



Daffodil International University

Dhaka, Bangladesh

**Thesis Report
On
Study on Industrial Automaton
AT
Walton Hi-Tech Industries Ltd.**

This thesis has been submitted to the Department of Electrical and Electronic Engineering in partial fulfillment of the requirement for the degree of Bachelor of Science in Electrical and Electronic Engineering.

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APPROVAL LETTER

This thesis report titled “**Study On Industrial Automation** ”, submitted by Md. Parvez Mosharaf ID:163-33-336, of the Department of Electrical & Electronic Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on January, 2020.

Board of Examiners:

DECLARATION

We hereby claim that this thesis is based totally on the end result observed via ourselves. The materials of work discovered through different researchers are stated with the aid of reference. This thesis is submitted to Daffodil International University for partial success of the requirement of the degree of B.Sc. In Electrical and Electronics Engineering. This thesis neither in complete nor in component has been previously submitted for any degree.

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ABSTRACT

This task gives the idea of using Programmable Logic controller PLC in Industrial Automation using PLC is a top aspect a virtual pc used for automation of everyday business electro-mechanical methods which include manipulate of system on manufacturing facility meeting line. an industries mostly pneumatic valves are used. These valves operate using air pressure, to supply this air pressure we need a compressor. Usually due to the large volume of air needed most of the industries use screw compressor which operate on a relay bases system. The relay-based system has a lot of disadvantages like complex circuitry design, difficult troubleshooting, and since relay is a mechanical device, It takes some delay to switch from off state to on state. Using PLC, we can eliminate these disadvantages and the major advantage of using a PLC is that, it can be monitored using SCADA on a computer

To accomplish this system motor, load cell, Photo-sensors, proximity Sensor, Safety Relay, Magnetic Contactor, Limit Switch, Push Lamp Switch, Normally Open Switch, Normally close switch, Solenoid Coil , Circuit Breaker, PLC , HMI, IPC, Input Output Unit, Emergency Stop Switch, SSR, Thermocouple, Rotary Encoder, Servo Motor , Servo Amplifier , Inverter are used.

CHAPTER 1

Introduction

1.1 Background of the Study:

The electronics corporation includes a huge variety of numerous manufacturing strategies and products. The maximum seen products of the electronics industry are purchaser gadgets consisting of Refrigerators, Compressor, Air Condition, tv units, track duplicate systems, and laptop systems. These seen merchandises represent a tip of the iceberg situation as a large part of the electronics enterprise agency is involved with the manufacture of the component components of merchandise. The manufacture of switches, published circuit boards, semiconductor gadgets and the assembly of complex computer structures are all factors of the electronics enterprise agency. The reality that every of those sports can also usually be finished with the useful resource of way of high-quality companies indicates that there are few commonplace factors throughout the electronics enterprise's factor groups. A digital product (besides for its packaging or casing), whether or now not it's a smooth transistor radio or a complex supercomputer, consists of primary elements - the digital components (transistors, resistors, and so on.) and the interconnections the numerous components. The electronics manufacturing industry is often involved with interconnection generation - the techniques of electrically becoming a member of the inputs and outputs of virtual components to shape walking circuits. Even the organizations which manufacture the real digital additives have to provide techniques of connecting them to exclusive gadgets. This e-book is normally worried with the

Production elements of the electronics organization. In well-known facts of the principle of electronics is not vital for many production techniques used for the manufacture of digital products. The simplest exceptions to this are at the same time as a tool's standard overall performance is sensitive to production-associated parameters. This chapter is worried with the international additives of the electronics corporation. A historic attitude is used to show the impact of all of sudden changing technological development on the corporation. The developing desires imposed via the marketplace for virtual merchandise are examined with

recognize to its impact on the electronics production organization. In order to understand the differing requirements and the following compromises which need to be reached for a regular product, the departmental form and the interplay amongst departments are cited for an everyday manufacturing organization. The capabilities of excellent guarantee and check engineering are so intimately entwined with nearly each different characteristic that they can't be considered in isolation. An evaluate of the fine and take a look at abilities and their interactions with different sports is given. The real outstanding and test sports activities are defined alongside the descriptions of the man or woman manufacturing strategies wherein suitable.

1.2 Objective of the Study

The main objective of the study is to access the academic knowledge in every part of my job and internship and to know the Industrial Automation

The main Objectives of the Study are:

01. DOL Starter to Start Load
02. Star Delta Starter with Controlling
03. Relay Controlling
04. How to Work Solenoid Coil
05. How to Work Inverter, Advance Inverter, VFD?
06. Control Motor Speed Using Inverter
07. Operation HMI
08. Operation PLC.
09. Input Output Module.

1.3 Limitations

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

1. I cannot acquire all the information of the Walton Hi-Tech Industries Ltd. because of the company internal rule.
2. I haven't any permission to get photos of all equipment

CHAPTER 2

Company Profile

2.1 Introduction

The company name is “Walton Hi-Tech Industries Ltd” and it is an Electronics and Home Appliance manufacturing company. “Walton Hi-Tech Industries Ltd” is the First largest Electronics and Home appliance manufacturing company in Bangladesh. By developing and support to local demand Walton entering to export their product in international market and give opportunity to many Engineers, Technician and workers in our country.

2.2 History of Walton Hi-Tech Industries Ltd.

Walton is the latest multinational Company electric, Electronics, motors and other appliances logo with one of the biggest properly prepared R & D facilities within the global carried out its manufacturing thru one of a kind subsidiaries below the banner of Walton group headquarters in Bangladesh. Walton had entered into electronics business in 1977 with manufacturing of electrical and electronic objects and step by step extended its operation in many different electronics areas that offer the basis for nearly each component of current lifestyles. The key mystery at the back of the achievement of Walton lays its variation of manufacturing potential and custom designed orientation of new product as in line with the call for of patron. World elegance machineries like Thermoforming, Channel Extrusion, ABS/HIPS Sheet Extrusion, Magnetic Strip Extrusion, PP Hollow Sheet Extrusion, CNC, VMC,

five axis VMC, Ultrasonic Welding, Injection Molding, Styrofoam Making, Hi Speed Power Press, Fin Press, Corrugation, SMT select and vicinity, SPG printing gadget, AOI machine, Tamura wave

solder device, Auto insertion gadget are getting used for the manufacturing of extraordinary merchandise of Walton.

