| ally Integrated | |
|-----------------|--|
| | |
| | |

4Production_line_project / PLC_1 [CPU 314C-2 PN/DP] / Program blocks

Main [OB1]

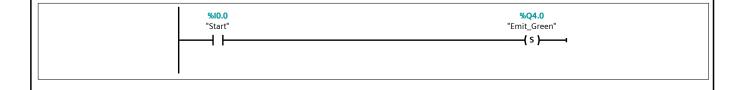
| Main Properties | | | | | | | | |
|-----------------|------|-----------|--------|--------------|----|--|--|--|
| General | | | | | | | | |
| Name | Main | Number | 1 | Type | OB | | | |
| Language | LAD | Numbering | Manual | | | | | |
| Information | | | | | | | | |
| Title | test | Author | | Comment | | | | |
| Family | | Version | 0.1 | User-defined | | | | |
| | | | | ID | | | | |

| Main | | | | | | |
|-----------------|-------------------|--------|---------------|---|--|--|
| Name | Data type | Offset | Default value | Comment | | |
| ▼ Temp | | | | | | |
| OB1_EV_CLASS | Byte | 0.0 | | Bits 0-3 = 1 (Coming event), Bits 4-7 = 1 (Event class 1) | | |
| OB1_SCAN_1 | Byte | 1.0 | | 1 (Cold restart scan 1 of OB 1), 3 (Scan 2-n of OB 1) | | |
| OB1_PRIORITY | Byte | 2.0 | | Priority of OB Execution | | |
| OB1_OB_NUMBR | Byte | 3.0 | | 1 (Organization block 1, OB1) | | |
| OB1_RESERVED_1 | Byte | 4.0 | | Reserved for system | | |
| OB1_RESERVED_2 | Byte | 5.0 | | Reserved for system | | |
| OB1_PREV_CYCLE | Int | 6.0 | | Cycle time of previous OB1 scan (milliseconds) | | |
| OB1_MIN_CYCLE | Int | 8.0 | | Minimum cycle time of OB1 (milliseconds) | | |
| OB1_MAX_CYCLE | Int | 10.0 | | Maximum cycle time of OB1 (milliseconds) | | |
| OB1_DATE_TIME | Date_And_Ti me | 12.0 | | Date and time OB1 started | | |
| Clamping time | Time | 20.0 | | | | |
| Clamping time_1 | Time | 24.0 | | | | |
| Constant | | | | | | |

Network 1: Start

start configuration

Network 2: Start Emit



Network 3:

emit one part at a time after each part reachees the sorting ir sensor

```
%I1.5
                    %DB10.DBX4.0
                                                                                    %M11.4
  "Sorting_ir_
sensor"
                                                                                 "M_emitGreen_
toggle"
                   "Green_Counter".
Q
                                             %Q4.0
                                         "Emit_Green"
     -IN H
    %M11.3
"M_sorting_end"
                                            %M11.4
                                        "M_emitGreen_
                                                                                     %Q4.0
                                            toggle"
                                                                                 "Emit_Green"
                                                                                     -( s )-
                                                                                     %Q9.0
                                                                                  "Emit_Blue"
                                                                                      -(R)-
                                            %M11.4
                                        "M_emitGreen_
                                                                                     %Q4.0
                                            toggle"
                                                                                 "Emit_Green"
                                                                                     -(R)-
                                                                                     %Q9.0
                                                                                  "Emit_Blue"
                                                                                     (s)-
```

Network 4: Stop Emit

green parts feeding stops in case of emergency, stop button pushed or green counter preset value reached

```
#IO.1

"Stop"

"Emit_Green"

(R)

#IO.7

"Emergency"

WDB10.DBX4.0

"Green_Counter".

Q

IDENTIFY TO SET TO
```

Network 5:

to fix a problem that faced us in factory i/o where the green emiting was stopped when the blue counter reached the preset value

```
*DB12.DBX4.0

"Green_Counter".

"Blue_Counter".Q

Q

"Emit_Green"

( S )
```

Network 6:

to fix a problem that faced us in factory i/o where the green emiting was stopped when the blue counter reached the preset value

