Gyanmanjari Institute of Technology Bhavnagar

Adani Mundra (Port)-Mundra

Industrial Visit Report

Visit Date: 01/03/2025 to 02/03/2025

No. of Student	53
Department	Degree Civil and Mechanical
Semester	2nd,4th and 6th
Faculty Co-Ordinator	Prof. Meet K. Vaghela Prof. Amisha D. Rathod

Industry Profile:

Company Name: **Mundra Port & Special Economic Zone Ltd.**

Address: Adani House, Nr. Mithakhali Circle Navrangpura, Ahmedabad, Gujarat. PIN Code: 380009.

Phone: Tel +91 79 2656 5555, Fax +91 79 2656 550

Homepage: www.info@adani.com

Work profile: Natural gateway for the cargo hubs functioning in the Northern and Western states of India as well as the NCR.

Objective of Visit

1) **Understanding Port Operations:**
   Learning about the infrastructure, logistics, and operations of Adani Mundra Port, including cargo handling and storage facilities.
2) **Industrial Processes:**
   Gaining insights into the refining and packaging processes at Adani Wilmar Limited, including automation and quality control in oil production.
3) **Power Generation Technology:**
   Observing the operations and technology behind the Mundra Thermal Power Plant, particularly the use of supercritical technology and its efficiency in power generation.

About Project Udaan

Under this project exposure tours are organized where in school/college students are given a chance to visit the Adani Group facilities such as Adani Port, Adani Power and Adani Wilmar refinery at Mundra, Hazira, SVPI Airport Ahmedabad, Dahanu, Kawai, Tiroda, Dhamra, Gangavaram, Krishnapatnam and Katupalli to get an insight into the large-scale business operations and thus get inspired to dream big in life. The exercise stimulates the young minds to dream big and help them become entrepreneurs, innovators, and achievers of tomorrow, and thus play an active role in the process of nation building.

Trip Schedule by Udaan Team

First Day		Second Day	
5:30 AM from Rajkot	Commencement of journey to Mundra from allocated location at Rajkot	05:30 AM	Wakeup
12:30 PM	Arrival at Shanti- Vihar in Mundra	06.30 AM	Aarti, yoga, laughing program
01:15 PM	Lunch at Shanti- Vihar Guest House	08:00 AM	Tea/coffee and breakfast
02:30 PM	Visit to Adani Ports & SEZ	09:45 AM	Port Visit to Adani West Ports
04:00 PM	Visit to Adani Wilmar Ltd.	10:15 AM	Visit to Adani Solar Ltd.
07:00 PM	Shantinath Mahadev Aarti	11:15 PM	Visit to Adani Power
08:00 PM	Dinner at Shanti- Vihar Guest House	12:15 PM	Lunch at Shanti- Vihar Guest House
09:00 PM	Optional-Cultural program/activities by students (in the presence of our rector)	13:15 PM	Departure from Shanti Vihar Mundra

About Visit

The technical visit to Adani Mundra port started at 28th February 2025 at 12:15 am from GMIU Bhavnagar. There were one bus containing total 53 students **(From Civil & Mechanical Department)** and 2 faculties **(Prof. Meet K. Vaghela, and Prof. Amisha D. Rathod)**

The private buses were boarded up to Rajkot. The buses reached Rajkot around 5:00am than from there the buses from Adani were taken up to Mundra port. The buses reached Adani Shantivihar around 11:30 am. The students were allocated specific rooms and then 1:00pm lunch was provided later.

After lunch there was a visit to adani power, adani solar and Adani west Port.

Site-1 Adani west port Mundra

On the first day of our visit, we explored the Adani coal basin, witnessing its efficient operations in handling large daily imports of coal. We observed how conveyors transport millions of metric tons of coal to both Tata and Adani thermal power plants, with the conveyors covered to prevent coal erosion during transfer. The storage area is strategically designed to convert coal into powder form, optimizing its efficiency as fuel.

To address erosion concerns, the coal is consistently kept wet, a practice that not only prevents erosion but also contributes to environmental conservation. The basin area is adorned with numerous trees strategically planted to act as wind barriers, further reinforced by nets to shield both the coal and the environment from adverse effects. For transportation beyond the power plants, Adani utilizes xylos for filling coal into trucks and separate xylos for loading coal onto trains. The conveyor system spans 8 kilometers for Adani's TPP and 13 kilometers for Tata's TPP. Moreover, a long rail line facilitates efficient coal transfer to other states, ensuring seamless logistics and operations across regions.

