

UniSim[®] Design Suite R390



Honeywell unveiled UniSim Design Suite R390, the latest release of Honeywell's steady state and dynamic process simulation offering. UniSim Design Suite is a part of Honeywell's family of simulation software and engineering solutions for process simulation, design, analysis, performance monitoring, optimization and business planning for the oil and gas production, gas processing, petroleum, refining and chemical industries. The new features and enhancements available in this release derive from ongoing input from UniSim Design users together with Honeywell's commitment to continuous improvement of its offering to better help its customers improve the safety, reliability and efficiency of their operations.

Key New Features and Enhancements

UniSim Excel Interface Tool (USE-IT)

As a case study tool, USE-IT allows UniSim Design users to configure process modeling based case studies within a Microsoft Excel worksheet. Once configured by the process engineers, USE-IT can be used as a hands-on tool for ongoing case studies by operational staff, taking the application of the simulation technology to a new level.

UniSim Design Suite Documentation

Documentation is installed by default under the UniSim Design directory. A separate Installation and Licensing Guide is also provided.

UniSim Design Features and Enhancements for Steady-State Applications

- The Input Summary feature, which has been added to improve usability, generates reports in which user-specified variables and variables that have had their default values overwritten with calculated results are clearly identified and presented for the flow sheet.
- The Adjust-Recycle Manager, which has been added to the simulation management tools, improves flexibility and controllability of flow sheet convergence, enabling power users to configure networks of Adjust/Recycle blocks to achieve more robust and faster convergence for large, complex flow sheets.
- The Modified Secant Method significantly enhances the performance of the Adjust block, especially when dealing with challenging situations such as a non-monotonic relationship between the adjusted and target variables, "flat curve" relationship between the adjusted

and target variables, wherein the response of the target variable to large changes in the adjusted variable is small, or the adjusted variable being "stuck" at one of its bounds.

- The enhanced DIPPR Loader improves DIPPR component loading performance and usability. These compounds can be used together with compounds from all UniSim Design Property packages.
- The newly exposed User Specifiable Trace Phase Fraction Limit offers users additional flexibility for detecting/displaying trace phase fraction. Users can choose to specify such limit from a case-specific Fluid Package or from the Preference File so that the same Trace Phase Fraction Limit applies to all new simulation models.
- The Absorber Bottom Stage Feed Split Option facilitates modeling a distillation column configuration having a bottom sump.
- Circulating Thermosyphon and Once Through Thermosyphon reboilers have been added to the distillation column reboiler configuration library.
- The Forced Reset Option improves user control of distillation column convergence.
- The column sub-flow sheet has been enhanced to support pressure back propagation across the sub-flow sheet.
- The distillation column Sparse Continuation Solver Enhancements has been extended to support the additional column auxiliary equipment such as a 3-phase separator and pump-arounds with pumps and valves within the column sub-flow sheet.

