



REPORT FOR SEMESTRAL WORK

Programmable Controller Applications

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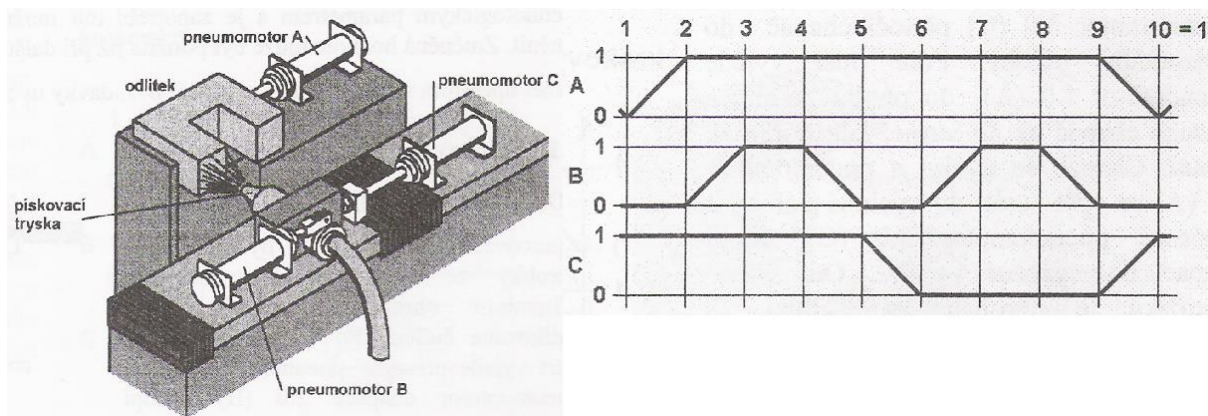
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Task A – Sanding facility

Functionality desired:

There is a need to sand (cleanse) two arms of the U-shaped casting. The casting is put manually into the clamping facility. Then via a START button the command for the beginning of the operation is relayed to the PLC. The casting is then clamped by the pneumatic motor A. Then the pneumatic motor B opens the valve of the sanding nozzle and let it to sand for the interval T_a . This interval of sanding is a parametr and it is possible to change it for each particular piece of the casting from some HMI facility (textual operator panel or PC with visualization application). After completing of the sanding on one arm of the casting the pneumatic motor C moves the bed with the nozzle to the second arm of the casting. The operation of sanding then repeats with the same interval. After completion of the second arm the pneumatic motor C returns the bed of the sanding nozzle to the initial position. Then the casting is released by the pneumatic motor A and it can be removed manually from the clamping bed.

Situation and step diagram:



1. Analysis:

1.1 List of inputs, outputs and internal variables for the control application

Description of predefined machine functions:

Buttons:

- S1: Pressing this button initiates the execution of the entire system.

Sensors:

- A0, A1: End switches of pneumotor A.
- B0, B1: End switches of pneumotor B.
- C0, C1: End switches of pneumotor C.

Valves:

- 1V-A: Control valve of pneumotor A.
- 1V-B: Control valve of pneumotor B.
- 1V-C: Control valve of pneumotor C.

- YA0, YA1: Coils of valve 1V-A.
- YB0, YB1: Coils of valve 1V-B.
- YC0, YC1: Coils of valve 1V-C.

