KBC

A Yokogawa Company

Petro-SIM™

Advanced Purpose-Built Process Simulation

Petro-SIM™ is the industry leading process simulation platform for driving excellence in facility performance and organisational productivity in hydrocarbon industries. At the core of Petro-SIM's technology, rigorous simulation models generate trusted results in an intelligent, user-friendly environment for upstream, midstream, or downstream refinery or petrochemical processes.

The Petro-SIM open platform architecture promotes integration and collaboration that enables your organisation to improve efficiencies in process modelling work processes.

Petro-SIM extends beyond its superior process simulation technology by supporting integration with other leading technologies and promoting enhanced team collaboration to drive business transformation and organisational excellence in your organisation.
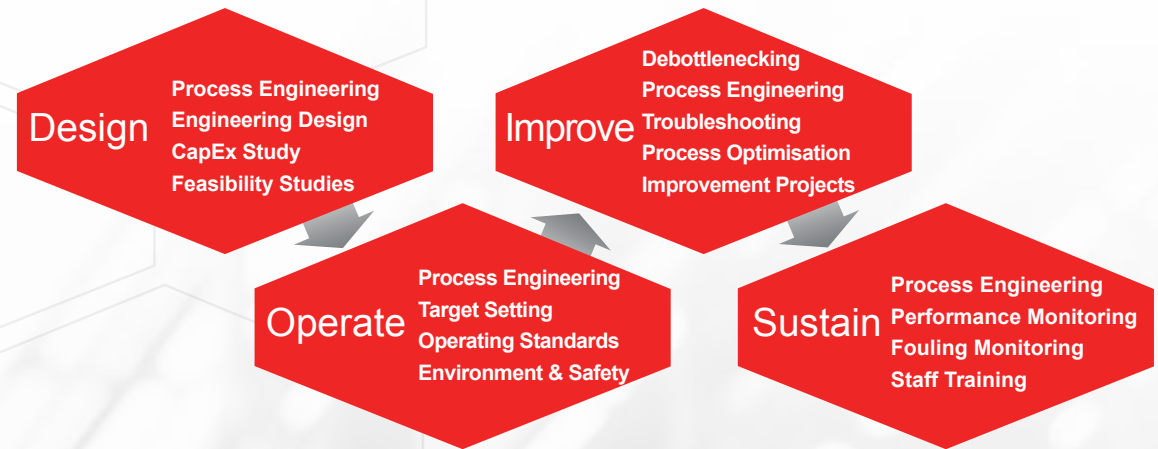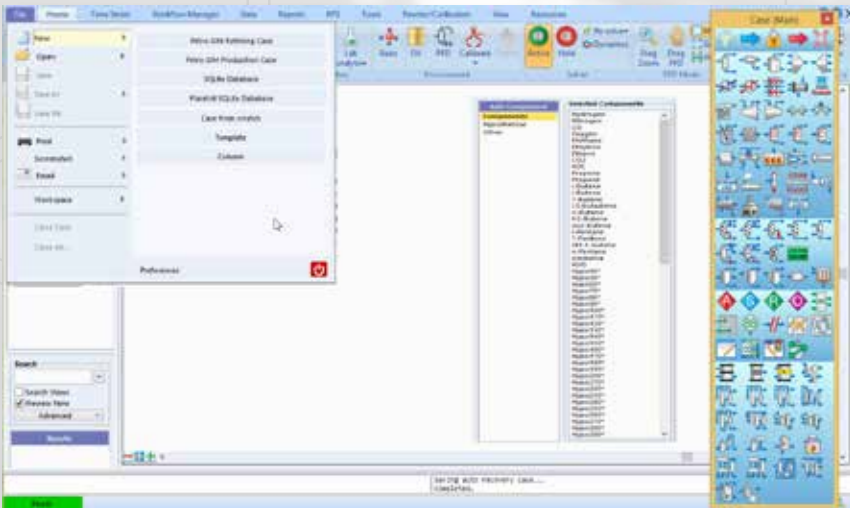
P=tro-SIM™

Petro-SIM provides innovative technology for the upstream and midstream hydrocarbon industries in an advanced process simulation platform.

Petro-SIM's Core Capabilities
in Advanced Process Simulation

Industry-Specific Process Simulation Models

Petro-SIM is a process simulator designed by engineers, for engineers. Auto-configuration options enable you to easily set up the simulation environment, configure appropriate component lists, and select the most relevant property package. Petro-SIM adapts the unit operations, utility options, and default stream property lists to reflect the type of process simulation user. Petro-SIM provides easy and efficient ways to access what is most relevant to you, saving valuable time and effort during model configuration, giving you more time for simulation results analysis.

