



Vicky Athanasiou  
October 12th, 2017

**UNISIM® DESIGN SUITE**  
Current CAPE-OPEN Capabilities

**Honeywell**  
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# Your Presenter Today



- Vicky Athanasiou is the Global Product Manager for Process Design, at Honeywell Process Solutions.
- Vicky has a Science Bachelor degree in Chemical Engineering from Massachusetts Institute of Technology, in Cambridge, Massachusetts, USA; a Masters degree in Biomedical Engineering from Imperial College of Science, Technology and Medicine, in London, UK; and a MBA in General Management from London Business School in London, UK.
- Vicky has 14 years of working experience in process simulation for process design and operator training simulation systems and 7 years in commercial roles including sales, sales support, business development and product and strategic marketing.

# Agenda

- Why does Honeywell support CAPE-OPEN?
- UniSim Design Suite – Current Capabilities
  - CAPE-OPEN Thermodynamic Sockets
  - CAPE-OPEN Unit Operation Sockets
  - UniSim Thermo CAPE-OPEN Package
  - UniSim CAPE-OPEN Mixer/Splitter Example
- Demo
- Q&A

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# Why Does Honeywell Support CAPE-OPEN?

- UniSim Design provides individual CAPE-OPEN Thermodynamic and Unit-Op sockets to flexibly communicate and interoperate with third party extensions.
- We are accommodating customers who use more than one simulation technology and/or want to use certain in-house developed tools/IP across multiple commercially available simulators. For example, customers who:
  - develop & use their own proprietary thermo
  - develop & use their own unit operations

This allows them to more accurately simulate their processes and plant assets and minimize the amount of maintenance for their in-house tools.

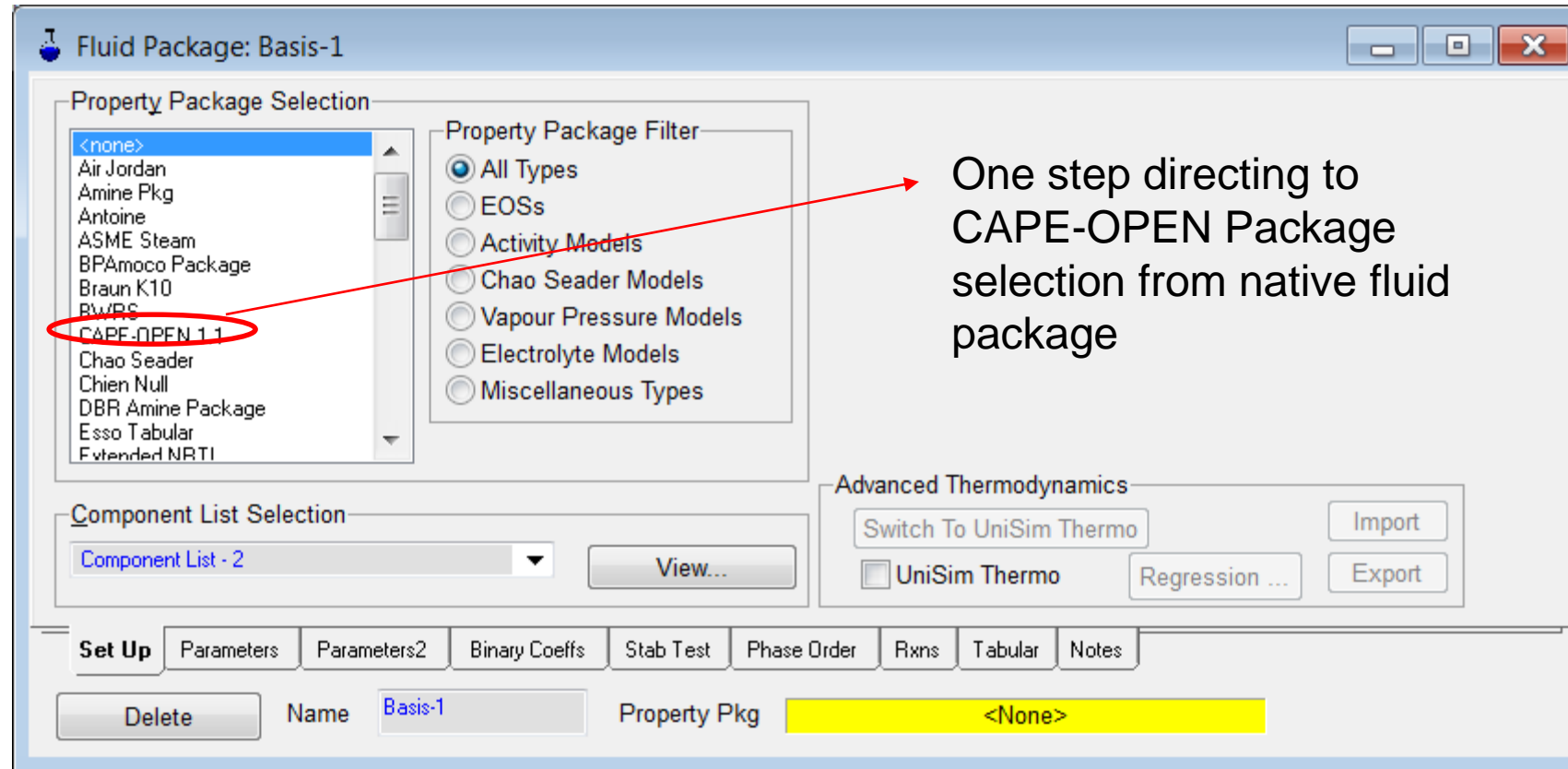
- CAPE-OPEN is one of several options for open architecture that UniSim Design supports.

