PLC and programming device and allows programming, simulation, and testing of logic before downloading it to the actual hardware.

02 Ladder Logic

Developed control logic using contacts, coils, timers, counters, and conditional instructions within the Ladder Diagram editor. Learned how to implement sequential operations, interlocks, and fail-safes that represent real world automation setups.

03 Functional Block Diagram

Created modular control logic using pre-defined and user-defined blocks, allowing for clearer visualization of data flow. Learned to define parameters, link function blocks, and convert LD logic to FBD for structured and reusable design.

04 Simulator

Used PME's simulation environment to test and validate control logic without connecting to physical hardware. Practiced forcing inputs, monitoring outputs, and simulating real-time behavior to debug and verify logic functionality.

05 I/O Testing

Learned to test digital and analog signals using reference tables in PME to monitor and force I/O values. Verified hardware functionality by triggering real-world inputs, forcing outputs, and checking continuity or voltage at terminals.

Movicon.NExT

Project Setup and Tag Configuration

- Created local projects in Movicon and added respective drivers
- Configured driver hostname and channel IP for communication
- Defined tags using structured data types for cleaner organization
- Mapped each tag to PME addresses with correct data types and R/W settings

Screen Design and Animation

- Built HMI screens using toolbox elements and symbol animations
- Used structured tags to simplify and standardize design
- Created reusable objects by grouping animated symbols
- Integrated alarms into screens to display real-time warnings and faults
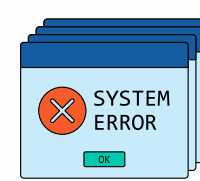
Navigation, Popups & Parameterization

