iSiM *ESL*

ISIM ESL – a graphical environment for robust dynamic system modelling

*Originally designed for the European Space Agency for satellite and spacecraft simulation, **ISIM ESL** has applications in all fields of industry, science and technology*

Version 8.3 – *the latest release* – includes new IDE – **ESL-Studio**

Benefits

ESL provides the following key advantages:

Rapid Development

- Interactive Development Environment for block diagram model construction
- submodel concept allows hierarchical modelling of complex systems
- interactive control of simulation using ***ESL-SEC*** *(Simulation Execution Control)*
- snapshot allows the state of a simulation to be saved and resumed later
- vector and matrix arithmetic
- both differential equation and transfer function model description

Accuracy

- wide range of sophisticated and proven numerical integration algorithms
- extensive checking of model correctness
- accurate treatment of discontinuities

Connectivity

- parallel simulation processing capability
- embedded and remote simulation capability
- invocation of external libraries

Robustness

- robust simulation engine handles very large non-linear models

Features

- ***ESL-Lite*** - free entry level version: supports interpreter only and limited number of differential equations
- ***ESL-Pro*** - professional version: full interpreter and translator functionality
- supports 32-bit and 64-bit MS Visual Studio C++ and MinGW g++ and gfortran (FORTRAN 2003) compilers
- real-time capability
- run-time and post-run graph plotting
- profile concept allows tailoring to specific application areas
- allows mix of graphical and textual modules
- simulation segments support systems with wide-ranging time constants

ESL-Studio

- ***ESL-Studio*** is an integrated development environment for creating ***ESL*** simulations using block diagrams and ***ESL*** source code
- it is an alternative to, and replacement for, ESL's older Integrated Simulation Environment (ISE) and may be used with either ***ESL-Pro*** or ***ESL-Lite***
- allows management of all stages of the simulation activity

"A simulation engine that runs forever"
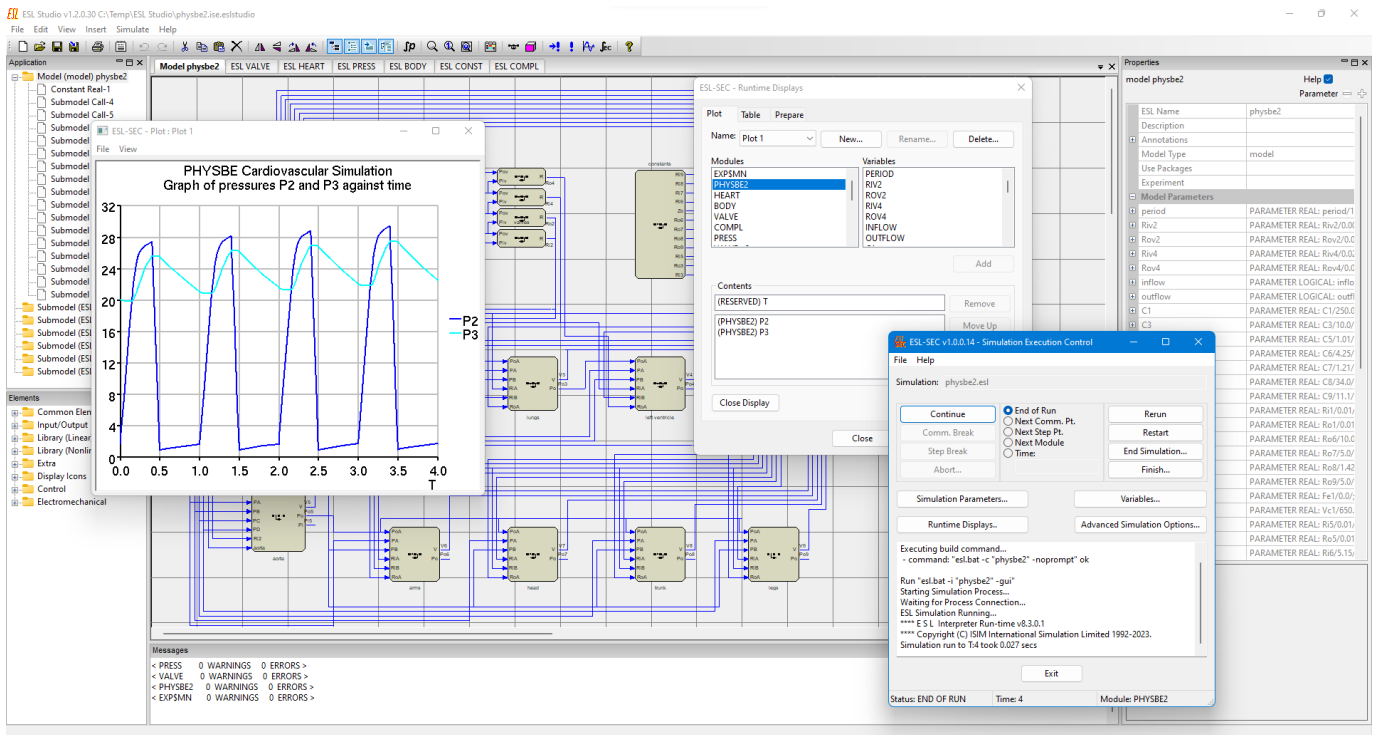
Building Simulation Models with *ESL*