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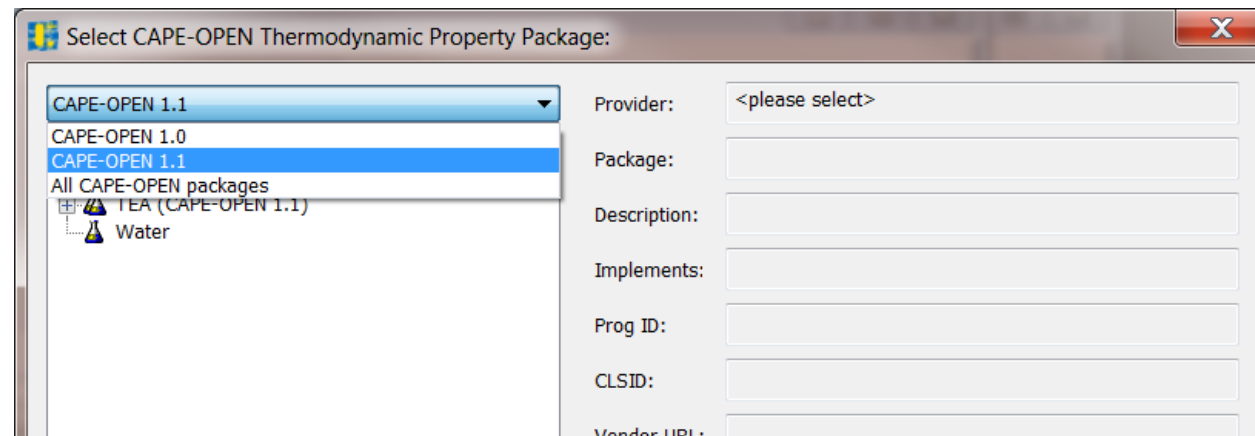
# CAPE-OPEN Thermodynamic Sockets

- Simplified set-up of a CAPE-OPEN package:



# CAPE-OPEN Thermodynamic Sockets

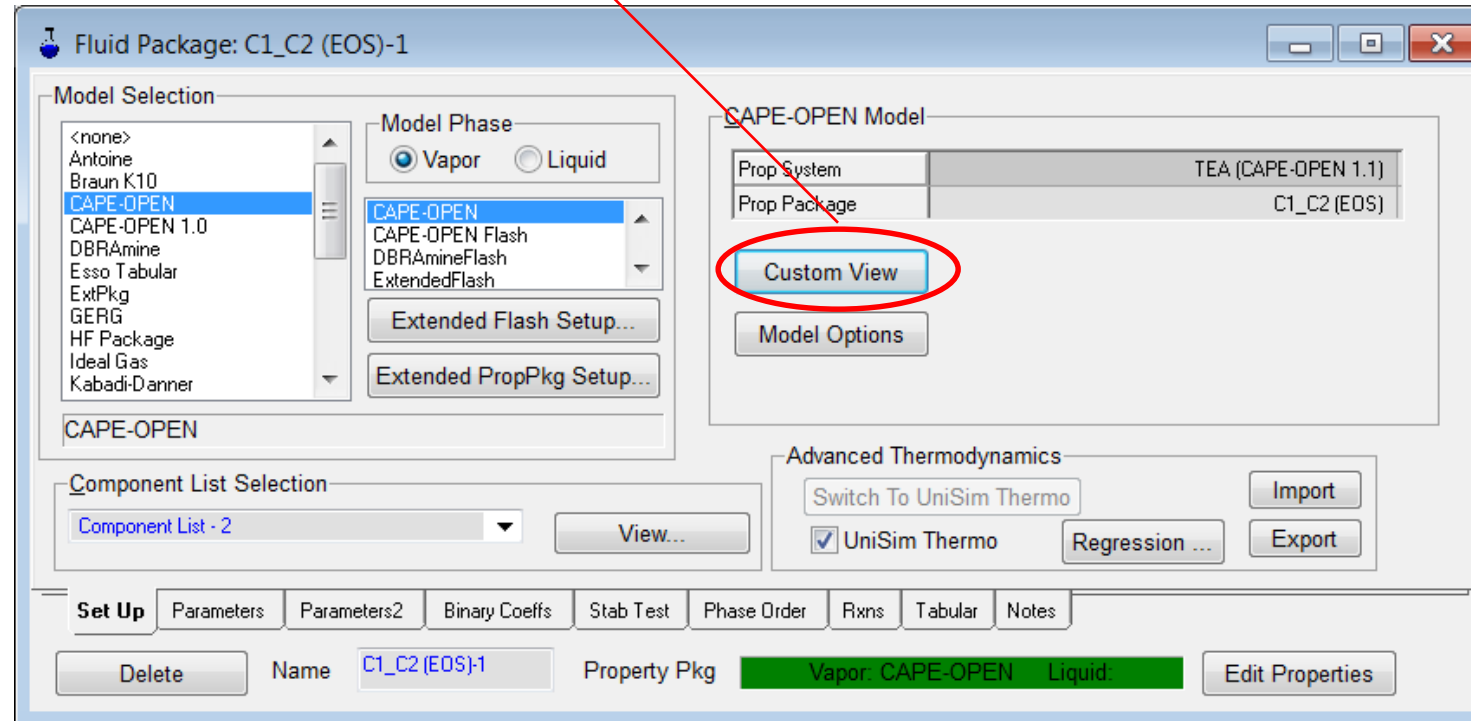
- CAPE-OPEN Thermo-socket supported both CAPE-OPEN 1.0 and CAPE-OPEN 1.1 standards
- With CAPE-OPEN 1.1:
  1. The flash calculation performance has improved
  2. Supported flash types are queried





