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Performance Analysis of Operating System, Power Generation, Distribution, Maintenance, Controlling and Protection System of Santahar 50MW Peaking Power Plant, Bogura

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ABSTRACT: A power plant is a facility for the generation of bulk electric power. Power plants produce electric energy from another form of energy. In our country the crisis of electricity in national grid is a common problem where in industrial sector the electricity is required for 24 hours in a day. Due to failure of national grid non-public business house owners are exploitation their own power plants combining with national grid to fulfil the demand of electricity. The most common fuels used in Santahar power plant (50MW) are HFO and LFO. This article is describing about the power generation distribution and maintenance, Protection and controlling of that plant, different major components of power station such as diesel or HFO engine, compressor, fuel system, operation and control unit, cooling system and maintenance procedures of the plants.

Keywords: Electric Energy, Peaking Power Plant, Power Generation, Maintenance, Controlling and Protection

Introduction

The power system of these days may be a complicated interconnected network. Power is generated at generating stations, typically situated far away from the users [1]. The central objectives are to extrovert theoretical knowledge to the practical field with adequate conceptualization and understanding the performance of power supply system, controlling system, operation and maintenance, protection system, HFO Separation System, Boiler system, LV Switchgears, MV Switchgears, HV Switchgears, Circuit breaker and Relays etc [2]. Another main objective of this study is mainly to understand the each & every point of the problem solving / continual improvement process in Plant and maintaining this properly and can get the best efficiency. The generated voltage is then stepped up to a higher voltage for transmission, as transmission losses are lower at higher voltages [3]. The transmitted electrical power is then stepped down at grid stations. The modern distribution system begins as the primary circuit, leaves the sub-station, and ends as the secondary service enters the customer's meter socket. First, the energy leaves the sub-station during a primary circuit, typically with all three phases [4]. The generating station provide electricity to the grid. For this purpose, it would like some equipment to provide and for protection. Generating station has its auxiliary supply also.

Bangladesh Power Development Board (BPDB) is responsible for major portion of generation and distribution of electricity mainly in urban areas except Dhaka and West Zone of the country [5]. The Board is underneath the facility Division of the Ministry of power, Energy and natural resources, Government of Bangladesh. Power Development Board (BPDB) was created as a public sector organization to spice up the country's power sector when the emergence of Bangladesh as a freelance state in 1972 [6]. The organization is liable for designing and developing the nation's power infrastructure and for operational a lot of its power generation facilities. The precursor of the BPDB was the Water and Power Development Authority (WAPDA) of Pakistan. Subsequently, the Rural Electrification Board (REB) and the Dhaka Electric Supply Authority (DESA) now Dhaka Electric Supply Company Limited (DESCO) were created. PDB was dominated by trade unions and the consistent operation at loss involved the government. In 2017 PDB was created a company by the govt. of Bangladesh. It is currently the parent company of Ashuganj Power Station Company Ltd, Coal Power Generation Company Bangladesh Limited, Electricity Generation Company of Bangladesh, Dhaka Electric Supply Company Limited, Dhaka Power Distribution Company Limited, North-West Power Generation Company Limited, North-West Zone Power Distribution Company Limited, and West Zone Power Distribution Company Limited [7]. In table 1 shows the manufacturing, testing, and transmitting facility of BPDB.

SL No.	Name of Power Station/ Location	Installed Capacity (MW)	Present (Derated) Capacity (MW)
1	KARNAFULI HYDRO (Kaptai)	230	230
2	RAOZAN (Chittagong)	420	420
3	ASHUGANJ (B.Baria)	724	724
4	GHORASAL (Polash, Narshindi)	950	950
5	HARIPUR (Narayngonj)	210	210
6	TONGI (Dhaka)	105	105
7	SHAHJIBAZAR (Hobigonj)	130	130
8	FENCHUGANJ	97	97
9	SYLHET	20	20
10	KHULNA	170	170
11	BHERAMARA	60	60
12	KUSTIA	170	170
13	BARISAL	55	55
14	BHOLA	5	5
15	BAGHABARI (Sirajgonj)	171	171
16	MAONA	35	35
17	GOPALGANJ	100	100
18	BARAPUKURIA (Dinajpur)	250	250
19	SAIDPUR	20	20

20	RANGPUR	20	20
21	RAJSHAHI (Katakhali)	150	150
22	BOGURA	50	50

Table 1: The manufacturing, testing, and transmitting facility of BPDB.

