Amirkabir University of Technology
(Tehran Polytechnic)

Industrial control project Report

PLC Based
Automatic Bottle Filling System

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Part 1

Filling is the task that is carried out by a machine and this process is widely used in many industries. In this project, the filling of the bottle is controlled by using a controller known as PLC which is also the heart of the entire system. For the conveyor system, a dc motor has been selected for better performance and ease of operation. A sensor has been used to detect the position of the bottles.

If we want to evaluate this process in a simple manor we will have

1-Bottle Pre-Wash

Bottles are manually inspected to ensure they are in good condition and no contaminants are present. Once inspected, bottles are loaded into the washing and filling line. First step within the line is a warm water interior & exterior pre-wash and sanitize.

2-Bottle Wash

Next, the bottles are rigorously washed on the interior & exterior with food grade detergent.

3-Bottle Sterilization

Bottles are then sterilized inside and out with Hydrogen Peroxide to eliminate any chance of bacterial contamination. Hydrogen Peroxide is very effective at killing any bacteria, and leaves no harmful residue.

4-Bottle Rinse

Purified water with ozone is then used to rinse the bottles before filling.

5-Filling

Bottles are filled under pressure with the required amount of water.

6-Capping

Immediately after filling, a tamper proof cap is pressed on the bottles.

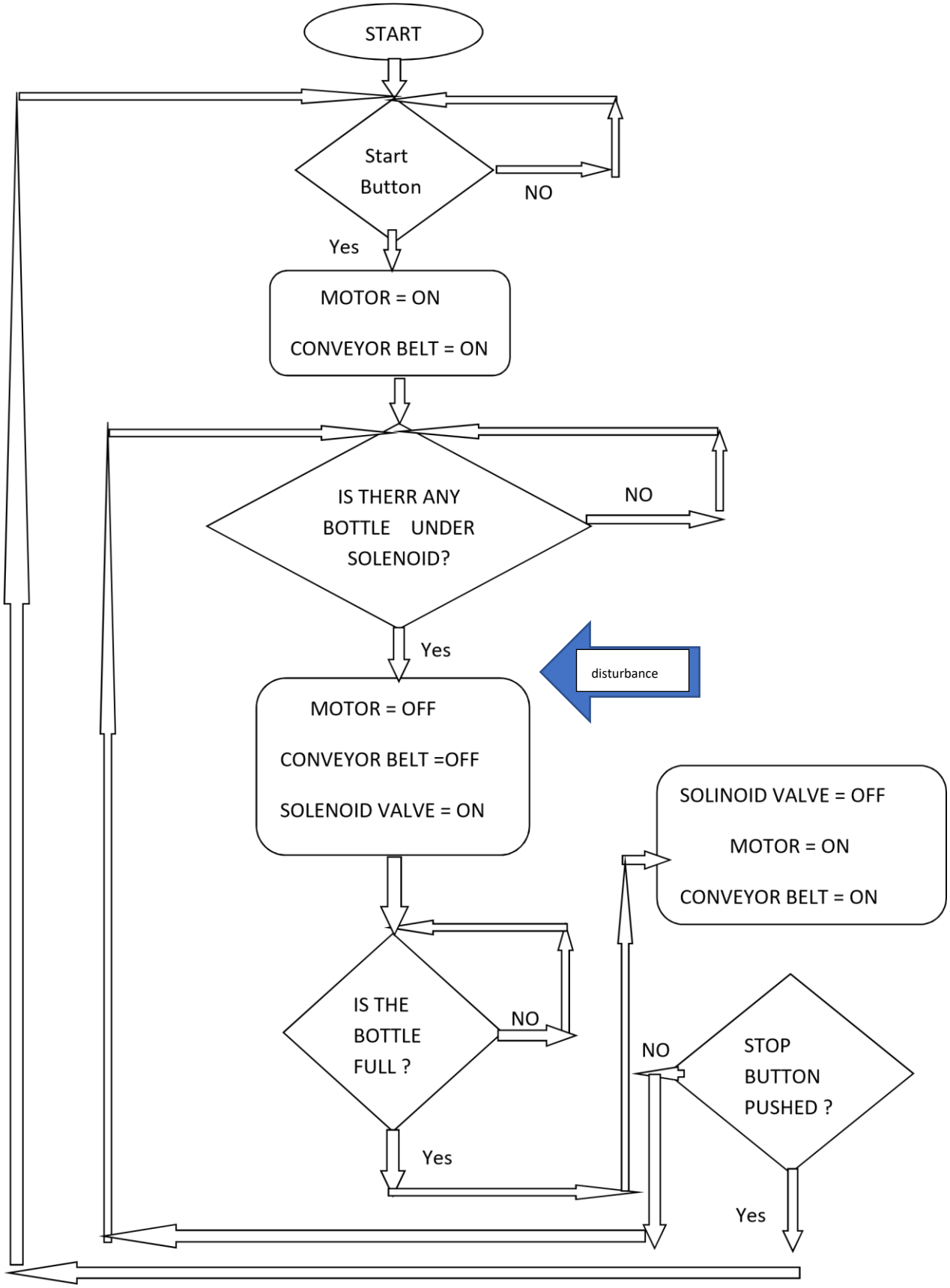
Part 2

flowchart

a date and lot code is printed on the cap of each bottle. The code allows tracing of the exact date and time of bottling.

Which leads us to the below flowchart

First we have push button which sometimes can be interpreted as an automatic and manual button based on situation and user decision then if the button was pushed it will go to next level otherwise it will feedback to itself.