Usability

Design
Process Engineering
Engineering Design
CapEx Study
Feasibility Studies

Improve
Debottlenecking
Process Engineering
Troubleshooting
Process Optimisation
Improvement Projects

Operate
Process Engineering
Target Setting
Operating Standards
Environment & Safety

Sustain
Process Engineering
Performance Monitoring
Fouling Monitoring
Staff Training

Petro-SIM, developed with the user in mind, focuses on usability from the layout of the ribbon bar that provides accessible functionality, to the right-click dynamic menu options. Sub-flowsheet technology offers a simplified, flexible workflow infrastructure to model the most complex simulations. The Petro-SIM navigation pane search feature allows you to quickly locate unit operations and components in your simulation cases. Journal features track the complete history of model changes while providing an undo capability.
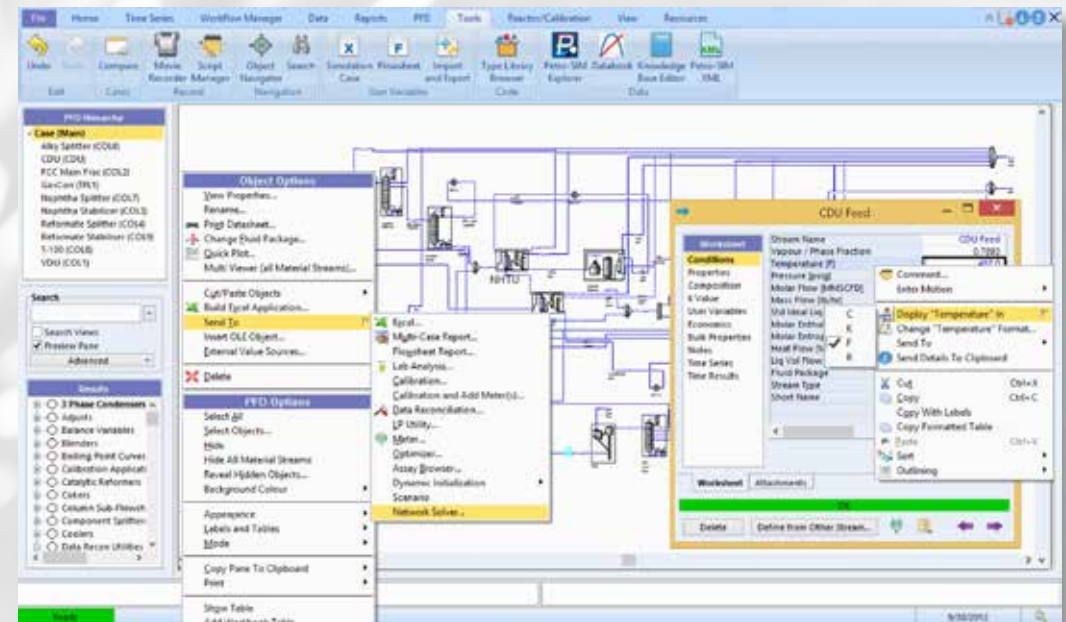
Purpose-Built Utilities

