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GSECL, Utran Power Plant

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## Industrial Visit to GSECL Power Plant

### Introduction:

On April 19, 2023, students of Second and Third Year of I&C branch visited the Gujarat State Electricity Corporation Limited (GSECL) Surat Power Plant. The purpose of the visit was to gain practical knowledge about the power generation process and to understand the various systems and technologies used in a thermal power plant. The GSECL Surat Power Plant is one of the largest power plants in Gujarat, with a capacity of 1560 MW.

### Arrival:

We arrived at the power plant at 10:00 am, and we were greeted by the plant officials. After a brief introduction, we were given safety instructions and were provided with safety helmets. We were then divided into groups and were taken on a guided tour of the plant.

### Power Generation Process:

We started our tour from the turbine hall, where we were shown the steam turbine and the generator. The plant uses coal as the primary fuel, which is burned in the boiler to produce steam. The steam then drives the turbine, which rotates the generator and produces electricity. We were also shown the cooling water system, which cools the steam after it passes through the turbine. The power generation process in GSECL Surat Power Plant involves several stages, including fuel processing, combustion, steam generation, steam turbine operation, generator operation, and environmental control.

Here's a brief overview of each stage:

1. Fuel Processing: The fuel, typically coal, is transported to the power plant and processed to remove impurities and size it appropriately for use in the boiler.
2. Combustion: The coal is burned in the boiler to produce heat, which is used to convert water into steam.

3. **Steam Generation:** Water is fed into the boiler, where it is heated to produce steam. The steam is then passed through a series of tubes, where it is further heated to reach high pressure and temperature.
4. **Steam Turbine Operation:** The high-pressure steam is directed onto the blades of a steam turbine, causing the turbine to spin. As the turbine spins, it drives a generator, which converts the mechanical energy of the turbine into electrical energy.
5. **Generator Operation:** The electrical energy produced by the generator is sent to a transformer, which increases the voltage to the level needed to transmit the electricity over the power grid.
6. **Environmental Control:** The flue gas produced during the combustion process contains various pollutants, such as sulfur dioxide and nitrogen oxide. The power plant uses several environmental control systems, such as the electrostatic precipitator and the flue gas desulfurization system, to remove these pollutants before they are released into the environment.

#### Sensors and Instruments:

The GSECL Surat Power Plant uses a wide range of sensors and instruments to monitor and control various aspects of the power generation process. Some of the common sensors and instruments used in the plant are:

1. **Pressure sensors:** These are used to measure the pressure of steam, water, and other fluids in the different parts of the plant.
2. **Temperature sensors:** These are used to measure the temperature of steam, water, and other fluids in the plant.
3. **Flow meters:** These are used to measure the flow rate of fluids in the plant, such as water, steam, and fuel.
4. **Level sensors:** These are used to measure the level of fluids in the different parts of the plant, such as water level in the boiler.
5. **Vibration sensors:** These are used to detect the vibration and movement of rotating machinery, such as the turbine and the generator.
6. **Gas analyzers:** These are used to analyze the composition of flue gas and measure the concentration of pollutants such as sulfur dioxide, nitrogen oxide, and carbon monoxide.
7. **Electrostatic precipitator:** This device is used to remove particulate matter from the flue gas.

8. Flue gas desulfurization system: This system is used to remove sulfur dioxide from the flue gas.

9. pH meters: These are used to measure the acidity or alkalinity of water used in the plant.

10. Power analyzers: These are used to measure the electrical parameters of the power generated, such as voltage, current, and frequency.

These sensors and instruments are essential for the safe and efficient operation of the power plant, and they help the operators to monitor and control various processes and systems in real-time.

#### Control Room:

We were then taken to the control room, where we saw the various control panels and systems used to monitor and control the power generation process. The control room in GSECL Surat Power Plant is the nerve center of the plant, where the plant operators and engineers monitor and control the power generation process. The control room is equipped with a wide range of control panels, displays, and systems that provide real-time information about the plant's operations. Here are some of the key features of the control room:

1. SCADA system: The control room is equipped with a SCADA (Supervisory Control and Data Acquisition) system, which collects data from various sensors and instruments in the plant and provides real-time information to the operators. The SCADA system displays information about the power generation process, such as the status of the boiler, turbine, and generator, as well as the temperature, pressure, and flow rate of fluids in the plant.

2. DCS system: The control room also has a DCS (Distributed Control System) system, which controls the various processes and systems in the plant. The DCS system is used to control the boiler, turbine, and generator, as well as the environmental control systems, such as the electrostatic precipitator and the flue gas desulfurization system.

3. Control panels: The control room has multiple control panels that allow the operators to monitor and control various systems in the plant. These control panels are equipped with switches, buttons, and displays that provide real-time information about the plant's operations.

4. Communication systems: The control room is equipped with a range of communication systems, such as intercoms and radios, which allow the operators and engineers to communicate with each other and with the field personnel.

5. Safety systems: The control room also has safety systems, such as fire alarms and emergency shutdown buttons, which are used to protect the plant and the personnel in case of emergencies. Overall, the control room in GSECL Surat Power Plant is a highly advanced and sophisticated facility that plays a crucial role in ensuring the safe and efficient operation of the power plant. The control room's systems and technologies enable the plant operators and engineers to monitor and control various processes and systems in real-time, which helps to maximize the plant's efficiency and minimize its environmental impact.

#### Conclusion:

The visit was an excellent opportunity for us to learn about the power generation process and the various systems and technologies used in a thermal power plant. We were impressed by the scale and complexity of the plant and the efforts made by the plant officials to control emissions and reduce environmental impact. We would like to thank the GSECL Surat Power Plant officials for providing us with this valuable experience.