KBC Driving Excellence

4th Quarter 2007

Helping Clients Achieve Operational and Capital Excellence

KBC/Rompetrol - Energy Efficiency Initiative Identifies Significant Opportunities for Improvement

by Zoran Milosevic - KBC and Silvian Potlogea - Rompetrol

Rompetrol Rafinare S.A. operates the medium complexity Petromidia refinery at Constanta on the Black Sea coast of Romania.

In an effort to improve the performance and profitability of its operations, Rompetrol signed a Technical Services Partnership agreement with KBC in August 2006, which made specialist know-how available to Rompetrol on a long-term basis. The Partnership incorporates a series of Profitability Improvement and Project Development initiatives with a technical assistance hotline.

Energy Efficiency Improvement was one of the first initiatives that was instigated. The scope of work included:

- Benchmarking of Refinery Energy Performance
- Gap Analysis of Areas of Inefficiency
- Fired Heater Assessment
- Steam/Power System Modelling and Optimisation
- Selective Process Unit Energy Optimisation, including:
  - Selected Heat Integration (Pinch) Studies
  - Process Unit Simulation (using KBC Petro-SIM™) and Optimisation
- Equipment-level Analysis (furnaces, turbines, exchangers, fouling)

The initiative started in September 2006 and the recommendations were presented to Rompetrol in February 2007. In July 2007, Rompetrol reported that the benefits implemented and achieved amounted to USD$4.3 Million/year.

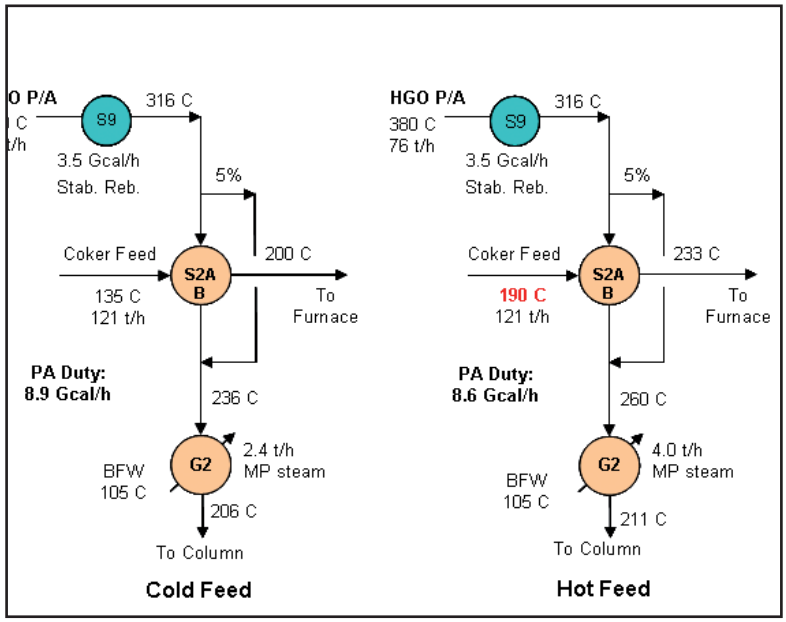
Rompetrol Energy Performance

The annual energy bill at Rompetrol is high- approximately USD$75 Million/year. This is due to the fact that both electrical power and steam are imported at a significantly higher cost than its own production cost would be for these two utilities. This offers a large incentive to improve the energy efficiency of the plant, especially by non-investmen measures.

The KBC Best Technology (BT) benchmark of the refinery was found to be 192%BT. The average energy efficiency of European refineries is around 180%BT, which places Rompetrol in the 3rd quartile of about 200 the refineries surveyed by KBC worldwide.

Of the 92% points by which the plant exceeds the Best Technology (100%) refinery performance, 33 points are attributable to the inefficiency (in cost terms) of importing steam and power.

Coker Hot Feeding Opportunity



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In This Issue...

