

**A
Report
on
Industrial Visit
At
NPCIL, Kakrapar, Gujarat**



Organized By

DEPARTMENT OF ELECTRICAL ENGINEERING



छोटुभाई गोपालभाई पटेल प्रौद्योगिकी संस्थान, बारडोली
Chhotubhai Gopalbhai Patel Institute of Technology, Bardoli

About The Plant:

Kakrapar Atomic Power Station is a nuclear power station in India, which lies in the proximity of the city of Vyara in the state of Gujarat. It consists of two 220 MW pressurized water reactors with heavy water as moderator (PHWR). The construction costs originally were estimated to be 3.8252 billion rupees, the plant was finally finished at a price of 13.35 billion rupees. Construction of units 3&4 started in November 2010. In January 2003, KAPS Unit-1 went critical on 3 September 1992 because of a leakage in the cooling loop and began commercial electricity production a few months later on 6 May 1993. KAPS Unit-2 went critical on 8 January 1995 and began commercial production in September 1, 1995. CANDU Owners Group (COG) declared K.A.P.S. as the best performing pressurized heavy water reactor. Nuclear power corporation of India limited(NPCIL) is Public Sector Enterprise under the administrative control of the Department of Atomic Energy (DAE),Government of India. It was established on 17th September, 1987. There are

20 units running under the NPCIL all over the India. Approximated installed capacity is 4780Mwe. All the Nuclear power plants are ISO-14001 and IS-18001 certified. The nuclear power plants under NPCIL are situated at Tarapur, Rawatbhata, Kalpakkum, Narora, Kakrapar and Kaiga. The type of reactors is BWR or PHWR.

Mission of NPCIL

To develop nuclear power technology and to produce nuclear power as a safe, environmentally benign and an economically viable source of electrical energy to meet the increasing electricity needs of the country.

About Nuclear Plant at Kakrapar

Atomic Power Station is a nuclear power station in India, which lies in the proximity of the city of Vyara in the state of Gujarat. Commercial operation of plant has started on May 6, 1993. In plant there are two pressurized reactors of 220MW with a heavy water as moderator (PHWR). The construction costs originally were estimated to be 3.8252 billion rupees; the plant was finally finished at a price of

13.35 billion rupees. Construction of units 3&4 started in November 2010. Kakrapar Nuclear Plant has won so many national and international awards for their safety and performance. India's Nuclear strategy is classified in 3 stages: (1) PHWR (2) FBR

(3) Breeder reactor. Kakrapar Nuclear power plant is working on stage 1. New two plants which are under construction is also working on stage 1 and it will produce 700MWe.

Constructional Data of Units

- Main plant area - $1000 * 700 \text{ m}^2$
- Excavation earth and rock - 387000 m^3
- Concrete / Cement - 235000 MT / 131000MT
- Structural steel/RE steel - 15000 MT/ 25000MT
- Piping/ SS tubing - 55 km
- Power and control cable: - 190km and 250km
- Tallest Structure - Unit 1 NDG (126.5m)

Technical Data

- Type of reactor: - PHWR
- Gross electricity generation: - $2 * 200 \text{ MWe}$
- Type of Fuel - Natural Uranium
- Primary coolant - Heavy water
- Number of bundles - 3672
- Number of coolant channel - 306
- Length of bundle - 49.5cm
- Diameter of bundle - 8.15cm
- Weight of bundle - 16.5kg
- Weight of uranium oxide cell: - 15kg

Details of Constructional Element

- Calandria- Made of stainless steel, 6.05m of diameter, 4.65m of length
- End Shield- Diameter of end shield is 5.2m
- Channel- 5.33 m of zircalloy tube (coolant tube)

Details of Visit:

Department of Electrical Engineering organized the visit to NPCIL, Kakrapar Atomic Power Plant for the student of B. Tech and M.Tech on 3rd October 2019 whose details are given as below.

Date of Visit	Branch and Semester	No. of Students	Total No. of Students	Accompanied Faculties
03/10/2019	5 th Sem BTech. (Electrical)	20	42	Mr. Darshan R Vora Ms. Yashvi Parmar
	3 rd Sem BTech. (Electrical)	14		
	3 rd Sem BTech. (Electronics & Communication)	5		
	1 st Sem MTech. (Power System)	3		

Total = 44 Personnel.