Petro-SIM enhances the value of simulation models through one-time configuration of easy-to-use utilities that automate tedious routine tasks, thereby eliminating unnecessary spreadsheets and time-consuming, repetitive tasks. The data reconciliation utility performs configurable reconciliation of material and elemental balances using process and laboratory data. The flowsheet report utility allows easy, one-click determination of elements, molecules, and streams across the processing facilities enabling tracking and optimisation of hydrocarbons through pipelines and facilities. The KPI utility tracks key information within a case, highlighting when data and results need to be reviewed and when corrective actions need to be taken. This automatic initial configuration is a powerful feature applied across the platform, driven from an underlying knowledgebase that you can customise and extend.
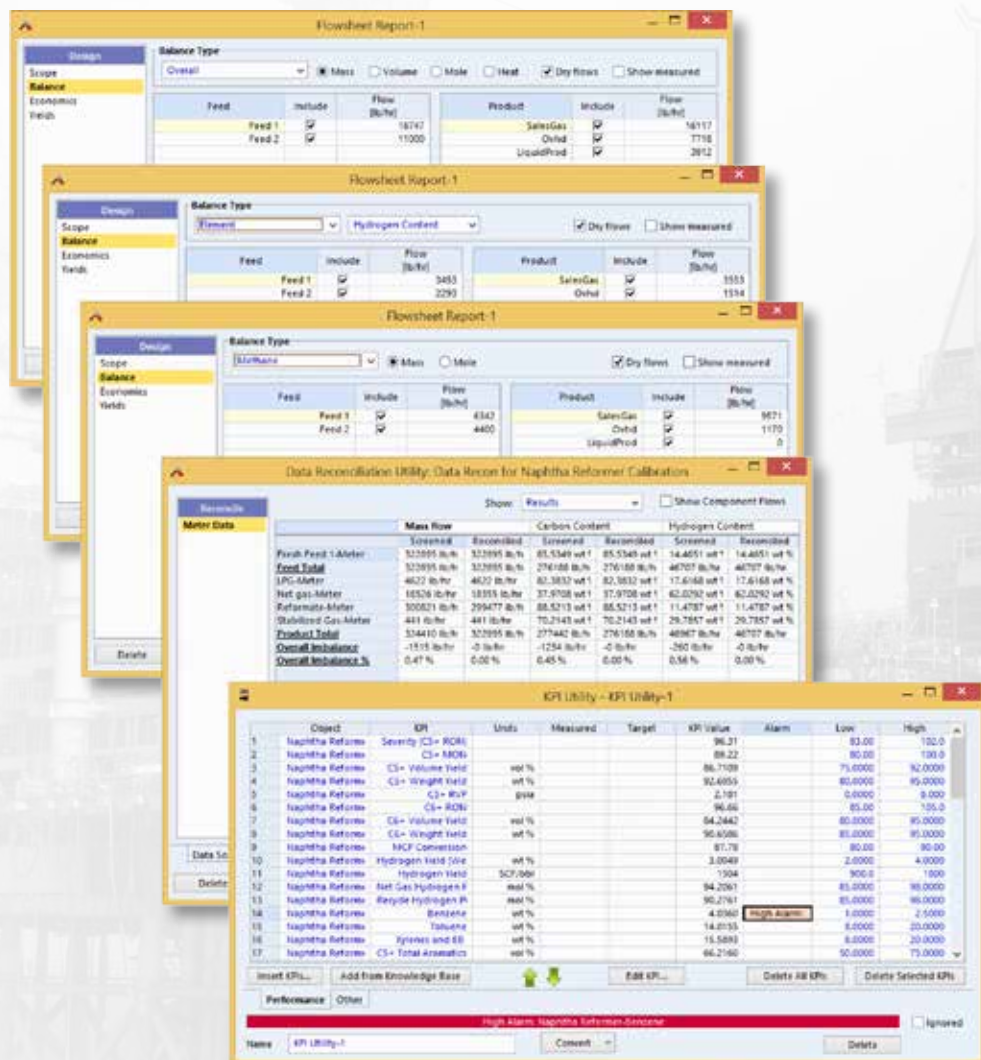
Date Enabled Modelling for Process Simulation

Petro-SIM is the first process simulator to implement date-based modelling, enabling you to run a steady state model at different points in time using multiple sets of time-dependent input data. You can activate alternative facilities required for equipment change-out or process debottlenecking inside one single simulation. The simulator calculates a series of steady state scenarios over days, months, and years in one single model. You can plot cumulative results over time and time weighted averages of rate variables such as volume, mass, and economic cost of key process variables, on time-series and results charts, enabling you to visually explore life of asset economics.

Extensive List of Industry Specific Unit Operations

Petro-SIM offers a broad list of unit operations that provide extensive coverage for process unit modelling across all hydrocarbon industry sectors. The unit operations include –

- General equipment operations include standard separators, compressors, pumps, heat exchangers, valves, and more.
- Generic reactors are provided to represent Gibbs, Equilibrium, and Conversion reaction systems encompassing CSTR and Plug Flow operations.
- Energy equipment such as the rigorous gas turbine, steam utility system unit operations such as boilers, steam turbo generators, steam headers, etc.
- Component splitter, DISTOP and Tray-to-Tray unit operations for short-cut column and detailed distillation column models.
- Logical unit operation such as adjust, set, recycle, spreadsheets, and optimisers.
- User and extension unit operations. A hydraulic plug-in unit operation that link to FEESA Maximus and Schlumberger PIPESIM software.
- Specialised reactor models for refining and petrochemicals processes, includes Fluidised Catalytic Cracking, Distillate Hydrotreater, Resid Hydrotreater, and many more.