START
Start Button
NO
Yes
MOTOR = ON
CONVEYOR BELT = ON
IS THERR ANY BOTTLE UNDER SOLENOID?
NO
Yes
disturbance
MOTOR = OFF
CONVEYOR BELT =OFF
SOLENOID VALVE = ON
SOLINOID VALVE = OFF
MOTOR = ON
CONVEYOR BELT = ON
IS THE BOTTLE FULL ?
NO
Yes
NO
STOP BUTTON PUSHED ?
Yes

Part 3

Algorithm

STEP 1	Press the "START" Push Button.
STEP 2	Then the "MOTOR" starts and the conveyor moves forward.
STEP 3	If the sensor detects the presence of bottle which is in position with the solenoid valve, then the conveyor will stop.
STEP 4	If the sensor does not detects any presence of the bottle, the conveyor keeps on moving.
STEP 5	After some delay the valve turn "ON" and the bottle will get filled till the timer gets off.
STEP 6	After the bottle is filled delay is provide and then after the delay the motor starts running.
STEP 7	And the process respects itself repeats itself from step 3

the above flowchart leads us to here so we can simplify the whole process in below section and determine the automatic part and manual and whether its locally or a remote control. At first, the auto selection switch is selected so that the entire system operates automatically.

Then the “Auto start push button” (toggle switch is used here) is selected and the motor starts.

and the conveyor belt starts moving. The DC motor used is a DC geared type motor whose shaft is coupled directly with the shaft of the roller. This motor has an input voltage of 12v with an input current of 600mA to 14A.The reason for selecting this motor is to achieve a high starting torque at a constant speed. It has a torque of 70kgcm.The motor comes with a metal gearbox and centered shaft. Shaft is loaded with bearing for wear resistance. The reason for choosing such a high torque is having such heavy rollers used on the either side of the hardware which is mounted with a conveyor belt. Then two to three bottles is placed simultaneously on the conveyor belt. Now as the bottle approaches towards the photoelectric sensor, the sensor senses the bottle and the conveyor stops running.

As the conveyor stops the solenoid valve gets energized and the water starts filling in the bottle.

After a given time period is over, then the solenoid valve gets de energized completely and water flowing through the valve is stopped and the conveyor belt starts moving. The valve remains DE energized until the bottle is sensed by the sensor again.

Then as this process is continued the water level in the tank keeps on decreasing with course of time. A water float switch is used which is dipped into the tank filled with water. The entire length of the equipment is 2m. It has an input voltage of 250V A.C with an input current of 15A.

It has a squares shape. It is designed to withstand a temperature of 80degree Celsius. It has

both NO & NC contacts and a 2m cable length.

It is dipped into the tank filled with water so it floats over the water and on decrease in water level the float switch falls down completely towards the ground due to low level of water which then closes the circuit connection with the relay. As a result, the pump that is interfaced with the entire system then gets completely energized and the water from the reservoir is pumped directly to the water tank and it is filled with water and gradually the water level starts rising and the float switch gradually starts to float over water. After the water is filled up to a certain level and the float switch starts floating over water, then the circuit breaks and the pump gets de energized simultaneously.

As this process takes place the entire system is turned OFF automatically. It remains in the OFF mode till the tank is refilled with water up to a certain level where the float switch comes to a completely horizontal position. After the tank is completely filled with water the activity of the motor as well as the belt is resumed respectively.

Then the system starts working as mentioned above.

EMERGENCY SWITCH has also been introduced in the system which works like a circuit breaker which disconnects the entire PLC system whenever any unfavorable conditions arise.

So if we want to simply answer the question we can say it’s usually an automatic process but the star/stop push button can sometimes be used as manual. It's also a 100% remote system.

Part 4

In automatic mode every valve and every sensor will be checked automatically and it will alarm the user if anything is no longer working accordingly, but as we switch to manual mod the system will alarm the user to let him know that the system will no longer check itself and everything need to be done manually.

In both automatic and manual system in case of emergency an alarm will be set off in automatic mode the breaks will work automatic and stop the setup and the valve will be closed to prevent from the liquid from licking, but in manual it will the operators job.

Part 5

As we all know when talking about an industrial process the important thing is the safety procedure.

It is necessary to pay attention to whether the safety equipment functions properly during use. Before reopening after each shutdown, You need to check the water tank, chain plate, conveyor belt, lid storage box, etc. for abnormalities, and pay attention to whether the water source, power supply, and air source are connected. Power QF, power indicator light is on, fault indicator light and emergency stop indicator light are not on, you can press the start button on the operation control box and the start switch at the filling place to start the overall operation of the machine. Press the stop button at the installation place and the control box. After stopping, the main power supply should be turned off.

Observe the mechanical parts frequently during production to see whether the rotation and lifting are normal, whether there are abnormalities, and whether the screws are loose;

Check the ground wire of the equipment and ensure reliable contact; clean the weighing platform frequently; check the pneumatic pipeline for leaks and whether the trachea is broken; The reducer motor is replaced with lubricating oil (grease) every year, check the tightness of the chain, and adjust the tension in time;

If you stop using it for a long time, you should empty the materials in the pipeline;

Do a good job of cleaning and sanitation, keep the surface of the machine clean, often remove the accumulated materials on the scale body, and pay attention to keeping the interior of the electric control cabinet clean.

The sensor is a high-precision, high-sealing, high-sensitivity device. Impact and overload are strictly prohibited. It must not be touched during work. Disassembly is not allowed for non-overhaul a sensor to detect if the bottles has any regular checkup for part detection sensor, and other sensors involve checking for damages in the conveyor to prevent it from properly functioning and also checks for the solenoid valve

checking the sensor which has the responsibility of checking and confiscating the distorted PART and so on.

Part 6

In our project we are only focusing on water bottle filling but it can be not only water for example it can also be used in juice filling in that case one of our input which is the liquid we want to fill our bottle with it.so before it comes to this part in needs to go through another process and combine with the right amount and also the get inserted with some substance to make it last for a longer time. And for water we also add this substance plus

something else to make sure the water doesn't have any taste. If the factory is making its own bottle we also have to take them as inputs from other part so now by having both the part and filling liquid the process will began.

The output will be bottles that were sealed and now it's ready for packaging so the next department will have the bottles one by one and make a package with 6 of them and then its ready for shipping

Part 7

Redundancy is one of the important steps in designing a system. Based on the impotency of the job or the sensitivity of it a control engineer should decide to whether add an extra part or leave it be, cause an extra part requires more money and we all know that the expenses are one of the main concerns in industries.

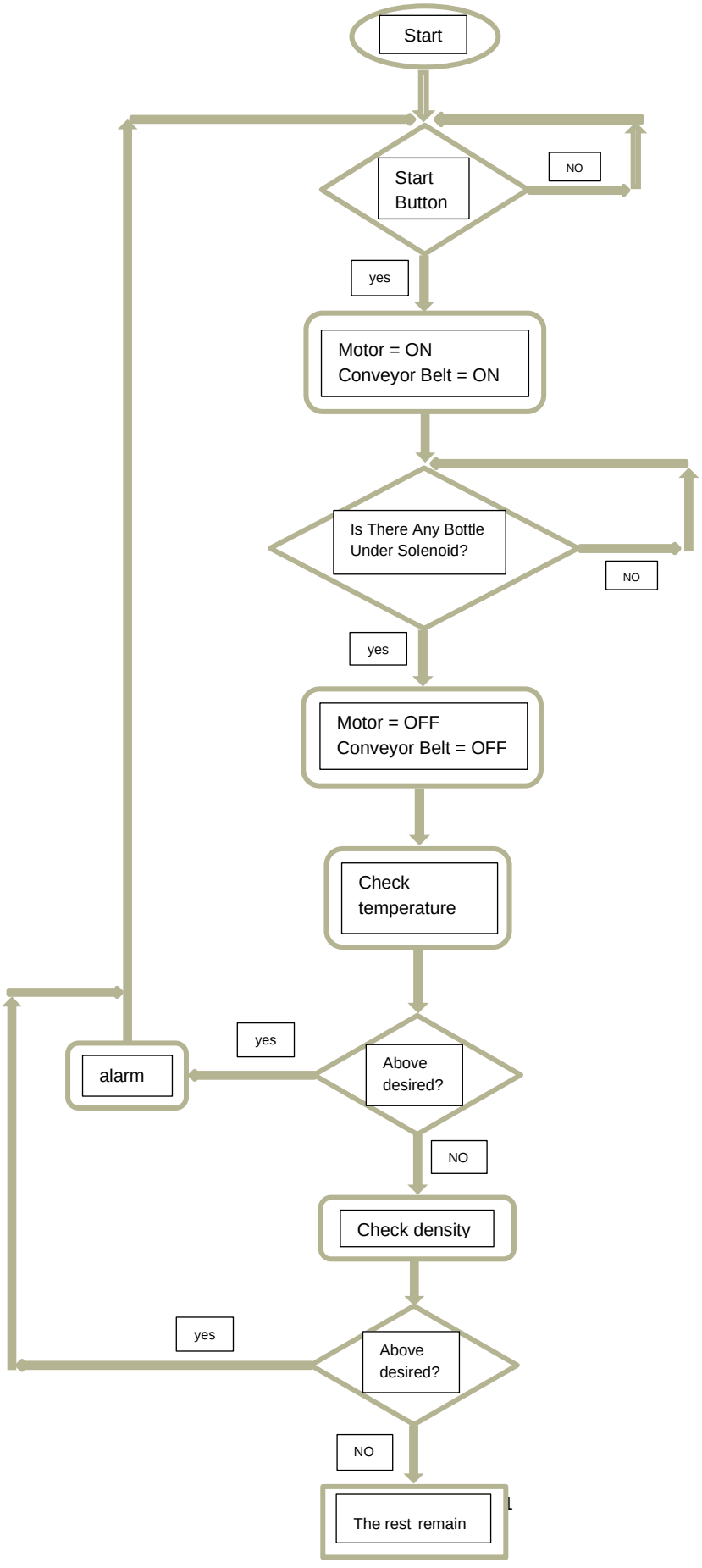
In this system we can add an extra sensor for measuring the level of liquid so incase our first sensors were not working properly, it will come to the circuits and the work will continue as it was programed. The other section that we can use a redundancy in it is the conveyor. If the break in conveyor encounter a problem the whole procedure will go sideways so we put another breaker incase that the first one run into some difficulties the other one will come in hand and the procedure will continue.

Part 8

If we want to define disturbance in a simple way, we can say that it's something unwanted that got added to our system along the way and we don't have any control over it. usually the first thing that comes to mind is the effect of media. the surrounding of the system can

add a lot of noise and unwanted disturbance to our system.in our case our liquid's temperature can be influenced by its surroundings and the easiest way to prevent it is to make sure a good isolation is installed around the tank. The other disturbance which is common between systems is our inputs. The density of input can be manipulated by others involved and we don't have a control over it.so if our liquid were anything with a desirable density we need to check it before pouring it into the bottles.

Part 9


Start
Start Button
NO
yes
Motor = ON
Conveyor Belt = ON
Is There Any Bottle Under Solenoid?
NO
yes
Motor = OFF
Conveyor Belt = OFF
Check temperature
yes
alarm
Above desired?
NO
Check density
yes
Above desired?
NO
The rest remain

Part 11

HARDWARE REQUIREMENT SPECIFICATION

1 Water Float Switch

2 Photoelectric Sensor

3 DC geared motor

4 Water pump

5 SMPS

6 Solenoid Valve

7 Water tank

8 Switches

9 Relays

10 Conveyor System

11 Temperature Sensor

12 Level Sensor

Water Float Switch

The entire length of the equipment is 2m. It has an input voltage of 250V A.C with an input current of 15A. It has a square shape. It is designed to withstand a temperature of 80 degree

Celsius. It has both NO & NC contacts and a cfls 2m cable length. It's working mechanism is

very simple. When the tank is filled up with water then the float switch “normally opens” (NO)

the circuit and when the tank is empty the float switch “normally closes” (NC) the circuit and energizes the hardware connected with it (mostly water pump is connected).

In this project, it is dipped into the tank filled with water so it floats over the water and on decrease in water level the float switch falls down completely towards the ground due to low level of water which then closes the circuit connection with the water float sensor. As a result, the pump that is interfaced with the entire system then gets completely energized and the water from the reservoir is pumped directly to the water tank and it is filled with water and gradually the water level starts rising and the float switch gradually starts to float over water. After the water is filled up to a certain level and the float switch starts floating over water, then the circuit breaks and the pump gets de energized simultaneously.

