Process modeling tools for simulation, design, performance monitoring optimization and business planning.

**The Challenge: Optimum Process Designs**
The oil and gas production, gas processing, petroleum refining and chemicals industries must optimize their process designs to achieve more reliable and stable operations. Optimum designs must be quickly identified with minimum risk of rework so that companies remain competitive and maximize their business performance. Process engineers are challenged with making timely business decisions while meeting the business objectives of designing and operating efficient, safe and profitable plants.

**The Opportunity: Linking Business Objectives and Process Design**
Process modeling is a powerful technology that enables decision makers and engineers to link critical business objectives to process design, thus enabling true plant lifecycle modeling.

The major business benefits of process modeling using UniSim® Design Suite include:

- Utilizing ‘what-if’ scenarios and sensitivity analyses to identify the optimal design based on operating and business targets.
- Ensuring that process equipment is properly specified to deliver desired product throughput and specifications.
- Evaluating the effect of feed changes, upsets and equipment downtime on process safety, reliability and profitability.
- Monitoring equipment performance against expectations.
- Improving plant control, operability and safety using dynamic simulation models of planned and existing plants.

**The Solution: UniSim Design Suite**
UniSim Design Suite provides an intuitive and interactive process modeling solution that enables engineers to create steady-state and dynamic models for plant and control design, performance monitoring, troubleshooting, operational improvement, business planning and asset management.

UniSim Design Suite helps process industries improve productivity and profitability throughout the plant lifecycle. The powerful simulation and analysis tools, real-time applications and the integrated approach to engineering solutions provided by UniSim Design Suite enables companies to improve designs, optimize production and enhance decision-making. These models may be leveraged into advanced training and optimization solutions provided by the UniSim® Operations and UniSim® Optimization suites.

**Benefits**

**Improved Process Designs**
Engineers can rapidly evaluate the most profitable, reliable and safest design. It is estimated that on-site design changes made during commissioning constitute 7 percent of the capital cost of a project. UniSim Design enables engineers to evaluate the impact of their design decisions earlier in the project. For new designs, UniSim Design enables users to create models quickly to evaluate many scenarios. The interactive environment allows for easy ‘what-if’ studies and sensitivity analysis. The top candidates can be used to create high fidelity models, in which additional equipment and process details are included.
Equipment Performance Monitoring

To ensure optimal equipment performance, UniSim Design allows users to rapidly determine whether equipment is performing below specification. For example, engineers troubleshooting or improving plant operations use UniSim Design to assess equipment deficiencies such as heat exchanger fouling, column flooding, and compressor and separation efficiencies. Engineers engaged in retrofit work can quickly evaluate equipment employed in different services or evaluate the consequences of a design basis change.

Reduced Engineering Costs

Simulating with UniSim Design reduces engineering costs by creating models that can be leveraged throughout the plant lifecycle, from conceptual design to detailed design, rating, training and optimization; providing a work environment that ensures work is completed quickly, effectively and consistently. This avoids the time-consuming and error-prone manual process of transferring, formatting and analyzing production and process data that can account for up to 30 percent of engineering time.

Features

In order to operate with maximum effectiveness and provide the necessary insights and knowledge, a process modeling tool must combine ease-of-use with robust engineering power. UniSim Design is built upon proven technologies with more than 30 years experience supplying process simulation tools to the oil and gas, chemicals and refining industries. Features include:

Easy-to-Use Windows Environment

PFDs provide a clear and concise graphical representation of the process flowsheets, including productivity features such as cut, copy, paste, auto connection and organizing large cases into sub-flowsheets.

Comprehensive Thermodynamics and Unit Operation Models

Ensure accurate calculation of physical properties, transport properties and phase behavior. UniSim Design contains an extensive component database and the ability to add user components. The latest release also features a newly developed pure compound database loader system which provides users with direct access to external compound property databases, such as DIPPR (Design Institute of Physical Properties). It offers tremendous flexibility for users to choose compound properties from their preferred sources to meet their needs. UniSim Design supports process modeling of distillation, reaction, heat transfer, rotating equipment and logical operations in both steady-state and dynamic environments. These models are proven to deliver quality realistic results and handle various situations such as vessel emptying or overflowing and reverse flow.