2.3 Achievements of Walton Hi-Tech Industries Ltd.

Walton has done many international & country wide awards and recognitions like a few contemporary prestigious and great commercial enterprise employer awards are: The Golden Globe Tiger Award 2015 in the elegance of Excellence & Leadership Brand, DHL-Daily Star Bangladesh fifteenth Business Award 2014 for Best Enterprise in Bangladesh, Asia Best Employer Brand Awards in 2015, Six instances 1st Prize for Highest VAT Payer at DITF-2015, 2014, 2013, 2012, 2011 & 2010 respectively, Second Prize for Premier Pavilion Category at DITF-2015, Best Refrigerator Brand Award-2014, Best Television Brand Award-2014, Best Local Brand Award-2014, 1st Prize for Premier Pavilion Category at DITF-2014, The Global Brand excellence Award in 2014 for brand excellence in consumer electronics, 1st Prize for Premier Pavilion Category at DITF-2013, Best Sponsor Award-2012, Creative Media Ltd. BABISAS Award-2012, Best Brand (Refrigerator) Award-2011, 2d Prize for Premier Pavilion Category at DITF-2011, 2d Prize for Premier Pavilion Category at DITF-2010, 1st Prize for Premier Pavilion Category at DITF-2009, 1st Prize for Premier Pavilion Category at CITF-2005.

2.4 Clients and Products

Walton has earned domestic and worldwide recognition for its reveal in and confirmed song record in a ramification of electronics fields. Walton is the pioneer of growing kingdom of the artwork designs and cutting-edge technology having main marketplace proportion specializing in Multi-Stored Refrigerators, Freezers, Air Conditioners, LED/ LCD televisions, Compressor, Smart Phones and Home Appliances. WALTON has set up a milestone as the highest exporting Bangladesh

employer in the subject of electronics, with a accepted presence in over 20 countries and via 2020 the presence of Walton may be ensured almost every country within the global.

2.5 Quality Assurance and Work Place Environment

Walton has been preserving 100% compliances considering that its inception and licensed ISO

14001:2015 Refrigerators & Air Conditioner Division, ISO 9001:2015 Refrigerators & Air Conditioner Division and OHSAS 18001:2007 Certificate for effectively adopting sound occupational fitness and protection management systems, efficient workforce control, minimizing the risk of injuries and reaching ok corporate recognition making sure the preferred of products and combining the above to decrease the manufacturing price. Our strategic philanthropy and company social duty (CSR) efforts are aligned to our key groups and consciousness mainly on sports and lifestyle, era and the surroundings with a selected emphasis on innovation in every of those regions. As a international chief inside the purchaser electronics industries, Walton is absolutely dedicated to responsible corporate citizenship and environmental stewardship thru its merchandise, its programs, its practices and its people.

2.6 Company Information:

The company basic information are given below,

1	Location (Headquarters)	Chandra, Kaliakir, Gazipur. Near at “Nandon Park’
2	Address (Corporate Office)	Plot-1088, Block-I, Sabrina Sobhan Road P.O-Khilkhet, P.S-Vatara,Bashundhara R/A, Dhaka-1229.
3	Nearest Port of Loading	Chittagong
4	Distance to Port	292 Kilometer
5	Tel NO.	008809606-555555
6	Email	hq@waltonbd
7	Legal status	Private Company
8	Year of Foundation	1977
9	Year of Foundation	ISO 9001:2015, OHSAS 18001:2007

2.7 Daily Average Production Capacity

Walton Hi-Tech Industries Ltd. According to their calculation the produce 15 type of productuct with minimum 1000 different models.

The daily production Capacity of Walton

Name	Production Unit	Capacity
Refrigerator	6	8000 pcs
Television	3	3000 pcs
Air Conditioner	2	600 pcs
Compressor	4	2500 pcs
Mobile Phone	2	1200 pcs
Computer Monitor	1	500 pcs
Laptop	1	300 pcs
Elevator	1	10 pcs
Battery	2	1000 pcs
Fan	2	2000 pcs
Gas Stoves	2	2000 pcs
Switch Socket	3	50000 pcs

Safety Precautions:2.8

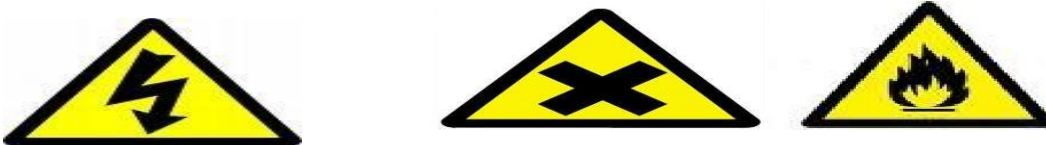
In order to avoid the hazards on the plant, company train their employees for the Safe handling and operation of materials and units installed on plant. So for this company follow following steps:

01. Give Knowledge
02. Give Training
03. Trouble Shooting
04. Smoking is strongly prohibited on all areas of the plant.
05. Leakages may occur and so serious damage can occur

Even a small mistake on the plant can cause a serious damage so MMM (Nab, Machine, Material) Is very Important

Different Safety Signs:2.9.

Safety signs are used for indication of the chance worried at the same time as carrying out the positive movement. They are very beneficial in for the concern as they deliver clear guideline approximately the hazard that one ought to face at the web site in which they are erected. Some unique protection symptoms are:



In safety there is a rule of triple **M**.

- Man safety
- Machine safety
- Material safety

Man safety:2.9.1

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. Also, no need of cellular

Machine safety: 2.9.2

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.

Material safety: 2.9.3

The protection of fabric is also vital. The aspect like sand is safe in keeping with its manner of protection. Other things like PTA, MEG are keep in keeping with its situations

Power Distribution:2.10

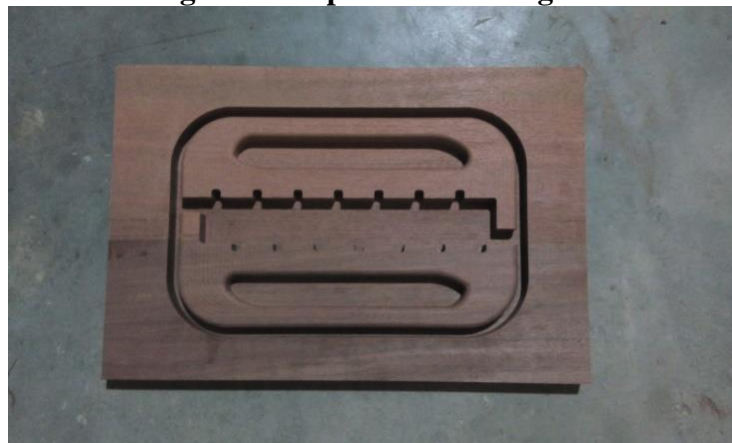
The feeder lines are fed to the panels placed there which are related to each brilliant with bus couplers alongside VCB breakers. From there, these lines are fed to Substation wherein the voltage is Step down from 11KVA to 400V. The strains from the transformers are fed to LVD Room in the shape of bus wires. The bus wires are fed to the panels in LVD Room in which the panels are connected in the shape of Ring Main System together with Power Factor Control and ACCB Breakers for protection purpose. From there, the energy is provided in addition as in step with requirement

