

The Modern Integrated Graphics User Interface (GUI)

The new GUI scheme is common to all the basic and accessory modules of SYMBOLS Sonata.

This is pinned

These are panes. They can be reorganized and docked on all sides. Their sequence can also be ordered by pulling the bottom tab left and right.

These are tabbed multiple document window headers. Click on the respective header to activate the corresponding document

These are output panes. They can be docked and floated together. The small splitter before the horizontal scrollbar can be used to adjust the size. The arrow buttons on the left can be used to scroll them.

SYMBOLS BondPad - Circuit.bgp
File Edit View Options Process Window Help
International
Capsules: Equation, Block Diagram, Electrical, Mechanical, Electronics, Hydraulics, Logic, Source, Economics, Structural, Thermal, Function
Tools Capsules Info Viewer
Outputs: Variable, Assignment
Ind_I (dov), Cap_C (dov), Resistor_F, Supply_V, Trans_mu
Equations Expressions Structural Compile
For Help, press F1

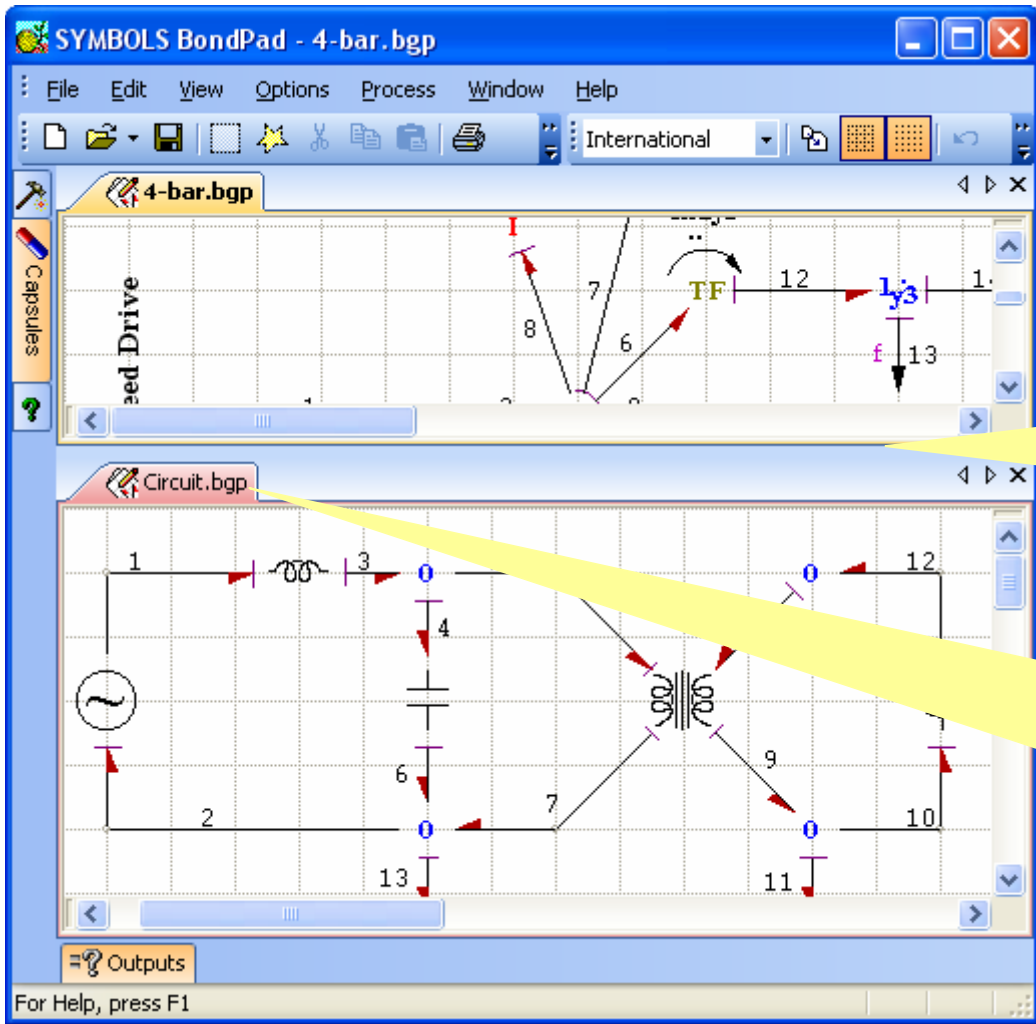
Panes are hidden, when unpinned.

Cross button to the right of tabbed window headers closes the current document. The arrows are used to scroll through document headers when they cannot be accommodated in given space.

To show hidden panes, click on the tab. The display stays till the window has focus or a time out occurs.

