

1910595

by Kieran Gower

FILE	11848_KIERAN_GOWER_1910595_179198_708295603.DOCX (12.65M)		
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Assignment: 2 Integrated Automation Systems

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Table of Content

Task 1 – Research

Task 2 – System Overview and Operation

Task 3 – Health and Safety, Maintenance and Reliability Requirements

Task 4 – System Design Adaptation

Task 5 - Conclusions and Recommendations

Task 6 – Team Working

Task 7 – Citation List

Task 8 – Appendix

Task 1 – Research

Use of 11pt Arial, full justification with 1.5 line spacing allows easier reading and marking

Industry 4.0 is the 4th revolution that has occurred in the manufacturing field worldwide. It is the name for the change to automation and digital links within systems which has been introduced within industrial processes over the previous few years. A flagship of Industry 4.0 is the M2M communication network (Machine to Machine). M2M allows for devices within a network to operate autonomously with no need for human interaction. It is used primarily to transfer data from sensors through a network. Ethernet is a commonly used network system in M2M which makes the network cost effective. M2M systems can be monitored and observed remotely from a location other than on site stood next to the system, it can be accessed from home, from another part of the building or remotely from laptops / handheld devices. The system also reduces downtime of networks or equipment as they can be constantly monitored so faults are picked up in early stages, before the equipment would fail. This reduces the production losses from downtime and the amount of maintenance on the equipment can be reduced due to its constant monitoring. It can also be beneficial between companies so one company can monitor another companies' system and provide servicing or reports to the other company prior to a piece of equipment failing and monitoring the equipment between service intervals every 1/2/3 months depending on the equipment. **Figure 1** shows some of the applications for M2M communication modules.

[How Wireless Logic delivers SIM-based secure connectivity to multiple IoT-enabled sectors](#)

[What is Machine-to-Machine \(M2M\)? \(techtarget.com\)](#)

Incorrectly cited, this is not the Harvard Method

Figure 1 [m2m applications - Bing images](#)



Parameters such as temperature, noise, pressure, vibration, can be monitored via M2M and if the system contained network sensors that had an internet connection via hub or 3G/4G

the system could then order spare parts autonomously if a high or low parameter is met in the monitoring stages. This would also allow engineers to be notified in advance if a piece of equipment began to stray from its running parameters, giving early warnings for preventative maintenance which would potentially be missed if that system was not in place and the equipment began to fail on a weekend / bank holiday. Inventory can also be tracked using M2M so stock levels on site can be monitored and alerted when essential spares are below a minimum set number, this prevents the company running out of vital spares if equipment begins to fail, a business would also be able to track / monitor shipment of equipment or spares and the conditions of the storage for them, giving live updates of location and conditions which would be vital for businesses in the food or animal shipment industry where parameters such as temperature or pressure would be vital in the survival of the animal or food in transit. Cloud computing alongside M2M allows the devices on the M2M network to be monitored globally as long as there is signal, this is vital for businesses with worldwide sites or departments and allows things such as software updates to be carried out live, from another part of the world. This reduces the need for in-house servers, in turn, reducing the cost for maintenance or updates on the servers.

[Machine-to-Machine \(M2M\) Applications - Adaptive Modules](#)

Incorrectly cited, this is not the Harvard Method

Task 2 – System Overview and Operation

Figure 2 shows an overview of the CIM System and the subsystems within. There are 5 stations within the system

1. Vision Inspection
2. Pneumatic Station
3. Mitsubishi Robot
4. Process Station
5. Hydraulic Station

There are 6 PLC's and 5 HMI's within the CIM system and each device is connected to the network via profinet switching, these can be seen in **Figure 3**. In the Pneumatic Station, a load can either be a stamped part or a round part, the pneumatic arm is used to load and unload the wagon. At the Vision Inspection Station there is a Cognex Camera which is used to quality check the part and determine whether or not the part has met the desired quality requirements of the system. The operator can set parameters for the camera in the system which then enables the camera to distinguish between a 'pass' part and a 'fail' part. At the Hydraulic Station the stamps are positioned into a location where they are pressed into pallets to ensure they are secure. For health and safety, there is a sensor situated in the hydraulic section of the system which halts the system if there is interruption in the beam. PLC 106 controls the Mitsubishi Robot and is linked with the Finishing Robot with the use of RS 232 module. A specific binary code is given to distinguish each wagon in the system, with the use of inductive sensors, the sensor sends a signal to the PLC to identify its location in the system. The binary code is withheld underneath each wagon and with the use of an actuator, **Figure 4** shows the 5 inductive sensors that count the binary coding, the wagon can be held or released as the sensors could the code for each one prior to moving to the next station.

Figure 2

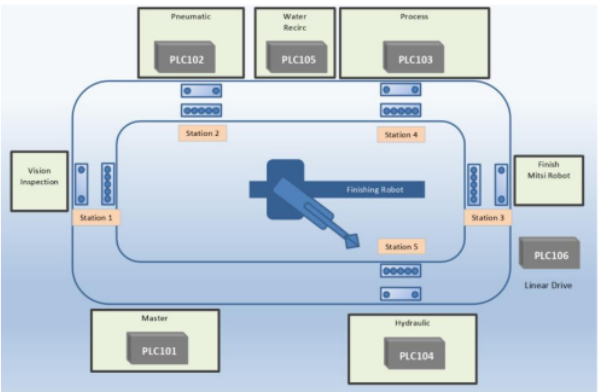


Figure 3

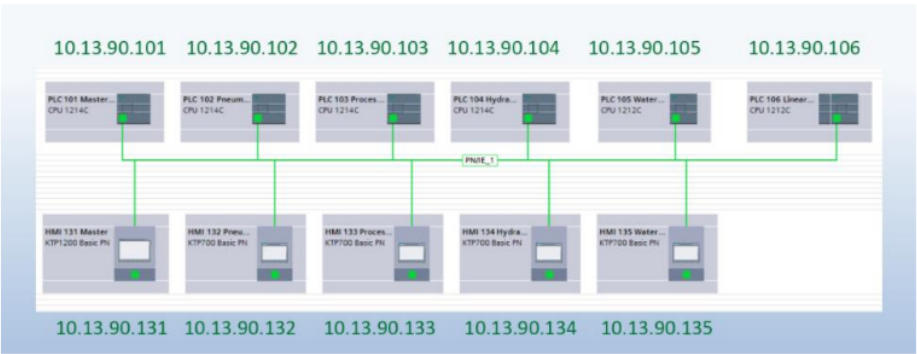
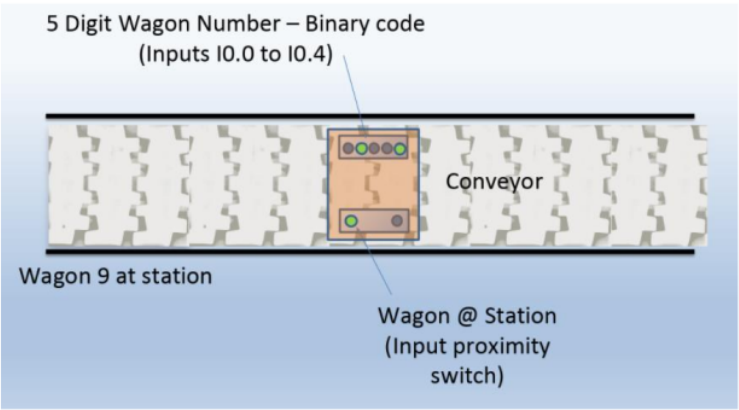


Figure 4



Operation

Referring to **Figure 5** which shows the set point and process values for the CIM System.

