

EcosimPro Version 4.6 Upgrade Presentation

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General Improvements on Version 4.6



This presentation shows some of the new capabilities, improvements and SPRs solved in EcosimPro 4.6

This presentation is a short summary of the document EcosimPro Upgrade 4.6. Please use this document to read more details.

Valid C++ compilers



- **Development phase:**
 - **Valid compilers for using EcosimPro 4.6:**
 - MS Visual C++ 6.0
 - MS Visual Studio C++ 2003
 - MS Visual Studio C++ 2008 (**NEW**)
- **Deck generation (runtime models) from EcosimPro models:**
 - All previous MS compilers under Windows
 - Windows & GCC 4.4.0 (**NEW**)
 - Linux & GCC 4.1.2 (Debian 4.0 32 bits) (**NEW**)

Summary

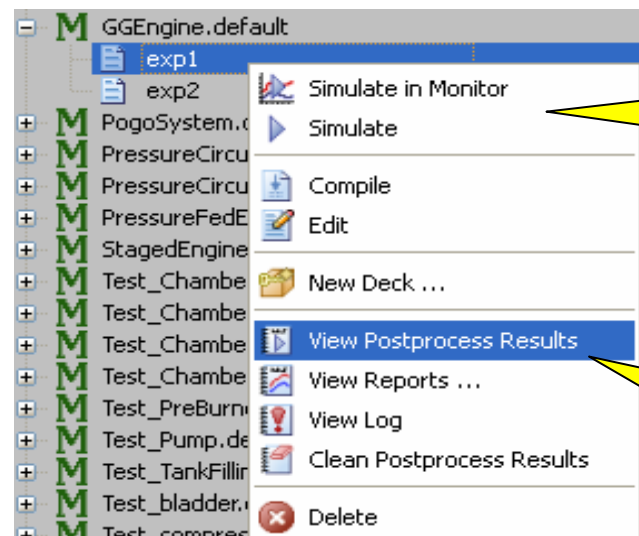


- 124 Software Problems (SPRs) reported by users solved
- New tool for analysing the performance of every function during the simulation *(NEW)*
- New tool for producing optimisation studies *(NEW)*
- Improved post-process tool for visualising simulation results *(IMPROVEMENT)*
- New tool for customizing any object editor *(NEW)*
- Aliases mechanism for variables *(NEW)*
- Improved Graphical Monitor with faster selection of variables and more information about variables. *(IMPROVEMENT)*
- Private variables in component *(NEW)*
- Save-Restore variable values in ASCII, XML or in memory *(NEW)*
- etc.

Improved Post-Process tool



- Internal redesign of the Post-process tool for:
 - Improving the performance
 - Making easier to play a previous simulation
 - Much faster than the on-line simulation
 - Option to create variables report
 - Option to create new plotters



Simulate graphically
the experiment

Simulate graphically a
previous simulation
(post-process)

Better steady debug info



Variable tracing(Jacobian variables + variables marked with trace flag):

Iteration	Inlet.W	Unknown variable
0	3	100
1	3.20396	106.539
2	3.20443	106.538
3	3.20446	106.538

Algebraics evolution on each iteration

Residues:

Iteration	Residue 1	Residue 2	Global Error	Convergence Ratio
0	6029.49	0.00230943	6029.49	1
1	-0.000350535	0.000147236	0.000380201	6.3057e-008
2	4.9451e-005	9.72813e-006	5.03988e-005	0.132558
3	1.22059e-007	2.2876e-009	1.2208e-007	0.00242228

Residues evolution

Convergence process:

Iteration	Residue1	Residue2	Global convergence
0	NO	NO	NO
1	NO	NO	NO
2	NO	NO	NO
3	YES	YES	YES

Convergence process of residues

Calculated Jacobian matrix (Iteration 1):

	Residue 1	Residue 2
Inlet.W	-1460.86	-0.297261
Unknown variable	-876.485	0.00891842

Jacobian matrix of partial derivatives

New tool for analysing performance



- New tool for evaluating the simulation performance.
- It allows to detect bottlenecks during runtime simulation

