

# EcosimPro

## Modelling and Simulation Software



EcosimPro · Newsletter N°6 · July 2012

## EDITORIAL



That simulation is a growing discipline is a well-known fact to everyone working in the field of engineering. With today's simulation tools and powerful new processors, complex systems can now be simulated that were unthinkable a few short years ago. In the end, the value added from simulation is being able to design the products better from the start and to save time and money on the production line.

As an example of this concept, Empresarios Agrupados (EA) is participating in the European aeronautics project CRESCENDO in the European Union's VII Framework Programme along with 58 other simulation software businesses, universities and aeronautics companies in Europe. This project is headed by Airbus and features the main actors in the European aeronautics industry such as Rolls-Royce, Snecma, Volvo, Thales, EADS, etc.

The main aim of the project is to create tools that can be used to share and re-use simulation models, data, user requirements, etc. to improve the design processes of new aircraft and engines. All the participants in the project agree: systems simulation from a very early stage in aircraft design helps to reduce the times and costs of designing the systems by validating many different design alternatives, using optimisation techniques to find optimal solutions and having behaviour models of the aircraft and engines before they are manufactured, thereby saving considerable money on the subsequent physical

tests that would otherwise be needed.

EA has participated with its PROOSIS tool, in which new capacities have been created so that models can be exported as black-box to improve the interaction among partners. It has also been equipped with a sophisticated optimisation tool so that models can be optimised without have to rely on external software as had previously been the case. Another enhancement has been to make PROOSIS models easier to execute from other Simulation Workflow tools widely used in the aeronautics industry.

On other fronts, we should mention the space simulation conference held in Bordeaux in May by the Association Aéronautique et Astronautique de France in collaboration with ESA and CNES. EcosimPro was there with a stand where we were giving demonstrations on the ESPSS jet propulsion libraries and EcosimPro.

We were also fortunate enough to attend some fascinating presentations given by European companies that have developed models in EcosimPro within the framework of concrete projects on aerospace simulation. We saw how users have been able to model complex propulsion systems and validate the models using a number of different techniques.

This newsletter also reports on the new versions of EcosimPro V5.0 and PROOSIS 3.0 that were released this June. We believe these new versions are a significant step forward for all of us, since they include profound changes on the internal level of some parts of the tool, such as all the software for creating graphics in the models, which has been fully overhauled and is now much more robust, powerful and efficient.

This new version also includes new capabilities many of our users had been requesting, such as the ability to work as a team via the connection to a Configuration Control software program (done in Subversion), as well as encrypting libraries and reading ASCII and XML files from the tool itself. We believe all these new features and the many others present in the new version will make the day-to-day tasks of simulation much easier.

Again, we truly hope you find this newsletter interesting and useful, and we welcome any suggestions you may have for upcoming issues.

Pedro Cobas Herrero  
Head of the Development Team of EcosimPro/PROOSIS



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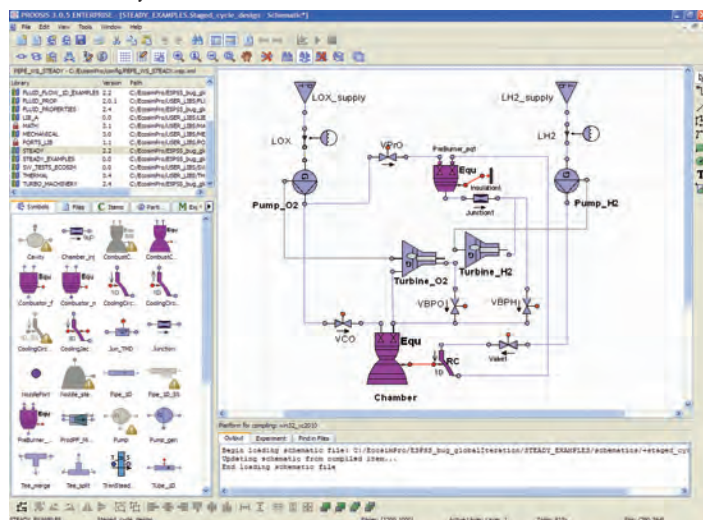
## LATEST NEWS ECOSIMPRO

### New versions of Ecosimpro and PROOSIS

Last June 14 saw the launch of the new official versions of EcosimPro 5.0 and PROOSIS 3.0. These new versions of the two programs represent a significant milestone: they include a number of improvements to the tool across the board, giving it greater capacity and flexibility to model and simulate complex systems. Some of the new features include the following:

- A brand new graphic modelling tool to make 2D schematic diagrams more quickly and flexibly. Considerable improvement has also been made in the quality of the final graphics of the icons and other graphic elements. It includes new features such as labelled connections to avoid simplifying the view of components with multiple connections, sub-categories in libraries to classify the icons, etc.

- A direct connection to the Subversion-Tortoise configuration control tool that noticeably enhances the teamworking capacities since it can be used with a common database of libraries so each user can get the latest version of them, make changes and control all the versions of the library, component files (.et and .eds), partitions, experiments and any other additional file used in the library.



