DC-SIM™ Technical Datasheet

KBC — A Yokogawa Company

Benefits

Optimise unit performance
- Determine the most profitable operation of the delayed coker given its constraints (heater, coke product properties, pump and compressor capacities)

Maintain the refinery LP
- Generate a consistent set of yield vector that accurately reflects the feeds from different available crudes
- Regenerate data when the model or the LP structure changes
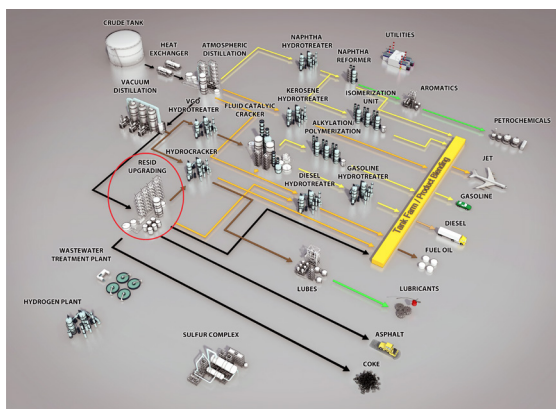
Understand unit behaviour
- Determine the yields for residual feeds from different available crudes and the yield shift as increasing amounts of vacuum gas oil are removed in the vacuum tower
- Find the coke fill time with different feeds, feed rates, drum temperatures, and recycle rates
- Train engineers and operators new to delayed coking by using the model to illustrate cause and effect through simulation runs
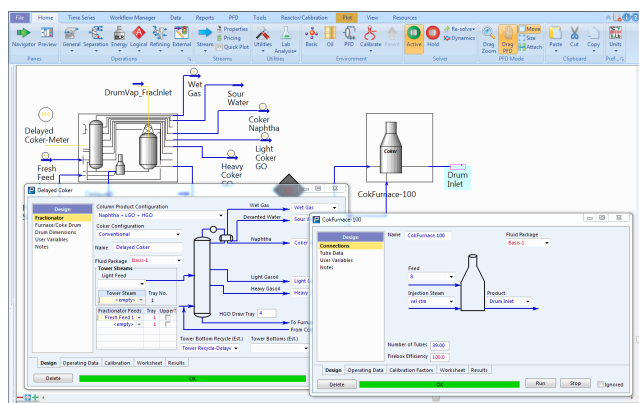
Monitor unit performance
- Track mass balance, furnace fouling, product yields and qualities, and other key process indicators
- Compare actual yields versus predicted

Overview Summary

Delayed coking is a key process used in many refineries to convert residual streams to more commercially viable products. Delayed cokers present numerous unique operational and safety challenges not faced in other process units. How do feedstock quality changes affect liquid product yields? Coke properties? Coke drum fill times? Coker furnace fouling and run lengths? From an operational perspective, what is the impact on product yields and qualities of changes in drum operating pressures? Temperatures? Recycles rates? Fractionator conditions? By allowing you to predict coker yields and product qualities for all your feedstock possibilities, coke drum operating conditions, and recycle rate options, DC-SIM enables you to answer these and many other important questions to enable you to operate this unit more effectively and safely.

DC-SIM, proven through decades of use by refiners worldwide, allows you to model the impacts of a variety of different feedstocks such as atmospheric residuals, vacuum residuals, or FCC slurry. The simulation includes the furnace, drums, main fractionator, and the drum vapour quenching system. Cycle time (drum fill time) and resulting coke qualities are predicted.

DC-SIM is a valuable tool to evaluate different crudes and their resulting coking yields on this key refinery process unit.
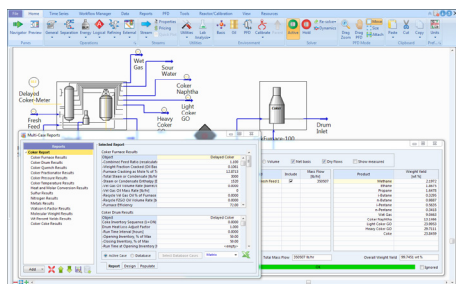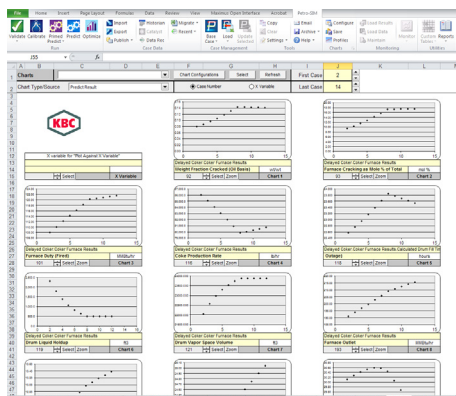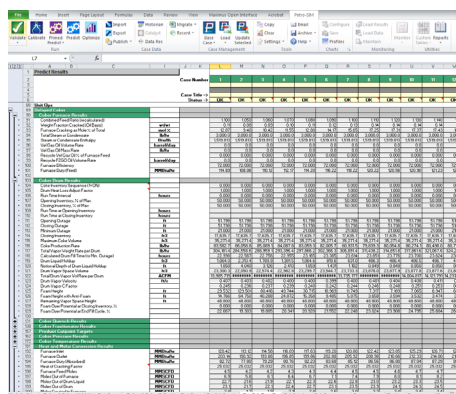
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Features

- Simulation of each coker component – furnace, drum and main column
- A first-principles, kinetic approach in modelling the key cracking and coke formation reactions and their heat effects
- Rigorous heat balance accounting for furnace heat input, heat rejection (column pump arounds) and quenches
- Detailed yields and product properties prediction
- Ability to simulate furnace feed configuration with or without recycle
- Ability to simulate the furnace in detail to predict fouling and furnace cycle lengths
- A built-in data reconciliation tool for reconciling mass and elemental balances
- Automatic data validation support to assess the quality of input data to the model
- A built-in optimiser allows you to identify the most profitable operation given feed/product pricing, energy costs, and unit constraints
- Direct access to process data historians
- Convenient and efficient platform for developing and maintaining LP vectors

Interface Options

DC-SIM is available through a graphical user interface with the same user-friendly look and feel as other unit operations within the Petro-SIM family of process simulators. Make configuration changes through simple drag and drop techniques on a process flowsheet diagram, compare plant data results in a meter view, and perform case studies and optimisations all within a single environment.

DC-SIM supports a real integration with Microsoft Excel® allowing you to readily create a customisable Excel application workbook for driving calibration, prediction, and even optimisation case runs. Analyse the results of several cases directly from within this Excel environment. Multiple charting options allow easy analysis of data and model predictions, and concise summary sheets provide relevant data at a glance. Excel interfaces are automatically generated and can be customised to your specific needs.

DC-SIM™ and Petro-SIM™

Because DC-SIM is available within the Petro-SIM environment, users with a Petro-SIM license can build very detailed process unit models that take advantage of Petro-SIM's sophisticated analysis tools, such as the popular LP Utility for easy generation and maintenance of LP submodels. Generate detailed models using downstream separation and auxiliary unit operations, link with assay and feed libraries and crude units to investigate feedstock effects, or use DC-SIM as part of a complete refinery wide model, at a level of detail unsurpassed by any other process simulation package.