TOTAL TIME CONSUMED: 1048.495 seconds

Total simulation time

ORDERED BY TIME CONSUMPTION

#	ID	TIME(s)	CALLS	% OF TOTAL
1	INTEG	1047.933	1	99.95 %
2	FLUID_PROPERTIES.PGasEnergy	214.046	18370827	20.41 %
3	COMB_CHAMBERS.MinGibbsEnergy_PH	149.432	86541	14.25 %
4	COMB_CHAMBERS.CG_thermoprop_vs_PTy	136.495	647599	13.02 %
5	FLUID_PROPERTIES.FL_Gcrit_fun	129.662	1213440	12.37 %
6	COMB_CHAMBERS.CG_SupersonicNozzleSection_HS	128.145	91008	12.22 %
7	COMB_CHAMBERS.CombProper_eq	127.106	60672	12.12 %
8	COMB_CHAMBERS.CombProper_eqi	119.121	60672	11.36 %
9	FLUID_PROPERTIES.FL_state_vs_ru	98.629	1092096	9.41 %
10	COMB_CHAMBERS.Bartz_Correlation	48.432	212420	4.62 %
11	COMB_CHAMBERS.CG_SonicThroat_HS	41.041	30336	3.91 %
12	MATH.max	38.273	17675458	3.65 %
13	thermo_prop	23.536	2700496	2.24 %
14	FLUID_PROPERTIES.htc_fun	22.419	879744	2.14 %

For each function:
 1- Order(by consu.)
 2- Name
 3- Total time
 4- Number of calls
 5- Percentage of total

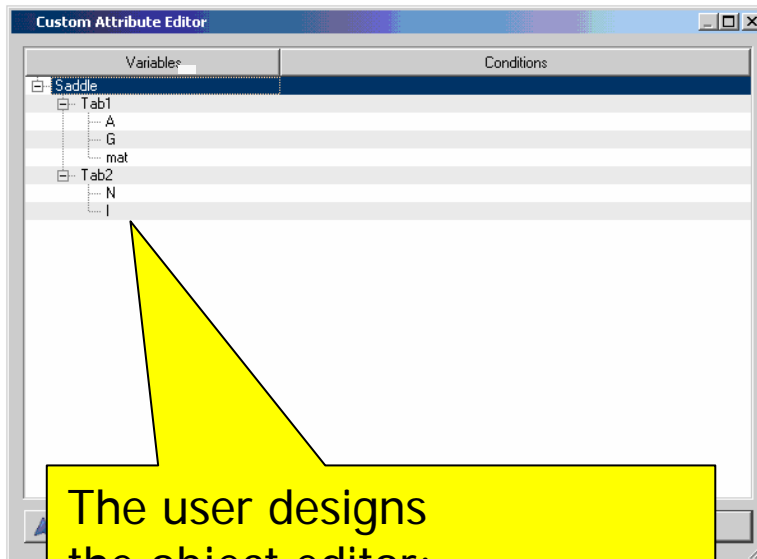
MODEL
 LIBRARY: ROCKET_EXAMPLES
 COMPONENT: GEngine
 PARTITION: default
 EXPERIMENT: exp1