PROOSIS 3.0

- New internal architecture of the simulation monitor, more powerful than the previous one and more flexible for following up the simulation.

- Capacity to work with the new Microsoft C++ 2010 compiler that can become up to 50% faster than previous versions.

- Generation of simulation results in international binary format HDF5. The user can now use other tools to perform a study of the file generated by a simulation, since HDF5 is a format used by a great many organisations and visualisation tools.

- Encryption of libraries. The user may offer a library in encrypted format to prevent the end user from seeing the source code.

- New classes for reading and writing XML files from the tool. In addition, new classes for reading ASCII files from EL simply and intuitively. In earlier versions this had to be done in external libraries in C/C++ or FORTRAN, whereas this version can do it directly in the tool.

### EcosimPro broadens its presence in Korea

Samsung Electronics Co. asked the EcosimPro group to do a reference case consisting of simulating a process of depressurising carbon dioxide in supercritical conditions. As a consequence of the good results obtained, Samsung Electronics now has a license for EcosimPro and the FLUIDAPRO professional libraries to run simulations of their systems. Likewise, other Korean companies have expressed interest in EcosimPro in the area of modelling reverse osmosis desalination plants, and various test cases have also been run. This new area of modelling has been performed successfully in other industrial projects. It is thus expected to become a new area of general application in EcosimPro.

### EcosimPro present at ITER Tritium Seminar

On June 13, the EcosimPro team went to the industry seminar

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“Technologies for designing components and systems of ITER’s Tritium Plant and industrial opportunities” held in Barcelona on June 12 and 13.

The seminar brought together a great number of world experts on tritium systems, from business as well as from research centres. The seminar analysed the extent of definition of the tritium systems in ITER as well as the developments made so far and the potential courses for future work.

EA’s contribution to this seminar focused on showing the libraries developed with EcosimPro and their usefulness in simulating systems involving hydrogen isotopes, which can be established along two lines: the analysis of the processes of diffusion and transfer of isotopes and the creation of models of the systems for extracting and purifying tritium currents.

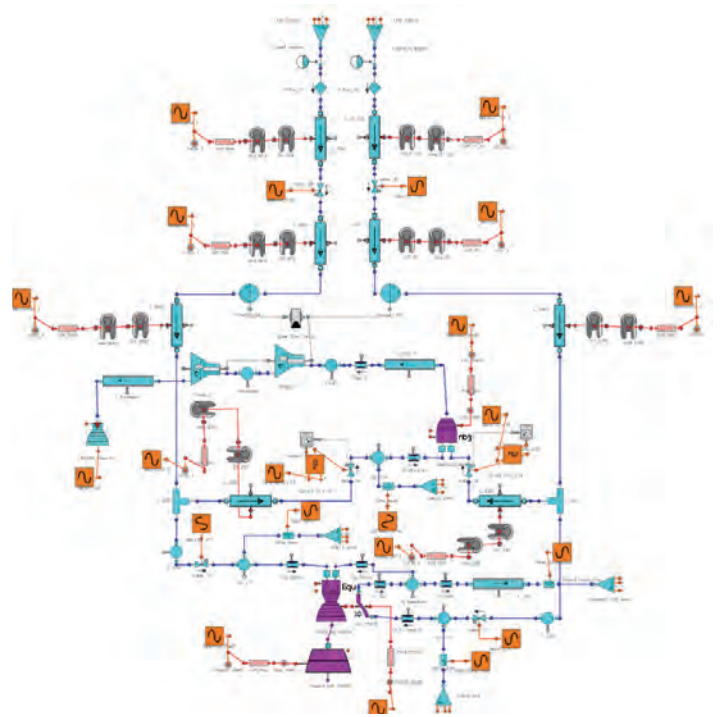
As examples of the capabilities of EcosimPro and the tritium library in this field, a few validation and verification cases were presented that showcased the suitability of their use as well as other models done to analyse ITER’s Test Blanket Module (TBM) and some systems for extracting and purifying currents that may be used as the basis for models of the Tritium Plant, depending on the how defined the systems are.

### New version of the ESPSS 2.4 libraries

Developed by EAI for the European Space Agency (ESA), the ESPSS (European Space Propulsion Simulation Software) libraries form a set of libraries for EcosimPro to simulate liquid fuel propulsion systems in space.

Phase 3 of the project, in which EAI is the main contractor, is bringing in new features to the ESPSS, such as:

- Enlarging the existing libraries with new physical phenomena (e.g., film boiling, absorption and desorption of non-condensable gases)
- Proposal and study of cases of validation
- New library for design calculation (direct stationary evaluation)
- New library called SATELLITE, to simulate the trajectory movement and attitude of a satellite, and calculate accelerations on the tanks
- New library of Electrical Propulsion



### Model of cryogenic rocket engine HM7B (Ariane 5 ECA)

During the development of Phase 3, a new stable version of the libraries has been released, ESPSS 2.4, available for all users. This new version includes several new capacities that were posed in Phase 3, and various bugs have been fixed, which makes this version much more robust and the simulations much faster.