Chapter-3

3.1 Practical Works sample Picture:



Fig: 3.1- Evaporator Bending die



**Fig: 3.2- Evaporator/Condenser
Tapping
Gauge**

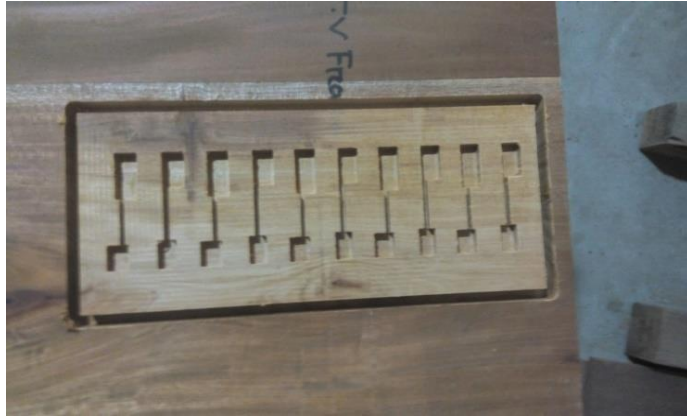


Fig: 3.3- Switch Socket Fixture



Fig: 3.3- Remote Jig

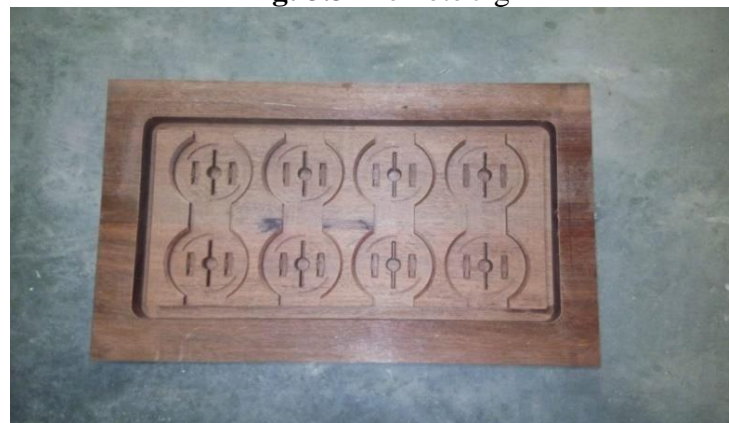


Fig: 3.4- Switch Socket Fixture



Fig: 3.5- Foundry Pattern



Fig: 3.6- Styrofoam dummy design



Fig: 3.7- Sign Making



Fig: 3.8- Frizz Production Unit

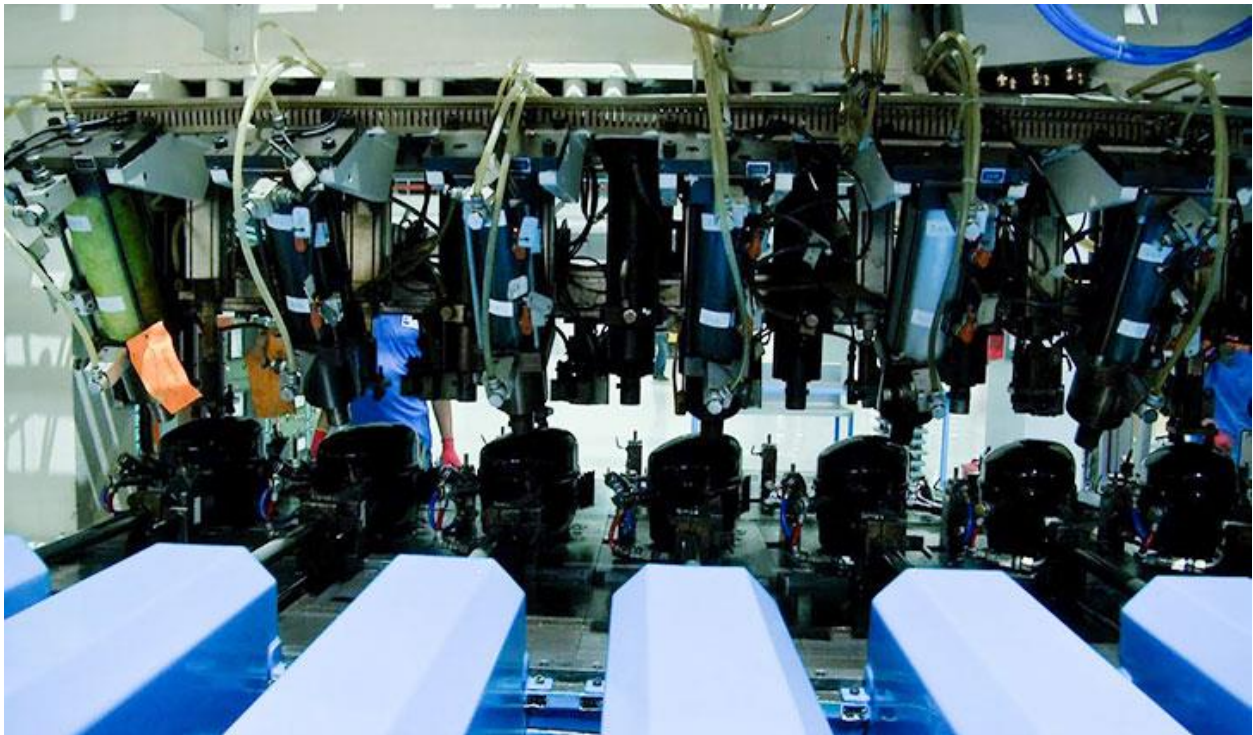


Fig: 3.9- Compressor Production Unit



Fig: 3.10- EPS SHEP MOLD

CHAPTER: 4

Automation:4.1

Automation or commercial automation is using control systems consisting of computer systems, controllers to control commercial machinery and strategies, to optimize productivity within the production of goods and delivery of offerings.



Fig:4.1- Automatic Control Machine

Automation is a step beyond mechanization. Whereas mechanization gives human operators with machinery to help them with the muscular requirements of work, automation substantially decreases the want for human sensory and mental necessities

Automation Impacts:4.2

It increases productiveness and decrease fee. It gives emphasis on flexibility and convertibility of producing manner. Hence gives producers the capacity to without difficulty switch from production Product A to manufacturing product B without absolutely rebuilt the existing system/product lines. Automation is now regularly applied frequently to boom pleasant inside the production procedure, where automation can increase excellent notably. Increased consistency of output.

Replacing humans in tasks carried out in risky environments.