New tool for customizing object editors

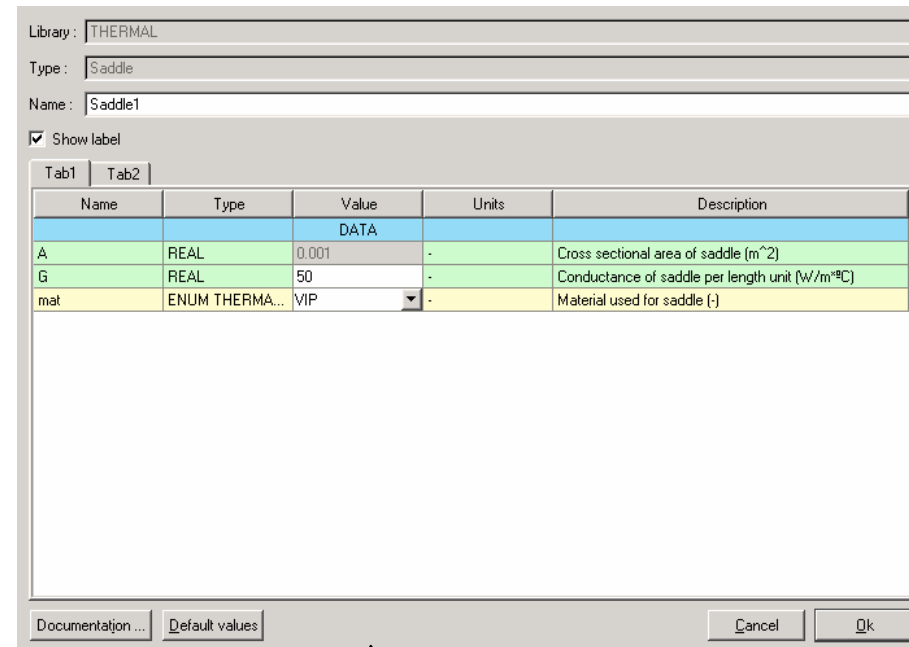


- New customisation object editor.
- It allows to customize any editor with different tabs



The user designs the object editor:

- number of tabs
- data to show on each tab



Final object editor

New mechanism for providing aliases



- New alias mechanism to assign an alias name to a variable.

	Component	Variable	Alias
34		TURBO.pct	
35		TURBO.thermTol	
36		TURBO.SIu_A	
37	Atmosphere	MNF_in	alias1
38	Atmosphere	Pamb_in	

- The variable “**Atmosphere.Pamb_in**” can be referred as well as “**alias1**”.
- The new alias is valid when making:
 - partitions
 - experiments
 - reports
 - monitor

More flexibility for file paths



- **New ways to work with relative and absolute paths:**
 - **Relative to an environment variable declared in EcosimPro or in the Operating System (uses % as delimiter).**

```
expandFilePath( "%MYDIR%/results/report1.rpt" )
```

- **Relative to library locations (uses @ as delimiter)**

```
expandFilePath( "@CONTROL@/input/file1.rpt" )
```

- **Absolute paths**

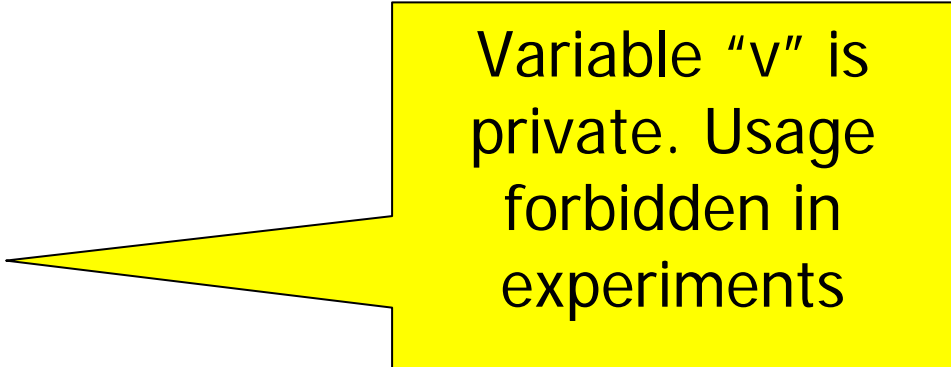
```
expandFilePath( "C:/root/input/file1.rpt" )
```

New prefix to set a variable as private



- New PRIVATE label to make a variable private in the experiments.
- For example:

```
COMPONENT foo
DECLS
  PRIVATE REAL v
```



Variable "v" is private. Usage forbidden in experiments

This can help the reduce the number of variables in reports, monitor, etc.

Better initialisation for arrays



- Arrays in TOPOLOGY block can be initialised with a constant
- For example:

```
COMPONENT Inner
DATA
  REAL data[N] = 4.5
END COMPONENT
COMPONENT Outer
DECLS
  CONST REAL initial= 8.0
TOPOLOGY
  Inner (N= 5) in1 (data= initial)
END COMPONENT
```

All elements of
data are initialised
to 8.0

Global variable in experiment



- In experiments it is allowed to create global variables and objects
- For example, in a experiment file named exp1.exp you can write:

```
REAL GA[3]= { 3.4, 21.23, 4.23 }
MyClass object1
EXPERIMENT exp1 ON foo.default
BODY
  FOR(i IN 1,3)
    WRITE("GA[%d]= %g\n",i,GA[i])
  END FOR
  object1.method1()
END EXPERIMENT
```

Global experiment variables

Automatic detection of variable ports initialisation in experiments



- Initialisation of port variables in INIT is detected
- For example:

```
PORT MyPort
  SUM REAL var
END PORT
COMPONENT foo
PORTS
  IN MyPort fin
DECLS
  REAL x
INIT
  fin.var= 1.0
CONTINUOUS
  fin.var' = x * cos(TIME)
END COMPONENT
```

Identified initialisation

- Default experiment

```
EXPERIMENT exp1
  ON foo.default
INIT
BODY
  . . . .
END EXPERIMENT
```

Not proposed for initialisation

Powerful macros language



Allowed usage of C macros in EL.

