

POWER GRID SUBSTATION VISIT REPORT

Visit to 132/33 KV AIS Grid Sub-Station (OPTCL), Ambagada, Brahmapur

1. Introduction

- A field visit is an essential part of engineering education, providing students with practical exposure to real-world power systems. On 16 April 2026, I accompanied my students on a visit to the 132/33 KV substation operated by Odisha Power Transmission Corporation Limited at Ambagada, Berhampur.
- The visit aimed to enhance students' understanding of power transmission, substation operation, and modern protection systems used in electrical networks.

2. Objectives of the Visit

- To study the operation of a 132/33 kV substation
- To observe practical working of substation equipment
- To understand transformer operation and protection
- To learn about control room monitoring systems
- To gain knowledge of safety practices

3. Overview of the Substation

- The substation receives electrical power at 132 KV and steps it down to 33 KV for distribution.
- During the visit, it was observed that the substation is equipped with 40 MVA power transformers, which play a crucial role in voltage transformation and power distribution.
- The substation ensures reliable power supply using advanced protection, control, and communication systems.

4. Transformer Details (Observed)

- **Rating:** 40 MVA
- **Voltage Level:** 132/33 KV
- **Type:** Oil-filled power transformer
- **Cooling System:** ONAN (Oil Natural Air Natural)
- **Protection System:**
 - Buchholz Relay
 - Differential Protection
 - Overcurrent Protection
 - NIFPS (Nitrogen Injection Fire Protection System)
- From the diagram plates observed on-site, students understood transformer internal construction, oil circulation, and tap changer operation.

5. Observations during the Visit

a) Switchyard Equipment

Students observed the following equipment in the outdoor yard:

- Power Transformer (40 MVA, 132/33 kV)
- Circuit Breakers (SF6 type for 132 kV)
- Isolators (Single and Double Break)
- Busbars (Rigid Copper type)
- Current Transformers (CT)
- Potential Transformers (PT) / CVT
- Lightning Arresters
- Wave Trap (PLCC communication)
- OPGW (Optical Ground Wire)
- Capacitor Bank (for power factor improvement)

b) Insulators and Transmission System

- Disc Insulators
- Suspension Insulators
- Tension Insulators
- Pin Insulators
- Transmission towers (based on angle classification A, B, C, D)

c) Protection and Auxiliary Systems

- Buchholz Relay (internal fault detection)
- Breather (Silica Gel type)
- Arcing Horn
- Bus Coupler
- Post Insulators
- Cooling System (Oil Natural)
- NIFPS (Fire protection system)

d) Control Room

Students visited the control room and observed:

- SCADA system for real-time monitoring
- Relay panels for protection
- Control panels for feeder operation
- Alarm and indication systems
- Measurement of voltage (from PT) and current (from CT)

e) Diagram Plates

From the displayed plates (manufacturer: ECE Industries Ltd.), students learned:

- Transformer internal structure
- Oil filling and maintenance procedures
- Tap changer operation and connections
- Technical specifications and ratings

These diagrams helped students understand the internal working of transformers in detail.

6. Learning Outcomes

- Understanding of practical substation operation
- Knowledge of transformer working and protection
- Familiarity with real-time monitoring systems
- Awareness of communication systems (PLCC, OPGW)
- Understanding of safety and maintenance practices

7. Safety Measures Observed

- Proper earthing of equipment
- Restricted zones with warning signs
- Safe distance from live conductors
- Use of protective equipment
- Fire protection systems (NIFPS)



POWER GRID OF OPTCL, AMBAGADA, BRAHMAPUR



40 MVA TRANSFORMER (132/33 KV)



POWER GRID OPTCL

8. Conclusion

The industrial visit to the 132/33 kV substation at Ambagada, Berhampur was highly informative and beneficial. Students gained practical exposure to power system components, transformer operation, and protection systems.

The visit successfully bridged the gap between theoretical knowledge and real-world application.

9. Guide / Instructor Details

1. **Name of Guide:** Er. Biswajit Nayak
Designation: Deputy Manager
2. **Name of Guide:** Er. Subhanjay Dash
Designation: Deputy Manager
3. **Name of Guide:** Mr. Ranjan Maharana
Designation: Operator
4. **Name of Guide:** Mr. Gyanaranjan Mishra
Designation: Operator