Network 7:

blue parts feeding stops in case of emergency, stop button pushed or green counter preset value reached

```
%I0.1

"Stop"

"Emit_Blue"

(R)

%I0.7

"Emergency"

%DB12.DBX4.0

"Blue_Counter".Q
```

Network 8: Stop Operations

stop configuration

Network 9: Feeding clamp set

when the part fully passes the ir sensor the clamp will start to work

```
%I0.2

"Feeding_ir_
sensor"

N |

%M0.0

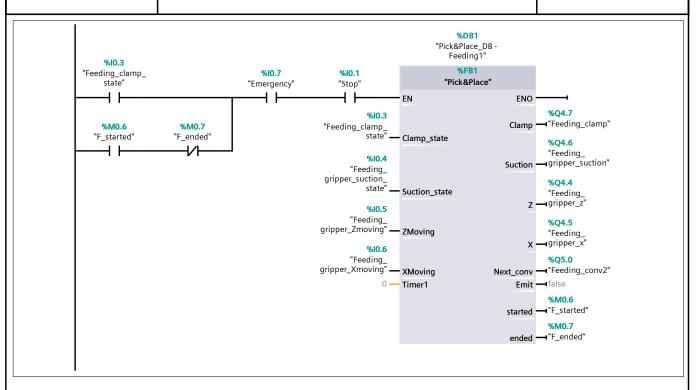
"M_Feeding_ir_
sensor"

(S)

1
```

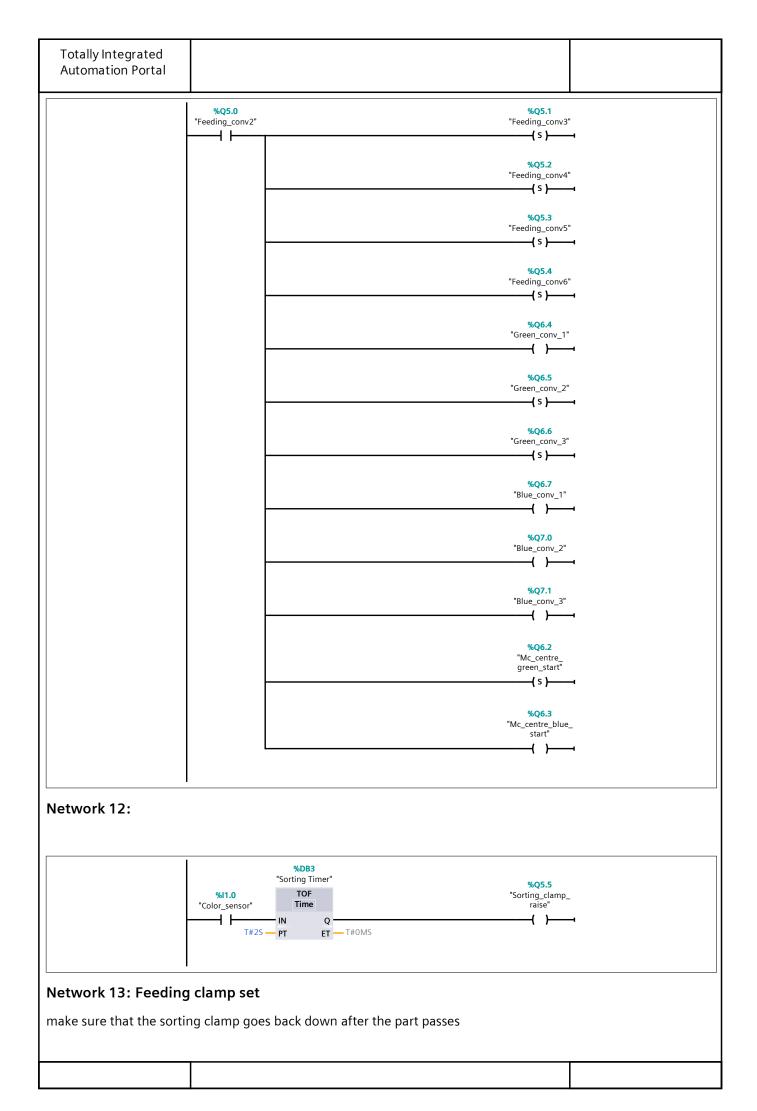
Network 10:

sub routine that controls the pick and place process



Network 11:

starts the conveyors of the production line



Network 14:

subroutine for the pick and place process

```
%DB2
                                                                          "Pick&Place DB -
                                                                             Sorting"
    %M1.1
                         %M1.2
                                                                               %FB1
"Sorting_gripper_
                    "Sorting_gripper_
end"
                                                                            "Pick&Place"
                                                                ΕN
                                                                                              ENO
                                                                                                       %Q5.6
                                                       %11 1
                                                                                                       "Sorting_clamp"
                                                                                             Clamp
     %|1.1
                                            "Sorting_clamp
                                                      state" — Clamp_state
"Sorting_clamp_
state"
                                                                                                       "Sorting_suction"
                                                                                           Suction
                                                      %I1.2
     H F
                                           "Sorting_suction_
                                                                                                       %Q6.0
                                                                                                       "Sorting_gripper_

Z"
                                                      state" —
                                                               Suction_state
                                          "Sorting_gripper
                                                                                                       %Q6.1
                                                  Zmoving"
                                                                ZMoving
                                                                                                        'Sorting_gripper_
                                                      %11.4
                                          "Sorting_gripper_
Xmoving" — XMoving
                                                                                                      ⊣false
                                                                                         Next_conv =
                                                                                              Emit → false
                                                               Timer1
                                                                                                       %M1.1
                                                                                                        "Sorting_gripper_
                                                                                            started '
                                                                                                       "Sorting_gripper_
                                                                                                      -end'
```

Network 15:

For green machining centre, make sure that there are no parts in the machine and if there aren't it will toggle the "produce lids" bit of the machining centre to change the production the next run from lids to bases and vice versa.

```
%12.5
                           %Q7.7
                       "Mc_green_
produceLids"
"Mc_centre_
green_opened"
                                                                                              %M1.7
                                                                                         "M_green_toggle"
     -IN-
                                                                                                ( )-
    %M1.6
  "Mc_green_
opened"
                                                                                               %Q7.7
                           %M1.7
                                                                                           "Mc_green_
produceLids"
                     "M_green_toggle"
                            (s)
                                                                                               %07.7
                           %M1.7
                                                                                            "Mc_green_
                                                                                           produceLids"
                      'M_green_toggle'
                                                                                                -(R)
```

Network 16:

For blue machining centre, make sure that there are no parts in the machine and if there aren't it will toggle the "produce lids" bit of the machining centre to change the production the next run from lids to bases and vice versa.

Totally Integrated **Automation Portal %I2.6** %08.0 "Mc_centre_blue_ "Mc_blue_ %M6.6 opened" produceLids" "M_blue_toggle" ┨и┞ ()-%M6.5 "Mc_blue_ %Q8.0 opened" %M6.6 "Mc_blue_ "M_blue_toggle" produceLids" 1 } (s)-%Q8.0 %M6.6 "Mc_blue_ produceLids" "M_blue_toggle" -(R)-

Network 17:

Raising the clamp after the machining if the product produced is a lid to let it pass to the second pick and place

```
%Q7.7

"Mc_green_
produceLids"

( )
```

Network 18:

Raising the clamp after the machining if the product produced is a lid to let it pass to the second pick and place

```
%Q8.0

"Mc_blue_
produceLids"

()

()
```

Network 19: Feeding clamp set

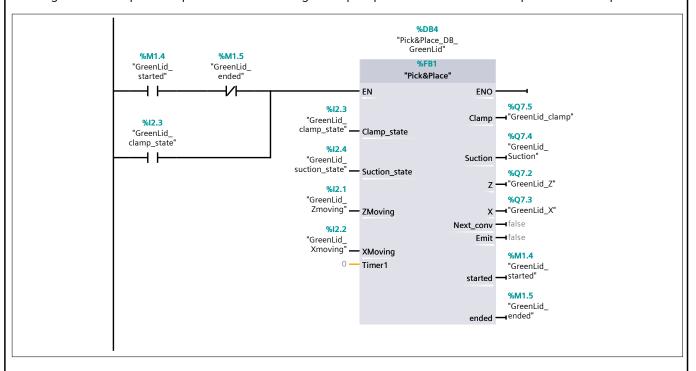
If the machine produced a lid, the positioner will clamp it to move it to next convyeor to get assembled