- Added hot regions and commands for screen transitions
- Designed reusable popup windows linked to alias structures
- Used parameters to dynamically map popup content for each instance
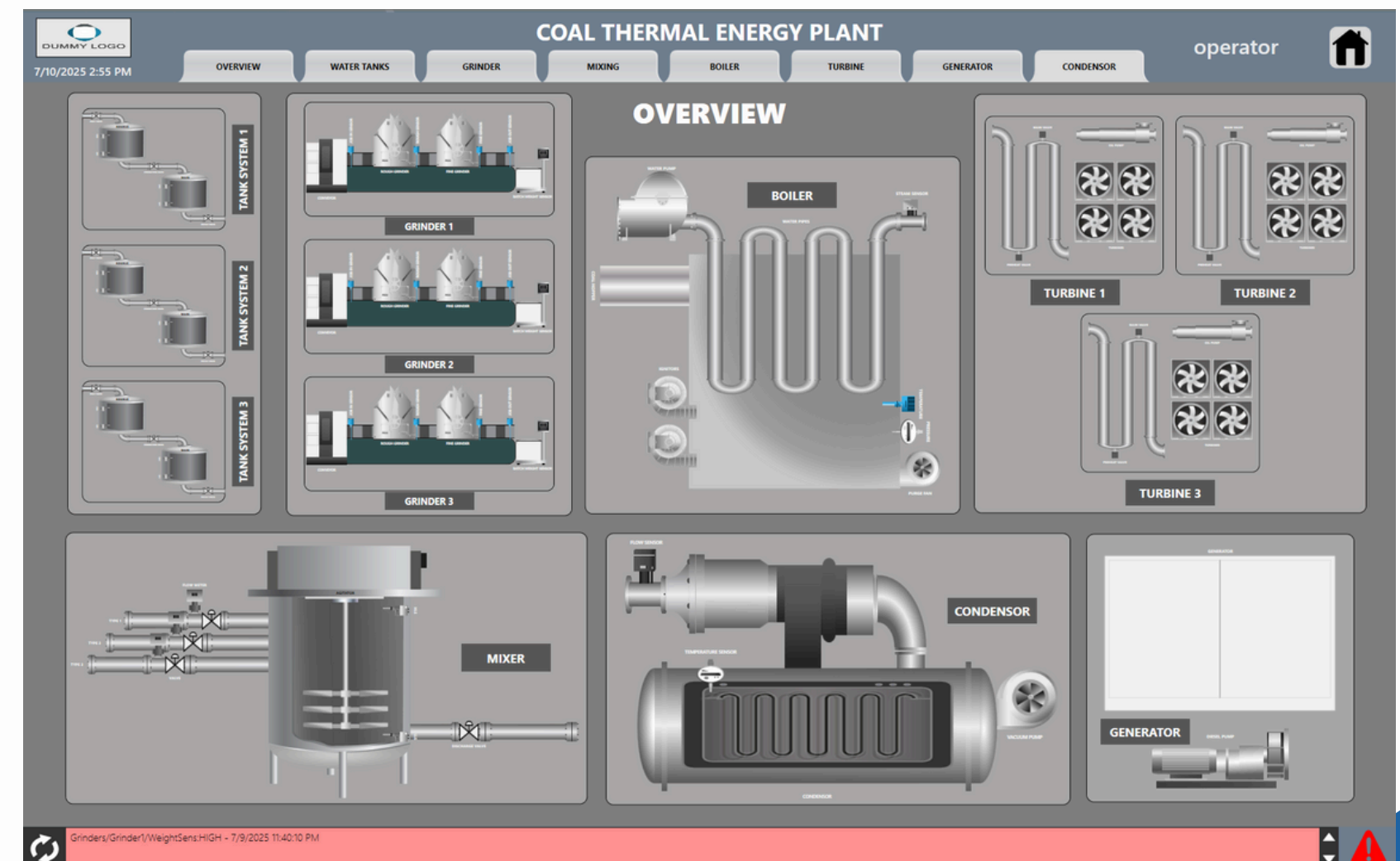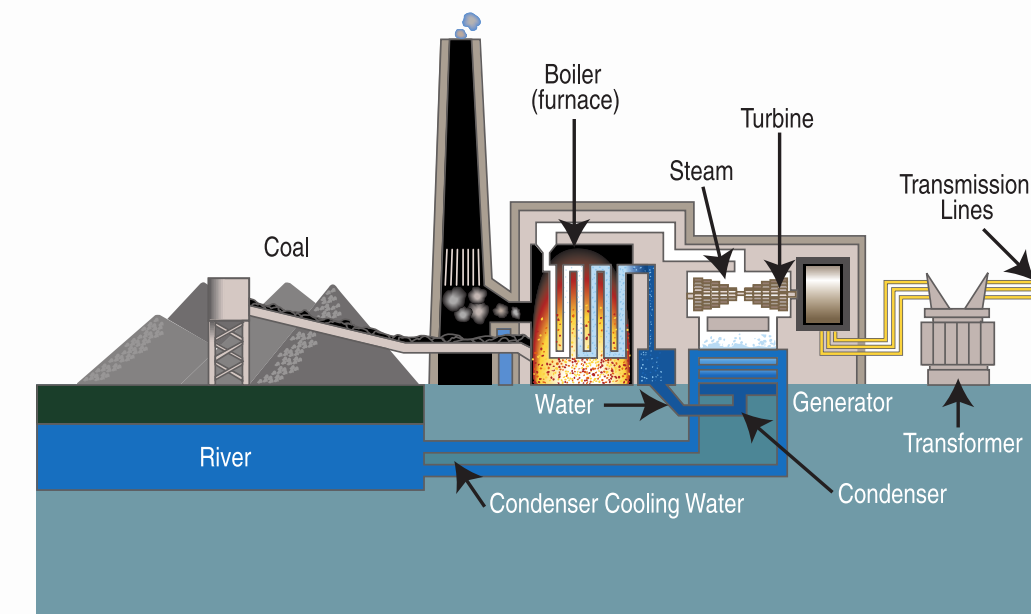- Applied non-modal window settings for smooth navigation and reuse

Testing and Runtime Tools

- Configured user roles and permissions to control screen access
- Used runtime mode to test tag behaviour and screen logic
- Forced values using the watch window for simulation
- Imported/exported tag CSVs to manage and modify tag data efficiently

Coal Thermal Power Plant

- Simulated complete plant operation using PME for PLC logic and Movicon for HMI design
- Covered all major stages:
  - Water Tank Control – Level monitoring and refill logic
  - Coal Grinding & Mixing – Timed sequence with interlocks
  - Boiler – Temperature-based heating with fail-safe checks
  - Turbine & Generator – Sequential startup and simulated power output
  - Condenser – Steam cooling and water recycling
- Used structured logic (LD/FBD), alarms, user roles, and popup-based HMIs
- Created a modular, real-time interactive simulation of the entire process

ACKNOWLEDGEMENT