Microsoft Excel Integration

Petro-SIM understands your need to extract, manipulate, and display key information from your simulations using other applications such as spreadsheets. Petro-SIM provides deep integration with Microsoft Excel that makes data transfer effortless. You can easily and readily auto-generate customisable Excel workbooks for simulation cases using a built-in wizard. With your data in Excel, you can drive all Petro-SIM actions from the customised Petro-SIM tab on the Excel ribbon. View single and multiple sets of simulation results in an Excel workbook, run case comparisons, and track results. Using Excel as the interface to drive simulation cases, you can configure and manipulate input data to a simulation while extracting key results. You have the flexibility to use Petro-SIM with Excel to the level that accommodates your individual preference.
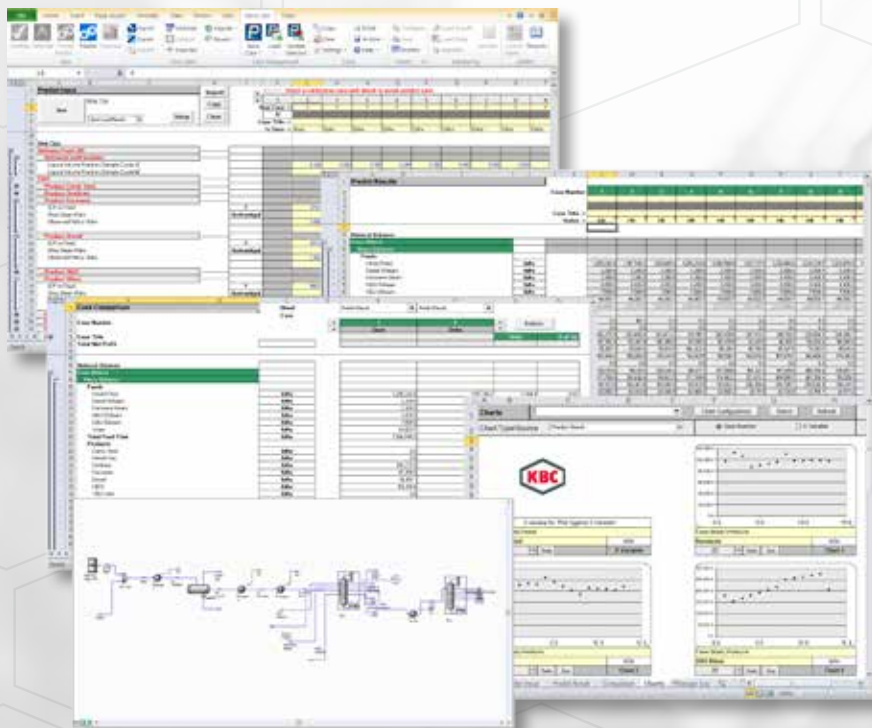
Data Historian Integration

Petro-SIM offers native integration to commercial data historians such as OSI PI, Honeywell PHD, and others with an additional mechanism for customised connections to any database. By enabling the direct transfer of laboratory and process data from these systems into a Petro-SIM simulation case, you can automate data entry, empowering you to make the most efficient use of your valuable time, while preventing data entry errors.
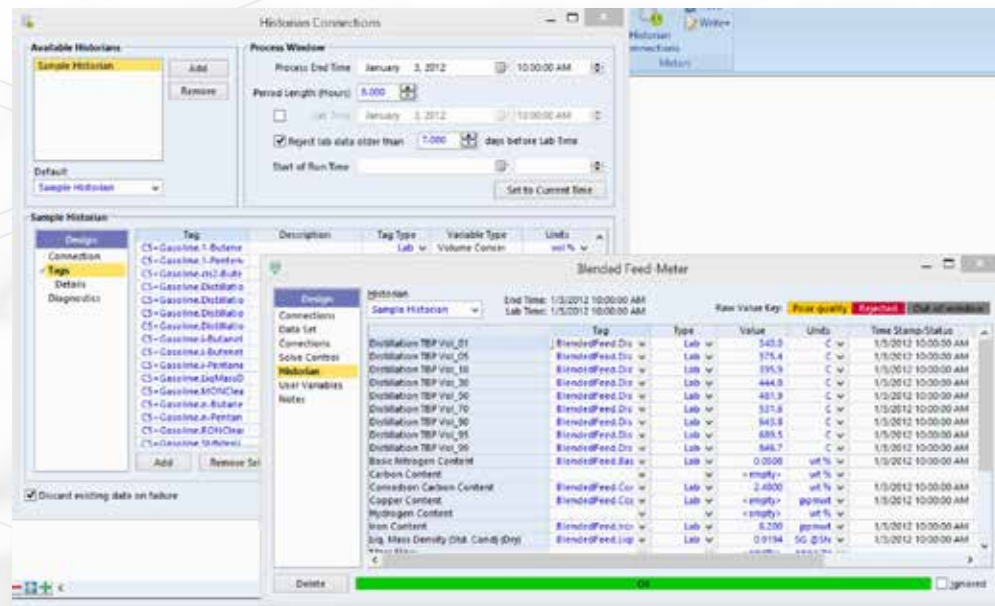
Use the Petro-SIM historian feature to import data into the simulation environment and specify how that data is used within the case. Update input data to ensure that it accurately represents the process unit or compare model results against actual data to tune models. By combining this capability with other Petro-SIM functionality, Petro-SIM can run multiple cases while automatically pulling in new datasets to track results over time, or compare two different datasets to track the model performance and unit performance over time.

Open Platform that Supports Integration of Leading Technologies

Petro-SIM provides a number of options for enhancing the standard process simulation capabilities by providing the ability to add your own or third-party objects to a simulation. Using this open platform, the functionality of Petro-SIM can be extended to integrate your unique or proprietary calculations and technology.

The user unit operation is a generic unit operation that allows for easy and quick addition of custom code that represents process equipment performance within a standard framework. The Extension unit operation provides that ability to fully customise a new user-created unit operation, and the proprietary code can then be compiled within a dynamic linked library file making it suitable for commercial distribution. Petro-SIM also natively supports CAPE-OPEN unit operations and property packages.

