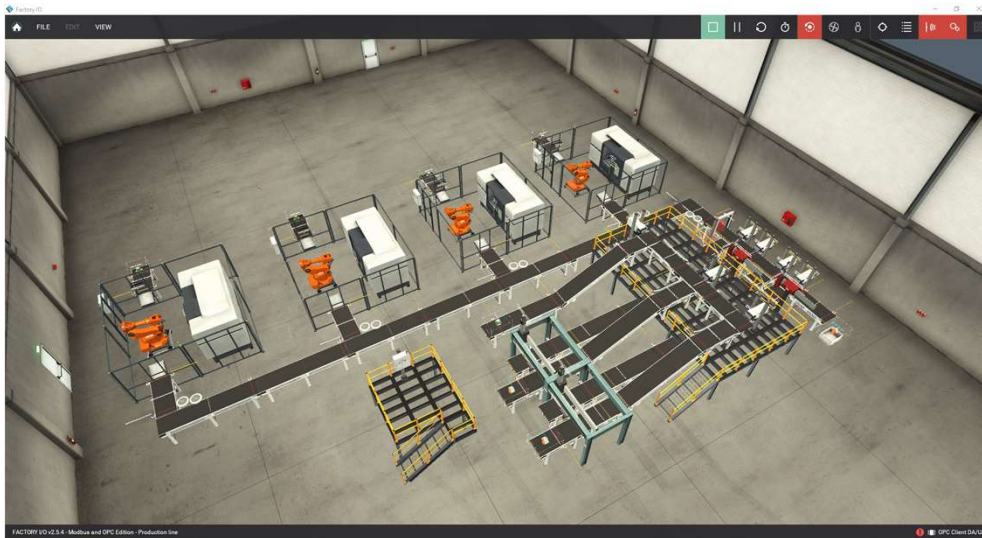


- Model production line



Factory IO

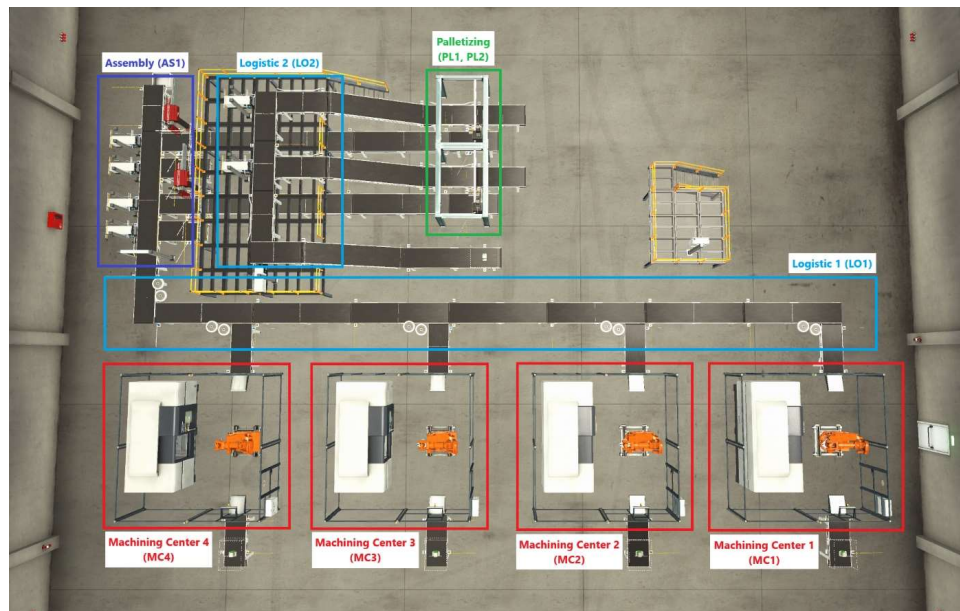
- **Functional Description**

The machining centers(+MC1-4) manufactures from two different materials, one base component and one cover component each, which are transported to the assembly station(+AS1) via a common logistics unit(+LO1). In the assembly station(+AS1), the component types and the material used are detected by a vision sensor(+AS1-B1). The combination of two material types and two component types, results in four different destinations for the material in the assembly station(+AS1). The components are sorted onto four different belts and clamped in the assembly position. For each material type, a pick-and-place unit picks up the cover component and places it on the base component. After assembly, the assembled components are transported to the material-related palletizing unit(+PL1 and +PL2). The empty pallets are transported in parallel from the pallet logistics(+LO2) to the palletizing units(+PL1 and +PL2). In the palletizing units, the components are stacked on the pallets with Pick&Place units and transported away.

**Subdivision of hardware zones**

The model is divided into the following hardware zones:

- +MC1 Machining Center 1
- +MC2 Machining Center 2
- +MC3 Machining Center 3
- +MC4 Machining Center 4
- +LO1 Logistic 1
- +AS1 Assembly 1
- +LO2 Logistic 2
- +PL1 Palletizing 1
- +PL2 Palletizing 2



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- **Hardware Zone Machining Center 1-4 +MC1-4**

As soon as the infeed conveyor is free, a new blank is loaded and transported to the end of the conveyor. The blank is conveyed via the infeed belt loading to the robot's pickup position, from which the robot grips the blank and loads the machining center. The robot grips the finished machined part in the machining center and places it on the outfeed conveyor. The component is transported on the outfeed conveyor to the end of the conveyor and is conveyed further after Logistic 1 has been released.



