PROOSIS
Propulsion Object Oriented Simulation Software

PROOSIS is a stand-alone, flexible and extendible object-oriented simulation environment for modelling gas turbine engines and other systems (control, electrical, thermal, hydraulic, mechanical, etc.). It was originally developed by Empresarios Agrupados Internacional S.A. and an aeronautics consortium of European universities, research institutes and corporate companies. It is based on EcosimPro, the European Space Agency's preferred tool for simulating rocket propulsion, environmental control and life support systems, among others.

PROOSIS has an advanced Graphical User Interface and uses a high-level, "engineer-friendly" object-oriented language (EL) for modelling engine systems and state-of-the-art technologies in areas such as numerical solvers, non-causal modelling of reusable libraries, XML file formats, map handling etc.
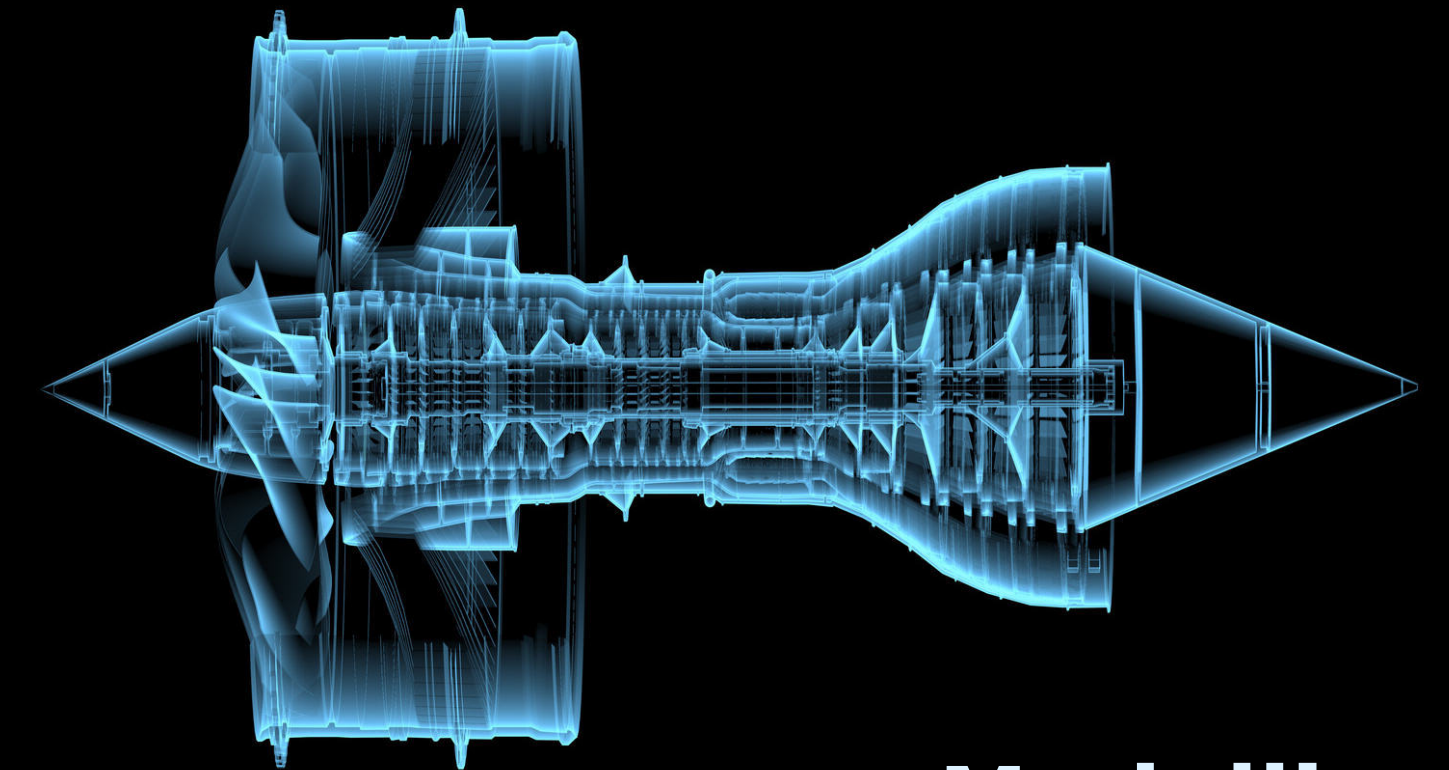
Any gas turbine engine configuration or system can be constructed graphically by 'dragging-and-dropping' the required component symbols from the included libraries to a schematic window. Using EL, users can also create new components and libraries, or extend the existing ones.