Active X (OLE Automation) Compliance

Permits the integration of user-created unit operations, proprietary reaction kinetic expressions and specialized property packages and interfaces easily; with programs such as Microsoft® Excel® and Visual Basic®.

UniSim License Manager includes functionalities to support temporary license locking to laptop computers (commuting), token-based licensing models and improved administration tools. A parametric modeling utility allows the simplification of high fidelity models using neural network technology for increased performance.
UniSim® Design Suite

Options

UniSim Design Suite provides maximum flexibility and power to users by using an open architecture which enables industry-specific capabilities to be easily added by Honeywell or third-party suppliers. The following options are available for UniSim Design to help ensure client needs are met and enhance the use of simulation throughout the plant lifecycle.

UniSim Dynamic Option provides dynamic simulation capability fully integrated with the UniSim Design environment. A steady-state model can be leveraged into a dynamic model which offers rigorous and high-fidelity results with very fine level of equipment geometry and performance detail. Special features for dynamic modeling include pressure-flow dynamics, a rich set of control functionality to support process control and detailed process monitoring, cause and effect matrices, and an event scheduler.

UniSim Blackoil Option from Neotec (now part of Schlumberger) provides standard methods for handling petroleum fluids when modeling upstream oil and gas facilities. This option provides the unique capability to model process flowsheets in a non-compositional manner.

UniSim Electrolyte Option is based on technology developed by OLI Systems Inc., experts in aqueous chemistry. It enables analysis of complex aqueous electrolyte systems within UniSim Design by combining the Honeywell’s simulation power with the extensive OLI’s databank and thermo-physical properties for more than 3,000 organic and inorganic electrolytic species. It offers OLI’s new Mixed Solvent Electrolyte model, allowing the simulation of strong electrolyte systems and systems that combine electrolytes with non-electrolytes, and a link to OLI’s Corrosion Analyzer application, for the investigation of the causes of corrosion before they happen. UniSim Design also has the capability to handle user-specified hypothetical components in the OLI simulation environment, expanding its reach to refinery applications.

UniSim Amines Option simulates and optimizes gas and liquid sweetening processes involving single, blended or activated amines. Its tray-by-tray approach models hydrogen sulfide and carbon dioxide absorption and reaction in various industrial solvents with outstanding accuracy. An advanced thermodynamic electrolyte model achieves more reliable results than empirical models, especially for blended amines.

UniSim PIPESYS™ Option, based on technology from Neotec (now part of Schlumberger) enables accurate modeling of single and multiphase flows for compositional and blackoil fluids, to design, de-bottleneck and optimize pipeline systems. It can account for pipeline elevation profiles, inline equipment, pipe composition and roughness, and fluid properties.

UniSim Spiral Wound Tube Bundle Option, accurate dynamic modeling of complex spiral wound tube bundle exchangers commonly found in LNG production.

UniSim Design Gasifier Option unlocks the gasifier operation block inside UniSim Design allowing the user to model these complex units in both steady state and dynamic modes.

UniSim OLGAS® Option incorporates industry-standard multiphase pipeline flow correlations from SPT Group (now part of Schlumberger) within UniSim Design to calculate pressure gradients, liquid holdups and flow regimes.

Link to Infochem’s (now part of KBC) Multiflash™ allows users to access the rigorous thermodynamic and PVT engine within UniSim Design, and to accurately determine the phase equilibria and thermodynamic properties of complex mixtures for upstream oil and gas facilities.