- **Hardware Zone Logistic 1 +LO1**

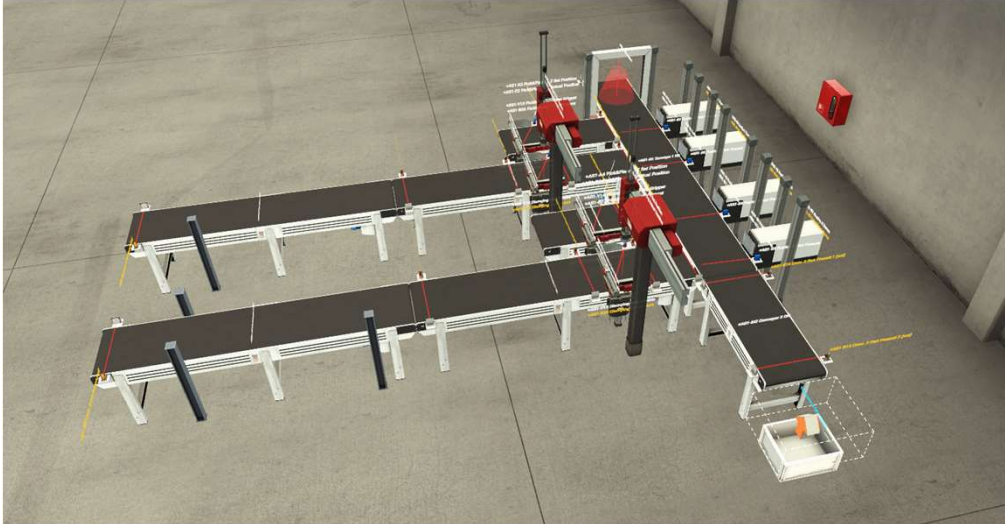
Logistic 1 transports the machined components from Machining Center 1-4 to Assembly 1. Logistic 1 releases Machining Center 1-4 for component removal, provided the requested conveyor is free. Logistic 1 in turn waits for the release of Assembly 1 HWZ to transport the components.





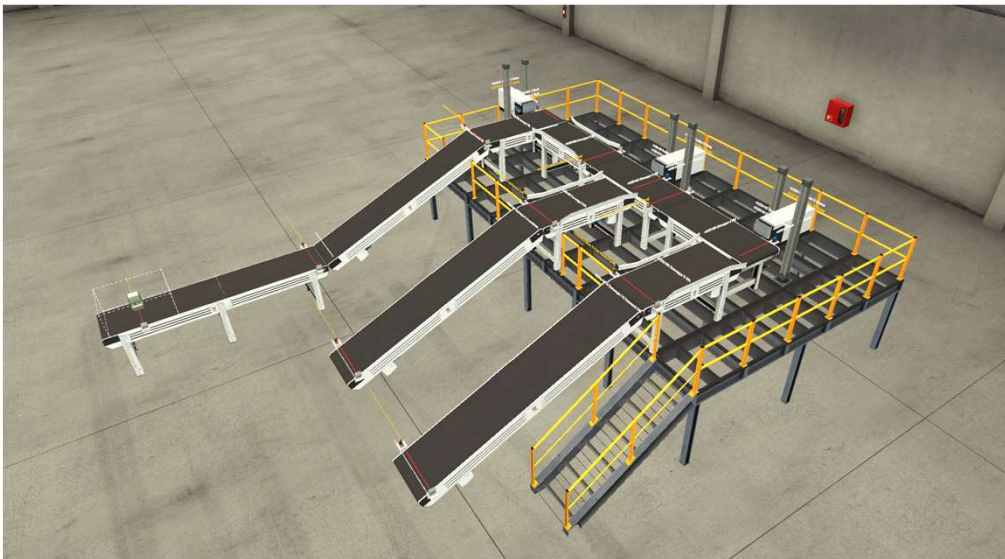
- **Hardware Zone Assembly +AS1**

At the beginning of the assembly HWZ there is a vision sensor with which the component type, base or cover component, is detected; defective components are also detected. The first assembly station is for green components and the second for blue components. In the respective assembly station, the lid components are conveyed onto the first belt (short belt) and aligned. Defective components are sorted out at the end of the belt in the reject box. The base components are conveyed to the respective second belt and clamped. The pick-and-place units then pick up the lid component and place it on the base component. The now assembled workpiece is unclamped again and transported to the end of the station. After receiving the release from Palletizing 1 and 2, the workpieces are transported away. When the sorting conveyor is free, Logistic 1 receives the release for infeed.



- **Hardware Zone Logistic 2 +LO2**

Logistic 2 is responsible for feeding empty pallets, a new pallet is always loaded when the loading station is free. At the end, the pallets are distributed to the two palletizing HWZ. The two palletizing HWZ are loaded as soon as they give the release.



- **Hardware zone Palletising 1-2 +PL1-2**

The finished workpieces are transported into the palletizing station via the workpiece feed belt and aligned. The pallets are transported into the station via the pallet conveyor. If a workpiece is in the station and a pallet is available, the Pick&Place unit picks up the workpiece and places it on the pallet. The loaded pallets are transported to the conveyor end of the unloading station. The palletizing HWZ gives the Assembly HWZ the go-ahead for workpiece feeding and the Logistic 2 HWZ the go-ahead for pallet feeding.



- **Driver**

Listed here are the driver modules used with an explanation of their function:

FB_FactoryIO_Axis	- Axis module for controlling all axes used
FB_FactoryIO_ClampingUnit	- Control module for the clamping units
FB_FactoryIO_Gripper	- Control module for the vacuum grippers
FB_FactoryIO_StopBlade	- Control module for the stoppers
FB_FactoryIO_Vision_Sensor	- Evaluation module for the vision sensor

## • Input/output assignment

The inputs and outputs of the model are assigned as follows (the designation input or output refers to the connected control):

### Hardwarezone Machining Center 1 +MC1

GVL\_FactoryIO\_MC1

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC1_B1	+MC1-B1 Infeed Part Present 1 (not)	:BOOL;
2	MC1_B2	+MC1-B2 Infeed Part Present 2 (not)	:BOOL;
3	MC1_IsBusy	+MC1 Is Busy	:BOOL;
4	MC1_Error	+MC1 Error	:BOOL;
5	MC1_DoorOpen	+MC1 Door Open	:BOOL;
6	MC1_Progress	+MC1 Progress [%]	:DINT;
7	MC1_B3	+MC1-B3 Outfeed Part Present (not)	:BOOL;
8	MC1_B4	+MC1-B4 Conveyor Part Present	:BOOL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC1_E1	+MC1-E1 Emitter	:BOOL;
2	MC1_M1	+MC1-M1 Infeed Conveyor ON	:BOOL;
3	MC1_Start	+MC1 Start	:BOOL;
4	MC1_Stop	+MC1 Stop	:BOOL;
5	MC1_Reset	+MC1 Reset	:BOOL;
6	MC1_ProduceLids	+MC1 Produce Lids	:BOOL;
7	MC1_M2	+MC1-M2 Outfeed Conveyor ON	:BOOL;

### Hardwarezone Machining Center 2 +MC2

GVL\_FactoryIO\_MC2

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC2_B1	+MC2-B1 Infeed Part Present 1 (not)	:BOOL;
2	MC2_B2	+MC2-B2 Infeed Part Present 2 (not)	:BOOL;
3	MC2_IsBusy	+MC2 Is Busy	:BOOL;
4	MC2_Error	+MC2 Error	:BOOL;
5	MC2_DoorOpen	+MC2 Door Open	:BOOL;
6	MC2_Progress	+MC2 Progress [%]	:DINT;
7	MC2_B3	+MC2-B3 Outfeed Part Present (not)	:BOOL;
8	MC2_B4	+MC2-B4 Conveyor Part Present	:BOOL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC2_E1	+MC2-E1 Emitter	:BOOL;
2	MC2_M1	+MC2-M1 Infeed Conveyor ON	:BOOL;
3	MC2_Start	+MC2 Start	:BOOL;
4	MC2_Stop	+MC2 Stop	:BOOL;
5	MC2_Reset	+MC2 Reset	:BOOL;
6	MC2_ProduceLids	+MC2 Produce Lids	:BOOL;
7	MC2_M2	+MC2-M2 Outfeed Conveyor ON	:BOOL;

#### Hardwarezone Machining Center 1 +MC1

##### Specification Inputs

- \*1 Infeed conveyor part present sensor 1
- \*2 Infeed conveyor part present sensor 2
- \*3 Machining centre working
- \*4 Machining centre error
- \*5 Machining centre door open
- \*6 Machining centre machining progress
- \*7 Outfeed part present
- \*8 Outfeed conveyor part present

##### Specification Outputs

- \*1 Load component
- \*2 Infeed conveyor M1 ON
- \*3 Machining centre start
- \*4 Machining centre stop
- \*5 Machining centre reset
- \*6 Machining centre produce lids
- \*7 Outfeed conveyor M2 ON

#### Hardwarezone Machining Center 2 +MC2

##### Specification

- \*1 Infeed conveyor part present sensor 1
- \*2 Infeed conveyor part present sensor 2
- \*3 Machining centre working
- \*4 Machining centre error
- \*5 Machining centre door open
- \*6 Machining centre machining progress
- \*7 Outfeed part present
- \*8 Outfeed conveyor part present

##### Specification

- \*1 Load component
- \*2 Infeed conveyor M1 ON
- \*3 Machining centre start
- \*4 Machining centre stop
- \*5 Machining centre reset
- \*6 Machining centre produce lids
- \*7 Outfeed conveyor M2 ON

## Hardwarezone Machining Center 3 +MC3

GVL\_FactoryIO\_MC3

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC3_B1	+MC3-B1 Infeed Part Present 1 (not)	:BOOL;
2	MC3_B2	+MC3-B2 Infeed Part Present 2 (not)	:BOOL;
3	MC3_IsBusy	+MC3 Is Busy	:BOOL;
4	MC3_Error	+MC3 Error	:BOOL;
5	MC3_DoorOpen	+MC3 Door Open	:BOOL;
6	MC3_Progress	+MC3 Progress [%]	:DINT;
7	MC3_B3	+MC3-B3 Outfeed Part Present (not)	:BOOL;
8	MC3_B4	+MC3-B4 Conveyor Part Present	:BOOL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC3_E1	+MC3-E1 Emitter	:BOOL;
2	MC3_M1	+MC3-M1 Infeed Conveyor ON	:BOOL;
3	MC3_Start	+MC3 Start	:BOOL;
4	MC3_Stop	+MC3 Stop	:BOOL;
5	MC3_Reset	+MC3 Reset	:BOOL;
6	MC3_ProduceLids	+MC3 Produce Lids	:BOOL;
7	MC3_M2	+MC3-M2 Outfeed Conveyor ON	:BOOL;