Network 20:

If the machine produced a lid, the positioner will clamp it to move it to next convyeor to get assembled

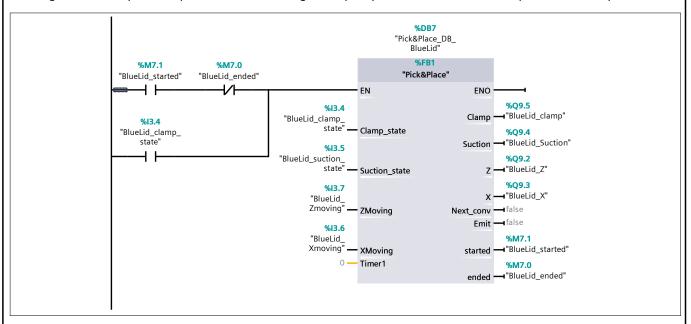
Network 21:

Starting the second pick and place after machining if the part produced is a lid and the product is clamped



Network 22:

Starting the second pick and place after machining if the part produced is a lid and the product is clamped



Network 23: Feeding clamp set

If a product is a base, the first positioner will clamp it to move it to nexr conveyor

Network 24: Feeding clamp set

If a product is a base, the first positioner will clamp it to move it to nexr conveyor

```
%I4.4

"BlueBody_ir_
sensor"

N |

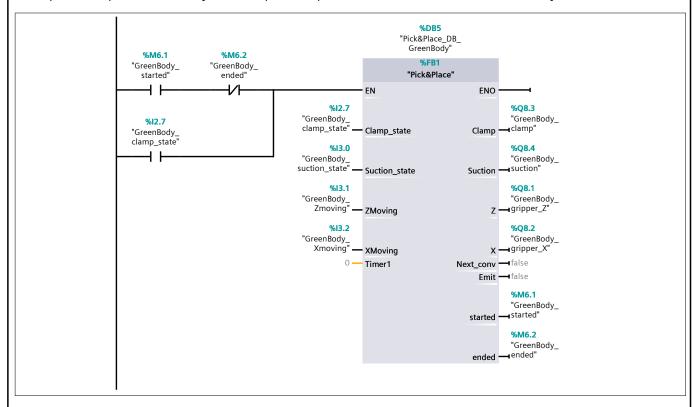
%M7.2

"M_blueBody_ir_
sensor"

(S)
```

Network 25:

If the produced product is a body, the first pick and place will work to move it to next conveyor



Network 26:

If the produced product is a body, the first pick and place will work to move it to next conveyor

```
%DB8
                                                                        "Pick&Place_DB_
                                                                          BlueBody"
   %M7.3
                        %M7.4
 "BlueBody_
                                                                             %FB1
                      "BlueBody_
  started"
                        ended"
                                                                         "Pick&Place"
                                                              ΕN
                                                                                             ENO
                                                    %14.0
                                                                                                     %Q10.3
                                             "BlueBody_
clamp_state"
                                                                                                     "BlueBody_
clamp"
    %14.0
"BlueBody_
clamp_state"
                                                            Clamp_state
                                                                                           Clamp
                                                     %14.1
                                                                                                     %010.4
                                               "BlueBody
                                                                                                     "BlueBody_
                                            suction_state"
                                                                                                    → suction"
                                                             Suction_state
                                                                                         Suction -
                                                                                                     %Q10.1
                                                                                                   "BlueBody_
⊣ gripper_Z"
                                               "BlueBody_
                                                Zmoving"
                                                              ZMoving
                                                    %14.3
                                                                                                     %Q10.2
                                               "BlueBody_
Xmoving" — XMoving
                                                                                                     "BlueBody_
                                                                                               x →gripper_X
                                                                                      Next_conv ─Ifalse
                                                        0 — Timer1
                                                                                            Emit —false
                                                                                                     %M7.3
                                                                                                     "BlueBody
                                                                                                    ⊣ started"
                                                                                          started -
                                                                                                     %M7.4
                                                                                                     "BlueBody_
                                                                                           ended -ended"
```