Link to Honeywell Predict Sour Water (SW) is available as a utility in UniSim Design. Predict SW provides a new methodology for the assessment and control of H2S-dominated, ammonium bisulfide corrosion. With the utility launched in UniSim Design, the process conditions (T, P) and stream compositions are automatically passed to Predict SW when a flowsheet stream requiring corrosion rate analysis is selected. The Predict SW calculation runs in the background and updates the utility with the corrosion rate and other applicable variables.

Link to SPT’s (now part of Schlumberger) OLGA Multiphase Pipeline Dynamic Simulator integrated within UniSim Dynamic Option, allows the simulation of transient multiphase flow of oil,
water, and gas in wells and pipelines together with the production facilities.

**Link to Petroleum Experts’ IPM Suite** allows users to holistically model oil and gas production system including reservoir, wells and surface facilities.

**Link to Schlumberger’s PIPESIM** allows the modeling of steady-state, multiphase, oil and gas production pipeline networks, together with their separation and treatment facilities.

**Link to Cost Engineering’s Cleopatra Enterprise** allows Cleopatra Enterprise to get the required process data from UniSim Design to provide engineers with a cost estimation of the project.

**Link to Kraji Solutions’s MySEP** allows the export of process data from UniSim Design to MySEP, in order to determine vessel sizes, select internals and assess the overall performance of each vessel.

**Link to MSE’s Pro-M** enabling users to define early in the project cycle, the best possible compression system configuration; and the impact such design will have in the overall production process

**Link to HTRI’s Xchanger Suite**, through the HTRILink feature, allows users to integrate Shell & Tube Heat exchangers modeled with Xist, either as Air Collers modeled with Xace, within the UniSim Design flow sheet.

**UniSim ExchangerNet** is an advanced tool for the design and optimization of heat exchanger networks. Utilizing advanced optimization technologies, ExchangerNet allows customers to perform pinch analyses as part of capital expenditure projects and ongoing operational optimization work. This leads to optimal process economics between capital and operating costs.

**UniSim Flare** is a steady state flare and relief network simulator used to design new flare and vent systems from relief valve to flare tip, or to rate existing systems to ensure that they can handle all possible emergency scenarios. UniSim Flare can also be used to debottleneck an existing flare system that no longer meets the need for safe operation in a plant.

**UniSim ThermoWorkbench** provides users with the ability to create and analyze thermodynamic packages by regressing parameters against laboratory data and for analyzing the resulting predicted phase equilibria behavior. These packages may then be used in UniSim Design or other application using UniSim Thermo. UniSim ThermoWorkbench also allows users to perform azeotropic calculations for multiple compound systems, and to view results using a number of different graphical tools such as Txy and ternary phase equilibria diagrams.
UniSim® Design Suite

UniSim Heat Exchangers is a suite of products that allow thermal specialists to design, check, simulate, and rate heat exchange equipment rigorously. Used on their own, they enable the determination of the optimum heat exchanger configuration that satisfies all process constraints. Integrated with UniSim Design, opportunities for capital savings in the overall process design may be identified. These products are the result of over 35 years of industry collaboration and research. The heat exchanger products offered in this suite include:

- Shell-Tube Exchanger Modeler
- Crossflow Exchanger Modeler
- Plate-Fin Exchanger Modeler
- Fired Process Heater Modeler
- Plate Exchanger Modeler
- FeedWater Heater Modeler
- Process Pipeline Modeler.

Benefits Guardianship Program
This product comes with worldwide, premium support services through our Benefits Guardianship Program (BGP). BGP is designed to help our customers improve and extend the usage of their software applications and the benefits they deliver, ultimately maintaining and safeguarding their software investment.

For More Information
Learn more about how Honeywell’s UniSim Design can improve your process efficiency visit our website www.honeywellprocess.com/software or contact your Honeywell account manager.

Honeywell Process Solutions
Honeywell
1250 West Sam Houston Parkway South
Houston, TX 77042

Honeywell House, Arlington Business Park
Bracknell, Berkshire, England RG12 1EB

Shanghai City Centre, 100 Junyi Road
Shanghai, China 20051

www.honeywellprocess.com