PROOSIS is capable of steady state and transient simulations as well as customer deck generation (dll, exe, ARP4868, AS4191). Different types of calculations can be performed (single or multi-point design, off-design, test analysis, sensitivity, parametric and optimisation studies, mission analysis, diagnostics, control system design and test, etc).

PROOSIS can also perform multi-fidelity, multi-disciplinary and distributed simulations. These are greatly facilitated by its open architecture, which allows it to connect to external commercial (Excel, Matlab, COM) or in-house tools and link with codes written in C, C++ and FORTRAN.

These features make PROOSIS a useful tool for all phases of the engine life cycle, from preliminary and detailed design to post-certification and in-service support, and allow it to serve as a common framework in multi-partner collaborative engine projects providing common standards and methodologies.
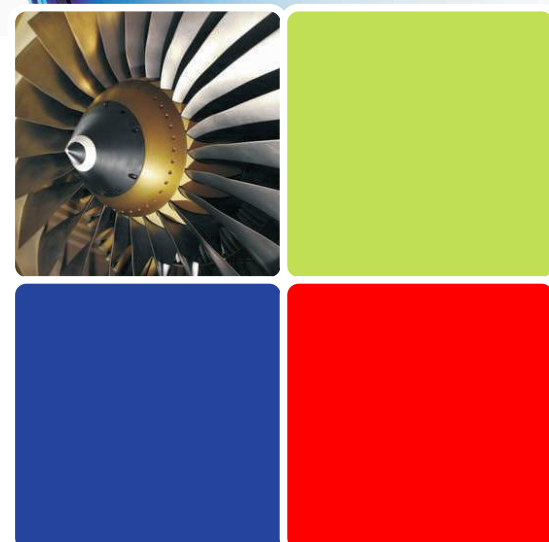
Lastly, PROOSIS also provides a multi-domain simulation platform for the simulation of gas turbines, engine/aircraft systems and power plants.

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EMPRESARIOS AGRUPADOS

PROOSIS
Propulsion Object Oriented Simulation Software

Modelling
Gas Turbine Engines
with PROOSIS

3-day Introductory Course

Madrid, Spain
24th - 26th October 2017

PROOSIS
Propulsion Object Oriented Simulation Software

EMPRESARIOS AGRUPADOS

COURSE OVERVIEW

PROOSIS is a leading tool for modeling gas turbines as well as for performing integrated simulations of aeronautics systems (ECS, Fuel, Electrical, etc.) with the motor. It was developed in collaboration with important engine manufacturers and prestigious universities. More and more users find it is the solution to their design problems, performance analysis, transient studies, optimization, etc. in an environment offering multiple functionalities.

The course is focused on the modeling and simulation of aeronautical propulsion systems and on acquainting users with the wide range of calculations that can be done with PROOSIS. Moreover, it also includes basic notions of creating and modifying basic components (eg compressors and turbines) as an introduction to modeling in PROOSIS. The topics covered therefore include:

- Basic notions of PROOSIS
- Creation of typical configurations (eg. Turbojet, Turbofan, etc.)
- Creation of typical performance calculations: design, off-design, transient, optimization, etc.
- Advanced modeling of other systems
- Exporting models as a black-box

This course is taught by our Aeronautics Propulsion modeling engineers. They have considerable experience in modeling and helping resolve our customer's simulation problems.

