

Machines Simulator v.3

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Machines Simulator Quick Guide



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Introduction

The objective of this guide is for the user to be able to start using EasyPLC with Machines Simulator quickly, without need to read all of the manuals of the entire software suite (EasyPLC User Manual and Machines Simulator Instruction Guide).

This is an explanation of how to run the first of the available virtual machines: Chain Conveyor, showing all the necessary steps needed to integrate and run with EasyPLC.

There is also a very simple example of how to create a basic installation/machine, adding components, assigning PLC I/O signals, and how to make the logic program with EasyPLC run the machine.



Running the Chain Conveyor machine

This is an explanation of how to make run this machine, useful the first time you test EasyPLC with Machines Simulator.

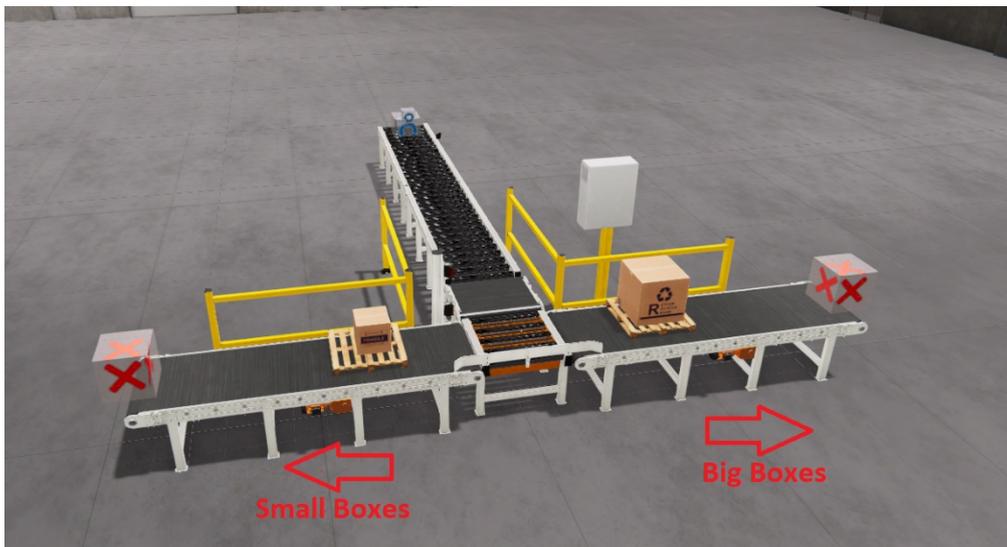
Machine Objective

This system must to be programmed in the following way:

Two types of boxes will arrive loaded in pallets from the cargo line, some with high boxes and others with small boxes.

Goods with high boxes should be sent to the transporter on the right, small boxes to the left.

Use the reading station with two photocells to make the selection, and the chain conveyor to move the pallets to the appropriate conveyor.

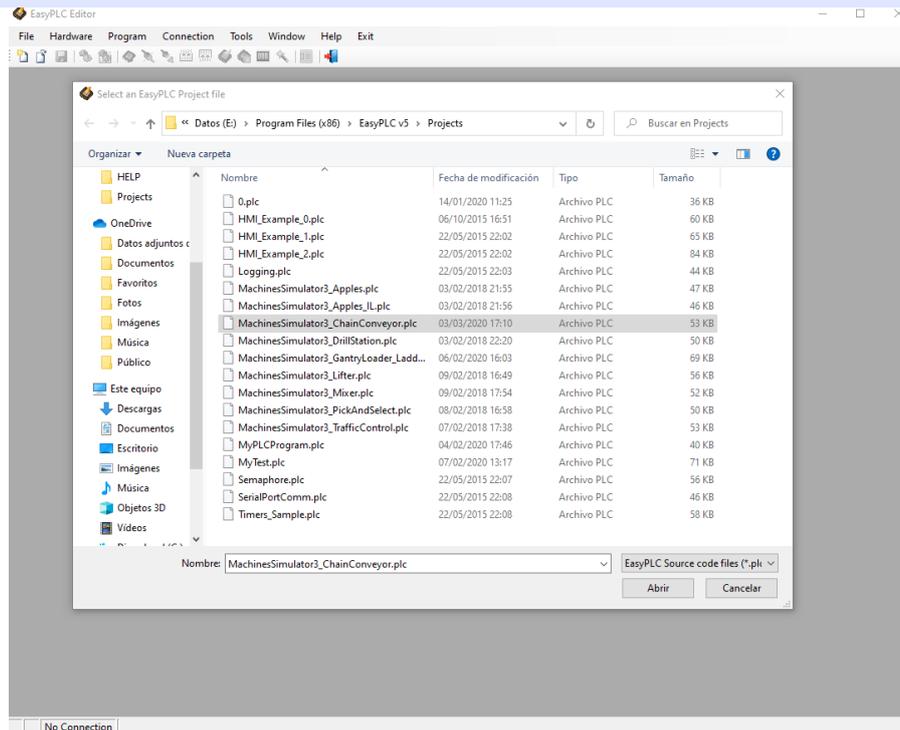


EasyPLC includes some example programs of the available Machines Simulator systems. The one used to manage this installation, is called ***MachinesSimulator3_ChainConveyor.plc***, is written in Ladder programming language, now is explained how to make run.

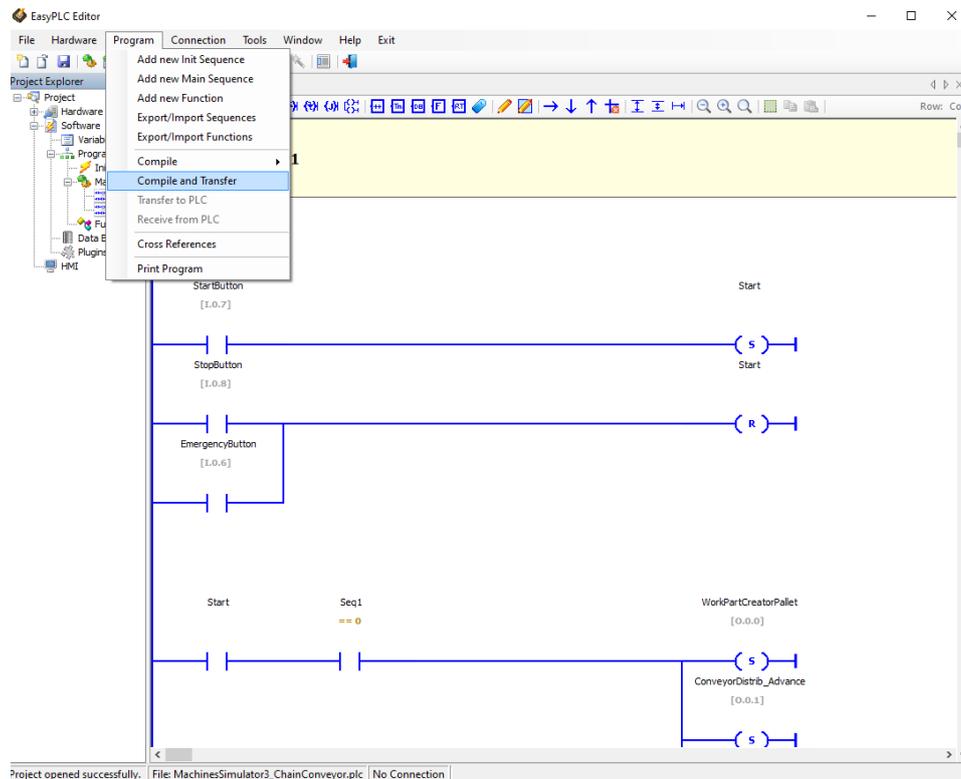
First, open EasyPLC Editor:



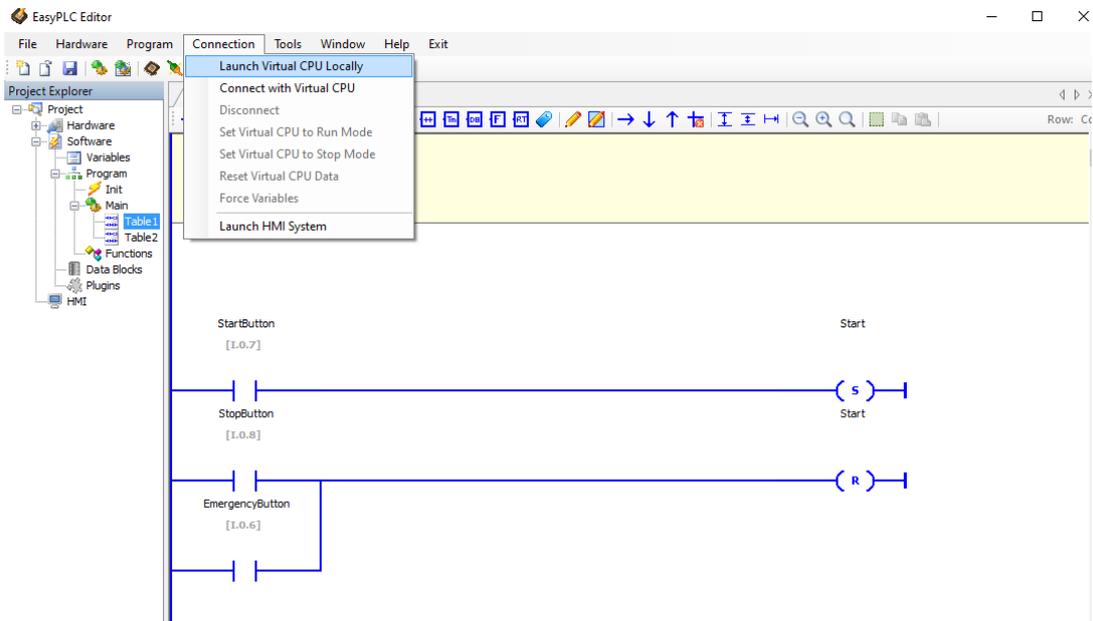
Click on Open Project, and select ***MachinesSimulator3_ChainConveyor.plc***



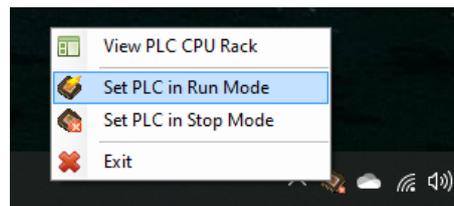
Select from EasyPLC Editor menu: Program -> Compile and Transfer:



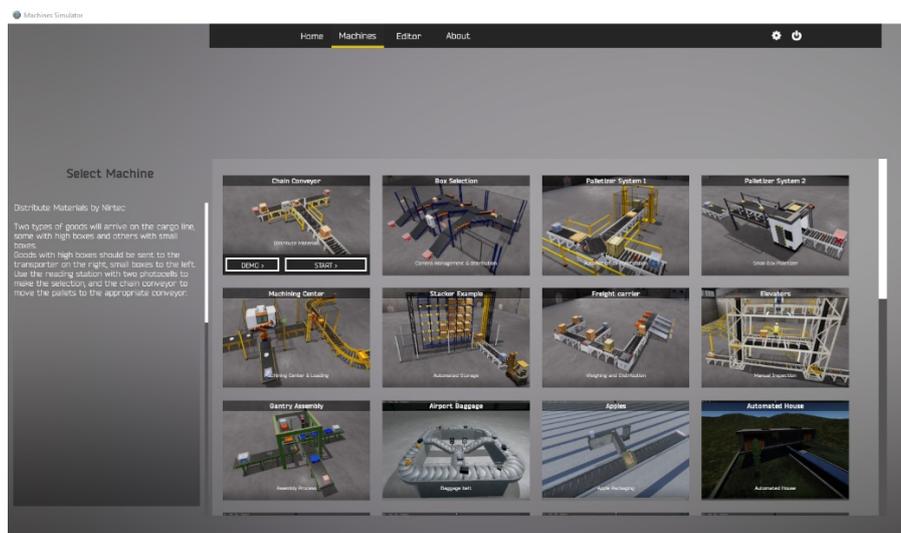
Select from EasyPLC Editor Main Menu -> Launch Virtual PLC CPU:



Set Virtual PLC CPU in Run Mode (right mouse click in the Virtual PLC CPU icon located in the tray windows area, and select from the pop-up menu *Set PLC in Run Mode*):



Once you have made this process, then launch Machines Simulator, select Machines Page, and place the mouse over the Chain Conveyor Machine, then click on START button:





If all is ok, you will see the PLC led status in green color, this is, Machines Simulator is connected with VirtualPLC

Now move in front of the small electric cabinet and press the flashing green Push button with mouse, in order to start the machine.



Note when you place the mouse cursor over the button, how the cursor changes, this means is an interactive element can be clicked

Then the machine will start to work in automatic mode managed by Virtual PLC.

Great! You have run the first virtual installation!



Running the Gantry Loader machine

As a second example is explained about how to how to make run other of the available machines.

Machine Objective

This system must to be programmed in the following way:

Manage the Gantry to pick the metal boxes from the conveyor belt, and place two metal boxes in one wood pallet located in the conveyor roller.

When the conveyor belt is on, automatically provides boxes, use the inductive switch to stop the belt in order to pick up the box with the gantry.

Manage the conveyor's stop to place the wood pallets in the download position.

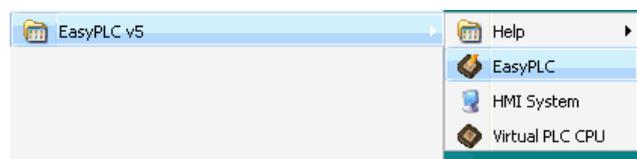
The Gantry is managed with six digital outputs, to move left, right, up, down, close and rotate grips. The Gantry will active 4 inputs in order to inform about their position (left - right - up - down).

