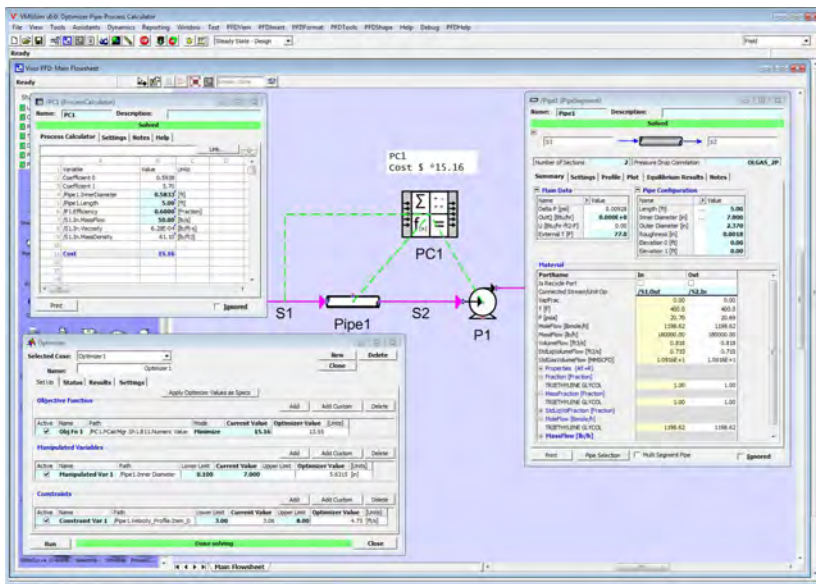


VMGSim 6.0

Release Highlights

Virtual Materials Group is proud to announce the release of **VMGSim 6.0**. This exciting new version is replete with additions and enhancements focused on increasing your productivity. From the creation of material streams on the fly to the ability to implement custom calculations in the new Process Calculator, **VMGSim 6.0** allows you to do more, faster and easier. New productivity tools and unit operations provide an unprecedented ability to customize, tune and further understand your process.

VMGSim 6.0 allows you to get the most from your process models.



New productivity tools

Optimizer is the ideal tool for increasing plant profitability while your system operates within specified constraints.

Model Regression is great for incorporating experimental/plant data into your simulation.

VMGSim OPC Server it is now much easier to connect your models to data management clients.

User interface enhancements

VMGSim 6.0 includes numerous improvements to the user interface:

- Visio™ PFD toolbar
- Visio™ Auto Stream Tool
- Redesigned reactors forms
- Redesigned interface for configuration of Material Balance Table and PFD data sheets.
- Option to hide PFD connections attached to Excel™ or Process Calculator unit operations.

New Process Calculator unit operation

The **Process Calculator** joins the Excel™ unit operation and the Selector Block as operations where custom calculations can be integrated into your flow sheet using a smart spreadsheet-like interface.

The **Process Calculator** is a flexible and effective tool that makes it easy to interact with live variables from your flow sheet. Use it to implement your own calculations or to make live summaries of the key variables of your process.

OLGAS Integration

The OLGAS pressure drop correlations for two and three phase flow are now available as options in our steady state Pipe Segment unit operation.

New Dynamics capabilities

Dynamics has a number newly supported unit operations and enhancements that make the development of superior simulation models easier.

The reactors, a multi sided heat exchanger and a suite of information unit operations are now part of the dynamics offering.

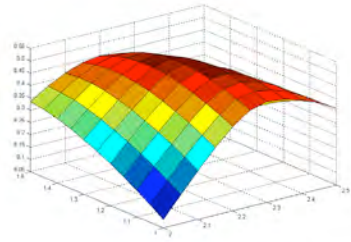
New Thermodynamics property package

Gasification (2010) is an advanced active solids property package, including Gibbs free energy minimization, which can be used as an option in our Plasma Gasification unit operation.

VMGSim 6.0 Release Highlights

Optimizer

VMGSim 6.0 features a robust multivariable **Optimizer**, the ideal tool for increasing plant profitability. The optimizer has an easy to use interface; objective functions can be defined using our custom calculation tools such as the Excel™ unit operation, Selector Block, or the Process Calculator for unmatched flexibility.



The Objective functions can be minimized or maximized.

The optimized values of the manipulated variables can be applied to your flow sheet with just the click of a button.

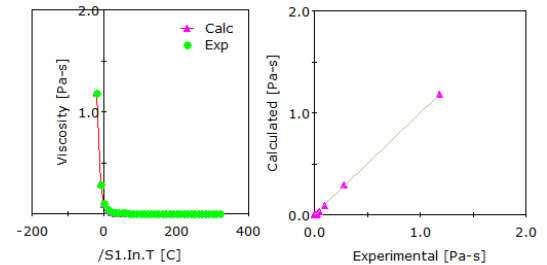
Limits can be applied to the Manipulated variables directly, instead of defining constraints.

