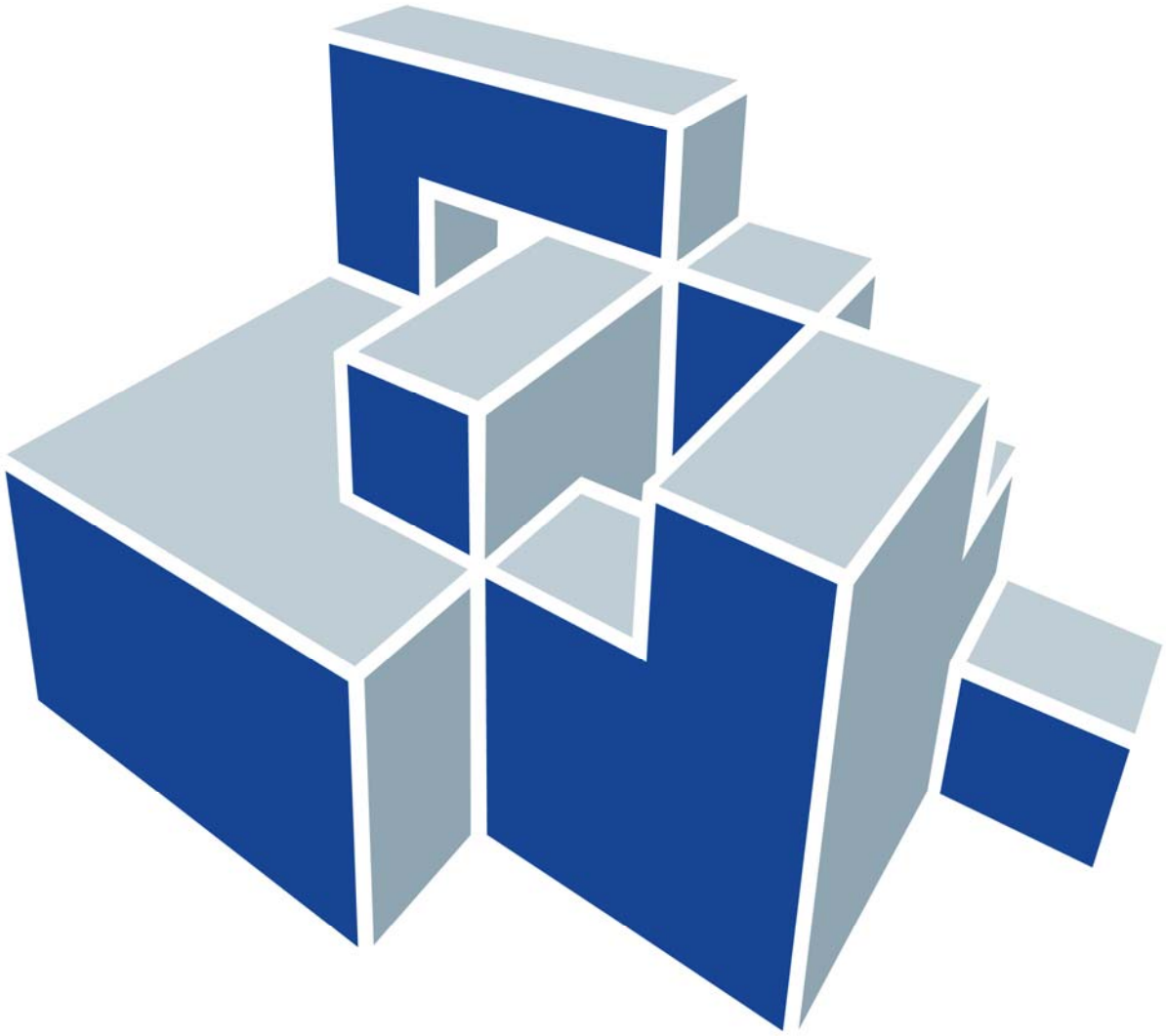
SIEMENS

SIMIT SCE

User Manual



SIEMENS

Issue date

July 2009

Siemens AG
Industry Sector
Industry Solutions Division

SIMIT-HB-SCE-2009-07-en

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1 PREFACE

SIMIT SCE is a Siemens solution specifically designed for training of automation engineers and used for the virtual commissioning of SIMATIC applications software. Thanks to the functional simulation of technical equipment or plants and its visualization, your students can test a PLC program under realistic conditions.

Students can understand the assignment faster and can focus on creating their PLC program. They can test it on the simulation at any time and, thanks to the high-quality display, are thus more motivated to find the correct automation solution.

The SIMIT SCE Campus License allows you to store a simulation project in form of an “executable simulation”. Your students can launch such a simulation and use it for testing, they cannot modify it however. As a precondition, the students computer needs to have the SIMIT4Students software installed.

This manual shows you how to use existing simulations in class with SIMIT SCE. Beyond that you learn how to use SIMIT SCE to create and use your own simulations.

Chapter 2 comments on special features of SIMIT SCE and depicts differences and limitations compared to the SIMIT Software as it is used in automation solutions in an industrial environment.

Chapter 3 guides you through the installation of SIMIT SCE.

Chapter 4 describes usage and general design of SIMIT SCE.

Chapter 5 provides a step-by-step instruction of how to build a simulation, using a simple press as an example.

Chapter 6 finally shows how to handle SIMIT SCE projects, with special emphasis on how to pass a simulation to your students.

2 SPECIAL FEATURES OF SIMIT SCE

Keeping close contact between industry and education has a long tradition at Siemens. “Siemens Automation Cooperates with Education”, short SCE, is the made-to-measure solution for institutions of education around the world. In this environment SIMIT SCE provides a reasonably priced way to use modern simulation techniques in training automation engineers.

2.1 Scope of SIMIT SCE

SIMIT SCE contains modules as follows:

- **SIMIT BASIC** is the basic system that comprises project management, graphical user interface and a basic library of components and controls.
- **SIMIT DGE** is the SIMIT graphics editor used for designing user defined diagrams.
- **SIMIT MCE** is the macro editor used to build macro components from standard components contained in the basic library.
- **SIMIT PLCSIM** is a gateway that builds up a connection for signal exchange between SIMIT SCE and an emulated Siemens control unit running in PLCSIM.[1]
- **SIMIT PRODAVE** is a gateway that builds up a connection for signal exchange between SIMIT SCE and a SIMATIC control unit of type S7-300 or S7-400.
- You can create an “**executable simulation**”, which can be passed to students of your own institution of education.

SIMIT SCE is a fixed configuration that cannot be enhanced by additional modules.

2.2 Limitations of SIMIT SCE

SIMIT SCE holds some restrictions:

- The above mentioned PLCSIM and PRODAVE are the only gateways available. Address scope is restricted to predefined ranges as follows:
  - 32 binary inputs I0.0-I3.7,
  - 8 analog inputs IW64-IW78,
  - 32 binary outputs Q0.0-Q3.7 and
  - 8 analog outputs QW64-QW78.
- The number of components and controls that can be used in a simulation is limited to 250.

[1] PLCSIM is not part of SIMIT SCE, but part of SIMATIC-Software

3 INSTALLING THE SOFTWARE

Before using it, SIMIT SCE Software needs to be installed on your computer.

Please note that you need to be logged on as administrator in order to install the software!

3.1 Prerequisites

Your computer must meet some minimum requirements as follows:

Hardware

- Standard PC
- CD drive
- One USB slot available, please do *not* use USB extensions or hubs.

Software

SIMIT SCE supports Windows Operating Systems as follows:

- XP Professional SP3
- Vista Professional
- Vista Ultimate

3.2 Installing SIMIT SCE

For installation please launch *Setup.exe* on your SIMIT SCE installation CD in the *SIMIT*-folder. If your computer does not have the required .NET framework installed, setup will first install .NET framework version 3.5 SP1. There is no internet access required to install SIMIT SCE.

After this, installation continues. If the installation does not proceed automatically, please start *Setup.exe* again.

During installation of SIMIT SCE please follow instructions as provided by the installation program.

3.3 Uninstalling SIMIT SCE

You can of course uninstall SIMIT SCE at any time. Just launch *Programs* | *SIMIT 7* | *Uninstall* from your Windows startup menu or uninstall SIMIT SCE in System Control via *Settings* | *System Control* | *Software*.

During uninstallation all those files and registry entries will be removed which were created during installation. Alternatively you can also delete your entire workspace. In this case please make sure that your workspace does not contain any files you still might need!

3.4 Installing SIMIT4Students

Before a student can launch an executable simulation, he or she needs to have the SIMIT SCE Runtime Environment installed. You find the required *Setup.exe* on your SIMIT SCE installation CD in the *SIMIT4Students*-folder. You are entitled to pass this file to your students.

Please note that during runtime environment installation your license number will be asked, hence you need to pass this 7 digit number to your students. You find the license number on your certificate of license as well as on your dongle.

Your students can use executable simulations only if these simulations were created using the SIMIT SCE Software with the corresponding license number.

3.5 Uninstalling SIMIT4Students

You can of course also uninstall the SIMIT SCE Runtime Environment at any time. Just launch *Programs* | *SIMIT 7* | *Uninstall* from your Windows startup menu or uninstall the SIMIT SCE Runtime Environment in System Control via *Settings* | *System Control* | *Software*.

4 INTRODUCTION TO SIMIT SCE

Studens who are to learn how to handle automation devices usually have a common problem: the finest PLC program is without effect if you lack the plant to be controlled.

SIMIT SCE bridges this gap by making the plant available to your students in form of a computer simulation.

When using SIMIT SCE the following issue is a matter of particular interest:

Linking on signal level

Define the gateway SIMIT SCE should use to communicate with your automation.

You can now set and read signals with SIMIT SCE without any further effort!

If you prefer an individually designed operating panel, proceed with the next step:

Operating

You can use diagrams with various controls placed upon them. You may automatically create such a diagram using data that is available already, such as the data in your gateway. You may also individually design your diagrams by manually creating them.

By simulating your plants behavior SIMIT SCE provides maximum benefit:

Simulation

In order to simulate your plant SIMIT SCE provides libraries which contain components covering a large field of applications: ranging from simple arithmetic and logical functions up to complex drive simulations or even process simulations.

You do not need any specialist knowledge to build up a simulation. The only thing you do is to place and connect components as provided in the SIMIT SCE library on the graphic user interface and parametrize them appropriately.

The remaining comments in this chapter provide you with a basic understanding of how to use SIMIT SCE.

4.1 Gateways

You may use SIMIT SCE in conjunction with a real control unit (SIMATIC S7-300 or S7-400) as well as a simulated control unit (S7-PLCSIM). In the first case the PRODAVE gateway is used via an MPI or Ethernet cable, in the latter case a pure software gateway is used (see Figure 1).

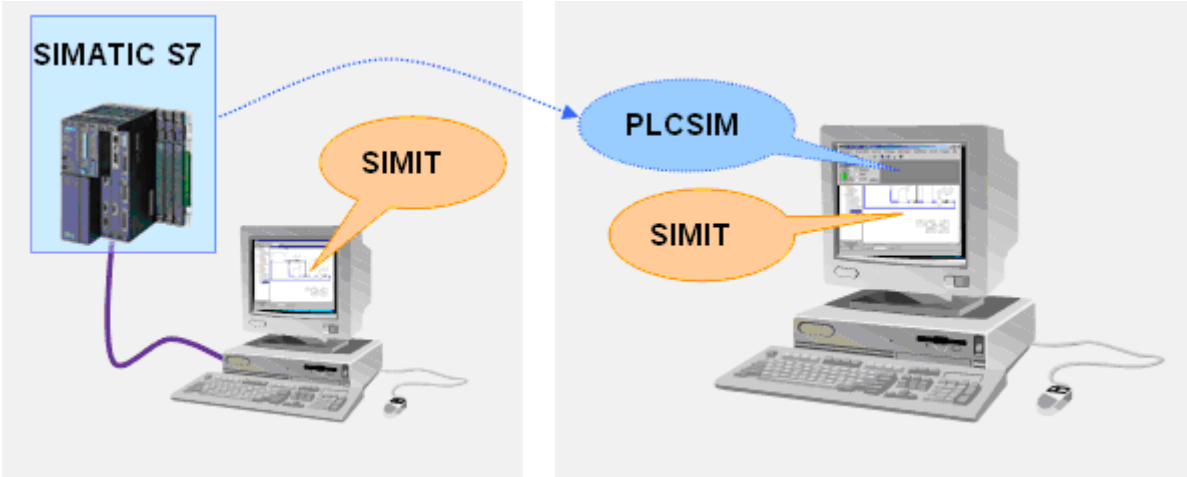

Figure 1: Setup with real control unit (left) and simulated control unit (right)

4.1.1 Connecting to a real control unit via PRODAVE

When connecting a real control unit to SIMIT SCE you have two options:

- **MPI**

  In this case you need either an MPI interface card in your computer or an MPI adapter for use with a USB or serial port.

- **Ethernet**

  When using a control unit with ethernet access you may also use this cable to connect to SIMIT SCE.

You choose the access mode in the properties dialog of your PRODAVE gateway as shown in Figure 2.

The corresponding interface must be selected as “PC/PG-Interface” within the Simatic manager.