BPDB's mission is to provide quality and reliable electricity to the people of Bangladesh for desired economic, social, and human development of the country undertaking institutional and structural reforms leading to the creation of a holding company. BPDB's vision is to secure continuous growth of electricity for sustainable development and ensure customer satisfaction. This report will cover the internal analysis of Power supply system, Operation & Maintenance of various Electrical Machines, Safety, Protection and Controlling System of these machines and what equipment is placed in which zone, how the equipment has been synthesized etc. What should be better for design and controlling system of various Electrical Machines for power generation will be the main scope of discussion in this report.

Generation

This is not possible to create or destroy the energy, only can convert it one form to another. There are different energy sources in nature [8]. The conversion of energy accessible in several forms in nature into electricity is understood as generation of electrical energy. Electrical energy may be a factory-made goods like clothing, furniture, or tools. Just as the manufacture of a trade goods involves the conversion of raw materials accessible in nature into the required kind, similarly electrical energy is created from the sorts of energy accessible in nature [9]. However, electricity differs in one necessary respect. Whereas other commodities may be produced at will and consumed as needed, the electrical energy must be produced and transmitted to the point of use at the instant it is needed. The entire method takes only a fraction of a second. This instantaneous production of electrical energy introduces technical and economic considerations unique to the electrical power industry. In Electricity Generation process at first fuel energy is converted into mechanical energy then the mechanical energy is converted to electrical energy [10]. The transmission voltage in Bangladesh is 11KV,33KV,66KV,132KV & 240 KV in Santahar 50MW Power Plant their generation voltage is 11KV & transmission voltage is 132KV. This instantaneous production of electrical energy introduces technical and economic considerations unique to the electrical power industry. In Electricity Generation process at first fuel energy is converted into mechanical energy then the mechanical energy is converted to electrical energy. The transmission voltage in Bangladesh is 11KV,33KV,66KV,132KV & 240 KV in summit Naryanganj power their generation voltage is 11KV & transmission voltage is 132KV.

Figure 1: MAN 18V32/40 Type Engine

Engine:

MAN 18V32/40 Type engine designed and manufactured by MAN Diesel & Turbo SE, Germany. A four-stroke engine with direct fuel rejection, two stages cooling systems (withHT Water pump and LT Water pump), belt-lubrication pump and two turbochargers at free end.

Manufacture, Country	**MAN Diesel & Turbo Germany**
Type	18V32/40
Speed	750 rpm
Rated Power	8730 kw
Bore	320 nm
Stroke	400 mm
Pressure	24.87
Cylinder Unit Power	500kW/cycle
Lubricating pump	Self-equipped
HT water pump	Self-equipped
LT water pump	Self-equipped

Table 2: Generating Set

In multiple-engine plants with GenSet-operation and load regulation by a power management system, the availability of engines not in operation is an important aspect. Engine start-up time until synchronization, load application times are the requirements on engine and plant installation for "Stand-by Operation" capability. Engine is attached lube oil pump.

Plant

- Pre lubrication pump with low pressure before engine. (0.3 bar < p oil before engine < 0.6 bar)
- Oil pressure > 0.3 bar to be ensured also for lube oil temperature up to 80 °C.
- Preheating HT cooling water system (60 - 90 °C).
- Preheating lube oil system (> 40 °C).
- Power management system with supervision of stand-by times engines.