Heat Exchanger Modelling and HTRI Integration

Petro-SIM provides standard detailed design and rating models with the option to use HTRI methods which are seamlessly integrated to provide rigorous industry-standard heat exchanger performance calculations.

Petro-SIM's proprietary shell and tube exchanger geometry design algorithm facilitates the rapid screening of heat exchanger designs to achieve energy savings. For the revamp of existing networks, screening for retrofit opportunities is completed with enhanced heat transfer coefficients via enhancements such as helical baffles being considered along with new tube bundle configurations and additional shells in series and parallel. From the thousands of potential designs, Petro-SIM recommends a new design using your criteria.

## Gas Turbine Power Generation Modelling

Gas turbines are the most efficient means of power generation, especially when configured in a combined cycle. Because their performance depends greatly on atmospheric conditions, rated efficiency cannot be taken for granted. Petro-SIM's gas turbine model predicts full or partial-load performance under different atmospheric or fuel conditions. In refineries and other processes with significant heat requirements, overall cycle efficiency can be increased to beyond 90% in a co-generation system, where gas turbine exhaust heat is recovered to make steam. Petro-SIM's heat recovery steam generator (HRSG) model, coupled with the gas turbine model can form a combined heat and power (CHP) system, with or without a burner for supplementary firing.

Heat and Power Systems

Petro-SIM now contains all unit operations required to effectively model heat and power utility systems, from deaerator to boiler, and steam header to desuperheater and multi-stage turbo-generator. Steam users, waste-heat boilers, and turbine drivers can be specified in a convenient tabular format, while the easy-to-use basic boiler complements the rigorous combination of burner plus steam generator. The gas turbine model is fully equipped to deal with part-load operation and varying atmospheric conditions.

The steam header model automatically opens or closes a vent, as the balance requires, and detects and removes any condensate formation. It automatically adjusts water injection to achieve a constant outlet temperature, or allows that temperature to vary freely according to inlet steam conditions. In Calibration mode, system heat and mass losses can be calculated and then trapped in any subsequent steam balancing exercises.

The boiler model allows up to three different energy sources and different firing-efficiency correlations for each source. The turbo-generator model allows up to ten stages, including condensing, and can be set up with fixed or variable power production. It can be modelled with fixed stage efficiencies, or with Willans parameters to represent typical flow-dependent efficiency characteristics.
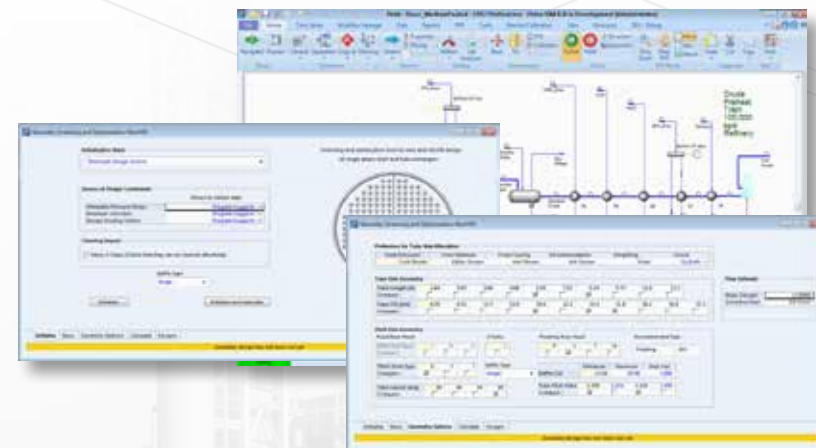
The heat exchanger unit operation incorporates an advanced geometry design algorithm that provides user-specified design constraints and options based on known limitations for the new or retrofitted exchanger.
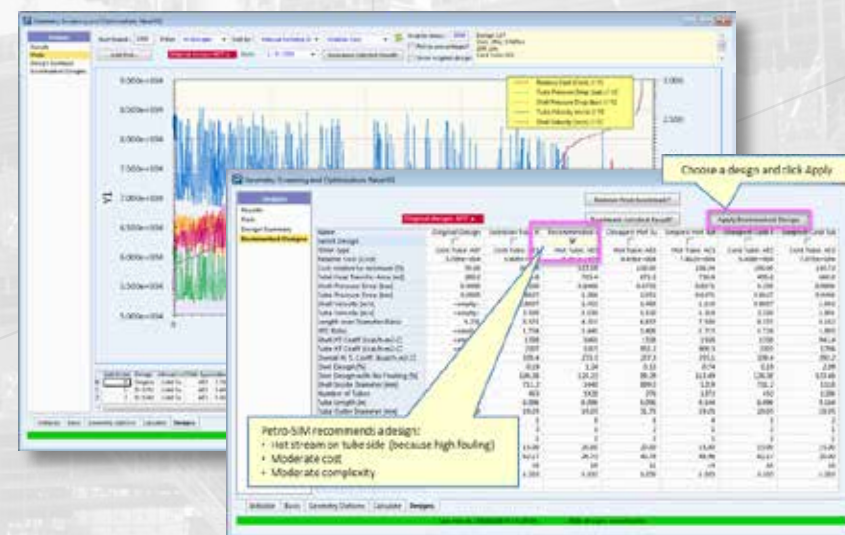
Potential design options are assessed based on the supplied pressure drop and velocity criteria, and then ranked based on relative cost criteria.