Figure 5

SP	PV	Description
0	1000	Empty Wagon (No work)
2000	2000	Wagon + Pallet (No work)
3000	3000	Wagon + Pallet + Stamp (No work)
3100	3000	Wagon + Pallet + Stamp (To be Inspected)
3100	3101	Wagon + Pallet + Stamp (Passed Inspection; To be Finished)
3100	3102	Wagon + Pallet + Stamp (Failed Inspection)
4000	4000	Wagon + Pallet + Round CH1 (No work)
4200	4000	Wagon + Pallet + Round CH1 (To be Inspected)
4210	4000	Wagon + Pallet + Round CH1 (To be Processed) (To be Inspected)
4200	4203	Wagon + Pallet + Round CH1 (Passed Inspection)
4210	4203	Wagon + Pallet + Round CH1 (To be Processed) (Passed Inspection)
4200	4204	Wagon + Pallet + Round CH1 (Failed Inspection) (To waste)
4210	4214	Wagon + Pallet + Round CH1 (Failed Inspection) (To waste)
5000	5000	Wagon + Pallet + Round CH2 (No work)
5300	5000	Wagon + Pallet + Round CH2 (To be Inspected)
5320	5000	Wagon + Pallet + Round CH2 (To be Processed) (To be Inspected)
5300	5305	Wagon + Pallet + Round CH2 (Passed Inspection)
5320	5305	Wagon + Pallet + Round CH2 (To be Processed) (Passed Inspection)
5300	5306	Wagon + Pallet + Round CH2 (Failed Inspection) (To waste)
5320	5306	Wagon + Pallet + Round CH2 (Failed Inspection) (To waste)
4210	4213	Wagon + Pallet + Round CH1 (To be Finished)
5320	5325	Wagon + Pallet + Round CH2 (To be Finished)
6000	6000	Finished Product to Store (To be Inspected)
6000	6007	Finished Product (Passed Inspection) (To Store)
6000	6008	Finished Product (Failed Inspection) (To waste)

The CIM system software contains a variety of programming languages which aid its process, Ladder FBD and SCL logic is used in the programme. Each individual PLC communicates with the Master PLC with the use of hard wiring, and some GET and PUT instructions. Each PLC contains a data block for the Master PLC with GET and PUT instructions identical for each PLC with the Master. Each GET and PUT command must be given a hardware tag within the PLC. Within the CIM System the process begins via a pin which is loaded into wagon, the system is monitoring the wagon using a 4-digit code which memorizes the state of the wagon in accordance with the PV and SP along with the individual binary code. Each code is significant to each station on the CIM System. After the loading station, the wagon would be moved to the vision station to be inspected, if the inspection fails the item will then be put into the rejection bin, if the item passes inspection the wagon would be transported to station 4. At this station, the pin would be submerged in tanks for cleaning purposes before being coated with aid of the robotic arm. The item is then replaced on the wagon and revisits the vision station to check for defects in the coating. If defects are found then it will be transported to the rejection bin again, if passed the robotic arm will pick up the pin and move it to station 5. In this station the finalised pin will be pressed into plastic to create a final product.

Task 3 – Health and Safety, Maintenance and Reliability Requirements

Produce a risk assessment for the system and make suitable suggestions on how the system could be made safer and conform to current regulations. Explain the maintenance and reliability requirements of the system and the existing measures that provide indication to engineers. *This task can be discussed in groups but explained individually.*

Hazard Location	Hazard	Person(s) At Risk	Risk Matrix Low / Medium / High	Existing Controls
Hydraulic Station	Electric Shock	Pupils	L	Only Trained and Authorised person to use the equipment. No unauthorised visitors PPE must be worn Isolator must be locked to prevent access to live terminals Students must be supervised by competent Staff Member at all times Low Voltage used no 3 phase Routine Maintenance Pre-Start Checks E stops
	Skin Irritation	Staff	L	
	Moving Parts	Visitors	L	
Process Station	Electric Shock	Pupils	L	Only Trained and Authorised person to use the equipment. No unauthorised visitors PPE must be worn Isolator must be locked to prevent access to live terminals Students must be supervised by competent Staff Member at all times Low Voltage used no 3 phase
	Moving Parts	Staff Visitors	L	

				Routine Maintenance Pre-Start Checks E stops
Conveyor	Electric Shock Moving Parts	Pupils Staff Visitors	L L	Only Trained and Authorised person to use the equipment. No unauthorised visitors PPE must be worn Isolator must be locked to prevent access to live terminals Students must be supervised by competent Staff Member at all times Low Voltage used no 3 phase Routine Maintenance Pre-Start Checks E stops
Vison Station	Electric Shock Moving Parts	Pupils Staff Visitors	L L	Only Trained and Authorised person to use the equipment. No unauthorised visitors PPE must be worn Isolator must be locked to prevent access to live terminals Students must be supervised by competent Staff Member at all times Low Voltage used no 3 phase Routine Maintenance Pre-Start Checks E stops

Various Electrical Equipment	Electric Shock	Pupils	L	Only Trained and Authorised person to use the equipment. No unauthorised visitors PPE must be worn Isolator must be locked to prevent access to live terminals Students must be supervised by competent Staff Member at all times Low Voltage used no 3 phase Routine Maintenance Pre-Start Checks E stops Cable in Trunking when across floor Good housekeeping
	Slips, Trips and Falls	Staff Visitors	L	

Further safety modifications could be made to the CIM system which would in turn make it safer to use and safer for the pupils / staff / visitors around it. An increase in the number of barriers around the CIM system would be needed to prevent someone from leaning over or around the conveyor / holding tanks / robotic arm and causing injury or harm to themselves or others. A solid barrier or a laser beam would be ideal so that when the beam is broken it acts as an E stop and shuts the process down immediately, the process would then have to be restarted manually to prevent further injury.

Task 4 – System Design Adaptation

To improve the performance of the system a series of modifications were implemented in the system. Alongside the handshaking signals, Get and Put instructions were implemented.

The Get and Put instructions were implemented in each PLC to the Master 101.

Each Get and Put instruction between each PLC and the Master PLC along with the tag list and data block for each can be seen in **Appendix 1**

Figure 6 shows the count status for the Linear Drive PLC 106 in the Master PLC 101 indicating that the communication is OK between 106 and the Master. The linear position of the robotic arm can also be seen as 589.93.