Start-up Boiler/ Auxiliary Boiler

Figure 2: Start-up Boiler/ Auxiliary Boiler

The burner mixes the fuel and oxygen together and, with the assistance of an ignition device, provides a platform for combustion. This combustion takes place in the combustion chamber, and the heat that it generates is transferred to the water through the heat exchanger. Controls regulate the ignition, burner firing rate, fuel supply, air supply, exhaust draft, water temperature, steam pressure, and boiler pressure. Hot water produced by a boiler is pumped through pipes and delivered to equipment throughout the building, which can include hot water coils in air handling units, service hot water heating equipment, and terminal units. Steam boilers produce steam that flows through pipes from areas of high pressure to areas of low pressure, unaided by an external energy source such as a pump. Steam utilized for heating can be directly utilized by steam using equipment or can provide heat through a heat exchanger that supplies hot water to the equipment.

HFO & LFO System

It consists of storage tank, strainers, fuel transfer pump and all-day fuel tank. The fuel oil is supplied at the plant site by rail or road. The oil is stored in the storage tank. From the storage tank, oil is pumped to smaller all-day tank at daily or short intervals. From this tank, fuel oil is passed through strainers to remove suspended impurities. The clean oil is injected into the engine by fuel injection pump. HFO and LFO storage tank, transfer pump, buffer tank, separator, HFO day tank, HFO feeder pump, auto backwash filter, quick shutoff valve, flow meter, booster modules are used component in HFO & LFO System.