Network 27:

The positioner on the assembly conveyor clamps on the body waiting unitl the lid is produced and assembled

```
#12.0

"GreenAsm_ir_
sensor"

| N |

#M6.3

"M_greenAsm_ir_
sensor"
```

Network 28:

The positioner on the assembly conveyor clamps on the body waiting unitl the lid is produced and assembled

```
"BlueAsm_ir_ sensor" "BlueAsm_clamp"

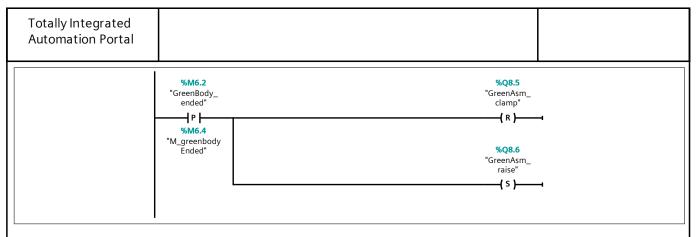
N | (S)

"MJ7.5

"M_BlueAsm_ir_ sensor"
```

Network 29:

After assembling the products the pick and place will raise a flag that will release the clamp of the positioner and then the positioner will raise allowing the assembled product to be moved from the production line



Network 30:

The positioner on the assembly conveyor clamps on the body waiting unitl the lid is produced and assembled

Network 31:

After assembling the products the pick and place will raise a flag that will release the clamp of the positioner and then the positioner will raise allowing the assembled product to be moved from the production line

Network 32:

After assembling the products the pick and place will raise a flag that will release the clamp of the positioner and then the positioner will raise allowing the assembled product to be moved from the production line

Network 33:

```
%M7.4

"BlueBody_
ended"

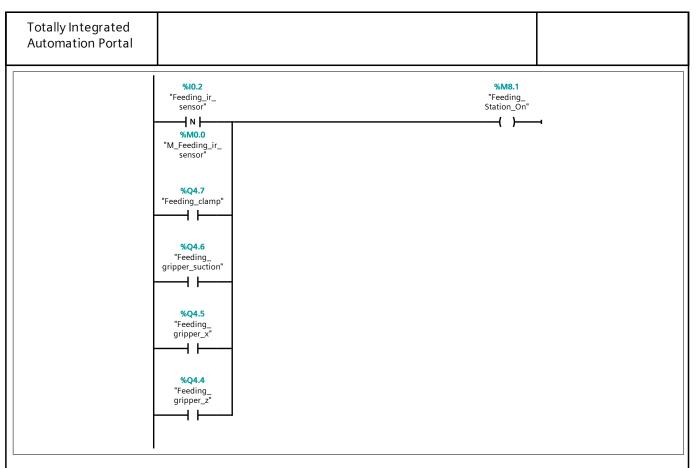
"Blue_Product_
Finished"

( )
```

Network 34:

Timer to wait for the assembly positioner after it was raised before it gets down again

Totally Integrated **Automation Portal** %DB6 "GreenAsm_ %M6.2 %M8.0 "GreenBody_ TON "Green_timer_ ended" Time memory" · IN ET — T#0MS T#3s -PT Network 35: %M8.0 %Q8.6 "Green_timer_ "GreenAsm_ memory" raise" (R)-Network 36: Timer to wait for the assembly positioner after it was raised before it gets down again %DB9 "BlueAsm_Timer" %M7.4 %M7.7 "BlueBody_ ended" TON "Blue_timer_ Time memory" - IN Q. T#3s — **PT** ET — T#0MS Network 37: %M7.7 "Blue_timer_ %Q10.6 memory" "BlueAsm_raise" -(R)-**Network 38: Feeding Station State** For HMI, if the feeding sesnor, the positioner, or the pick and place machine are active, indicates the feeding station is active on HMI