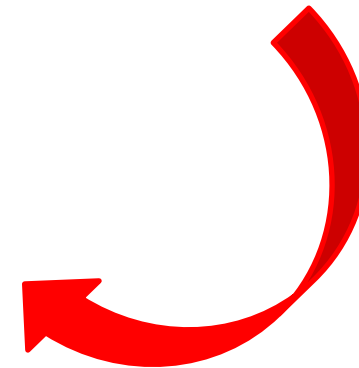
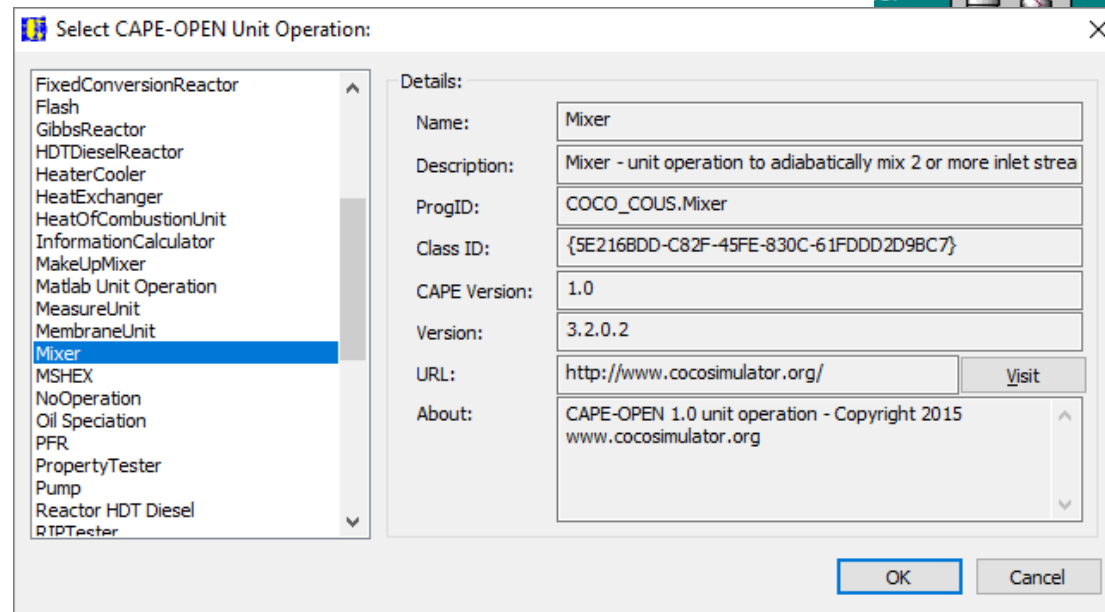
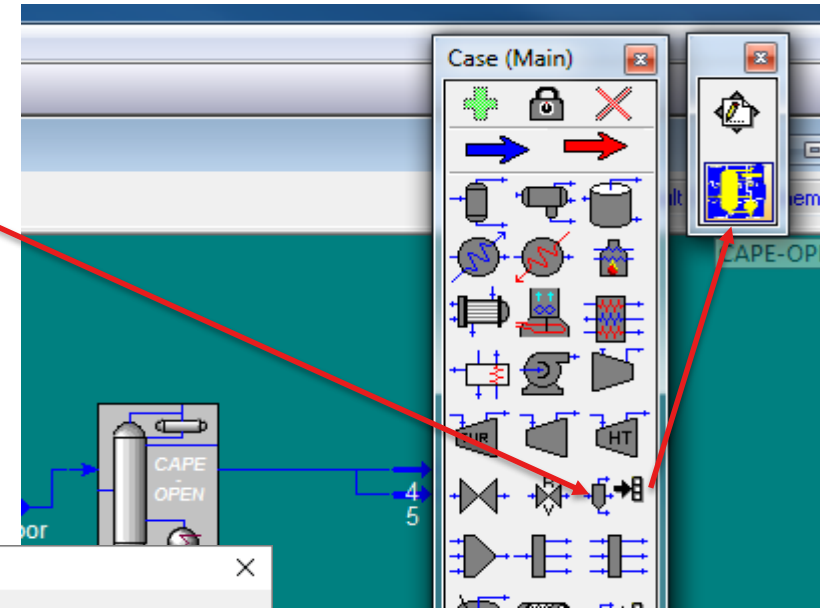
# CAPE-OPEN Thermodynamic Sockets

- UniSim Design supports persistence: it can save and load the changes made within the CAPE-OPEN package.
- Also, it is easy to access the CAPE-OPEN package for editing.