These improvements have been possible thanks to feedback from ESPSS users (ESA, Astrium, OHB, to name a few), to the accumulated expertise of EAI in simulations of these systems and to the study of different cases of validation posed in Phase 3 of the project.

### Enhancements to THERMAL\_BALANCE library

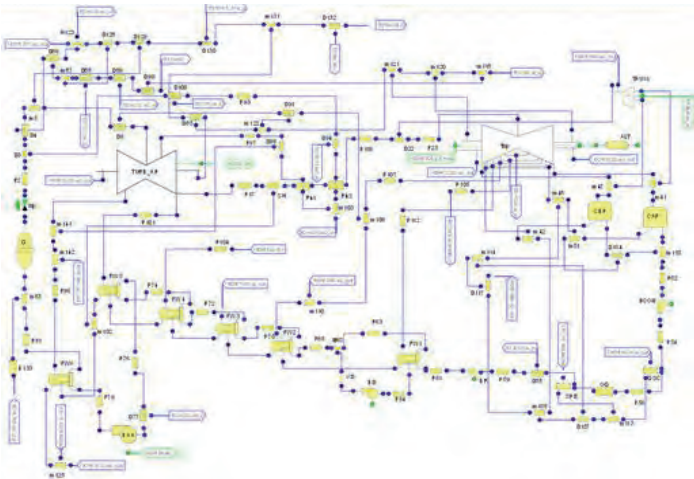
The Thermal\_Balance library has now had some of its components modified to achieve an easier, more streamlined system of generating equations.



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### Schematic diagram of power plant thermal balance with EcosimPro / THERMAL\_BALANCE

This was done by preventing some equations from being re-ordered, mainly by defining some of the variables as EXPLICIT (for example, pressure drop coefficients in piping, secondary branches in dividers, etc.) as well as other modifications to prevent the flow from reversing, such as the use of non-return valves in the pipes.

Furthermore, the models and the results are now easier to view either by using the Labels option in the schematics, by generating macro-components (HP and LP turbine block) or, when running the experiment, by the GSE schematics.

### EcosimPro/ESPSS at the European Space Propulsion Conference in Bordeaux

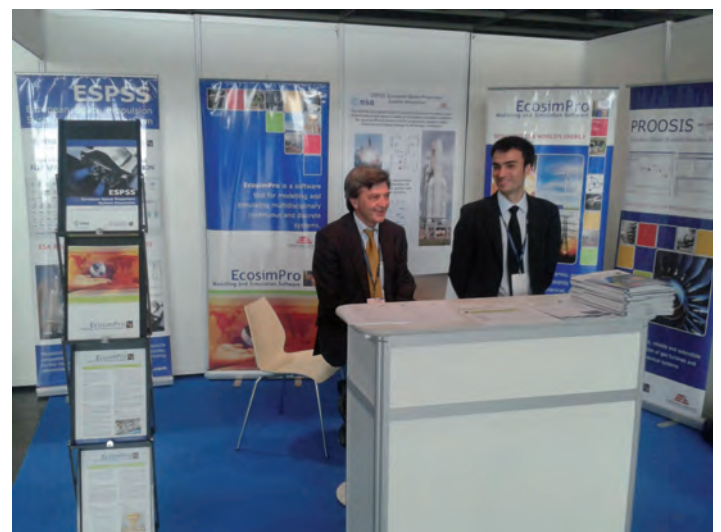
EcosimPro was present at the third edition of the European Space Propulsion Conference held in Bordeaux this year from the 7<sup>th</sup> to 10<sup>th</sup> of May. Organised by the Association Aéronautique et Astronautique of France in collaboration with the European Space Agency and CNES, the event was attended by more than 400 delegates from different organisations in the world space sector such as, ESA, NASA, DUR, ASI, CNES, EADS-ASTRIUM, SNPE, MOOG, AMPAC, ALTA Space, etc. A large number of high-calibre papers were given regarding aerospace propulsion systems. The presentations were held in parallel sessions and took place in the Bordeaux Conference Centre.

The opening session was attended by key figures from space agencies and businesses in the sector. Alongside the presentations there was an exhibition area featuring around 20 stands from various companies showcasing their products.

EA took part in both, presenting papers on simulation work as well as hosting a stand. Jose Moral gave a paper based on a final degree project by Jose Amer, who had interned at EA, titled “Adaptation of the ESPSS/EcosimPro platform for the design and analysis of liquid propellant rocket engines”. Stefano Nancleiro, from Iberespacio, gave a paper called “Small GEO Xenon propellant supply assembly pressure regulator panel: test results and comparison with EcosimPro predictions”.