UPCOMING HUMAN PERFORMANCE IMPROVEMENT SEMINARS

Training Skills for Process Plant Trainers (TSPPT)
• 30 Jan -1 Feb – Houston, Texas, USA

Improving and Sustaining Process Plant Operator Performance (ISOP)
• 25-27 Feb – Singapore
• 9-11 Apr – San Antonio, Texas, USA

Supervising for Operational Effectiveness (SOE)
• 5-7 Mar – San Antonio, Texas, USA
• 28-30 Apr – Bangkok, Thailand

Complying with Process Safety Management (PSM)
• 12-14 Mar - Houston, Texas, USA

Achieving and Sustaining Operational Excellence (OpX)
• 26-28 Mar – Orlando, Florida, USA
• 16-18 Apr – Paris, France

For more information or to register, visit www.kbcat.com.

FEATURE STORY

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The other inefficiencies were found in:
- Sub-optimal Heat Integration of CDU (7 points)
- Furnace Inefficiency (6 points)
- Design of Individual Units (10-15 points in HDS units alone)

Opportunities

The Energy Initiative focused on non-investment type opportunities, observing some site-specific factors:

- The design and the operation of the process units is reasonably efficient
  - Therefore most opportunities would be found in the Steam and Power system, and in inter-unit energy integrations
- High cost of imported steam, relative to fuel cost dictated that:
  - Own generation should be maximised
  - Generating steam is more cost-effective than preheating feed, especially in the Coker unit

Rompetrol continues the implementation of KBC recommendations.

Once all non-investment opportunities are implemented, the BT benchmark of the refinery is expected to improve from 192% to 176%BT, placing Rompetrol in the 2nd quartile of worldwide refineries.

FEATURED PROJECTS

Technical and Commercial Due Diligence

Financial Services Company
USA

The client needed to verify portions of a business plan submitted as part of a financing request. KBC was retained to determine the mechanical condition and potential value of certain refining assets. The client was also interested in the market conditions in which the asset would be utilised as a representation of the downside risk of repayment.

KBC reviewed the assets onsite at several locations to determine the condition of the equipment. KBC Market Services group provided regional margins and market balances for the client to select the most challenging environments for these assets as a representation of the downside. KBC used a Petro-SIM model to determine the refinery yields and maximum specifications attainable in these markets to define the product value. KBC used its CapX tools to determine the installed cost at these locations and estimated the value in the forecast economic environment.

A KBC team integrated the CapX evaluation approach of hands-on experience, market knowledge, and our proven simulation capabilities to deliver the desired solution to the client.

The client was able to utilise the Due Diligence report from KBC along with our help in answering follow up questions to make a timely decision on the loan request.

PP(M)SB/MRC Uses Petro-SIM Simulation and Petro-SIM LP Utility

PETRONAS Penapisan (Melaka) Sdn Bhd (PP(M)SB)
Malaysia

PETRONAS Penapisan (Melaka) Sdn Bhd (PP(M)SB), a subsidiary of Malaysia's national oil company, PETRONAS and its joint venture company, Malaysian Refining Company Sdn. Bhd, own and operate the country's largest crude oil refineries, processing 250,000 barrels per day of crude oil.

In light of new technology, PP(M)SB decided to upgrade its long-term planning data generation for more efficient results in its refineries' production by implementing Petro-SIM, a graphical refinery flowsheet simulation software. Petro-SIM is the only commercial process simulator capable of rigorously modelling the complete refining process from crude units connected to downstream separation and conversion units to product blending, with the full suite of KBC SIM reactor models. In addition to Petro-SIM, the KBC SIM models have been licensed for various hydrotreaters and conversion process units.