## Hardwarezone Machining Center 4 +MC4

GVL\_FactoryIO\_MC4

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC4_B1	+MC4-B1 Infeed Part Present 1 (not)	:BOOL;
2	MC4_B2	+MC4-B2 Infeed Part Present 2 (not)	:BOOL;
3	MC4_IsBusy	+MC4 Is Busy	:BOOL;
4	MC4_Error	+MC4 Error	:BOOL;
5	MC4_DoorOpen	+MC4 Door Open	:BOOL;
6	MC4_Progress	+MC4 Progress [%]	:DINT;
7	MC4_B3	+MC4-B3 Outfeed Part Present (not)	:BOOL;
8	MC4_B4	+MC4-B4 Conveyor Part Present	:BOOL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	MC4_E1	+MC4-E1 Emitter	:BOOL;
2	MC4_M1	+MC4-M1 Infeed Conveyor ON	:BOOL;
3	MC4_Start	+MC4 Start	:BOOL;
4	MC4_Stop	+MC4 Stop	:BOOL;
5	MC4_Reset	+MC4 Reset	:BOOL;
6	MC4_ProduceLids	+MC4 Produce Lids	:BOOL;
7	MC4_M2	+MC4-M2 Outfeed Conveyor ON	:BOOL;

### Hardwarezone Machining Center 3 +MC3 Specification Inputs

- \*1 Infeed conveyor part present sensor 1
- \*2 Infeed conveyor part present sensor 2
- \*3 Machining centre working
- \*4 Machining centre error
- \*5 Machining centre door open
- \*6 Machining centre machining progress
- \*7 Outfeed part present
- \*8 Outfeed conveyor part present

### Specification Outputs

- \*1 Load component
- \*2 Infeed conveyor M1 ON
- \*3 Machining centre start
- \*4 Machining centre stop
- \*5 Machining centre reset
- \*6 Machining centre produce lids
- \*7 Outfeed conveyor M2 ON

### Hardwarezone Machining Center 4 +MC4 Specification Inputs

- \*1 Infeed conveyor part present sensor 1
- \*2 Infeed conveyor part present sensor 2
- \*3 Machining centre working
- \*4 Machining centre error
- \*5 Machining centre door open
- \*6 Machining centre machining progress
- \*7 Outfeed part present
- \*8 Outfeed conveyor part present

### Specification Outputs

- \*1 Load component
- \*2 Infeed conveyor M1 ON
- \*3 Machining centre start
- \*4 Machining centre stop
- \*5 Machining centre reset
- \*6 Machining centre produce lids
- \*7 Outfeed conveyor M2 ON



## Hardwarezone Logistic 1 +LO1

GVL\_FactoryIO\_LO1

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	LO1_B1	+LO1-B1 Conv. 1 Part Present (not)	:BOOL;
2	LO1_B2	+LO1-B2 Conv. 2 Part Present (not)	:BOOL;
3	LO1_B3	+LO1-B3 Conv. 3 Part Present (not)	:BOOL;
4	LO1_B4	+LO1-B4 Conv. 4 Part Present (not)	:BOOL;
5	LO1_B5	+LO1-B5 Conv. 5 Part Present (not)	:BOOL;
6	LO1_B6	+LO1-B6 Conv. 6 Part Present (not)	:BOOL;
7	LO1_B7	+LO1-B7 Conv. 7 Part Present	:BOOL;
8	LO1_B8	+LO1-B8 Conv. 8 Part Present (not)	:BOOL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	LO1_M1	+LO1-M1 Conveyor 1 ON	:BOOL;
2	LO1_M2	+LO1-M2 Conveyor 2 ON	:BOOL;
3	LO1_M3	+LO1-M3 Conveyor 3 ON	:BOOL;
4	LO1_M4	+LO1-M4 Conveyor 4 ON	:BOOL;
5	LO1_M5	+LO1-M5 Conveyor 5 ON	:BOOL;
6	LO1_M6	+LO1-M6 Conveyor 6 ON	:BOOL;
7	LO1_M7	+LO1-M7 Conveyor 7 ON	:BOOL;
8	LO1_M8	+LO1-M8 Conveyor 8 ON	:BOOL;