- Pressure back propagation for vessels is now available for the 2-Phase and 3-Phase Separators, Tank, CSTR, Gibbs Reactor, Equilibrium Reactor and Conversion Reactor unit operations.
- The rate-based electrolyte distillation column unit operation has been enhanced to support different tray types, such as Sieve, Valve, and Bubble Cap, and Packed segments.
- The rate-based electrolyte distillation column unit operation can now calculate mass transfer coefficients based on tray type, providing users an option when such data is not readily available.
- To help with convergence of electrolyte distillation column unit operation, users can specify initial values for the top stage vapor and liquid rates.
- The allowable number of side-draws and pump-arounds for electrolyte distillation column unit operations has been increased to 5 and 10, respectively.
- The Pump-Around “Return Temperature” in an electrolyte distillation column unit operation has become a user-specifiable variable.
- The following enhancements have been made to the Compressor unit operation.
 - A user-friendly data input environment
 - Built-in intelligence to check for irregularity in a user specified compressor curve
 - Display of the “Speed-Flow Curve”, “Operating Point” and Trail Points on a graph
 - Indicator of whether the current operating condition is below the surge flow rate
- A Single Outlet Vessel option has been added to the separator unit operation to reflect some industrial equipment symbolized in the process flow sheet.
- The following enhancements have been made to the Spreadsheet block.
 - Strings (labels of variables) can be used in formulas
 - OldValue function remembers the last non <empty> value from a function
- The ‘Find’ Command now supports wildcards (eg. “V-1*”)
 - Improved handling of the Object Palettes enables the Object Palette to appear and move together with the active window of the PFD.
 - The PIPESIM link has been enhanced to support steady state PIPESIM Single Branch (*.bps) models and controlled boundary variable transfer between UniSim Design streams and PIPESIM sources/sinks.
 - A user-specifiable upper limit is now supported for estimated hydrocarbon binary interaction parameters for the Peng-Robinson equation of state.
 - A new Chung-Twu method for molecule weight estimation of user-defined hypothetical compounds is now available.
 - UniSim License Manager (ULM) has been enhanced with the following features.
 - Maxed Out Durations can be monitored and included in reports
 - License Failure Alerts can be configured and sent to the license administrator

UniSim Design Features and Enhancements for Dynamic Applications

- Equilibrium reactions now support total overall (non-phase specific) mole fraction as the concentration term entering into the equilibrium constant definition. This allows solid components to enter into the Keq definition and hence reactions where solids may be a limiting reactant are correctly handled.
- Kinetic reactions also now support total (non-phase specific) mole fraction as the concentration term in the rate equation. This allows the modeling of reactions with a solid reactant.
- To improve usability, a new view has been added to display the reaction stoichiometry of all reactions of a reaction set in one matrix.
- A correction to the Phase Holdup has been applied to the separator unit operation, correcting residence times for the holdup phases previously calculated.
- A new approach to convective heat transfer using an improved LMTD equation has been implemented in the LNG unit operation to prevent temperature crosses. An extended option has also been added, allowing for startup/shutdown situations where heat may flow across and through stagnant layers.
- In dynamics user input curves are often fit against an analytical expression which is then solved within the PF Solver. Compressor and Pump Curve Fit Tools have been made available to users.

- Enhancements to the additional stream property infrastructure have been made to support:
 - Solids Particle Size Distribution propagation and calculation
 - Polymer properties propagation and calculation
 - Catalyst properties propagation and calculation
- Extensive improvements and fixes have been made to the Cyclone and Hydro-cyclone unit operations to ensure proper behavior in Dynamics and Steady State applications.
- A Trace message now appears when the Pressure-Flow network is un-solvable (not just un-converged). The message identifies which equation is producing a singular system / matrix.
- The Basic and Detailed heat exchanger unit operations and the Kettle/Tube Bundle within the Separator unit operation have been enhanced to support the following malfunctions:
 - Overall performance deterioration
 - Shell and/or Tube fouling affecting pressure drop and/or heat transfer
 - Tube to Shell (or vice-versa) leakage
- The Transmitter unit operation now supports additional types of malfunctions, such as PV drift, fail to specified value and hold at current value, and noise. This is supported for the PID FB Controller and also via a generic Signal Malfunction in the Enhanced MV Table.
- Global malfunctions of various types are now supported, such as instrument air (valves), electrical (valves, pumps, air coolers, digital operations), and boundary stream (cooling water, etc.).
- Custom Malfunctions are supported for Algebraic and Discrete types of variables, allowing any simulation variable to be “failed”.
- Temperature PV ramping to the heat trace temperature now does not have to ramp to the ambient temperature, but can also ramp to a user-specified temperature.
- Easier access is now provided to start, stop and reset a Transfer Function ramp from a Spreadsheet, Event Scheduler, etc.
- A Restriction Orifice functionality, which matches well with the ISO-5167 and AGA-3 standards, has been added to the UniSim Design Relief Valve.
- The Nozzle Elevation Preservation feature ensures that the nozzle elevation and diameter data do not get lost when being temporarily separated from its connecting stream.
- Solids Particle Size Distribution (PSD) data are now propagated along the flow path and throughout the dynamic flow sheet and mixed appropriately wherever two or more streams come together.
- The Relief Valve has been validated against API Recommended Practice 520, achieving a good match for Liquid, Vapor and Choked Vapor flows.
- Profit Controller Enhancements
 - Easy switchover between the APC and Regulatory Control layer
 - Model gain and delay values can be viewed from the Operation tab, Gain and Delay page. Model gains and delays can also be modified and sent to Profit Controller
 - The state of the Profit Controller (handling constraint, control ok, optimizing) is displayed on the Operation page.
 - The user can choose to reset/retain some user settings and limits when re-loading xm and xs files.
 - The user can select to delete intermediate testing files during auto tests.
 - The “Drop CV” checkbox in Profit Controller for optionally dropping CVs from the control calculations has been implemented.
 - SP versus Range Control is set automatically when loading a set of xm and xs files.
 - The PID controller is automatically set to Auto mode when the master Profit Controller is turned OFF.
 - Correct CV Steady State values and future values are displayed.
 - MV moves displayed set to 0 when MVs are dropped.
 - Total test time in Auto test is now calculated correctly.
- The Alarm Manager provides a single view for reporting all Controller alarms, similar to a DCS Alarm display, so that the Trace and Status window will no longer be cluttered with alarms.