Photoelectric Sensor

Operating voltage is 6 – 36 VDC and its output current is 300 mA. It’s response frequency is 0.5 kHz. It’s output type is n – p – n 3 wire (Black, Blue and Brown). It is made of brass or plastic.

In this project, it is used to sense the position of the bottles. A round shaped sensor is used which can detect opaque, transparent or any other kinds of objects. In this case it is

detecting different plastic bottles. The sensor used here is a diffused reflective type sensor. The range of sensing the objects are 100 mm.

Water pump

The net weight of the pump is 150 gm. Its dimensions of inlet and outlet are 15 mm O. D. and 5 mm O. D. Its working voltage is 12 V DC and working current is 0.1 – 0.5 A. Its lift is 130 cm at 12 V DC and flow rate is 300L/H.

In this project, the water pump is submerged in the reservoir from where the water will be pumped up to the main tank if it gets empty.

SMPS (Switched Mode Power Supply)

A switched-mode power supply is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy. Ideally, a switched-mode power supply dissipates no power. Voltage regulation is achieved by varying the ratio of on-to-off time. In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor. This higher power conversion efficiency is an important

advantage of a switched-mode power supply. Switched-mode power supplies may also be substantially smaller and lighter than a linear supply due to the smaller transformer size and weight.

In this project, 24 V DC and 12 V DC SMPS had been used for the power supply of the different components used. For example, 12 V DC is used to supply power to water pump, DC geared motor and 24 V DC is used to supply power to the solenoid valve, water float switch and photoelectric sensor.

Solenoid Valve

Qualified application voltages as following description:

AC 110V AC 380V ; AC 220V DC 24V ±10% ; AC 36V DC 12V

Induction coil insulation has qualities of high moisture proof, heat-resistance and succeeded water immersed handling function. Capacity of induction coil sequent electric current and maximum temperature up to 90oC.

In this project, It is normally used to automatically control the flow of the water that shall fill the water bottle. When the water bottle placed over the conveyor belt, which is initially at motion, is sensed by the Photoelectric sensor, the conveyor stops running and at the same time the solenoid valve gets energized and water starts flowing through the valve for a certain time period (depending on the time we set on the timer in the PLC programming). As the time period is over then the solenoid valve gets de energized and water stops flowing through the valve. The conveyor belt starts moving again and the valve remains de energized until and unless the bottle is sensed by the sensor again.

Water Tank

The function of the water tank is to store the water which is to be filled in the water bottle via solenoid valve whenever required. The water tank contains a float switch which is normally used to determine the level of water and whenever the water level in the tank falls it is restored by the water stored into the reservoir with the help of the pump through a narrow pipe which is connected with the tank.

Switches

The type of switches we used in our project are the toggle switches. Two toggle switches are used to change the mode: Manual and Auto. Two toggle switches are used for “Auto Start” and “Auto Stop”. For manual mode, two toggle switches are used for “Conveyor Start” and “Conveyor Stop” and two toggle switches are used for “Solenoid valve Open” and “Solenoid valve close”.

And lastly, one toggle switch is dedicated for the “Emergency” Switch.

Relays

In below table we have coil assessment

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
AC	6 V	443 mA	385 mA	3.1 Ω	80% max. of rated voltage	30% min. of rated voltage at 60 Hz 25% min. of rated voltage at 50 Hz	110% of rated voltage	Approx. 2.3 VA at 60 Hz Approx. 2.7 VA at 50 Hz
	12 V	221 mA	193 mA	13.7 Ω				
	24 V	110 mA	96.3 mA	48.4 Ω				
	100 V	26.6 mA	23.1 mA	760 Ω				
	110 V	24.2 mA	21.0 mA	932 Ω				
	200 V	13.3 mA	11.6 mA	3,160 Ω				
	220 V	12.1 mA	10.5 mA	3,550 Ω				
	230 V	10.0 mA	11.5 mA	4,250 Ω				
	240 V	11.0 mA	9.6 mA	4,480 Ω				
DC	6 V	224 mA		26.7 Ω		15% min. of rated voltage		Approx. 1.4 W
	12 V	112 mA		107 Ω				
	24 V	55.8 mA		430 Ω				
	48 V	28.1 mA		1,710 Ω				
	100 V	13.5 mA		7,390 Ω				
	110 V	12.3 mA		8,960 Ω				

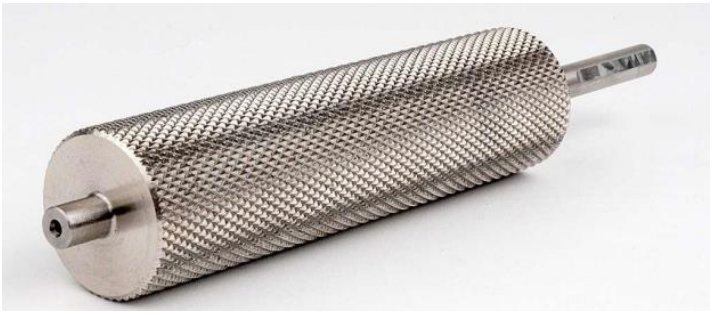
Load		Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)
Contact mechanism		Single	
Contact material		AgSnIn	
Rated load	NO	10 A, 250 VAC 10A, 30 VDC	7 A, 250 VAC
	NC	5 A, 250 VAC 5 A, 30 VDC	
Rated carry current		10 A	
Max. switching voltage		250 VAC, 250 VDC	
Max. switching current		10 A	
Max. switching power	NO	2,500 VA/300 W	
	NC	1,250 VA/150 W	

Contact resistance	100 mΩ max.
Operate time	AC: 20 ms max. DC: 30 ms max.
Release time	20 ms max.(40 ms max. for built-in Diode Relays)
Max. operating frequency	Mechanical: 18,000 operations/h Electrical: 1,800 operations/h (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC 50/60 Hz for 1 min between coil and contacts 1,000 VAC 50/60 Hz for 1 min between contacts of same polarity and terminals of the same polarity 2,500 VAC 50/60 Hz for 1 min between current-carrying parts, non-current-carrying parts, and opposite polarity
Insulation method	Basic insulation
Impulse withstand voltage	4.5 kV between coil and contacts (with 1.2 × 50 µs impulse wave) 3.0 kV between contacts of different polarity (with 1.2 × 50 µs impulse wave)
Pollution degree	3
Rated insulation voltage	250 V
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s² (approx. 100 G) Malfunction: 100 m/s² (approx. 10 G)
Endurance	Mechanical: 5,000,000 operations min. (at 18,000 operations/h under rated load) Electrical: 100,000 operations h. (at 1,800 operations/h under rated load)
Failure rate P level (reference value)	10 mA at 1 VDC
Ambient temperature	Operating: –40 to 60°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 90 g

Conveyor System

Conveyor belt: A belt of length 2*(3ft.2inches) and width is 3.9 inches. The material used is PVC. Reason for choosing this belt is has low friction and oil resistant.