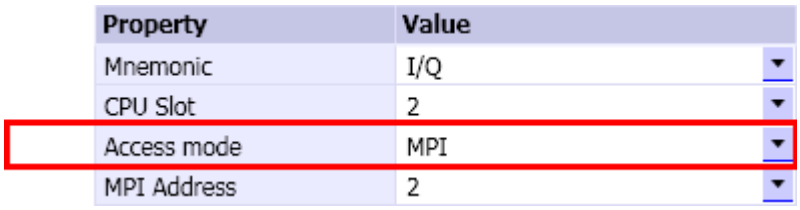

Figure 2: Access mode of the PRODAVE gateway

4.1.2 Connecting to S7-PLCSIM

Instead of a real S7 control unit you can also use the control unit simulation PLCSIM. In this case you do not load your STEP7 application program into the real SIMATIC control unit but into PLCSIM.

You can launch PLCSIM directly from SIMATIC-Manager ().

SIMIT SCE can be used with PLCSIM version 5.2 through 5.4 SP3. Any multi CPU capabilities of PLCSIM as introduced with version 5.4 SP3 are not supported however.

Please note that the software S7-PLCSIM itself is not part of SIMIT SCE.

4.2 The user interface of SIMIT SCE

The user interface of SIMIT SCE is divided into some major elements as shown in Figure 3:

- The **Menus** along with the **Toolbar** provide easy access to the functions available in SIMIT SCE. Additional functionality is available via context menus.
- The **Project view** shows the currently used project in form of a tree view.
- Diagrams and gateways are shown and edited in the **Work area**.
- Library components, controls, graphic tools and the signals available in your project can be found in the **Tool window**.
- A currently selected object shows its properties in the **Property view**.
- Use the **Tab control** at the bottom to switch between open diagrams and gateways.

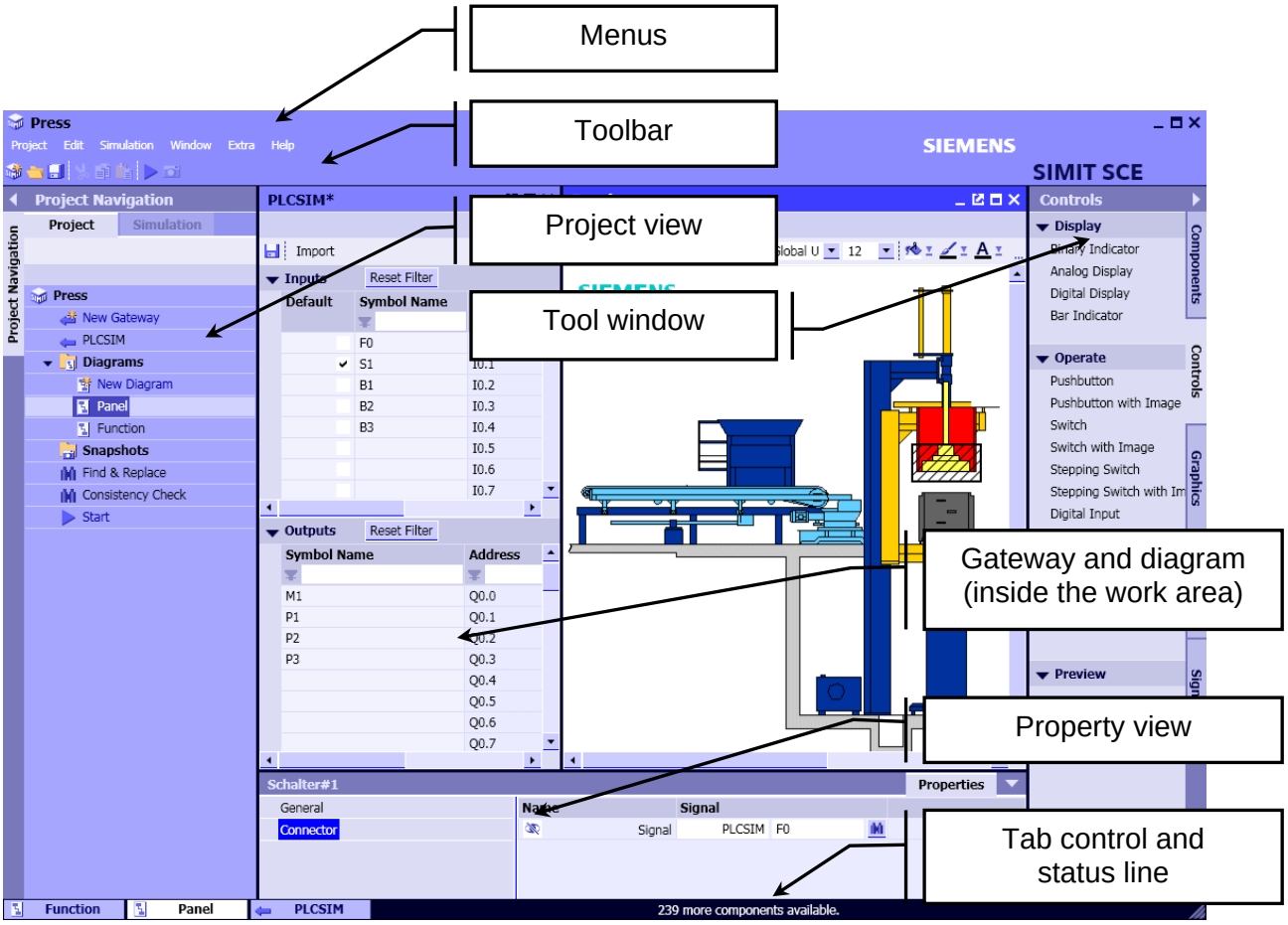

Figure 3: User interface of SIMIT SCE

4.3 Simulation projects in SIMIT SCE

Simulation projects are handled in the project view. A SIMIT SCE project contains different elements as shown in Figure 4.

- **Gateways** ( ) establish a link between SIMIT SCE and a control unit. You can create a new gateway by double clicking the tree entry “New Gateway” ( ).
- **Diagrams** ( ) are placed in the “Diagrams” folder and contain the simulation built with library components. You can create a new diagram by double clicking the tree entry “New Diagram” ( ).
- Snapshots of your simulation are placed in the **Snapshots** folder.
- You can **Find & Replace** signals, components and connectors in your project.
- The **Consistency Check** will reveal formal errors in your project.

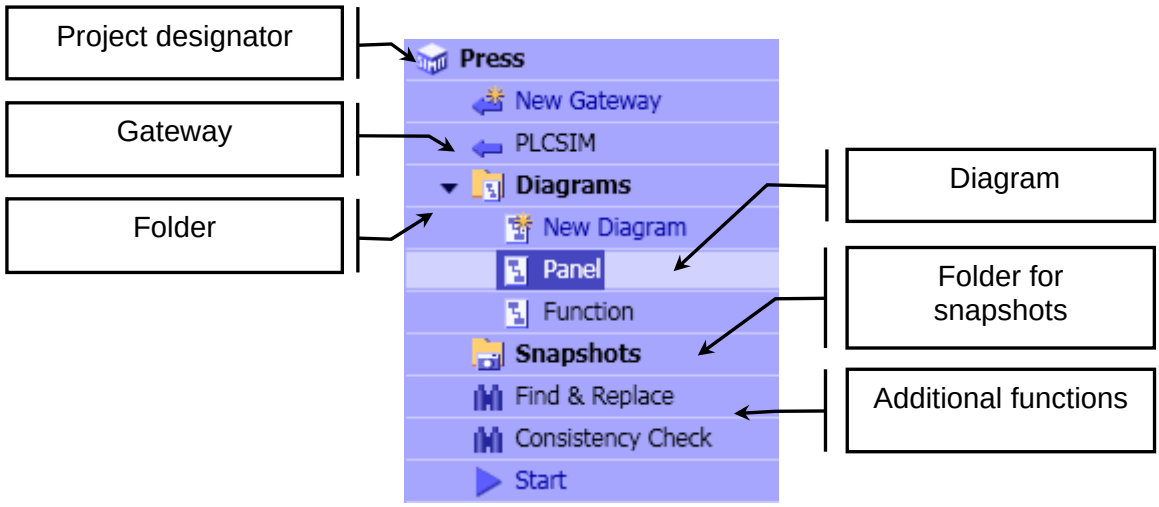

Figure 4: Elements of a SIMIT SCE project

4.4 Building a simulation

In SIMIT SCE you build a simulation using predefined components on diagrams (see Figure 5). You can add a new diagram to your SIMIT SCE project using the tree entry “*New Diagram*”. When double clicked in the project view, an existing diagram is opened in the work area.

Components offering various arithmetic and logical functions can be found in the standard library. Based on these components a simulation is built on a diagram and then is connected to the control unit using peripheral connectors (see Figure 5). Just drag and drop

components from the library onto the diagram, connect the connection points and specify the components parameters.

In order to establish a connection between two connection points (i.e. input and output) place the mouse above a connection point you want to use and click left. Note that the mouse cursor changes when placed above a connection point and do not keep the left mouse button pressed. Now move the mouse to the other connection point you want to use and click left again. A connection is now established and you see a connection line. Alternatively you can also drag and drop one connection point to another.

You can set a components parameters by using the blue input fields. To enter a value in an input field double click the field and commit your input by pressing RETURN. Alternatively you may use the components property view. You can open a components property view by double clicking the component.

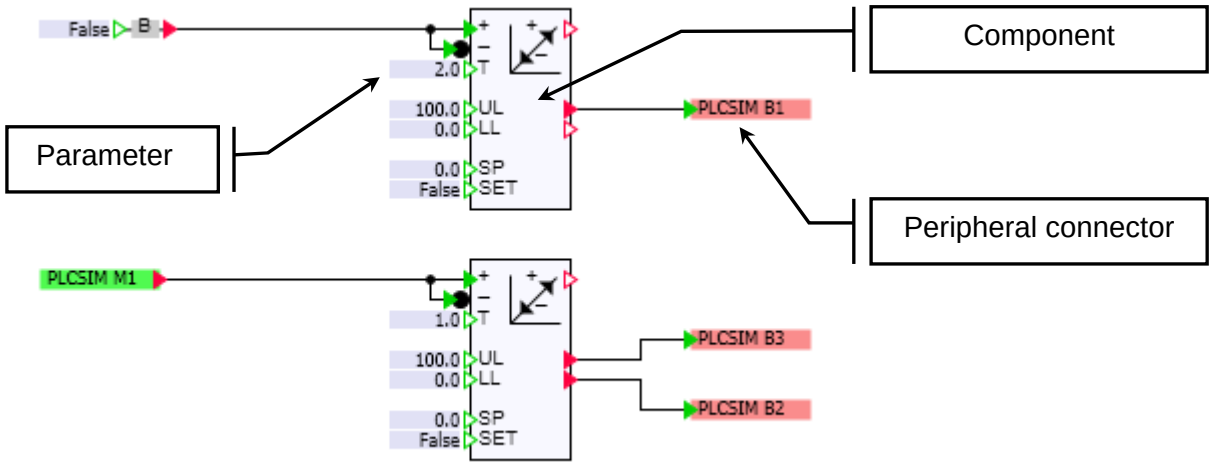

Figure 5: Diagram with components and peripheral connectors

The control units input and output signals are managed in gateways. These signals are displayed on the diagram as peripheral connectors: Output signals are represented as green peripheral connectors, input signals as red peripheral connectors. You can place peripheral connectors on a diagram via drag and drop from the gateway. For this purpose open the gateway and split your work area using the menu "*Window* | T*ile Horizontally*" so that both gateway and diagram are visible. Then drag the signal of interest onto the diagram by gripping it within the gateways left border and keeping the SHIFT-key pressed. Finally connect its connection point with a components connection point.

The so-called controls are divided into operating and display controls. In order to set values when the simulation is running operating controls are made available, display controls are used to show values. Controls can be placed on separate diagrams clearly laid out and according to your requirements. Figure 6 shows an example of a diagram with operating controls and binary display controls.

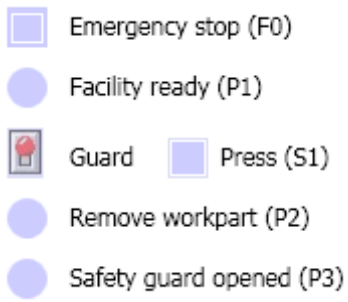

Figure 6: Diagram with some controls

4.5 Running the simulation

You can run the simulation using the toolbar or the project view ( ) as well as the menu "*Simulation* | *Start*". A change in the SIMIT SCE color scheme from blue to orange indicates that the simulation is running.

All changes to the simulation, be that on diagrams or in gateways, take effect automatically when the simulation is run next time.

While the simulation is running you can open and close diagrams and select a component by clicking it with the *right* mouse button. Opening the property view enables you to observe any change of a selected components input and output values in a running simulation.

5 EXAMPLE OF USE “PRESS”

The example of use “*Press*” shows how a simulation is built so that you can perform simulation based testing. The PLC program is to be executed in PLCSIM and controls the press that is simulated in SIMIT SCE.

You find the SIMATIC program as well as the complete SIMIT project on your installation CD in the “Samples”-folder. If you wish to gain experience with a ready-to-use simulation first, please continue with chapter 6.1.

