

BHEL Industrial Visit



On 12th December 2018 there was an industrial visit to BHEL for 1st semester students arranged by Director of III(Industry Institute Interaction) cell of GAT **Dr. Geetha Prakash** madam. It was very much informative

got to learn many things. BHEL is a central government company. B.H.E.L stands for Bharat Heavy Electronics Limited. It is an electronics division.

The products system and services of BHEL are:

1. Power generation systems.
2. Transmission system.
 - HVDC (high voltage direct current) transmission systems.
 - Flexible AC transmission system (FACTS).
3. Transportation systems.
 - Traction systems.
4. Industrial systems.

Some of the products manufactured:

1. DCS (Distributed control system).
2. GT (Gas Turbine).
3. Traction.
4. NPCIL (Nuclear power corporation of India limited) for electricity generation and distribution.
5. Solar panels (Also PV modules).

Thermal power plant [800 MW] :-

BHEL's first 800MW supercritical thermal power plant –

BHEL has commenced commercial operation of its 1st 800MW unit-highest rating coal based supercritical thermal power plant. It was achieved by the 1st

unit of 2*800MW yeramarus thermal power plant station of Raichur power corporation limited (RPCL) in Raichur district of Karnataka. KPCL (Karnataka power corporation limited) and BHEL are the main equity partners of RPCL, the owner and operator of this power plant. It has to supply all the critical equipment like boiler, turbine and generators, electricals ,key packages of balance of plant and also carried out the associated civil work.

GAS TURBINE :-

BHEL is one the largest gas turbine manufacturer in India, meeting specific customers requirement. The unique features of this gas turbine are the use of HSD(High Speed Diesel) as fuel.

✓ There is also DIESEL POWER PLANT in BHEL.

- SOLAR POWER PLANT :-



High efficiency mono and polycrystalline silicon PV modules in its state of the art production has been manufactured by BHEL Bengaluru. Company has dedicated facility for manufacturing space grade panels and batteries. BHEL designed floating SPV plants can be installed on city lakes of hydel power plants (drinking, irrigation water ponds .

The designer was recyclable, UV and corrosion resistant HDPE (high density polyethylene floats). BHEL has established 25kw floating SPV plant. Example 100 kw grid interactive solar PV plant at Lakshadweep.

SPACE grade SOLAR :-

BHEL is the exclusive supplier of space grade panels and batteries to ISRO for their space programs since 2001.

VARIOUS DEPARTMENTS IN BHEL :

1. FABRICATION DEPARTMENT

- Bus Bars Processing unit:

Bus bar processing is a complex process which allows which allows you to give the right size, shape or punch holes in the Al or Cu busbars . SH400 is an example of a complex busbar processing station. In electric power distribution busbar is a metallic strip or bar,also used to connect high voltage equipment at electrical switchyards and low voltage equipment in battery banks.

- CNC [Computer Numerical Control] :



The process can be used to control a range of complex machinery, from grindness and lathes to mill and routers .In CNC, machines are operated via numerical control, wherein a software program is designated to control an object. The language behind CNC machining is alternately referred to as G code, and its written to control the various behaviours of a corresponding machines, such as speed, feed rate and coordination. For starters a 2D or 3D CAD drawing is conceived, which is then translated to computer code for the CNC system to execute.

- Control Equipment [C.E] :

Control panels are assembled inside a closed metal box like thing, inside it there will be the control modules (all the PCB's done are assembled inside control modules). Testing of control module is done in Main assembly.

2. DEPARTMENT OF VALVE SET ASSEMBLY :

Here, they assemble IGBT modules and also test them. IGBT modules of traction valve set assembly are mainly involved in the traction assembly.It is used in Indian Railways in trains to control the traction engine . IGBT stands for Insulated Gate Bipolar Transistor. IGBT is used in medium to high power application like switched mode power supplies traction mode control and induction heating .

3. INCIRCUIT TESTING AND WAVE SOLDERING DEPARTMENT :-

- Traction Module testing of PCB is done in basement of PCB :

In Wave soldering , has been the common method of soldering multi leaded THT(through hole component) such as through hole collector or highly application specific THT components ,onto a circuit board designed for surface mount type component.

4. PCB (Printed Circuit Board) DEPARTMENT :

- Surface Module Technology [SMT] :-

In this the robots assemble componenets on the bear PCB's ;

Robots place solder paste and they will assemble all SMT components. Soldering is done through robotic machine i.e. hot wave oven also known as reflow oven (room size) ,the temperature varies from 170 degree C to 270 degree C. Slowly PCB is sent through oven through conveyer it will pass through different temperature zone. Finally the components which comes outside are all soldered. EX. Protruding leads in radio circuit, if there is any THC (Through Hole Component) then it is placed to PCB (mounted to one side but soldered on other side). Now it is sent to the THC assembly. Later it is sent to ICT (in circuit testing) department.

✓ PCB MAX TESTING :-

From the ICT department, it will be sent to Max Testing. In Max testing, the module received from ICT department after testing in ICT department tests it for full functionality. Trouble Shooting is also done if required. Trouble shooting is a logical, systematic search for the source of problem in order to solve it and make the product or process operational again. After trouble shooting is done it is sent to main assembly.

5. DEPARTMENT OF MAIN ASSEMBLY :-

The components placed inside the control assembly panels like small PCB's and other circuits are known as sub assembly. All modules put together, whole panel testing takes place. After the trouble shooting and testing it is sent to main assembly, they will assemble in panels . In each panel there were 50 modules. Then they test for whole set of panel, testing whole panel functionality.

- MODULE REPAIR CENTRE [MRC] :-

It repairs the fresh module. In short it does module repairing test. Oscilloscope multimeters are used to check or to test.

6. DEPARTMENT OF PV MODULE ASSEMBLY :-

The silicon wafers are kept in a furnace and are coated with a silicon nitride, anti-reflective coating. Control is performed at every step of the production process from receiving the incoming wafers to packing the completed cells are sent to solar module facility to be assembled first. The thin silicon wafers are imported to BHEL from Australia, Russia, China.

✓ TCI – Tin Copper Interconnect.

It then generates some voltage when it is exposed to light.

220 watt = 220 watt/ hr.

- Solar panel lamination –
Sealed into ethylene vinyl acetate, they are put into a frame that is sealed with a silicon glue and covered with black on both sides and glass plate on front side. This is lamination process, important step in solar panel process. Finally structure is then supported with aluminium frames and ready in the PV module. PV stands for Photovoltaic cell.

There are DOCUMENTATION departments also.

These are all the information got from an industrial visit to BHEL.