Several design options, which minimise cost while optimising pressure drop and velocity, are automatically recommended. These recommended designs can be assessed and compared against user-selected designs. You then select the final design and apply it to the model to be run in steady state rating mode.

Database Integration

Petro-SIM encourages collaboration between users within a department and departments in an organisation through native integration with industry standard SQL databases such as SQL Server, Oracle, and SQLite. Petro-SIM case information can be exported to the database in relational tables that can be readily queried making the results of simulations even more readily accessible and available to you through any tool that communicates with a SQL database. The database underpins Petro-SIM's multi-case reporting functionality, giving you powerful ways to analyse your results.

Petro-SIM cases can be stored directly to the database to enable case and revision management, with Petro-SIM automatically tracking case hierarchy so you can see how cases develop and evolve. Database administrators can set up and control access to simulation cases for individuals, allowing user-specific privileges to cases or components within cases. Collections of cases can be revised and stored through the database.

Petro-SIM simulation components such as assays, calibration data, workflow libraries, and report templates can all be stored and revised through the database. Authorised users can publish new revisions of simulation components enabling other users to subscribe to and seamlessly manage the transfer of these components to their work environment. You can manually or automatically ensure that everyone is using the correct version of these components and set up alerts to notify subscribers when new versions are available.

Windows Workflow Foundation

Petro-SIM is fully integrated with Microsoft Windows Workflow Foundation enabling you to customise your simulation experience. You can create simple workflows directly using Petro-SIM or create more complex workflows using Microsoft Visual Studio. Anyone can reuse these workflows in any simulation case and distribute, maintain, and manage them using either a Petro-SIM database or by creating XML files.

The Petro-SIM integrated workflow technology enables your organisation to impose its own unique sets of standards on simulations or automate the quality control checking of simulation cases to improve productivity and save time, all while ensuring quality results. This mechanism helps to facilitate knowledge capture and sharing from simulation experts to those new to simulation.
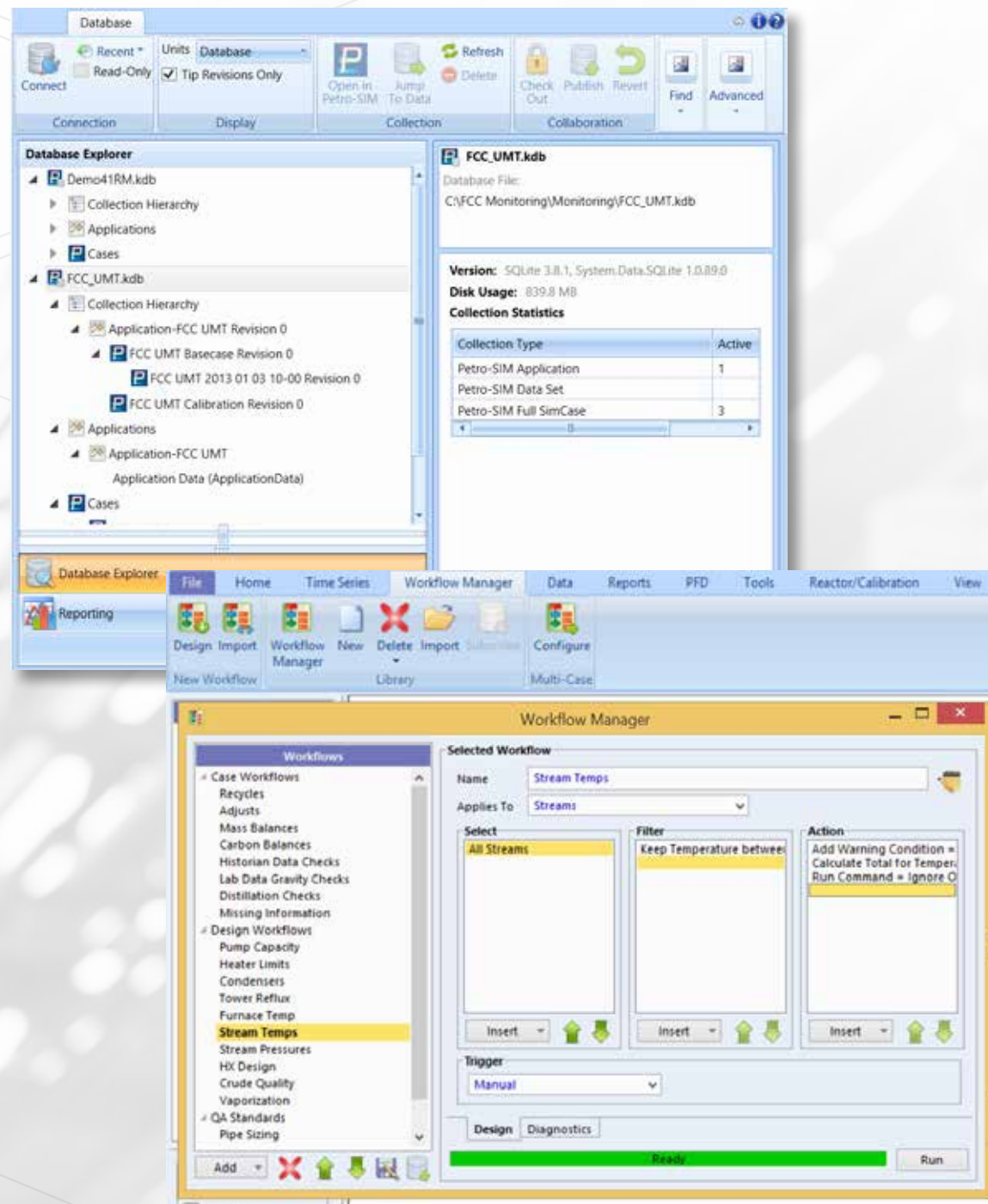
Single Case Reporting in Petro-SIM