Drive roller:



Total net weight of the rollers are 5 Kg. The diameter of the shaft of the roller is taken 1 inch whereas the diameter of the rollers are 3.5 inches. The length of the shaft whose one side is elongated for coupling with the motor is 3 inches. The length of the roller is taken 4 inches.

Temperature and level sensor

temperature sensor installed in the industrial background

This paper presented an automatic control of temperature and level of Continues Stirred Tank Reactor (CSTR) using PLC and SCADA. The CSTR is heated using heating-coil and its temperature and level are measured by RTD and float type level sensor respectively. The accurate control of temperature and level are the realistic feature of this system and balances the process.

Part 14

- Disturbance in the surface sensor, or photoelectric sensor:

The surface sensor allows the various containers to be filled without wasting a substance, which can sometimes cause significant loss in the long run (such as perfume), Pharmaceuticals, mercury, etc.), in cases such as pharmaceutical products where the percentage of substance, and total amount of a product is very important.

Disruption of the temperature sensor: By causing a disturbance in this sensor in case of system malfunctions the temperature rises above the allowable level, the alarm is not activated and the safety of the system is endangered. Also, changing the temperature of the liquid changes its density. Constant duration of weight is injected more or less than the specified amount into the container.

Another case is the disturbance and change in the volume of material inside the tank, the larger the volume of material inside the tank, the more pressure is placed behind the pump, thus it changes the flow rate of the pump (volume of material passing through the pump per unit time).

Another disorder is related to the change of material concentration, which also has a great effect on changing the volume of pumped material per unit time.

To solve the problems, the simplest way is to place a low-volume feed tank between the storage tank and the device so that the increase or decrease in the volume of liquid in it has less impact on the pump.

Secondly, at the beginning of each working day, the device should be set to trial and error once. This type of mechanism is suitable for semi-concentrated materials such as edible and industrial oils, dilute materials that do not foam. To prevent problems in activating alarms and to ensure the security of the system, several temperature sensors can be used to activate the alarm replacement sensors in case of failure of one of the sensors.

Part 15

In the event of a power outage, an emergency power generator is placed in the basement to be activated in the power outage. As soon as the generator is activated, all sensors start from the beginning.

To prevent water leakage, a flowmeter is installed in the tank outlet valve. If the value displayed by the flowmeter increases significantly, the possibility of pipe leakage increases and the water must be cut off.

In the event of a water leak or any adverse conditions, the emergency switch installed in the system acts like a global stop and shuts off the entire system.

Part 17

SELECTION OF PLC

There are some main factors to choose a PLC for any application. They are:

- Input and output
- Memory size
- System speed
- Compatibility to HMI

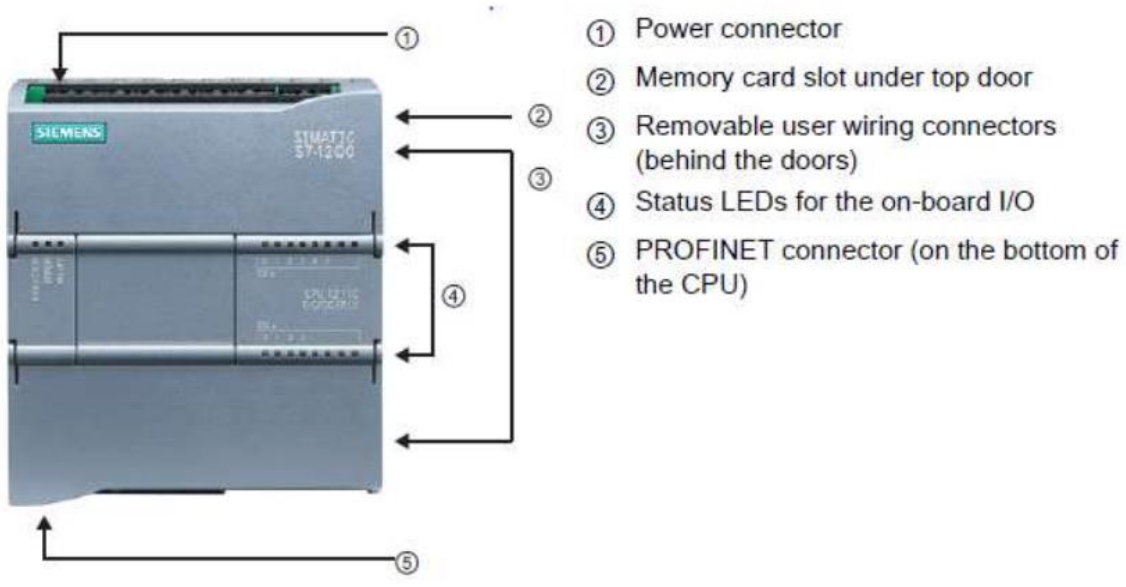
• Easily communicable

Different PLCs have different number of I/O ports. And in some, adding external I/O cards can increase number of I/O ports.

S7-1200 has the characteristics as below:

- Bit Memory (M) 8192 bytes
- On – board digital I/O 14 inputs/ 10 outputs
- On – board analog I/O 2 inputs
- Voltage range 85 to 264 VAC
- Input current (max. load) • CPU only – 100 mA at 120VAC; 50mA at 240 VAC . CPU with all expansion accessories – 300mA at 120 VAC; 150mA at 240 VAC.