Network 39: Sorting Station State

For HMI, if the sorting sesnor, the positioner, or the pick and place machine are active, indicates the sorting station is active on HMI

```
%M8.2
                                                                                         "Sorting_Station_
On"
     %Q5.6
"Sorting_clamp"
      H F
                                                                                               <del>(</del> )-
     %Q5.5
"Sorting_clamp_
raise"
      +
     %Q6.1
"Sorting_gripper_
X"
     %Q6.0
"Sorting_gripper_
Z"
      %I1.5
   "Sorting_ir_
     sensor"
```

Network 40: Machining Center Blue State

Network 41: Machining Center Green State

Network 42: Assembly Station Blue State

For HMI, if the pick and place is active, this indicated that assembly station is active on HMI

```
%Q10.2
"BlueBody_
gripper_X"
                                                                                                 %M8.5
                                                                                            "Asm_Station_
Blue_On"
                                                                                                 <del>(</del> )–
      +
    %Q10.1
  "BlueBody_
gripper_Z"
      %Q9.3
  "BlueLid_X"
      +
    %010.4
  "BlueBody_
suction"
    %Q9.2
  "BlueLid_Z"
      +
    %Q10.6
"BlueAsm_raise"
```

Network 43: Assembly Station Green State

For HMI, if the pick and place is active, this indicated that assembly station is active on HMI

```
Totally Integrated
Automation Portal
                                        %Q8.5
                                                                                                                         %M8.6
                                     "GreenAsm_
                                                                                                                     "Asm_Station_
                                       clamp"
                                                                                                                      Green_On"
                                         4 H
                                                                                                                          ( )-
                                       %Q8.6
                                     "GreenAsm_
                                        raise"
                                         %Q8.2
                                    "GreenBody_
gripper_X"
                                         4 F
                                       %Q8.1
                                    "GreenBody_
gripper_Z"
                                         H F
                                       %Q7.3
                                    "GreenLid_X"
                                         <del>|</del> | |-
                                       %Q8.4
                                    "GreenBody_
suction"
                                        4 F
                                       %Q7.2
                                    "GreenLid_Z"
                                         4 F
                                       %Q8.6
                                     "GreenAsm_
raise"
                                         4 F
```

Network 44:

Counter fot the blue parts with preset value 3, the value of the current number is shown on HMI and in factory i/o

```
%DB12

"Blue_Counter"

"Blue_Product_
Finished"

CU
Q
false — R
3 — PV

CV

"Blue_Counter"

%M9.1

"Blue_Counter_
On"

%QW102

%QW102

**Blue_Count"
```

Network 45:

Counter fot the blue parts with preset value 3, the value of the current number is shown on HMI and in factory i/o

```
%M8.7

"Green_Product_Finished"

CU Q

false — R %QW100

PV CV — "Green_Count"
```

| Totally Integrated | | | | | | | |
|---|-----------------------------|------------------------------------|----|--|--|--|--|
| Automation Portal | | | | | | | |
| Network 46: | | | | | | | |
| Stop the production line if the stop or emergency is pushed | | | | | | | |
| | %I0.1 "Stop" | %Q5.1 "Feeding_conv3' | | | | | |
| | | | | | | | |
| | %I0.7 "Emergency" | %Q5.2 "Feeding_conv4" | | | | | |
| | | • • | - | | | | |
| | %Q4.3 "Feeding_conv1" | %Q5.3 "Feeding_conv5" | | | | | |
| | | %Q5.4 | • | | | | |
| | | "Feeding_conv6" | | | | | |
| | | %Q6.4 | | | | | |
| | - | "Green_conv_1" | - | | | | |
| | | %Q6.5 "Green_conv_2" | | | | | |
| | | | - | | | | |
| | | %Q6.6 "Green_conv_3" | | | | | |
| | | | - | | | | |
| | | %Q6.7 "Blue_conv_1" | _ | | | | |
| | | %Q7.0 | | | | | |
| | | "Blue_conv_2" | -1 | | | | |
| | | %Q7.1 | | | | | |
| | - | "Blue_conv_3" | - | | | | |
| | | %Q6.2 | | | | | |
| | | "Mc_centre_ green_start" | - | | | | |
| | | %Q6.3 | | | | | |
| | | "Mc_centre_blue start" { R } | - | | | | |
| | | %Q5.0 | | | | | |
| | | "Feeding_conv2" | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |