CO in KBC and Infochem: Current status and future plans

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KBC provides independent consulting services, technology and implemented solutions to improve the long-term, sustainable profitability of our clients worldwide.

**KBC Office Locations**

- Provide Independent, Objective Advice
- Enhance Capital & Asset Effectiveness
- About 300 employees worldwide. KBC has established global non-exclusive collaboration agreements with leading engineering contractors
- Improve Operational Performance and increase Competitive Advantage
- KBC is continuously expanding its competencies through targeted acquisitions and alliances
- Meet Individual Client Needs with Consulting, Implementation & Technology
- Client include worldwide leading companies in the oil & gas, refining, petrochemical, and other process industries as well as governments.

**Core Software products:**

- Petro-SIM and SIM Suite of Refinery Reactors
- ProSteam Toolkit and Utility System Optimization
- SuperTarget (heat integration)
Infochem

- Specialist providers of physical properties and thermodynamics software and consulting to the energy and chemicals industries
- Established in 1986
- Based in London with staff of 10 people
- Focus on upstream oil & gas
- Core product: Multiflash
- Active participants in CAPE-OPEN since 1999
KBC + Infochem

- KBC acquired Infochem in June this year
- Key step for KBC in expanding our service and software offerings to upstream oil and gas
- Acquisition allows us to pool our respective strengths in hydrocarbon characterisation and deliver on our vision of unified process simulation across upstream and downstream
Petro-SIM

- Petro-SIM is a full-featured, graphical process simulator designed primarily for refineries and petrochemical plants.
- The only available product that can solve the refinery wide model with 1st principle rigor – it can model “crude to products”.
- Provides the ability to model a valve, an FCC unit or the whole refinery – complete scalability.
- One tool capable of many uses – design, optimization of existing assets, evaluation of different operating strategies, economic planning support.
Petro-SIM and Refinery Reactors

- Petro-SIM includes rich range of detailed refinery reactor process models
  - All major refinery processes covered – FCC, Hydroprocessing, naphtha reforming, thermal cracking and more
  - Corporate standard of many refiners worldwide
- Models serve applications in
  - Off-Line Analysis and Decision Support
  - LP Data Generation
  - Unit Monitoring
  - On-Line Optimization (RTO)
Petro-SIM and CO

• Petro-SIM has supported CO Unit Operation standard since 2008
  ▪ Used quite extensively for integration with commercial 3rd party products for applications in heat exchanger rating/design and CFD analysis
  ▪ Seeing some demand by our clients for CO as way to integrate their own technologies

• Petro-SIM as of June this year supports the CO Property Package 1.1 specification
  ▪ Used as vehicle for integrating Multiflash
  ▪ Showing early benefits in combined KBC+Infochem consultancy
• Comprehensive phase behaviour package
  - multi-phase fluid/solid capability
  - standard models for oil/gas/petrochemical/polymer applications
  - Petroleum fluid characterisation (pseudocomponents and property matching)

• Upstream modules
  - Flow assurance modules for hydrates/waxes/asphaltenes/solid freezeout
  - High accuracy model for: natural gas, CO2, light hydrocarbons, water, refrigerants, etc…. 
• Supports CO Thermo Spec 1.0 and 1.1
• Includes Property Package Manager and Property Packages with persistence and editing support
• Uses Multiflash GUI to configure PP
• Full multiphase gas/liquids/solids capabilities available through the CO 1.1 version
• Supports all (useful):
  ▪ Phases
  ▪ Properties
  ▪ Derivatives
  ▪ Flashes, etc....
Some Multiflash CO applications

- Mercury in natural gas/oil processing (5 phases: VLWLS)
- BP Cold Flow process - hydrates handling in sub-sea flowlines (6 phases: VLWIH1H2)
- Wax deposition in sub-sea flowlines (4 phases: VLWS)
- Polymer production (4 phases: VLLS)
- Hydrate inhibitor partitioning (VLW)
Demo: Petro-SIM and Multiflash

- HP compressor train in gas processing facility
- Uses Multiflash mercury model to track mercury distribution
Future plans: Petro-SIM

- Update product as needed to support changes in the property package and unit operation specifications
  - End-user demand is a key motivator for us
- Refinery Reactors
  - Obviously a core area of interest for KBC
  - We will add support to Petro-SIM for this emerging standard
Future plans: Multiflash

- 64 bit Windows support including CO
- Compound data interface (compound & correlation server) ?
- Wider support of non-Microsoft platforms
- PVT lab experiments
- Model developments
  - Mercury
  - Electrolytes
  - PC-SAFT
CO Thermo developments

• Some personal ideas…
• Reducing computational overheads
  - Integers instead of strings
  - Direct calculation methods that avoid using the MO (eg. CalcAndGetLnPhi)
• Calculations
  - Critical point
  - Cricondentherm & cricondenbar
  - Phase boundaries
• Flash derivatives
  - Derivatives of flash outputs wrt flash specifications *with phases in equilibrium*
Summary / Conclusions

• Our demonstration shows the clear value of CO
  ▪ Used Multiflash thermo for functionality not readily available in Petro-SIM
  ▪ Making Petro-SIM support CO Property Packages was straightforward

• KBC and Infochem are committed partners for CO