

Study on Industrial Machine Controlling System

At Apex Footwear Ltd.

A Thesis Submitted In Partial Fulfilment of the Requirements For The
Degree of Bachelor of Science in Electrical and Electronic Engineering

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June, 2021

CERTIFICATION

This is to certify that this thesis entitled “**Study On Industrial Machine Controlling System At Apex Footwear Ltd**” is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering in partial fulfilment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on June, 2021.

Supervised by

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Internship Certificate



April 01, 2021

Ref: HR/InT/DIU/2021/L-725

TO WHOM IT MAY CONCERN

This is to certify that, **Md. Sajib Rana**, Student ID Number: **173-33-551**, Department of Electrical and Electronic Engineering, from *Daffodil International University (DIU)* has successfully completed 02 (Two) months long "Internship" program from February 02, 2021 to March 31, 2021 at **Apex Footwear Limited**, Shafipur, Kaliakoir, Gazipur.

We wish every success in his future endeavor.

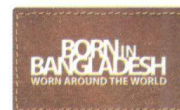
Sincerely yours,
On behalf of Apex Footwear Limited-

A handwritten signature in black ink, appearing to read "Md. Arifur Rahman".

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I will be completed forever to the Daffodil International University, Bangladesh we are very grateful to Allah Almighty, who has provided us such an opportunity to gain expertise in Apex Footwear Limited, I would really like to explicit my cordial gratitude to my Internship manual **Md. Ashraful Haque, Assistant Professor of Department of Electrical& Electronic Engineering**, Daffodil International University for this honest efforts to make this challenge a success one, It turned into his guidance and relentless motivation at some point of the course of uncertainties and doubts that has helped me immensely to head in advance with this project. I would like to specific my heartfelt thankfulness Md. Ashraful Haque Assistant Professor of the Department, Electrical Engineering for this guidance and aid, I am additionally grateful to the faculties of Electrical Engineering Department for presenting their helpful arms in the course of the direction of our undertaking. It turned out to be a great experience to do an internship right here . We have learned a lot of things in practice that we have learned theoretically before, we thank Almighty for enabling us to complete this Internship report in a timely manner. Words are just a few of the many humble obligations to our loving parents for their prayers to allow this process to be accomplished.

ABSTRACT

Early detection of irregularities in electrical machines is important because of the diversity of their use in different fields. An accurate fault detection scheme helps to stop the spread of failure or limit its growth to a serious degree and consequently hinders because of the scheduled downtime which is production and financial income. Among the various types of failures that can occur in electrical machines, the rotor to fault is about 20%. Most of the industries use pneumatic valves. Successful detection of any electrical failure. Signal processing techniques for eliminating fault properties. Aim to present this paper. Stimulation and rotor fault of the broken rotor bar when there was a lifting of the properties using waveform analysis appeared in the current signal. In this case, a brief explanation of rotor failure, various methods of condition monitoring for the purpose of rotor fault identification is addressed. Then, analyse the motor current signature.

This system includes motor, load cell, photo sensor, proximity sensor, protection relay, magnetic contactor, limit switch, push lamp switch, normally open switch, normally closed switch, solenoid coil, circuit breaker, plc, input, HMI Used Emergency Stop Switch, SSR, Thermocouples, Rotary Encoder, Servo Motor, Servo Amplifier, Inverter, and Fuse Used.

CHAPTER 1

Introduction

1.1 Back ground of the Study:

Electrical machines have been widely used in many industrial processes and have been playing a non-convertible role in various miscellaneous industries. Despite their reliability and visibility, electronic machines are still at risk of failure due to exposure to a variety of harsh environments and conditions, existence or production defects. If these errors, failures and gradual degradation can cause motor disruption the left is not detected and their results unplanned downtime is very costly. Early detection of irregularities in electrical machines with proper fault diagnosis schemes will help prevent high cost failures to reduce maintenance costs and prevent deadlines but stop the transmission of the error or limit its growth to a serious degree resulting in loss and consequent loss. Income electrical machine is a general term for machines using electromagnetic forces such as electric motors, electric generators and others. They are electrical energy converters, electric motors convert electrical mechanical energy while electric generators convert mechanical energy into electricity. Running parts in a machine can be rotating or linear. A third category that is often included in addition to motors and generators is transformers, although they have no moving parts but are power changers, changing the voltage level of the alternating current.

Electric machines, in the form of generators, produce virtually all electrical energy on earth, and take on almost everyone in the form of electric motors.

discoveries in the electrical and New electronics industries, rapid expansion of products and markets, have made it difficult for workers in this field to maintain the required skill limits to manage their activities. Consultancy field engineers,

1.2 Objective of the Study:

The main objective of the study is to access the academic knowledge in every part of my internship and to know the Industrial machine controlling system.

The main Objectives of the study are:

1. Star Delta Starter with Controlling
2. DOL Starter to Start
3. Relay Controlling
4. How to Work Inverter, Advance Inverter.
5. VFD
6. How to Work Solenoid Coil
7. Control Motor Speed Using Inverter
8. Operation HMI
9. Operation PLC
10. Input Output Module

1.3 Limitations:

The section of this chapter deals with the limitations of the study that are as below:

- I cannot acquire all the information of the Apex Footwear Limited. Because of the company internal rule.
- I have any permission to get photos of all equipment.

CHAPTER 2

Company Profile

2.1 Introduction:

The company name is “Apex Footwear Limited” and it is one of the biggest industrial hubs of the country. Apex Footwear Limited, engages in the production, manufacture and sells leather shoes and leather products. the company was founded on January 4,1990. which has monthly capacity of 6,60,000 pair leather shoes.

The culture of combined team efforts throughout our competent management and industrial engineering units resulted consistently moves South East’s capability forward and facilitated international experts.

2.2 Vision and Mission

Vision: Apex Footwear Ltd. strives to be a global leader in the leather industry. by offering quality leather shoe manufacturing, innovative products and out standing services. we create a socially responsible organization that complies with international standards. apex footwear industry a vision of very important part honest growth.