List of Students & Faculties for NPCIL Visit

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5 th Sem BTech. (Electrical)			
Sr. No.	Enrollment No	Student Name	Sign
1	201603100610023	Dhruv Hiteshbhai Patel	<i>Dhruv</i>
2	201703100610001	Bhargav Pravinbhai Radadiya	<i>Bhargav</i>
3	201703100610002	Abhirajsinh Yogendrasinh Atodaria	<i>Abhiraj</i>
4	201703100610003	Jenish Kamleshbhai Kanetiya	X AD
5	201703100610005	Hemanshu Mansukhbhai Sojitra	<i>Hemanshu</i>
6	201703100610007	Dhruv Rameshbhai Patel	<i>D.R. Patel</i>
7	201703100610009	Jigarkumar Harishbhai Patel	<i>J.H. Patel</i>
8	201703100610010	Poorvikumari Chandubhai Ganvit	<i>Poorvi</i>
9	201703100610014	Riken Sanjaybhai Bodara	<i>R.S. Bodara</i>
10	201703100610015	Meet Dinesh Purohit	<i>Meet</i>
11	201703100610019	Harshit Suresh Chawla	<i>Harshit</i>
12	201803100620001	Rohit Sureshbhai Kumbhani	<i>Rohit</i>
13	201803100620002	Venish Rameshbhai Goyani	<i>Venish</i>
14	201803100620003	Pranavkumar Hemantbhai Bhavsar	<i>Pranav P.H.</i>
15	201803100620007	Tejal Pareshbhai Patel	<i>Tejal</i>
16	201803100620008	Dikshi Rakeshbhai Modi	<i>D.R. Modi</i>
17	201803100620009	Bhavik Shaileshbhai Ahir	X AD
18	201803100620010	Krutiben Ashokbhai Valvi	<i>K.A. VANI</i>
19	201803100620011	Nidhesh Vinubhai Italiya	<i>N.V. Italiya</i>
20	201803100620012	Rikin Shambhubhai Chabhadiya	<i>Rikin</i>
21	201803100620015	Falgunikumari Umedbhai Patel	<i>Falguni</i>
22	201803100620016	Yuvrajsinh Mulrajsinh Ravrana	<i>Yuvraj</i>
3 rd Sem BTech. (Electrical)			
23	201803100610001	Roshankumar Yogendraprasad Yadav	<i>Roshan</i>
24	201803100610002	Rajkumar Jayeshkumar Rupawala	<i>Raj</i>
25	201803100610003	Hetkumar Dipakbhai Patel	<i>Het Patel</i>

male - 30
female 14
total 44

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26	201803100610004	Daminiben Rajeshbhai Gamit	D.R. Gamit
27	201803100610005	Sandeepbhai Ramanbhai Rohit	X AB
28	201803100610006	Vatsal Pragneshbhai Tandel	Vatsal
29	201803100610009	Kishore Pranavkishore Satyam	Kishore
30	201803100610010	Vikas Rajeshkumar Maurya	Vikas
31	201803100610011	Sagar Brijlal Kamal	Sagar
32	201803100610012	Smitkumar Parmar	Smit
33	201803100610017	Fenil Dineshbhai Tandel	Fenil
34	201803100610018	Sairam Pedduri	P. Sairam
35	201903103520064	Mayuri Gamit	Mayuri
36	201903103520066	Sonali Patel	S.N. Patel
37	201903103520067	Janki Patel	J.Y. Patel
3rd Sem BTech. (Electronics & Communication)			
38	201803100710003	Sumeet Patel	Sumeet
39	201803100710004	Ambika Rathi	Ambika
40	201803100710005	Krishna Patel	Krishna
41	201803100710006	Rahul Bindal	Rahul
42	201903100720001	Amit Prajapati	Amit
1st Sem MTech. (Power System)			
43	201904102110001	Pratishtha Patel	P.A. Patel
44	201904102110002	Kajal Rathod	Kajal Rathod
45	201904102110003	Piyush Patel	Piyush

List of Faculties:

46	Mr. Darshan R Vora	31/10/19
47	Ms. Yashvi N Parmar	

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CISF UNIT KAPS-K

Activities on the Day of Visit:

We took entry for our visit at 10:00 AM. In the visit, NPCIL authorities welcomed us on the Gate-Pass section. All the students had submitted their ID card photocopies there and registered first. We all moved to the main site of the plant by their bus. After that, we moved to presentation hall. Then Mr. Patil (Maintenance engineers) came there along with two other engineers. They explained the working of Nuclear power plant with the help of demo structure of the plant. The questioning was also being taken by us and the satisfactory answers were given by them. Then they explained all the nuclear power plants which are established and are under construction in India. They also distributed two booklets. Later they discussed about the various activities about plant in nearby areas.

Then we all were moved towards the working site of the plant where we had seen the natural draught cooling tower and the forced draught cooling tower. We all were moved towards the safety and control department. There we had observed different control rooms for different turbine sections. All the control of the whole generation system was controlled by that control room containing different control switches and digital panels. This whole controlling system was controlled by 2 to 3 control engineers. There were two different sections in the control room. One of them was for the whole controlling of the power generation of unit -1 and other was for the power generation for the unit-2. Then we were taken to the plant where we had seen the condensers, heat exchangers, water circulating pumps.

We had also seen re heaters. One of the engineers had given overview of the working of the heat exchangers and the other units. The steam which was generated was taken to the steam turbines and turbines were caused to generate the electricity which was generated by the generator. All the flows whether it was air flow or steam flow or water flow were flowing from the piping which was appearing to be a complex design of the plant. Though these much equipments were there the plant was very neat and tidy. We had also seen some release valves for releasing the unwanted flow of steam. This way, the complete information regarding each and every section of the plant was given by the allotted engineers and they also briefly explained regarding how this power generation was actually taking place.

They also explained that how this generated nuclear power was transmitted. They also discussed regarding how the backup power system was helpful in the case of power failure in the plant. After this we had seen the switchyard and nuclear reactors from outside. One of the reactors was under the maintenance condition. Then a whole grid system containing generators, transformers, electricity transfer cables were observed. After this complete explanation we had went to the exit. After the complete explanation of the nuclear power plant we had been taken to the canteen for the lunch.

After finishing the lunch, we had travelled to the main gate by the company's transportation vehicle. Then after reaching at the main exit we had officially checked out and then after we had thanked the all authorities and left the plant. On the way back to college, the photo of visit had been taken and all the students finally left for the college.

Glimpses of Visit:







We heartiest thanks to NPCIL, Kakrapar to give an opportunity to visit such an esteem organisation and we also want to thank our director Dr. R. V. Patil sir, Head of the Department Mr. Ankur V. Rana sir and all the faculties for coordinating the visit.