Figure 6

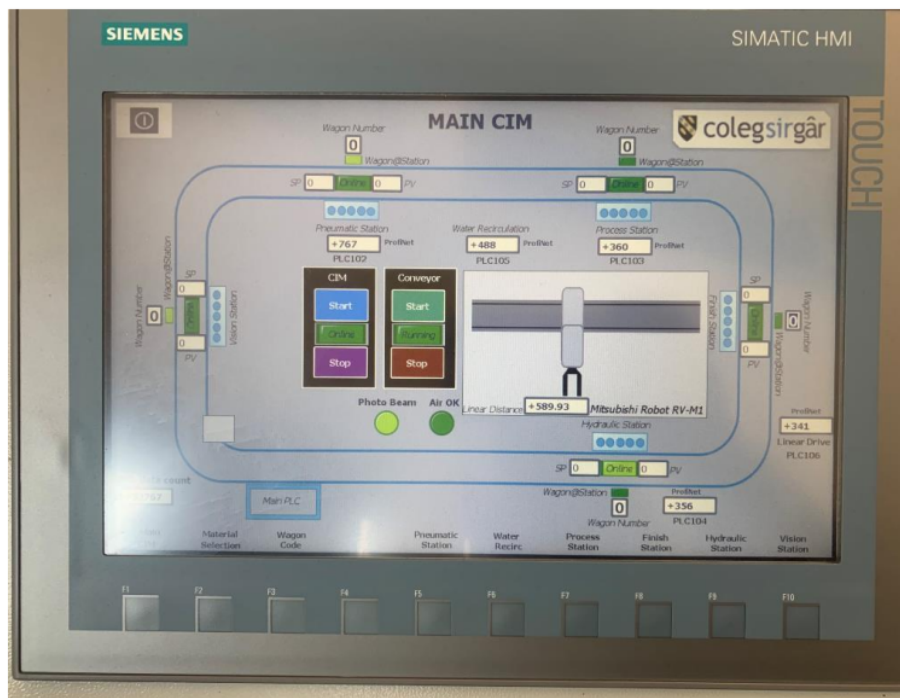


Figure 7 shows the re designed image of the Mitsubishi Robot on the main HMI screen and it shows that the position is animated as the location of the robot can be seen with its linear distance in the image.

Figure 7

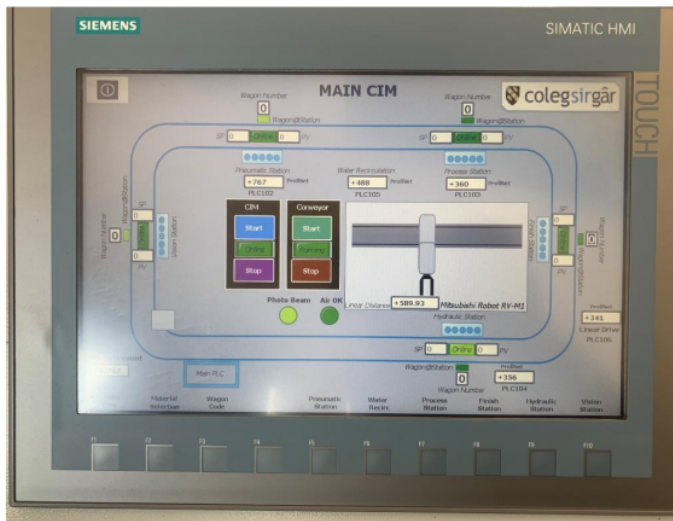


Figure 8 shows the programme block created to display the linear distance of the robotic arm.

Figure 8

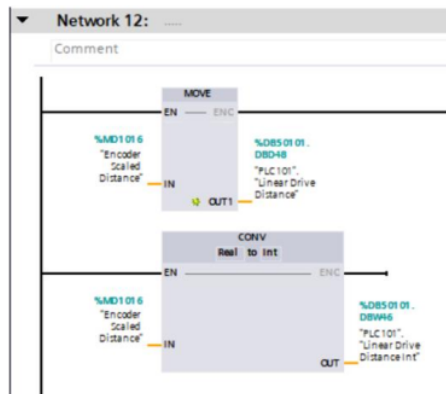


Figure 9 shows the additional diagnostic screen to assist an engineer for improved maintenance, containing manual pump control, levels for both tanks, a comms OK signal to the Master PLC and values for the flow transmitter along with a common alarm light.

Figure 9



Figure 10 shows the additional screen to assist an engineer for improved maintenance, this includes manual control for the robotic arm with left and right limit indicators, along with indicators for the robot to monitor its condition throughout the operation.

Figure 10

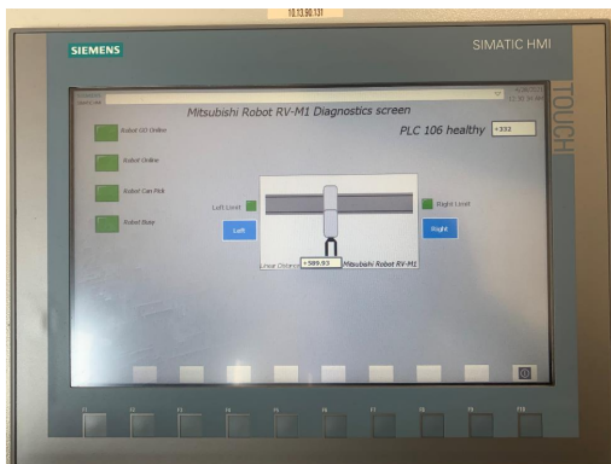


Figure 11 shows the Air OK on the Master HMI screen which does not allow the conveyor to run unless the air pressure in the system hits a set parameter.

Figure 11



Figure 12 shows the Air OK interlock in the programme

Figure 12

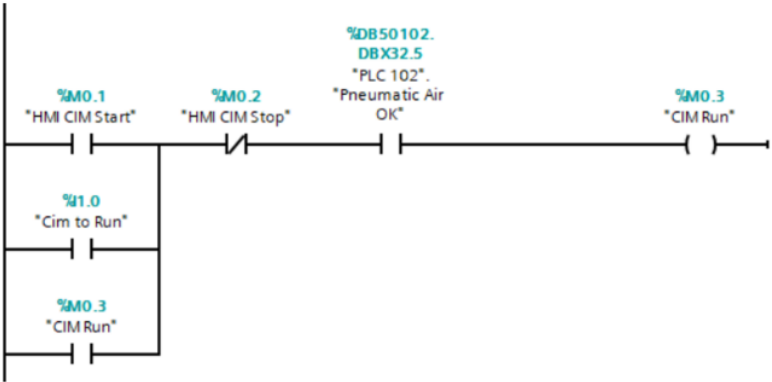


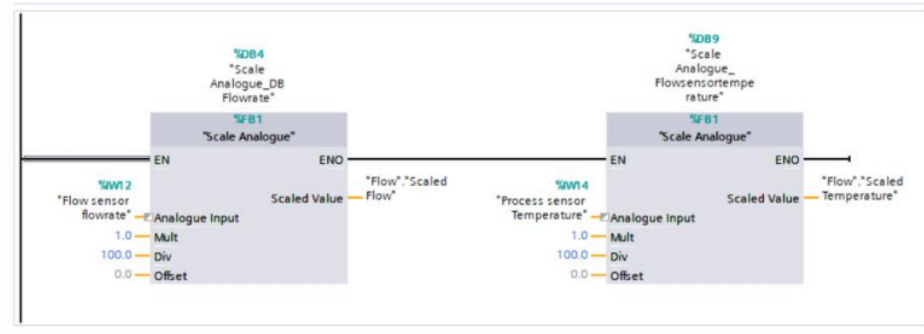
Figure 13 shows the diagnostic screen with the added information for water recirculation from the IO link flow transmitter