5.1 Automation assignment

In this simplified example the press contains two movable parts only: a safety guard and a plunger. The safety guard is moved directly with a switch on the operator panel. The control unit receives a binary feedback only which indicates whether or not the safety guard is down.

Having lowered the safety guard the operator triggers the control unit with a pushbutton. The control unit then checks if the grid is down. If this is the case the control unit will lower the plunger until the limit switch is activated. Then the control unit will move the plunger back to its initial position and signal the workpiece to be removed. Opening the safety guard will delete this message.

The operator panel also contains an emergency stop switch. This switch being pressed the control unit is to move up the plunger at once and signal the machine to be not operational any more.

Summarized, signal exchange between control unit and (simulated) plant looks like this:

Signal name	Address	Type	Remark
F0	I 0.0	BOOL	Switch: Emergency Stopp
S1	I 0.1	BOOL	Pushbutton: Press
B1	I 0.2	BOOL	Feedback safety guard closed
B2	I 0.3	BOOL	Feedback Press up
B3	I 0.4	BOOL	Feedback Press down
M1	Q 0.0	BOOL	Command lower plunger
P1	Q 0.1	BOOL	Display machine ready
P2	Q 0.2	BOOL	Display remove workpiece
P3	Q 0.3	BOOL	Display safety guard open

Tabelle 1: The press controls symbol table

5.2 Press control

Programming the press control in STEP7 is not subject of this manual. To make the interaction between control device and simulation in SIMIT SCE more vivid, a simple implementation is suggested here (see Figure 7). You find this control program in form of an archived STEP7 program *Press.zip* on your SIMIT SCE-CD in the *Samples* folder.

```
OB1 :   "Main Program Sweep (Cycle)"

Network 1 : Display: Facility Ready

          AN    "F0"
          =     "P1"


Network 2 : Display: Safety Guard Opened

          AN    "B1"
          =     "P3"


Network 3 : Move Plunger

          A     "S1"
          A     "B1"
          AN    "F0"
          =     "M1"


Network 4 : Display: Remove Working Part

          A     "B3"
          S     "P2"

          A     "B2"
          AN    "B1"
          R     "P2"

          BEU
```

Figure 7: STEP7 program of a press control

In order to use this control program along with the SIMIT SCE sample project, please proceed like this:

- Retrieve S7-project *Press.zip* with SIMATIC-Manager,
- Launch PLCSIM and load the S7-Programm into PLCSIM and
- Turn PLCSIM into state RUN or RUN-P.

PLCSIM now executes the control program.

A connection used for signal exchange between PLCSIM and SIMIT SCE will be established automatically upon starting the simulation. The PLCSIM gateway in SIMIT SCE defines which I/O signals are coupled between PLCSIM and SIMIT SCE.

5.3 Simulation

We now want to build a simulation with SIMIT SCE to test this press control program. The simulation should perform several tasks:

- An operator panel with switches, pushbuttons and display controls should be available that enables operating of the safety guard and allows signal exchange with the control unit.
- The operator should be able to manually raise and lower the safety guard. A binary input tells the control unit that the guard is closed.
- The control unit uses an output signal to lower the plunger, which takes about one second. Initial and final position are registered and communicated to the control unit.
- All movement is to be visualized.

In the next steps we will see how to meet all these requirements using SIMIT SCE.

5.3.1 Creating a simulation project

After startup SIMIT SCE shows a project dialog. You can create new projects or open existing ones here. Please select “New Project” and provide a folder in which to place your data. As project name you may use “Press”.

If SIMIT SCE is running already, you can open this dialog using the menu “*Project* | *New Project*”.

Figure 8: Project dialog in SIMIT SCE

Finally you click “Create”.

5.3.2 Connecting to PLCSIM

In this example of use the STEP7 program should not be loaded into a real control unit but into PLCSIM instead. In case PLCSIM is not running already, please proceed as described in chapter 5.2 to start PLCSIM, load the S7 project and turn PLCSIM into mode “RUN-P”.

By adding a gateway in SIMIT SCE you also define which signals are to be communicated with the real control unit or with PLCSIM in this case. Please add a new gateway to your project be double clicking the “New Gateway” entry in the project view. Select “PLCSIM” and confirm by clicking “OK”.

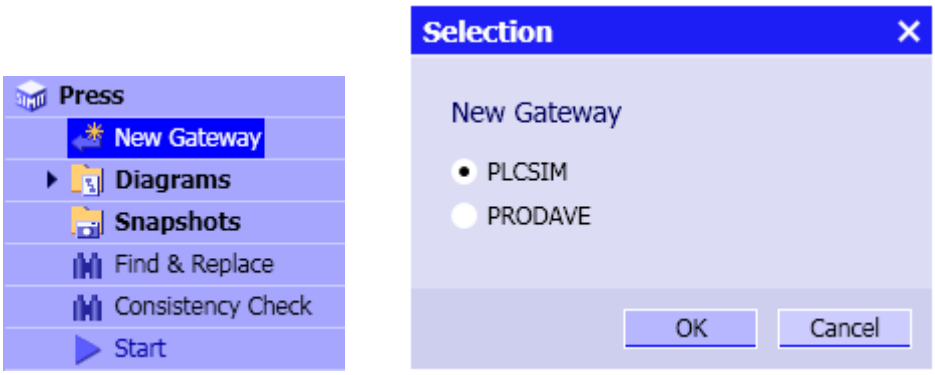

Figure 9: Adding a new gateway

You may change the gateways name “PLCSIM”. For your project to match this example please confirm the default value by pressing “RETURN”.

In the work area you now see all available binary and analog signals which are communicated between SIMIT SCE and PLCSIM. Please note that both range and addresses of these signals are immutable in SIMIT SCE.

When starting the simulation you can immediately observe signal exchange. Just click the -symbol in the tool bar. Alternatively you may double click the “Start” entry in the project view or select the menu “*Simulation* | *Start*”. A change in the color schema from blue to organge indicates that the simulation is now running. Also the project view switches to simulation mode.

You may now set the output Q0.7 in PLCSIM and observe the reaction in SIMIT SCE. Conversely you may set a control units input in SIMIT, e.g. I0.7 and observe the reaction in PLCSIM.

Please note that the STEP7 program will set the outputs Q0.1 and Q0.3 to “1”, given that you already have loaded the SIMATIC project “*Press*” into PLCSIM. In this case you cannot set outputs Q0.0 through Q0.3 manually!

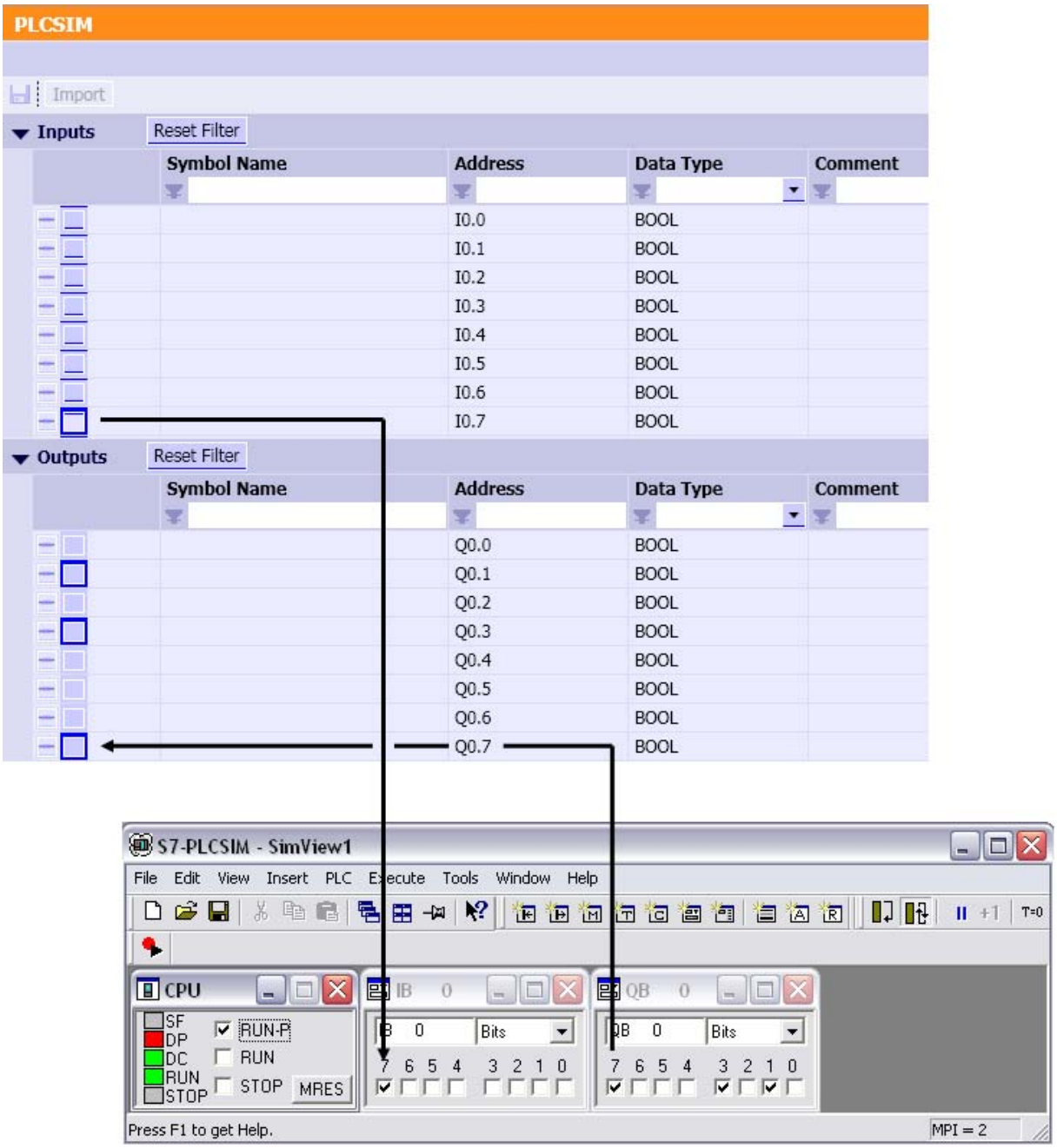

Figure 10: Signal communication between SIMIT SCE and PLCSIM

Please end the simulation before proceeding. Just click the -symbol in the tool bar. Alternatively you may select the menu “*Simulation* | *Exit*”.

I/O signals can also be addressed symbolically in SIMIT SCE. Just enter appropriate names in the gateways “Symbol Name” column or import a symbol table already created by SIMATIC manager.

To do so you just need to export a symbol table in SIMATIC managers symbol editor.

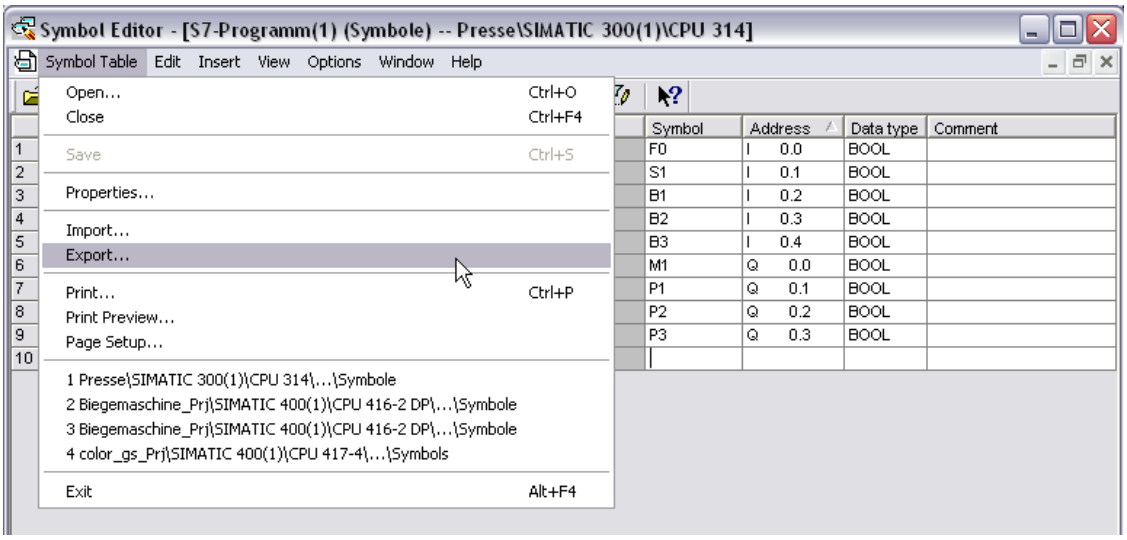

Figure 11: Exporting a symbol table

Afterwards you can import the symbol table into the gateway editor in SIMIT SCE.