On May 8, ESA hosted a workshop for all European ESPSS users, EA and ESA. Pedro Cobas, from EA, presented the new capabilities of EcosimPro 5.0, and Jose Moral presented the latest features of the propulsion library in EcosimPro/ESPSS Version 2.4, while Francesco di Matteo from ESA presented the enhancements being done in Phase III and Johan Steelant from ESA, gave an overview on the status of ESPSS and its future.

Afterwards, several library users such as Thales-Alenia, EADS, Astrium, Von Karman Institute, Kopoos, etc. gave various industrial presentations done with the tool and concluded with a suggestions session in which users made a number of proposals for new improvements for upcoming versions. It was also decided to hold a yearly workshop for users of EcosimPro/ESPSS.



PROOSIS stand at the 2012 Propulsion Conference (Bordeaux)

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Over the four days conference several demonstrations of EcosimPro/ESPSS were given at the EcosimPro stand to a number of companies interested in the product. The next conference will be held in 2014.

### European Crescendo project forum in Toulouse

A public forum of the European CRESCENDO project was held in Toulouse (France) on June 19, 20 and 21, 2012.



This project belongs to the VII European Framework Programme and is led by Airbus. Fifty-nine European organisations took part representing the aeronautics world: aerospace companies (e.g. Airbus, Snecma, Rolls-Royce, Volvo, MTU, EADS, etc.), simulation software companies (e.g. EA, Dassault, ANSYS, LMS, MSC, etc.), and universities (e.g. Cambridge, Belfast, Athens, etc.). The aim of the project is to create new tools and standards in the world of simulation of aeronautic systems.

A great number of papers were presented by project participants over the three days, such as a detailed description of the concept of the Behavioural Digital Aircraft (BDA).

The BDA will make it possible to store and share models in a federated way by the lifecycle of an aeronautical product. The BDA is made up of a Model Store to store models and data, tools of the Simulation Factory for creating simulation workflows and Quality Lab tools for validating the models.

The aims of the project are quite ambitious, since the idea is to appreciably reduce the effort required in the design of new aircraft and engines by reusing models, reducing the physical tests, etc.

EA participated in this project with its PROOSIS product, and has worked on several work packages. For example, along with Snecma and Intespace, EA presented a PROOSIS connection to the Dynaworks test database to help fit models more efficiently since it directly connects the motor performance model and the real test data, thereby giving a faster fit with the parameters.

In addition, EA presented another paper with Turbomeca, Euro-

copter and the University of Athens on improving how to export performance models of an aeronautical engine such as a black box and the creation of a powerful optimization tool integrated into PROOSIS.

The example presented was the optimisation of the parameters of the engine modelling a model of helicopter in PROOSIS and setting a typical mission for the helicopter to carry out.

### Collaboration between EA and CIEMAT: GRANT 254

EA is participating with CIEMAT in Grant 254, a project launched by Fusion For Energy (F4E) whose aim is to model Tritium transport and conceptual design of the auxiliary systems of the Test Blanket proposed by Europe (Tritium Migration modelling and conceptual design of the Tritium accountancy systems for the European Test Blanket Systems).

The modelling tools used included TMAP (Tritium Migration Analysis Program), an industry leading tool for calculating transport of hydrogen isotopes, and EcosimPro.

A library has been developed in EcosimPro to validate this software in regards to TMAP by carrying out verification cases with both analytical and experimental solutions alike.

The results have been satisfactory and EcosimPro is now situated as the possible simulation tool for modelling the two TBM (Test Blanket Module) configurations proposed by Europe for ITER (HCLL: Helium Cooled Lithium Lead and HCPB: Helium Cooled Pebble Bed) as well as the auxiliary systems for Tritium extraction.

There is already a model of HCLL available in EcosimPro that will soon be assessed by F4E. The final aim is for EcosimPro to develop the components needed for modelling the TBM and auxiliary systems that let F4E make a conceptual development of the process and keep track of the Tritium inventory at all times.

### Simulator of Parabolic Dish Solar-Thermal Power Plants

A simulator has been developed in EcosimPro for a solar-thermal power plant with parabolic collectors in order to study the typical transients of this type of power plants: startup, shutdown,



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passing clouds, a trip in some equipment, etc. Among their main applications is the training of operators and engineers in operating the plant, the support in developing the engineering of the plant and checking the logics and control sequences before startup (virtual commissioning).

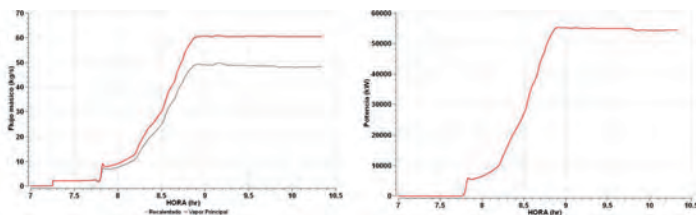
The simulation model represents the transient behaviour of the following parts of the solar-thermal plant using parabolic collectors:

- Solar field
- Heat Transfer Fluid (HTF) Circuit
- Steam generation units
- Steam cycle and circulating water system
- Control sequences and loops and plant operating modes

The models of equipment are based on equations of conservation of mass, energy and motion and the data from the specification sheets of the equipment (geometric data, data from operating points).