Figure 13



Figure 14 shows the block created to calculate the desired information in the programme which was then tagged in the diagnostic screen

Figure 14



Task 5 – Conclusions and Recommendations

To aid with understanding of Industry 4.0 and M2M communication, the topic was researched with specific regards to manufacturing systems and the applications of M2M in modern day industrial processes. The CIM System in which the investigation was based around was then investigated, giving a brief overview along with a detailed description of the process of the system and each PLC and their connections with the Master, along with how the wagons on the CIM System are identified and controlled using the programme. A risk assessment was drawn up to identify the hazards in and around the CIM System and the control measures in place to reduce the risk of a hazard and an accident occurring using risk level matrix to identify areas of risk that would be medium or high and introducing relevant controls in place to reduce to a low. Recommendations and suggestions were also made to improve safety of the CIM System. Modifications were then implemented to allow Get and Put communication to the Master and the other PLC's in the system. These Get and Put instructions were hard wired in parallel with the handshaking signals already in place in the programme. The modification of Get and Put signals can get rid of outputting the I/O's from the PLC via hardwired signals and also a reduction in cable. 2 additional diagnostic screens were created to aid the maintenance engineer in carrying out diagnostic and fault-finding tasks, ensuring important information stood out on the screen which would reduce down time and increase cost saving on live equipment. Each of the specifications set in the brief had been met with proof of each stage throughout the assignment. The finishing station would benefit from a more modern robotic arm as the current robotic arm is slow and sluggish in comparison to what is available in the market in present day, the upgrade would increase the cycle time of the system which in turn would improve numbers in production on a plant, and with a newer robotic arm you would benefit from a more accurate, faster and more reliable part of the system.

Task 6 – Team Working

Use the third Person

During the investigation I worked in a team and Dorian and Joe, our workload was split equally throughout the investigation with everyone contributing independently with shared opinions on every group task, each group task was brainstormed, and the input was equal from us all. Dorian was primarily working on implementing the changes on the programme, Joe was most influenced on the Health and Safety, Maintenance and Reliability and I was most influenced on the system overview and operation ensuring everyone was clear on the operation of the CIM System and we cross referenced our group work prior to writing in the investigation to ensure all our work correlated well.

Task 7 – Citation List

Listing method for sources is incorrect, this is not Harvard

[m2m applications - Bing images](#)

[Machine-to-Machine \(M2M\) Applications - Adaptive Modules](#)

[How Wireless Logic delivers SIM-based secure connectivity to multiple IoT-enabled sectors](#)

[What is Machine-to-Machine \(M2M\)? \(techtarget.com\)](#)

[IoT M2M - How Machine 2 Machine Works and its Applications - DataFlair \(data-flair.training\)](#)

Task 8 – Appendix

PLC 106 Get and Puts

Siemens - C:\Users\evand\Documents\Automation\CM Complete System_V16\CM Complete System_V16

Project: CM Complete System_V16 - PLC 101 Master - 0 [CPU 1214C-2 DP] - Program blocks - PLC 106 [0850106]

PLC 106 (snapshot created: 2/28/2020 5:09:49 PM)

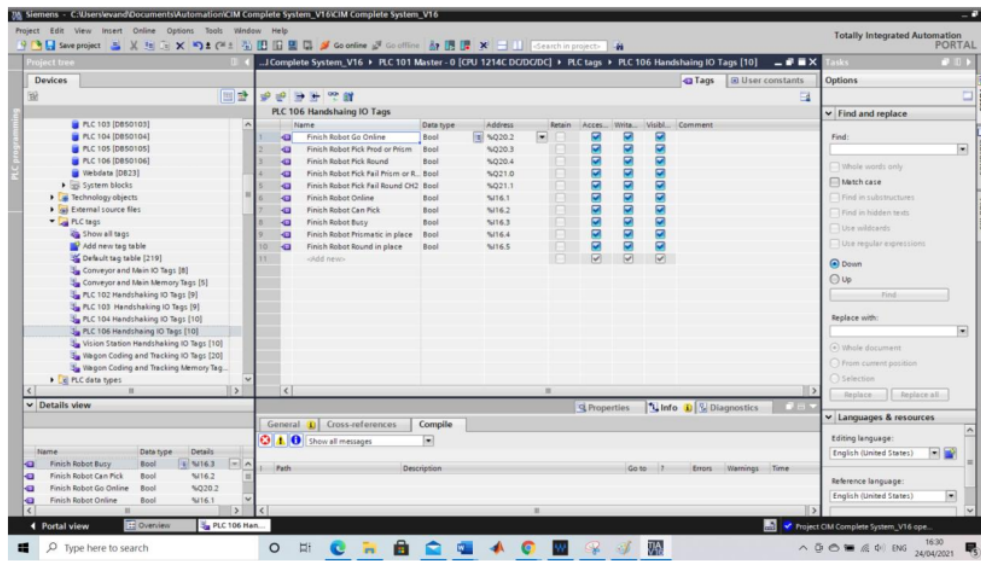
Name	Data type	Offset	Start value	Snapshot	Retain	Accessible f...	Write...	Visible in...
Get Word 14	Word	28.0	1640	1640000				
Get Word 15	Word	30.0	1640	1640000				
Put Bit 0 - clock test bit	Bool	32.0	false	FALSE				
Finish Robot Online	Bool	32.1	false	FALSE				
Finish Robot Can Pick	Bool	32.2	false	FALSE				
Finish Robot Busy	Bool	32.3	false	FALSE				
Finish Robot Pick Fail	Bool	32.4	false	FALSE				
Finish Robot Round in	Bool	32.5	false	FALSE				
Put Bit 6	Bool	32.6	false	FALSE				
Put Bit 7	Bool	32.7	false	FALSE				
Put Bit 8	Bool	33.0	false	FALSE				
Put Bit 9	Bool	33.1	false	FALSE				
Put Bit 10	Bool	33.2	false	FALSE				
Put Bit 11	Bool	33.3	false	FALSE				
Put Bit 12	Bool	33.4	false	FALSE				
Put Bit 13	Bool	33.5	false	FALSE				
Put Bit 14	Bool	33.6	false	FALSE				
Put Bit 15	Bool	33.7	false	FALSE				
Get Word 1	Word	34.0	1640	1640000				
Get Word 2	Word	36.0	1640	1640000				
Get Word 3	Word	38.0	1640	1640000				

Siemens - C:\Users\evand\Documents\Automation\CM Complete System_V16\CM Complete System_V16