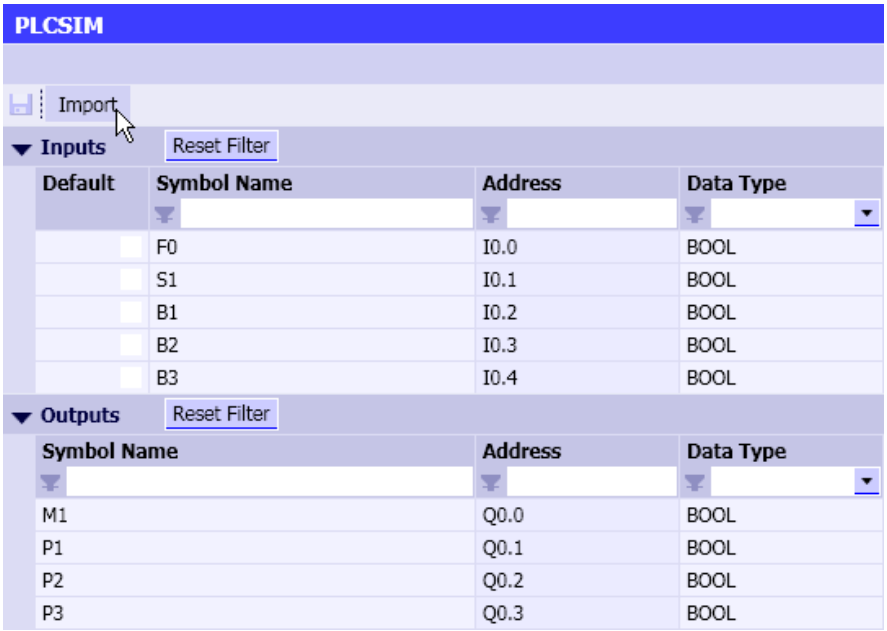

Figure 12: Importing a symbol table

SIMIT SCE supports both ASC and SEQ files. In the “Samples” folder on your SIMIT SCE CD you find an applicable symbol table.

By importing a symbol table you have modified the gateways configuration which is visualized by an asterisk in the window title. Click the disk symbol to save changes.

5.3.3 Building an operator panel

You can observe and operate all I/O signals in the gateway editor as described above. You may still want to access specific signals in form of an individually designed operator panel, however. Please open the “Diagrams” folder and double click the “New Diagram” entry. Then change the diagrams name from its default into “Panel”.

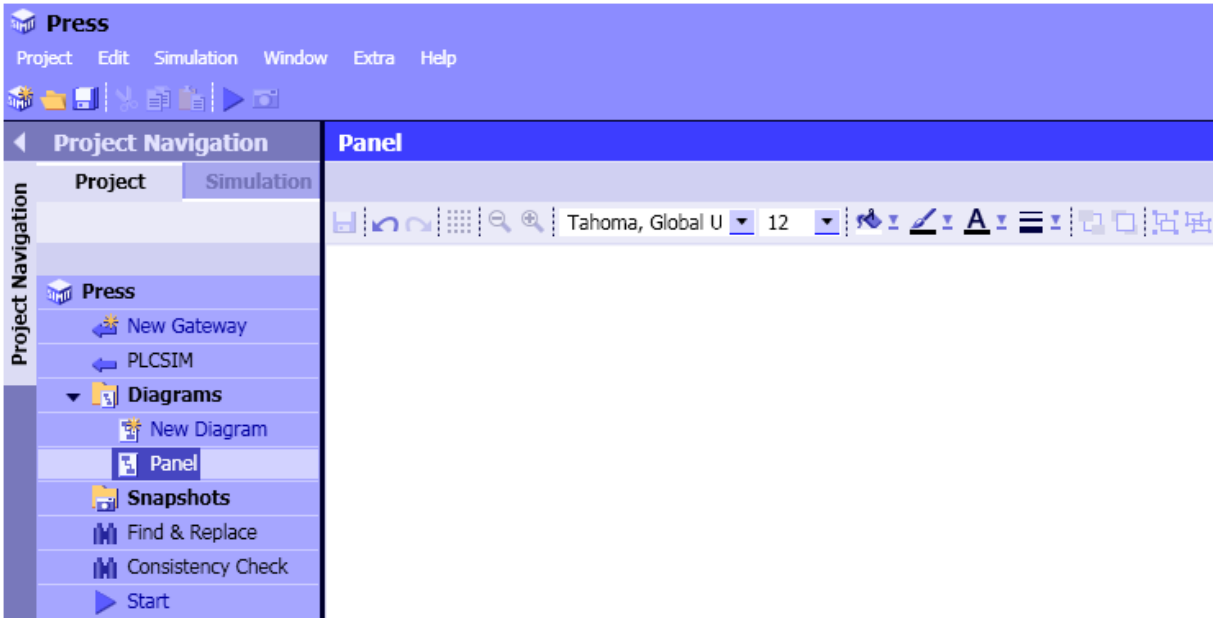

Figure 13: Creating a new diagram

Your work area now shows an empty diagram. On the right hand side you see the tool window containing the tabs “Components”, “Controls”, “Graphics”, “Projects” and “Signals”. To build an operator panel we first need the “Controls” tab. Just drag and drop three “Binary Indicators” from the tab onto your diagram.

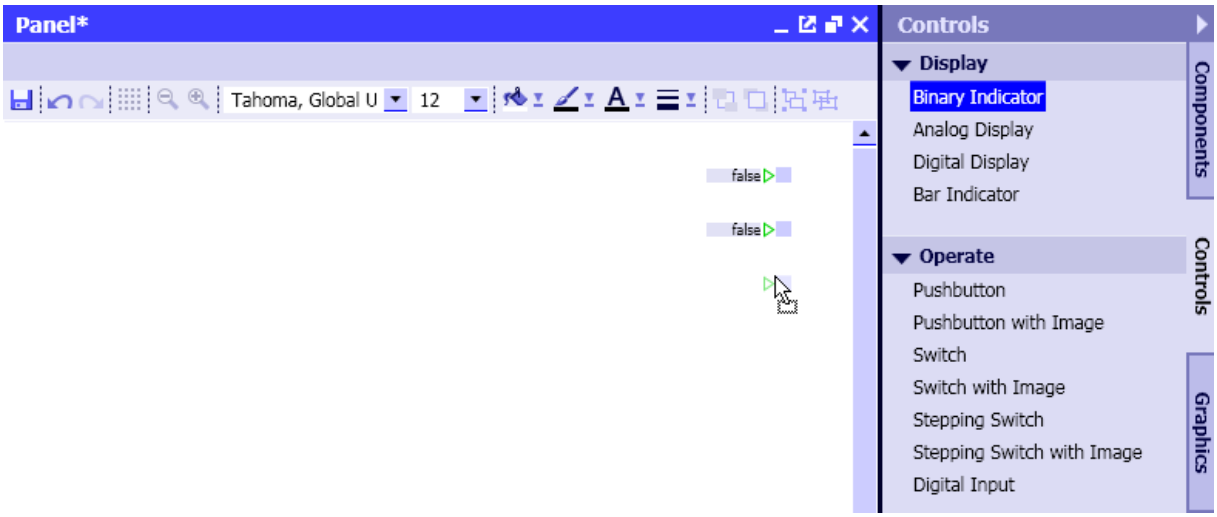

Figure 14: Placing a control

Just like components, controls can be connected using signal lines. This is indicated by the green triangle on the binary indicators left hand side. For an operator panel this is not useful however. Please select the control and select the “Connector” section in its property view. Click the -symbol to make the connection point invisible.

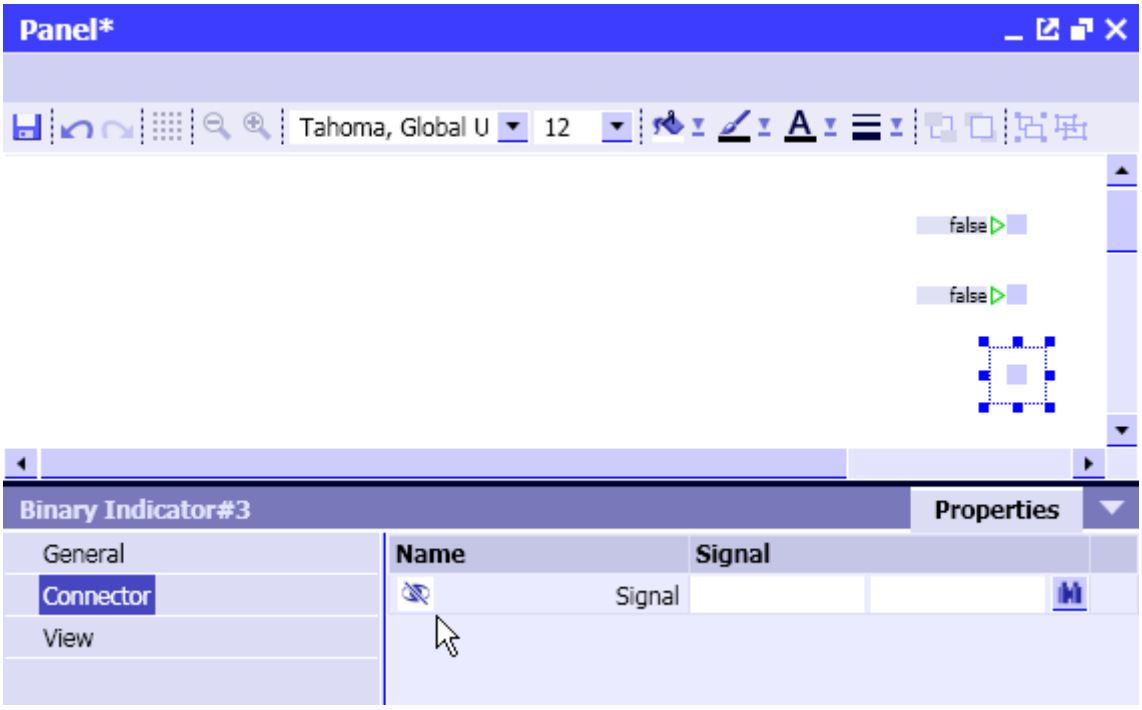

Figure 15: Signal connection of a control

You can now enter the name of the signal to be visualized by this binary indicator. Please enter the gateways name “PLCSIM” in the left hand field and the signals name “P1” in the right hand field. If there were no symbol table imported, the signal name would have to be the absolute address “Q0.1” instead of “P1”.

Alternatively you may open the “Signals” tab and drag and drop an I/O signal into the Signal field.

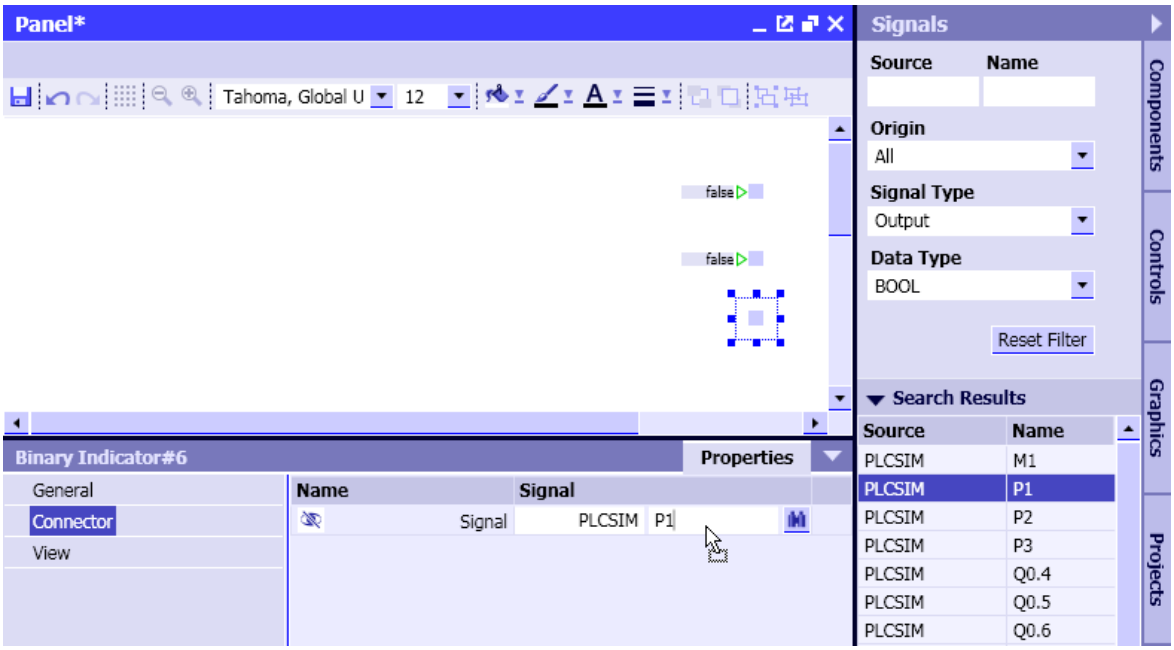

Figure 16: Signals tools window

There are several ways to filter signals in your simulation project. In the above image only binary output signals are visible (Signal type: Output, Data type: BOOL).

Please note that the signal list is updated only when a diagram or gateway is saved!

Please complete all three binary indicators by entering signals “P1”, “P2” and “P3”.

If you wish you may also change the binary indicators shape. The property view will show a choice named “Shape” in the “View” section which you may change to “Round”. You may also change the binary indicators size directly on the diagram. Just select the control and drag it to its favored size.

Figure 17: Resizing a binary indicator

Now add a “Switch” control to your diagram and parametrize it with Signal “F0”. Also place a “Pushbutton” control with Signal “S1”.

If you wish to drag and drop signals from the “Signals” tab please make sure that filters are set appropriately! You may reset all filters via “Reset Filter”.

When starting the simulation again, you can now access these signals directly on your diagram.

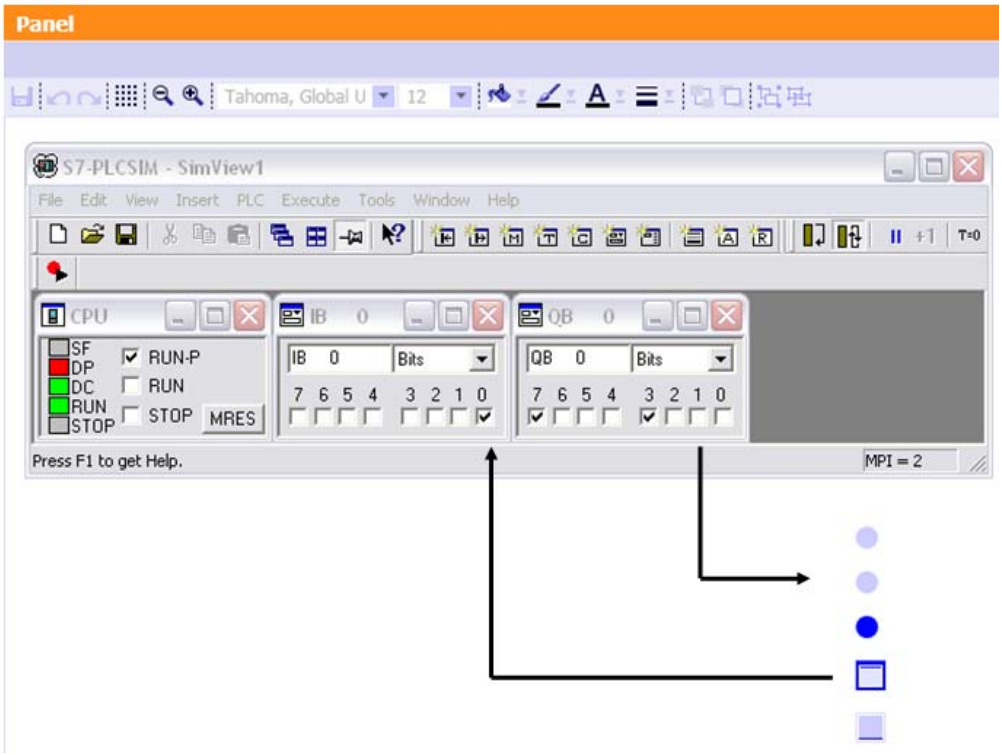

Figure 18: Operator panel

Please note again that the PLC program reacts to input “F0” and resets output “P1”.

Before proceeding please close the simulation again by clicking the -symbol or using the menu “*Simulation* | *Exit*”.

5.3.4 Simulating the movable safety guard

Our next step is to simulate the movable safety guard. This task consists of two assignments: On the one hand we have the basic function that generates a delayed feedback “grid closed” after activating a switch. On the other hand we need an appropriate visualization to show this process.

For the pure function please add a new diagram and name it “Function”.

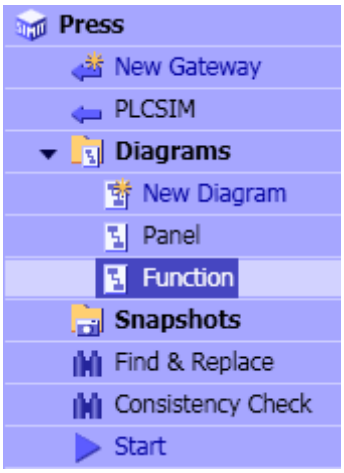

Figure 19: New diagram named “Function”

The safety guards movement is to be modeled using a ramp function that yields the grids vertical position. You find an appropriate “Ramp” component in the tools windows “Component” tab under “*STANDARD* | *AnalogExtended*”. Please drag and drop this component onto your diagram.

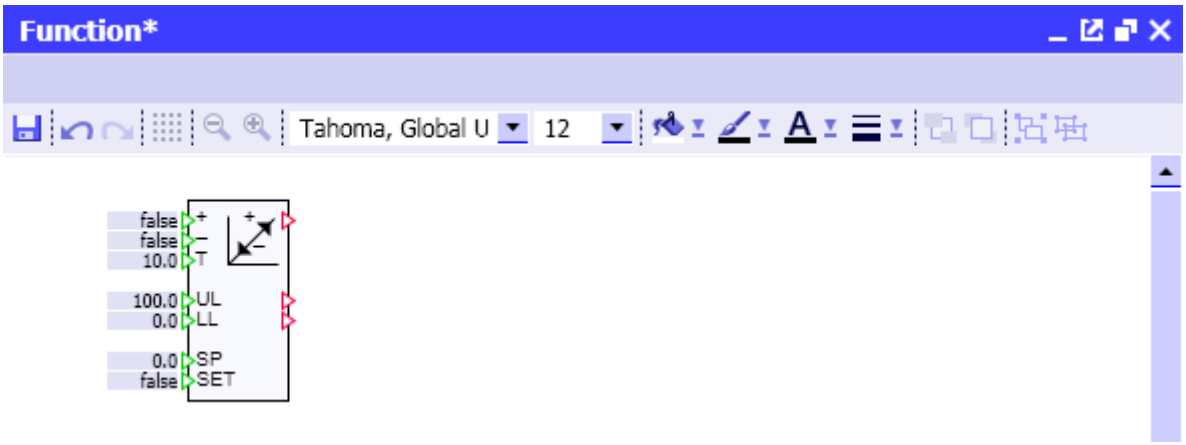

Figure 20: “Ramp“ component

This component computes a ramped value that runs from its lower limit “LL” to its upper limit “UL” within an adjustable time “T”, provided that the input “UP (+)” is set to “TRUE”. If the input “DOWN (-)” is set to “TRUE”, the values behave accordingly.

The components outputs indicate whether or not one of the limits is reached.

Since the safety guard is to be operated with one single switch, this switches signal needs to have its original value as well as the inverted value processed. One way to realize this is to use a “BConnector” component from the “*CONNECTORS*” library and a “NOTc” negation from “*STANDARD* | *BinaryBasic*”:

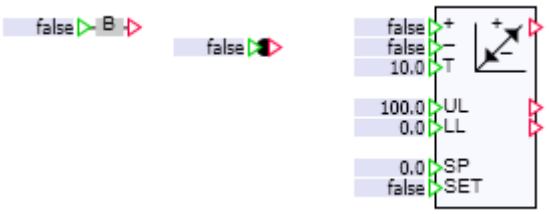

Figure 21: “Ramp”, “BConnector” and “NOTc”

Now place the NOTc in such a way that its red output triangle overlaps with the ramps green input triangle. The two connection points are now connected. In order to move the NOTc please take care to touch the component itself, not its connection points since you will not be able to move it otherwise. You may want to zoom the diagrams display using the -symbol from the tool bar.

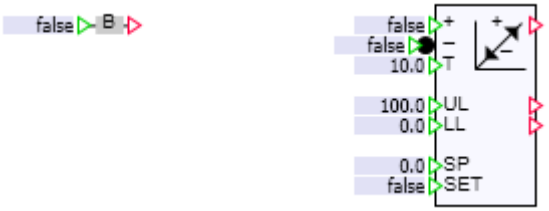

Figure 22: “Ramp” with inverted input

We are still lacking two connections which you now can establish using signal lines. Just click the BConnectors output and then the input to be connected or drag from one connection point to the other:

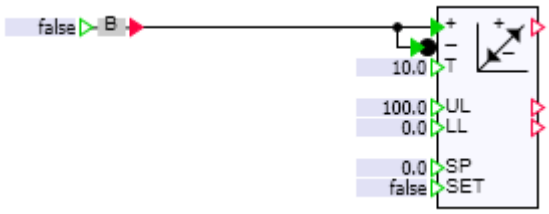

Figure 23: Connected Ramp component

Since the ramp is to be controlled via the BConnector, the latter should be assigned a meaningful name, e.g. “Guard”. Just select the BConnector and overwrite its current name “BConnector#1” with “Guard” in the components property views “General” section.

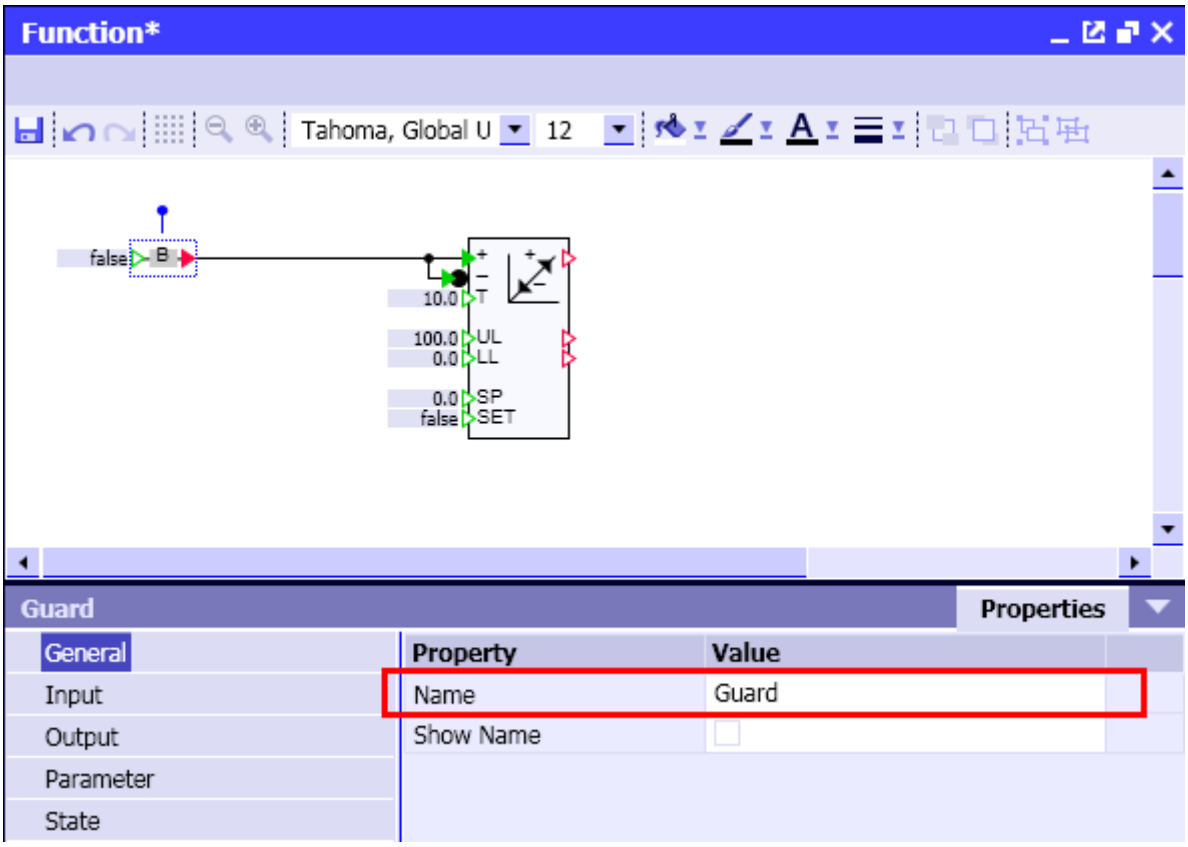

Figure 24: Name of a component

Now we want to inform the control unit about the safety guards state using signal “B1”. The easiest way to establish this connection is using the tool windows “Signals” tab again. Just drag signal “B1” onto the diagram without dropping, i.e. without releasing the mouse button! You see that SIMIT SCE first offers you to place controls handling this signal. In this case we need a peripheral connector. You can create a peripheral connector by pressing the SHIFT-key and then releasing the mouse button. Finally please connect the peripheral connector to the ramp.

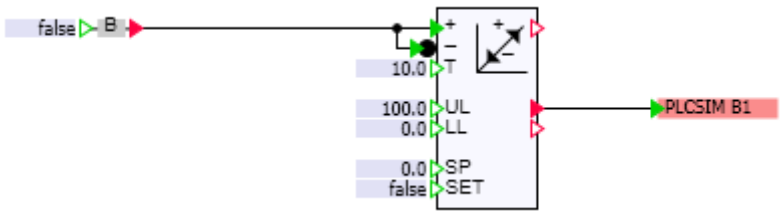

Figure 25: Complete connection

In the next step we set the ramps running time to two seconds. We do this directly on the diagram by double clicking the blue input field of input “T” and overwriting with “2”.

Please add a switch to handle the safety guard on the operator panel. In case you still have the diagram “Panel” open, you can get it back into your working area using tabs on the bottom of the screen.

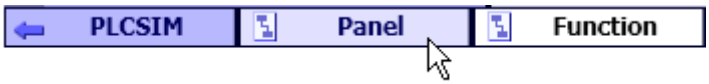

Figure 26: Tab control for changing the working area

We are going to use a switch with freely designed images here. Please drag a “Switch with Image” control from the tool window “Controls”. Again we want the signal connection to be invisible and be linked to the input “IN” of our BConnector named “Guard”.

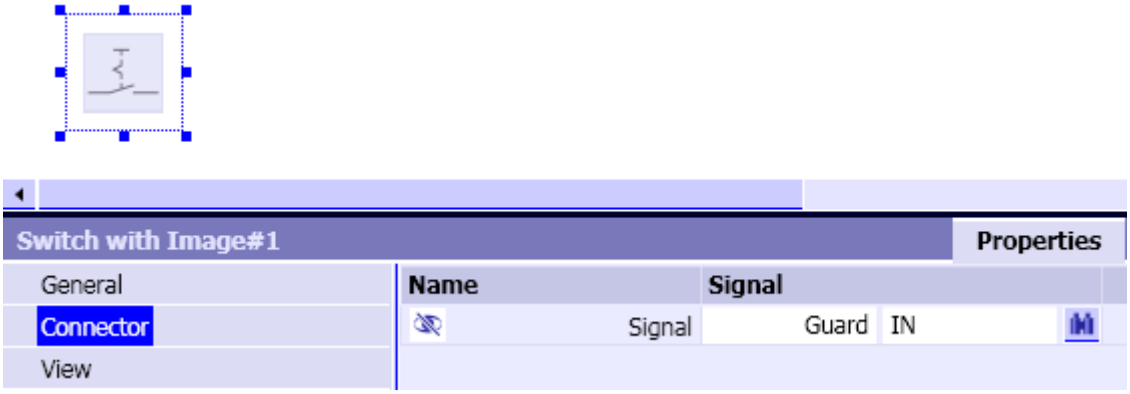

Figure 27: Switch with image with its signal connection

Please select the images to be displayed in the “View” section (see Figure 28). The images we use here as an example can be found on the SIMIT SCE installation CD in the “Samples” folder.

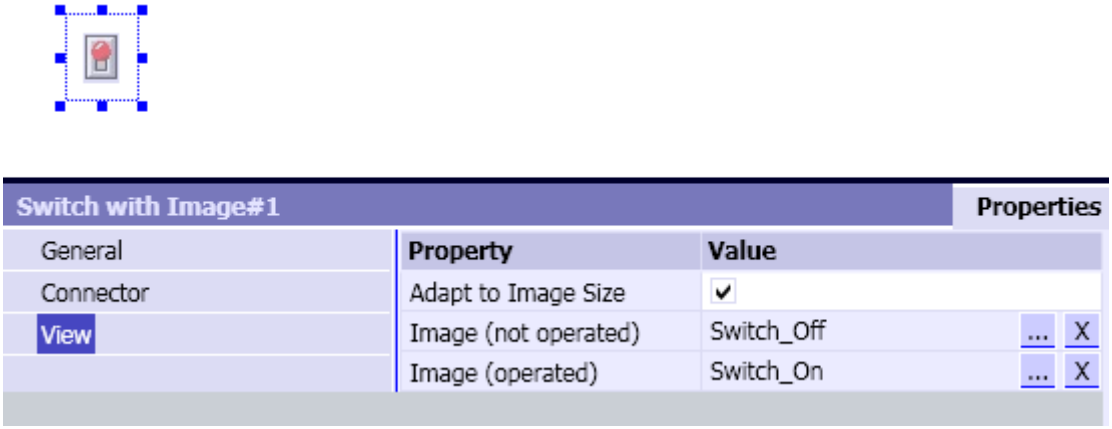

Figure 28: Defining images to be displayed

Please take care to check the “Adapt to Image Size” box so that images are displayed in their original size!

When starting the simulation you now see the feedback arriving in the control unit two seconds after activating the switch with image.

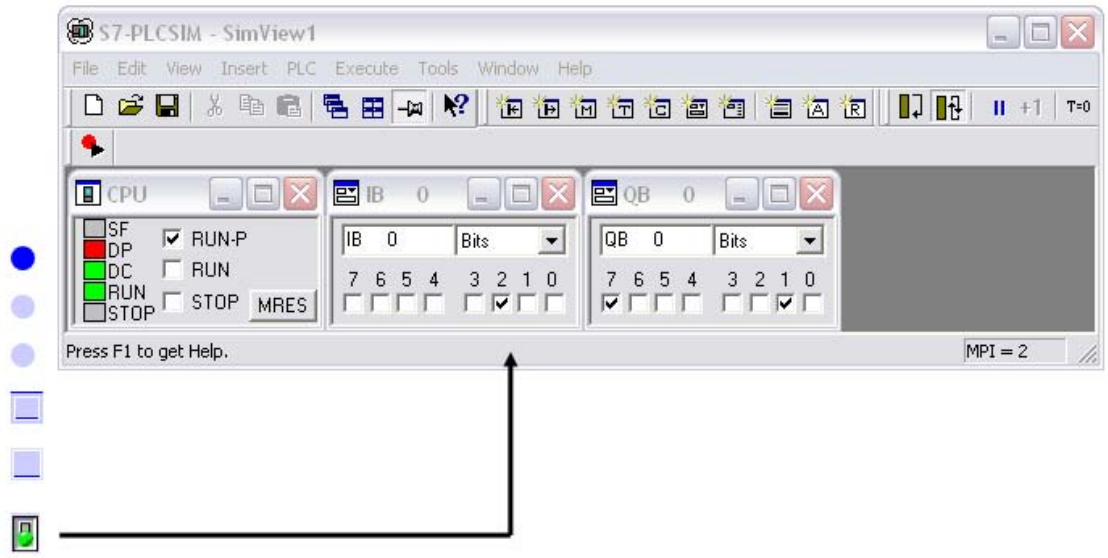

Figure 29: Feedback signaling closed guard

Before proceeding please close the simulation again!

5.3.5 Background image and labeling

You may want to make your operating panel more vivid and use a background image. To do this, please open the property view and click any non-occupied area on the diagram to have

the diagrams properties shown. Then select the background image from the “Samples” folder on your SIMIT SCE installation CD. Finally adapt the diagrams size to the images dimension, e.g. you use 700 x 500 pixel.

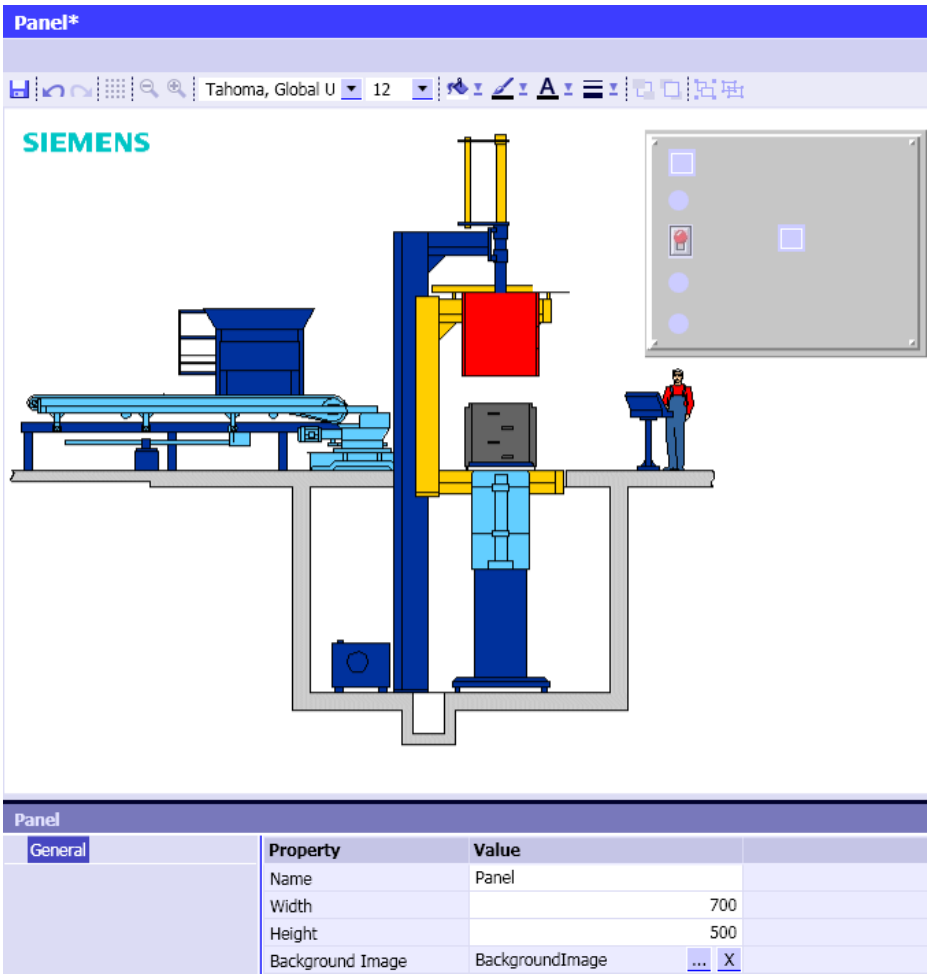

Figure 30: Background image

You may have noticed that the controls were already placed accordingly in the above image. The only thing we are still lacking is some meaningful labeling. If you are not sure any more which signal is displayed on which binary indicator, just select the control and check its property view for the “Signal” entry.

Please open the “Graphics” tool window now and click the Text -symbol. You can now draw a selection frame on the diagram and input some text therein. Like this you can label your operation panel as shown in Figure 31.

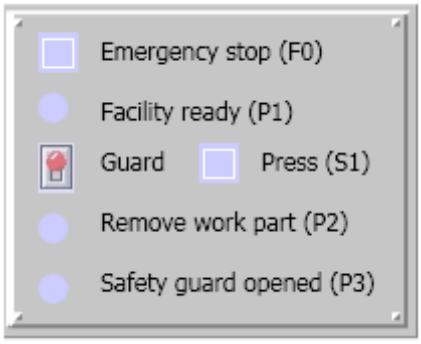

Figure 31: Labeled operating panel

Please take care to draw a large enough frame for each text to fit entirely into a single line and not to overlay any controls!

5.3.6 Graphics and Animation

The next step is to visualize the safety guards movement. First we need to create an appropriate graphic. Please select the tool window “Graphic” and choose the Rectangle symbol. On the diagram you draw a rectangle of about this size:

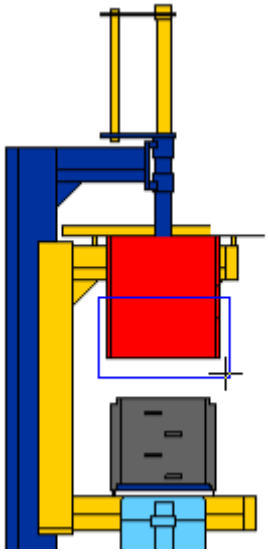

Figure 32: Introducing the Safety Guard

For the guard to be “transparent” select the rectangle and select “No Color” as fill color.

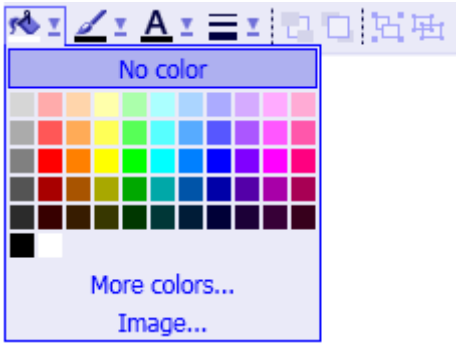

Figure 33: Selecting a fill color

Now activate the grid using the -symbol and zoom your display with the -symbol for easier working.

Please note that the background image is not visible as long as the grid is active!

Use the Line -symbol in the tool window to indicate a guard with some diagonal lines.

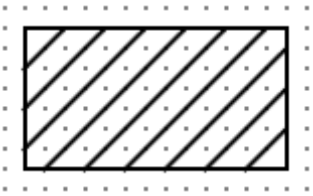

Figure 34: Safety guard

Select the outer rectangle again and assign it a line width of twp points (2,0 Pt).

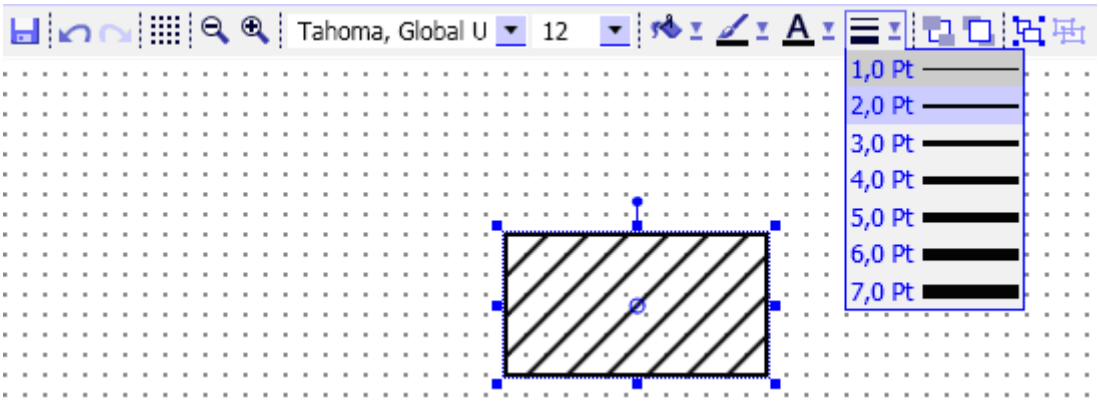

Figure 35: Adjusting the line width

Since the safety guard is to be moved as a single unit, please group the rectangle and the diagonal lines. To do this, just draw a selection frame around all graphic elements and click the  -symbol in the tool bar.

After deactivating the grid your safety guard should look like this:

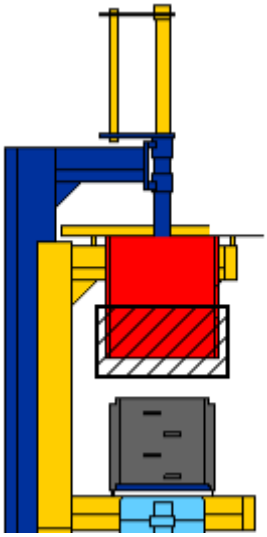

Figure 36: Safety guard as grouped graphic

Finally this graphic is to be animated, i.e. moved depending on the ramps value. Please select the safety guard and open the property view. Double click the topmost entry “New Animation” and select “Movement”.

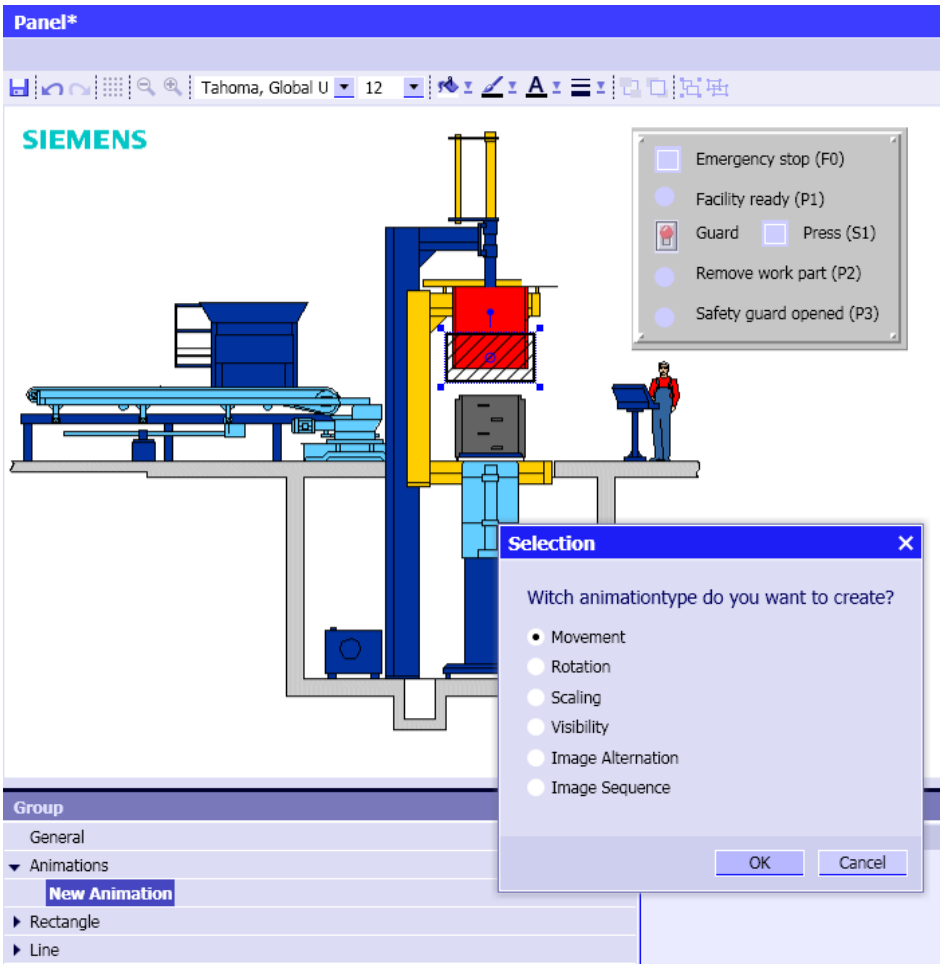

Figure 37: Selecting an animation type

In the mode you have just entered you can define direction and distance of the movement. Press SHIFT to only allow horizontal and vertical movements and drag the safety guard down a little.

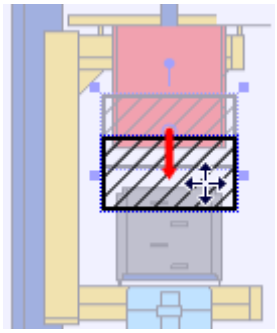

Figure 38: Defining a movement

Now enter the output “Y” of the ramp component “Ramp#1” as the signal to control this movement or drag and drop this signal from the tools window “Signals”.

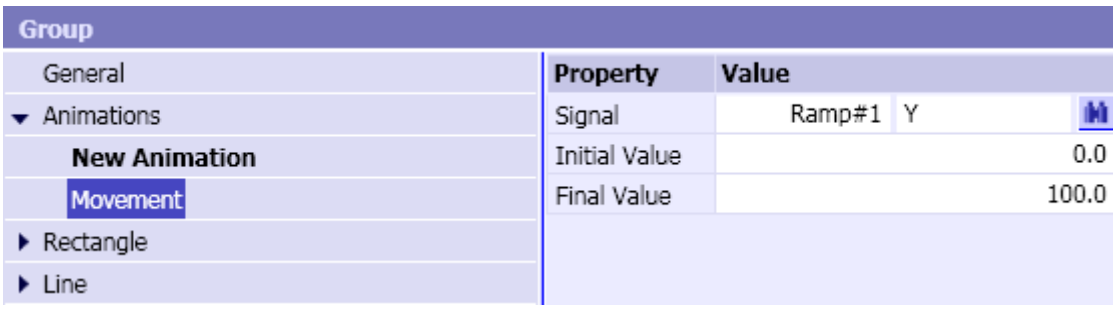

Figure 39: Signal to control an animation

To leave the animation mode click any non-occupied area on the diagram.

When starting the simulation now you can move the safety guard up and down using the switch  !

Before proceeding please close the simulation again!

5.3.7 Simulating the plunger

We simulate the plunger in a similar manner. On the functional diagram we need an additional ramp that is operated by the control unit in this case.

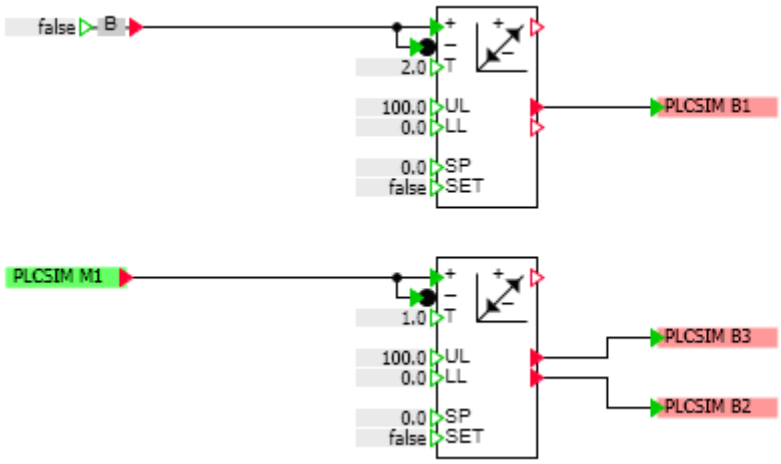

Figure 40: Function enhanced with the plunger

Please note that you can easily copy components by dragging an existing component with the Control-Key pressed.

As a visualization of the plunger just draw some rectangles and group them.

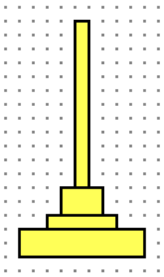

Figure 41: Plunger

The output signal of the second ramp is used to animate the plunger.

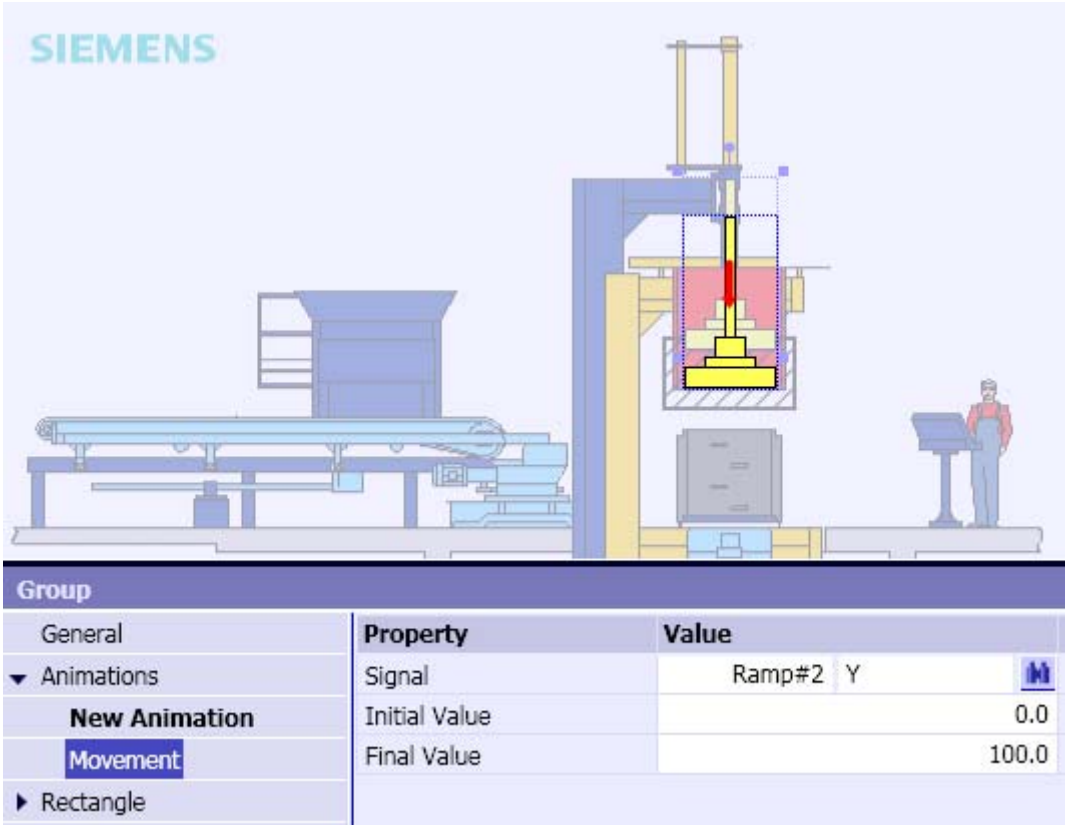

Figure 42: Animating the plunger

Being the last element that was drawn, the plunger overlays the safety guard. To fix this, please select the plunger and bring it to back using the -symbol.

We have now completed with this example of use. You can now test whether or not your control unit behaves correctly. You may check if the press is operable when the safety guard is open!

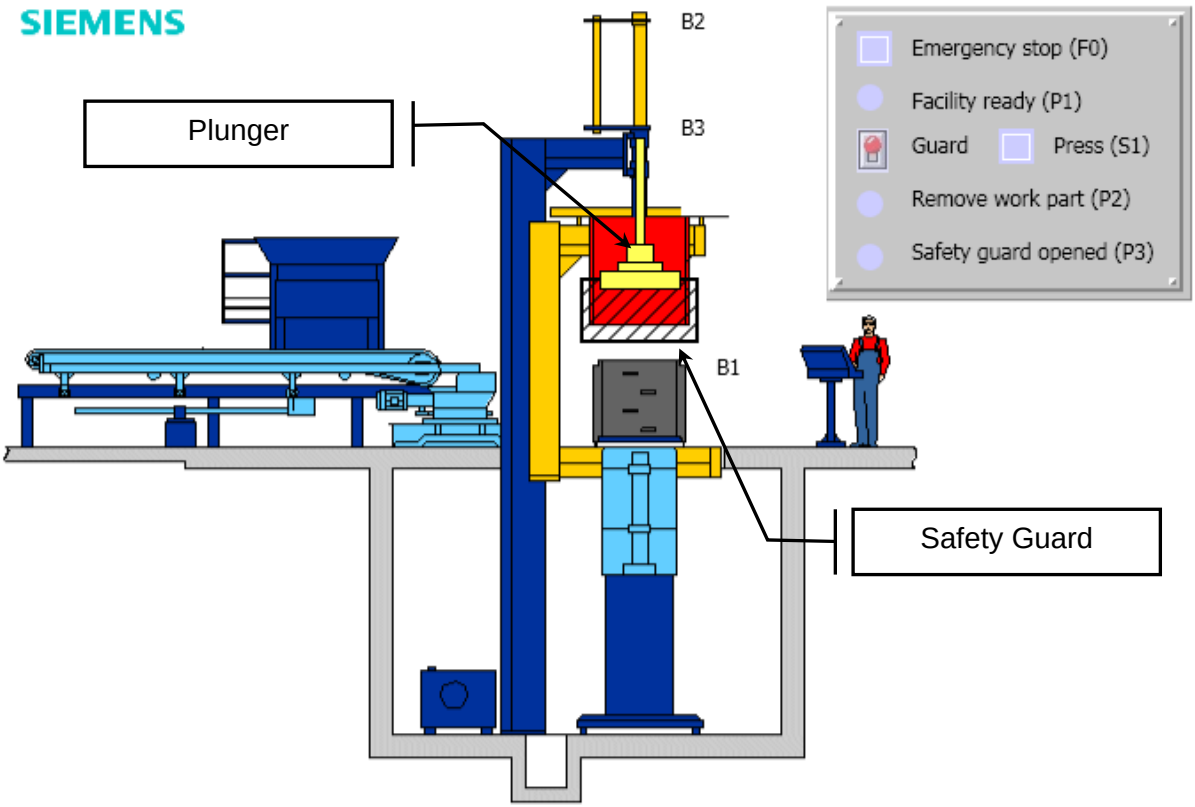

Figure 43: Finished example of use “Press”

6 PROJECT MANAGEMENT

6.1 Archived Projects

SIMIT SCE projects can be merged into a single file and thus be archived or transferred to another computer.