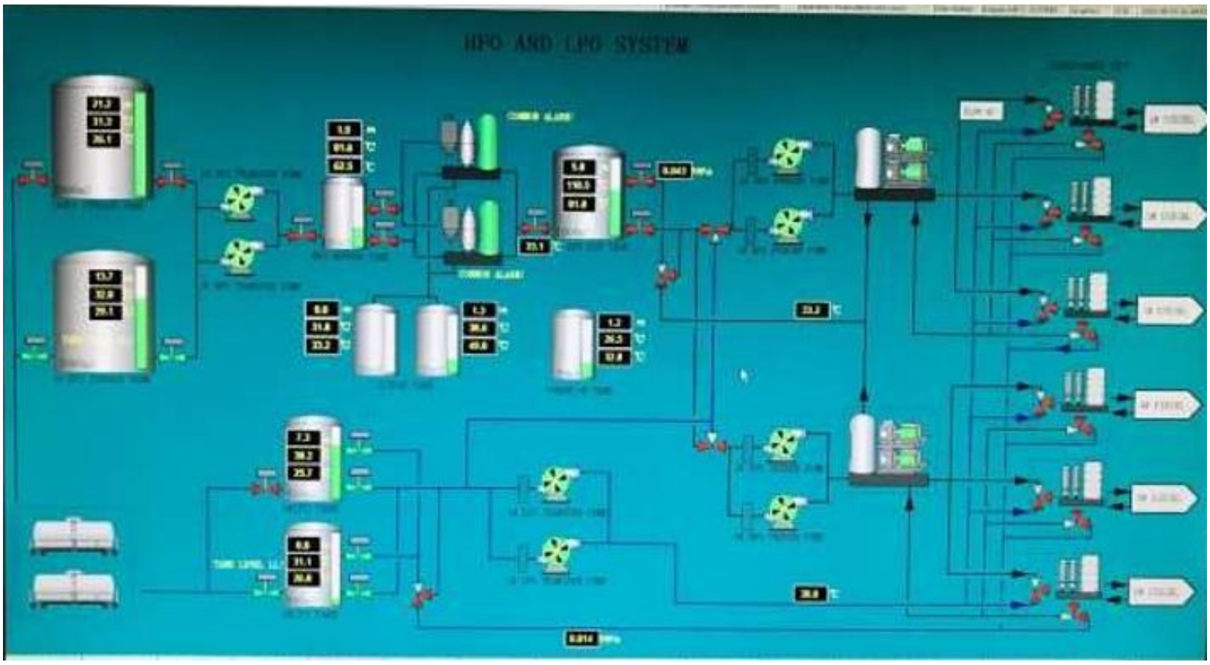

Figure 3: Fuel flow diagram of HFO power plant

HFO Storage/Fuel storage tank used to store fuel from shipment. Steam circulates around the tank to keep the temperature around 50°C. It ensues settling of water mixed with heavy fuel oil. Screw type pump used (Normally twin-screw pump) used to pump untreated high viscous heavy fuel oil into the buffer tank from storage tank. Heavy fuel oil (HFO) from the storage tank pump into the buffer tank where it heated. Water and heavy impurities mixed with the fuel settling down to the bottom of buffer tank. Usually rotary or centrifugal type purifier used. Purifier separate water and solid sludge usually Carbon deposit, Sulfur, ash etc. The separator should correctly adjust for the specific gravity of the fuel. All fuel oil separators available should be operated continuously. Fuel flow rate and temperature control also are important. Experience has shown that the correct temperature for centrifuging high viscosity fuels is in the region of 95 to 98° Centigrade. If excessive slugging occurs, it gives evidence of incompatibility, the fuel should be separated at the slowest possible rate using purifiers in parallel. To ensure fuel feed to the main engine, the separated heavy fuel oil (HFO) is pumped into the service tank (day tank. Heating coils in both tanks ensure an even temperature between 167°F and 194°F (75°C and 90°C) which keeps the oil pump able. A screw pump used as feed pump in a HFO power plant to ensure uniform pressure in the fuel supply line. Automatic backwash filter filtrated purified heavy fuel oil (HFO) to ensure there is no foreign particle in the fuel.

Figure 4: Different types of HFO power plant's equipments

Booster Module

The fuel comes from day tank have a high viscosity. To inject the fuel in the cylinder, need viscosity same as diesel. So, there is an arrangement in viscosity module to reduce the viscosity in particular value by heating fuel (generally by steam). A set of equipment installed in a series ensure filtrated and desired viscosity. The equipment used are HFO & LFO changeover valve, Fuel mixing tank, Flow meter, Booster pump, Fuel duplex filter, Steam heater, Viscosity controller, Cooler etc.

Lubricating System

The system minimizes the wear of rubbing surfaces of the engine. It comprises of lubricating oil tank, pump, filter, and oil cooler. The lubrication oil is drawn from the lubricating oil tank by the pump and is passed through filter to remove impurities. The clean lubrication oil is delivered to the points which require lubrication. The oil coolers incorporated in the system keep the temperature of the oil low. The main operating conditions are engine crankcase, turbo chargers and governor must be filled with lube oil of the correct quality and the lube oil cooler must be assembled.

Turbocharger

A turbocharger, or turbo, is a gas compressor that is used for forced induction of an internal combustion engine. The purpose of a turbocharger is to increase the density of air entering the engine to create more power i.e. Increase the thermal efficiency of the engine. The turbine converts exhaust to rotational force, which is in turn used to drive the compressor. The compressor draws in ambient air and pumps it into the intake manifold at increased pressure, resulting in a greater mass of air entering the cylinders on each intake stroke. The pressure in the atmosphere is no more than 1 ATM (approximately 14.7 psi). So there ultimately will be a limit to the pressure difference across the intake valves and the amount of airflow entering the combustion chamber. The turbocharger increases the pressure at the point where air is entering the cylinder. As a result, a greater mass of air (oxygen) will be forced in as the inlet manifold pressure increases. The additional air flow makes it possible to maintain the combustion chamber pressure and fuel/air load even at high engine revolution speeds, increasing the power and torque output of the engine. The pressure in the cylinder must not go too high to avoid detonation and physical damage The intake pressure must be controlled by venting excess gas The control function is performed by a waste gate, which routes some of the exhaust flow away from the turbine. This regulates air pressure in the intake manifold.

Heat Recovery Steam Generator (HRSG) System

The exhaust gas from the combustion turbine becomes the heat source for the Rankine cycle portion of the combined cycle. Steam is generated in the heat recovery steam generator (HRSG). The HRSG recovers the waste heat available in the combustion turbine exhaust gas. The recovered heat is used to generate steam at high pressure and high temperature, and the steam is then used to generate power in the steam turbine/generator. The HRSG is basically a heat exchanger composed of a series of preheaters (economizers), evaporator, reheaters, and superheaters. The HRSG also has supplemental firing in the duct that raises gas temperature and mass flow. This section is intended to provide turbine operators with a basic understanding of heat recovery steam generator (HRSG) design and operation. The power generation block of the facility produces electrical power in two separate islands: (1) The first island within the combined-cycle power block is the combustion turbine (CT) generator set. (2) The second island is the HRSG steam turbine generator set.