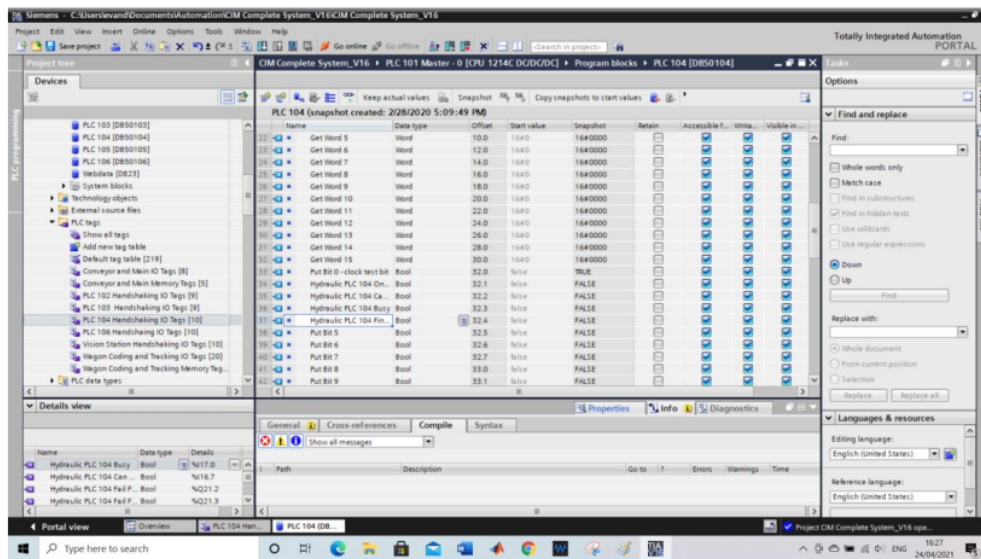
Project: CM Complete System_V16 - PLC 101 Master - 0 [CPU 1214C-2 DP] - Program blocks - PLC 106 [0850106]

PLC 106 (snapshot created: 2/28/2020 5:09:49 PM)

Name	Data type	Offset	Start value	Snapshot	Retain	Accessible f...	Write...	Visible in...
Get Bit 0 - clock test bit	Bool	0.0	false	FALSE				
Finish Robot Go Online	Bool	0.1	false	FALSE				
Finish Robot Pick Prod	Bool	0.2	false	FALSE				
Finish Robot Pick Round	Bool	0.3	false	FALSE				
Finish Robot Pick Fail	Bool	0.4	false	FALSE				
Finish Robot Pick Fail	Bool	0.5	false	FALSE				
Get Bit 6	Bool	0.6	false	FALSE				
Get Bit 7	Bool	0.7	false	FALSE				
Get Bit 8	Bool	1.0	false	FALSE				
Get Bit 9	Bool	1.1	false	FALSE				
Get Bit 10	Bool	1.2	false	FALSE				
Get Bit 11	Bool	1.3	false	FALSE				
Get Bit 12	Bool	1.4	false	FALSE				
Get Bit 13	Bool	1.5	false	FALSE				
Get Bit 14	Bool	1.6	false	FALSE				
Get Bit 15	Bool	1.7	false	FALSE				
Get Word 1	Word	2.0	1640	1640000				
Get Word 2	Word	4.0	1640	1640000				
Get Word 3	Word	6.0	1640	1640000				
Get Word 4	Word	8.0	1640	1640000				



PLC 104 Get and Puts



Siemens - C:\Users\evand\Documents\Automation\CM Complete System_V16\CM Complete System_V16

Project: CM Complete System_V16 - PLC 101 Master - 0 [CPU 1214C DC/DIG] - Program blocks - PLC 104 [DB50104]

PLC 104 (snapshot created: 2/28/2020 5:09:49 PM)

Name	Data type	Start value	Snapshot	Retain	Accessible f...	Write...	Visible in...
1	Static						
2	Get Bit 0 - clock test bit	Bool	0.0	false			
3	Hydraulic PLC 104 Go ...	Bool	0.1	false			
4	Hydraulic PLC 104 Pick ...	Bool	0.2	false			
5	Hydraulic PLC 104 Press ...	Bool	0.3	false			
6	Hydraulic PLC 104 Fail ...	Bool	0.4	false			
7	Hydraulic PLC 104 Fail ...	Bool	0.5	false			
8	104 Fail Finished CH2	Bool	0.6	false			
9	Get Bit 7	Bool	0.7	false			
10	Get Bit 8	Bool	1.0	false			
11	Get Bit 9	Bool	1.1	false			
12	Get Bit 10	Bool	1.2	false			
13	Get Bit 11	Bool	1.3	false			
14	Get Bit 12	Bool	1.4	false			
15	Get Bit 13	Bool	1.5	false			
16	Get Bit 14	Bool	1.6	false			
17	Get Bit 15	Bool	1.7	false			
18	Get Word 1	Word	2.0	164000			
19	Get Word 2	Word	4.0	164000			
20	Get Word 3	Word	6.0	164000			
21	Get Word 4	Word	8.0	164000			

Details view: Name, Data type, Details

- Hydraulic PLC 104 Busy - Bool - N17.0
- Hydraulic PLC 104 Can ... - Bool - N16.7
- Hydraulic PLC 104 Fail F... - Bool - N201.2
- Hydraulic PLC 104 Fail F... - Bool - N201.3

Portal view: PLC 104 DB

Siemens - C:\Users\evand\Documents\Automation\CM Complete System_V16\CM Complete System_V16

Project: CM Complete System_V16 - PLC 101 Master - 0 [CPU 1214C DC/DIG] - PLC tags - PLC 104 Handshaking IO Tags [10]

PLC 104 Handshaking IO Tags

Name	Data type	Address	Retain	Access...	Write...	Visible...	Comment
1	Hydraulic PLC 104 Online	Bool	N16.6				
2	Hydraulic PLC 104 Can Pick	Bool	N16.7				
3	Hydraulic PLC 104 Busy	Bool	N17.0				
4	Hydraulic PLC 104 Finished	Bool	N17.1				
5	Hydraulic PLC 104 Go Online	Bool	N200.0				
6	Hydraulic PLC 104 Pick Fin CH1	Bool	N200.1				
7	Hydraulic PLC 104 Press Bound	Bool	N200.7				
8	Hydraulic PLC 104 Pick Fin CH2	Bool	N200.5				
9	Hydraulic PLC 104 Fail Finished	Bool	N201.2				
10	Hydraulic PLC 104 Fail Finished	Bool	N201.3				
11	void name						

Details view: Name, Data type, Details

- Hydraulic PLC 104 Busy - Bool - N17.0
- Hydraulic PLC 104 Can ... - Bool - N16.7
- Hydraulic PLC 104 Fail F... - Bool - N201.2
- Hydraulic PLC 104 Fail F... - Bool - N201.3

Portal view: PLC 104 DB

PLC 103 Get and Puts

Siemens - C:\Users\evand\Documents\Automation\CM Complete System_V16\CM Complete System_V16

Project: CM Complete System_V16 - PLC 101 Master - 0 [CPU 1214C-2 DP] - Program blocks - PLC 103 [DB50103]

PLC 103 (snapshot created: 2/28/2020 5:09:49 PM)