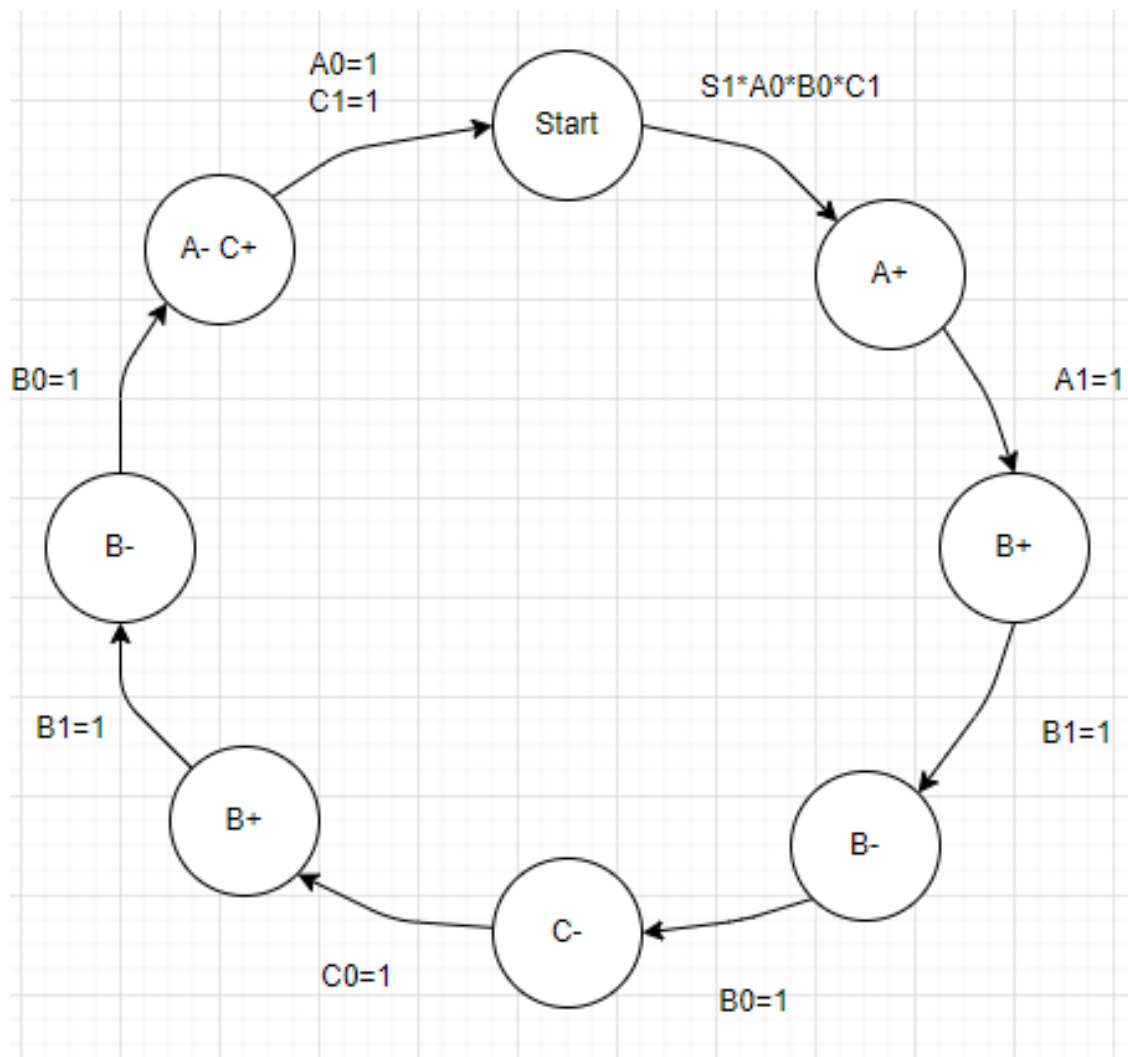
PLC:

- A0: Input signal from end switch A0.
- A1: Input signal from end switch A1.
- B0: Input signal from end switch B0.
- B1: Input signal from end switch B1.
- C0: Input signal from end switch C0.
- C1: Input signal from end switch C1.
- S1: Input signal from button S1.
- YA0: Output signal to the control coil of valve YA0.
- YA1: Output signal to the control coil of valve YA1.
- YB0: Output signal to the control coil of valve YB0.
- YB1: Output signal to the control coil of valve YB1.
- YC0: Output signal to the control coil of valve YC0.
- YC1: Output signal to the control coil of valve YC1.