Fig: 4.2- PLC Control Board

4.2.1 Component of Industrial Automation:

The name of component of automation:

- 01. Magnetic Contactor**
- 02/ HMI**
- 03. Relay**
- 04. Push lamp Switch**
- 05. Controlling Cable**
- 06. Proximity Sensor**
- 07. Magnetic Sensor**
- 08. Capacitive sensor**
- 09. Level Sensor**
- 10. Thermocouple**
- 11. Inverter**
- 12. Pressure Sensor**
- 13. Servo Motor**
- 14. Servo Drive**
- 15. MCCB**
- 16. MCB**
- 17. Heater**
- 18. Power Supply**
- 19. Solenoid Coil**
- 20. Programmable Logic Controller (PLC)**
- 21. Induction Motor**
- 22. Stepper Motor**
- 23. Motion Sensor**
- 24. Temperature Controller**

Magnetic Contactor: Magnetic Contactor Is One Kind Of switch. Is used 3 Phase High Voltage Operation. Magnetic contactors are a form of electrical relay discovered on maximum electrically powered motors. ... They are removable from a motor so that an operator may match with that motor; disassemble or keep it, with out the opportunity of stay modern nevertheless passing thru the device



Fig:4.3 – Magnetic Contactor

Human Machine Interface (HMI): HMI Is Interface of Machine and Human. Also called an HMI. An HMI is a software application that affords information to an operator or consumer approximately the country of a manner, and to simply accept and put into effect the operators control commands. Typically, statistics is displayed in a image format (Graphical User Interface or GUI)



Fig:4.4 – Human Machine Interface (HMI)

Relay: A relay is an electromagnetic switch operated with the aid of using a pretty small electric powered modern-day-day that might spark off or off a miles large electric powered cutting-edge-day. The coronary heart of a relay is an electromagnet (a coil of cord that becomes a temporary magnet while energy flows through it). You can take into account a relay as a type of electric powered lever: transfer it on with a tiny present day and it switches on ("leverages") each other system using a far larger contemporary. Why is that beneficial? As the call indicates, many sensors are highly touchy portions of digital tool and convey only small electric currents. But regularly we need them to power bigger portions of system that use large currents. Relays bridge the distance, making it possible for small currents to spark off large ones. That way relays can paintings each as switches (turning things on and stale) or as amplifiers (converting small currents into larger ones).

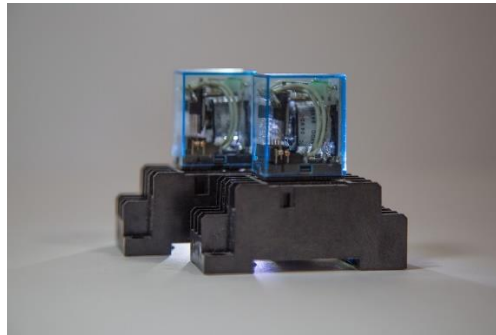


Fig: 4.5 -Relay Contact

Push Lamp Switch: A Push Button transfer is a type of transfer which consists of a simple electric powered mechanism or air switch mechanism to turn something on or off. Depending on model they might function with non-permanent or latching motion feature



Fig: 4.6 Push Lamp Switch

Controlling Cable: Control cables are multi-conductor cables used in automation and instrumentation packages. Control cables can measure and modify transmissions of automated approaches. Control cables are regularly UL rated. Control cables typically are shielded with a foil guard, braid shield or mixture of the two.

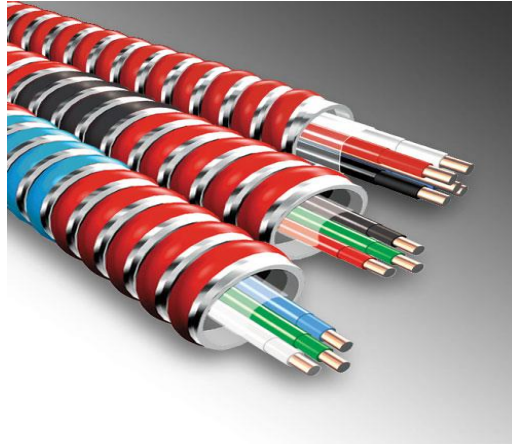


Fig: 4.7 Core Controlling Cable

Proximity Sensor: Proximity Sensor is one kind of input Component. This is a sensor capable of stumble on the presence of nearby items without any physical contact. A proximity sensor frequently emits an electromagnetic discipline or a beam of electromagnetic radiation (infrared, as an instance), and looks for changes in the field or return sign.



Fig:4.8 Proximity Sensor

Magnetic Sensor: Magnetic sensor definition is a sensor that is used to observe disturbances as well as changes inside a magnetic area such as electricity, path, and flux. These sensors are separated into organizations.



Fig: 4.9 Magnetic Sensor

Capacitive Sensor: A capacitive sensor is a proximity sensor that detects close by items by means of their impact on the electrical field created via the sensor. ... Capacitive sensors have some similarities to radar of their capability to detect conductive substances, while seeing through insulating substances together with wooden or plastic.



Fig: 4.10 Capacitive sensor

Level Sensor: Level sensors detect the extent of liquids and other fluids and fluidized solids, which include slurries, granular substances, and powders that exhibit an higher loose floor. Substances that go with the flow emerge as basically horizontal of their packing containers (or other bodily limitations) due to gravity while maximum bulk solids pile at an perspective of repose to a peak. The substance to be measured can be inner a field or may be in its herbal shape (e.G., a river or a lake). The stage measurement can be both continuous or factor values. Continuous stage sensors measure stage inside a unique variety and decide the precise quantity of substance in a positive place, even as factor-degree sensors most effective indicate whether

the substance is above or underneath the sensing factor. Generally, the latter come across ranges which are excessively high or low.



Fig:4.11 Level Sensor

Thermocouple: A thermoelectric device for measuring temperature, which includes wires of various metals related at points, a voltage being advanced between the two junctions in percentage to the temperature distinction



Fig: 4.12 Thermocouple

Inverter: A 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 circuitry



Fig: 4.13 Inverter

4.3: Introduction to Programmable Logic Controller (PLC)

A PROGRAMMABLE LOGIC CONTROLLER (PLC) is an industrial pc control gadget that continuously monitors the country of input devices and make choices based upon a custom application to govern the nation of output devices.

It is designed for more than one inputs and output arrangements, extended temperature ranges, immunity to electric noise, and resistance to vibration and effect.

Almost any production procedure can significantly beautify the usage of this type of manage system, the biggest advantage in the use of a PLC is the potential to change and replicate the operation or method whilst gathering and communicating essential statistics.

Another advantage of a PLC is that it is modular. I.E. You could blend and in shape the forms of input and output gadgets to exceptional healthy your utility.



Fig: 4.14- PLC

History of PLC's:4.4

The first Programmable Logic Controllers had been designed and advanced through Modicon as a relay replacer for GM and Landis.

The number one purpose for designing this sort of device was getting rid of the big fee worried in replacing the complicated relay-primarily based system manipulate structures for main U.S. Car producers.

These controllers removed the need of rewiring and including additional hardware for each new configuration of logic. The first PLC, model 084, was invented with the aid of Dick Morley in 1969.

The first industrial a success PLC, the 184, become added in 1973 and turned into designed with the aid of Michel Greenberg. Communications abilities started out to appear in about 1973. The first such machine turned into Modicum's Modbus. The PLC ought to now talk to other PLCs and that they can be some distance far away from the real machine they have been controlling.

What is inside a PLC: 4.5

The PLC, being a microprocessor based totally device, has a similar inner structure to many embedded controllers and computer systems.

They include the CPU, Memory an I/O tool. These components are indispensable to the PLC controller. Additionally, the PLC has a connection for the programming and Monitoring Unit or to connect PLC's in other area.

