



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION



Report of Industrial Visit to IOCL Mathura Oil Refinery, Mathura (16th April 2025)



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

विकसित भारत
अभियान
1947 TO 2047

Table of Contents

Sr. No.	Content
1	Event Approval form
2	Note sheet
3	Notice
4	Event Poster
5	Report
6	Annexure I :- Attendance
7	Annexure II :- Parent Consent Form
8	Annexure III:- Student Undertaking
9	Annexure IV:- Learning Outcomes



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

विकसित भारत
अभियान
1947 TO 2047

Event Poster



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION



विकसित भारत
अभियान
1947 TO 2047

School of Engineering and Technology
collaboration with
Centre of Excellence in Robotics and Automation
(organizes)

INDUSTRY VISIT

INDIAN OIL CORPORATION LIMITED-Mathura Refinery

Date: April
16th, 2025



Time: 9:00 AM

Faculty Coordinator

Dr. Kishore Ajay Kumar Ayyala
Dr. Imran Siraj
Mrs. Achana Goyal

Convener

Dr. Pankaj Aggarwal

Student Coordinator

Abhinav Kumar
Meenakshi Rakesh Pai



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION



Report on
Industrial Visit to IOCL Mathura Oil Refinery, Mathura
Organized by
School of Engineering and Technology in Collaboration with Centre of Excellence-Robotics & Automation

Date: 16th April 2025

Venue: IOCL Mathura Refinery, Mathura

Event Type: Industrial Visit

Mode of Activity: Offline

Target Group: B.Tech Engineering Students

Resource Person: Mr. Ramraj, IOCL Mathura Oil Refinery, Mathura

Faculty Coordinators: Mrs. Archana Goyal, Dr. Kishore Ajay Kumar Ayyala, Dr. Imran Siraj,
Ms. Ruchika Bhakhar

Number of Participants: 20 Students

Introduction

The industrial visit to IOCL Mathura Oil Refinery, organized by the Department of Computer Science and Engineering, provided students with an exceptional opportunity to witness the real-world application of Information Technology in one of India's largest and most technologically advanced oil refineries. This initiative aimed to bridge the gap between academic learning and industrial practices by exposing students to the technological backbone that powers the refinery's complex and mission-critical operations.

Aligned with the *Sustainable Development Goals (SDGs)*—specifically *Target 4.3* (Ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education), *Target 8.6* (Substantially reduce the proportion of youth not in employment, education or training), and *Target 9.4* (Upgrade infrastructure and retrofit industries to make them



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

विकसित भारत
अभियान
1947 TO 2047

sustainable)—this visit was structured to enhance students' industry readiness, technical competencies, and awareness of sustainable industrial practices.

As a key unit of Indian Oil Corporation Limited (IOCL), the Mathura Refinery integrates a broad range of digital systems—including Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS), Industrial IoT, and cybersecurity frameworks—making it an ideal learning platform for students of computer science. The visit was designed to help students understand the practical implications of their academic knowledge in domains such as automation, process control, industrial data management, and cybersecurity in operational technology (OT) environments.

Students had the opportunity to interact with industry professionals and learn how large-scale IT infrastructure supports safe, efficient, and continuous refinery operations. The refinery's use of cutting-edge technologies such as real-time data monitoring, predictive maintenance through AI/ML models, and secure communication networks offered insights into how the convergence of IT and OT is shaping the future of smart and sustainable industries.

Such visits are crucial in developing a deeper appreciation for the role of computer engineers in industrial ecosystems. They not only broaden students' technical perspective but also help them envision career paths in sectors beyond conventional software development—such as industrial automation, infrastructure security, and process optimization.

Objectives

Real-World Exposure: To observe how IT and digital systems are deployed in process industries like oil refineries, contributing to **Target 4.3** by enhancing access to practical technical education.

Cybersecurity Awareness: To understand how critical infrastructure like refineries is secured against cyber threats, thereby preparing students for future employment in high-demand industrial sectors (**Target 8.6**).

SCADA & DCS Systems: To learn about Supervisory Control and Data Acquisition (SCADA) and Distributed Control Systems (DCS) that ensure safe, reliable industrial operations.