For example create file macros.el with :

```
#define INIT_V3D(vect,i1,i2,i3,init) \  
    EXPAND ( i IN 1,i1) \  
        EXPAND ( j IN 1,i2) \  
            EXPAND( k IN 1,i3) \  
                vect[i,j,k] = init
```

Create a macro in
the C macro
language

Then a component can use:

```
#include <macros.el>  
COMPONENT testMacro1  
DECLS  
    REAL v[4,3,5]  
    REAL r[2,1,4]  
CONTINUOUS  
    INIT_V3D(v,4,3,5,3.14)  
    INIT_V3D(r,2,1,4,6.18)  
END COMPONENT
```

Use of C macros
in EL

New formats saving/reading variables



- **Save-Restore variables to/from files in ASCII, XML and MEMORY:**

Save all variables ended in "T" in a file named "temperatures.xml" in ASCII, XML and memory buffer :

```
SAVE_VARS("temperatures.xml", "*T", T_ASCII)  
SAVE_VARS("temperatures.xml", "*T", T_XML)  
SAVE_VARS("temperatures.xml", "*T", T_MEMORY)
```

Restore only variables ended in "T" from a file named "temperatures.txt" in ASCII, XML and memory buffer:

```
RESTORE_VARS("temperatures.txt", "*T", T_ASCII)  
RESTORE_VARS("temperatures.txt", "*T", T_TEXT)  
RESTORE_VARS("temperatures.txt", "*T", T_MEMORY)
```

New statement to close open files



- New function to close files:

```
WRITEF("mfile.txt","Hello world!")
```

```
CLOSEF("mfile.txt") (NEW)
```

New functions to calculate steady and transient states in silent mode



- **New STEADY and INTEG function working in silent mode:**
 - No messages are produced
 - No log info is produced
 - No report data is generated
 - They are faster than regular functions
- **These new functions are used typically when the user is only interested to obtain the final result (not the evolution of the calculation).**
- **The names are:**
 - `STEADY_SILENT()`
 - `INTEG_SILENT()`

New functions to transform variables



- New conversion functions among the main types:

```
FUNCTION STRING integerToString (INTEGER v)
```

```
FUNCTION STRING boolToString (BOOLEAN v)
```

```
FUNCTION STRING realToString (REAL v, INTEGER  
    precision=15)
```

```
FUNCTION INTEGER stringToInteger (STRING v)
```

```
FUNCTION REAL stringToReal (STRING v)
```

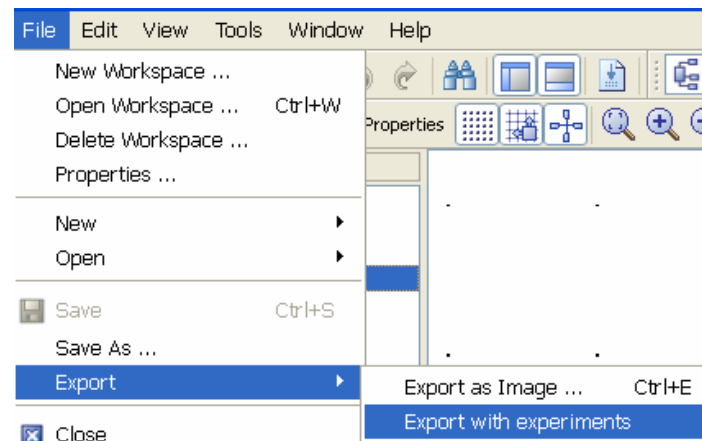
```
FUNCTION BOOLEAN stringToBool (STRING v)
```