The constraints can be used to drive your simulation to a certain state, even without an objective function.

Model Regression

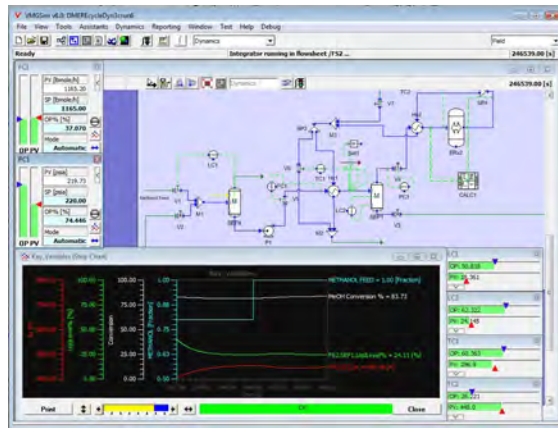
The **Model Regression** utility is used to estimate model parameters to fit a model to experimental/plant data using an optimizer.

Reconcile plant performance data with your model for accurate plant models.



Dynamics

Dynamics continues to get better with the release of VMGSim 6.0. You will find an extended suite of supported unit operations, additional new features along with enhancements to numerous existing capabilities. It is now easier than ever to create superior dynamic models of your process.



Enjoy the benefits of going Dynamic in VMGSim 6.0.

- Understand the transient behavior of continuous or batch processes
- Evaluate the performance of new and existing control systems
- Improve process/plant design
- Add another dimension to plant troubleshooting

New supported Unit Operations

- Multisided Heat Exchanger
- Reactors: Conversion, Equilibrium, CSTR and PFR
- Process Calculator

- Information unit operations: Hydrate, Distillation Curve, XY Curve, Special Properties, Water Dew Point, Amine Detail

Enhancements to Distillation Section

- Amine efficiency calculations
- Support for liquid-liquid extraction

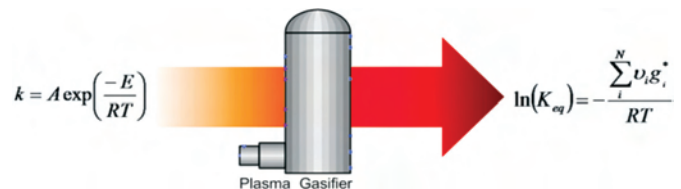
General enhancements

- Option to track kinetic energy.
- Improved pipe choke calculations.
- Separators support Delta P specs.
- Added the integrate function to selector block.
- Auto tuning in the PID controller.

Gasification (2010)

This property package adds a new dimension of simulation modeling possibilities with inclusion of Gibbs minimization directly in the Plasma Gasification reactor:

Metal and metal oxide species and solid phase identification allow for more accurate slag section considerations. Prediction of low to high temperature NOx and SOx plus associated species combined with user defined particulate matter carry-over make for flexible configurations to accommodate almost any situation.

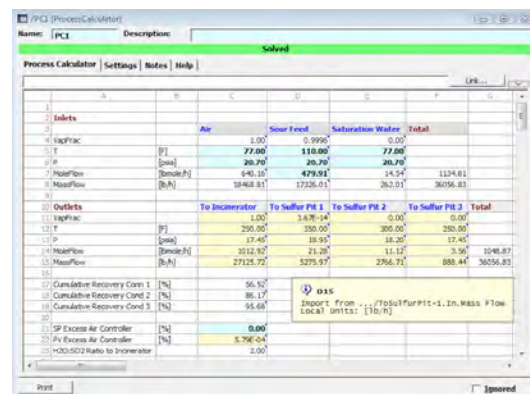


Process Calculator

The **Process Calculator** is a flexible and effective tool that makes it easy to interact with live process variables from the simulation.

The **Process Calculator** can be used to perform custom calculations and export the results back into your model via a spreadsheet-like interface that includes a large number of built-in functions.

The **Process Calculator** also provides a rich set of visual formatting features, making it an ideal tool for creating tailor-made live summaries of your simulation.



Inlets		Air	Sour Feed	Saturation Water	Total	
1	Flow	1.00	0.9999	0.00		
2	Flow	77.00	110.00	77.00		
3	Flow	20.70	20.70	20.70		
4	Flow	540.16	479.84	14.54	1134.61	
5	Mass Flow	18468.81	17208.01	262.01	36056.83	
Outlets		To Incinerator	To Sulfur PE 1	To Sulfur PE 2	To Sulfur PE 3	Total
11	Flow	1.00	0.00	0.00	0.00	
12	Flow	250.00	330.00	300.00	250.00	
13	Flow	17.40	18.90	18.20	17.40	
14	Mass Flow	2012.67	71.20	11.12	3.96	1046.87
15	Mass Flow	27125.72	5275.57	376.71	888.44	36056.83
16	Cumulative Recovery Cond 1	56.52				
17	Cumulative Recovery Cond 2	86.17				
18	Cumulative Recovery Cond 3	95.68				
19	SP Excess Air Controller	0.00				
20	Pv Excess Air Controller	5.79E-04				
21	H2O/SO2 Ratio to Incinerator	2.00				

VMGSim OPC Server

With the **VMGSim OPC Server** it is much easier to connect your models to plant control system components.