Display key case information readily in the Petro-SIM simulation environment using the auto-generate customisable reports features. You can create on-demand reports to view critical information in a useful and productive display area. Reports can be saved as templates which can be recalled at any time from any Petro-SIM case. You can create a set of reports for any type of simulation case, edit them as needed, and recall them for use at any time. Share reports within your organisation with team members, or reuse them in any case.

The report generation process allows you to customise the data that you see and the format in which that data is displayed. Petro-SIM assists you in the creation of these reports by selecting key variables for units within the case to give you a starting point. Select the type of information displayed by adding specific filters.

Multi-Case Reporting in Petro-SIM

Take reporting one step beyond a single simulation case by comparing different cases. Evaluate the changes in different designs or operating cases using a consistent set of key parameters to quantify differences. Compare changes in a given unit across time looking at different cases side-by-side, or view trends of key variables. Using database collaboration, Petro-SIM reporting can display report results from cases exported and stored to the database.

Petro-SIM Explorer

Petro-SIM Explorer enables browsing of Petro-SIM model data stored to the Petro-SIM database as collection hierarchies. You can navigate through cases, objects, and associated variables quickly accessing model data without the need to open Petro-SIM. You can also use the Petro-SIM Explorer to view unit monitoring applications, assays, report templates, and workflows that were stored to the database.