Name	Data type	Offset	Start value	Snapshot	Retain	Accessible f...	Write...	Visible in...
Get Word 3	Word	8.0	1640000					
Get Word 4	Word	8.0	1640000					
Get Word 5	Word	10.0	1640000					
Get Word 6	Word	12.0	1640000					
Get Word 7	Word	14.0	1640000					
Get Word 8	Word	16.0	1640000					
Get Word 9	Word	18.0	1640000					
Get Word 10	Word	20.0	1640000					
Get Word 11	Word	22.0	1640000					
Get Word 12	Word	24.0	1640000					
Get Word 13	Word	26.0	1640000					
Get Word 14	Word	28.0	1640000					
Get Word 15	Word	30.0	1640000					
Put Bit 0 - clock test bit	Bool	32.0	False					
Process PLC 103 Online	Bool	32.1	False					
Process PLC 103 Can P...	Bool	32.2	False					
Process PLC 103 Can P...	Bool	32.3	False					
Process PLC 103 Busy	Bool	32.4	False					
Process PLC 103 Finished	Bool	32.5	False					
Put Bit 6	Bool	32.6	False					
Put Bit 7	Bool	32.7	False					

Details view: Name, Offset, Data type

- Get Bit 0 - clock test bit: 0.0, Bool
- Go Online: 0.1, Bool
- Pick Round CH1: 0.2, Bool
- Pick Round CH2: 0.3, Bool

Siemens - C:\Users\evand\Documents\Automation\CM Complete System_V16\CM Complete System_V16

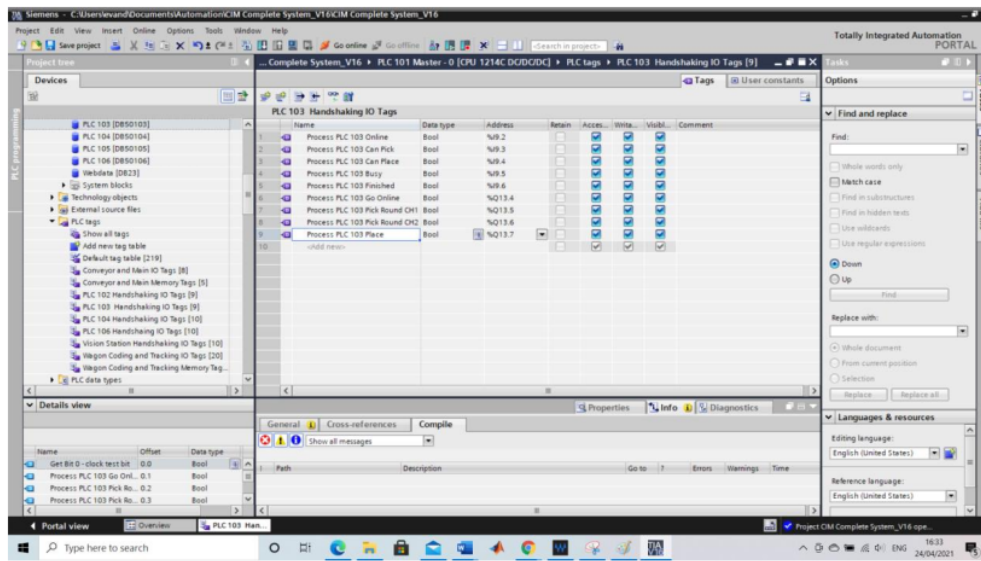
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PLC 103 (snapshot created: 2/28/2020 5:09:49 PM)

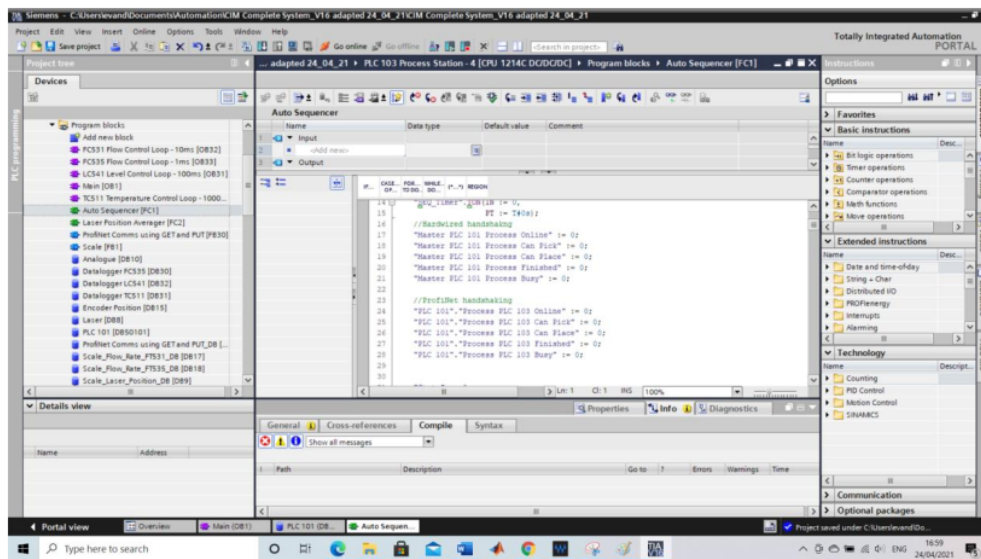
Name	Data type	Offset	Start value	Snapshot	Retain	Accessible f...	Write...	Visible in...
Static								
Get Bit 0 - clock test bit	Bool	0.0	False					
Process PLC 103 Go On...	Bool	0.1	False					
Process PLC 103 Pick...	Bool	0.2	False					
Process PLC 103 Pick...	Bool	0.3	False					
Process PLC 103 Pick...	Bool	0.4	False					
Get Bit 5	Bool	0.5	False					
Get Bit 6	Bool	0.6	False					
Get Bit 7	Bool	0.7	False					
Get Bit 8	Bool	1.0	False					
Get Bit 9	Bool	1.1	False					
Get Bit 10	Bool	1.2	False					
Get Bit 11	Bool	1.3	False					
Get Bit 12	Bool	1.4	False					
Get Bit 13	Bool	1.5	False					
Get Bit 14	Bool	1.6	False					
Get Bit 15	Bool	1.7	False					
Get Word 1	Word	2.0	1640000					
Get Word 2	Word	4.0	1640000					
Get Word 3	Word	6.0	1640000					
Get Word 4	Word	8.0	1640000					

Details view: Name, Offset, Data type

- Get Bit 0 - clock test bit: 0.0, Bool
- Process PLC 103 Go On...: 0.1, Bool
- Process PLC 103 Pick...: 0.2, Bool
- Process PLC 103 Pick...: 0.3, Bool