Each stage of the simulation activity is managed through **ESL-Studio** which allows the construction of block-diagram model descriptions and the inclusion of textual **ESL** code where appropriate - for example, to describe highly non-linear elements.

ESL submodels can be developed in block-diagram form or as **ESL** textual code. External textual submodels and libraries can be included.

Seamless compilation and build of your simulation program is then initiated with the option to run immediately through the interpreter, or further translated into C++ or FORTRAN. In either case, execution is managed through **ESL-SEC** (Simulation Execution Control) which provides run-time control of the simulation.

All program variables and parameters can be accessed from **ESL-SEC** when running the simulation. Graphical and tabulated output from your simulation can be specified through the use of special simulation display elements on the block-diagram prior to execution or alternatively from **ESL-SEC** at run-time. Run-time commands and output specifications can be logged to a driver file and used at a later time to repeat simulation scenarios. Simulation output can be written to a *Prepare* file for post run analysis using **ESL-Displays**.

The final simulation, compiled to C++, can be generated, via C#, as a Windows .NET Framework assembly which may be invoked from any .NET Framework application, and integrated with C#, Visual Basic, etc. The generation of COM/ActiveX components and DLLs is also supported .

Some *ESL* Applications

Giotto - Halley's Comet Probe
ESL was used to simulate the control system responsible for the 'de-spin' of the antenna system. The probe rotated during flight for even distribution of solar exposure. The communication antenna required rotation in the opposite direction to maintain a fixed orientation with respect to the earth.

Hubble Space Telescope (HST)
An ***ESL*** study was carried out to simulate the effect on the orientation of the telescope as it makes the transition between sunlight and eclipse. The dynamic effect of thermally induced vibrations in the solar panel arrays was investigated.

Validation of On-Board Software
Validation facilities allow satellite software to be tested on the ground prior to launch in a simulated space environment. ***ESL*** has been used to provide the dynamic features of the environment simulation.

North Morecambe Bay Gas Rig Training Simulator for British Gas, UK
ESL is used to provide the underlying real-time simulation of the process plant and associated equipment. The "embedded segment" facility is used to integrate the real-time simulation with the decision control functions of the simulator and graphical operator screen displays.

Rapid Gravity Filter Simulation for Yorkshire Water, UK
This application provides a detailed simulation of rapid gravity filter beds and associated WTW plant with the objective of optimising filter management in order to minimise the risk of contamination with *Cryptosporidium.* Here embedded and remote ***ESL*** segments were combined with a Visual Basic interface to provide the packaged product - ***COGSYS H$_2$O$_k$.***

Gas Turbine Compressor Station Integration Testing for Transco, UK
In this application, ***ESL*** simulations were used for integration testing of various components of a new gas compressor station. Simulations of the gas-turbine compressor train and associated control panel were integrated with the plant SCADA system, allowing validation of the control sequences to be carried out prior to commissioning. The application demonstrates the ease with which ***ESL*** simulations can be integrated with existing hardware and software systems.

For further information contact:

Dr J G Pearce
ISIM International Simulation Limited
161 Claremont Road
Salford M6 8PA
United Kingdom

Tel: +44 (0) 161 736 5283
info@isimsimulation.com
https://www.isimsimulation.com

Platforms supported

ESL is currently available with full technical support (*ESL-Pro*) for the following platforms:

Windows 10, 11

ESL is also available for Linux

ESL – for accurate and robust simulation