The model also includes simulating the weather conditions: intensity of direct sunlight, wind speed, etc.

Shown next are the results from the simulation of plant startup on a summer day with little cloudiness. It has been assumed that said startup is partially supported by a boiler as the field is focused when sunrise is detected.



Flow of main steam and reheat steam

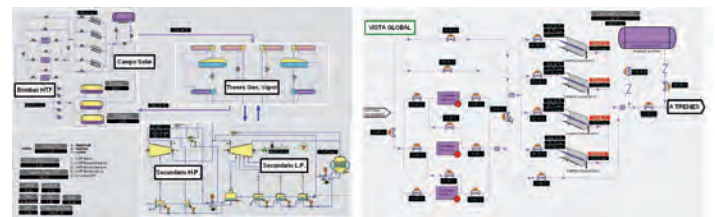
Electrical output

The increase in HTF flow through the system is staggered as a particular temperature is reached in the loop.

The simulation model was used to generate an OPC server (Object Linking and Embedding for Process Control) that was then connected to one of the plant's SCADA systems. OPC is an industrial communications standard for sharing data among any hardware and software systems that have that interface.

The simulator's SCADA system consists of 6 control display screens showing the main systems making up a parabolic trough solar-thermal plant:

- Solar Field
- Steam generation units
- HTF pumps and flash tanks
- Part of the high pressure steam cycle
- Part of the low pressure steam cycle
- Overview of the entire solar plant



Functional diagram of the overview of the plant      Functional diagram of the solar field

The SCADA program was developed by the Centro Tecnológico Azucarero (CTA) in conjunction with the University of Valladolid, and is implanted at a number of sugar refineries. It is a PC-based system with Windows OS, with an OPC communications system for synchronised and real-time operation of the software modules: Dynamic simulation of the process, operator and instructor consoles and communications system as per the OPC standard. Its main functionalities include:

- Navigation between the various functional diagrams
- Visualization of the most important system variables
- Modification of control variables, actuator positions and operating modes
- Generation of alarms
- Selection of pre-defined training sessions
- Activation and deactivation of faults in the process
- Control of the simulation speed

The modular object-oriented structure implemented in the simulator makes it flexible and portable. It can be run from a PC and the simulation model can easily be modified or improved to

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adapt it to another plant configuration or include new control strategies and operating sequences.

This tool can be of great use to engineers and operators of solar-thermal plants in terms of training as well as engineering and operating tasks.

### EcosimPro at Cryogenics Conference in Fukuoka (Japan)

The 24<sup>th</sup> International Cryogenics Conference was held this year in Fukuoka (Japan) from the 14<sup>th</sup> to the 18<sup>th</sup> of May. More than 570 experts and conference-goers from research centres, universities and industries around the world took part in the different sessions.

The conferences presented the latest developments in this area and analysed the difficulties of aspects of particular relevance such as the ITER cryogenics system.

EA presented the new library CRYOLIB based on EcosimPro for modelling large-scale cryogenic systems, and developed in collaboration with CERN. Furthermore, the “short courses” given at the conference included one on using EcosimPro to model and simulate cryogenic systems, and it showed the great usefulness in designing them as well as for optimising their control system by commissioning, operator training, etc.

In addition, the posters session featured a poster presented with



Photo of the stand

CERN on the main characteristics of the library and its application to modelling the cooling system of the Large Hadron Collider (LHC) at CERN.

Several EcosimPro users also presented their works done using this tool. William Booth (CERN) gave a poster titled “Dynamic simulation of the ITER helium cryogenic system under pulsed heat loads”, in which they analysed the results of several different control strategies on the model of a 2.5 kW ITER cooler at 4.5K with a distribution system and 4 auxiliary cold boxes, as developed in EcosimPro.

Christine Hoa (CEA) presented a poster called “Dynamic modeling of a forced flow supercritical helium loop with EcosimPro” in which she analysed the dynamic behaviour of HELIOS in operation. HELIOS is an experimental full-scale reproduction developed by CEA for the cooling circuit of the magnets for the tokamak JT-60SA. Ms Hoa also took part in the presentations session with a paper called “Experimental investigations for smoothing pulsed heat loads on cryogenic circuits of superconducting magnets in JT-60SA tokamak”.

Alongside the presentations there was an exhibition area with 47 stands from different companies showcasing their products. EA also took part there by giving live demonstrations of EcosimPro with the new library CRYOLIB to conference-goers interested in the product.

### Journals take interest in EcosimPro

In recent months, EcosimPro has taken the spotlight in a number of special issues dedicated to fuel cells and desalination plants.

Journals such as Metallurgy and Electricity, Electronics and Communications and Infoenviro have included features on the use of EcosimPro in this fields and on the many advantages of using the simulation to optimise safety and performance.