So this plc is chosen.



The CPU combines a microprocessor, an integrated power supply, input and output circuits, built-in PROFINET, high speed motion control I/O and on board analog inputs in a compact housing to create a powerful controller. After downloading a program, the CPU contains the logic required to monitor and control the devices in the application. The CPU monitors the inputs and changes the output according to the logic of the user's program.

The CPU provides a PROFINET port for communication over a PROFINET network.

Part 18

Input	Task	Output	Task
I:0.0	Level Switch in Water Tank	O:0.0	Conveyor Start CMD
I:0.1	Proximity Sensor for Bottle Filling	O:0.1	Solenoid Valve Open CMD
I:0.2	Auto Selection	O:0.2	Conveyor Start Indication
I:0.3	Manual Selection	O:0.3	Solenoid Valve Open Indication
I:0.4	Auto Start Push Button	O:0.4	Water Pump
I:0.5	Auto Stop Push Button		
I:0.6	Conveyor Start in Manual Mode		
I:0.7	Conveyor Stop in Manual Mode		
I:1.0	Solenoid Valve Start in Manual Mode		
I:1.1	Solenoid Valve Stop in Manual Mode		
I:1.2	Emergency Switch		

Part 19

Power Budget

The CPU has an internal power supply that provides power for the CPU, the signal modules, signal board and communication modules and for other 24VDC user power requirements. 5VDC logic budget supplied by the CPU and the 5VDC power requirements of the signal modules, signal boards and communication modules.

The CPU provides a 24 VDC sensor supply that can supply 24 VDC for input points, for relay coil power on the signal modules, or for other requirements. If your 24 VDC power requirements exceed the budget of the sensor supply, then you must add an external 24 VDC power supply to your system. Some of the 24 VDC power input ports in the S7-1200 system are interconnected, with a common logic circuit connecting multiple M terminals. For example, the following circuits are interconnected when designated as "not isolated" in the data sheets: the 24 VDC power supply of the CPU, the power input for the relay coil of an SM, or the power supply for a nonisolated analog input. All non-isolated M terminals must connect to the same external reference potential.

General Specification of CPU 1214C

Technical Data	Description
User memory – • Work	• 75 Kbytes
Load	4 Mbytes internal, expandable upto SD card size
Retentive	10 Kbytes
On – board digital I/O	14 inputs/ 10 outputs
On – board analog I/O	2 inputs
Process image size	1024 bytes of inputs (I)/ 1024 bytes of outputs (Q)
Bit Memory (M)	8192 bytes
Temporary (local) memory	16 kbytes for startup and program cycles (including associated FBs and cycles (including associated FBs and FCs) 4 kbytes for standard interrupt events including FBs and FCs
Signal modules expansion	8 SMs max.
SB, CB, BB expansion	1 max
Communication module expansion	3 CMs max
High – speed counters	6 total Single phase: 3 at 100kHz and 3 at 30kHz clock rate Quadrature phase: 3 at 80kHz and 3 at 20kHz clock rate
Pulse outputs	4
Pulse catch inputs	14
Time delay/cyclic interrupts	4 total with 1ms resolution
Edge interrupts	12 rising and 12 falling (14 and 14 with optional signal board)
Memory card	SIMATIC Memory card (optional)
Real time clock accuracy	+/- 60 seconds/month
Real time clock retention time	20 days typ./12 days min. at 40oC (maintenance free super capacitor)

Power Supply:

Technical Data	
Voltage range	85 to 264 VAC
Line frequency	47 to 63 HZ
Input current (max. load)	• CPU only -100 mA at 120VAC; 50mA at 240VAC • CPU with all expansion accessories -300Ma at 120VAC; 150mA at 240VAC
Ground leakage, AC line to functional earth	0.5mA max
Hold up time (loss of power)	20ms at 120VAC; 80ms at 240VAC

Digital Inputs and Outputs:

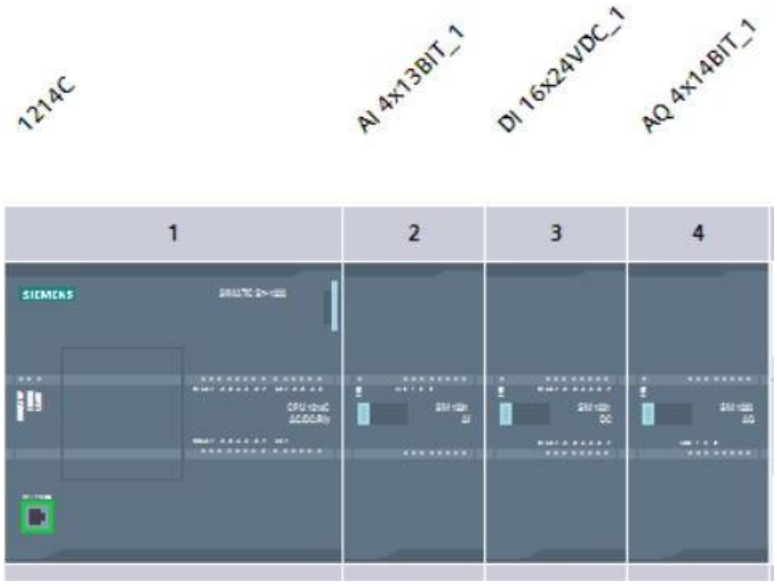
- Number of inputs: 14
- Rated voltage: 24 VDC at 4 mA, nominal
- Surge voltage: 35 VDC for 0.5 sec
- Logic 1 signal (min.): 15 VDC at 2.5 mA
- Logic 0 signal (max.): 5 VDC at 1 mA
- Number of outputs: 10
- Current (max.): 2A
- Surge current: 7A with contacts closed
- Maximum relay switching frequency: 1 Hz

Part 20

PLC Ladder Diagram (Siemens)

For this part we have used TIA V16, which is for Siemens.