KBC Market Services

REFINING MARGINS

by Peter Stewart

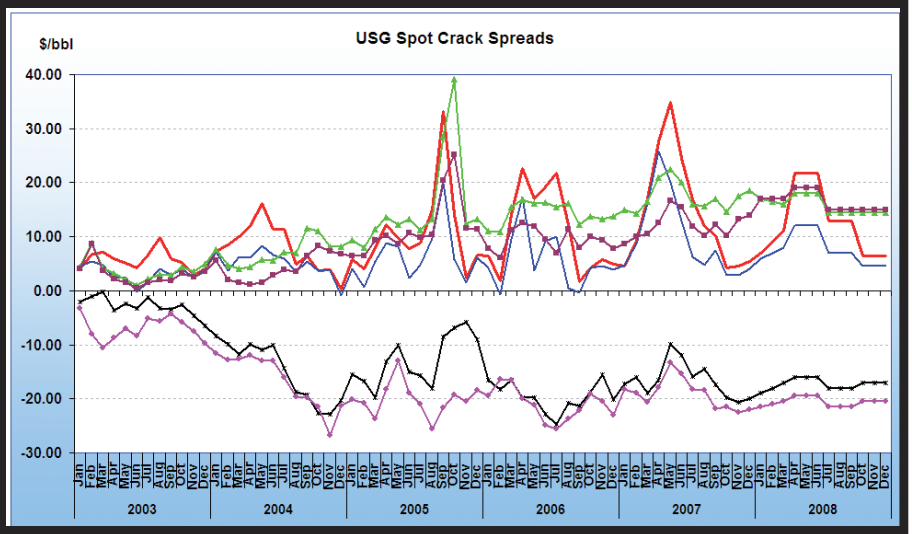
Despite record high crude prices, 2007 has been kind to refiners overall and margin strength looks set to be sustained as we move into 2008.

Although high conversion margins in the US Gulf took a sharp downturn during the autumn, when gasoline demand slows but winter demand for distillates has not yet kicked in, their seasonal peak of more than USD$20/bbl during the summer was the highest since 2005. Gasoline cracks hit the highest levels since Hurricane Katrina. Growing competition from Africa and the Middle East for European gasoline surpluses in the spring look set to sustain margins well into 2008.

European refinery margins were supported ahead of the winter by strong middle distillate prices, particularly in diesel and jet fuel. Refiners have been faced with increasingly tight sulphur limits in road fuels for several years. They now have to deal with a target of 0.1% in heating oil in 2008, 10 ppm in diesel from 2009, and increasing parts of the tanker market moving to 1.5% fuel oil since 2006. With most spare production capacity held by Middle Eastern countries that typically make heavy sour crude, and with European refiners struggling to keep up with middle distillate demand, margin strength will likely be sustained.

The outlook for Asia is broadly similar. Refiners in Singapore shook off the seasonal trend of a drop in margins during the autumn, even as the price of light regional crudes cleared USD$100/bbl. The recent Asian strength was partly the result of much stronger than usual fuel oil cracks, because of tight Middle Eastern supplies.

Asian demand growth has been the main factor in the rise of oil prices in the 21st century. The biggest caution to our buoyant outlook for refining is naturally the potential for a slowdown in demand growth as a result of record high oil prices. The credit crunch in the US has already spread to other parts of the world, and Asian countries have started to review oil price subsidy regimes. Although there are signs that high oil prices have dented oil demand, so long as world GDP growth remains robust, the risk of a sudden slowdown appears remote.



PP(M)SB previously used KBC Petrofine and Crude Assay Management System (CAMS) as its core simulation and assay synthesis tools. The client also previously used the Petrofine-based process models for Catalytic Reforming (PF/REFOP) and Distillation (PF/DISTOP), known collectively as the OP series models.

This package of tools was used for LP vector generation, unit monitoring, calibration and target setting. In order to automate the LP vector generation for the OP series models, the PP(M)SB refinery planning group had previously licensed KBC Vectorfine, a graphical user interface based on Microsoft Access and Visual Basic for Applications (VBA), which was used for the crude and vacuum units' LP data generation.

In addition to the modelling of refinery and optimisation of process unit operations, Petro-SIM has a built-in interface especially intended for LP data generation so it is a natural progression from Vectorfine.

Hence with KBC Implementation Services, Petro-SIM serves as the common refinery simulation software between the Technology Department and the Planning Group. The Technology Department updates the models in Petro-SIM to keep them current for troubleshooting and optimisation work. The Planning Group uses the same models in Petro-SIM to keep the LP data tables updated.

The project started with the configuration and calibration of the process units, which included the reactor models. The models were calibrated to represent the actual unit operations. This calibration step customised the process unit simulation unique only to that unit. After calibration, the process unit simulation models could be used in a predictive mode to troubleshoot or optimise the unit's performance.