New save-as and export utilities for schematics



Save-as: Save the schematic with other name

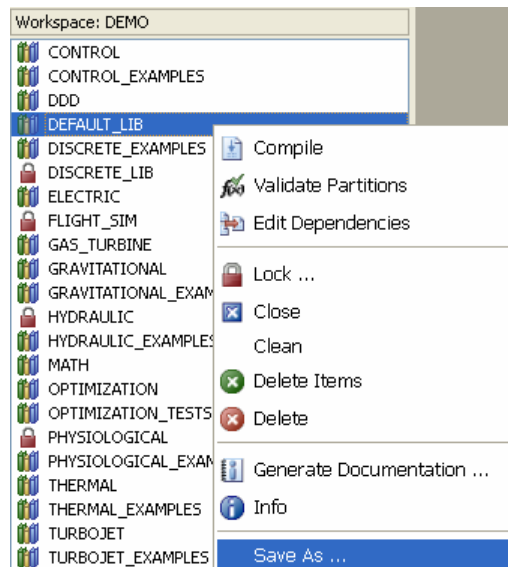
Export: Not only save the schematic with other name but also copy the associated partitions & experiments in the new folder name



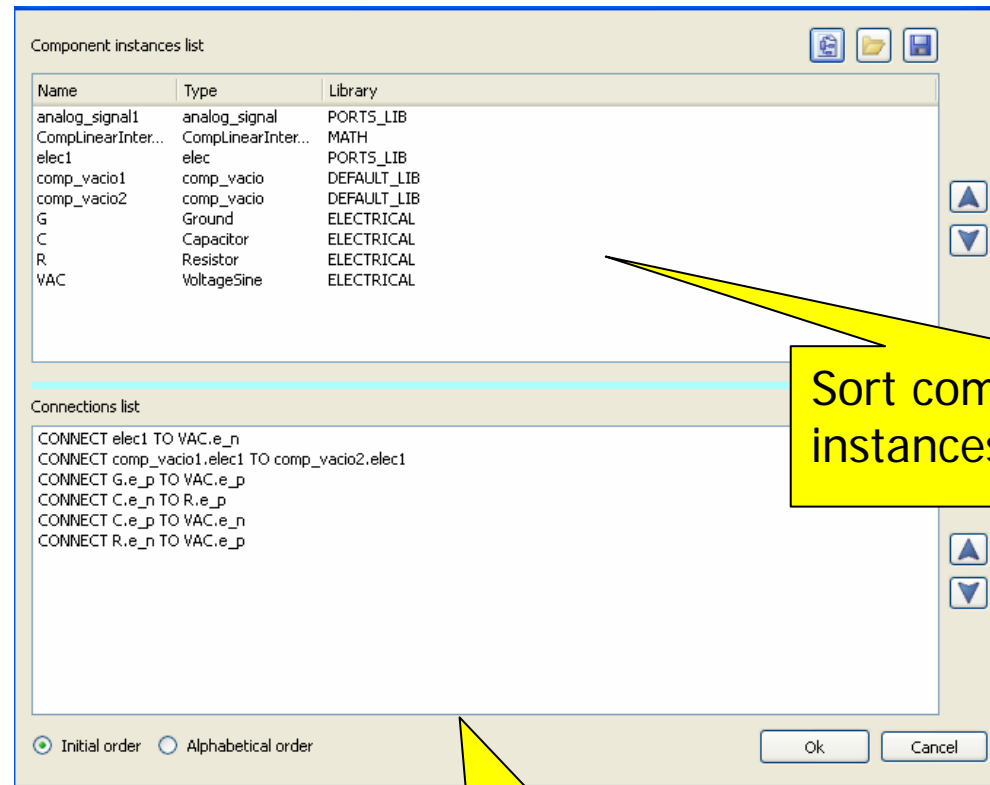
New Save-as for libraries



- Save a complete library (including components, schematics, partitions and experiments) in a new folder with a new name



New tool for sorting topology items



Sort component instances

Sort connections

New capability for creating directories of experiments



- The user can create experiment directories under each experiment. This makes easier to have multiple experiments associated to an experiment.