Mission: Our mission is drive strong synergy with our partners throughout the world who share our commitment to safe and healthy Workplaces, to deliver high quality products and services. we realize customers expectations and improve on them continuously. and vendor of choice for our customers, shareholders value creation, compliant with best global practices &standards.

2.3 Company Information :

The company basic information is given below:

01	Location	Shafipur, Kaliakoir, Gazipur.
02	Address (Corporate Office)	House #6, Road #137, Block # SE(D), Gulshan-1, Dhaka-1212, Bangladesh.
03	Tel. No	+880255044841
04	Legal Status	Private Company
05	Year of Foundation	1990
06	Manufacture	100% Leather Shoe Factory

2.4 The Function Under Division :

The following department attached with division which as follows:

- Finance & Accounting department
- HR, Admin & Compliance department
- Marketing & Product development department
- Component department
- Cutting department
- Swing department
- Lasting department
- Warehouse department
- R& D of Leather
- Maintenance department

2.5 Safety Precaution

In order to avoid the hazards on the plant, companies train their employees for the safe handling and operation of materials and units installed on plant, so for this company follow following steps :

1. Give Knowledge
2. Give Training
3. Trouble Shooting
4. Smoking is strongly prohibited on all areas of the plant.
5. Leakages may occur and so serious damage can occur.

2.6 Different Safety Signs

Safety signs are used to manage positive movements as well as to indicate anxious opportunities. They are very helpful for concern because they provide clear guidelines since they should face almost the same danger in the website they have created. Some of the unique security features are,

- **Man Safety**
- **Machine Safety**
- **Material Safety**

2.6.1 Man Safety

In safety the primary component is guy safety. Man, safety is one of the important things between the regulations of protection. Man, protection method the way to safe guy in operating region (plant). Mask, safe- shield, gloves and many others are supplied for protection.

2.6.2 Machine Safety

Machine safety is also crucial. The problem shoot, renovation of temperature is the important one. No use of cell near to gadget because safety of tripping and matching of frequency.

2.6.3 Material Safety

The protection of leather is also vital. The aspect like send is safe in keeping with its manner of protection. Other things like PTA, MEG are keeping in keeping in wit its situation.

2.7 Power Distribution:

Apex Footwear limited company has brought 33KV line from PGCB. First, this 33KV line has been fully protected and brought to 33KV substation. A substation of 33/11 KV has been set up here, another 6.3MVA,11/0.415KV substation has been installed for the 11KV line coming from this 33/11KV substation. Apex footwear limited has two indoor type substations.

Now, 6.3MVA has been converted from indoor type substation to 415V AC using step down transformer and from this 6.3 MVA, 11/0.415KV substation current is being distributed as per demand through low tension or LT panel.

In short, the 33 KV line has been distributed through substations to 11KV and the 11KV line has been converted to 0.415KV and has been fully distributed to apex footwear limited.

CHAPTER 3

6.3 MVA, 11/0.415 KV SUB-STATION

3.1 Introduction

Currently the electric power system is AC. In other words, the production, transmission and supply of electrical energy is being done through AC supply system. Electrical power is generated at the power station, which is usually located at a distance from the electrical customers. The electrical energy generated is transmission and distributed through complex networks. In many cases, during the transmission of electricity, it is necessary to change the various characteristics such as voltage, AC to DC frequency, power factor. The equipment used in this transformation is called a sub-station.

For example, the amount of voltage produced at a power station is 11KV. This voltage is raised to 132KV or 230KV using a step up transformer to transmit it over long distance. For this purpose transformer is used in sub station. Again the voltage demand of the customer side is 11KV, 0.415KV, 0.230KV. that is, high voltage is distributed to the sub station with the help of step down transformer to suit the customer. In many cases AC power needs to be converted to DC power. Sub-stations play to a vital role in changing and upgrading the power factor.

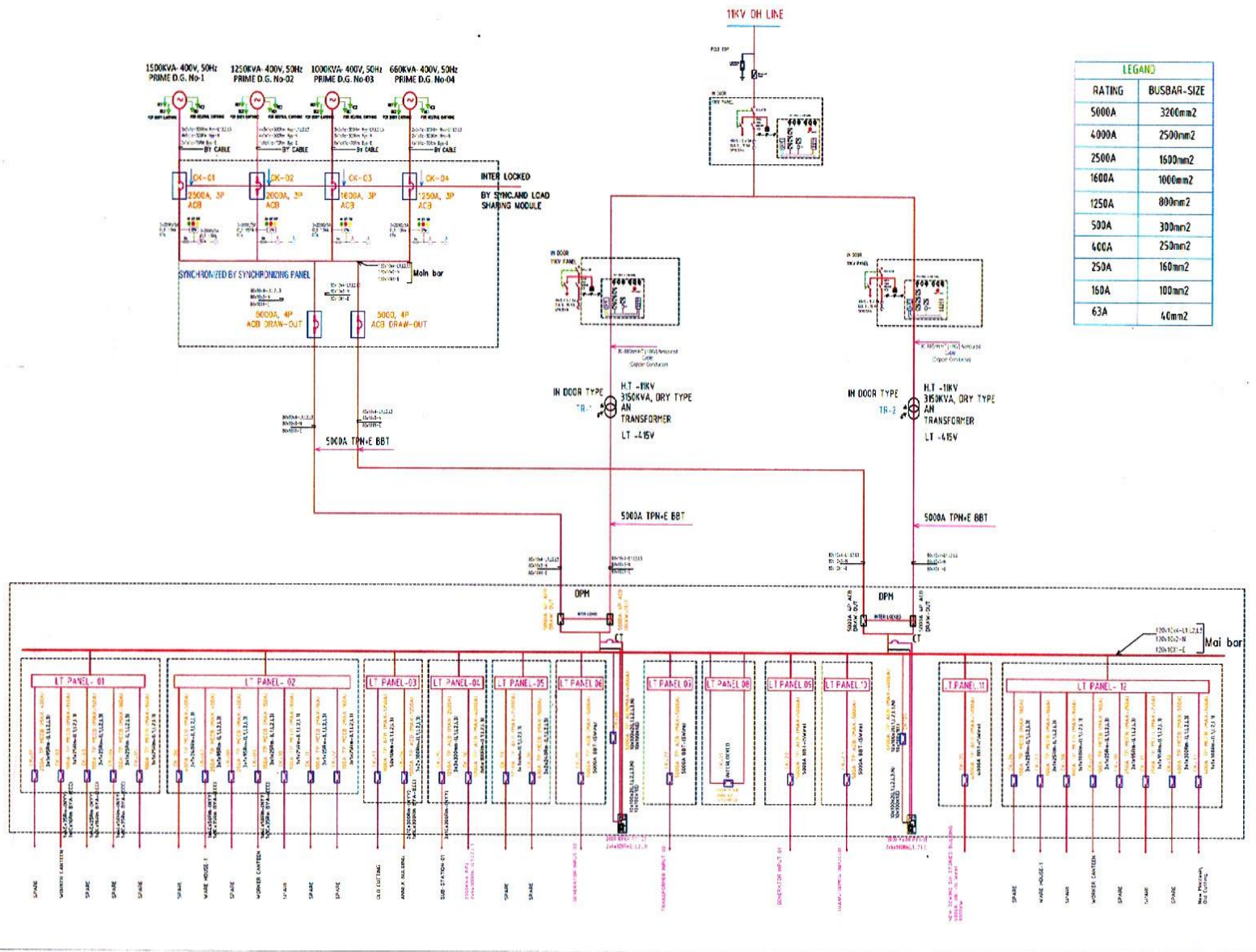
3.2 Factor to be considered in selecting the site of a sub-station