Both topics have also been published in a large number of general and sectorial media such as Interempresas, Inmodiario, Ecoticias, EfikosNews, Tecnología Ambiental, Madrid Actual, Innova noticias, Globedia, Techweek, Revista Medioambiente, Itcio. Furthermore El Economista website featured a book review on “Introduction to modelling with EcosimPro”, joined by news in international media such as Engineerlive and News-today.

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### CERN announces the possible discovery of the Higgs boson after an experiment at the LHC

On July 4, 2012, CERN announced to the press that they may have finally detected the Higgs boson, after many years of unsuccessful attempts.

The two main experiments (ATLAS and CMS) announced the observation of a new particle that is “consistent with the Higgs boson”, with a mass of around 125 GeV/c<sup>2</sup>. Attempts will be

made over the coming months to confirm that the particle detected is in fact the elusive boson.

As mentioned in a previous newsletter, EcosimPro was used by CERN to model and to simulate the cryogenic system of the entire cooling loop of the LHC, which served to validate the system and to optimize the control logic, and is being used today for simulation and training of the LHC plant operators.

CERN and EA are building a commercial cryogenic library named CRYOLIB which is expected to be ready at the end of July for use at other similar installations.

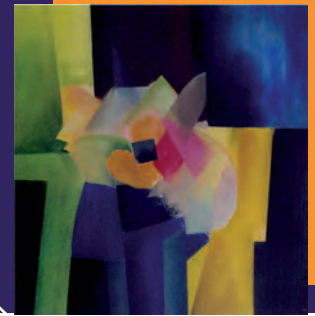


Installation of the world's largest silicon tracking detector in the CMS experiment. (Michael Hoch, ©CERN)



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## FAQs: New tool for Library Configuration Control



The new version of EcosimPro/PROOSIS provides a tool for controlling the source code (SCC). This new feature facilitates collaborative work between two or more users as well as keeping control over changes made to the code throughout the project.

This feature is supported at both the functional and graphic level, with the connection being established only as the client. The user is assumed to have a SubVersion (SVN) repository installed and configured; i.e., EcosimPro cannot create or manage the repository.

A source code control is a system for controlling changes in files and for managing how these files are shared. Generally, it is used on ASCII files, since the differences between the various version can be controlled and compared. This does not mean that binary files cannot be used, although it can only state that the binary file has been changed or not, i.e., it does not give the specific differences between the versions of binary files.

Each user works in an independent local copy. When the changes are ready to be shared (or simply saved for control purposes), they are uploaded to the repository. A repository is a database that stores files along with any modifications thereto via the project. All text files are compressed before being stored in the repository. Furthermore, if a file is modified, the new version is not stored completely, only the part that has changed.

This way, the repository can store large amounts of information by optimising the available storage space. Binary files cannot be optimised this way, since they must be saved in their entirety in each version.

Whenever a change is uploaded to the repository, it is marked with a number. Each change is called a revision. A new revision is comparable to a general snapshot of the project at a given time. In other words, a revision is a global number that belongs to all the files in the repository, not just the ones that have been modified.

Initially, only files created by users should be uploaded to the repository, not files created by EcosimPro, in other words, ASCII files of source code, setup files, data input files, partitions, experiments, schematic diagrams, etc as well as binary files such as .lib files of

external libraries, etc. Files generated as .elb, .unt, .dll, etc. should not be uploaded.

With ASCII files, not only can differences be found, but also, when two users modify the same code at the same time, mechanisms can be set to detect and correct any conflicts. This feature is not available for binary files.

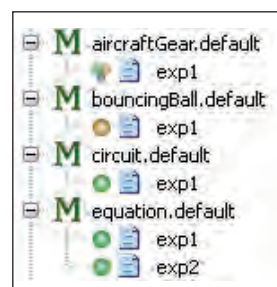
In conclusion, the files that should be uploaded to the repository are the ones needed to generate the rest of the files again. EcosimPro will only manage these code files, even though it offers the option to upload other files types as well. Thus, when a library is uploaded to the repository, it is advisable to use only EcosimPro and no other external tool, so as to keep from uploading files that may cause problems.

A user may obtain the files needed to reproduce a specific situation from any specific point in time simply by downloading the files associated with a revision.

### Integration in the graphic interface

EcosimPro has an area where the files used by the various different parts of the program are represented: configuration of libraries, EL files, schematic diagrams, partitions, experiments, etc. These have an icon that has been extended to encompass another icon that will represent the relationship between the local file and the copy in the repository.

An item may have more than one associated file. For example, an item may include the file of the experiment and the configuration of the Monitor associated with that experiment.



Experiments with Explorer

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### Status of a local file with respect to the repository.