# CAPE-OPEN Unit Operation Sockets

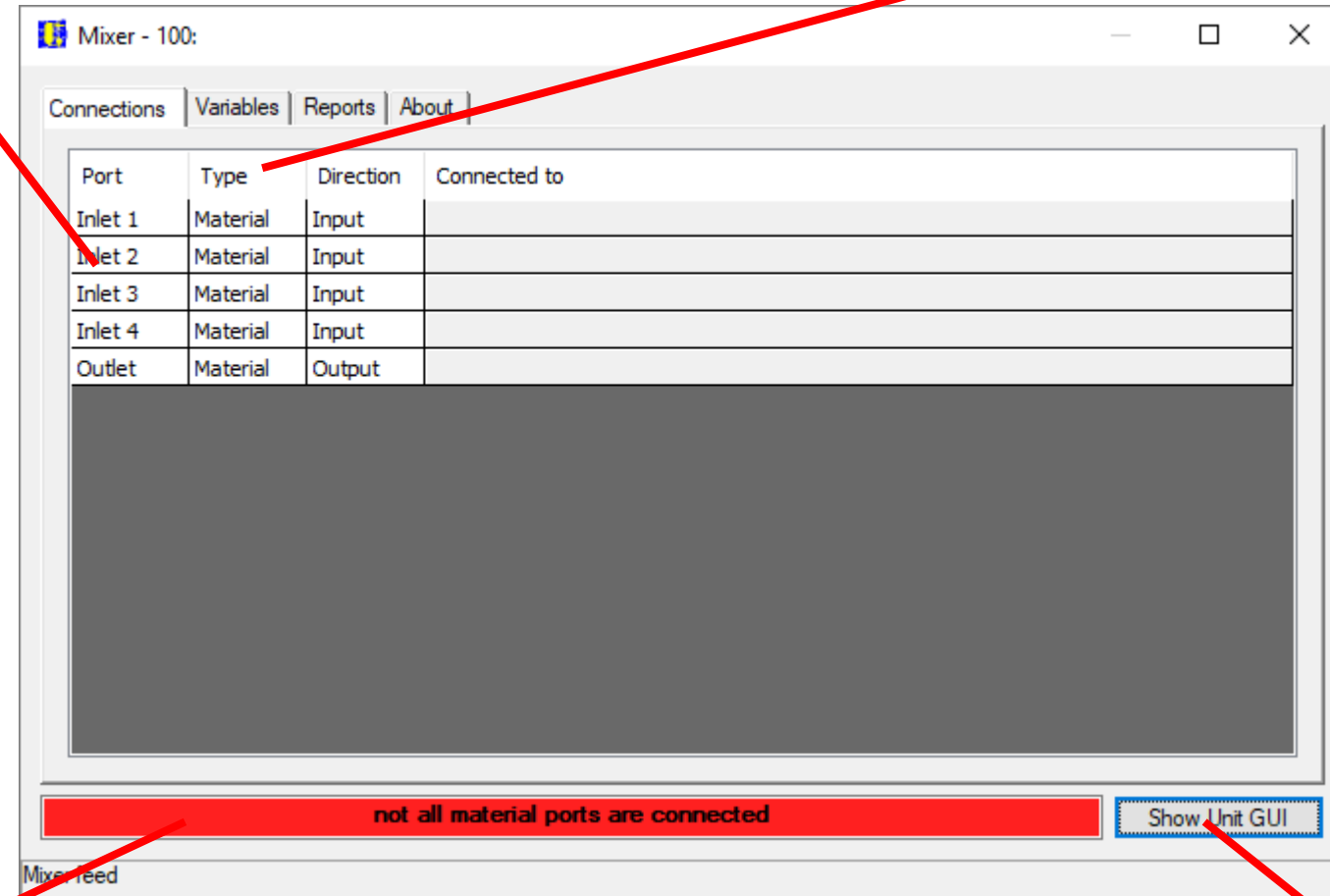
- Implemented as Unisim Extensions
  - Insert via Unit-Op palette (Recommended) or Unit Operation dialog
  - Select a CAPE-OPEN unit operation by name
  - Meta information is displayed while the unit operation is selected



# CAPE-OPEN Unit Operation Sockets

Dynamic port collection

Support for Material and Energy ports



Validation status always visible

Support for Edit

# CAPE-OPEN Unit Operation Sockets

Dynamic parameter collection

Parameter dimensionality and unit conversions

Support for:

- Persistence
- Logging and Reports
- Thermo 1.0 & 1.1

The screenshot shows a window titled "HeaterCooler - 100:" with tabs for "Connections", "Variables", "Reports", and "About". The "Variables" tab is active, displaying a table with the following data:

| Variable           | Value     | Unit |
|--------------------|-----------|------|
| Type               | Heat duty |      |
| Outlet temperature | 26.85     | C    |
| Heat duty          | 0         | kWh  |
| Pressure drop      | 0         | kPa  |
| Thermo Version     | 1.0       |      |

Below the table is a "Reset" button. At the bottom of the window, there is a red status bar with the text "not all material ports are connected" and a "Show Unit GUI" button.

# CAPE-OPEN Unit Operation Sockets

- CAPE-OPEN Parameters can be used in any context normal parameters can be used (such as spreadsheet table or adjuster)
- Calculations are on hold while the user is inside the edit log'
- A unit op is not recalculated unless an input parameter or feed stream changes.