PLC 103 Handshaking in PLC103 Auto sequencer



```

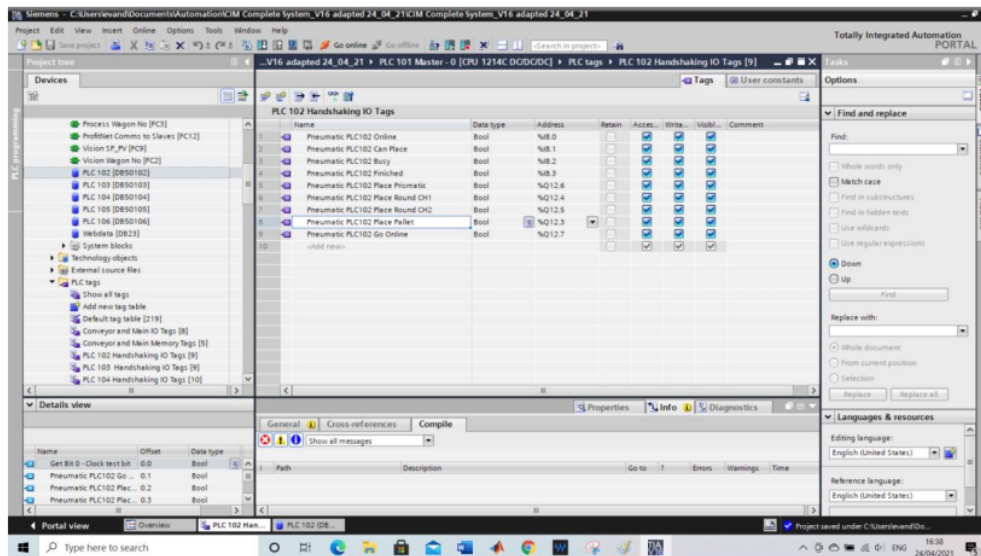
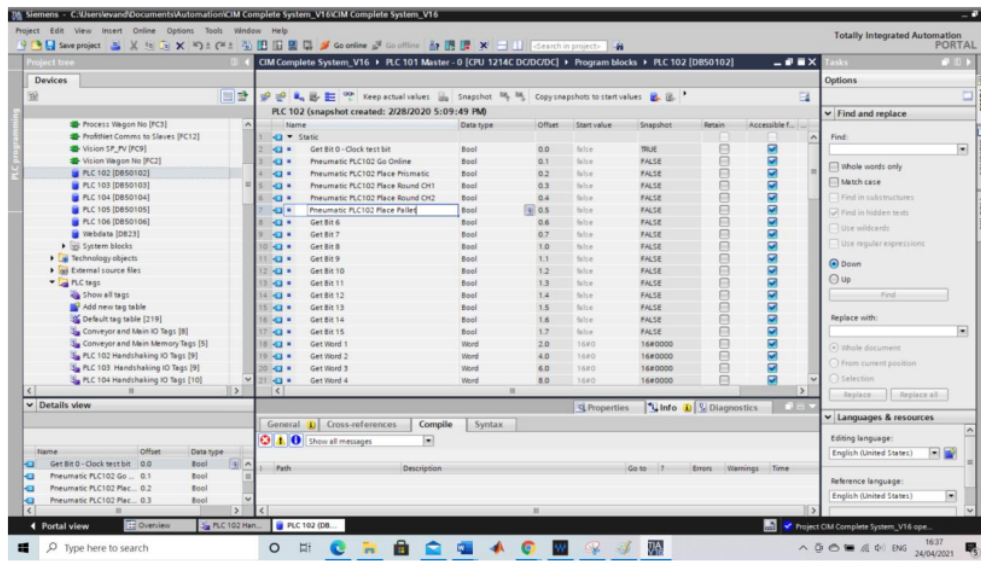
70      3: //wait for PICK command
71      "Master PLC 101 Process Online" := 1;
72      "PLC 101"."Process PLC 103 Online" := 1;
73      "Master PLC 101 Process Can Pick" := 1;
74      "PLC 101"."Process PLC 103 Can Pick" := 1;
75      "Master PLC 101 Process Busy" := 0;
76      "PLC 101"."Process PLC 103 Busy" := 0;
77
78      IF
79      ("HMI_Pick" = 1 OR
80      "Master PLC 101 Process Pick_CH 1" = 1 OR "PLC 101"."Process PLC 103 Pick Ro
81      "Master PLC 101 Process Pick_CH 2" = 1 OR "PLC 101"."Process PLC 103 Pick Ro
82      "Master PLC 101 Process Busy" := 1;
83      "PLC 101"."Process PLC 103 Busy" := 1;
84      "State" := 4;
85      END_IF

```

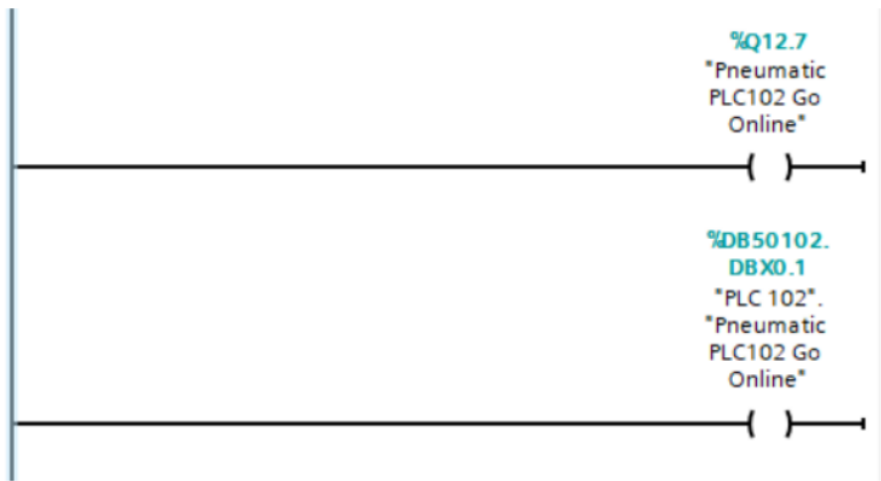
PLC 102 Get and Puts

The screenshot displays the SIMATIC Manager interface for a PLC 102 project. The main window shows a table of variables for PLC 102, with columns for Name, Data type, Offset, Start value, Snapshot, Reason, Accessible, Write, and Visible. The table lists various input and output variables, including 'Get Word 9' through 'Get Word 15', 'Put Bit 6' through 'Put Bit 13', and 'Pneumatic PLC102 Ca...' through 'Pneumatic PLC102 Bu...'. The 'Offset' column shows values ranging from 18.0 to 32.5. The 'Start value' column shows values ranging from 1640000 to 32.5. The 'Snapshot' column shows values ranging from 1640000 to 32.5. The 'Reason' column shows values ranging from 1640000 to 32.5. The 'Accessible' column shows values ranging from 1640000 to 32.5. The 'Write' column shows values ranging from 1640000 to 32.5. The 'Visible' column shows values ranging from 1640000 to 32.5.

Name	Data type	Offset	Start value	Snapshot	Reason	Accessible	Write	Visible
Get Word 9	Word	18.0	1640	1640000				
Get Word 10	Word	20.0	1640	1640000				
Get Word 11	Word	22.0	1640	1640000				
Get Word 12	Word	24.0	1640	1640000				
Get Word 13	Word	26.0	1640	1640000				
Get Word 14	Word	28.0	1640	1640000				
Get Word 15	Word	30.0	1640	1640000				
Put Bit 6 - Clock test bit	Bool	32.0	False	False				
Pneumatic PLC102 Ca...	Bool	32.1	False	False				
Pneumatic PLC102 Bu...	Bool	32.2	False	False				
Pneumatic PLC102 Bu...	Bool	32.3	False	False				
Pneumatic PLC102 Bu...	Bool	32.4	False	False				
Put Bit 6	Bool	32.5	False	False				
Put Bit 7	Bool	32.6	False	False				
Put Bit 8	Bool	32.7	False	False				
Put Bit 9	Bool	32.8	False	False				
Put Bit 10	Bool	32.9	False	False				
Put Bit 11	Bool	33.0	False	False				
Put Bit 12	Bool	33.1	False	False				
Put Bit 13	Bool	33.2	False	False				