The **VMGSim OPC Server** is a separate application that exposes **VMGSim** to OPC clients through the OPC Data Access 2.0 interface.



OPC is a widely accepted industrial communication standard that enables the exchange of data between devices and applications. OPC (OLE for Process Control) is a set of standard interfaces based upon Microsoft's OLE/COM technology.

OLGAS Integration

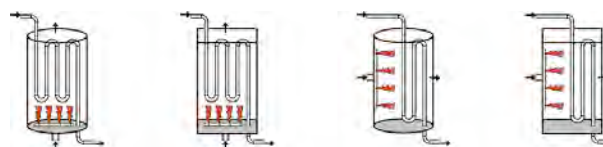
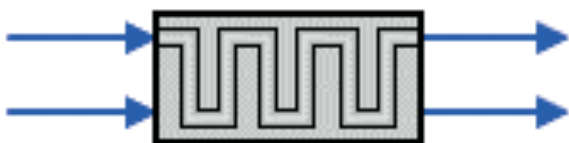
VMGSim 6.0 includes the integration of SPT Group's OLGAS two and three phase pressure drop correlations. **OLGAS** provides some of the most advanced pressure drop correlations for reliable pipeline simulation. These correlations are available as an option in our steady state Pipe Segment unit operation.

OLGAS is the steady state model of OLGA®-both property of SPT GROUP. OLGAS is a mechanistic point model that calculates pressure gradients, liquid hold-up and flow pattern at a specific section of pipe/tubing.

Ethylene Cracking Reactor

The **Ethylene Cracking Reactor** allows predictive trending of a matched steam cracking reactor. The overall model involves both furnace and process side calculations including a "C2 Feed" or "C2, C3 Feed" kinetic based reaction slate. Both radiant and convective heat transfer with specified coke thicknesses allow for detailed model development.

Furnace options available, plus multiple connected unit operations within a flow sheet, allow for almost any detailed geometry of a furnace to be created.



Cylindrical Rectangular X-Cylindrical X-Rectangular

Unit Operations

- Plasma Gasification Reactor: Enhancements to operate in predictive mode by estimating equilibrium conditions when using the Gasification (2010) property package.
- Pipe Fittings: Add fittings to each section of the Pipe Segment.
- Shell and Tube Heat Exchanger: Support for double pipe in heat exchanger rating.
- CSTR: Allow users to define level in steady state.
- CSTR, Equilibrium Reactor and Conversion Reactor: Support vapor and liquid draws.
- CSTR and PFR: Allow users to define concentration and reaction rate units when not using Advanced Kinetics. Faster calculations.
- PFR: Added pressure drop estimation.
- Selector Block: New support for custom code when in advanced mode.
- Special Properties: New property Cp/Cv.

Flow sheeting and Graphical User Interface (GUI)

- Visio™ PFD – PFD tool bar: Includes shortcut to common operations, such as flip, send Visio™ to back, Auto Stream tool, Dynamics start/stop integrator, Flow sheet Form, Lock/Unlock connections.
- Auto Stream Tool: Add streams without having to drag and drop from the palette. Just create them on the fly using the mouse cursor.
- Case Study: New Clone feature.
- Equilibrium Results tabs: New “extended” option to see every property that can be calculated by the property package. Supports Copy/Paste Connection.
- Visio™ PFD: Option to hide the PFD connection lines going into an Excel™ unit operation or Process Calculator.

- Extended profiles properties list for Towers, Pipe Segment, Cooler, Heater and PFR. The extended list of possible profiles includes all of our physical properties, special properties and hydrates.
- Visio™ PFD: Data Sheets and Material Balance Table configuration forms redesigned. More properties, user has control over order of variables. Supports display units, and duplicate of variables in different units.
- Oil Characterization Form: Clear curves buttons for each input curve. Faster paste of curves.
- General: File association to vmp files.
- Reactors General: Enhanced forms and usability. Forms redesigned to make better usage of the available space.
- All Reactor shapes grouped in a single Visio™ stencil.
- CSTR and PFR: The 'Reactions' tab was updated to have the same look and feel of the rest of the interface. The 'Kinetics' tab was reorganized for easier visualization of key elements. The 'Kinetics Variables' tab groups the information into different sections.
- PFR Form: New button to select the size from a pipe data base, new 'Plot' tab. Added the 'Equilibrium Results' tab.

Thermodynamics

- Gasification (2010): Highly advanced active solids property package.
- Enable gamma distribution characterization when viscosity is provided but no MW or SG.
- Improvements in TRAPP method for viscosity calculation for condensates.
- Improvements in TRAPP method in APRNG for estimation of transport properties.

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