## Hardwarezone Logistic 2 +LO2

GVL\_FactoryIO\_LO2

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	LO2_B1	+LO2-B1 Conv. 1 Part Present 1 (not)	:BOOL;
2	LO2_B2	+LO2-B2 Conv. 1 Part Present 2 (not)	:BOOL;
3	LO2_B3	+LO2-B3 Conv. 2 Part Present (not)	:BOOL;
4	LO2_B4	+LO2-B4 Conv. 3 Part Present	:BOOL;
5	LO2_B5	+LO2-B5 Conv. 4 Part Present (not)	:BOOL;
6	LO2_B6	+LO2-B6 Conv. 5 Part Present 1	:BOOL;
7	LO2_B7	+LO2-B7 Conv. 6 Part Present	:BOOL;
8	LO2_B8	+LO2-B8 Conv. 7 Part Present (not)	:BOOL;
9	LO2_B9	+LO2-B9 Conv. 8 Part Present (not)	:BOOL;
10	LO2_B10	+LO2-B10 Conv. 9 Part Present (not)	:BOOL;
11	LO2_B11	+LO2-B11 Conv. 10 Part Present (not)	:BOOL;
12	LO2_B12	+LO2-B12 Pusher 1 Home	:BOOL;
13	LO2_B13	+LO2-B13 Pusher 1 Work	:BOOL;
14	LO2_B14	+LO2-B14 Pusher 2 Home	:BOOL;
15	LO2_B15	+LO2-B15 Pusher 2 Work	:BOOL;
16	LO2_B16	+LO2-B16 Pusher 3 Home	:BOOL;
17	LO2_B17	+LO2-B17 Pusher 3 Work	:BOOL;
18	LO2_B18	+LO2-B18 Conv. 5 Part Present 2 (not)	:BOOL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	LO2_E1	+LO2-E1 Pallet Emitter	:BOOL;
2	LO2_M1	+LO2-M1 Conveyor 1 ON	:BOOL;
3	LO2_M2_F	+LO2-M2 Conveyor 2 Forward ON	:BOOL;
4	LO2_M2_B	+LO2-M2 Conveyor 2 Backward ON	:BOOL;
5	LO2_M3	+LO2-M3 Conveyor 3 ON	:BOOL;
6	LO2_M4	+LO2-M4 Conveyor 4 ON	:BOOL;
7	LO2_M5	+LO2-M5 Conveyor 5 ON	:BOOL;
8	LO2_M6	+LO2-M6 Conveyor 6 ON	:BOOL;
9	LO2_M7	+LO2-M7 Conveyor 7 ON	:BOOL;
10	LO2_M8_F	+LO2-M8 Conveyor 8 Forward ON	:BOOL;
11	LO2_M8_B	+LO2-M8 Conveyor 8 Backward ON	:BOOL;
12	LO2_M9	+LO2-M9 Conveyor 9 ON	:BOOL;
13	LO2_M10_F	+LO2-M10 Conveyor Forward 10 ON	:BOOL;
14	LO2_M10_B	+LO2-M10 Conveyor Backward 10 ON	:BOOL;
15	LO2_Y1	+LO2-Y1 Pusher 1 Home	:BOOL;
16	LO2_Y2	+LO2-Y2 Pusher 1 Work	:BOOL;
17	LO2_Y3	+LO2-Y3 Pusher 2 Home	:BOOL;
18	LO2_Y4	+LO2-Y4 Pusher 2 Work	:BOOL;
19	LO2_Y5	+LO2-Y5 Pusher 3 Home	:BOOL;
20	LO2_Y6	+LO2-Y6 Pusher 3 Work	:BOOL;

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## Hardwarezone Logistic 1 +LO1

### Specification Inputs

- \*1 Conveyor 1 part present
- \*2 Conveyor 2 part present
- \*3 Conveyor 3 part present
- \*4 Conveyor 4 part present
- \*5 Conveyor 5 part present
- \*6 Conveyor 6 part present
- \*7 Conveyor 7 part present
- \*8 Conveyor 8 part present

### Specification Outputs

- \*1 Conveyor 1 M1 ON
- \*2 Conveyor 2 M2 ON
- \*3 Conveyor 3 M3 ON
- \*4 Conveyor 4 M4 ON
- \*5 Conveyor 5 M5 ON
- \*6 Conveyor 6 M6 ON
- \*7 Conveyor 7 M7 ON
- \*8 Conveyor 8 M8 ON

## Hardwarezone Logistic 2 +LO2

### Specification Inputs

- \*1 Conveyor 1 part present 1
- \*2 Conveyor 1 part present 2
- \*3 Conveyor 2 part present
- \*4 Conveyor 3 part present
- \*5 Conveyor 4 part present
- \*6 Conveyor 5 part present 1
- \*7 Conveyor 6 part present
- \*8 Conveyor 7 part present
- \*9 Conveyor 8 part present
- \*10 Conveyor 9 part present
- \*11 Conveyor 10 part present
- \*12 Pusher 1 in home position
- \*13 Pusher 1 in work position
- \*14 Pusher 2 in home position
- \*15 Pusher 2 in work position
- \*16 Pusher 3 in home position
- \*17 Pusher 3 in work position
- \*18 Conveyor 5 part present 2

### Specification Outputs

- \*1 Load pallet
- \*2 Conveyor 1 M1 ON
- \*3 Conveyor 2 M2 forward ON
- \*4 Conveyor 2 M2 backward ON
- \*5 Conveyor 3 M3 ON
- \*6 Conveyor 4 M4 ON
- \*7 Conveyor 5 M5 ON
- \*8 Conveyor 6 M6 ON
- \*9 Conveyor 7 M7 ON
- \*10 Conveyor 8 M8 forward ON
- \*11 Conveyor 8 M8 backward ON
- \*12 Conveyor 9 M9 ON
- \*13 Conveyor 10 M10 forward ON
- \*14 Conveyor 10 M10 backward ON
- \*15 Pusher 1 to home position
- \*16 Pusher 1 to work position
- \*17 Pusher 2 to home position
- \*18 Pusher 2 to work position
- \*19 Pusher 3 to home position
- \*20 Pusher 3 to work position