Pre-configured reports can be run in the Petro-SIM Explorer allowing for reporting of datasets and plots against single or multiple cases, again without the need to open Petro-SIM. Petro-SIM Explorer is a standalone application that enables you to access model data on an ad-hoc basis, run standard templates against up-to-date model data, and distribute data efficiently to your project team and across your organisation.
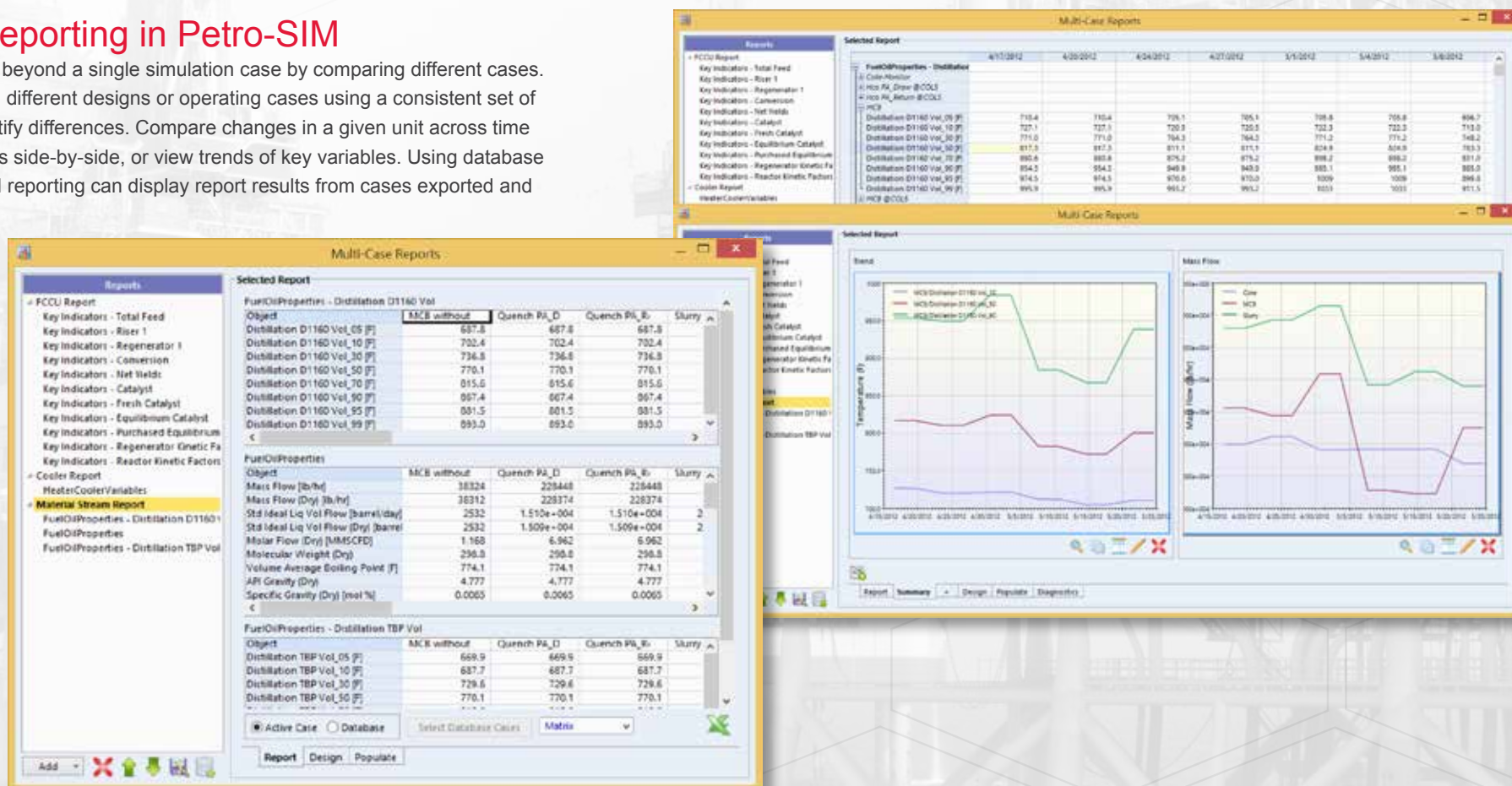
Support for Efficient Work Practices

Petro-SIM is more than a standalone rigorous process modelling environment. Its open platform architecture provides integration, collaboration, reporting, and web-enabled technology allowing your organisation to gain efficiencies in process modelling work processes. At the core is the Petro-SIM process simulation technology complete with rigorous, leading technology models for the upstream, midstream, and downstream refining and petrochemical hydrocarbon industries.

The Petro-SIM platform with full integration to commercial data historian and databases systems offers a central repository for project design data and access to plant operating data for performance monitoring. Maintaining a consistent set of design basis and operating models becomes a straight-forward process, you can store and update project model files in a version-managed database. As a result, internal and external project team members can access current data and generate custom reports against the latest model data, collaborate effectively within a distributed project team, and drive efficient project work practices.
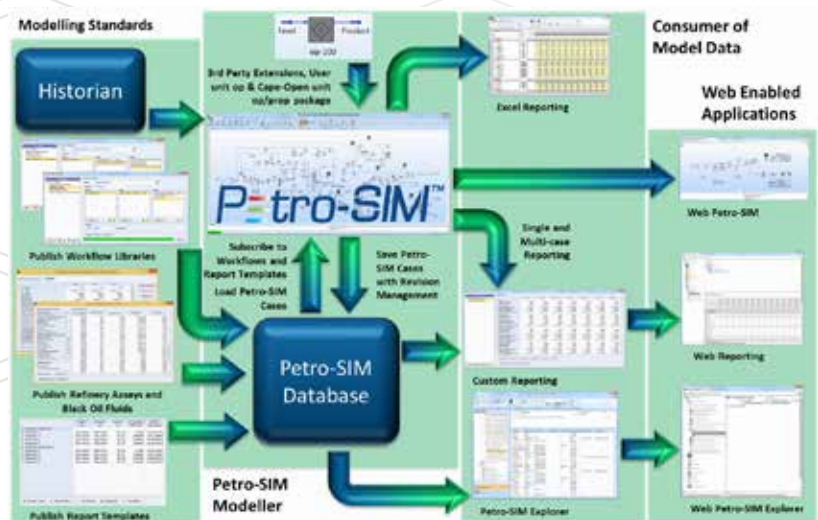
KBC has a unique focus on:

Quality. Innovation. Support. Value.

All of these areas of focus are backed up by our industry-leading consulting capabilities to help provide answers for our diverse clients. In addition, world class technical support is available to all of our customers under a maintenance agreement.

Petro-SIM is the process simulation platform that was purpose-built with industry relevant technology. Petro-SIM focuses on maximising the value of your assets by providing you with the confidence to make knowledgeable decisions to improve your facility's performance and drive organisational excellence.

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