The HRSG absorbs heat energy from the exhaust gas stream of the combustion turbine. The absorbed heat energy is converted to thermal energy as high temperature and pressure steam. The high-pressure steam is then used in a steam turbine generator set to produce rotational mechanical energy. The shaft of the steam turbine in connected to an electrical generator that then produces electrical power. The waste heat is recovered from the combustion turbine exhaust gas stream through absorption by the HRSG. The exhaust gas stream is a large mass flow with temperature of up to 1,150F. Most large HRSGs can be classified as a double-wide, triple-pressure level with reheat, supplementary fired unit of natural circulation design, installed behind a natural gas fired combustion turbine. The steam generated by the HRSG is supplied to the steam turbine that drives the electrical generator system.

Cooling System

The cooling system of the engine uses chemically treated fresh water. The system is divided into a low-temperature (LT) and a high-temperature (HT) cooling water circuit. The cooling water is circulated in the system by directly driven centrifugal pumps mounted on the crankshaft of the engine. The LT cooling water is circulated through the charge air cooler and lube oil cooler. The HT water cools the engine jacket. The temperature in the LT and HT circuits is controlled by three-way valves. The temperature control valves direct the water to the cooling radiators or back to the engine, depending on the temperature of the water. An expansion vessel is installed in the system. The expansion vessel is connected to the cooling water circuits on the engine by vent pipes. A preheating unit is used to heat the jacket cooling water before the engine is started. The cooling water circuits include sensing equipment (sensors) for monitoring the pressure and temperature of the system.

Exhaust System

This system leads the engine exhaust gas outside the building and discharges it into atmosphere. A silencer is usually incorporated in the system to reduce the noise level. The exhaust system of a diesel engine performs three functions. First, the exhaust system routes the spent combustion gasses away from the engine, where they are diluted by the atmosphere. This keeps the area around the engine habitable. Second, the exhaust system confines and routes the gases to the turbocharger, if used. Third, the exhaust system allows mufflers to be used to reduce the engine noise.

Electrical System

Electrical system means function of Synchronous Generator, Power Plant Electrifications, M.V switchgear, L.V switchgear & 110V electrical DC systems by plant is electrically Plant Electrifications. Brief discussion is below of:

- Synchronous Generator.
- Power Plant Electrifications.
- M.V switchgear.
- L.V switchgear.
- 110V electrical DC system.

Synchronous Generator

The synchronous generator is an electrical equipment which converts the mechanical energy from a prime mover into an AC electrical power at a constant voltage and frequency. The synchronous motor always runs at the constant speed which is called synchronous speed. Synchronous machines are primarily used as electricity (AC) generators. It provides the electric power utilized by all sectors of contemporary societies like industries, commercial, agriculture and domestic. Synchronous generators are typically used to produce a large power system for supplying electricity to the loads or consumers. Synchronous generators are built in massive units, there rating vary from 10MW to 100MW.

Standard Generators Main Features

Generator

The HAR7 185-08P Generator is supplied by Hyundai, Korea. The parameter is showing as:

Manufacture, Country	Hyundai, Korea
Type	HAR7 185-08P
KVA rating	10946.0 KVA
Power factor (0.80)	0.8 lagging
Max. lagging & leading KVAR capability	4370 leading & 8975 lagging
Rated voltage between lines, KV	11

Connection of armature winding	Y type
Rated current, A	574.5
Rated frequency, Hz	50
At pf 0.8, %	97.3
At pf 0.1, %	98
Stator Overloading, %	110 % for 1 hour every 12 hour
Max. Torque when the stator is short-circuited, Nm	940 kNm-3 phase & 1210 kNm-2 phase