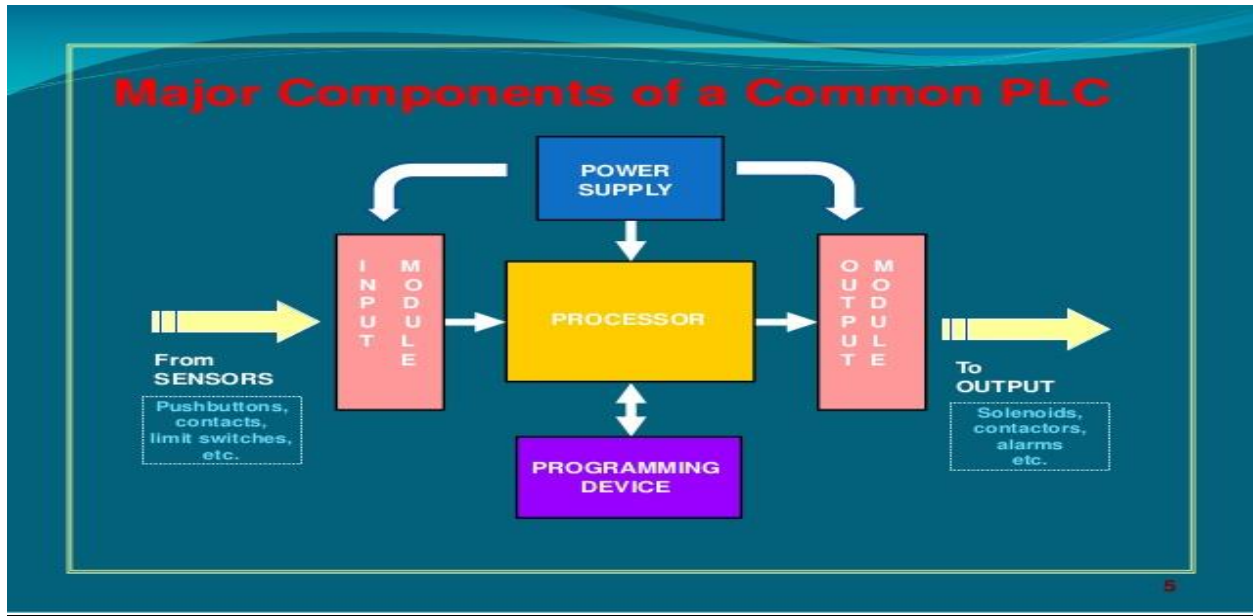


Fig: 4.15- Major Component Of PLC

The CPU is the thoughts of a PLC device. It includes the microprocessor, reminiscence integrated circuits, and circuits essential to maintain and retrieve statistics from memory.

PLC's or programming terminals. The job of the processor is to display screen popularity or country of input gadgets, test and remedy the best judgment of a person utility, and manipulate on or off united states of America of output devices.

RAM or Random-Access Memory is a volatile memory that might lose its statistics if electricity have been removed, therefore some processor devices are furnished with battery backup. Normally CMOS (Complementary Metal Oxide Semiconductor) type RAM is used. ROM is a nonvolatile form of memory. This manner it shops its statistics even though no strength is available. This shape of reminiscence information can most effective be have a look at, it is placed there for the inner use and operation of processor units.

EEPROME or Electrically Erasable Programmable Read Only Memory is generally an upload on reminiscence module that is used to back up the primary software in CMOS RAM of the processor. In many instances, the processor may be programmed to load the EEPROM'S software to RAM, if RAM is lost or corrupted.

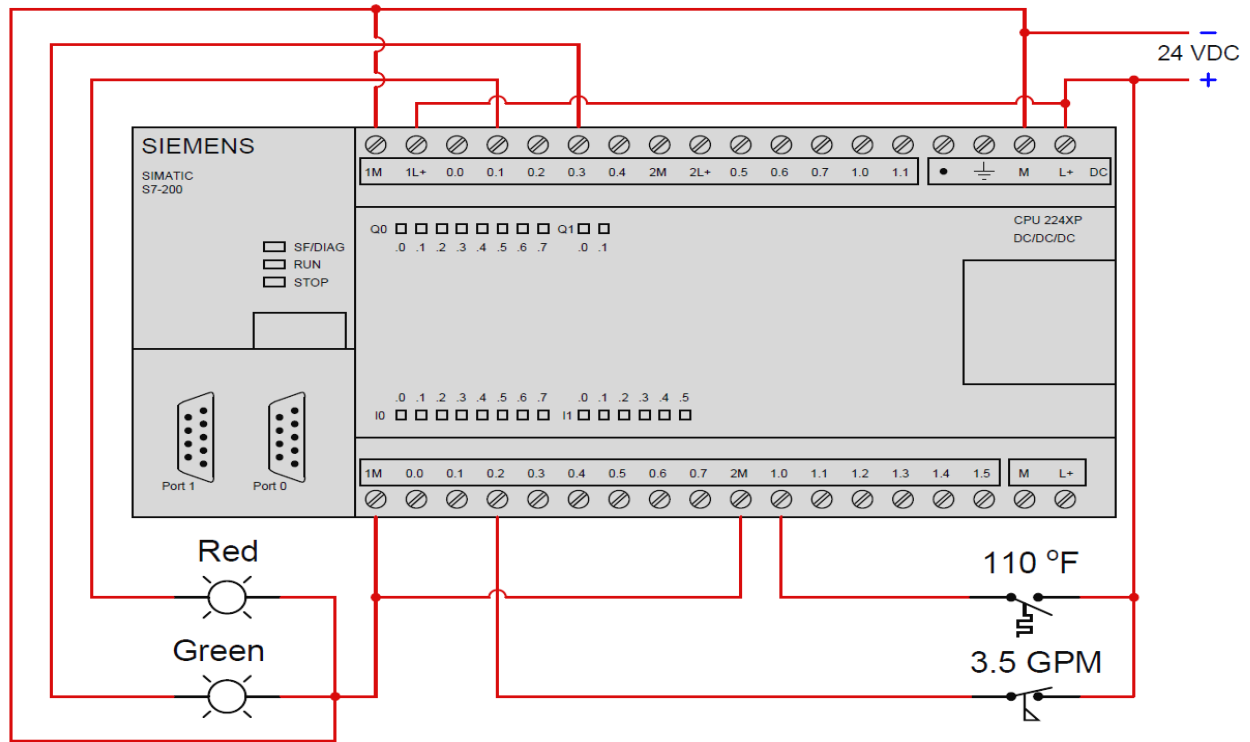


Fig: 4.16-Block Diagram of PLC

INPUT OUTPUT MODULE:4.6

Input Module:

Input modules interface directly to devices which include switches and temperature sensors. Input modules convert many one of a kind styles of electric indicators consisting of 120VAC, 24VDC, or four-20mA, to signals which the controller can recognize. Since all electrical systems are inherently noisy, electric isolation is provided among input and processor. The component most customarily used for this reason is opt coupler. Input signal from the sector gadgets are commonly 4 to 20 ma or 0-10 V.