You can save an open project using the menu "*Project* | *Archive*" in form of a SIMIT SCE archive with the suffix ".simarc".

In order to retrieve an archived SIMIT SCE project use the menu „*Project* | *Retrieve*". You can freely choose the target folder.

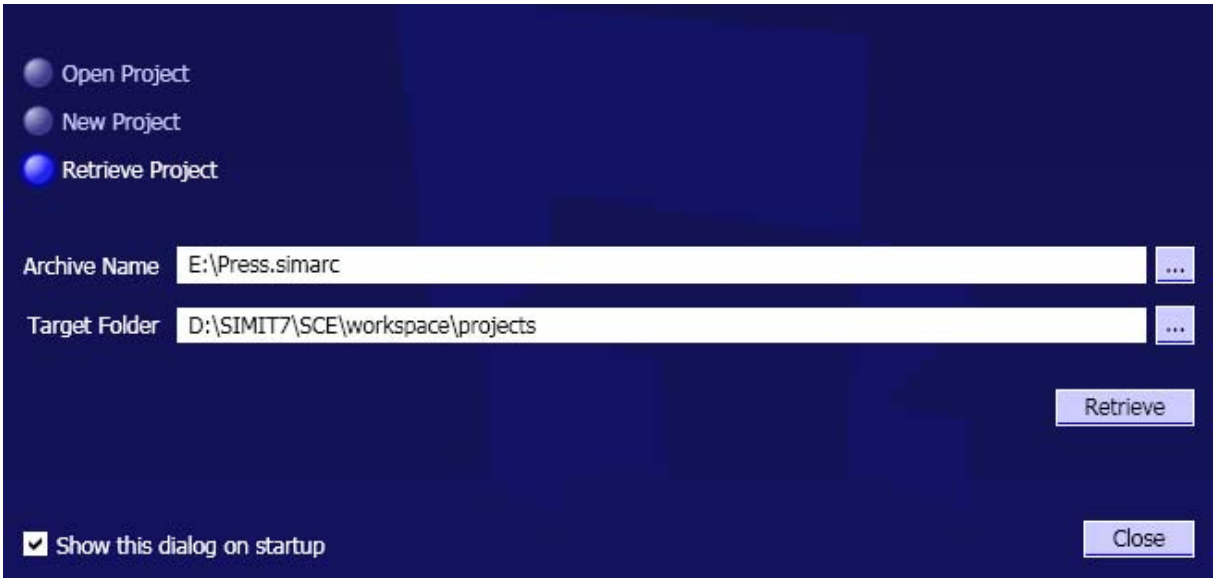

Figure 44: Retrieving a SIMIT SCE project

6.2 SIMIT4Students

SIMIT SCE provides the special feature to build an “executable simulation” that can be passed to students.

In such an executable simulation you have exactly one diagram from the underlying SIMIT SCE project available. Hence it is useful to organize your project in such a way that all information and controls are placed on one single diagram if they should be available to your student.

In the project view open the diagrams context menu and select “SIMIT4Students”. The resulting executable simulation has the suffix “.simit4S”.

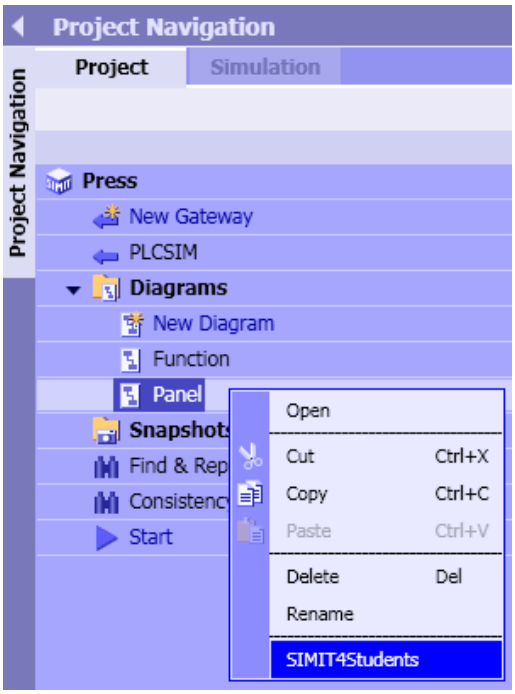

Figure 45: Passing a SIMIT SCE project in form of an executable simulation

Please note that before using this executable simulation, your student needs to install the SIMIT SCE Runtime Environment (see chapter 3.4).

Your students can only use executable simulations that were created with a SIMIT SCE installation with your license number.

When using SIMIT SCE in class the students computers may be connected via Ethernet to the computer SIMIT SCE is installed on. In this case the student can launch the executable simulation by double clicking it, provided that SIMIT SCE is currently running. In this case an automatic check is performed whether or not a SIMIT SCE application with the corresponding dongle is available.

If there is no network connection, a 12 digit password needs to be entered when launching an executable simulation. This password is provided when creating the executable simulation so please take care to note it down.

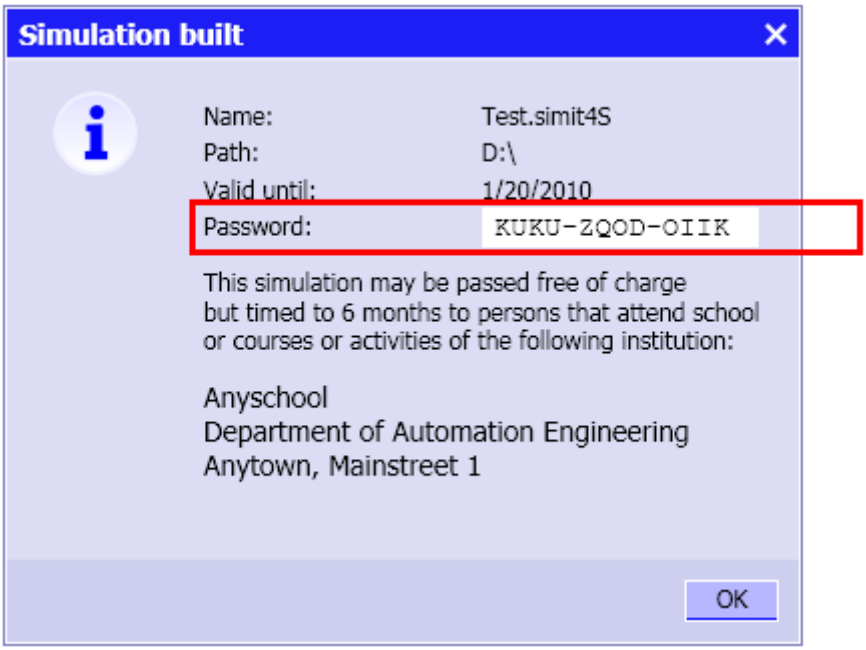

Figure 46: Creating an executable simulation

Please note that these executable simulations are operable within the given period of six months only. You can create a new executable simulation for your students at any time later however and as often as you wish.

Only if the students PC is not able to connect to a computer that runs SIMIT SCE, the simulation password is required (figure 47).

The executable simulation will be opened in a window that contains the before-selected diagram only. The simulation will start automatically, just close the window to end the simulation.

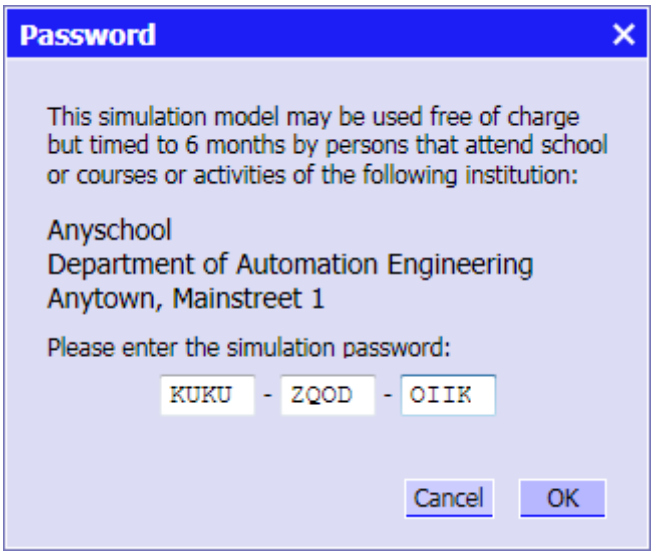

Figure 47: Starting the executable simulation with password

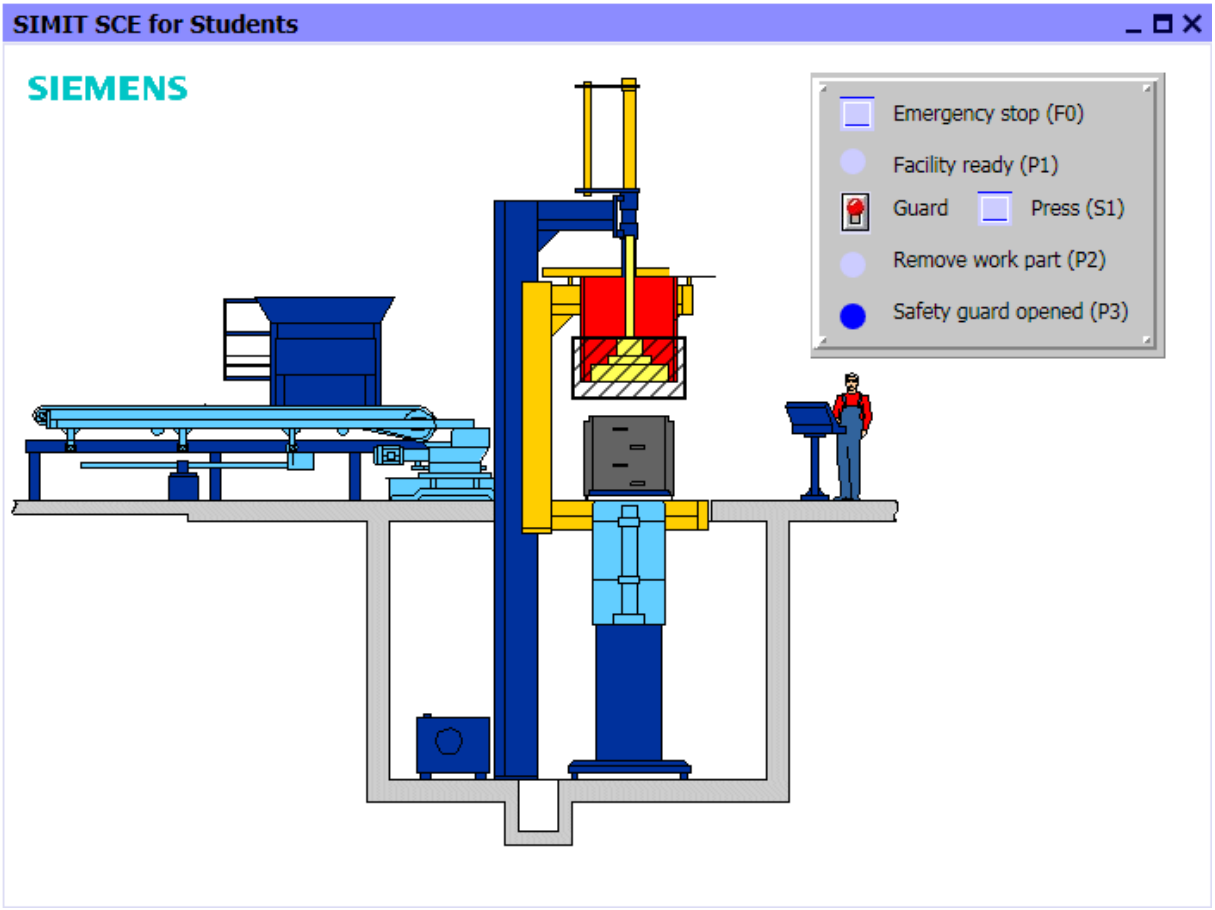

Figure 48: Executable simulation on a students computer