Process Optimization with IT: To gain insights into how data analytics and computer algorithms contribute to refinery efficiency and sustainable industry upgrades, aligned with **Target 9.4**.

Industry Readiness: To familiarize students with real-life challenges and IT applications in industrial environments, bridging the gap between academic knowledge and industry needs.

Methodology

The visit included guided tours, expert interactions, and live demonstrations:

- **Technical Presentations** on the refinery's digital control architecture and IT backbone.
- **Visit to Control Room** to observe DCS & SCADA systems in action.
- **Interaction with Cybersecurity & Automation Engineers** who shared real-world challenges and case studies.
- **Demonstration of Safety Protocols**, AI/ML applications in predictive maintenance, and data monitoring systems.

Key Highlights

1. Inaugural Session

The visit commenced with an inaugural session hosted at the IOCL Training Centre within the refinery premises. The session began with a warm welcome by IOCL officials, followed by an overview presentation introducing the refinery's history, production capacity, and strategic significance in India's energy sector. Students were briefed on safety protocols, environmental norms, and the schedule of the day. The opening address also emphasized the importance of integrating IT with industrial processes, setting the stage for a meaningful and educative experience.

- Introduction to IOCL Mathura Refinery
- Safety instructions and visit guidelines
- Overview of refinery operations and digital systems



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION



Student Learnings:

- Understood the real-world scope and impact of public sector industries like IOCL
- Gained awareness of industry-standard safety practices
- Recognized the relevance of Computer Science in critical infrastructure

2. Refinery Overview Session

Before the plant tour, students attended a detailed session focused on the operational structure, production capacity, and technological landscape of the IOCL Mathura Refinery. Experts explained the refinery's role in the national fuel supply chain, the flow of processes from crude input to product output, and the digital technologies that enable safe and efficient functioning.

- Introduction to the end-to-end refining process
- Explanation of crude oil sourcing, processing, and product distribution
- Overview of the refinery's production capacity and energy efficiency systems
- Insight into the integration of IT systems for plant optimization and monitoring

Student Learnings:

- Understood the full workflow of a refinery from raw input to end product
- Learned how data acquisition systems support real-time decision-making
- Gained perspective on how large-scale infrastructure relies on IT and automation
- Appreciated the coordination between different engineering disciplines in refinery operations

3. Introduction to Various Units of the Refinery

A technical session introduced the students to the **core processing units** of the refinery. Key process areas such as **Crude Distillation Unit (CDU)**, **Hydrotreating Unit**, **Catalytic Cracking Unit (FCCU)**, and **Delayed Coker Unit (DCU)** were introduced, along with their roles in the



production of petrol, diesel, LPG, and other petroleum products. Special focus was placed on the use of **control systems, instrumentation, and real-time monitoring** technologies across these units. Students learned how process engineers use data analytics and industrial software tools to optimize operations and ensure plant safety.

- Overview of IOCL's role in national energy production.
- Explanation of crude oil sourcing, refining stages, and product distribution.
- Observation of **Distillation Towers, Cooling Towers, and Pump Houses**.
- Insights into **Catalytic Cracking and Blending Units** for different fuel products.

Student Learnings:

- Gained a clear understanding of the structure and function of core refinery units such as CDU, FCCU, DCU, and Hydrotreaters.
- Learned how petroleum products like petrol, diesel, and LPG are derived through various refining processes.
- Understood the importance of process control systems, sensors, and automation in maintaining safety and operational efficiency.
- Observed how real-time monitoring and data analytics are used to track parameters such as temperature, pressure, and flow rate across units.
- Discovered how control room systems integrate with field units through SCADA/DCS platforms.
- Developed awareness of how computer engineers contribute to plant optimization through industrial software and IT-enabled infrastructure.
- Appreciated the complexity of fuel blending processes and the technology behind maintaining product quality standards.

4. Visit to Plant

Students visited various sections of the refinery plant while adhering to safety norms. The plant tour offered a close look at industrial pipelines, towers, storage tanks, and heat exchangers that drive continuous refinery operations.