Once the box is picked in longitudinal sense, must to be placed in the pallet in transversal sense. Then the gantry grips must to be rotated during the movement or before to download it.

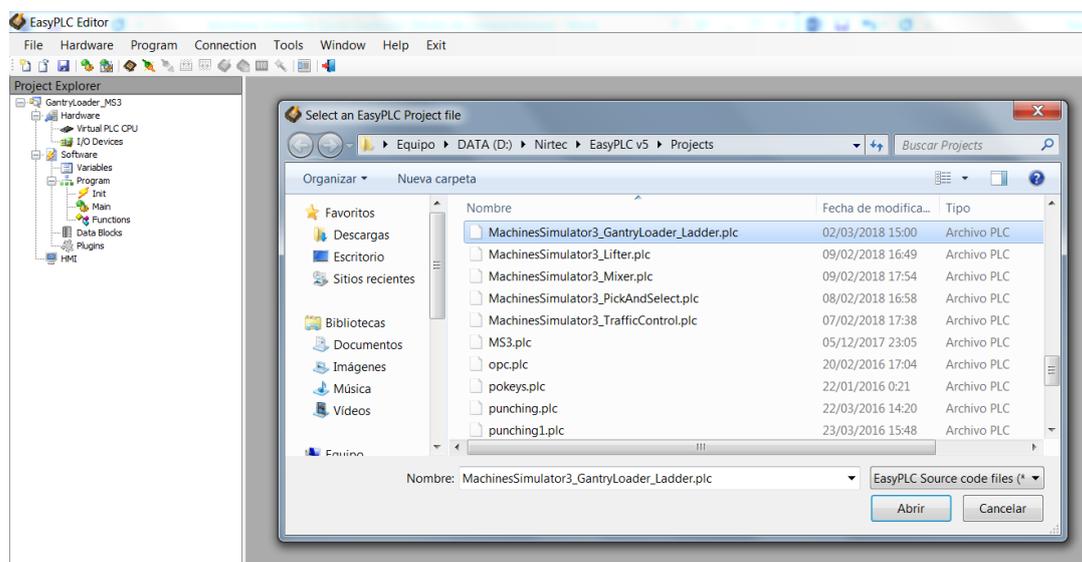
When Pallet have two metal boxes, release it.

EasyPLC includes some example programs; one is used to manage this installation, this is written in Ladder programming language, now is explained how to make run.

First, open EasyPLC Editor:

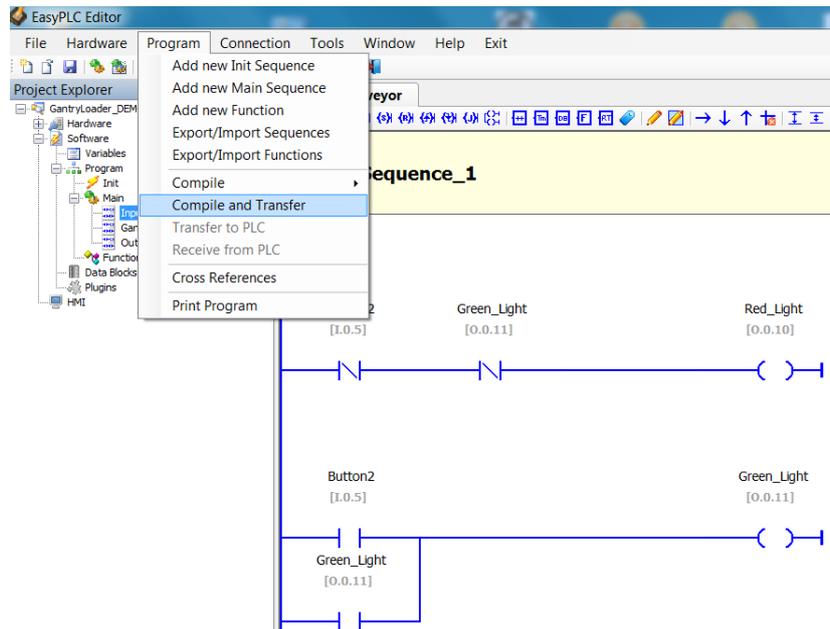


Click on Open Project, and select **MachinesSimulator3_GantryLoader_Ladder.plc**

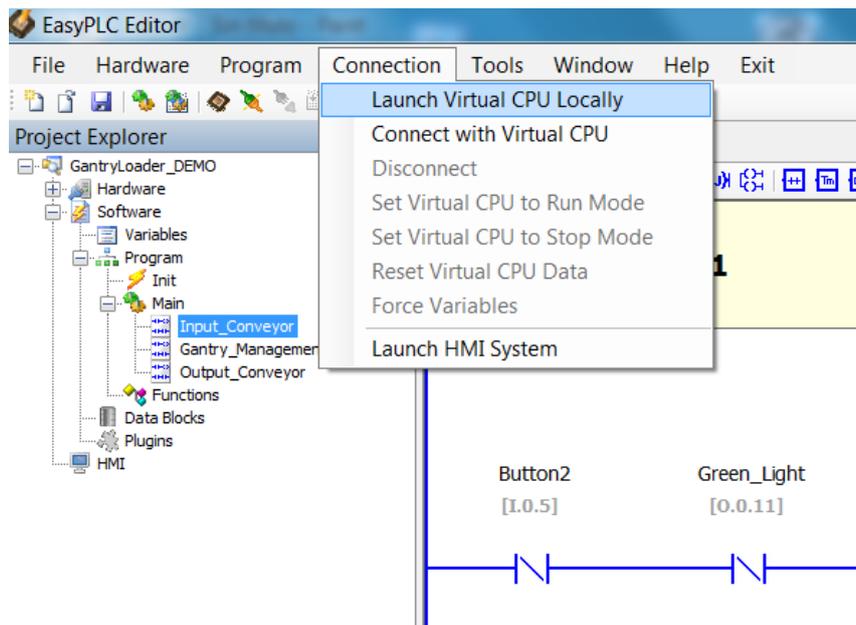




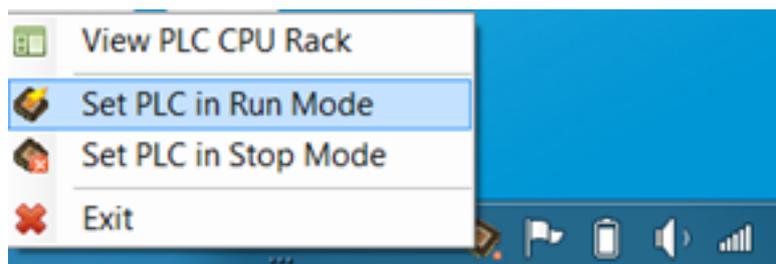
Select from EasyPLC Editor menu: Program -> Compile and Transfer:



Launch Virtual PLC CPU:

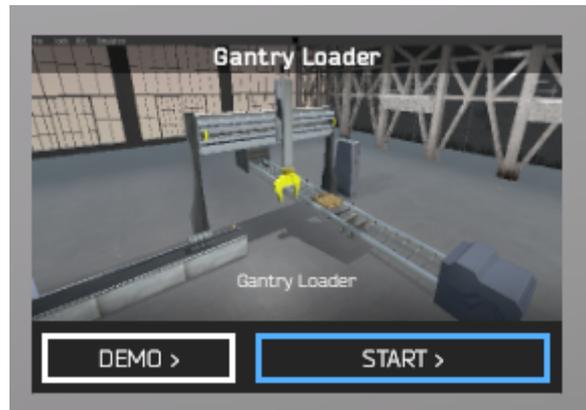


Set Virtual PLC CPU in Run Mode (right mouse click in the Virtual PLC CPU icon located in the tray windows area, and select from the pop-up menu *Set PLC in Run Mode*):





Once you have made this process, then launch Machines Simulator, select Machines Page, and search for Gantry Loader machine, and then click on START button:



If all is ok, you will see the PLC led status in green color, this is, Machines Simulator is connected with VirtualPLC

Now move in front of the electric cabinet and press the flashing green Push button with mouse, in order to start the machine.



Note when you place the mouse cursor over the button, how the cursor changes, this means is an interactive element can be clicked

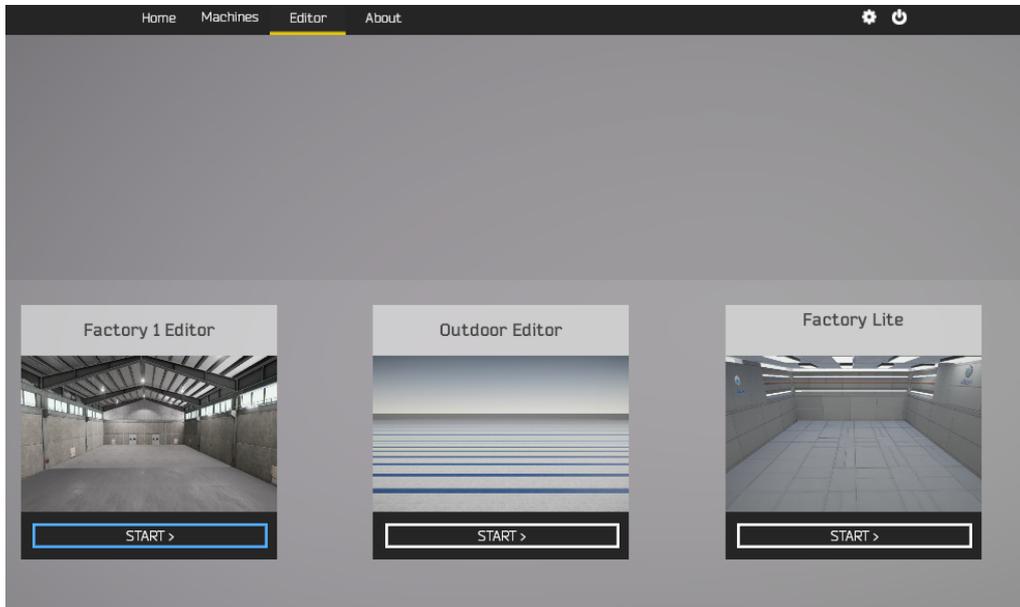
Then the machine will start to work.



Creating the first Installation

Now, is explained an example about how to create our first machine and how to make the logic program in order to automatize it.

Click in the upper menu -> Editor



In this image the Factory 1 environment has been chosen

Place the mouse cursor over the Factory 1 Editor and click on the Start Button.

Go to left Tools Library, click on the left arrow on Transports category to expand, and click on the first item ConveyorBelt1. A new conveyor is added to the machine. Now let's customize it!

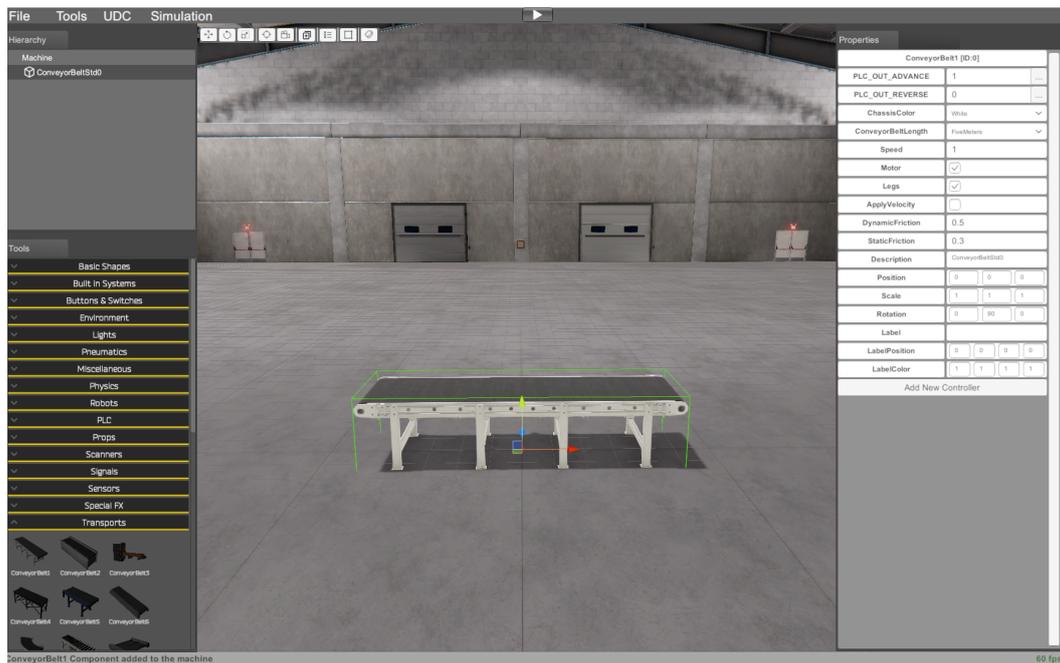


In the right properties grid, change the following properties:

- Rotation = (0, 90, 0)

