

INPLANT TRAINING REPORT



ADITYA BIRLA GROUP

ULTRATECH CEMENT LIMITED

(Reddipalayam Cement Works)

Submitted by:

N.DIANA

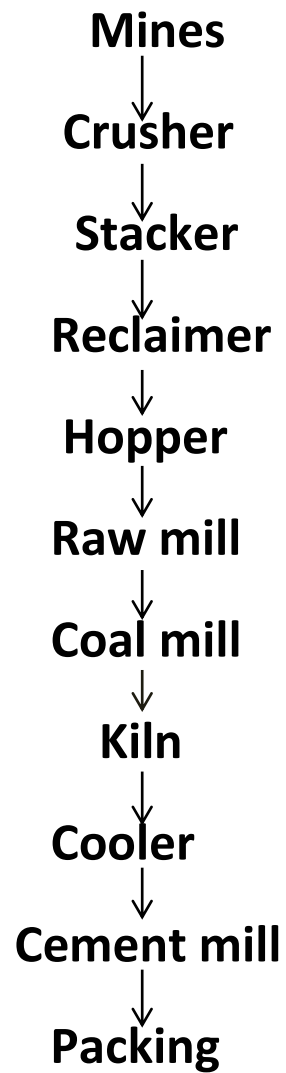
Electronics and Instrumentation

Firstly, I would like to thank ULTRA TECH CEMENT LIMITED,
UNIT: Reddipalayam cement works, Ariyalur for giving me the opportunity to
attend in-plant training and improve my knowledge in the field of
Instrumentation.

I also extend my special thanks to Mr. Heera Kumar- HOD E&I and
the whole instrumentation team for helping me in my In-plant training and
giving me a detailed knowledge about the working of the cement plant.

I hereby submit my report for the training undergone by me
between the periods of 04.02.2020 to 18.02.2020.

Process taking place in the cement plant:



Limestone is the basic raw material for the production of cement. It is a sedimentary rock composed of calcium carbonate in the mineral calcite. It most commonly forms in clear, warm, shallow marine waters. In order to get lime stone mining process has to be practiced.

MINES:

For mining ripper dozer is being used, which consumes 80 litres of diesel per hour. In order to remove water from the mines, six motors are being used and the ratings are of 7 KW & 75 KW. Mines get power from the TNEB. A generator is also used for emergency purposes. This raw material when brought from the mine is in huge form. So, in order to bring it into small pieces crusher is used.

CRUSHER:

The crusher consists of wobbler feeder which breaks large pieces of lime stone into small pieces. The oval shape of the feeder helps in the movement of the material. Here the raw material is crushed to the size of 50mm. The crusher consists of two rollers which crushes the material into small pieces which allow only the particles which are of the size of 50mm and below, then the material is taken to the stacker.

STACKER:

At the stacker different grades of lime stone mixing takes place so that all types of different materials can be mixed. From the stacker the material is taken with the help of the reclaimer.

RECLAIMER:

The reclaimer with the help of scrapper chain conveyor draws the raw material from the stacker and passes it to the belt conveyor and the belt conveyor takes it to the raw mill hopper.

HOPPER:

Hopper is a concrete container where the raw material is stored. Then the raw material from the hopper is taken to the raw mill.

RAW MILL:

In the raw mill the material is crushed to the size of some microns. The classifier is used in the raw mill to decide the size of the particle which has to be taken. This is done by increasing or decreasing the speed. The vertical roller mill is used to crush the material. Then the material is passed to the silo. Here the material is stored. After this the material is passed through the cyclones which is called preheater.

There are four cyclones of such type. When the material crosses all the four cyclones the temperature of the material is about 1000 deg.cel. Then the material is passed to the kiln.

KILN:

Kiln is a furnace which rotates with a variable speed. The temperature of the kiln is increased by burning coal. The temperature of the kiln is also increased by burning materials like old tyre, paints etc. as alternative fuel. When the material is comes out of the kiln it is in the molten form. The temperature of the clinker is now about 1400 Dec.Cel. It is now sent to the cooling portion where it is cooled and then sent to the clinker silo.

BAG FILTER:

At every place where the material is passed, consists of a bag filter. This bag filter consists of strong bags, so that when high pressure of dust air passes through it the material will remain along with the bag and the air will pass through it. This helps for the reduction of pollution.