- Observation of large-scale industrial infrastructure
- Guided walkthrough of process units and safety systems
- Insight into mechanical and control system interdependencies

Student Learnings:

- Visually connected theoretical knowledge with practical applications
- Observed the complexity and coordination required in plant operation
- Appreciated the role of control systems in maintaining operational stability

5. Visit to Ecological Park

To highlight IOCL's commitment to sustainability, students were taken to the Ecological Park within the refinery premises. They explored biodiversity areas, water conservation systems, and green initiatives implemented by the refinery.

- Walkthrough of green zones and plantations
- Briefing on rainwater harvesting and wastewater treatment
- Overview of energy-efficient systems and eco-friendly technologies

Student Learnings:

- Understood how industries can balance productivity with sustainability
- Learned about green practices like recycling and biodiversity promotion
- Realized the importance of integrating eco-conscious design in industrial planning

6. Visit to Control Room

Students visited the refinery's centralized control room—where plant operations are managed in real time using advanced digital systems. The tour featured live SCADA screens, alarm systems, and analytics dashboards.

- Demonstration of SCADA/DCS monitoring systems



- Overview of alarm response, system redundancy, and data visualization
- Introduction to cybersecurity in critical infrastructure

Student Learnings:

- Learned how real-time data is used to monitor and control refinery functions
- Understood the role of IT in predictive maintenance and process optimization
- Gained exposure to cybersecurity and network resilience in industrial settings

The visit concluded on a positive and enthusiastic note, with students actively sharing their feedback and reflections on the enriching experience. IOCL officials interacted with the students, providing valuable career guidance and encouraging them to explore opportunities in core industries such as energy, process automation, and IT integration. A lively **Q&A session** was held where students sought advice on career prospects and the evolving role of technology in industrial operations. The event ended with a **group photograph**, capturing the memorable moments and the spirit of learning and collaboration fostered during the visit.

Conclusion

The industrial visit to IOCL Mathura Oil Refinery proved to be a highly enriching and insightful experience for the B.Tech CSE students. It offered a rare opportunity to explore the integration of Information Technology with large-scale industrial operations, particularly in the areas of process automation, real-time data monitoring, industrial control systems, and cybersecurity.

Through guided sessions, live demonstrations, and interactions with IOCL professionals, students developed a deeper understanding of the operational structure of an oil refinery, the significance of automation in ensuring process efficiency and safety, and the pivotal role of IT systems in critical infrastructure. The visit successfully bridged the gap between academic concepts and their practical application in a highly specialized industrial setting.



The experience not only enhanced students' technical knowledge but also broadened their perspective on diverse career paths within core industries, particularly in the domains of industrial IT, SCADA/DCS system management, data-driven decision-making, and cybersecurity.

Future Scope

- **Increased Collaboration with Industry:** Future visits and collaborations with industries like IOCL can facilitate long-term student-industry interaction and foster practical learning beyond the classroom.
- **Skill Development Workshops:** Follow-up sessions on SCADA/DCS, industrial cybersecurity, and IoT in process industries can further enhance technical skillsets.
- **Internship & Project Opportunities:** Students can be encouraged to undertake mini-projects or internships focused on process automation, network security in OT environments, or energy informatics.
- **Curriculum Enrichment:** Insights gained from such visits can be used to align academic curriculum with current industry needs, particularly in the areas of control systems, industrial data analytics, and infrastructure IT.
- **Interdisciplinary Learning:** Promoting collaboration between computer science, electronics, and mechanical engineering students to simulate real-world problem solving in industrial environments.

Key Highlights:

- **Insight into Refinery Operations:** Students gained a comprehensive understanding of the refining process, including crude oil distillation, catalytic cracking, and fuel production units.
- **Exposure to Industrial IT Systems:** The visit highlighted the use of advanced digital systems like SCADA and DCS for real-time monitoring, automation, and control of refinery operations.



- **Hands-On Learning through Site Tours:** Guided plant visits allowed students to observe large-scale industrial infrastructure, safety protocols, and the integration of mechanical and IT systems.
- **Focus on Sustainability:** The visit to IOCL's Ecological Park showcased the company's commitment to environmental responsibility through green initiatives and waste management systems.
- **Industry Interaction and Career Awareness:** Students interacted with IOCL professionals, explored practical applications of their academic knowledge, and learned about career paths in industrial automation and IT.