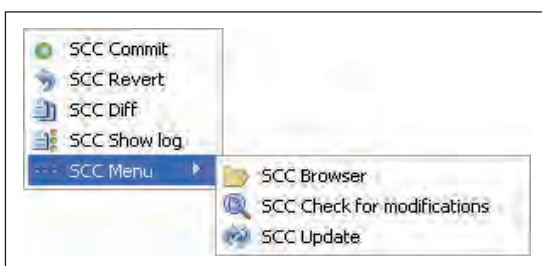
- SVN has a great number of statuses available but only the ones relevant to EcosimPro have been considered. The set of statuses implemented along with their icons are as follows::
- The local copy of the associated file has not been modified.
- The local copy of the associated file has been modified.
- The associated file will be added to the repository after a commit action.
- The associated file will be removed from the repository after a commit action.
- There is a conflict between the local copy and the repository.
- The associated file is not in the repository.
- The associated file is not in the repository and furthermore is ignored in the SCC dialogs.

The status request is for a file that no longer exists locally.

The item is associated with several files which have different statuses with respect to the repository.

### SCC Actions

Like with the statuses, SVN has a great number of actions available. Again, only the ones relevant to EcosimPro have been considered. The actions available for each file depend on its status.



SCC options

The whole set of available actions is as follows:

- Connect to repo: Connects the workspace file or library to a repository.

- Commit: Uploads a set of changes to one or more files as a single revision.

- Revert: Undoes an action to a file.

- Diff: Shows the differences between the local copy of the file and the last version in the repository.

- Show log: Shows a dialog with the history of the file in the repository. This history has a list with the revisions that affect the file and information such as: who made the change, what type of change was made, when, a description of the change, etc.

- Launch browser: Launches a browser of the repository that opens in the directory of the associated file.

- Check for modifications: Checks if any other user has uploaded any modification of the file to the repository.

- Update: Updates the file with the latest version of the repository.

- Edit conflicts: When updating, there may be a conflict if another user has modified the same lines of code. In this situation, a new file will be created with information from both versions so that the user can choose which parts are valid. This selection can be made using the edit conflict dialog or by hand.

- Resolve conflicts: Once the user has resolved the conflict, this action will unflag the conflict.

- Add: Flags the file for upload to the repository in a commit action.

- Delete: Flags the file for deletion from the repository in a commit action

- Ignore: Flags the file for being ignored by the SCC dialogs.

- Clean up: Eliminates potentially inconsistent statuses in a local directory. This status can come up, for example, if there are errors in communicating with the server.

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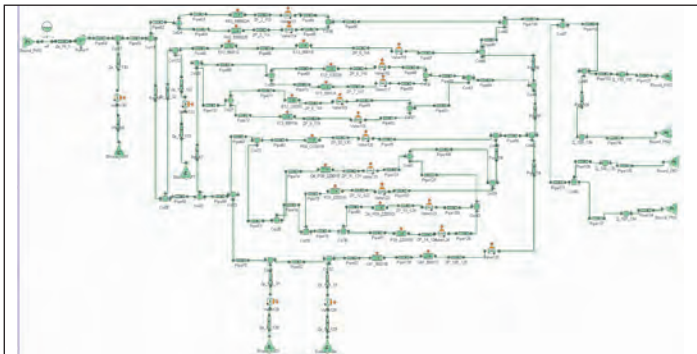
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## FAQs: Tools for easier viewing in schematic diagrams



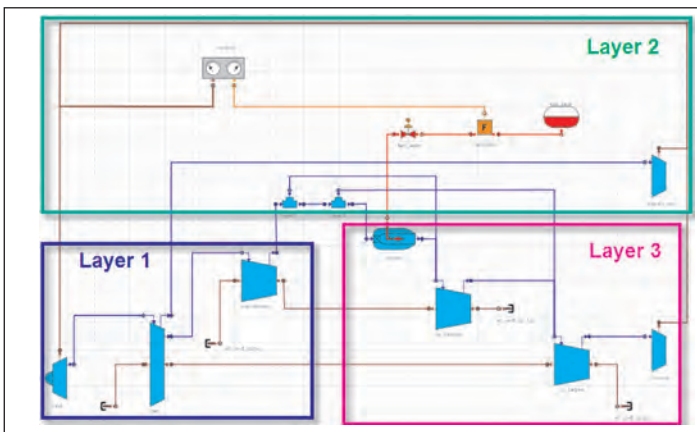
Ask any EcosimPro user about the advantages of graphics-based modelling with schematic diagrams when it comes to creating topological models, and the vast majority would agree on two main aspects: how easy it is to make the models and how easy it is to understand them.

However, when the models are complicated, there are more and more components and the topologies become highly complex, viewing them becomes more and more complicated as well.



Example of a complex schematic diagram

This is why we have worked hard to keep the visuals as straightforward as possible in these latest versions of EcosimPro by giving



3-Layer Schematic Diagram

the user the tools for simplifying how a large model is displayed.

These tools are layers and text connectors.

