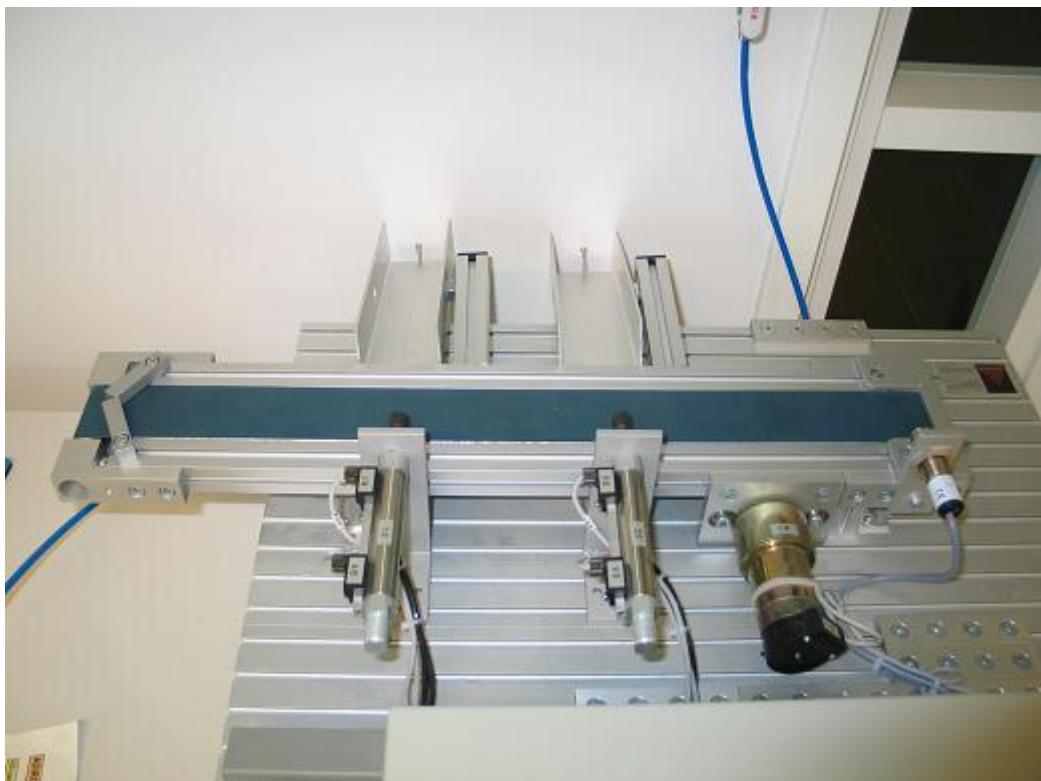


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## CONVEYOR STATION



## 1 Laboratory work in general

### 1.1 Preparations

Since all the laboratory works are available online, it is possible for the group to prepare the laboratory work beforehand. It makes the actual work in laboratory faster and easier.

### 1.2 Pre-Works

1. The group explore this document contents and check out how the drilling machine (in the laboratory) works.
2. Open new project and adding I/O-list from the Excel sheet.
3. The group makes first manual drive part. Also the touch screen manual control part making as ready as possible.(it is possible use also PC-screen panel).

Additional the group should plan and program a roughly commented logic program, which accomplishes the functions told in the chapter 2 Description of activities.

The I/O list is in the chapter 2.6, (+ Excel table) Plan also an I/O list for the communication between the touch screen and the PLC. Use a proper memory area for that.

Use the picture in the chapter 2.7 as an example to program the touch screen.

## 2. Description of activities

### 2.1 Logic control

In this conveyor station laboratory work group are using the touch screen to control the actuators. The group makes panel to control actuators as description below represented. The place where you find this file is represented place 2.6.

### 2.2 Manual control

Manual operation is only available when Auto/Man -switch is in Manual mode, Manual permit (from MRA fb) is active and the Emergency Stop switch hasn't been pressed.

Touch screen include all necessary buttons for manual control. The conveyor belt rotating both direction. Cylinder 1 and 2 control so that every other press control cylinder out and every other press control cylinder in. There must be also inhibition for the belt rotating. So if one or both cylinders are not in position, then it is not possible to rotate the belt.

When the Auto/Man –rotary switch is turned into Auto-position, it resets all the manual operations. (also cylinders moves in)

### 2.3 Reference run

The reference run is generally intended to drive a machine or system to a state which can be identified by PLC and where the automatic run can be started in a controlled way.

The reference run has to be done before starting the automatic run (permit to run from MRA fb), if the conveyor isn't in the reference point.

When the Auto/Man -switch is in the Auto-position and Start-push-button is pressed, the PLC clears the conveyor before starting the automatic run.

To clear the conveyor, the conveyor motor run to the right for 10 seconds. Engine stops after the 10 seconds or after a small delay if the conveyor sensor has identified the work piece. Also if the cylinder or both cylinders are out these must drive in before starting rotate the belt.

Small delay ensure that the work piece is surely against the conveyor's end. When the reference run is ok → information to the touch screen is on (text or some other signal).

Now the reference run is done, and the automatic run can be started by pressing Start-button.(ie. Auto permit will be an active)

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## 2.4 Automatic run

When the Auto/Man -switch is in the Auto-position, the Emergency Stop circuit hasn't gone off and the conveyor is in the reference point, the automatic run can be started by pressing the Start-button from the touch screen.

By pressing the Pause -button the automatic run stops. When pressing the Pause-button second time, the conveyor continues the automatic run at the same point where it was stopped.