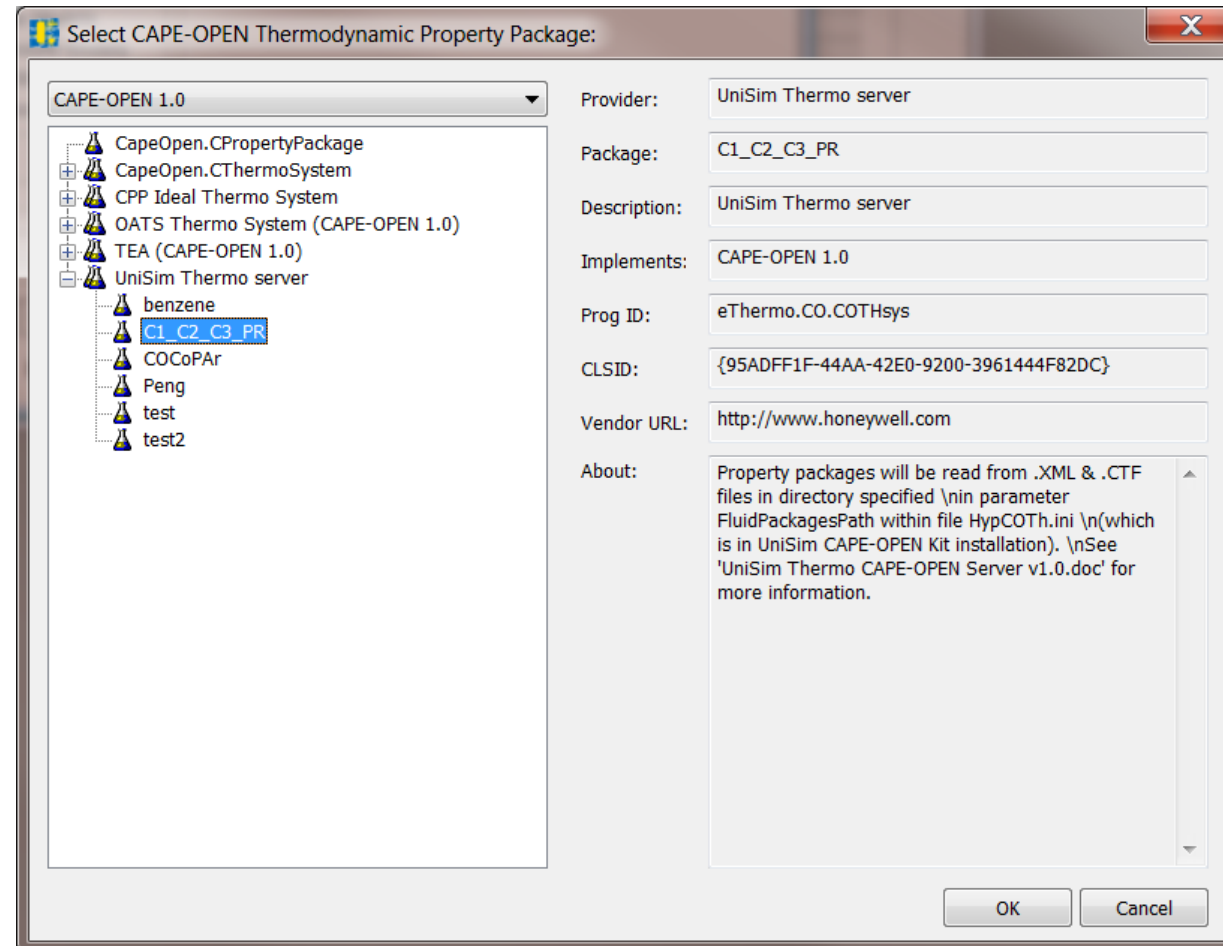
The screenshot displays a process simulation environment. On the left, a unit operation labeled 'CAPE-OPEN' (CO-100) is shown with three streams: stream 1 entering from the top left, stream 2 entering from the bottom left, and stream 3 exiting to the right. Below the unit operation is a spreadsheet icon labeled 'SPRDSHT-1'. The spreadsheet window is open, showing a table with columns A, B, C, and D. The 'Current Cell' is A2, with the variable 'User Variables (Pressure Drop (kPa))' and the formula '=a1\*2'. The spreadsheet shows the following data:

|   | A     | B | C | D |
|---|-------|---|---|---|
| 1 | 10.00 |   |   |   |
| 2 | 20.00 |   |   |   |
| 3 |       |   |   |   |
| 4 |       |   |   |   |
| 5 |       |   |   |   |
| 6 |       |   |   |   |
| 7 |       |   |   |   |
| 8 |       |   |   |   |

The spreadsheet window also shows tabs for 'Connections', 'Parameters', 'Formulas', 'Spreadsheet', 'Calculation Order', 'Initialize From', and 'Variables'. The 'Spreadsheet' tab is active. At the bottom of the window, there are buttons for 'Delete', 'Function Help...', 'Spreadsheet Only...', and 'Ignored'.