The event ended on a positive note, equipping students with valuable skills and industry exposure.

Glimpses of Industrial visit



Photo 1: Students in front of IOCL

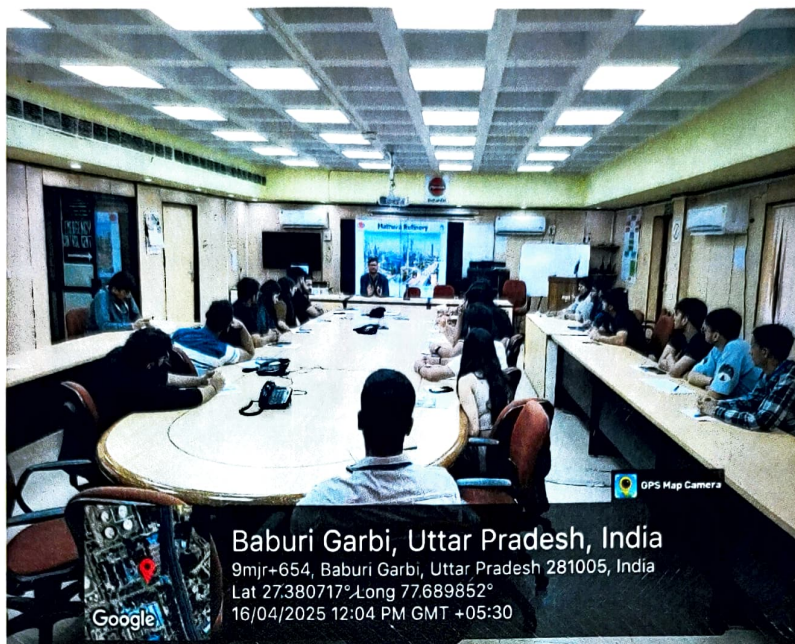


Photo 2: Understanding the Refinery structure and its working

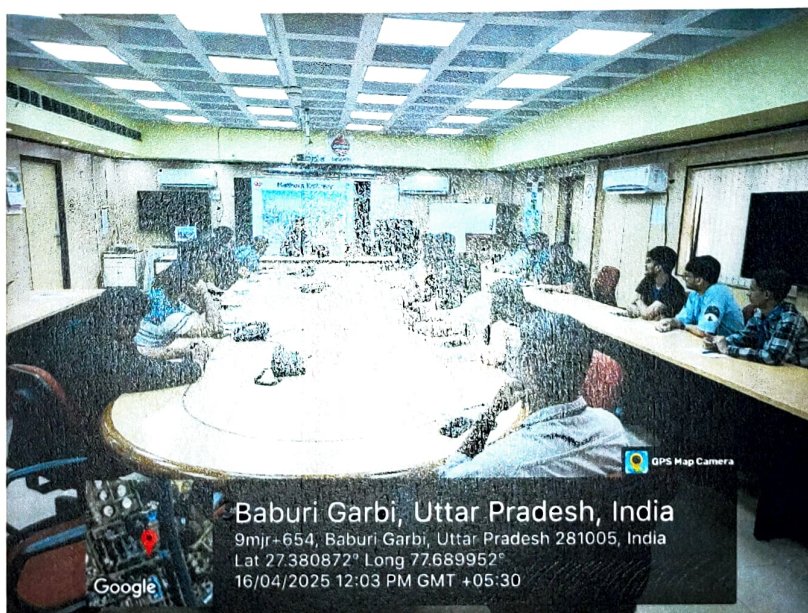


Photo 3: Students Understanding the Insights of Refinery



Photo 4: GM Interacting with Students



Photo 5: In IFR suits



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

60 YEARS
विकसित भारत
अभियान
1947 TO 2047



Photo 6: Visit to Ecological Park



Photo 7: Group photograph



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

विकसित भारत
अभियान
1947 TO 2047



Photo 8: Students at IOCL Mathura Oil Refinery