CEMENT MILL:

From there with the help of belt conveyor the clinker is taken to be added with the gypsum. This is because without the presence of gypsum the cement would react with water very fast and become dry very fast. Therefore gypsum acts as an additive. After adding gypsum the clinker particle is sent for grinding.

If the gypsum is added with clinker it becomes OPC(ordinary Portland cement) grade and if the fly ash is added with clinker it becomes PPC(Portland pozzolana cement)grade.

While passing through the conveyor belt it is checked whether it contains any iron particles. If it is so they are removed with the help of magnets. Then it is sent to roller press.

ROLLER PRESS:

The material then passes through the roller press where it is pressed and with the help of bucket elevator it is sent to the ball mill.

BALL MILL:

The ball mill consists of much number of small balls which will bring the material in a finely powdered state. Then with the help of bucket elevator it is sent to the cement silo.

CEMENT SILO:

The cement silo consists of four division which stores different grade of cement. It is then sent for packing.

PACKING:

The packing machine is of rotating type. The speed of the rotating packing machine is about 2.5 rpm. Then with the help of belt conveyor the bags are sent for loading. The production of cement is about 4500 tons per day.

FIELD INSTRUMENTS:

➤ **TEMPERATURE SENSOR:**

❖ **RTD:**

Resistance temperature detector is a temperature sensor that operates on the measurement principle that a material electrical resistance change with temperature.

❖ **RTD pt100:**

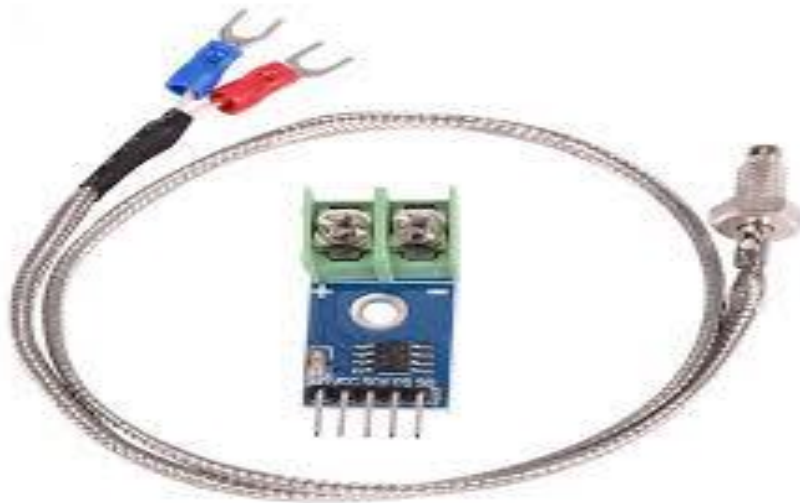
It is a platinum RTD with a resistance of 100 ohm at 0°C change with temperature. It is suitable for applications in the range of -200°C to 600°C but most commonly used in the range -50°C to 250°C.

It consists of length of fine wire wrapped around a ceramic or glass core but other constructions are also used. The RTD wire is pure material of platinum, nickel or copper.



❖ THERMOCOUPLE:

Thermocouple are based on the Seebeck effect i.e. thermocouple current is generated when two different metal wires are put into contact at both ends with their junctions having a different temperature.



❖ TYPE K:

Thermocouple k type is the combination of Chromal =nickel +chromium, alupal = nickel + aluminium.

General purpose thermocouple with a sensitivity of approximately 41 microvolt / °C. It is inexpensive and probes are available in its -200° C to 1350° C.

➤ VIBRATION SENSOR:

It works based on piezoelectric effect. Piezo sensors are flexible devices that generate electric charge as the sensing element. The

movement of this sensing element is used to actuate when they are stressed. This output voltage is proportional to the strength of shock or vibration.

➤ **LEVEL SENSOR:**

A liquid level control system by using a float sensor works on the principle of buoyancy, which states, “a float immersed in a liquid is buoyed towards upward direction by an applied equal force to the weight of the displaced liquid.

➤ **PRESSURE SENSOR**

The principle of pressure sensor is the force applied will deflect the diaphragm inside the pressure transducer. The deflection of the internal diaphragm is measured and converted into an electrical output. Most pressure transducer are designed to produce linear output with applied pressure.

❖ **PRESSURE SWITCH:**

This is a device designed to monitor a process pressure and provide an output when a set pressure (setpoint) is reached. A pressure switch does this by applying the process pressure to a diaphragm or piston to generate a force.