The multi-purpose terminals contain nine berths of a total 1.8 thousand meters long with alongside depths ranging from 9 to 16.5 meters. Berth 1 is 275 meters long with alongside depth of 15.5 meters and can accommodate vessels to 75 thousand DWT. Berth 2 is 180 meters long with alongside depth of 13 meters and can accommodate vessels to 30 thousand DWT. Accommodating vessels to 60 thousand DWT, Berths 3 and 4 are each 225 meters long; Berth 3 has alongside depth of 14 meters, and Berth 4 has alongside depth of 12 meters. Berths 5 and 6 are each 250 meters long with alongside depth of 14 meters, and both can accommodate vessels to 150 thousand DWT. Berths 7 and 8 are each 175 meters long with alongside depth of 12 meters and can accommodate vessels to 40 thousand DWT. The Barge Berth is 80 meters long with alongside depth of 6 meters and capacity for vessels of 2500 DWT.

The Port of Mundra is planning several additions and improvements. Two thermal power plants are under construction that will produce over 8600 megawatts. A new terminal site is proposed to be located about ten nautical miles west of the current terminals at the Port of Mundra. The

terminal will eventually contain three deep-water offshore berths and two sets of stackyards for coal, iron ore, and other dry bulk cargo.

The marine infrastructure at Mundra Port consists of ten (10) berths for handling dry bulk & break bulk cargo, three (3) berths for handling liquid cargo, six (6) container berths including a Ro-Ro berth, three (3) mechanised import cargo berths and 2 single point moorings for crude oil imports. The mechanised import cargo berths can handle vessels with maximum draft of 19 meters and other berths can handle vessels with maximum draft of 17 meters. The SPM facility offers a draft of 32 meters.

Heaps of coal was alongside the road. There was PORT based SEZ which was spread in 15000 hectares. There were open stock yard for MINERALS & Closed Stock yards for FERTILIZERS & GRAINS etc. Jetty was divided as DRY CARGO, CONVEYOR BELT for COAL & PIPELINE for Liquid crude i.e. VLCC(Very Large Cargo Container) & ULCC(Ultra Large Cargo Container).

Site - 2 Adani Power Plant

The Mundra Thermal Power Project was conceived to provide power for the captive consumption of APSEZ in Mundra. Thereafter the vision and the capabilities of the promoters has made Mundra Power project the largest single location Coal based Thermal Power Station in India and one of the top five in the World. All the nine units of Mundra power plant have been commissioned one after another in shortest possible time of 33 months. Capacity - 4620 MW (5 X 660 MW + 4 X 330 MW). Largest single location private coal-based power plant in the world. Adani Power created history by synchronizing the first super-critical technology based 660MW generating unit at Mundra.

This is not only the first super-critical generating unit in the country but also the fastest project implementation ever by any power developer in the country with synchronization within 36 months from the inception.

The Phase III of the Mundra Project, which is based on supercritical technology, has received 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC).

This is the world's first thermal project based on supercritical technology to get registered as CDM Project under UNFCCC.

The power plant supplied 4620 Mega Watts of energy. Out of these 2000 is supplied to HARYANA, 2000 to GUJARAT government, & 620 is internally used. It uses HVDC (High Voltage DC) for transmission to HARYANA as it is a long-distance transmission it is to be converted into DC first & then it is again recovered. Live status of frequency and power generated was available in the control room

Site-3 Adani solar

We visited Adani Solar Techno Park, where they observed the manufacturing process of solar panels using silica. Adani's in-house manufacturing plant enables them to produce 88% of their solar panels, making them the sole Indian company manufacturing solar cells. These cells are supplied for their hybrid plant, which currently boasts a capacity of 550 MW and is set to expand to 30 GW at Thawada, aiming to become the world's largest hybrid power plant by integrating wind turbines and other renewable sources. Key suppliers in this process include Vishaka and Company, providing glass for the solar panels, and Jash Energy, providing solar trackers. In the upcoming month, Adani aims to meet a production target of 1000 MW of solar panels at Thawada, showcasing their commitment to large-scale renewable energy production. We also learned about the process of manufacturing a solar panel from silica, covering stages from ingot to wafer, wafer to solar cell, and solar cell to module.

From Ingot to Wafer:

Silicon Ingot Formation: Pure silicon is melted and crystallized to form a solid ingot.

• **Ingot Slicing**: The ingot is cut into thin slices using diamond wire saws, creating silicon wafers.

