Report on Industrial Visit To

Sathanur Hydro Power Plant, Sathanur

(12.09.2018)

DEPARTMENT OF EEE

ADHI COLLEGE OF ENGINEERING AND TECHNOLOGY

NO. 6, MUNU ADHI NAGAR, SANKARAPURAM, WALAJABAD,

KANCHIPURAM – 631605.

Total Number of student visited: 55

Organized by: R KARTHICK, AP/EEE (Event coordinator)

INTRODUCTION TO THE COMPANY:

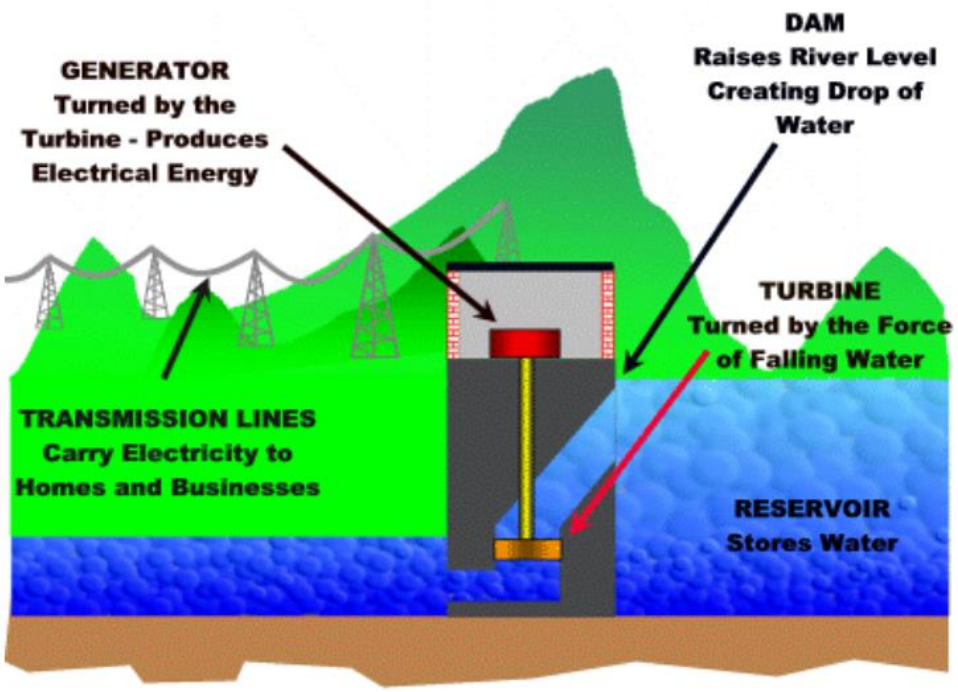
Sathanur Hydroelectric Power Plant is located at Sathanur, Near Thiruvannamalai, Tamil Nadu, India. Location coordinates are: Latitude = 12.1833, Longitude = 78.8505. This infrastructure is Hydro Power Plant type with a design capacity of 7.5 MW. It has 1 unit. The first unit was commissioned in 1999. It is operated by Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO).

OVERVIEW OF THE PLANT:

Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy.

Parts of a Hydroelectric Plant

Most conventional hydroelectric plants include four major components (see graphic below):



Dam:

Raises the water level of the river to create falling water. Also controls the flow of water. The reservoir that is formed is, in effect, stored energy.

Turbine:

The force of falling water pushing against the turbine's blades causes the turbine to spin. A water turbine is much like a windmill, except the energy is provided by falling water instead of wind. The turbine converts the kinetic energy of falling water into mechanical energy.

Generator:

Connected to the turbine by shafts and possibly gears so when the turbine spins it causes the generator to spin also. Converts the mechanical energy from the turbine into electric energy. Generators in hydropower plants work just like the generators in other types of power plants.

Transmission lines:

Conduct electricity from the generating station to distribution side (consumers).

PLANT FEATURES:

Plant Capacity	: 7.5 MW
Land for Plant	: 17,750 acres
Type of plant	: Vertical Kaplan
Length of penstock	: 40m
Penstock (Internal diameter)	: 2.60m
Height of dam	: 36.28m

MAJOR COMPONENTS SPECIFICATIONS:

TURBINE:

The Kaplan turbine is an inward flow reaction turbine, which means that the working fluid changes pressure as it moves through the turbine and gives up its energy. Power is recovered from both the hydrostatic head and from the kinetic energy of the flowing water. The design combines features of radial and axial turbines.

The inlet is a scroll-shaped tube that wraps around the turbine's wicket gate. Water is directed tangentially through the wicket gate and spirals on to a propeller shaped runner, causing it to spin. The outlet is a specially shaped draft tube that helps decelerate the water and recover kinetic energy. The turbine does not need to be at the lowest point of water flow as long as the draft tube remains full of water. A higher turbine location, however, increases the suction that is imparted on the turbine blades by the draft tube. The resulting pressure drop may lead to cavitation. Variable geometry of the wicket gate and turbine blades allow efficient operation for a range of flow conditions. Kaplan turbine efficiencies are typically over 90%, but may be lower in very low head applications.

GENERATOR:

In electricity generation, a **generator** is a device that converts motive power into electrical power for use in an external circuit. It works based on principle of faraday law of electromagnetic induction. The faradays law states that whenever a conductor is placed in a varying magnetic field, EMF is induced and this induced EMF is equal to the rate of change of flux linkages. This EMF can be generated when there is either relative space or relative time variation between the conductor and magnetic field. So the important elements of a generator are: Generators are basically coils of electric conductors, normally copper wire, that are tightly wound onto a metal core and are mounted to turn around inside an exhibit of large magnets

The specification of generator in the plant:

Voltage/Current	: 11000V/437A
Excitation voltage	: 64-132V/152-269A
Type	: HV732530/18
Design	: IP 31
Capacity	: 7500KW /8333kVA
Speed	: 333.33rpm

TRANSFORMER:

A **transformer** is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. A varying current in one coil of the transformer produces a varying magnetic field, which in turn induces a voltage in a second coil. Power can be transferred

between the two coils through the magnetic field, without a metallic connection between the two circuits. The specification of the transformer in power plant:

Type : Step down
Capacity : 8/10 MVA
Voltage : 33/11 kV
Cooling : ONAN / ONAF

CIRCUIT BRAKEER:

A **circuit breaker** is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current, typically resulting from an overload or short circuit. Its basic function is to interrupt current flow after a fault is detected. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation.

CONCLUSION:

The Industrial Visit to the Sathanur Hydro Power Plant, Sathanur was highly successful. We received insight of the whole plant right from the raw material (water) procurement, processing, generation & transmission of electricity. The whole process was explained in detail by their representative with detailed description about each equipment with their specifications. A doubt solving session with the Control Room Incharge cleared all our queries. This kind of industrial exposure helped us to absorb the theoretical aspects of Power Plant and Power Electronics Engineering more efficiently.