Power sub-stations are very important part of the power system. ensuring Uninterrupted power supply depends on successful operation of power substations. Thus, the following factors need to be considered in designing or selecting sub-stations.

1. **Load Centre:** The main issue in selecting the location of the sub-station is the load centre. In other wise, care must be taken while selecting to location of substation so that the substation is located in a place from which the cost of power supply, transmission, etc. is minimum.
2. **It should is providing safe arrangement:** In order for the various equipments of the sub-station to be able to supply electricity safely and round the clock, regular maintenance, cleaning, fire protection, open air flow, etc. should be ensured.
3. **The amount of rated voltage of the incoming and outgoing lines.**
4. **Total MVA transformer to be supplied.**
5. **Type of consumer.**
6. **Geographical area available.**
7. **It should be easily operated and maintained.**
8. **Reliable arrangement:** In order to ensure uninterrupted power supply, suitable protective gear should be installed.

3.3 SINGLE LINE DIAGRAM OF 6.3 MVA SUB-STATION

POWER DISTRIBUTION PLAN OF 6.3MVA, 11/0.415KV SUB-STATION



3.4 Description:

When the 11KV line enters the indoor type substation, the line will first enter the indoor type HT panel or 11KV panel through the underground cable with the help of a drop-out fuse from the pole to protect the line.

The indoor type substation is designed in such a way that two transformers equal to 3150 KVA are used here because if one transformer has any problem then the substation does not become idle or closed, so another transformer is used. Now incoming and outgoing indoor type 11KV panel has been installed. The ink panel isolator, VCB circuit breaker, and 11KV process control panel, This is how indoor type 11KV HT panel is diagnosed or installed. Here the 3150 KVA dry type transformer, whose HT-11KV and LT-415V are connected to the 2000 KVAR PFI panel with the help of bus bar through the enter locked system from the transformer output. This indoor type 6.3 MVA substation has 1500KVA, 1250KVA, 1000KVA, 660KVA, these four generators to generate electricity at all times, and these four generators are synchronized through four synchronizing panel through enter locked system PFI power factor improvement panel has been connected to the main bus bar. And from this main bus bar the load is being distributed to the LT panel board or the whole company.

3.5 List of different component of an indoor sub-station

1. Bus bar
2. Lightning Arrestor
3. Isolator
4. Circuit Breaker
5. Instrument Transformer
6. Power Transformer
7. Metering and Indication Instrument
8. Insulator
9. Miscellaneous Equipment
10. Panel Board
11. HT Panel
12. LT Panel
13. PFI Panel
14. Control desk
15. Workshop
16. Arrangement of Air Flow
17. Arthing Switch

3.6 Function of the component of an indoor sub-station

Bus bar: The bus bar is a rectangular bar made of aluminium or copper, which always operates at a constant voltage. The incoming and outgoing lines of the substation are connected with the help of bus bar.

Lightning arrester: Lightning arresters are used to protect various equipment of the substation from surge caused by over voltage.

Isolator: Isolators are used to disconnect various equipment of the substation, especially the transformer from the line at no load conditions or at very low loads.

Circuit Breaker: It is a switching device by which the circuit can be opened or closed in both normal and abnormal conditions. This means that the circuit breaker can disconnect the circuit from the line at full load, its operation is automated.

Instrument Transformer: Instrument transformer has two types.

Current Transformer (CT): A current transformer or CT is used to measure high quality current in a high voltage line with a low range ammeter.

Potential Transformer (PT): A potential transformer or PT is used to measure high voltage with a low range voltmeter.

Power Transformer: The power transformer used in indoor substation is step down nature. It provides low voltage power supply according to customer demand.

Metering and Indicating Instrument: Different types of indicating instruments like ammeter, voltmeter, wattmeter, energy meter etc. are used to take different readings of substation.

Miscellaneous Equipment: Many other miscellaneous types of equipment are used in indoor type substation.

Fuse: Fuse is kind of protective device. drop out fuse, cartridge fuse, are used in substation.

Carrier Current Equipment: The substation has its own emergency communication management for emergencies.