## Hardwarezone Assembly +AS1

GVL\_FactoryIO\_AS1

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	AS1_B1	+AS1-B1 Vision Sensor	:DINT;
2	AS1_B2	+AS1-B2 Pusher 1 Part Present	:BOOL;
3	AS1_B3	+AS1-B3 Pusher 2 Part Present	:BOOL;
4	AS1_B4	+AS1-B4 Pusher 3 Part Present	:BOOL;
5	AS1_B5	+AS1-B5 Pusher 4 Part Present	:BOOL;
6	AS1_B6	+AS1-B6 Pusher 1 Home	:BOOL;
7	AS1_B7	+AS1-B7 Pusher 1 Work	:BOOL;
8	AS1_B8	+AS1-B8 Pusher 2 Home	:BOOL;
9	AS1_B9	+AS1-B9 Pusher 2 Work	:BOOL;
10	AS1_B10	+AS1-B10 Pusher 3 Home	:BOOL;
11	AS1_B11	+AS1-B11 Pusher 3 Work	:BOOL;
12	AS1_B12	+AS1-B12 Pusher 4 Home	:BOOL;
13	AS1_B13	+AS1-B13 Pusher 4 Work	:BOOL;
14	AS1_B14	+AS1-B14 Conv. 2 Part Present 1 (not)	:BOOL;
15	AS1_B15	+AS1-B15 Conv. 2 Part Present 2 (not)	:BOOL;
16	AS1_B16	+AS1-B16 Conv. 3 Part Present 2 (not)	:BOOL;
17	AS1_B17	+AS1-B17 Conv. 4 Part Present 2 (not)	:BOOL;
18	AS1_B18	+AS1-B18 Conv. 4 Part Present 3 (not)	:BOOL;
19	AS1_B19	+AS1-B19 Conv. 4 Part Present 4 (not)	:BOOL;
20	AS1_B20	+AS1-B20 Conv. 5 Part Present (not)	:BOOL;
21	AS1_B22	+AS1-B22 Conv. 6 Part Present 2 (not)	:BOOL;
22	AS1_B24	+AS1-B24 Conv. 7 Part Present 2 (not)	:BOOL;
23	AS1_B25	+AS1-B25 Conv. 7 Part Present 3 (not)	:BOOL;
24	AS1_B26	+AS1-B26 Conv. 7 Part Present 4 (not)	:BOOL;
25	AS1_B27	+AS1-B27 Conv. 8 Part Present (not)	:BOOL;
26	AS1_B28	+AS1-B28 Clamping Unit 1 Clamped	:BOOL;
27	AS1_B29	+AS1-B29 Clamping Unit 1 Limit	:BOOL;
28	AS1_B30	+AS1-B30 Clamping Unit 2 Clamped	:BOOL;
29	AS1_B31	+AS1-B31 Clamping Unit 2 Limit	:BOOL;
30	AS1_B32	+AS1-B32 Clamping Unit 3 Clamped	:BOOL;
31	AS1_B33	+AS1-B33 Clamping Unit 3 Limit	:BOOL;
32	AS1_B34	+AS1-B34 Clamping Unit 4 Clamped	:BOOL;
33	AS1_B35	+AS1-B35 Clamping Unit 4 Limit	:BOOL;
34	AS1_B36	+AS1-B36 Pick&Place 1 Part Present	:BOOL;
35	AS1_B37	+AS1-B37 Pick&Place 2 Part Present	:BOOL;
36	AS1_B39	+AS1-B39 Conv. 3 Part Present 1 (not)	:BOOL;
37	AS1_B40	+AS1-B40 Conv. 4 Part Present 1 (not)	:BOOL;
38	AS1_B41	+AS1-B41 Conv. 6 Part Present 1 (not)	:BOOL;
39	AS1_B42	+AS1-B42 Conv. 7 Part Present 1 (not)	:BOOL;
40	AS1_B43	+AS1-B43 Conv.3 Part Present 3	:BOOL;
41	AS1_B44	+AS1-B44 Conv.4 Part Present 3	:BOOL;
42	AS1_B45	+AS1-B45 Conv.6 Part Present 3	:BOOL;
43	AS1_B46	+AS1-B46 Conv.7 Part Present 3	:BOOL;
44	AS1_E1	+AS1-E1 Pick&Place 1 X Actual Position	:REAL;
45	AS1_E2	+AS1-E2 Pick&Place 1 Z Actual Position	:REAL;
46	AS1_E3	+AS1-E3 Pick&Place 2 X Actual Position	:REAL;
47	AS1_E4	+AS1-E4 Pick&Place 2 Z Actual Position	:REAL;

## Hardwarezone Assembly +AS1

GVL\_FactoryIO\_AS1

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	AS1_M1	+AS1-M1 Conveyor 1 ON	:BOOL;
2	AS1_M2	+AS1-M2 Conveyor 2 ON	:BOOL;
3	AS1_M3	+AS1-M3 Conveyor 3 ON	:BOOL;
4	AS1_M4	+AS1-M4 Conveyor 4 ON	:BOOL;
5	AS1_M5	+AS1-M5 Conveyor 5 ON	:BOOL;
6	AS1_M6	+AS1-M6 Conveyor 6 ON	:BOOL;
7	AS1_M7	+AS1-M7 Conveyor 7 ON	:BOOL;
8	AS1_M8	+AS1-M8 Conveyor 8 ON	:BOOL;
9	AS1_Y1	+AS1-Y1 Pusher 1 Home	:BOOL;
10	AS1_Y2	+AS1-Y2 Pusher 1 Work	:BOOL;
11	AS1_Y3	+AS1-Y3 Pusher 2 Home	:BOOL;
12	AS1_Y4	+AS1-Y4 Pusher 2 Work	:BOOL;
13	AS1_Y5	+AS1-Y5 Pusher 3 Home	:BOOL;
14	AS1_Y6	+AS1-Y6 Pusher 3 Work	:BOOL;
15	AS1_Y7	+AS1-Y7 Pusher 4 Home	:BOOL;
16	AS1_Y8	+AS1-Y8 Pusher 4 Work	:BOOL;
17	AS1_Y9	+AS1-Y9 Clamping Unit 3 Clamp	:BOOL;
18	AS1_Y10	+AS1-Y10 Clamping Unit 3 Raise	:BOOL;
19	AS1_Y11	+AS1-Y11 Clamping Unit 4 Clamp	:BOOL;
20	AS1_Y12	+AS1-Y12 Clamping Unit 4 Raise	:BOOL;
21	AS1_Y13	+AS1-Y13 Pick&Place 1 Close Gripper	:BOOL;
22	AS1_Y14	+AS1-Y14 Pick&Place 2 Close Gripper	:BOOL;
23	AS1_Y15	+AS1-Y15 Clamping Unit 1 Clamp	:BOOL;
24	AS1_Y16	+AS1-Y16 Clamping Unit 1 Raise	:BOOL;
25	AS1_Y17	+AS1-Y17 Clamping Unit 2 Clamp	:BOOL;
26	AS1_Y18	+AS1-Y18 Clamping Unit 2 Raise	:BOOL;
27	AS1_A1	+AS1-A1 Pick&Place 1 X Set Position	:REAL;
28	AS1_A2	+AS1-A2 Pick&Place 1 Z Set Position	:REAL;
29	AS1_A3	+AS1-A3 Pick&Place 2 X Set Position	:REAL;
30	AS1_A4	+AS1-A4 Pick&Place 2 Z Set Position	:REAL;