High Speed Counter counts the point where the piece is on the conveyor. Teacher shows how this counter works. Piece removing place (cyl1 or cyl2) select with Start-button. (how long Start –button are press)

When you press the Start- button less than 1 second ➔ Place one is chosen. If you press the Start-button over a second ➔ Place two is chosen.

When the automatic run is on, the text frame gives information what is situation in the process.

The group can decide how the program cycle this conveyor system works.

### Example cycle

- Starts, when the work piece is at the end of the conveyor and Start-push-button is pressed,
- .
- Conveyor moves the piece to left (almost complete left) according the amount of pulses.
- Delay 1 s
- Conveyor moves the piece to right and stop when piece is left or right cylinder position (depends on which one you have chosen)
- Delay 1 s
- Left or right cylinder makes forward / backward moves and kick the piece out of the conveyor.
- New piece to start place ➔ new cycle (reset counter and sequencer)

## 2.5 I/O list

### Outputs

Y1	Cylinder 1	Q4.00
Y2	Cylinder 2	Q4.01
M1_right	Conveyor to right	Q4.03
M1_left	Conveyor to left	Q4.04
H1	Signal light (green)	Q5.00
H1_CC	Signal light G_CC	M x.x
H2	Signal light (red)	Q5.01
H2_CC	Signal light R_CC	M x.x
H3	Signal light (white)	Q5.02
H3_CC	Signal light W_CC	M x.x

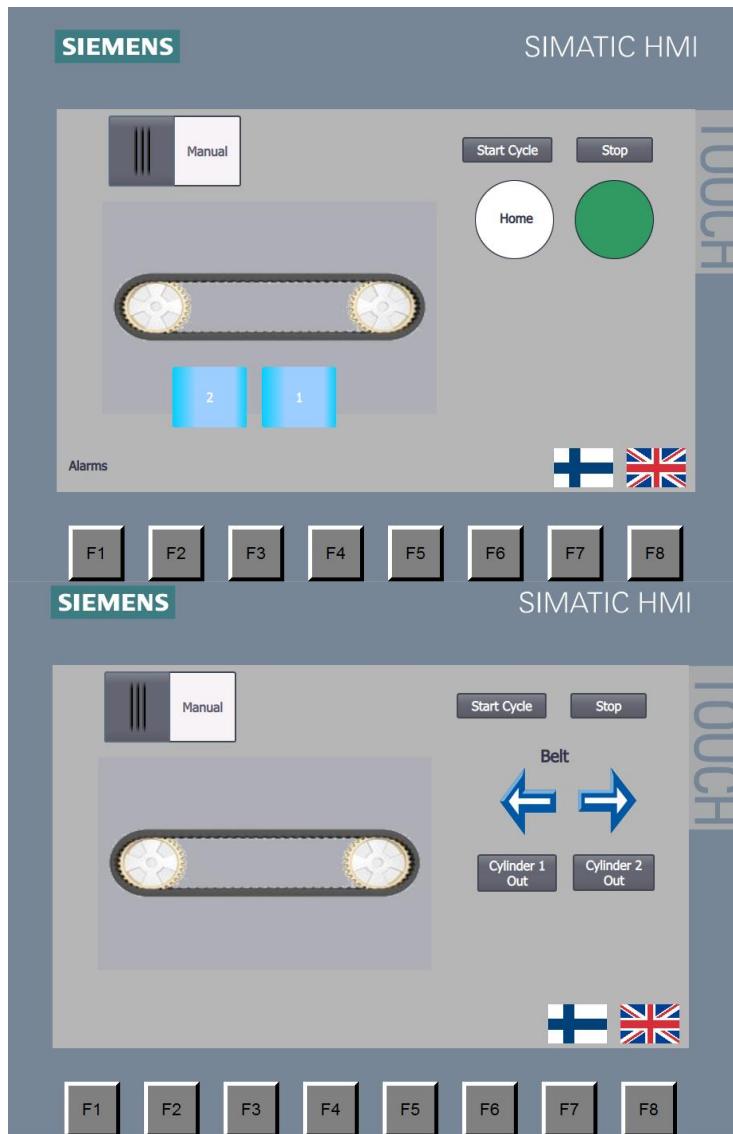
### Inputs

Stop_TP	Stop-button	M x.x
Start_TP	Start-button	M x.x
A_M_TP	Auto/Man switch (1=auto, 0=Man)	M x.x
Pause_TP	Pause-button (self sealing)	M x.x
rCyl1-	Cylinder 1 behind	I4.05
rCyl1+	Cylinder 1 front	I4.06
rCyl2-	Cylinder 2 behind	I4.07
rCyl2+	Cylinder 2 front	I5.00
rConvend	Workpiece on the conveyor	I5.01

- + All the auxiliary memory areas you might need

## 2.6 Monitoring program from the touch screen

The group make touch screen control for the machine. The group has free hands to design an own control panel. Figure 1. shows an example of the user interface.



Picture1. Example of the user interface

## 3 Laboratory work

Download the program you have done to the PLC. Read through the chapter 2 Description of activities, and make sure your program follows the instructions or it follows the instruction given by the teacher.

Save your program carefully to the “Sandbox” [\\cfile3\ sandbox\\$\](\\cfile3\ sandbox\$)

## 4 Reportecification

Because the report is not required, **the program circuits must be clearly commented.** The laboratory work is accepted, when the teacher has checked the group's program in laboratory.