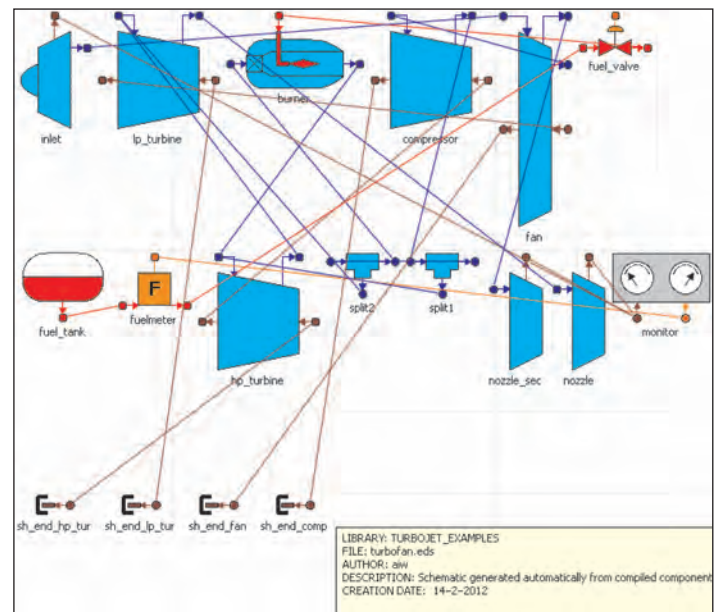
### Layers

Layers are a device that lets the user define groupings of components within a schematic diagram.

Layers help simplify how the schematic diagrams look by separating the display into logical parts, defining the order of each layer when compiling the model, etc., and all without having to modify the underlying mathematical model. With this tool, the user can view one, two, or all three layers at once.

### Text connectors

This new graphics feature simplifies the connector lines on the schematic drawings.



Schematic diagram with complex topology

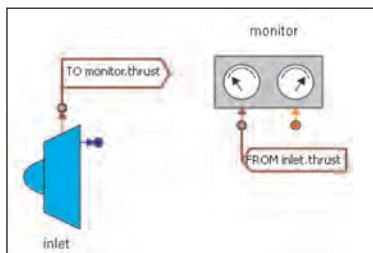


# EcosimPro

## Modelling and Simulation Software

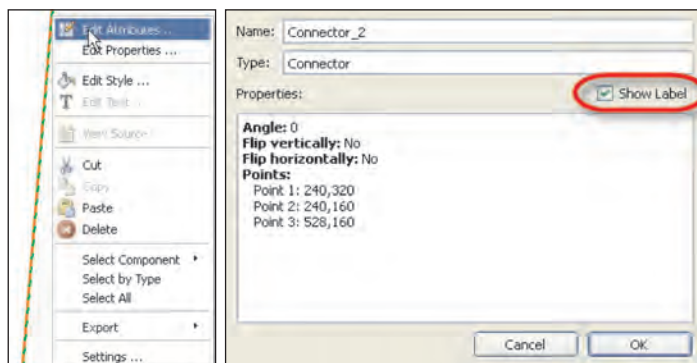
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Large diagrams with many connectors can become a tangled mess of connectors that take space away from the rest of the graphics and make it hard to follow the lines.



Labelled connection

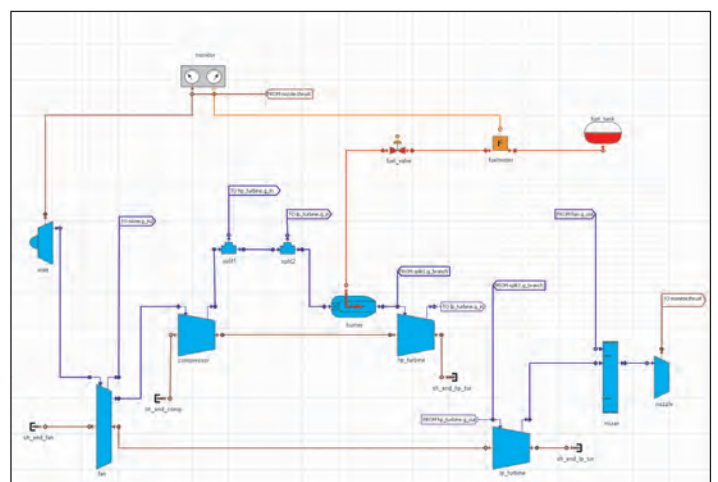
That is why they have created text connectors that work like labels to let the user replace connector lines with information tags (cus-



Connection editor

tomizing the text and the style) that show where a connection goes to and from.

Changing the type of connector is as easy as editing the attributes of the connector line and marking the “Show label” option.



Schematic diagram with labelled connections

As the following example shows, the text connectors simplify and enhance the look of the schematics by not having long lines criss-crossing through the model graphics yet all without any loss of information.

Please feel free to send us any suggestions you may have for the EcosimPro newsletter, whether these have to do with content, articles or interviews that you would like to see published in coming issues to [info@ecosimpro.com](mailto:info@ecosimpro.com). We look forward to receiving them. With your collaboration, we can continue to improve and expand the newsletter sections that are most relevant to you.

## SUGGESTIONS

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