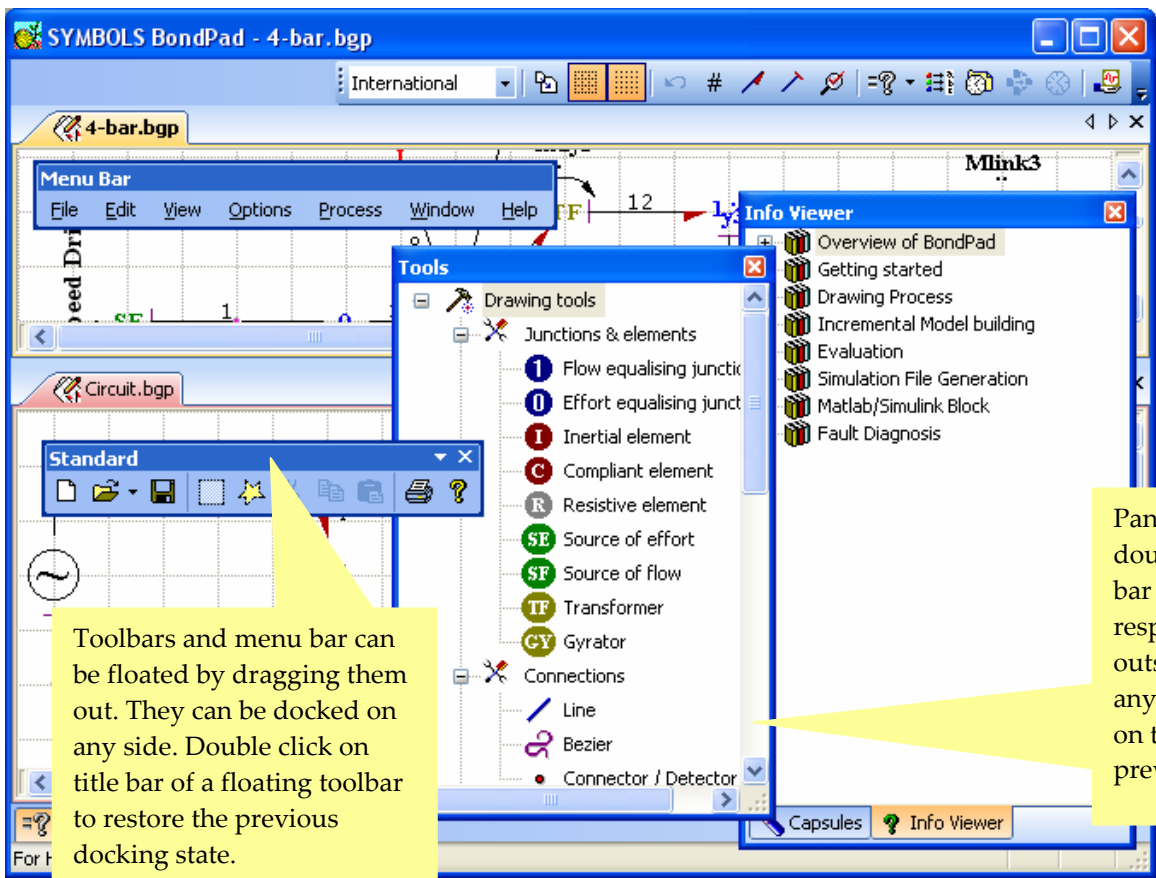
Unpinned panes can be pinned and then they remain docked.

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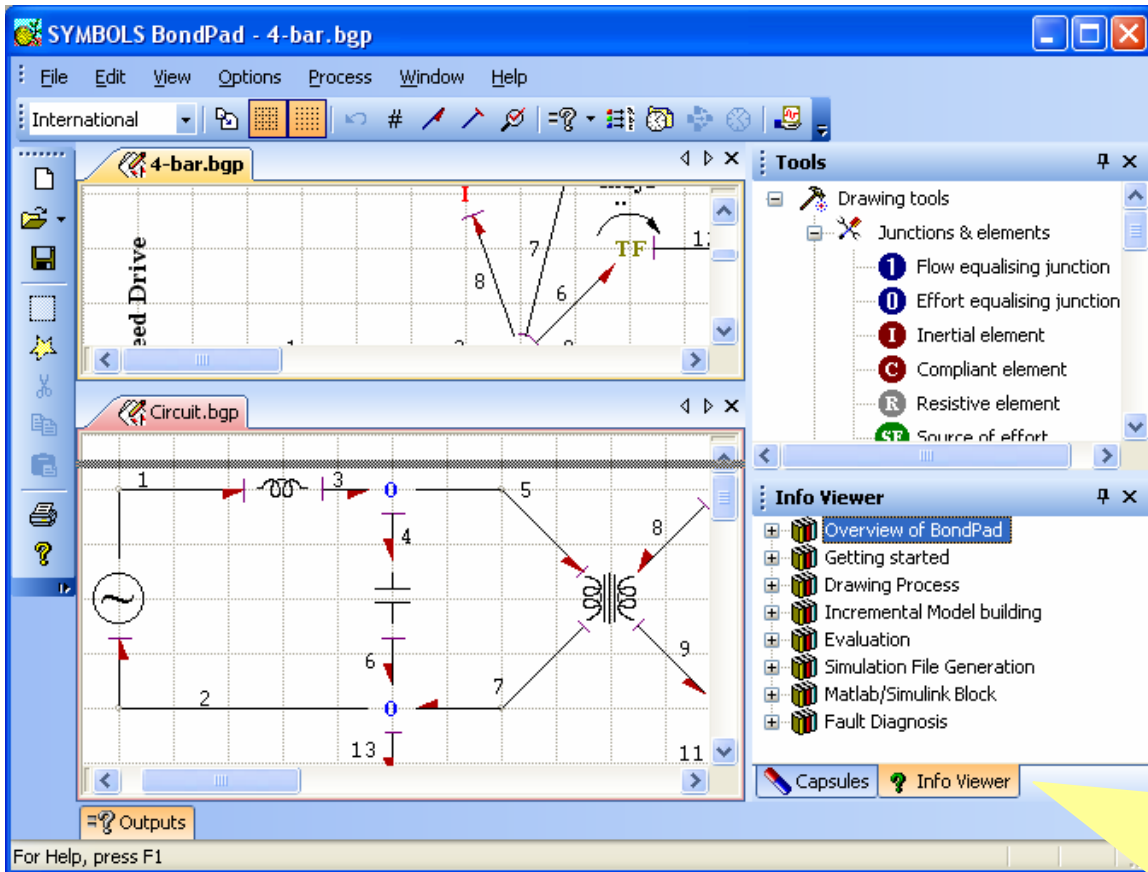
The splitter between the two separate tabbed window headers is used to resize their workspace.

Tabbed windows can be organized to groups in rows or columns. Drag the window document header to achieve this. Split headers like shown here can be merged to a single group by dragging headers from one group to other.