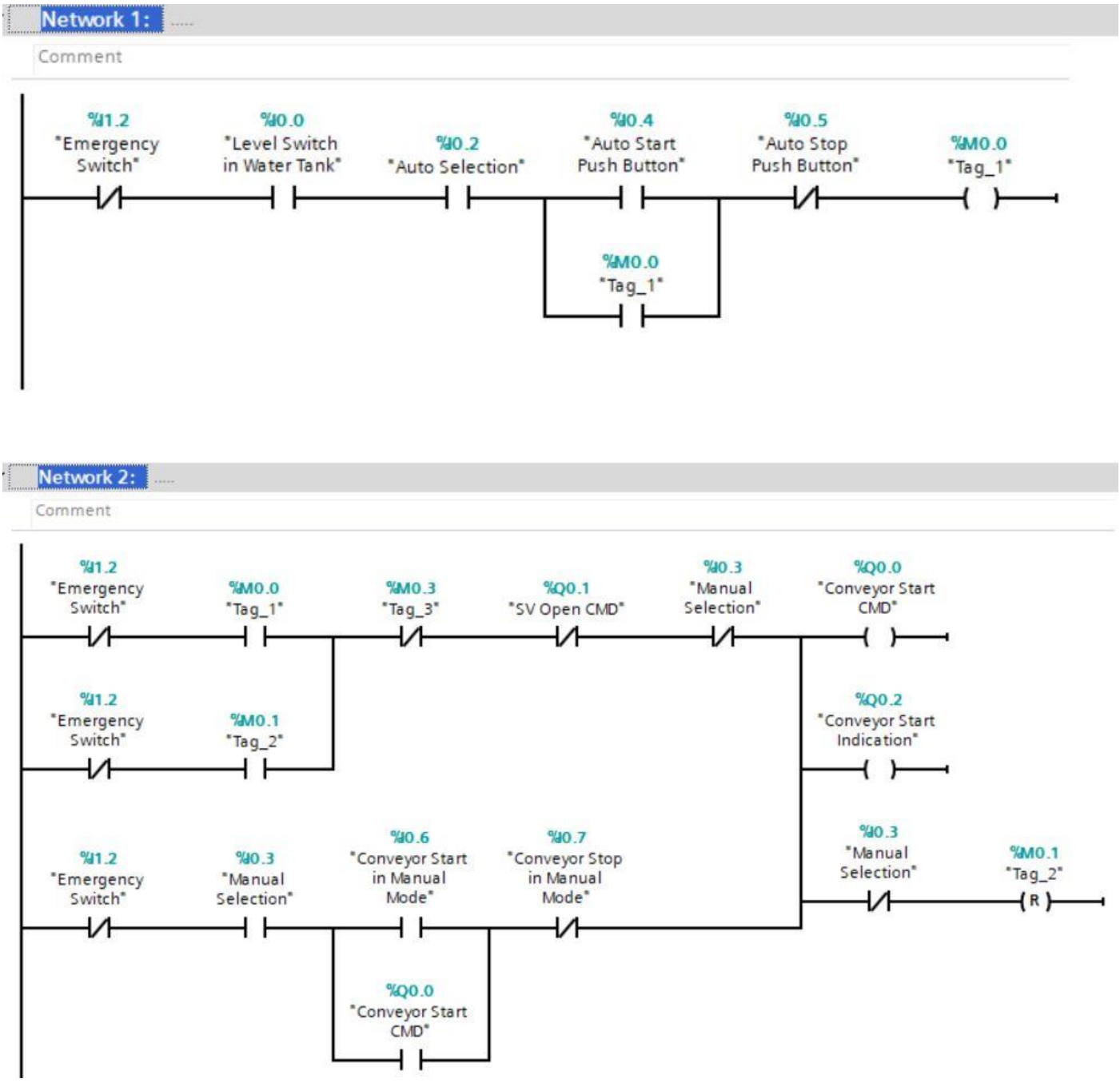
Device configuration:



Tags:

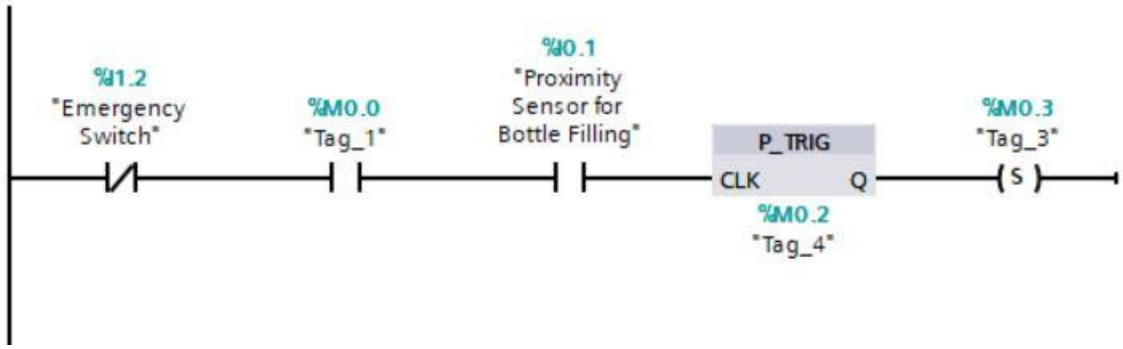
		Name	Data type	Address
1		Level Switch in Water Tank	Bool	%I0.0
2		Proximity Sensor for Bottle Filling	Bool	%I0.1
3		Auto Selection	Bool	%I0.2
4		Manual Selection	Bool	%I0.3
5		Auto Start Push Button	Bool	%I0.4
6		Auto Stop Push Button	Bool	%I0.5
7		Conveyor Start in Manual Mode	Bool	%I0.6
8		Conveyor Stop in Manual Mode	Bool	%I0.7
9		SV START IN MANUAL MODE	Bool	%I1.0
10		SV Stop in Manual Mode	Bool	%I1.1
11		Emergency Switch	Bool	%I1.2
12		Conveyor Start CMD	Bool	%Q0.0
13		SV Open CMD	Bool	%Q0.1
14		Conveyor Start Indication	Bool	%Q0.2
15		SV Open Indication	Bool	%Q0.3
16		Water Pump	Bool	%Q0.4
17		Tag_1	Bool	%M0.0
18		Tag_2	Bool	%M0.1
19		Tag_3	Bool	%M0.3
20		Tag_4	Bool	%M0.2

