

# HOT BILLET SHEAR MACHINE CONTROL PANEL

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**Abstract:** This project is mainly divided into two parts. In the first part we deal with the learning of all components which is used in Electric Control Panel and visit at industry where testing of panel and hot billet shear machine. In the other part we deal with the programming of the PLC, Interconnection of the wiring diagram and Design of wiring in AutoCAD of the project. Electric control panels are design and used to control mechanical equipment. There are different types of components used in electric control panel. Normally, the PLCs that have been used in the industrial field is usually to control a mechanical movement either of the machine or heavy machine in order to create an efficient production and accurate signal processing. Before, a programmable logic controller would have been programmed in ladder logic, which is similar to a diagram of relay logic. In this project, a discussion about electric control panel, PLCs applications, wiring diagrams in AutoCAD, will be explained in more details and specified. Whereby, a machine that used to prepare cut hot billet with precise size. Several electronics and electric devices that usually been controlled by the PLC area hot billet shear machine, induction motor, re-circulation pump, proximity sensor, conveyor belt, solenoid valve, push buttons, relays and other devices.

**Index Terms** – Auto CAD designs, PLC and induction motor

## INTRODUCTION

Purpose of this project is improve the quality and features as per seller's requirement for shear machine can fulfill our customer requirement and order flow of Horizontal Hot Billet Shear Machine is more than other.

The difficulty is that one cannot execute whole project with full commitment at the time of Order Placing due to insufficient data of whole machine and wrong electrical design.

Hot Billet Shear Machine will be operated by two cylinders (1. Cutting Cylinder and 2. Travel Cylinder). By Sensing the length for Billet Cut by any device, Operation of Shear machine will start. Cutting Cylinder will start forward and start to cut the billet at the time of cutting and trolley will start move forward by the force of billet withdrawing speed. After cutting the billet trolley will move backward by pump.

This Shear Machine can cut the billet as minimum as lowest 1 Mtr. Billet length. In the other part we deal with the programming of the PLC, Interconnection of the wiring diagram and Design of wiring in AutoCAD of the project. Electric control panels are design and used to control mechanical equipment.

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In this project, a discussion about electric control panel, PLCs applications, wiring diagrams in AutoCAD, will be explained in more details and specified. Several electronics and electric devices that usually been controlled by the PLC area hot billet shear machine, induction motor, re-circulation pump, proximity sensor, conveyor belt, solenoid valve, push buttons, relays and other devices.

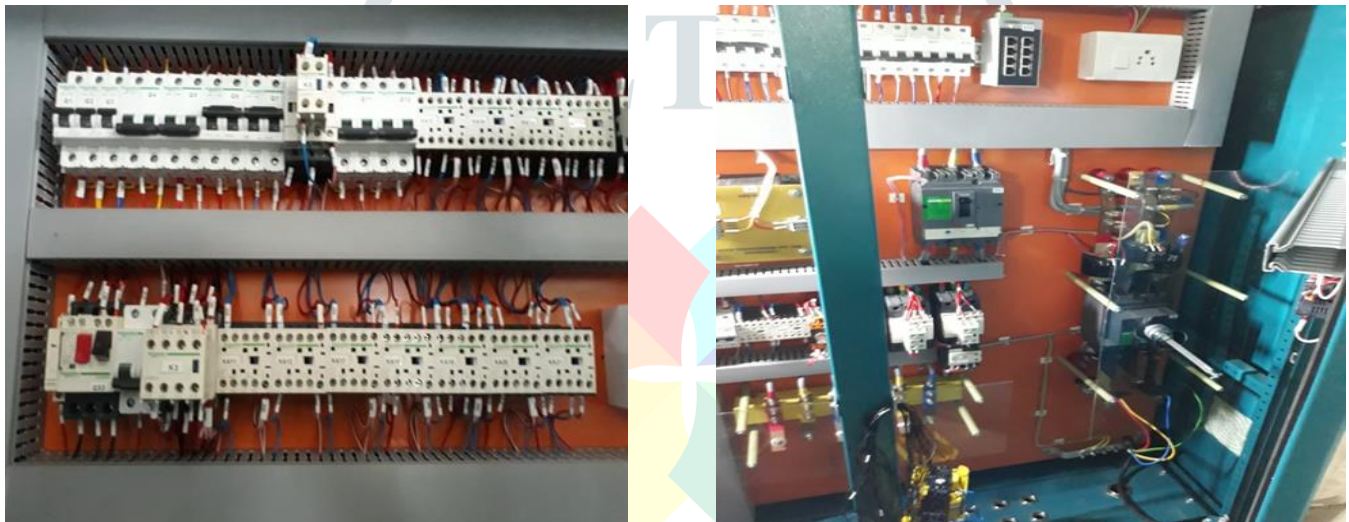


### 1.1 OVERVIEW OF ELECTRIC CONTROL PANEL

In this project electric control panel is used for to control hot billet shear machine.

An electric Control Panel is defined as an assembly of a logical and typical arrangement of two or more components such as motor controllers, overload Relays, fused disconnect switches, and circuit breakers and related control devices including pushbutton stations, selector switches, timers, switches, and control relays, with related wiring, terminal blocks and similar components.

There are different and many types of Electrical Control Panels used in the industry for different resolutions are responsible for holding Electrical control panels the meters, switches, relay, cables, MCCB and other such electrical equipment. High tension control panels and Low tension control panels.



### 1.2 TESTING

There is some testing in industry and we are taking total testing. List of tests carried out are as follows.

1. Control Panel Insulation Resistance Test
2. Continuity test
3. Earthing test
4. Short circuit test
5. High voltage test

Test Voltage for Meggering:

When AC Voltage is used, The Rule of Thumb is Test Voltage (A.C) = (2X Name Plate Voltage) + 1000.

When DC Voltage is used (Most used in All Megger), Test Voltage (D.C) = (2X Name Plate Voltage).

Voltage Level IR Tester

650V 500V DC

1.1KV 1KV DC

3.3KV 2.2KV DC

66KV and above 5KV DC

#### 1. Insulation Resistance Test: -

The measurement of insulation resistance is a common routine test performed on all types of electrical wires and cables. As a production test, this test is often used as a customer acceptance test, with minimum insulation resistance per unit length often specified by the customer. The results obtained from IR Test are not intended to be useful in finding localized defects in the insulation as in a true HIPOT test, but rather give information on the quality

#### 2. Continuity test

Measuring Continuity in an Electrical Control Panel

Step 1 Turn Off the Breaker That Controls the Circuit

Step 2 Check the Tester

Step 3 Touch Lead to Terminal

Step 4 Touch Other Lead to Terminal

#### 3. Short circuit test

A blocked rotor test is directed on an enlistment engine.

It is otherwise called short out test, bolted rotor test or slowed down torque test.

From this test, cut off at typical voltage, control factor on short out, complete spillage reactance, and beginning torque of the engine can be found.

The test is directed at low voltage provided that the connected voltage was ordinary voltage then the current through the stator windings would be sufficiently high to overheat the windings and harm them.

#### 4. Earthing test

The fall of potential test technique is utilized to gauge the capacity of an earth ground framework or an individual cathode to disseminate vitality from a site.

The earth terminal of intrigue must be disengaged.

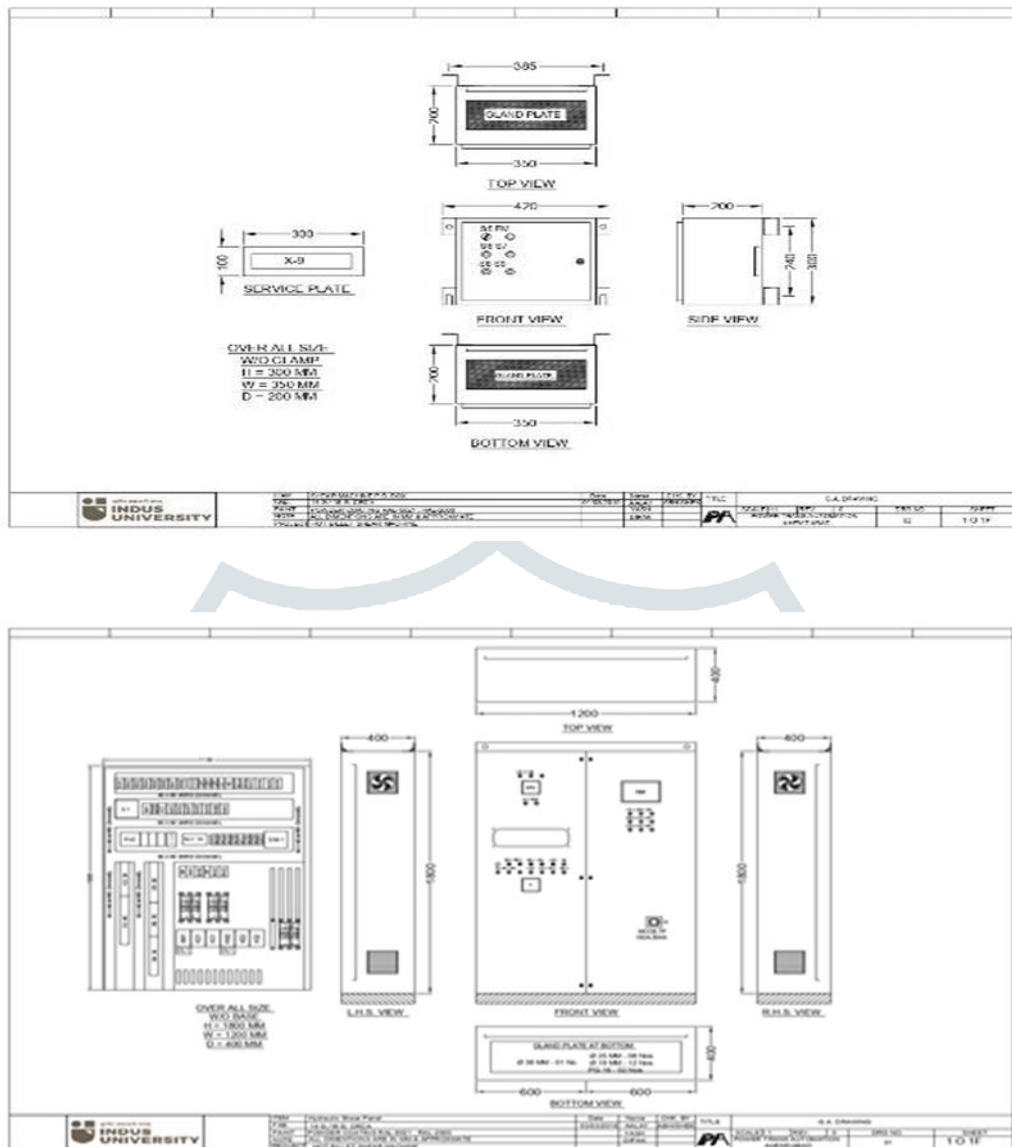
The analyzer is then associated with the earth cathode.

#### 5. High voltage test

High Voltage Testing of electrical gear covers a wide scope of procedures relying upon the idea of the hardware and the kind of test required.

High Voltage testing is typically performed to qualify the gadget to work securely amid appraised electrical conditions, an approach to check the adequacy of its protection

### 1.3 LIST OF FIGURE



**I. RESULT**

Calculation of No Load Test of Induction Motor

Let the total input power supplied to induction motor be  $W_0$  watts.

Where,

$V_1$  = line voltage

$I_0$  = No load input current

Rotational loss =  $W_0 - S_1$

Where,

$S_1$  = stator winding loss =  $Nph I_2 R_1$

$N_{ph}$  = Number phase

The various losses like windage loss, core loss, and rotational loss are fixed losses which can be calculated by

Stator winding loss =  $3I_0^2R_1$

Where,

$I_0$  = No load input current

$R_1$  = Resistance of the motor

Core loss =  $3G_0V^2$

Where,

Full load current of three phase induction motor =

$I$  (current at full load) =  $\frac{P}{1.732 * \text{Power factor} * V} = 415$ , power factor = 0.81, hp= 50,  $I=?$

=  $37300/581.53$

$I = 64.14\text{amp}$

## II. CONCLUSION

From this project “electric control panel” we are able to know how to do different types of tests in panel, interconnection wiring diagram in AutoCAD design and programs in PLC for Automation system.

In electric control panel Testing result show all parameter satisfies the standards of control panel and it shows that control panel is ready for to control shear machine.

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