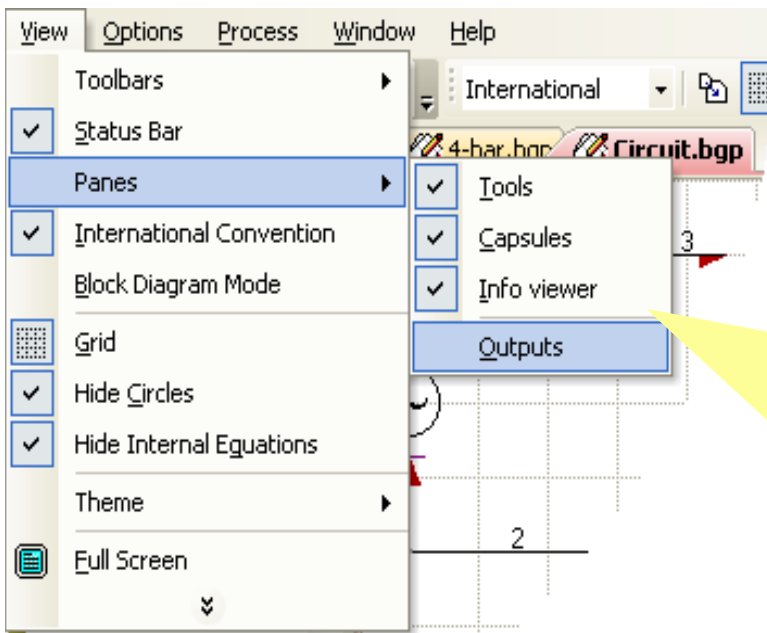


Toolbars and menu bar can be floated by dragging them out. They can be docked on any side. Double click on title bar of a floating toolbar to restore the previous docking state.

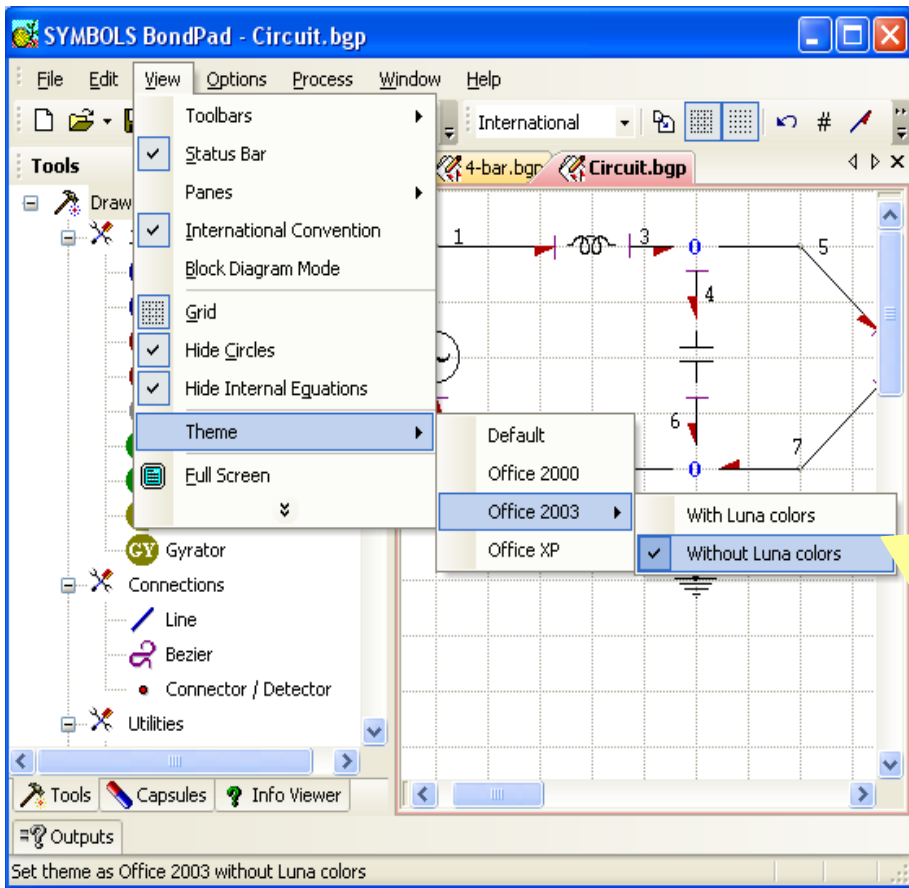
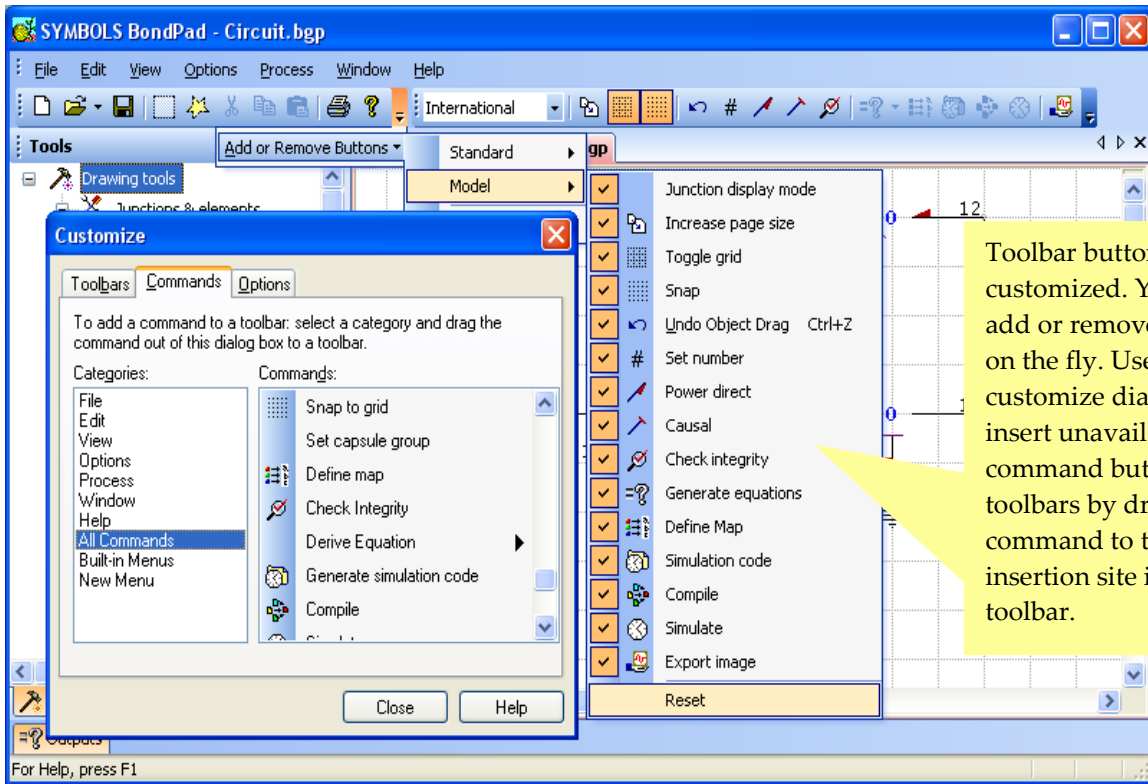
Panes can be floated by double clicking on their title bar or dragging their respective tab (at bottom) outside. They can be docked anywhere. Double clicking on their title bar will restore previous docking state.