DC Supply : Managing dc supply current indoor type substations is an important task as it is used for dc supply relays or various others purposes.

Fire Extinguisher: Fire extinguishing system should be kept in the substation. In be event of a extinguish the fire initially.

Panel Board: Different types of meters such as ammeters, voltmeter, energy meter etc. are attached to the panel board.

Control Desk: Control desks are used to control different parts of the substation separately.

PFI Panel: Power factor improvement or PFI is very important task for indoor type substation. With the help of PFI panel board the power factor is kept at a value of 1 or around 0.99.

Workshop: Repair and maintenance work of various equipment of the substation is done in the workshop.

Arrangement of Air Flow: Air flow is arranged in transformer various heat generating devices and switchgears.

Arthing Switch: Any additional charge on the line is discharged through the earthing switch. this allows the lineman to work safety.

CHAPTER 4

Sample Picture and work

4.1 Practical works sample picture



Fig: 4.1 Air compressor machine

Air compressors are a type of gas generator, such as an air compressor that used a rotary-type positive displacement mechanism. Abbreviations are the most commonly used replacement of piston compressors where large amounts of high pressure air are required, either to handle large industrial application chillers, or high power wind tools such as jackhammers and effect wrenches. The mesh rotors force the gas with the compressor, and the gas exits at the end of the screws.



Fig: 4.2 Boiler machine

Fire-tube boilers developed as the third of four major historical types of boilers: low-pressure tank or "straw fork" boilers, liquid boilers with one or two large flue, many small-tube fire-tube boilers, and high-pressure water. Tube Boilers their advantage over liquid boilers with single flue many small tubes provide multiple heat surface areas for the same overall boiler volume. A tank of water entered by ordinary construction tubes that carries hot flue gases from the fire. The tank is cylindrical for the most part as the most powerful practical size for a compressed container and this cylindrical tank can be horizontal or vertical.



Fig: 4.3 Diesel generator

A diesel generator is the connection of a diesel engine with an electric generator that produces electrical power. This is a specific case of engine generator. The ignition engine of a diesel compressor is usually designed to run on diesel fuel but some types are adapted tot other liquid fuels or natural gas. Diesel generating sets are used in places where there is no connection to the power grid, or as an emergency power supply if the grid fails, as well as for more complex applications such as pick-logging, grid support and export to the power grid. Diesel fuel is named after the diesel engine, not vice versa; Diesel engines are compression-ignition engines and can handle a wide variety of fuels depending on the configuration and location. Where a grid connection is found, gas is often used, as the gas grid will be under pressure during almost all power cuts. It is introduced by introducing gas with the incoming air and using a small amount of diesel fuel for ignition. Can be converted to 100% diesel fuel operation instantly. Jenbacher gas engines are renewed for strong performance in tough fuel conditions



Fig: 4.4 Injection mould machine

The injection mould machine is usually a large machine. Injection mould machine is a combination of electrical, mechanical, hydraulic system, and pneumatic system, the operation of these four parts. Leather shoe soles are made by injection mould machine. Injection mould machines include some machines that are automatic or PLC. The injection mould machine is supplied with a 415v supply voltage, and converts 415v to 24v using a step-down transformer, which operates the 24v machine to various equipments inside the control box. The injection mould machine is 50-60 watts.



Fig: 4.5 Sewing arm cutting machine

sewing arm cutting machine is usually a small size hydraulic pressure machine. This sewing arm cutting machine consists of three parts: electrical, mechanical, and hydraulic systems. This machine cuts leather through hydraulic pressure in different shapes to make shoes. This sewing arm cutting machine is supplied with 415v, but the machine is managing the work by converting 24v using a step down transformer. This sewing arm cutting machine takes 30-35 litres of hydraulic oil to operate the hydraulic system. This machine can be called a manual machine.

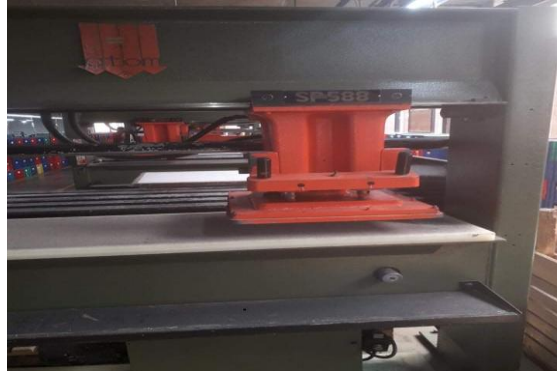


Fig: 4.6 Travelling head cutting machine

The travelling head cutting machine is usually a large size hydraulic machine. The travelling head cutting machine consists of a combination of electrical, mechanical, and hydraulic systems. This machine cuts into different sizes of different materials for leather, synthetic, and shoe soles. This machine is given 3 phase 415v supply voltage, but the machine is operated on 24v supply for safety. travelling head cutting machine It takes 50-60 litres of hydraulic oil to operate the hydraulic system. This machine is operated manually.



Fig: 4.7 Splitting machine

The splitting machine is a critical machine. The splitting machine consists of a combination of electrical and mechanical parts. Thick pieces of leather are cut thin or thin by a splitting machine. This machine uses sharp blade, and small, large motors to cut the leather into pieces. This machine is supplied with 360-415 volts and the maximum power of the machine is 3.1 KW.



Fig: 4.8 Ambush machine

The ambush machine is a hydraulic machine. This machine consists of a combination of electrical, mechanical, heating, and hydraulic systems. This machine is used to tighten the upper leather with a synthetic material through hydraulic pressure, and the design is made with a hydraulic system on the upper leather. This machine is operated by plc. The stampa or ambush machine requires a minimum of 60 litres of hydraulic oil to operate the hydraulic system. The power of this machine is 7kw.



Fig: 4.9 Back part moulding machine

The back part moulding machine is a pneumatic, and the heating machine. The back part moulding machine is made up of electrical, mechanical and pneumatic systems. The back part of the moulding machine is used to heat and cool the upper sole of the shoe, and the air pressure is used to create a shape of the shoe. This machine is supplied with single phase, 230 v. And the machine takes 130pv air pressure to handle the work. And the minimum heating temperature is 120. The back part moulding machine works automatically



Fig: 4.10 Lasting machine

The lasting machine is a hydraulic system machine. This machine is a critical machine. A lasting machine is a combination of electrical, mechanical, hydraulic systems, and heating. This lasting machine is attached to the upper sole with insole pressure by glue. The upper sole and insole are first inserted into the machine, then a type of liquid glue is applied from the heating section through the upper sole and insole hydraulic pressure. This machine requires a minimum of 120 litres of hydraulic oil to operate the hydraulic system. The temperature in the heating section of this machine is kept at 130-170. 360-400v supply is given to the machine.



Fig: 4.11 Hot air blower machine

The hot air blower machine is a machine consisting of three parts namely electrical, mechanical, heating section. This machine produces hot air, and the shoes are kept in this machine for a few minutes. This machine is supplied with 400v supply, and a 2 KW motor is used to disperse the heat generated from the heating coil.

CHAPTER 5

Operation

5.1 Automation

Automation or commercial automation uses computer systems to control productivity between product production and offer delivery, regulators use control systems to control commercial equipment and strategies. It emphasizes flexibility and conversion to production methods. Thus manufacturers enable production from production system A to production B without any difficulty in completely rebuilding existing system / product lines. Automation is now regularly applied at a fascinating pace within the production process, where automation can increase significantly. The output is increasingly consistent. Replacement of people in tasks.

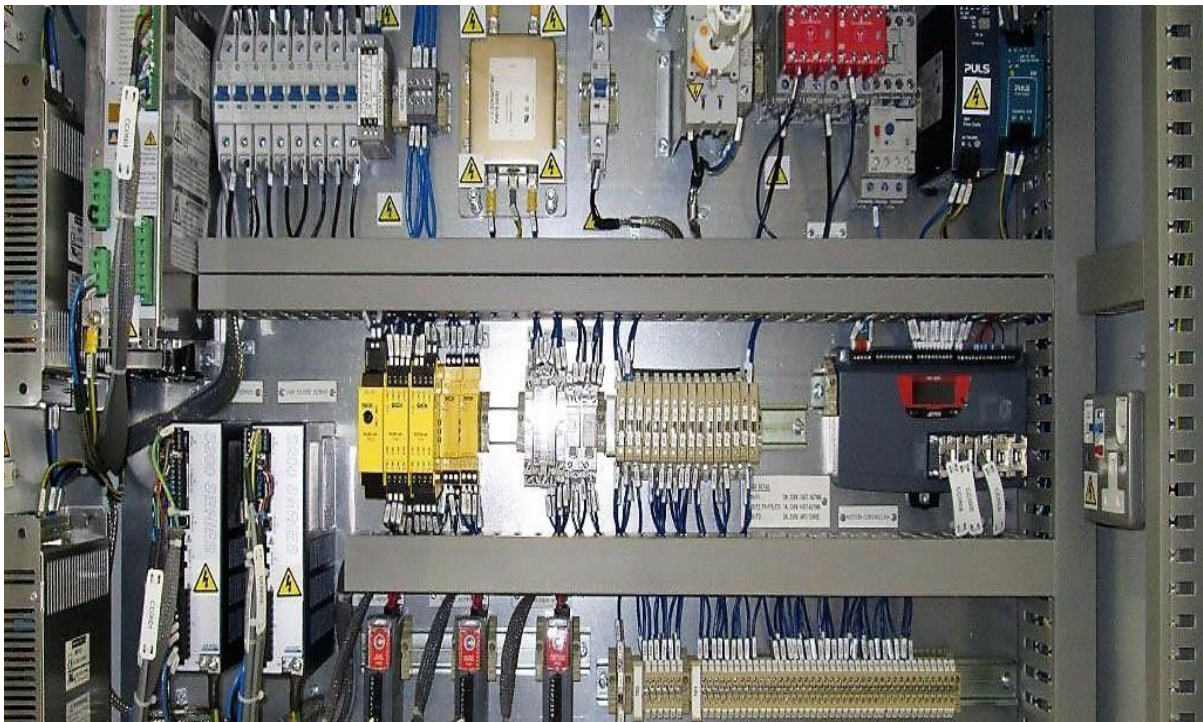


Fig: 5.1 Automation

5.2 Component of Industrial Automation

The name of component of Automation

- 1. Magnetic Contactor**
- 2. Relay**
- 3. HMI**
- 4. Push Lamp Switch**
- 5. Controlling Cable**
- 6. Proximity Sensor**
- 7. Magnetic Sensor**
- 8. Capacitive Sensor**
- 9. Level Sensor**
- 10. Thermocouple**
- 11. Inverter**
- 12. Pressure Sensor**
- 13. Servo Motor**
- 14. MCB**
- 15. Heater**
- 16. Power supply**
- 17. Solenoid coil**
- 18. Programmable Logic Controller PLC**
- 19. Induction Motor**
- 20. Steeper Motor**
- 21. Temperature Controller**
- 22. Fuse**

Magnetic Contactor

Magnetic contact is a type of switch. 3 phases is used in high voltage operation. Magnetic communicators have invented electric relays in electric motors. These are removable from the motor so that any operator matches that motor; Isolate or keep it without the opportunity to stay modern even after passing through the device. A contact is a special type of relay that is used to turn an electrical circuit on or off. These are most commonly used in electronic motors and lighting applications.

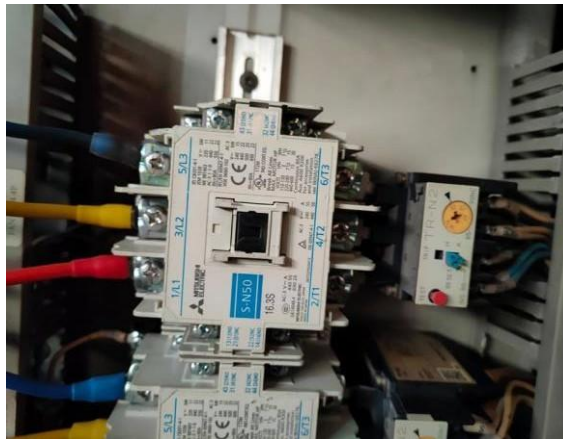


Fig: 5.2 Magnetic Contactor

Human Machine Interface (HMI)

HMI is the interface of machine and human. This is called HMIO. An HMI is a software application that gives an operator or customer information about the country in almost any way and can only receive and execute operator control orders. Typically, statistics are displayed in an image format.

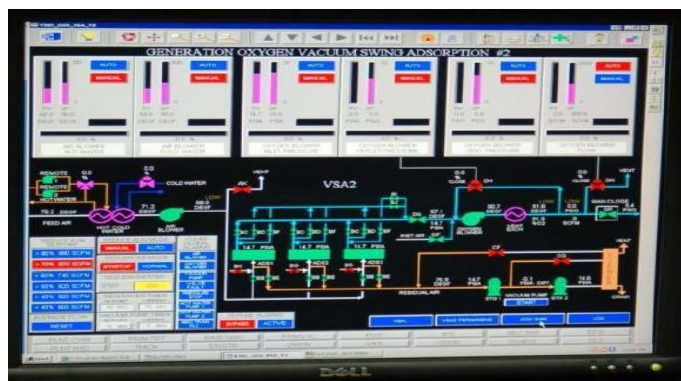


Fig: 5.3 Human Machine Interface

Relay

The relay is an electromagnetic switch that operates with the help of a great small electric powered modern day use that can turn the day off of a one mile huge electric powered cut-out. The coronary heart of the reel is an electromagnet (a coil of cord that becomes a temporary magnet when energy flows through it). You can think of a relay as a kind of electrically driven lever: move it with a small current time and switch it to each other's systems ("leverage") using a larger current. Why is it useful? As the call suggests, many sensors are a very attractive part of digital equipment and provide only small electrical currents. But on a regular basis we need to get a larger part of the system that uses their larger currents. The need relays move the distance, making the larger ones fit for smaller currents. In this way the relay can paint each painting as a switch (turning things on and off) or as an amplifier (converting small currents to larger ones).



Fig: 5.4 Relay

Push Lamp Switch

A push button transfer is a type of transfer that turns any normal or electronically operated process or air switch process on or off. Depending on the model they may work with the non-latching or latching motion feature.



Fig: 5.5 Push Lamp Switch

Controlling Cable

Control cables are multi-conductor cables used in automation and materials packages. Control cables can automatically measure and correct the transmission. The control cables are rated regularly wool. The control wires are usually lined with a foil guard, braid shell or a mixture of the two.



Fig: 5.6 Controlling Cable

Proximity Sensor

Proximity sensor is a kind of input material. It is a sensor capable of stumbling in the presence of nearby items without any physical contact. A proximity sensor often emits an electromagnetic chain or beam of electromagnetic radiation (infrared, for example) and detects signs of field change or reversal.



Fig: 5.7 Proximity Sensor

Magnetic Sensor

The definition of a magnetic sensor is a sensor that is used to observe changes in magnetic fields, such as electricity, path, and current, as well as disturbances. These sensor are divided into entities.



Fig: 5.8 Magnetic Sensor

Capacitive Sensor

A capacitive sensor is a proximity sensor that detects proximity by items through their effects in the electrical field created by the sensor. Capacitive sensors have some similarities with radar in their ability to detect conductive substances when viewed through insulators in combination with wood or plastic.



Fig: 5.9 Capacitive Sensor

Level Sensor

Level sensors detect concentrations of liquids and other liquids and liquids, including slurries, granules, and powders that appear on the floor at higher loose levels. Substances that move with the flow appear largely due to gravity in their packing containers (or other physical constraints) as horizontal when most bulk solids pile up in the direction of reaching a peak. The substance to be measured may be the interior of a field or in its medicinal form (e.g., a river or lake). Phase measurements can be two consecutive or factor values. Uninterrupted stage sensors measure size within a unique variety and determine the exact amount of matter in a positive space, even factor- degree sensors effectively indicate whether the substance is above or below the sensitive factor, usually following subsequent ranges that are too high or too low.



Fig: 5.10 Level Sensor

Thermocouple

A thermoelectric device for measuring temperature, which consists of various metal wires related to the dots, has a voltage between two percent of the temperature difference.



Fig: 5.11 Thermocouple

Inverter

An inverter convert (DC) to alternating present day (AC). The input voltage, output voltage and frequency, and usual energy coping with depend upon the design of the precise tool or circuit. Electronic signal inverter, an electronic device or circuitry that converts direct current (DC) to alternating current (AC). The resulting AC frequency depends on the particular device employed. Inverters work against "converters" that were large electronic devices that originally converted AC to DC. Input voltage, output voltage and frequency and overall power handling depends on the design of the specific device or circuitry. The inverter produces no power; Power is supplied by DC source. A power inverter can be fully electronic or a combination of mechanical effects and electronic circuitry. Static inverters do not use moving parts in the conversion process.



Fig: 5.12 Inverter

Fuse

A fuse is an electrical protection device that overrates to provide current protection to an electrical circuit. Fuses have been used as necessary safety devices since the first days of electrical engineering. Today there are thousands of different fuse designs that have specific current and voltage ratings, braking capacity and response time depending on the application.