Function Block:



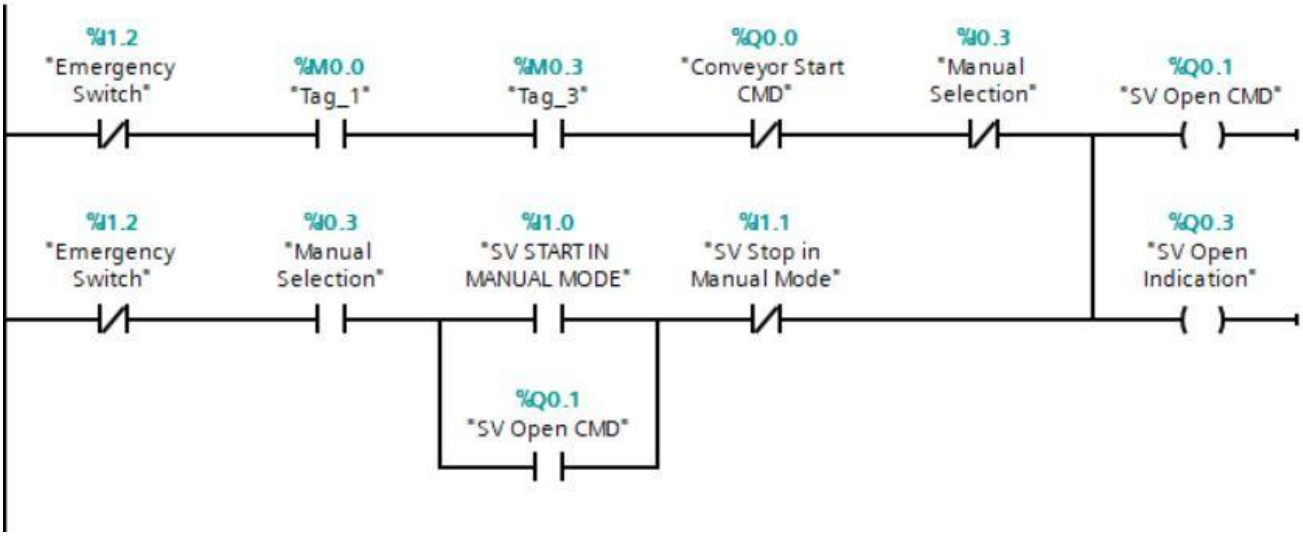
Network 3:

Comment



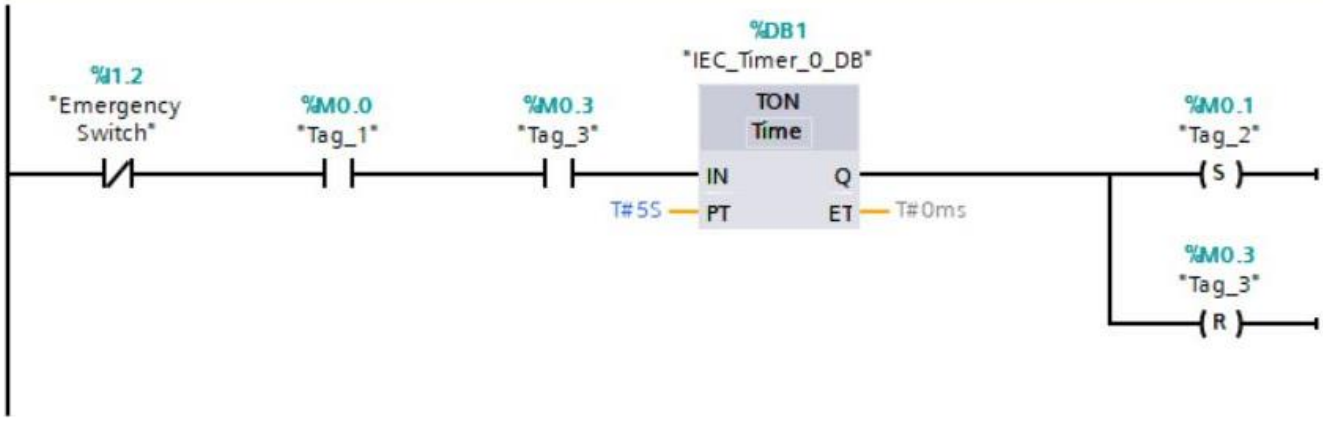
Network 4:

Comment



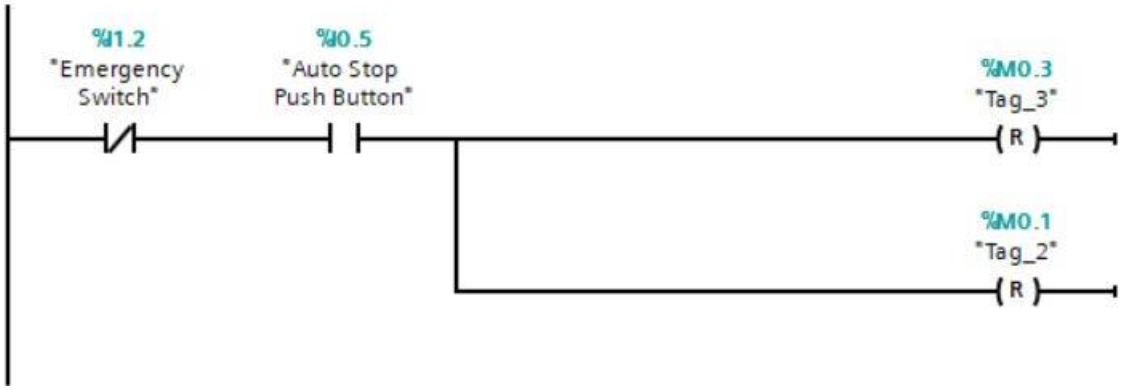
Network 5:

Comment



Network 6: .....

Comment



Network 7: .....

Comment