Table 3: Specification of Generator

There are many kinds of Generator faults occurred and protections are also taken to solve those faults. Those are given in a table below:

Generator Faults	Generator Protection
Earth Fault and over current fault	Generator Differential protection
Unbalanced and over loading	Earth fault and Over-current protection
Over voltage and over frequency	Negative Phase-sequence protection
Stator Winding Fault	Over Voltage and frequency (Over-speed) protection
Phase to Earth Fault	Protection against power swing, unbalanced Voltage and Current Protection
Phase to Phase Fault	Surge arresters for surge over-voltage
Field Winding Fault	Rotor and stator Earth-fault protection
Loss of Excitation	Field (Excitation) failure protection
Synchronization failure	Winding and Bearing Temperature rise or thermal protection
Over-heating	Reverse Power protection

Table 4: Generator faults occurred and protections.

DC System

A DC Power System is used to provide uninterrupted operating power for control, signaling, relays, tripping and closing of switchgears, emergency motors of most important auxiliary systems. The DC system consists of a free-standing cubicle including charges (rectifier), batteries and distribution. Normally the rectifier supplies the load. The battery bank supplies the load for a limited time if the mains supply is interrupted.

The Main Components of DC Power System

Rectifier / Charger

A rectifier is an electrical device that converts AC current to DC current, which flows in only one direction. The rectifier is used to charge and maintain the DC plant batteries to keep the plant running in the event of a power failure. It provides 149.6V for charging batteries.

Controller

Controller provides the logic to the rest of the system for looking at the rectifier and batteries and distribution and giving those operating commands into the status and functionality of the unit. The DC system provides 128.4V to the consumers in the power plant.

Batteries

Batteries are part of a DC plant typically run in a series, due to the amount of power needed. There are 108p batteries used for DC system. Each provides 270W at 1.8V end voltage.

V Switchgear

Medium voltage switchgear room is used for the station outgoing switchgear. Which power is produced by the engine is go to the power transformer is process by the M.V switchgear.

Figure 5: M.V switchgear room

Rated voltage	11kV
Max. voltage	17.5kV
Rated current	2500-5000A
Max continuous work current of the bus bar	2500-5000A
Rated frequency	50Hz
Rated lighting impulse withstand voltage	75kV
Rated withstand voltage of work frequency	42kV
Voltage of control	DC 125V