Machines Simulator

- PLC_Out_Advance = 1
- PLC_Out_Reverse = 0



Add a Photocell, Select from left Tools Panel Components -> Sensors-> Photocell

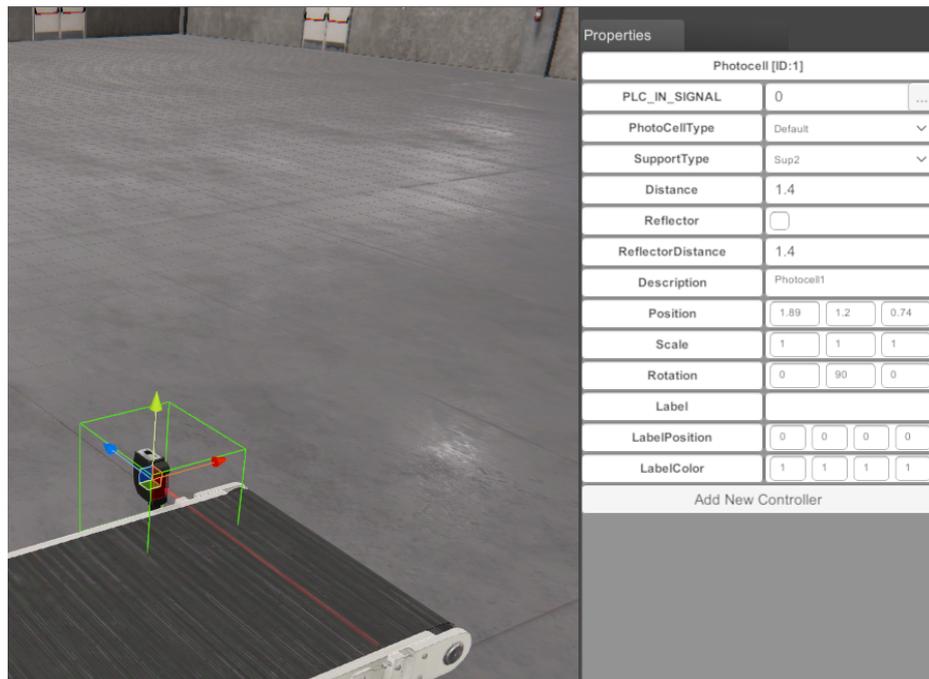


By default will be placed in the middle of the factory, change the following properties:

- PLCIN_Signal = 0
- SupportType= Sup2
- Rotation = (0, 90 ,0)
- Position
 - X = 1.89

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- $Y = 1.2$
- $Z = 0.74$



When the properties will be changed, the photocell will be placed in the same place that is showed in the picture. You can also move it with the gizmo axis.

Now we need another switch placed in the opposite conveyor side. To do it let's copy the recent created one. Be sure the switch is selected, then press Left Control + D key.

Now, a new Photocell is placed on the machine (we have duplicated the previous one). By default, the new element created will be placed in the same location that Photocell 1, for this reason is not visible. Now change the following properties:

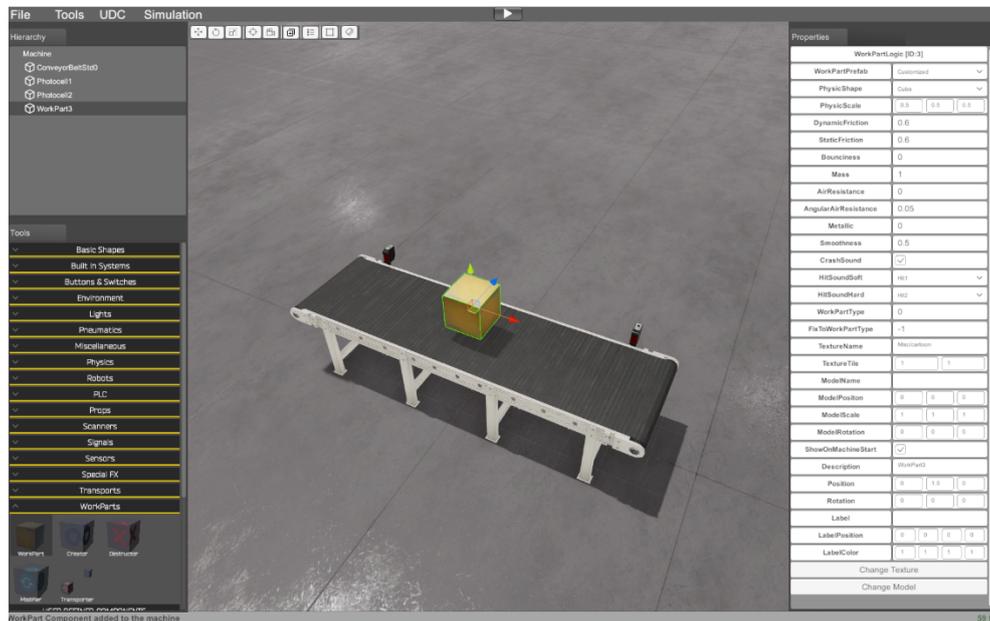
- PLC Signal Input = 1
- Description: Photocell2
- Position
 - $X = -1.89$
 - $Y = 1.2$
 - $Z = 0.74$



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Ok, now we have created our simple machine, composed by one conveyor that works in two directions and two Photocells that will detect the parts when arrive to the sensors position.

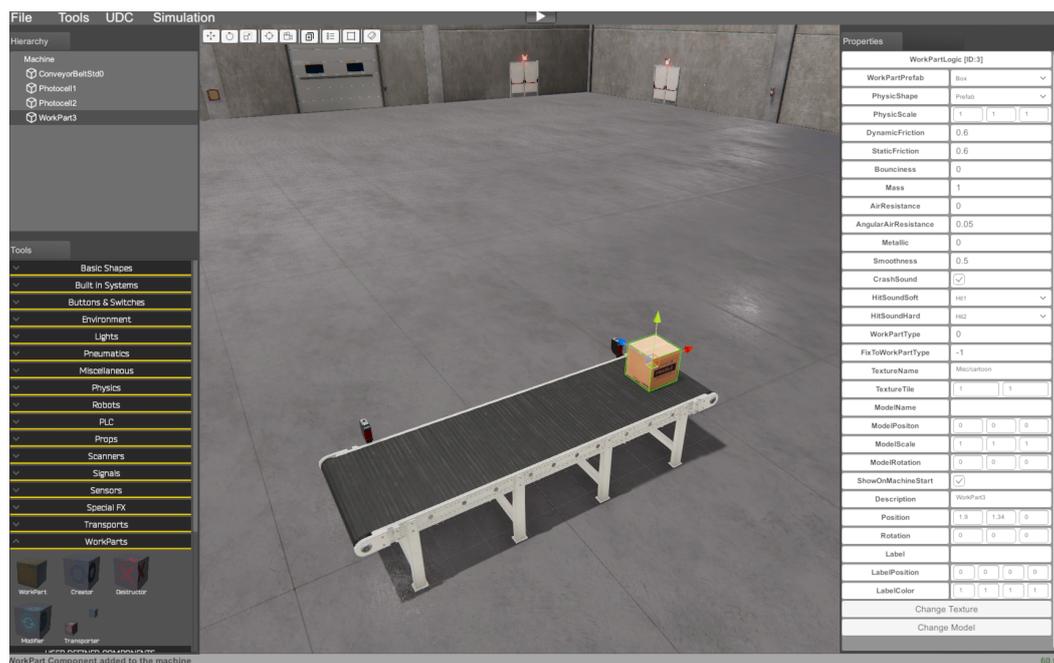
Now is time to create the part that will move over the conveyor. To do it make click on the WorkParts Tool panel, then click in the WorkPart item:



Then a new WorkPart is added to the installation, now change the following properties in order to customize it:

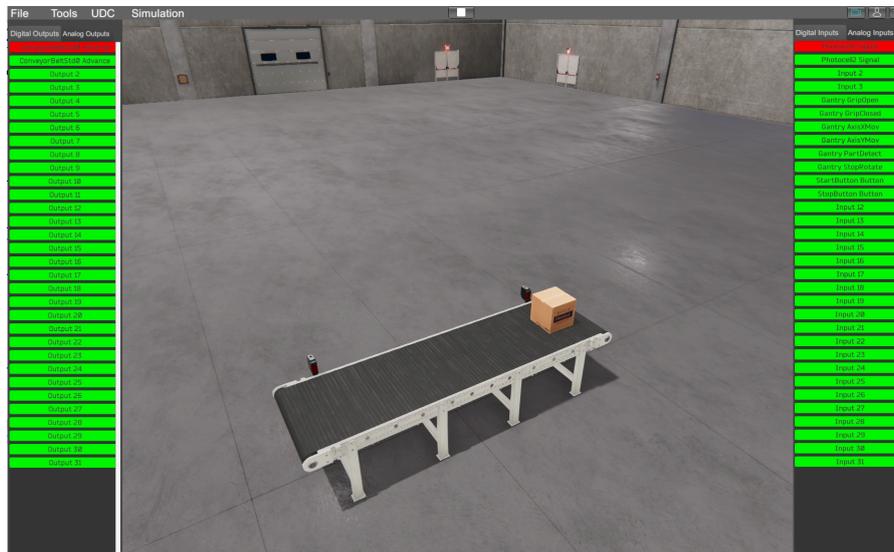
- WorkPartPrefab: Box
- Position
 - X = 1.9
 - Y = 1.34
 - Z = 0

The result must to be like this:





Now the Installation is finished, let's try it to see how it works, press Start Simulation from Play Button. Press buttons ConveyorBeltStd0 Reverse or ConveyorBeltStd0 Advance, you will see how the part is moving over the conveyor. In the right panel you will see the signal activations of the photocells when detects the part.

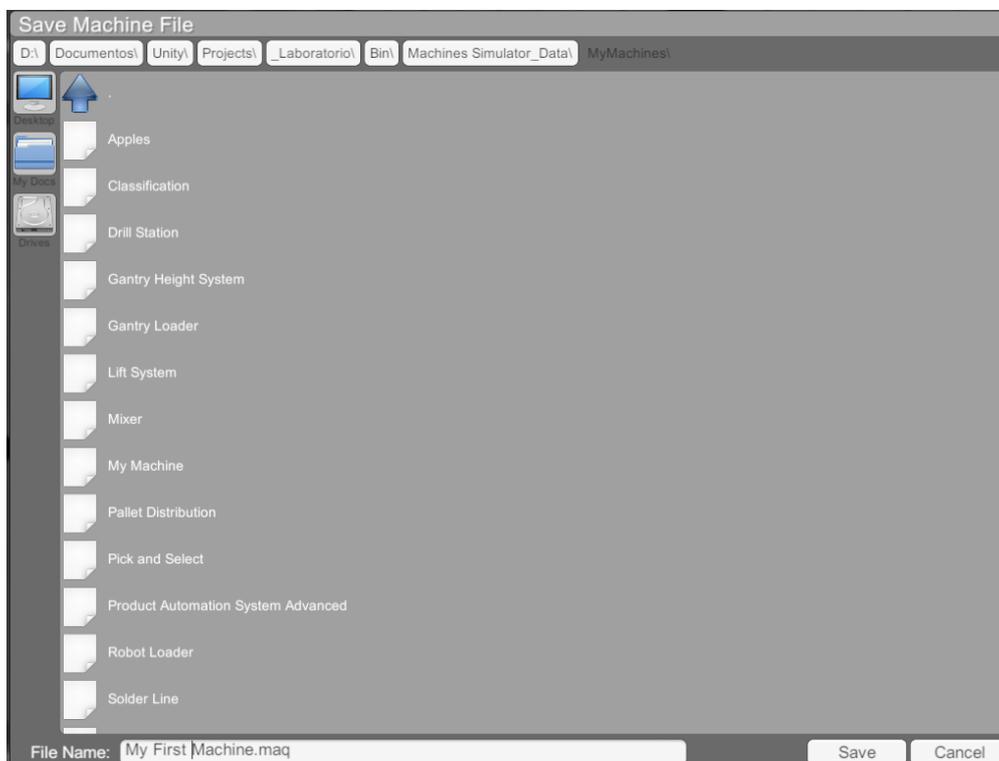


This check will show us that the work done is ok.

Now Select Tools -> View/Hide IO Panels, then place in a position the machine will be visible and press F11 Key, then a screen shot of the machine is created and can be visible for the users in the Machines Simulator Machines Page.

Now Stop the simulation and click on Machine, in Author type your name, in Description type: First Machine.

Now select File -> Save Machine button from Menu, and name it My First Machine:

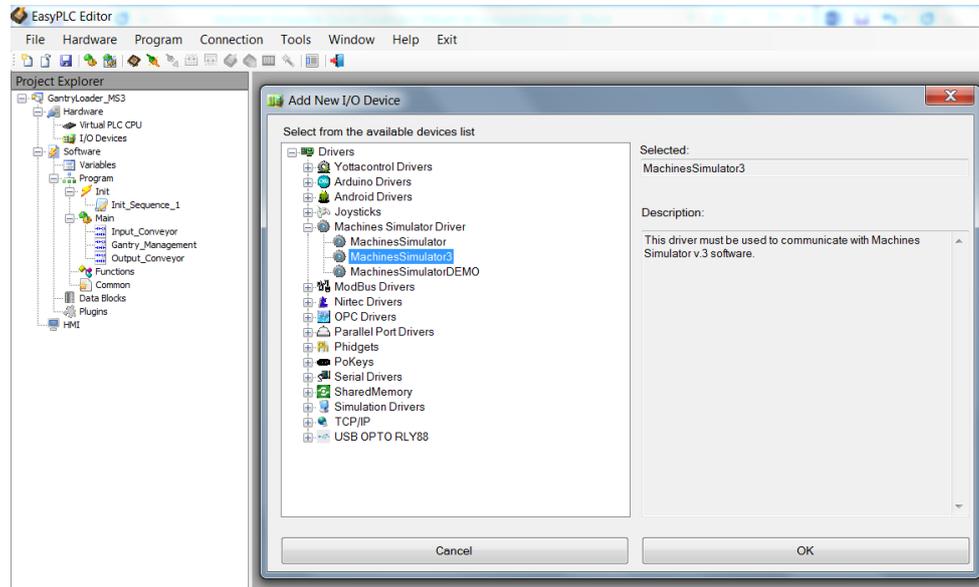




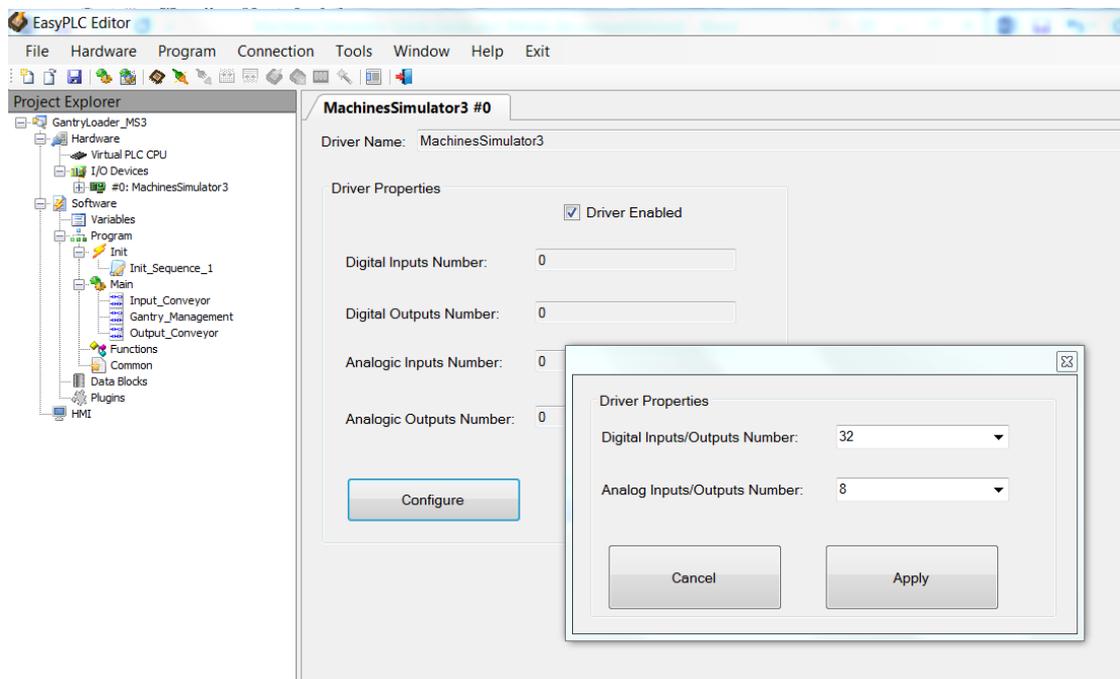
Making the logic Program

Once the virtual machine is finished, we're going to create the logic program.

Open EasyPLC Editor and create a new Project, by default is added the Simulated Driver, delete it and add the MachinesSimulator3 driver.



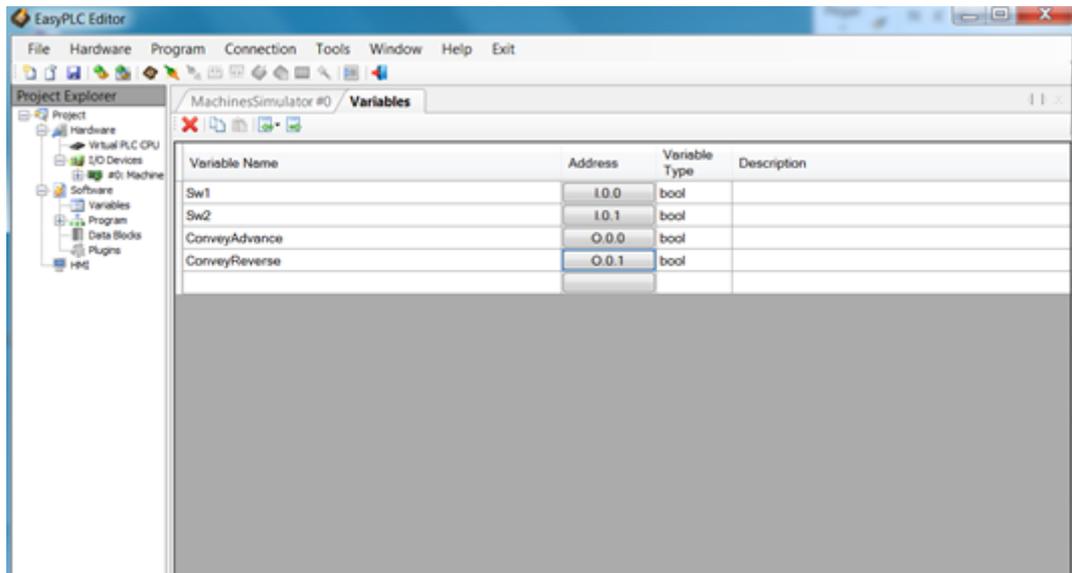
When the MachinesSimulator3 driver is added to the project click in the configure button and type the following configuration:



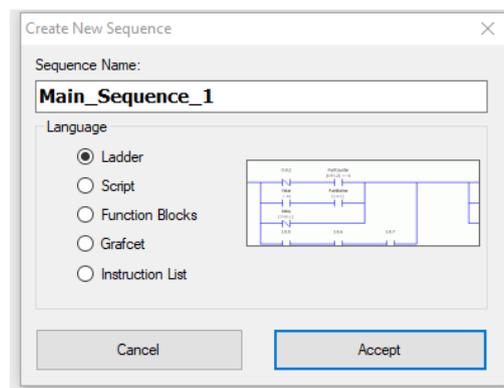
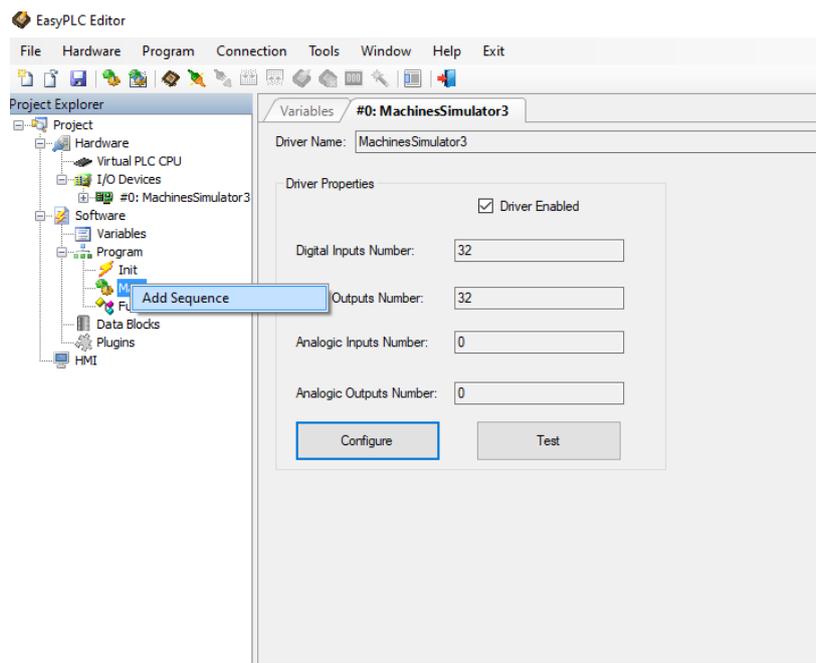
Then press Apply button, you have configured 32 digital I/O and 8 analogic I/O.



Add the following Variables to the Program, making the same linking of elements (see Address column):

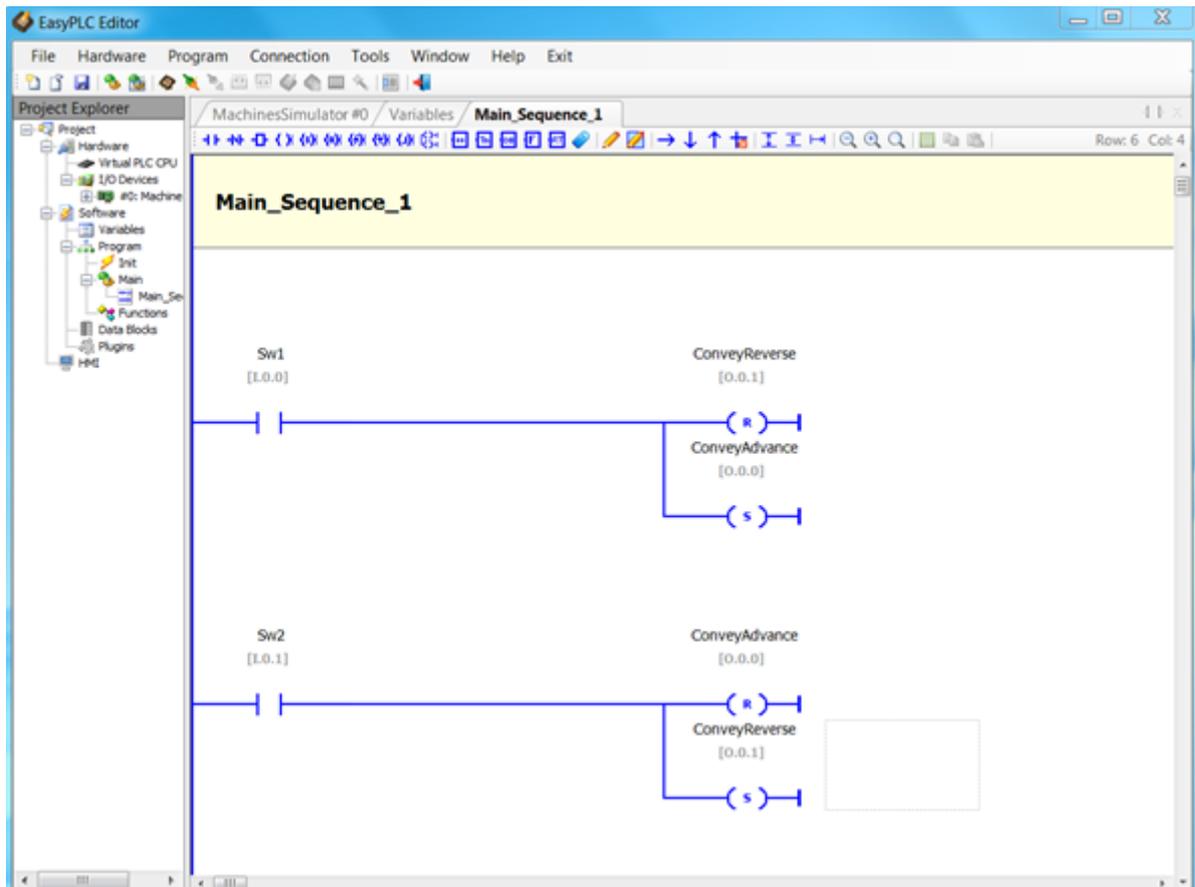


Create a new Main Ladder sequence, Clicking right mouse button over Main node of Software tree:

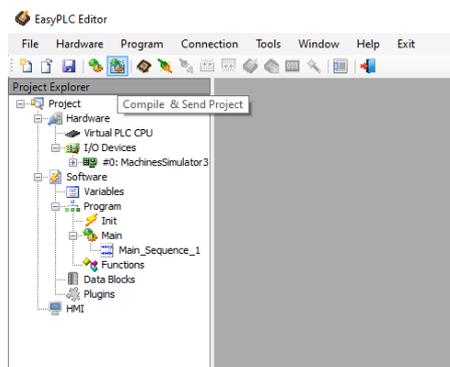




and write the following segments:

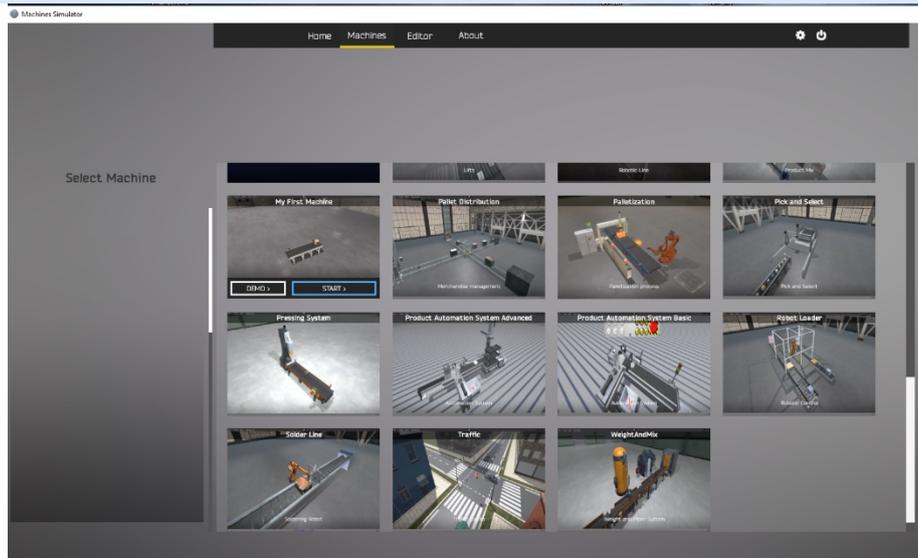


Save the logic program. Compile and transfer to Virtual PLC:



Launch Virtual PLC CPU and set to Run Mode.

Launch Machines Simulator, select Machines Page and select My First Machine:



You will see how the logic program is managing the installation moving the part from left to right when the part arrives to the switches positions:



Ok, is not a very exciting machine! but is your first step in the virtual automation world.

More

Please visit often the www.nirtec.com website to check for new information, updates and new content.

I hope you enjoy Machines Simulator!

If you have some question or doubt, please email me:

Info@nirtec.com

Good luck in your virtual programming world!