## Hardwarezone Assembly +AS1

### Specification Inputs

- \*1 Vision sensor
- \*2 Pusher 1 part present
- \*3 Pusher 2 part present
- \*4 Pusher 3 part present
- \*5 Pusher 4 part present
- \*6 Pusher 1 in home position
- \*7 Pusher 1 in work position
- \*8 Pusher 2 in home position
- \*9 Pusher 2 in work position
- \*10 Pusher 3 in home position
- \*11 Pusher 3 in work position
- \*12 Pusher 4 in home position
- \*13 Pusher 4 in work position
- \*14 Conveyor 1 part present 1
- \*15 Conveyor 2 part present 2
- \*16 Conveyor 3 part present 2
- \*17 Conveyor 4 part present 2
- \*18 Conveyor 4 part present 3
- \*19 Conveyor 4 part present 4
- \*20 Conveyor 5 part present
- \*21 Conveyor 6 part present 2
- \*22 Conveyor 7 part present 2
- \*23 Conveyor 7 part present 3
- \*24 Conveyor 7 part present 4
- \*25 Conveyor 8 part present
- \*26 Clamping unit 1 clamped
- \*27 Clamping unit 1 limit switch
- \*28 Clamping unit 2 clamped
- \*29 Clamping unit 2 limit switch
- \*30 Clamping unit 3 clamped
- \*31 Clamping unit 3 limit switch
- \*32 Clamping unit 4 clamped
- \*33 Clamping unit 4 limit switch
- \*34 Pick&Place 1 part present
- \*35 Pick&Place 2 part present
- \*36 Conveyor 3 part present 1
- \*37 Conveyor 4 part present 1
- \*38 Conveyor 6 part present 1
- \*39 Conveyor 7 part present 1
- \*40 Conveyor 3 part present 3
- \*41 Conveyor 4 part present 3
- \*42 Conveyor 6 part present 3
- \*43 Conveyor 7 part present 3
- \*44 Pick&Place 1 X actual position
- \*45 Pick&Place 1 Z actual position
- \*46 Pick&Place 2 X actual position
- \*47 Pick&Place 2 Z actual position

## Hardwarezone Assembly +AS1

### Specification Outputs

- \*1 Conveyor 1 M1 ON
- \*2 Conveyor 2 M2 ON
- \*3 Conveyor 3 M3 ON
- \*4 Conveyor 4 M4 ON
- \*5 Conveyor 5 M5 ON
- \*6 Conveyor 6 M6 ON
- \*7 Conveyor 7 M7 ON
- \*8 Conveyor 8 M8 ON
- \*9 Pusher 1 to home position
- \*10 Pusher 1 to work position
- \*11 Pusher 2 to home position
- \*12 Pusher 2 to work position
- \*13 Pusher 3 to home position
- \*14 Pusher 3 to work position
- \*15 Pusher 4 to home position
- \*16 Pusher 4 to work position
- \*17 Clamping unit 3 close clamp
- \*18 Clamping unit 3 raise clamp
- \*19 Clamping unit 4 close clamp
- \*20 Clamping unit 4 raise clamp
- \*21 Pick&Place 1 close gripper
- \*22 Pick&Place 2 close gripper
- \*23 Clamping unit 1 close clamp
- \*24 Clamping unit 1 raise clamp
- \*25 Clamping unit 2 close clamp
- \*26 Clamping unit 2 raise clamp
- \*27 Pick&Place 1 X set position
- \*28 Pick&Place 1 Z set position
- \*29 Pick&Place 2 X set position
- \*30 Pick&Place 2 Z set position

## Hardwarezone Palletizing 1 +PL1

GVL\_FactoryIO\_PL1

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	PL1_B1	+PL1-B1 Conv. 1 Part Present (not)	:BOOL;
2	PL1_B2	+PL1-B2 Conv. 2 Part Present 1 (not)	:BOOL;
3	PL1_B3	+PL1-B3 Conv. 3 Part Present (not)	:BOOL;
4	PL1_B4	+PL1-B4 Conv. 4 Part Present 2 (not)	:BOOL;
5	PL1_B5	+PL1-B5 Clamping Unit 1 Clamped	:BOOL;
6	PL1_B6	+PL1-B6 Clamping Unit 1 Limit	:BOOL;
7	PL1_B7	+PL1-B7 Pick&Place Part Present	:BOOL;
8	PL1_B8	+PL1-B8 Conv. 2 Part Present 2 (not)	:BOOL;
9	PL1_B9	+PL1-B9 Conv. 4 Part Present 1 (not)	:BOOL;
10	PL1_E1	+PL1-E1 Pick&Place X Actual Position	:REAL;
11	PL1_E2	+PL1-E2 Pick&Place Y Actual Position	:REAL;
12	PL1_E3	+PL1-E3 Pick&Place Z Actual Position	:REAL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	PL1_M1	+PL1-M1 Conveyor 1 ON	:BOOL;
2	PL1_M2	+PL1-M2 Conveyor 2 ON	:BOOL;
3	PL1_M3	+PL1-M3 Conveyor 3 ON	:BOOL;
4	PL1_M4	+PL1-M4 Conveyor 4 ON	:BOOL;
5	PL1_Y1	+PL1-Y1 Stop Blade UP	:BOOL;
6	PL1_Y2	+PL1-Y2 Clamping Unit 1 Clamp	:BOOL;
7	PL1_Y3	+PL1-Y3 Clamping Unit 1 Raise	:BOOL;
8	PL1_Y4	+PL1-Y4 Pick&Place Close Gripper	:BOOL;
9	PL1_A1	+PL1-A1 Pick&Place X Set Position	:REAL;
10	PL1_A2	+PL1-A2 Pick&Place Y Set Position	:REAL;
11	PL1_A3	+PL1-A3 Pick&Place Z Set Position	:REAL;