Select a new experiment group (subdirectory)

Using the GUI with the hierarchy

The image shows two screenshots of the EcosimPro software interface. The left screenshot shows a context menu with the following options: Simulate in Monitor, New Experiment Wizard, New Experiment, **New Group** (highlighted), View Mathematical Model, View External Objects ..., Update, and Info. A yellow callout box points to the 'New Group' option with the text 'Select a new experiment group (subdirectory)'. The right screenshot shows a hierarchical tree structure under 'Models'. The tree includes 'aircraftGear.default', 'exp1', 'group1', 'bound', 'circuit', 'equat', 'freeze', 'lorent', and 'particle'. A context menu is open over 'group1', showing options: New Experiment Wizard, New Experiment, **New Group**, and Delete Group. A yellow callout box points to the 'New Group' option with the text 'Using the GUI with the hierarchy'.

Software Problem Reports (SPRs) solved



3min	Font settings don't allow saving or undoing changes.
16enh	Impossible to manage system libraries.
37enh	La opción de "Clean Files" no aparece
40enh	Separadores de palabra para el editor de texto
61enh	Deactivation of code views in "Simulation View" mode
63enh	Integration of EcoMonitor in EcoStudio
74cri	Computation time in batch simulations
87maj	conversion of symbols .trs from 3.4.1 to 3.7.90: ports - ...
88enh	Component/Subcomponents/partitions Explorer in Schematic ...
89nor	Focus error when double click
92maj	Inconsistent messages when Updating a component
117min	Problem with the window title and a documentation file
125enh	Libraries' rename functionality
127enh	Wrong functionality of buttons undo/redo with HTML
128enh	Blank screen when opening a non existing HTML link
133enh	Missing files in the XML
145nor	Problem with boundaries when passing data to variable in ...
146min	Problem with delay and variables
160enh	Grid color's saving
162tri	Zoom makes the window disappear and appear
166nor	Problem when two EDS files have the same name
170enh	Wrong operation when adding images in symbols or schematics
173min	Delete-All-Items options does not erase all required files
179maj	Problems with toolbars buttons in Excel
188enh	Blocking a model while being in Simulation Mode
189enh	The schematic view should automatically appear near the e...
207cri	Missing the OUT specification of the symbol ports
210enh	"Simulation View" should not allow to edit source files
223enh	Web site, e-mail address and problems report system
230nor	Cannot put more than 1 images in a symbol
235enh	Overselected letters when I double click on the code
246nor	Simulation error when the postprocess option is activated
265min	Color problem in the attribute editor of a symbol
269enh	Palette filename should be generic
271cri	Do not compile functions of version 3.4.2
272min	Problem with symbols having images. Images disappear
274cri	A discrete variable can not be an output within a SEQUEN...
275maj	Inconsistent error message
284enh	View .el files associated to a component in the partition...

Software Problem Reports (SPRs) solved



- [285](#)min Copy/paste in Schematic view
- [300](#)enh Attributes editor do not show component description
- [301](#)nor Choose component for symbol generation dialog box does no...
- [312](#)nor Internal variables of the model are been declared in KRN...
- [329](#)cri Error reading sparsity file
- [339](#)nor Erro changing library path
- [340](#)nor Erro open proosis when current workspace have libraris th...
- [341](#)maj INTEG_END signal is not reported to monitor and decks
- [342](#)cri To change the selected library when compiling
- [343](#)cri Error while loading libraries due to error in schematics ...
- [344](#)nor Problems when zooming
- [345](#)blo EcosimPro 4.4 closes if I click ok on Dnode
- [346](#)cri Jacobian and residues number. is always 0
- [347](#)cri Problems with the Plot disposition
- [348](#)cri Error on the schematics been able to create automatically
- [349](#)nor "Save file" prompt without modification
- [350](#)nor Obsolete indication in schematic view not refreshed
- [351](#)nor Constant parameters are not accesible
- [353](#)maj Experiments are not accessible in the Schematic view
- [354](#)blo The "R_AbsoluteSensorAngle" MECHANICAL symbol appears as ...
- [355](#)nor Editing some symbols, the CONTROL port appear out place
- [356](#)maj New plots do not have default scale
- [357](#)cri Monitor crash
- [359](#)nor Error in symbol generation
- [360](#)nor Clock icon do not appear while charging the monitor
- [361](#)maj Plot zooming capability is too limited
- [362](#)nor HTM file editor
- [363](#)cri Monitor tool needs 450 MB only to be opened
- [365](#)nor Zoom is lost when change plot options
- [367](#)nor Error using arguments in EL functions
- [368](#)nor Colores asignados en los histogramas de multiples variables
- [370](#)nor Data con parametros de construccion
- [372](#)tri error in displaying "%1" when writting titles in plot axi...
- [373](#)nor Option "No Pen" and other options are not saved
- [375](#)nor Function "gvalEnum" returns a wrong value
- [377](#)enh Initial values of the dynamic PORT variables
- [378](#)cri Monitor seem to be too time consuming modifying plot's va...
- [380](#)cri Information in EL and schematic does not match
- [381](#)nor fatal error C1076
- [382](#)maj Problem with FORTRAN character arguments