WHO IS THIS COURSE MEANT FOR?

This course was conceived for new users of PROOSIS who are interested in the following areas of study of gas turbines:

- Conceptual design
- Detailed design
- Performance study
- Engine Operation
- Transient simulation
- Optimization
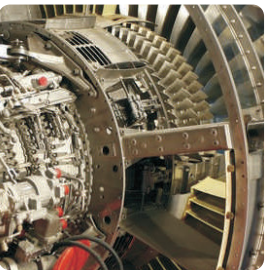
COURSE INFORMATION

COURSE FEE

The fee for the course is 1000 euro (VAT not included). For multiple attendees from the same company, there are discounts from the second person. The fee includes beverages, coffee, lunches, dinner on 25th October and copy of the slides.

Also, a copy of the book "Introduction to Gas Turbine Modeling with PROOSIS" as educational supporting material will be provided.

COURSE LOCATION

EA Headquarters (Madrid city centre)
Calle Magallanes, 3
Madrid, 28015
Spain

COURSE DINNER

On 25nd October there is an official dinner visiting a typical restaurant in the historic city centre of Madrid.

HOW TO REGISTER FOR THE COURSE

Please, contact Daphne Diana Jimenez
E-mail: djj@empre.es
Phone: +34.913.098.150
Web: www.proosis.com

HOTEL RESERVATION

Some hotels nearby have special discounts for attendees. Please contact us for good prices and reservations.
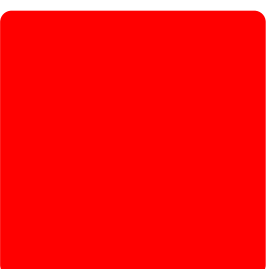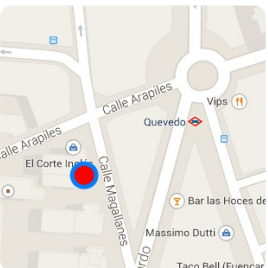
PROGRAMME

TUESDAY, 24th OCTOBER (9AM – 6PM)

INTRODUCTION TO PROOSIS
- Overview: User Types in PROOSIS, Libraries
- Main Features: Flexibility, Acausal and object-oriented modeling, steady and transient equation solvers, etc.

FIRST STEPS
- Graphical User Interface
- Workspaces & Libraries
- Components: Code (equations edition), classes, ports, functions
- Partitions: Symbolic manipulation, Creation of robust math models
- Experiments: Sequential code, Wizards, Execution, Monitor simulations

TURBO LIBRARY
- Description of the main components and ports of TURBO library
- Working with Maps
- First creation of an engine

CREATING MODELS GRAPHICALLY
- Engine Topology: Basic steps, Examples (Turbojet, Turbofan, etc.)

WEDNESDAY, 25th OCTOBER (9AM-6PM)

DESIGN
- Design (Simple Design for Steady, Map Scaling, Initialization, etc.)

OFF-DESIGN
- Steady State : Steady, Data, Initialization, Boxes, Plots
- Operating Line: Parametric Steady, Plots
- Transients: Transient integrators

ADVANCED CALCULATIONS
- Sensitivity analysis
- Parametric Study: Parametric Case - Steady, Design, Transient
- Extended Steady: Single / MPD / Inequalities / Design Calculations
- Extended Transient: Inequalities, Explicit & Dynamics
- Optimization and Parameter Estimation

THURSDAY, 26th OCTOBER (8:30AM-4PM)

EXTERNAL CONNECTIONS
- Decks: Features, Wizard, C++ interface
- Excel Connection: Excel Addin, Watch, Reports

COMPLETE EXAMPLE
- Creation of a Turbofan
- Turbofan Complete Analysis:
  - Design: Single Design, Multi-Point Design, Optimisation
  - Steady: Single Point, Operating Line, Optimal Point
  - Transient: Complete Mission

EXPORTING MODEL:
- Deck Generation & Use
- Excel Connection

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