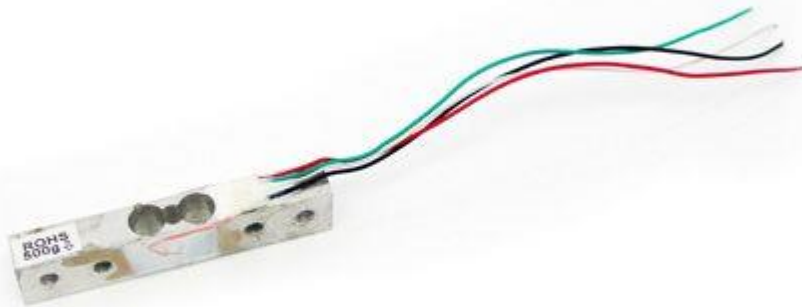
A pressure switch is used to detect the presence of fluid pressure. Most pressure switches use a diaphragm or bellow one or more switch contacts to indicate an alarm or initiate a control action.

❖ **PRESSURE TRANSMITTER:**

A pressure transducer, often called a pressure transmitter, is a transducer that converts pressure into an analog electrical signal. Pressure applied to the pressure transducer produces a deflection of the diaphragm which introduces strain to the gauges.

➤ **WEIGHT SENSOR:**

The working principle of the weight sensor or load cell depends on the conversion of a load into an electronic signal. The signal can be a change in voltage; current otherwise frequency based on the load as well as used circuit. It is divided into static and dynamic.



- **STATIC:**
 1. Bin weight
 2. Packer weight
 3. Weigh bridge
- **DYNAMIC:**
 1. Weigh feeder
 2. Solid flowmeter
 3. Belt weigher

➤ **PROXIMITY SENSOR:**

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation and looks for changes in the field or return signal.



TYPES OF PROXIMITY SENSOR:

Inductive, capacitive, photoelectric and ultrasonic.

❖ **CAPACITIVE PROXIMITY SENSOR:**

As the object comes close to the plate of the capacitor the capacitance increases and as the object moves away the capacitance decreases. The detector circuit checks the amplitude output from the oscillator and based on that the output switches.

❖ **INDUCTIVE PROXIMITY SENSOR:**

An inductive proximity sensor is a non-contact electronic proximity sensor. It is used for positioning and detection of metal objects. The sensing range of an inductive switch is dependent on the type of metal being detected.

➤ **PULL CORD SWITCH:**

Pull cord switch is an emergency switch to stop the belt conveyor instantly when an accident happens. It is mounted on the sides of the conveyor of the conveyor belt, preferably approximately every 20-25 meters. When the rope is pulled on either side. The switch is operated unless and until the handle is manually reset to the normal operation, the switch remains in operating condition



➤ **CROSS BELT ANALYSER:**

PGNAA and PFTNA TECHNOLOGY:

Prompt gamma neutron activation analysis (PGNAA) and pulsed fast thermal neutron activation (PFTNA) provides continuous, online bulk raw material analysis.

PGNAA works by bombarding sample material with neutrons. Neutrons interact with elements in the sample, which emit secondary prompt gamma rays. These gamma rays are collected and measure with a high resolution gamma rays spectrum is analysed to determine information about specific elements.

PFTNA uses an electrical tube to provide a pulsed flow of neutrons that interacts with the nuclei of atoms in the passing material. In response the atoms emit gamma rays at characteristics energy levels.



➤ **GAS ANALYSER:**

Gas analyser works on the principle of absorption of light by the gas under test. Absorption analysers need only shine a beam of light through an unheated sample chamber, then measure how much of specific wavelengths were absorbed by the sample.

➤ **VARIABLE FREQUENCY DRIVE:**

A variable frequency drive is a type of motor controller that drives an electric motor by varying the frequency and voltage supplied to the electric motor. Other names for a VFD are variable speed drive, adjustable speed drive, adjustable frequency drive.

The two main features of variable frequency drive are adjustable speeds and soft start/ stop capabilities. These two features make VFDs a powerful controller to control the AC motors. VFD consists of mainly four sections; those are rectifier, intermediate DC link, inverter and controlling circuit.

➤ **X-RAY FLUORESCENCE:**

XRF is a non-destructive analytical technique used to determine the elemental composition of material. XRF analysers determine the chemistry of a sample by measuring the fluorescent x-ray emitted from a sample when it is excited by a primary x-ray source