Users can create their own personalized docking scheme. The current docking state is saved when the application is closed. When the application starts next time, previous docking state is loaded automatically.



Any closed pane can be viewed again by using the highlighted menu item shown here. The pane appears in its previous state. It can then be docked, floated, merged to groups or hidden, as desired. Similarly, closed toolbars can be restored.



Enhancements to BondPad and FDIPad Modules:

SYMBOLS BondPad - Circuit.bgp

File Edit View Options Process Window Help

International

4-bar.bgp Circuit.bgp

Tools

1 2 3 4 5 6 7 8 9 10 11 12 13

Compile

Outputs

```

-----Configuration: Circuit - Win32 Release-----
Compiling...
C:\SYMBOLS Shakti\Example\Circuit\Circuit.cpp:
Circuit.obj created successfully
Linking...
Circuit.dll created successfully

Circuit.dll - 0 error(s), 0 warning(s)
    
```

Equations Expressions Structural Compile

Compile simulation code

Symbols Sonata uses integrated compilation. When you have installed any Microsoft Visual Development environment (MSDev), compiler paths are automatically loaded. For Borland builder/ compiler, you can set the respective paths manually. The compiler output is shown in the bottom pane. This allows you to correct your mistakes at the development stage itself. If there are no compilation errors, the simulation button after the compile button opens the recently created simulation experiment file in the simulator interface.

NOTE: If you make any changes to your model, equations or expressions, recreate simulation code, compile it and then run simulator. Otherwise, old code would continue running with any previously existing bugs.

SYMBOLS BondPad - Circuit.bgp

File Edit View Options Process Window Help

International

4-bar.bgp Circuit.bgp

Tools

1 2 3 4 5 8 12

Compile

Outputs

```

-----Configuration: Circuit - Win32 Re
Compiling...
C:\SYMBOLS Shakti\Example\Circuit\Circuit.cpp:
Warning W8082 C:\SYMBOLS Shakti\Example\Circuit\Circuit.cpp 45:
Warning W8082 C:\SYMBOLS Shakti\Example\Circuit\Circuit.cpp 68: Division by zero
Circuit.obj created successfully
Linking...
Circuit.dll created successfully

Circuit.dll - 0 error(s), 2 warning(s)
    
```

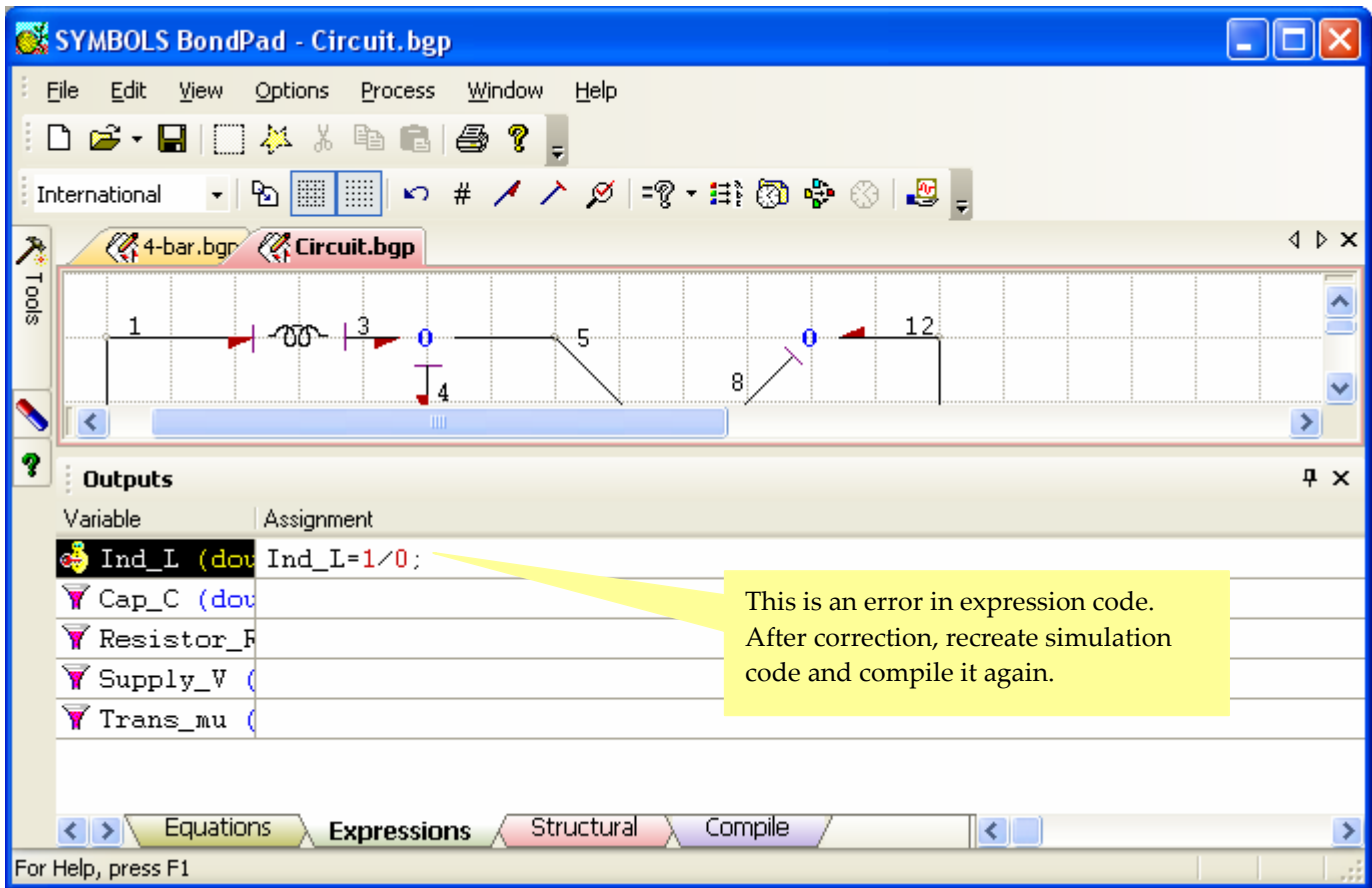
Equations Expressions Structural Compile

Compile simulation code

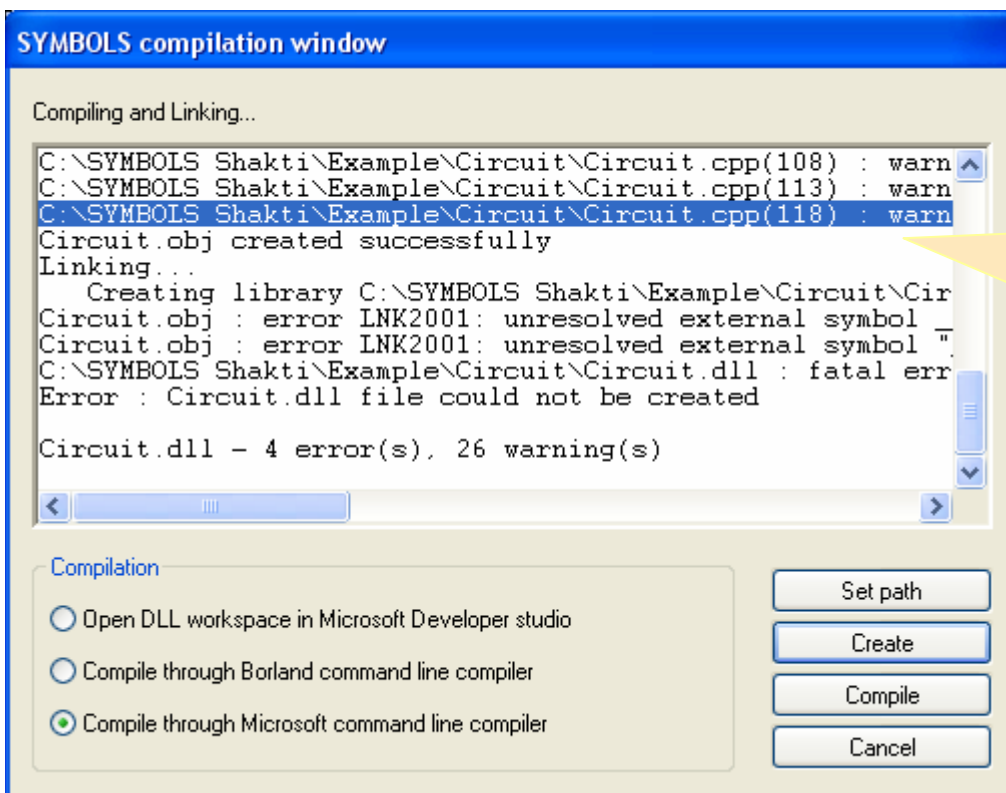
Compiler errors are shown in bottom pane. Double click any line showing an **Error** or a **Warning** to highlight the expression from which that error/warning occurs. This feature uses in-depth scanning and can open several levels deep capsule file containing that error.

Note: If you make changes to a capsule file, regenerate its equations and that of all higher level capsules or the model containing it.

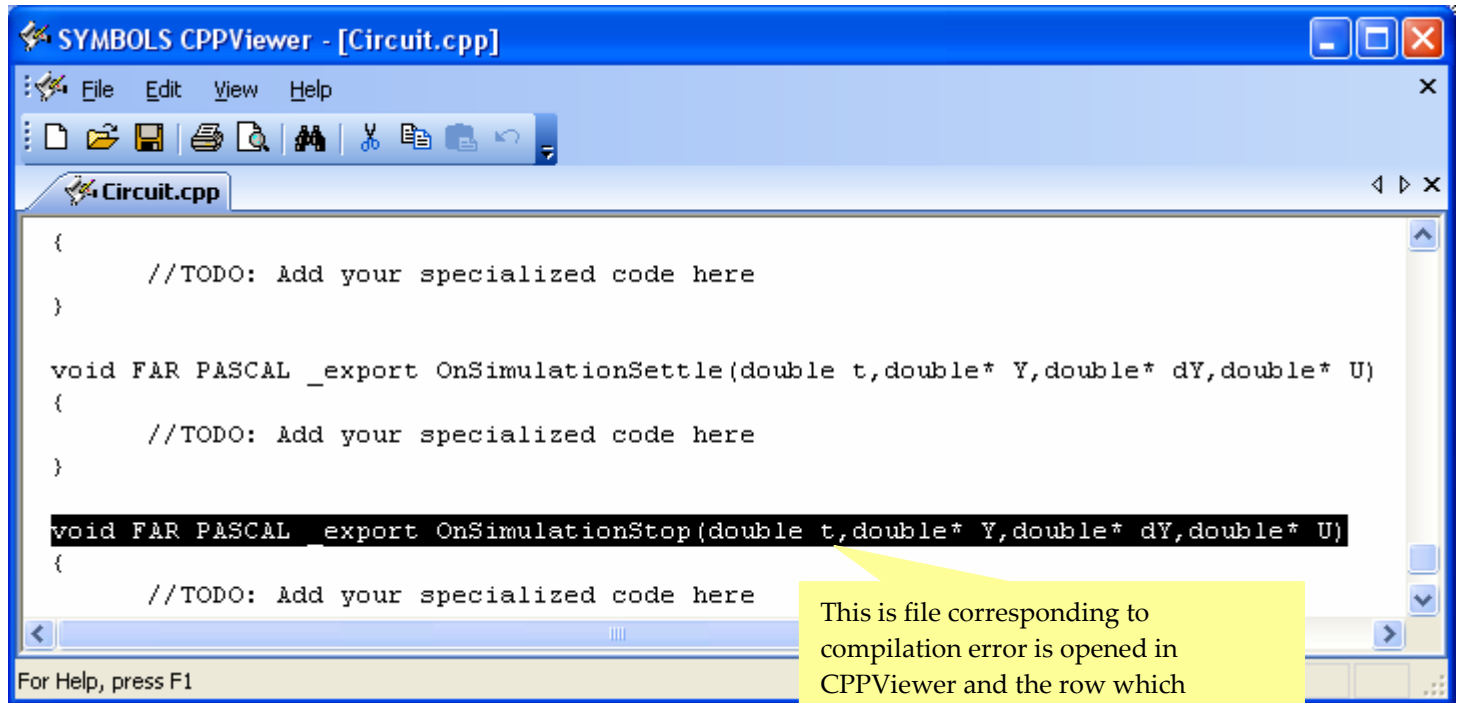
Errors/warnings due to code not corresponding to the model (e.g. in some header file) are not searched.



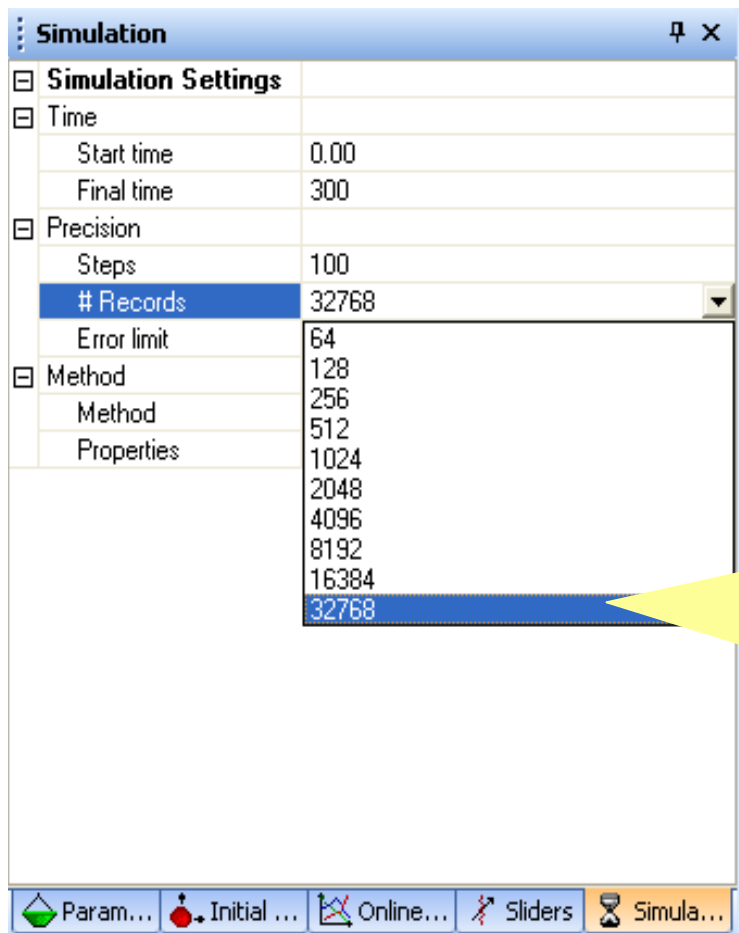
Enhancements to Simulator Module:



Compiler errors are shown in compilation window. Double click any line showing an **Error** or a **Warning** to highlight the expression from which that error/warning occurs. This opens the generated C++ code in the editor called CPP viewer.

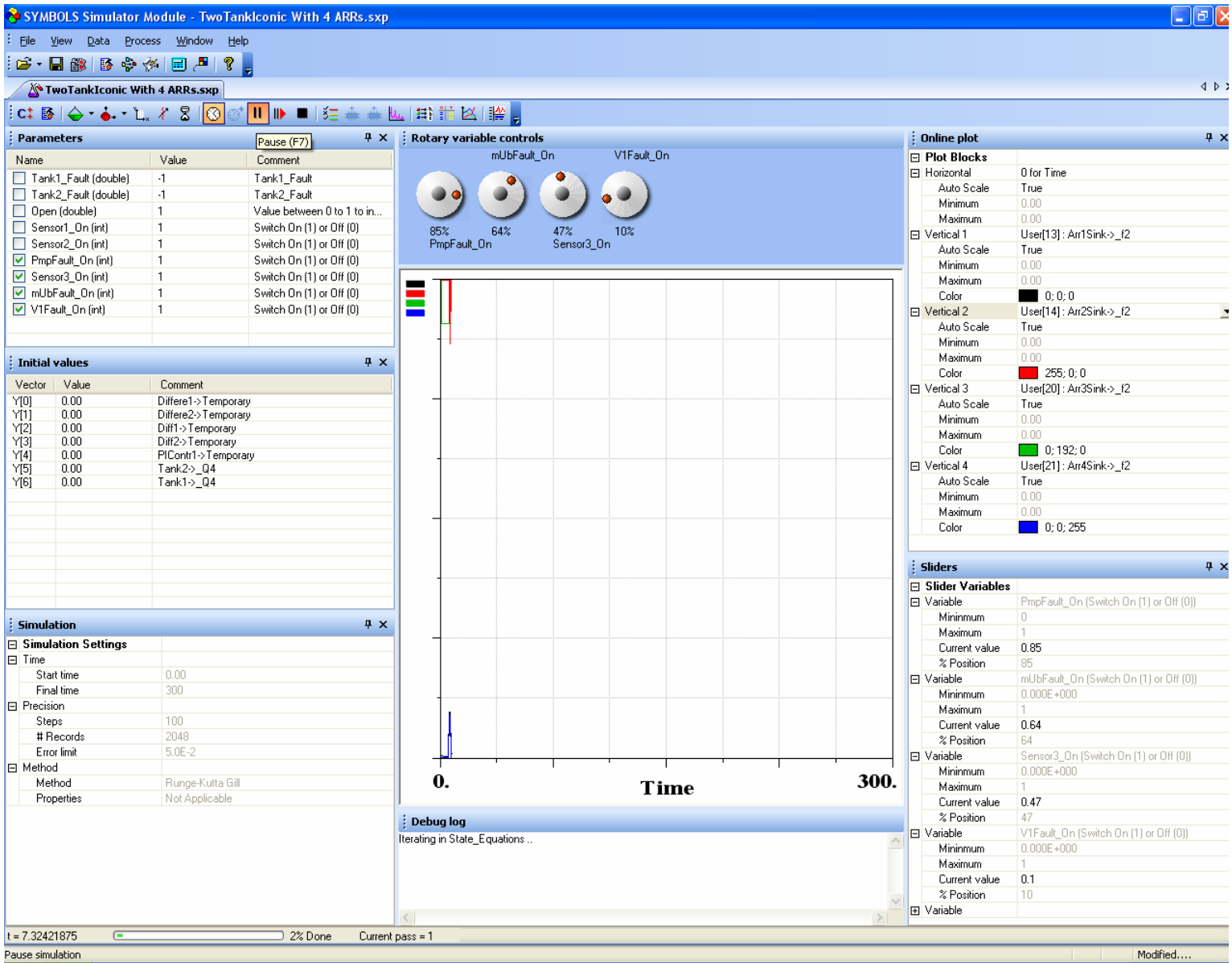


This is file corresponding to compilation error is opened in CPPViewer and the row which generated compiler error/warning is highlighted.



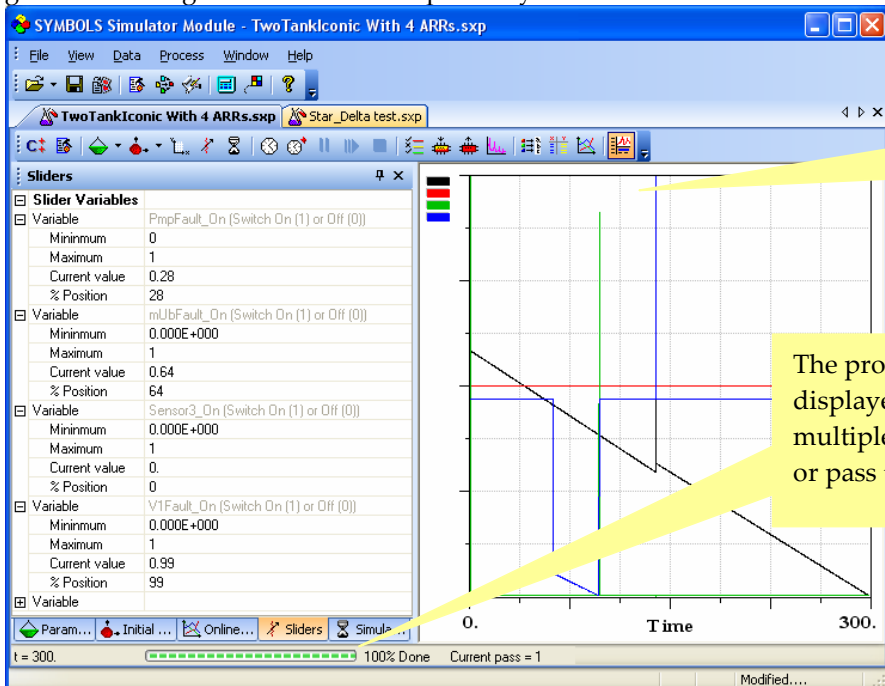
New simulator module allows more number of records so that finer details in dynamics can be examined. Furthermore, it generates clear broadband Fourier transforms. Simulations for longer time range can be precisely carried out.

Note: Online displays of large amount of data can slowdown the process. For time critical processes, you may wish to turnoff the online results display.



The new simulator display control panel is shown above. The ticked items in parameters pane are added as slider variables. Input values for others must be set before simulation. Tips: To quickly enter parameter values, click on the value field of the first item and after entering data click Enter. This moves the caret to next field. Similarly enter data for initial conditions.

The data entry mode for simulation settings, online plot and sliders panes are through grid controls. You can expand or collapse grid items using + and - buttons respectively. New simulator module allows you to select the color of online plots.



If you select Autoformat option, all panes are arranged automatically to a compact layout. This is the default option.

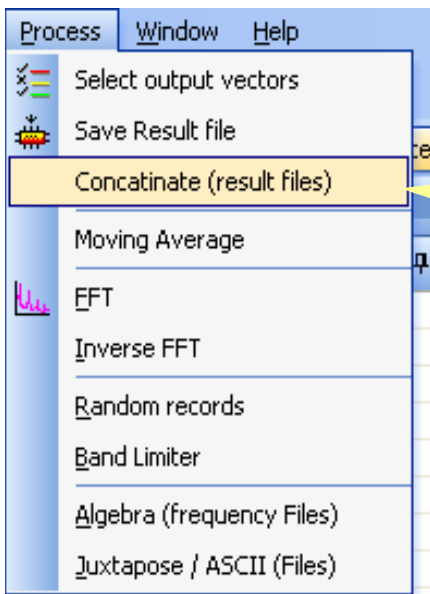
The progress of simulation is displayed in the status bar. For multiple simulations, the current step or pass too is displayed there.

Slider Variables	
Variable	PmpFault_On (Switch On (1) or Off (0))
Minimum	0
Maximum	1
Current value	0.28
% Position	28
Variable	mUbFault_On (Switch On (1) or Off (0))
Minimum	0.000E+000
Maximum	1
Current value	0.64
% Position	64
Variable	Sensor3_On (Switch On (1) or Off (0))
Minimum	0.000E+000
Maximum	1
Current value	0.
% Position	0
Variable	V1Fault_On (Switch On (1) or Off (0))
Minimum	0.000E+000
Maximum	1
Current value	0.99
% Position	99
Variable	

Before simulation, set the range for slider variables. The starting value can be chosen using the slider as shown or it can be directly entered in the current value field.

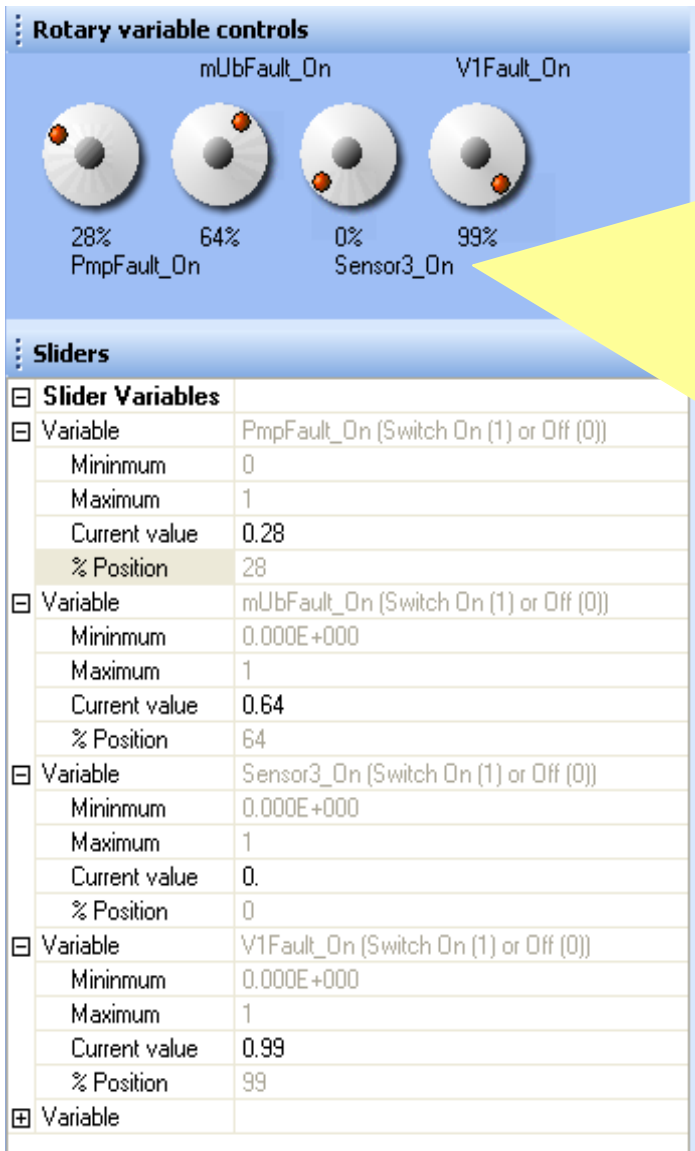
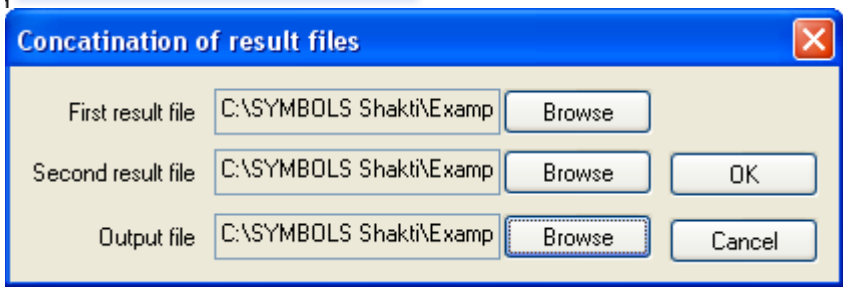
While simulation is in progress, the position cannot be modified using the slider, but you can pause it and then type in a new current value. To modify parameter values at the runtime, use the rotary controls discussed afterwards.

During simulation, the numerical calculations are given highest priority. Therefore, the system may not quickly respond to your mouse or other events (such as resizing panes, operating the rotary controls, etc.). If you have slider variables and want to change them at runtime, you may introduce a simulation delay which halts the numerical engine for a specific duration after each step and allows all other messages to be processed before resuming next step numerical calculations. The default delay is None. Usually small to medium delay is sufficient for operating rotary controls.



All simulation output is now volatile. New simulator features allow saving the selected results to a file. Furthermore, several result files containing same output vectors and same simulation step (i.e. time duration/records) can be concatenated to create large data files. Only two files can be concatenated at a time; rest of the file can then be appended to the resulting file from previous operation, recursively.

This feature allows creation of long time response database especially suitable for animation and study of system behavior such as chaos and stability.



The runtime changes to parameter values are achieved through rotary controls. They can be operated on the fly or after the simulation is paused. For each slider variable, a rotary control appears. The position of the red knob determines the value of the variable. When user clicks on the red knob and moves the mouse cursor, knob position changes and the corresponding parameter value is updated in the sliders pane.

Tips: for finer parameter adjustment, try rotating the knob at a larger radius, i.e. after selecting the knob, move the mouse cursor a little bit far and then move it.

The rotary controls are a great means for quick transitions such as for a switch. There is a dead zone in each rotary control between 0% and 100% positions. See the 3rd and 4th controls in the figure. When knob is dragged between these two positions, the values flip suddenly through the half way. This is especially suitable to change values from min to max and vice versa, e.g. switching on and off, introducing a fault in fault simulations for FDI, etc. This is not possible using a normal slider, since user has to drag the slider through the entire range and intermediate values would be transmitted to numerical routines during simulation.

Enhancements to Control Systems Module and its Graph window :

Common GUI features are available for both the applications.