Fig: 4.17- Input Module

OUTPUT MODULE:

Output module interface proper now to gadgets such as motor starters and lighting fixtures. Output modules take virtual indicators from the PLC and convert them to electric signs and symptoms along with 24VDC and four mA that area devices can understand. D to A conversion is completed of their modules. Usually Silicon Controlled Rectifier (SCR), triac, or dry touch relays are used for this cause. Normally the output signal is zero-10 V or four-20 mA.



Fig: 4.18- Output Module

4.7: Operation of PLC

PLC Operates through always scanning the program and performing upon the commands, one by one, to interchange on or off the various outputs. In order to try this PLC first scans all, the inputs and stores their states in memory. Then it incorporates out program scan and makes a decision which outputs ought to be high according to the program logic.

Then subsequently it updates those values to the output desk, making the required outputs go high. At his factor PLC tests its very own running system and if the whole thing is good enough, it goes returned to scanning inputs all over again.

PLC SCAN CYCLE

Whenever a program is carried out in a PLC, earlier than changing any output state, the processor scans the input table and the entire software, which gives upward push to states of the output devices in line with this system common sense. These values are then up to date to the output desk making the tool.

SCAN TIME

Time taken by plc to execute these three steps (Checking Input status, Executing Program, Updating Output Status) is denoted by its scan time.



Fig: 4.19- PLC scan Cycle

4.8: Programming Languages used to Program a PLC

While Ladder Logic is the most commonly used PLC programming language, but it is not the only one. Following table lists some of the Languages that are used to program a PLC.

- 01.Ladder Diagram (LD).
- 02.Functional block Diagram (FBD)
- 03.Structured Text (ST)
- 04.Instruction List (IL)
- 05.Sequential Functional Chart (SFC)

4.9: LADDER DIAGRAM

It is a graphical programming language, initially programmed with easy contacts that simulate the opening and closing of relays. Ladder Logic programming has been extended to include capabilities together with Counters, Timers, shift Registers and math operations.



Fig: 4.20- Ladder Diagram

Ladder logic is a technique of drawing electric control schematics. It is now a graphical language very popular for programming Programmable Logic Controllers (PLCs). It was at the beginning invented to describe control systems crafted from relays. The call is based

on the statement that applications on this language resemble ladders, with vertical "rails" and a sequence of horizontal "rungs" among them.

A software in ladder good judgment, also known as a ladder diagram, is much like a schematic for a fixed of relay circuits. An argument that aided the initial adoption of ladder common sense changed into that a extensive form of engineers and technicians might be able to understand and use it without much extra education, due to the resemblance to familiar hardware systems.

(This argument has turn out to be less applicable for the reason that most ladder logic programmers have a software background in extra conventional programming languages, and in exercise implementations of ladder common sense have traits — such as sequential execution and guide for manipulate go with the flow capabilities — that make the analogy to hardware really obscure.)

Ladder common sense is broadly used to program PLCs, in which sequential manage of a system or manufacturing operation is required. Ladder good judgment is beneficial for easy however critical manage structures, or for reworking vintage hardwired relay circuits. As programmable common-sense controllers became greater sophisticated it has also been utilized in very complicated automation systems.

Ladder logic can be notion of usually-primarily based language, instead of a procedural language. A "rung" within the ladder represents a rule. When implemented with relays and different electromechanical devices, the diverse regulations "execute" simultaneously and right away. When implemented in a programmable common-sense controller, the regulations are commonly achieved sequentially through software program, in a loop.

By executing the loop rapid sufficient, typically typically in line with 2d, the impact of simultaneous and on the spot, execution is obtained. In this manner it's far much like different rule-primarily based languages, like spreadsheets or SQL. However, right use of programmable controllers requires know-how the restrictions of the execution order of rungs.

4.10: Example of a simple ladder logic program

The language itself may be seen as a set of connections among logical checkers (relay contacts) and actuators (coils). If a direction may be traced between the left side of the rung and the output, through asserted (proper or "closed") contacts, the rung is true and the output coil storage bit is said (1) or real. If no route may be traced, then the output is fake (0) and the "coil" by using analogy to electromechanical relays is considered "de-energized". The analogy among logical propositions and relay contact repute is due to Claude Shannon.

Ladder logic has "contacts" that "make" or "spoil" "circuits" to govern "coils." Each coil or contact corresponds to the repute of a unmarried bit within the programmable controller's memory. Unlike electromechanical relays, a ladder application can refer any range of times to the status of a unmarried bit, equal to a relay with an indefinitely huge range of contacts.

So-known as "contacts" can also seek advice from inputs to the programmable controller from physical gadgets which includes pushbuttons and limit switches, or may additionally constitute the status of inner storage bits which can be generated somewhere else inside the program.

Each rung of ladder language commonly has one coil on the far proper. Some producers can also permit more than one output coil on a rung.

--()-- a regular coil, true when its rung is true --(\)-- a "not" coil, false when its rung is true

--[]-- A regular contact, true when its coil is true (normally false)

--[\]-- A "not" contact, false when its coil is true (normally true)

The "coil" (output of a rung) may represent a physical output which operates some device connected to the programmable controller, or may represent an internal storage bit for use elsewhere in the program.

Generally Used Instructions & symbol for PLC Programming

Input Instruction

--[]-- This Instruction is Called IXC or Examine If Closed.

If a NO switch is actuated, then best this education will be authentic. If a NC switch is actuated, then this coaching will now not be real and subsequently output will not be generated.

--[]-- This Instruction is Called IXO or Examine If Open.

If a NC transfer is actuated, then most effective this guidance can be authentic. If a NC switch is actuated, then this education will not be real and therefore output will not be generated.

Output Instruction

--()-- This Instruction Shows the States of Output.

I.E.; If any training either XIO or XIC is genuine then output might be excessive. Due to high output a 24-volt sign is generated from PLC processor.

Rung

Rung is a simple line on which instruction are placed and logics are created

TIMER

A timer is a programmable education that shall we you turn on or flip off bits after a preset time.

The two number one sorts of timers are TON for “timer on postpone” and TOF for “timer off delay”.

Timers in RS Logix 5000 use tag names for identification.

COUNTER

A counter is a programmable practise that we could you turn on or turn off bits after a preset depend has been reached.

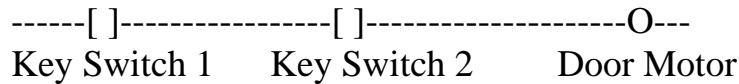
There are one of a kind types of counters available inside the RS Logix, however the CTU (counter up) preparation covers everything we can speak approximately here.

Counters in RS Logix 5000 use tag names for identity.

BIT

An address within the PLC. It can be an input, output or internal coil, among others.