Table 5: Specification of M.V Switchgear

Sensors Used in System

Plant

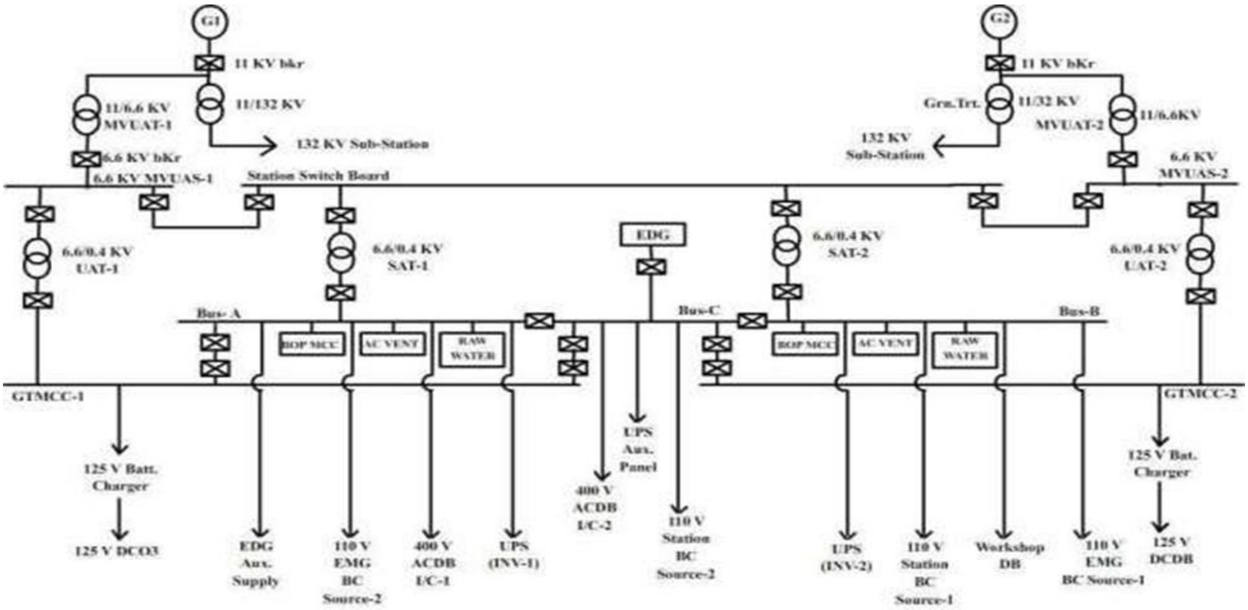

Figure 6: Bus and General Specification of Santahar Power Plant

Figure is a single line representation of Santahar plant in terms of bus and general specifications. The whole plant constitutes of two units. For the purpose of discussion and understanding, only one unit's workflow is going to be described briefly here. 11kV current is generated at first in generator unit of the plant. This current is then stepped up to 132kV and sent to the substation. A portion of this high voltage current is bypassed right after generation into Medium Voltage Unit Auxiliary Transformer (MVUAT-1) for the auxiliary usage within the plant. For the auxiliary purpose of the plant, this transformer steps down the 11kV current into 6.6kV current. Then it goes to Medium Voltage Unit Auxiliary Station (MVUAS-1). This station again relates to the switching board of the plant through circuit breakers. Now this 6.6kV voltage is stepped down in to 0.4 kV through Unit Auxiliary Transformer (UAT-1) and sent to Gas Turbine Motor Control Circuit (GTMCC-1). Similarly, through Station Auxiliary Transformer (SAT-1) the voltage is reduced to 0.4kV. Finally, this 0.4kV current from UAT-1 and SAT-1 respectively is reduced as per need and used in all necessary auxiliary units such as Balance of Plant Motor Control Circuit (BOP MCC), BUS A, Battery charger, Emergency Diesel Engine (EDG) etc. of the plant. Similar workflow occurs in the other unit.

The Power Transformer

In Santahar 50 MW Peaking Power Plant, I closely observed power transformers and they are generally installed for step up or step down the voltage. For long line transmission high voltage is needed. In Santahar 50 MW Peaking Power Plant, there are total four power transformers. Transformer-1 of the substation is a transformer which is used for stepping up the generated voltage from 11kV to 132 kV. This is a Δ-Y connected transformer. Transformer-2 is a transformer which is tapped from transformer 1. This is a step-down transformer. Here, the voltage level is stepped down from 132kV to 11kV. Transformer-3 is also step-down transformers tapped from transformer 2. Here, the voltage level is stepped down from 11kV to 6.6kV. Those transformers are used for auxiliary purpose of the plant. This 6.6kV high voltage is not directly used for auxiliary purpose but is made change as per demand to lowest nominal voltage need. Transformer-4 is not in action.

Figure 7: Power Transformers

Type of cooling	**ONAN/ONAF**			
Rated MVA	40/50			
Voltage Ratio	11/132 KV			
Rated KV	HV	132		
	LV	11		
Rated Line Current	HV	174.95/218.69		
	LV	2099.45/2624.31		
Vector Group		YNd1		
No of phase		3		
%Impedance 15 MVA		9.564		
Temperature Rise	Top oil	50ºC		
	AVG.WDG	55ºC		
Diagram DRG no		PP40/50M- 40004		
Year of MFG		2010		
Standard		ANSI 57.13		
Frequency		50HZ		
	HV		L1 650 AC 275	AC 70

Insulation level	LV	KV	L1 95 AC 38	AC 34
	LVN		L1 75AC 28	AC 34
Core & Coil		35000Kg		
Tank & Fitting		21500Kg		
Mass of Oil		24500Kg		
Total Mass		81000Kg		
Transport Mass		69000Kg		
Volume of OIL		28100L		

Table 6: Rating of Power Transformer used in Santahar 50MW HFO Power Plant

Transformer Protection

- Transformer Differential Protection
- Non-directional Instantaneous Earth Fault Relay
- Earth Fault Inverse definite minimum time (IDMT) Relay
- Over Current IDMT Relay
- Restricted Earth Fault Relay
- Buchholz Relay protection
- Pressure Relief Valve (PRV) protection
- Oil surge protection.