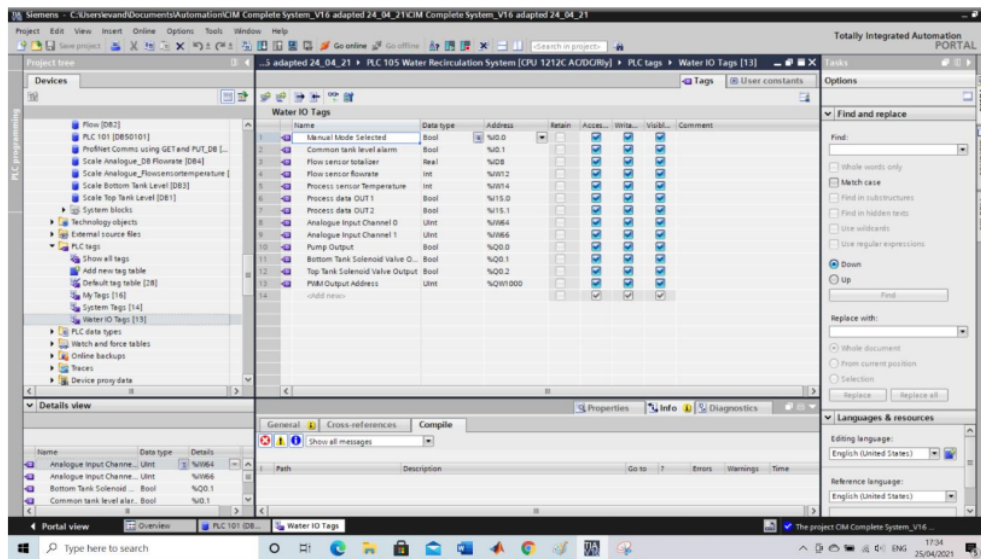
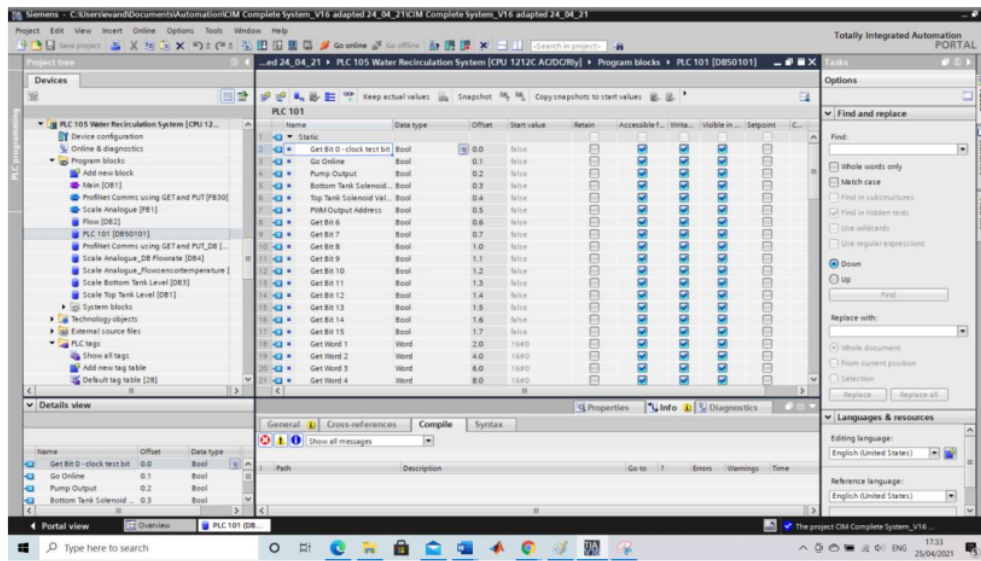


Pneumatic PLC 102 Handshaking



PLC 105 Get and Puts

The screenshot displays the Siemens SIMATIC Manager interface, specifically the 'PLC 105 Get and Puts' window. The window is divided into several panes. The left pane shows a tree view of the project, including 'PLC 105' and 'PLC 105 Get and Puts'. The main pane displays a table of data points for PLC 105, with columns for Name, Data type, Offset, Start value, Retain, Accessible, Write, Visible in, and Setpoint. The table lists various data points such as 'Get Word 6', 'Get Word 7', 'Get Word 8', 'Get Word 9', 'Get Word 10', 'Get Word 11', 'Get Word 12', 'Get Word 13', 'Get Word 14', 'Get Word 15', 'Put Bit 0 - Clock test bit', 'Manual Mode Selected', 'Common tank level', 'Flow sensor totalizer', 'Flow sensor flowrate', 'Process sensor temp', 'Process data OUT1', 'Process data OUT2', 'Analogue input Chan...', 'Analogue input Chan...', and 'Put Bit 10'. The right pane shows the 'Find and replace' dialog, with the 'Find' field set to 'Find:'. The bottom pane shows the 'Properties' dialog, with the 'General' tab selected. The status bar at the bottom indicates the current project is 'The project SIM Complete System_V16'.



1910595

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

43/100

PAGE 1

PAGE 2

PAGE 3

QM

Use of 11pt Arial, full justification with 1.5 line spacing allows easier reading and marking

Your presentation could be improved making the text easier to read and mark. Your tutor will then be able to add comments between lines

QM

Incorrectly cited, this is not the Harvard Method

PAGE 4

QM

Incorrectly cited, this is not the Harvard Method

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13



Use the third Person

You are referring to first or second persons (I, we, you, us etc) whereas you should use the third person thus depersonalising it.



Listing method for sources is incorrect, this is not Harvard

MS Word can automatically generate this list for you

GRADING FORM: NEW CSG-RUBRIC

KIERAN GOWER

43

1. ENGAGEMENT WITH LITERATURE



There is evidence of research but the Harvard method of citing and listing has been ignored.

6

(6/20)

2. KNOWLEDGE AND UNDERSTANDING

- | | | |
|---|---|-----------|
|  | Knowledge of the basic underlying concepts and principles is accurate with a good understanding of the field of study but lacks depth and/or breadth. (10/20) | 10 |
|---|---|-----------|

3. COGNITIVE AND INTELLECTUAL

- | | | |
|---|--|----------|
|  | Limited attempt at evaluation of the underlying concepts and principles, tending towards description. Can interpret qualitative and quantitative data but with some errors. Some evidence to support emerging arguments and judgements but these may be underdeveloped or with a little inconsistency / mis-interpretation No testing table (9/20) | 9 |
|---|--|----------|

4. PRACTICAL APPLICATION

- | | | |
|---|---|-----------|
|  | A good and appropriate application of basic methods, materials, tools and/or techniques. Clear appreciation of the context of the application. Good evidence of different approaches to problem-solving in particular contexts and proposes mostly appropriate solutions. (10/20) | 10 |
|---|---|-----------|

5. TRANSFERABLE SKILLS



Mostly ordered presentation and structure in which relevant ideas / concepts are reasonably expressed. Work may lack coherence and/or accuracy in places. Can work as part of a group, meeting most obligations to others but perhaps with limited involvement in group activities. Demonstrates the basic skills for employment requiring the exercise of some personal responsibility, with some areas of minor weakness. (8/20)

8