

Application of CAPE-OPEN Standards for the interoperability between Computer-Aided Modelling Tools (MoT) and Process Simulators (ProSim)

Ricardo Morales-Rodríguez, Rafiqul Gani
rmr@kt.dtu.dk, rag@kt.dtu.dk

CAPEC, Department of Chemical Engineering, Technical University of Denmark, DK-2800 Lyngby, Denmark

Alain Vacher, Pierre Castelain, Stéphane Déchelotte
Alain.Vacher@prosim.net, Pierre.Castelain@prosim.net, Stephane.Dechelotte@prosim.net

ProSim SA, Stratège Bâtiment A, BP 2738, F-31312 LABEGE Cedex, France

Keywords

CAPE-OPEN, ICAS-MoT, Simulis, ProSimPlus, plug/wrapper

It is well known that computer-aided tools (software) play a vital role in the modelling/design/analysis/control of chemical products and processes that manufacture them. As these tools may come from different sources and disciplines, an important issue is *how they can be used efficiently for the design/analysis of specific process-product?* One alternative is to employ the CAPE-OPEN interface standards for the integration of diverse computational tools.

The objective of this presentation is to highlight the application of computer-aided modelling tools for the generation and use of modelling objects in CAPE-OPEN compliant process simulators. This presentation will highlight the use of external modelling objects for unit operation models as well as thermodynamic property models. We need to illustrate the following:

- A process simulator with a generic CAPE-OPEN socket (e.g. ProSimPlus).
- Simulis thermodynamics to test the thermodynamic calculations.
- A CAPE-OPEN unit/thermo plug/wrapper (link) available to receive an external model object from an external source.
- The model object representing any model (unit operation or thermo) generated through a computer-aided modelling tool for model translation, analysis and solution (ICAS-MoT).

The advantage of using ICAS-MoT is that it is able to transfer the model equations representing any new unit operation/thermo into a COM-object that is able to use in various simulation engines (Icassim and Dynsim available within ICAS software), external software (i.e. Excel) or external simulators (ProSim, etc) with a well defined interface without the user having to write any programming code. On the other hand, ProSim has Simulis thermodynamic and ProSimPlus; where, Simulis thermodynamic is a thermophysical properties calculation server available as an MS-Excel add-in, a MATLAB toolbox or as a module pluggable in any other software that requires thermophysical properties. Simulis is designed in particular for calculation of any type of transport properties (specific heat, viscosity,...), thermodynamic properties (enthalpy, compressibility factor,...) or phase equilibria (VLE, LLE, VLLE, salt formation,...) on multi components mixtures. ProSimPlus is a process engineering software that performs rigorous mass and energy balance calculations for a wide range of industrial steady-state processes. It is used in design as well as in operation of existing plants for process optimization, units troubleshooting or debottlenecking, plants revamping or performing front-end engineering analysis.

The presentation will illustrate the application of the CAPE-OPEN standards for a model generated and tested in ICAS-MoT. First the equivalent COM-object is created in ICAS-MoT. This COM-object is then wrapped with a unit-wrapper and plugged into a general CAPE-OPEN unit operation socket that is available for any simulator to be used either from MoT or ProSimPlus. It will also highlight the synergy between ICAS-MoT and Simulis thermodynamic through the use of a plug/wrapper socket for the calculation of thermodynamic properties based on externally supplied property models. The main objective with the application examples is to highlight the generic nature of the CAPE-OPEN plug and socket that allow smooth and easy integration.