Sulphur Hexafluoride (SF6) High Voltage Circuit Breaker

In Santahar 50 MW Peaking Power Plant SF6 circuit breakers that were mentioned to be used in each of the three phases with rated voltage of 11KV. As it is very renowned for extinguishing arc in short times, hence it has been incorporated in three phase. So that while over voltage occurs, the breaker can trip to discontinue the system. But due to its high cost, it is not something that is used in many parts of the system.

Model	HECS-100M
Rated voltage	132 kV
Peak voltage of system	145 kV
Rate frequency	50 Hz
Style of the neutral point grounding	Directly earthing
Service place	Outdoors
Rate currency	1250 A effect value
Rate short-circuit breaking currency	40 kA effect value
Rate thermal currency	40 kA
Time-lasting of rate thermal currency	3 s
Rate short-circuit shut off currency	100 kA (peaking value)
Rate dynamic current	100 kA (peaking value)

Table 7: Ratings of SF6 circuit breaker in Santahar.

Air Break Circuit Breaker and Air Blast Circuit Breaker

In Santahar I saw both Air Break Circuit Breaker and Air Blast Circuit Breaker that has been used in bus bar and motor feeders and its rated voltage is 400 Volt AC and 230 Volt AC respectively. It has been mainly used here for its fast operation actually. These circuit breakers have panels that are installed in switchgear panel room of Santahar. So when these circuit breakers are tripped, light flickers in those panels which indicate that the breaker is tripped. Figure 4.2 is the apparent look of the breaker. It cannot be made work externally except just pulling up the lever as we can see in the figure to trigger down the breaker manually in case of any emergency need.

Figure 8: Different types of circuit breaker used in Santahar.

Breaker's Name	Rating	Where Used
SF_6 Circuit Breaker	11kV	Three Phase Line
Air Break Circuit Breaker	400V AC	Bus Bar and Motor Feeders
Air Blast Circuit Breaker	400V AC	Bus Bar and Motor Feeders
Miniature Circuit Breaker	230V AC	Each single phase of Three Phase Line
Molded Case Circuit Breaker	230V AC	Each single phase of Three Phase line

Table 8: Complete information of different Circuit Breakers that are used in Santahar.

Conclusion

I spent some remarkable days at Santahar 50MW Peaking Power Plant during my internship program. I consider myself very lucky to have my internship program with a reputed company like BPDB. It gives me an opportunity to apply my theoretical knowledge in practice. My achievements from Santahar 50MW Peaking Power Plant are: (1) Industrial training provided by Santahar 50MW Peaking Power Plant has enriched my practical knowledge. (2) It has opened my eyes about practical operation of different equipment and machines. There are few limitations I had faced. The time of the internship was too short for which I could not learn all the sections thoroughly. Because of company confidentiality, I was unable to see the internal circuit designs of the equipment which I felt necessary for me to see. In future this power plant needs to do some upgradation of their systems. Capacitor should discharge before working in electronics circuit because it causes hazard shock which is dangerous for human body. In a Power Plant substation is a high voltage area. So, everyone should be aware of the precautions of power station. The authorities in Santahar 50MW Peaking Power Plant were very concerned about all kinds of safety. The friendly environment in Santhar 50MW Peaking Power Plant encouraged me to co-operate with each other. I have learned a lot and obtained practical knowledge from my internship at Santahar 50MW Peaking Power Plant, which will help me in my future life.

CONFLICTS OF INTEREST

There are no conflicts to declare.

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