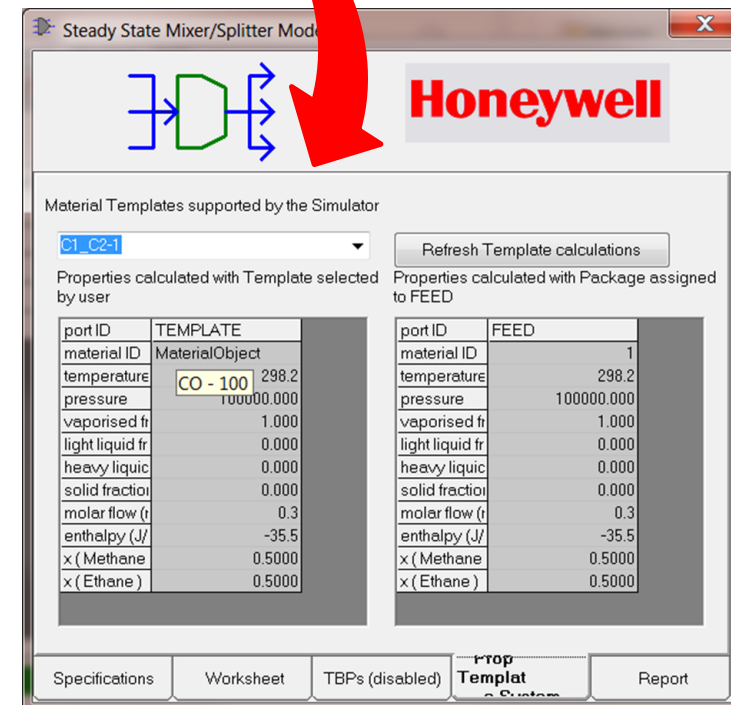
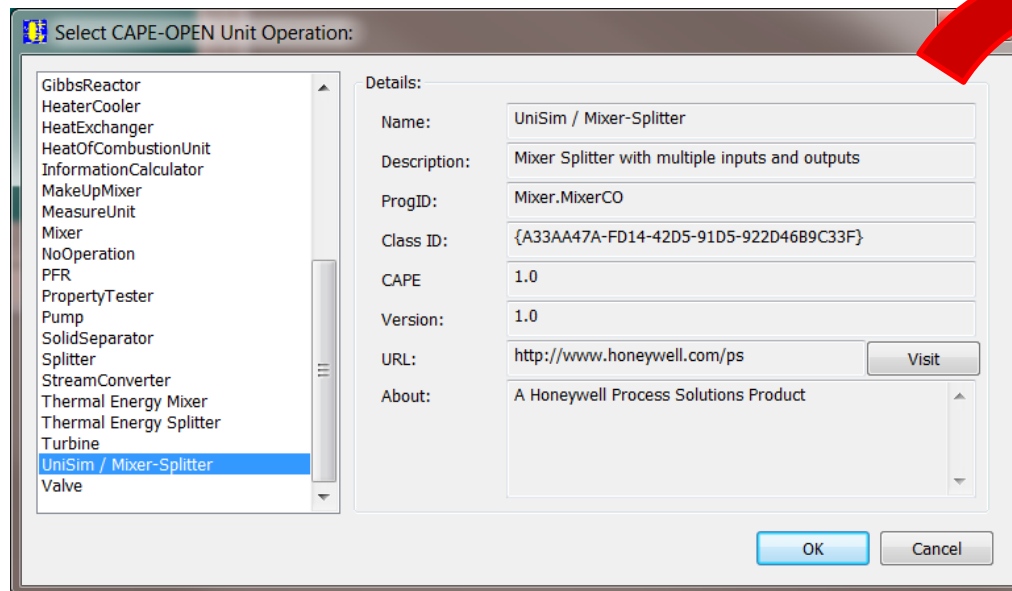
# UniSim Thermo CAPE-OPEN Package

- UniSim Thermo provides a server to make a CAPE-OPEN package (CAPE-OPEN 1.0)



# UniSim CAPE-OPEN Mixer/Splitter Example

- There is a Mixer/Splitter example of UniSim CAPE-OPEN unit operation.



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# Demo



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# Q&A



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