The calibrated process units' reactor models were represented in the Petro-SIM flowsheet along with relevant rigorous tray-to-tray product fractionation together with upstream crude and vacuum distillation columns' simulation.

After the process units' reactor models were calibrated to match actual plant performance by the Technology Department and the Planning Group, and used subsquently for process troubleshooting and optimisation, they could then be used concurrently by the Planning Group to generate data to update the LP tables.

Petro-SIM includes a unique feature, the LP Utility, which is customised to automatically generate and output LP vectors. The LP Utility is a systematic work process template in Petro-SIM; it enables the user to customise LP data generation applications for assays and process units. Users can operate it for typical LP data generation set-ups like distillation column swing cuts for assay tables, perturbations and regressions for the process units' LP tables.

The LP Utility for PPMSB was configured in the Petro-SIM flowsheets with the calibrated process models. The LP Utility set-up considers the required swing cuts or modes, perturbation steps, and regression and recursion calculations. This LP utility runs the models in a predictive mode and uses the simulation results to generate LP vectors. These steps are done automatically once the LP Utility runs are initiated. The LP Utility was set up to export the LP data into the Excel®-based template file. The organised data management added efficiency and improved data tracking to the LP data generation process.

EVENTS

8th Annual ME Refining Conference
24-26 Feb – Abu Dhabi, UAE
Kevin Clarke, KBC Executive Vice President – EMEA Operations, will present "Capital Excellence in the Development of a Middle East Grassroots Refinery."

Middle East Fuels Symposium
27-28 Feb – Abu Dhabi, UAE
Neil Atkinson, Senior Staff Consultant, KBC Market Services, will present "More Demand, More Crude Oil, More Refining?" following the completion of KBC Market Services annual Long Term Oil Market Outlook. The paper will discuss the key issues affecting oil demand, supply, and price to 2030.

ARTC 11th Annual Meeting
4-6 Mar – Bangkok, Thailand
Antonio Della Pelle, KBC Business Development Manager, will present "PetroChina Dalian Petrochemical Company Refinery and KBC Cooperation on Total Site Utilities Optimisation."

NPRA Annual Meeting
9-11 Mar – San Diego, California, USA
KBC will attend the NPRA Annual Meeting where leading industry experts share valuable insights on major issues, including energy and environmental initiatives and the latest technical developments. Joe Jacobs, KBC Senior Staff Consultant will present "Gasoline or Diesel: What is the Right Choice?" In addition, Diego Polanco, KBC Senior Consultant, will present "Monitoring and Reducing a Refinery's Carbon Footprint," and Kevin Smith, KBC VP of Human Performance Improvement, will present "The Journey to Operational Excellence." KBC will also host a hospitality suite at the event.

World Refining and Fuels Conference
11-12 Mar – San Diego, California, USA
KBC will attend the World Refining and Fuels Conference, which consists of a variety of sessions covering the latest fuel technologies, including biofuels integration.

NPRA International Petrochemical Conference
30 Mar -1 Apr – San Antonio, Texas, USA
KBC will attend the NPRA International Petrochemical Conference, which consists of a variety of sessions covering key political, economic, and environmental issues affecting the petrochemical industry.

1st Asia Alternative Fuels Conference
12 May – Kuala Lumpur, Malaysia
KBC's David Turner, Executive Vice President – Business Development, ASIA, will present "Alternative Fuels – Challenge and Issues"

2nd Asia Bottom of the Barrel Technology Conference
13-14 May – Kuala Lumpur, Malaysia
Paul Kennedy, KBC Executive Vice President – ASIA Operations, will present "Maximising Vacuum Column Cutpoint to Minimise Fuel Oil Yield."

6th Asia Petrochemicals & Gas Technology Conference
15-16 May – Kuala Lumpur, Malaysia
Steven Kantorowicz, KBC Vice President – Petrochemical, ASIA, will present "The Never-ending Quest for Improvement Opportunities."

KBC

DRIVING EXCELLENCE

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