Software Problem Reports (SPRs) solved



- [383enh](#) Visibility specification on declared variables is necessary
- [384nor](#) REPORT_TABLE inside a FOR
- [386nor](#) the experiment file can not be edited
- [387nor](#) wrong message when a library is created
- [388maj](#) Compilation fails but return OK
- [389maj](#) Experiment compilation fails
- [390nor](#) Experiment vars fail
- [391blo](#) Monitor do not respond
- [395maj](#) E0304
- [396cri](#) water properties not found
- [398nor](#) error when I compile an experiment
- [399nor](#) error when I compile an experiment
- [400nor](#) Not refresh when the option "save as" is used
- [401nor](#) Problem in partition wizard when HI is empty
- [404maj](#) Problems with EcosimPro symbols
- [405maj](#) EcosimPro does not load beyond Splash Screen
- [409nor](#) ZONE change not detected
- [410min](#) Warning creating a new library
- [411maj](#) Problem when the user tries to include a new plot during ...
- [415nor](#) installation problem when the compiler selected is Micros...
- [416nor](#) discr variables can't be modified by the user during the ...
- [417nor](#) ESPSS Validation Tests results are different from those i...
- [418nor](#) Unlock library fail
- [419cri](#) Enormous simulation time for a Fluid Flow 1D based Reacti...
- [420maj](#) Old pieces of code continue to show up eve if I try to mo...
- [421nor](#) Working model of the Junction component: dP losses even i...
- [422tri](#) Best way to model a Reaction Control System to perform a ...
- [423enh](#) The type of variables must appear in the watch
- [424nor](#) In the watch widget of the monitor, the check for variabl...
- [425nor](#) In the watch of the monitor it is allowed to leave the va...
- [426nor](#) In the watch widget of the monitor there is not way to re...
- [428min](#) When there is a STEADY calculation, the output shows a li...
- [429min](#) EcosimPro 4.4.0: List of minor comments worrying for the ...
- [430nor](#) Formulation of Peltier Element
- [431nor](#) "C4700" error and the link errors "LNK4075" and "LNK4098"
- [432cri](#) Unit (unt files) is not deleted before compilation
- [434cri](#) Schematic editor loses component information
- [435maj](#) The experiment tab is not refreshed (updated) in schemati...
- [436maj](#) Filter under a "New hystogram" wizard takes enormous CPU ...
- [438nor](#) "readTableCols1D" function does not allow relative path



Software Problem Reports (SPRs) solved



- [442](#)nor How to simulate filling conditions in priming
- [444](#)nor The INITIAL tab does not work properly
- [445](#)cri Problem with the reading of Boolean parameters in the sch...
- [446](#)nor Problems of translation of EL code in the schematics view
- [448](#)nor Problem about remove derivative
- [449](#)min Discrepancy in Getting Started Guide
- [451](#)nor "new postprocess results" file is saved inside "bin"
- [453](#)nor new branches in ppr
- [454](#)nor problem refreshing a map
- [455](#)nor "Properties dialog couldn't be opened property"
- [457](#)nor Could not start the nmake command
- [458](#)nor Watch internal variables
- [459](#)nor manual TURBOJET
- [460](#)cri Initialize an array with a scalar
- [461](#)nor Criptic error message about Tank_Bladder
- [462](#)nor Cannot impose external Pressure to RCT component
- [464](#)nor Fluid Flow 1D Tee component: insufficient understanding o...
- [465](#)nor hardware/software requisites
- [467](#)maj Partition makes crash of the EcosimPro main window
- [468](#)nor Button "Print..." inside the dialog "File>Print Preview....."
- [469](#)nor In the source code of the HTML file corresponding with th...
- [470](#)nor To change the message that appears when there is not libr...
- [471](#)blo Fatal error: Could not start the nmake command