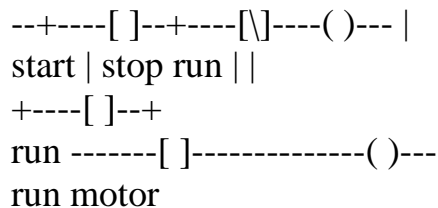
Example-1



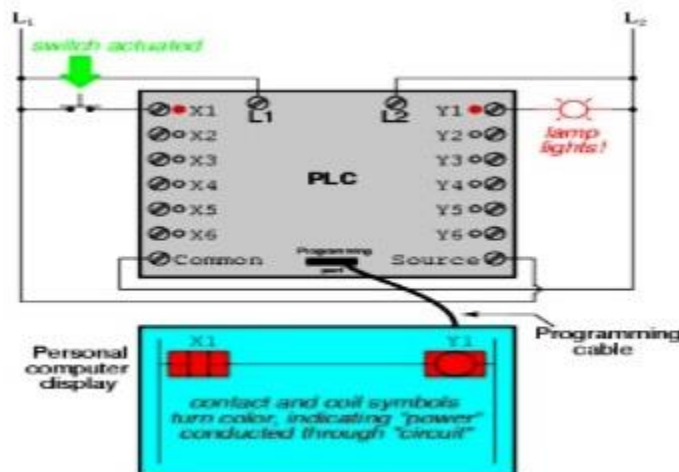
This circuit suggests key switches that security guards might use to set off an electric motor on a bank vault door. When the normally open contacts of both switches near, electricity is able to drift to the motor which opens the door. This is a logical AND.

Example-2

Often, we've got a touch green "start" button to show on a motor, and we need to turn it off with a huge red "Stop" button.



4.11: Lamp Glows when at Input Switch is Actuated



It need to be understood that the X1 touch, Y1 coil, connecting wires, and "strength" acting within the personal laptop's display are all digital. They do now not exist as actual electric powered additives. They exist as commands in laptop software -- a bit of software program application software only -- that really takes area to resemble a actual relay schematic diagram.

Equally essential to apprehend is that the private pc used to reveal and edit the PLC's software isn't always critical for the PLC's persevered operation. Once a software program has been loaded to the PLC from the private laptop, the private computer may be unplugged from the PLC, and the PLC will hold to have a look at the programmed instructions.

It includes the private computer show inside the ones illustrations in your sake most effective, in helping to understand the connection between actual-existence conditions (switch closure and lamp recognition) and this system's repute ("power" thru digital contacts and digital coils).

The proper power and flexibility of a PLC is determined out whilst we want to adjust the conduct of a manipulate machine. Since the PLC is a programmable device, we are able to modify its behavior through converting the instructions we deliver it, on the same time as not having to reconfigure the electric components associated with it. For instance, assume we desired to make this switch-and-lamp circuit characteristic in an inverted fashion: push the button to make the lamp turn off, and launch it to make it switch on.

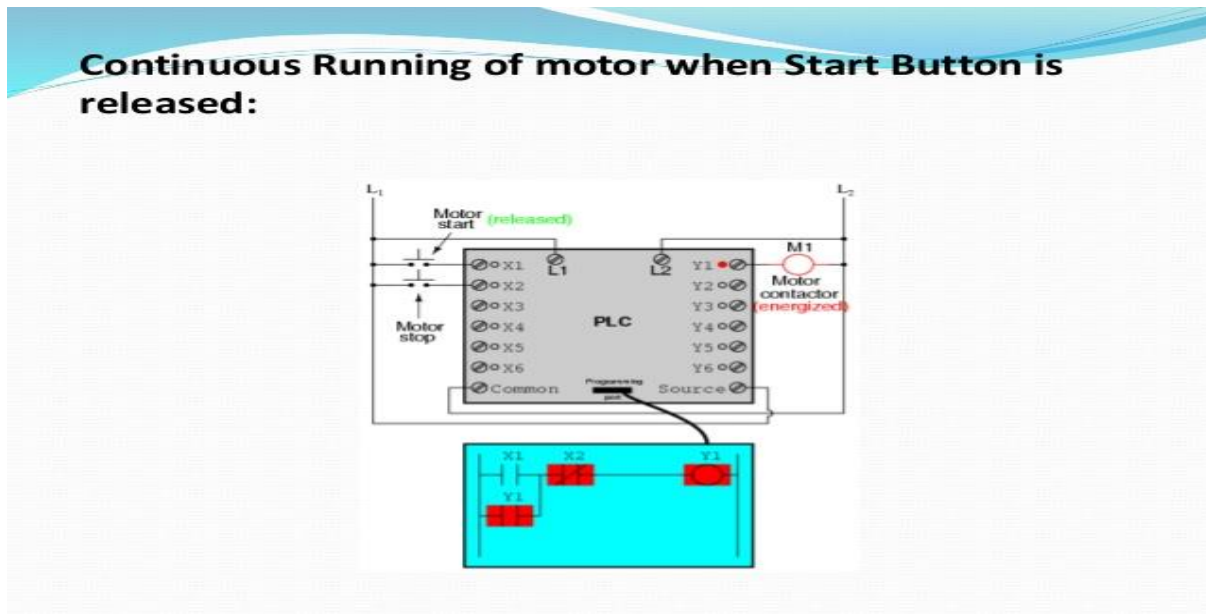
The "hardware" solution may also need to require that a normally-closed pushbutton transfer be substituted for the commonly-open switch currently in area. The "software program" answer is a first-rate deal much less difficult: in reality adjust this gadget clearly so touch X1 is generally-closed in place of typically-open.

4.12: Programming for Start/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.

```

---+----[ ]---+----[\]----( )---
| start | stop run
|| +----[ ]---+
Run
    
```



The pushbutton switch linked to enter X1 serves as the "Start" transfer, whilst the switch connected to enter X2 serves as the "Stop." Another touch within the application, named Y1, makes use of the output coil reputation as a seal-in touch, at once, in order that the motor contactor will continue to be energized after the "Start" pushbutton transfer is released. You can see the generally-closed touch X2 appear in a coloured block, showing that it's far in a closed ("electrically accomplishing") country.

Starting of Motor

If we have been to press the "Start" button, enter X1 would energize, for that reason "ultimate" the X1 touch within the application, sending "energy" to the Y1 "coil," energizing the

Y1 output and applying 120-volt AC power to the actual motor contactor coil. The parallel Y1 touch may even "near," for this reason latching the "circuit" in an energized

To Stop the Motor

To prevent the motor, we ought to momentarily press the "Stop" pushbutton, if you want to energize the X2 input and "open" the normally-closed "contact," breaking continuity to the Y1 "coil:

When the "Stop" pushbutton is launched, input X2 will de-energize, returning "touch" X2 to its regular, "closed" nation. The motor, but, will not begin again till the "Start" pushbutton is actuated, because the "seal-in" of Y1 has been lost.

4.13: PROJECT: Door Simulator Logic on PLC Using Ladder Logic.