• **Surface Polishing**: The wafers undergo polishing to achieve a smooth and uniform surface.

From Wafer to Solar Cell:

• **Texturing**: The wafer surface is textured to reduce reflection and increase light absorption.
• **Doping**: Doping with specific materials creates layers with different electrical properties, forming a PN junction.
• **Screen Printing**: Metal contacts and busbars are screen-printed onto the wafer to allow electrical connections.

Site-4 Adani ports and SEZ

On the second day of our visit, we explored the largest commercial port operator in India, Adani Ports and Special Economic Zone Limited (APSEZ) commands a significant share, approximately 25%, of the nation's cargo flow. Its extensive reach spans the maritime states of Gujarat, Maharashtra, Goa, Kerala, Andhra Pradesh, Tamil Nadu, and Odisha, boasting a network of 13 domestic ports. The installation of state-of-the-art cargo-handling infrastructure underscores APSEZ's commitment to excellence, ensuring the seamless management of diverse cargo types, including containers, liquid and dry cargo, and crude oil. Moreover, with over 15,000 hectares of land meticulously divided, Adani Port Mundra emerges as a testament to strategic planning and operational proficiency. From a student's perspective, witnessing the scale and sophistication of APSEZ's operations offers valuable insights into the dynamics of India's maritime trade landscape.

Site-5 Adani Wilmar Limited

The visit to the Fortune Oil Refinery Plant provided a fascinating insight into the manufacturing processes of packaging materials for edible oil. Various packaging options such as pouches, bottles, jars, and tin cans were observed being produced on-site. The refinery imports crude oil from foreign sources and refines it using advanced technology, including PLC (Programmable Logic Controller) systems and cooling equipment. The final packaged products are stored in warehouses, with production adjusted based on market demand despite a daily refining capacity of 200 metric tons and a total refinery capacity of 5000 metric tons across different units. Key consumers of Fortune Oil Refinery include Nestle India and Parle, with their major products including Palmoline Oil, Palmcurline Oil, Soybean Oil, and Sunflower Oil. Each oil type undergoes specific heating processes for purification, with a

noteworthy achievement of zero waste generation from raw materials through innovative recycling processes. Palmoline oil, derived from palm tree fruit pulp, and Palmcurline oil, extracted from its seeds, are particularly favored in the food industry for their neutral taste and odor properties, ideal for preserving snacks like namkeens and chips.

In the refining process, the first step was BLEACHING. Under bleaching, the major impurities were removed from the oil which deteriorated the color of the oil.

The bleached oil was then FILTERED and the heavy impurities were taken out from it. Finally, the strong smell of crude was to be eliminated to get the final product. Thus the DEODERIZATION of oil was done. This process removed all the impurities which were deteriorating the odor of oil.

At 250-270 degrees Celsius, the oil was made to pass high vacuum pressure which refined it completely. Fatty acids, which were removed while deodorizing, were sent to the soap industry.

Other impurities which were extracted from the crude while bleaching and filtration were sent to incense stick making industries. And thus, no part of the crude was wasted at any of the step in the refining process.

After knowing refining, students were taken to the packaging section of the oil industry. Uniform conveyer belt system that connected the whole packaging process into one. The oil bottles were filled and entered into the station where first they were shut with bottle caps. And then they were further passed to put on the Label. Afterwards, a packaging machine packed 36 bottles each at the same time into three different boxes i.e. 12 bottles in one box. Finally, the boxes were sealed with tape and were further sent for storage or export.

The whole process was fully automatic and was working on PLCs. The PLCs made the work so easy that not a single human was involved in this process at any instance of time. ADANI WILMAR packaging unit has 6 cold storage units in which the temperature is slowly decreased up to -5 degree Celsius. The fully equipped Adani Wilmar can produce 6000-7000 liters of oil/hour in the industry.

The students have also visited Shantinath Mahadev Temple during evening prayer followed by dinner and were engaged in fun games in the campus later.

Next day 2nd March we going toward Adani power and adani wilmar.

The visit was ended after lunch and feedback to the officials. The buses have started from Mundra around 1 pm and reached Rajkot at 7 pm. Then after we reached Bhavnagar around 1am by private bus.

The visit was truly professional and well managed till the end. The staff and students were thankful to the Adani foundation and GMIU Bhavnagar management for granting the permission for the visit. From this visit, we gathered the information and learned to utilize practical knowledge like design of docks and shipyard. Students learned clear idea about theoretical and practical design parameter.