## Hardwarezone Palletizing 2 +PL2

GVL\_FactoryIO\_PL2

Input Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	PL2_B1	+PL2-B1 Conv. 1 Part Present (not)	:BOOL;
2	PL2_B2	+PL2-B2 Conv. 2 Part Present 1 (not)	:BOOL;
3	PL2_B3	+PL2-B3 Conv. 3 Part Present (not)	:BOOL;
4	PL2_B4	+PL2-B4 Conv. 4 Part Present 2 (not)	:BOOL;
5	PL2_B5	+PL2-B5 Clamping Unit 1 Clamped	:BOOL;
6	PL2_B6	+PL2-B6 Clamping Unit 1 Limit	:BOOL;
7	PL2_B7	+PL2-B7 Pick&Place Part Present	:BOOL;
8	PL2_B8	+PL2-B8 Conv. 2 Part Present 2 (not)	:BOOL;
9	PL2_B9	+PL2-B9 Conv. 4 Part Present 1 (not)	:BOOL;
10	PL2_E1	+PL2-E1 Pick&Place X Actual Position	:REAL;
11	PL2_E2	+PL2-E2 Pick&Place Y Actual Position	:REAL;
12	PL2_E3	+PL2-E3 Pick&Place Z Actual Position	:REAL;

Output Nr.	PLC Variable name	Factory IO -Variable name	Daten type
1	PL2_M1	+PL2-M1 Conveyor 1 ON	:BOOL;
2	PL2_M2	+PL2-M2 Conveyor 2 ON	:BOOL;
3	PL2_M3	+PL2-M3 Conveyor 3 ON	:BOOL;
4	PL2_M4	+PL2-M4 Conveyor 4 ON	:BOOL;
5	PL2_Y1	+PL2-Y1 Stop Blade UP	:BOOL;
6	PL2_Y2	+PL2-Y2 Clamping Unit 1 Clamp	:BOOL;
7	PL2_Y3	+PL2-Y3 Clamping Unit 1 Raise	:BOOL;
8	PL2_Y4	+PL2-Y4 Pick&Place Close Gripper	:BOOL;
9	PL2_A1	+PL2-A1 Pick&Place X Set Position	:REAL;
10	PL2_A2	+PL2-A2 Pick&Place Y Set Position	:REAL;
11	PL2_A3	+PL2-A3 Pick&Place Z Set Position	:REAL;



# Selmo

## Hardwarezone Palletizing 1 +PL1

### Specification Inputs

- \*1 Conveyor 1 part present
- \*2 Conveyor 2 part present 1
- \*3 Conveyor 3 part present
- \*4 Conveyor 4 part present 2
- \*5 Clamping unit clamped
- \*6 Clamping unit limit switch
- \*7 Pick&Place 1 part present
- \*8 Conveyor 2 part present 2
- \*9 Conveyor 4 part present 1
- \*10 Pick&Place X actual position
- \*11 Pick&Place Y actual position
- \*12 Pick&Place Z actual position

### Specification Outputs

- \*1 Conveyor 1 M1 ON
- \*2 Conveyor 2 M2 ON
- \*3 Conveyor 3 M3 ON
- \*4 Conveyor 4 M4 ON
- \*5 Stopper up
- \*6 Clamping unit close clamp
- \*7 Clamping unit raise clamp
- \*8 Pick&Place close gripper
- \*9 Pick&Place X set position
- \*10 Pick&Place Y set position
- \*11 Pick&Place Z set position

## Hardwarezone Palletizing 2 +PL2

### Specification Inputs

- \*1 Conveyor 1 part present
- \*2 Conveyor 2 part present 1
- \*3 Conveyor 3 part present
- \*4 Conveyor 4 part present 2
- \*5 Clamping unit clamped
- \*6 Clamping unit limit switch
- \*7 Pick&Place 1 part present
- \*8 Conveyor 2 part present 2
- \*9 Conveyor 4 part present 1
- \*10 Pick&Place X actual position
- \*11 Pick&Place Y actual position
- \*12 Pick&Place Z actual position

### Specification Outputs

- \*1 Conveyor 1 M1 ON
- \*2 Conveyor 2 M2 ON
- \*3 Conveyor 3 M3 ON
- \*4 Conveyor 4 M4 ON
- \*5 Stopper up
- \*6 Clamping unit close clamp
- \*7 Clamping unit raise clamp
- \*8 Pick&Place close gripper
- \*9 Pick&Place X set position
- \*10 Pick&Place Y set position
- \*11 Pick&Place Z set position