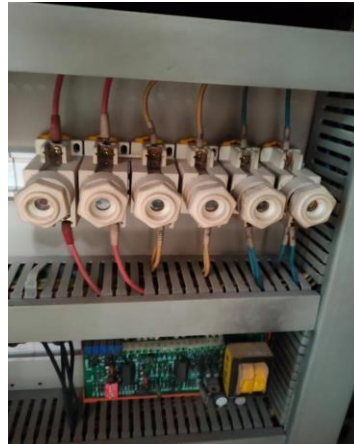


Fig: 5.13 Fuse

5.3 Introduction to Programmable Logic Controller (PLC)

Programmable Logic Controller (PLC) is an industrial PC control gadget that continuously monitors the countries of the input device and makes choices based on a custom application to manage the countries of the output device. It is designed for multiple input and output formats, increased temperature range, resistance to electrical noise and resistance to vibration and impact. Almost any manufacturing process can significantly beautify the use of this type of management system; the biggest advantage of using PLC is the possibility of changing and copying the operation or method during the collection and communication of the required statistics.



Fig: 5.14 PLC

5.4 History of PLC

The first programmable logic controllers were designed and developed by Modicum as a relay replacement for GM and Landis. The number one purpose for designing this type of device was to get rid of the large fees of car manufacturers in the original United States who were concerned about replacing the manipulative structures of complex relay-based systems. These controllers eliminate the need for each new configuration of the logic, including re-additions and additional hardware. The first PLC, Model 084, was invented in 1969 with the help of Dick Morley.

The first industrial success was added to PLC, 184, 1973, and was transformed into design with the help of Michelle Greenberg. Communication capabilities began to be demonstrated around 1973. This was the first such machine to be turned into Modicum's Mudbugs. The PLC should now talk to other PLCs and they may be a little away from the actual machine they are controlling.

5.5 What is inside a PLC

PLC, being a fully microprocessor based device, has a similar internal structure to many embedded controllers and computer systems.

These include CPU, memory and I / O equipment. These components are essential to the PLC controller. Additionally, there is a connection for the PLC's programming and monitoring unit or for establishing the PLC's connection in another area.

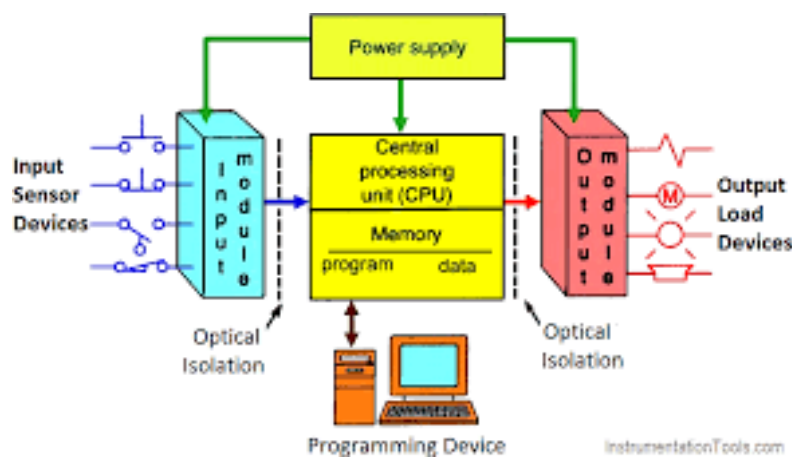


Fig: 5.15 Major Component of PLC

CPU is the idea of PLC device. These include microprocessors, integrated circuits in memory, and circuits needed to maintain and retrieve data from memory. PLC or programming terminals. The function of the processor is to display the popularity of the screen or the country of the input gadget, to test and remedy the best judgment of a person's utility, and to drive the output devices in or outside the United States. RAM or random-access memory is an unstable memory that can lose its statistics if electricity is removed; so some processor devices are equipped with battery backup. Typically CMOS (complementary metal oxide semiconductor) type RAM is used. Rom is a memory less form. In this way it buys its figures even when no power is available. This size of memorable data can be most effective It is placed for internal use and operation of processor units EEPROME or electronically readable program read-only memory is usually an upload to the memorable module which is used to back up the initial software in the processor's CMOS RAM. In many cases, the processor can be programmed to load EEPROM'S software into RAM, if RAM is lost or damaged.