- In a situation where more than three phases co-exist, the enhanced solids merge handling feature allows users to specify the two particular phase slots to be merged, to ensure consistency in the dynamic model and prevent phase flipping.
- A new PFD nozzle has been added to the PID FeedBack Controller, allowing for an Indicator to be connected to a controller or digital point without requiring selection of the PV a second time.
- Improved link with HTRI software offers UniSim Design users easy access to HTRI's Xist program via UniSim Design heat exchanger unit operation for detailed modeling, using property and process data from UniSim Design with geometry data specified in the HTRI user interface launched from UniSim Design. Data are written back to UniSim Design to allow reports to show geometry used and calculated values.
- For full mechanical design of the shell and tube heat exchangers, it is possible to now import data from UniSim Shell-Tube Exchanger into Microprotol from EuResearch.

UniSim Heat Exchangers Enhancements

- Improved UniSim Heat Exchanger Output provides the ability to select/deselect the different sections of the output file and to give easy access to printing. This applies to all heat exchanger applications when used standalone, as well as to UniSim Shell-Tube Exchanger, UniSim Plate-Fin Exchanger and UniSim Cross-Flow Exchanger when used within UniSim Design via Heat Exchanger, LNG, and Air Cooler unit operations.
- Enhanced data transfer capability within the UniSim Design ensures the synchronization of common data between the native heat exchanger unit operation and the integrated UniSim Shell-Tube Exchanger.
- Improved integration between UniSim Design and the three UniSim Heat Exchanger programs, named UniSim Shell-Tube Exchanger, UniSim Plate-Fin Exchanger and UniSim Cross-Flow Exchanger, ensures that no data gets lost while switching between UniSim Design and the integrated UniSim Heat Exchanger programs.

UniSim Design Suite R390, along with the latest release of Honeywell's UniSim® Operations Suite, is a comprehensive solution that fully engages Honeywell's simulation experience in multiple process industries, from our strong position in the Oil & Gas, Refining and Chemicals industries to recently active industries in Power and Mining.

For more Information: Please contact the Product Manager, Laurie Wang at laurie.wang@honeywell.com or 1-403-503-1347. Please also see [UniSim Design Suite Web Page](#). Training is available and can be arranged either at a customer site or Honeywell office. Please contact us for more information.

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More Information

For more information on Honeywell's UniSim Design Suite, visit www.honeywell.com/ps or contact your Honeywell account manager.

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