Equipment Required:

Logix Pro Software
Personal Computer
PLC Lab Manual

Theory:

PLC operates through always scanning this device and performing upon the instructions, one after the alternative, to replace on or off the various outputs. In order to try this PLC first scans all, the inputs and stores their states in reminiscence. Then it consists of out software check and comes to a choice which outputs ought to be immoderate in line with this system correct judgment.

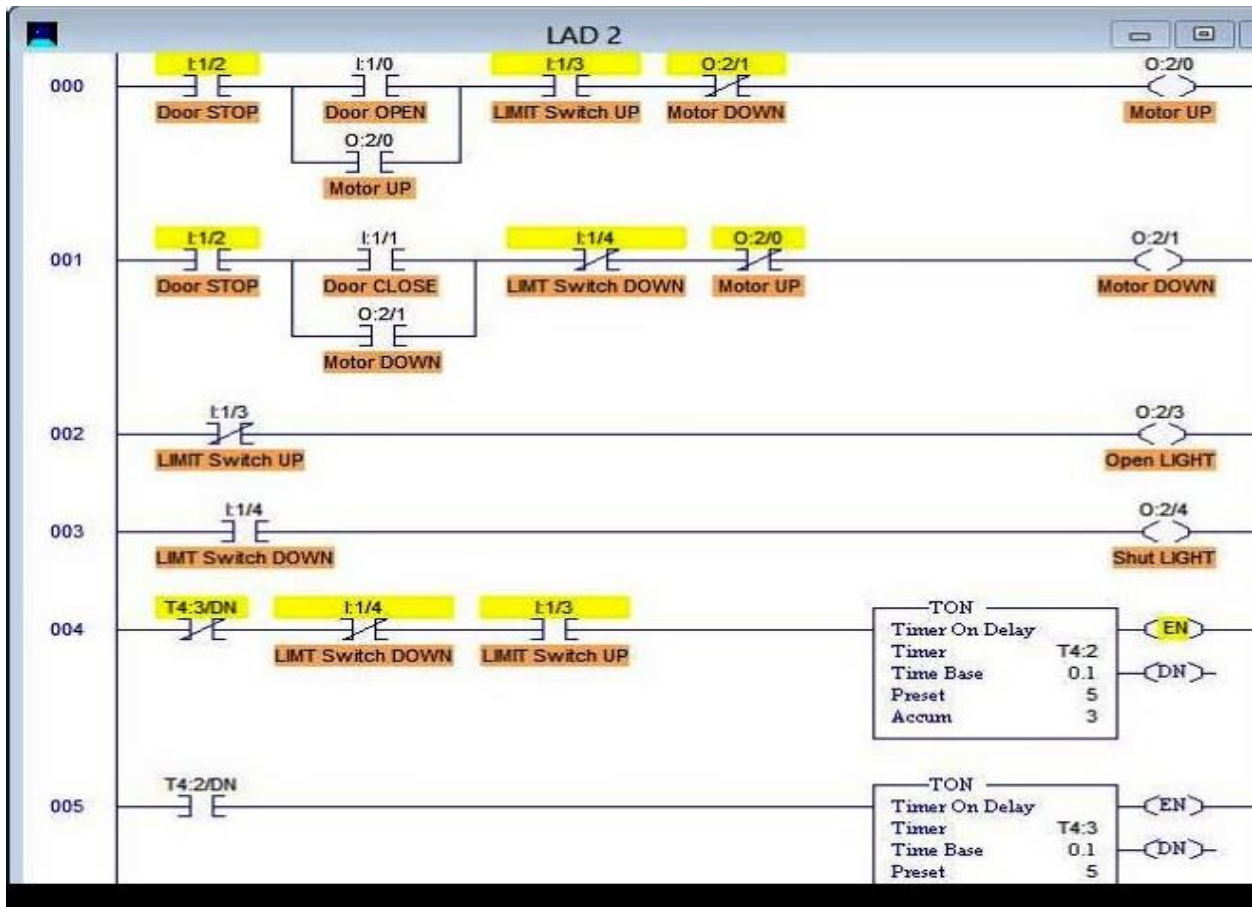
Ladder Logic is a graphical programming language, first of all programmed with smooth contacts that simulates the hollow and final of relays. Ladder Logic programming has been accelerated to consist of capabilities which includes Counters, Timers, shift Registers and math operations.

Ladder not unusual experience is a technique of drawing electric powered not unusual feel schematics. It is now a graphical language very famous for programming Programmable Logic Controllers (PLCs). It have turn out to be at the start invented to give an explanation for not

unusual experience made from relays. The name is based totally on the remark that applications on this language resemble ladders, with vertical "rails" and a chain of horizontal "rungs" amongst them.

Procedure:

- 1) Make a Ladder Logic of working of Door simulator.
- 2) Save the program on Logix Pro Software.
- 3) Simulate the program and check for errors.
- 4) Run the program using run option.
- 5) Program is complete



Result:

The Ladder logic simulated and Run successfully. The Door simulator worked perfectly with the PLC program.

Chapter-5

Conclusion

5.1 Conclusion:

In the Walton Hi-Tech Industries Ltd. Maintenance department have many modern Industrial types of machinery and experienced graduate engineer. The plant is maintained properly with the experienced engineer and employees, so that I can earn more experience here for my professional life. Walton is a top largest Electronics Manufacturing Industries of Bangladesh as well as best ranks in the world, so its great opportunity for me to work with Walton.

At the time of my works in the Walton Hi-tech Industries Ltd. I found there CNC Router machine, VMC, EDM 3 axis & 5 axis VMC, PCB Drilling & Routing machine, Water Jet machine, Injection molding machinery, Sheep Mold, Pre-Expender, Thermo forming, extruder, roll former PU forming and many types of testing lab. I have practical work in automation engineering By working in Project implementation & maintenance section, several Maintenance electronics section and work with experienced Engineer/. I am able to expert about the Controlling Automation day by day, which is very important for my professional life.

During my working the operation and development and other Maintenance work I learned and observed that will help me to build my career in the field of Any Type Machine Maintenance (Electronics) field of industry

5.2 Recommendations

The Walton Hi-tech Industries Ltd. Production and manufacturing is fully well equipped. The machinery is properly observed everything that's why there are the numbers of problems is

less. During my working have found some problems in different parts of the machinery and the testing lab and on basis of this problems and analysis of the problems I have tried to give some recommendation.

1. It may be better if we include Styrofoam, Pre-Expender, injection mold, Block Mold, Machine maintenance (Electronics)
2. Relay Controlling, PLC controlling, DOL, Star Delta Starter, Many Type Sensor As like Proximity Sensor, magnetic sensor, level sensor photo sensor Wight scale Etc.

References

The following is the reference list for any further information:

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- (ii) Several R&D (Refrigerator, TV, Compressor, Mobile) works of Walton Group.
- (iii) www.wikipedia.com
- (iv) <http://www.insulatorsindia.com/>
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- (vii) https://en.wikipedia.org/wiki/Programmable_logic_controller
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