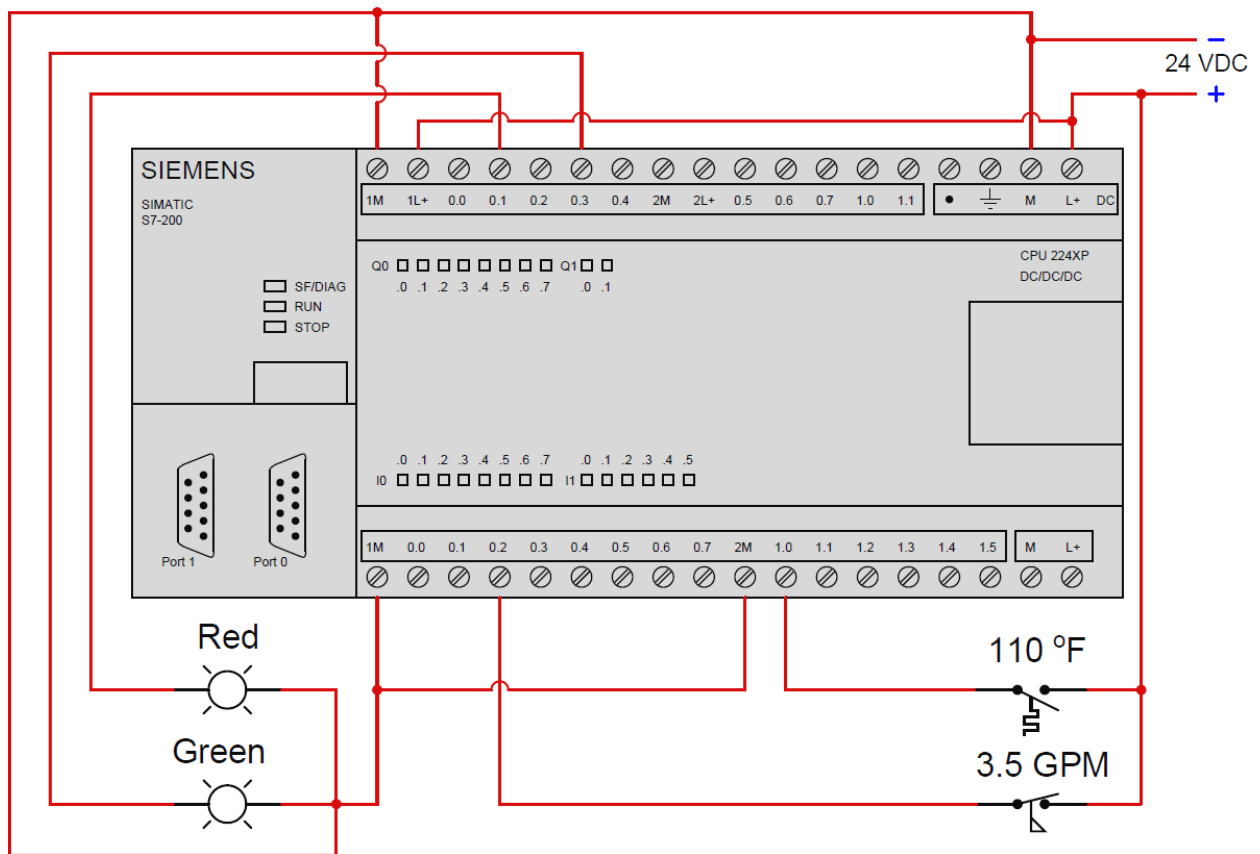
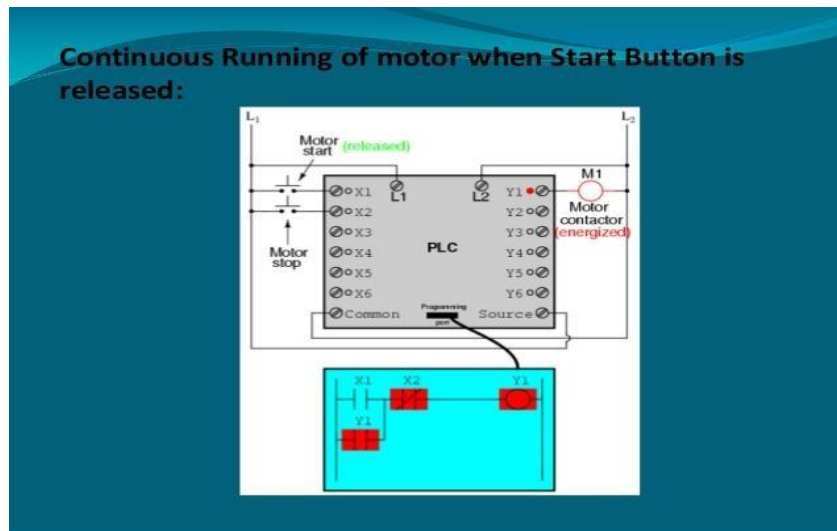


Fig: 5.16 Block Diagram of PLC

5.6 Programming for Star\Stop of Motor by PLC

Often, we have a little green “start” button to turn on a motor, and we want to turn it off with a big red “Stop” button. The pushbutton switch attached to the X1 entry acts as a "start" transfer, while the attached switch acts as a "stop" to enter the X2. Another touch in the application called Y1 uses the output coil reputation as a seal-in touch at once, so that the motor contact will continue to be driven after the "start" pushbutton transfer is released. If you see a colour block appear on the normally-closed Touch X2 it shows that it is in a closed ("electrically performing") country.



Starting of Motor

If we keep pressing the "Start" button, X1 will encourage us to enter, so touch the "final" TX1 in the application, send "power" to the Y1 "coil," strengthen the Y1 output and apply AC power of 120 volts Will be the original motor communication coil. The parallel Y1 Touch can be even "closer", due to an excited "circuit" latching.

Stop of Motor

To stop the motor we need to press the "Stop" pushbutton for the moment, if you want to strengthen the X2 input and stop the continuity of the "off" communication, the "Y1" coil: when the "Stop" pushbutton is turned on, the input X2 is out The motor will return the "Touch" X2 to its "regular""off" nation, however, will not restart until the "Start" push button is effective, because the "Seal in" Y1 is lost.

CHAPTER 6

Conclusion

6.1 Conclusion:

The maintenance department of Apex Footwear Limited has many modern industrial types of equipment and experienced graduate engineers. Plant properly with experienced engineers and staff, so that I can gain more experience for my professional life. Apex is a very good organization as the best ranked world in Bangladesh, so it is a great opportunity for me to work with Apex Footwear Limited.

During my tenure at Apex Footwear Ltd. I have done practical work of machine control through the Project Implementation and Maintenance Division, several maintenance engineering departments. I am able to specialize in controlling automation during the day, which is very important in my professional life. During my career I have learned and observed operations and other development maintenance work that will help me build my career in any type of machine maintenance in the industry.

6.2 Recommendation :

Apex Footwear Ltd. Manufacturing and production is fully well equipped. All of which have a low number of problems with the machinery is properly monitored, I found my work time.

The equipment and tests found some problems in different parts of the lab and made this problem and problem analysis fundamental. I have tried to make some recommendations.

Many types of sensors like relay controlling, PLC controlling, DOL, Star Delta Starter, Proximity Sensor, Magnetic Sensor, Level Sensor, Photo Sensor Wit Scale etc.

References

The following is the reference list for any further information.

1. Apex Footwear Ltd. Company Profile
2. WWW.wikipedia.com
3. <http://WWW.insulatorsindia.com/>
4. <http://WWW.hindusthanurban.com/>
5. WWW.Google.com
6. WWW.instrumentationtools.com
7. WWW.plcdev.com/
8. WWW.Sciencedirect.com