Clocking chain:

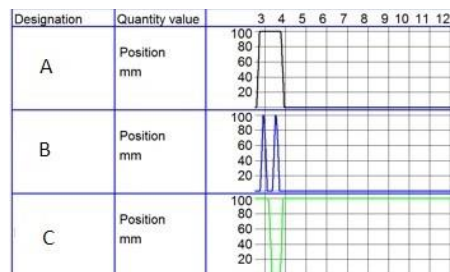
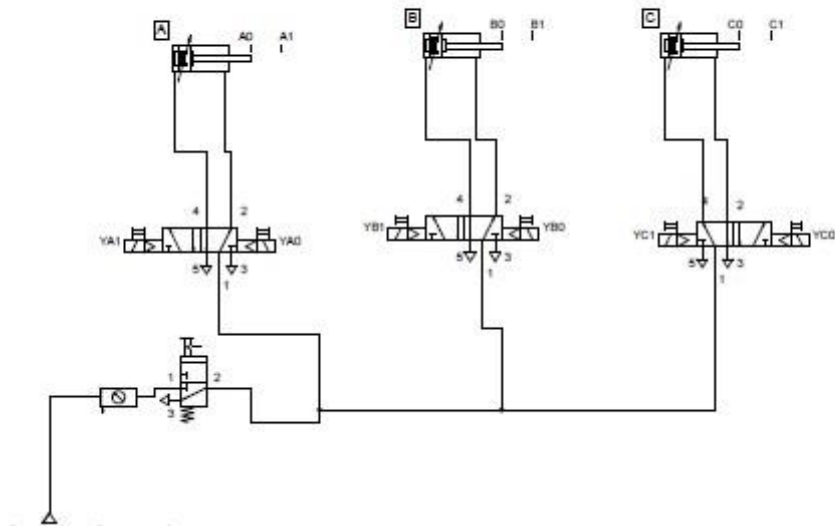
- A0, B0, C0: Reset signals.
- A1, B1, C1: Set signals.
- S1: Auxiliary contact for the first cycle after power-on.

1.2. State diagram

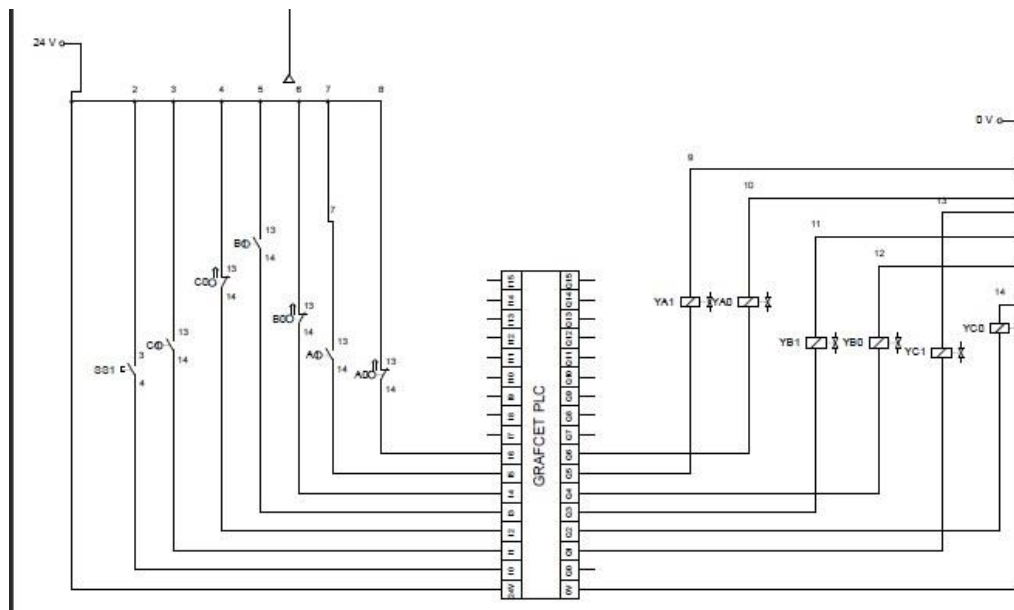


2.Implementation in fluidsim:

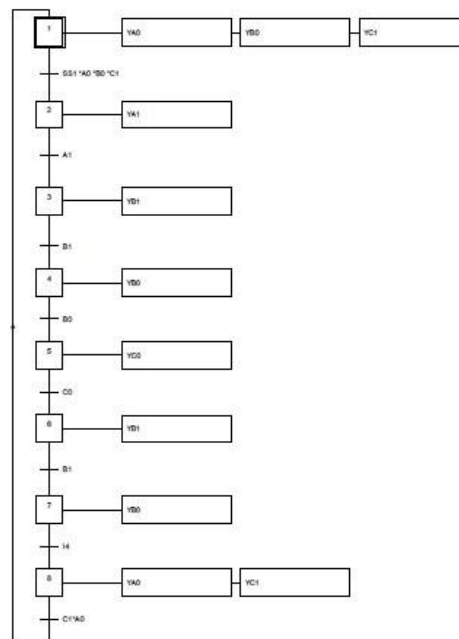
2.1. Pneumatic part:



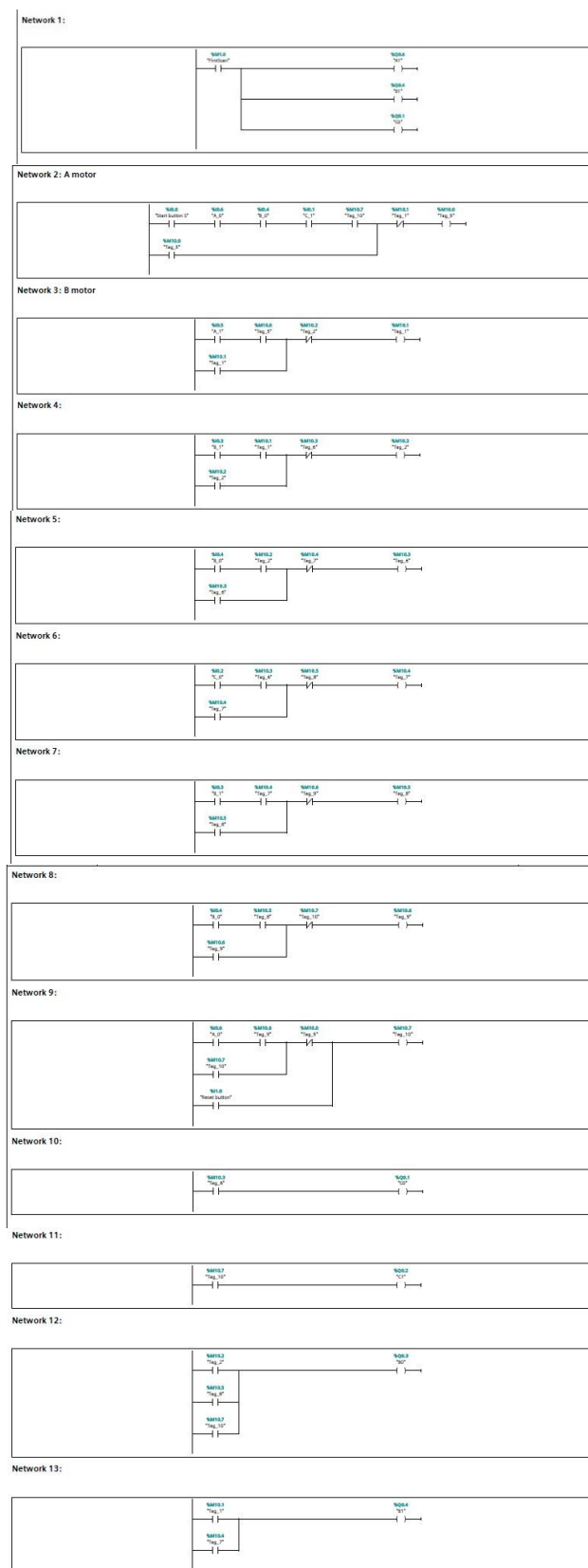
2.2. Electronic Part:

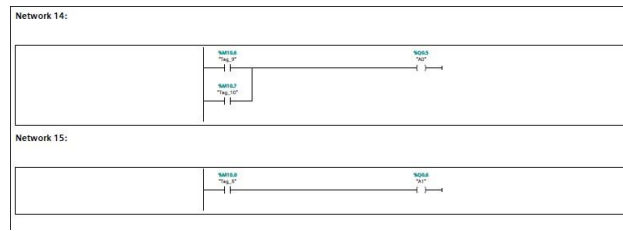


2.2.1. SW part GRAFCET:



2.2.2.TIA Portal Networks (HardwarePart):





3. Conclusion:

We have designed a pneumatic circuit that is controlled by a PLC from a given step diagram. We simulated the circuit designed in the FluidSim program and then transformed it into the TIA Portal program from where we loaded it directly into the PLC. We assembled and connected the given circuit to the PLC and successfully tested the entire connection.