



# Driving Excellence

Issue I - 2008

Helping Clients Achieve Operational and Capital Excellence



## KBC Performs Independent Review of Delayed Coker Project *by Paul Haugseth*

The client approached KBC to conduct a third-party review of a project to increase the refinery crude processing capacity, which would require the construction of a Delayed Coker Unit along with other refinery upgrades. The client requested KBC to review the overall refinery configuration and comment on the recommended plan. They were looking for potential design issues that may have not been addressed, and they wanted to ensure that the unit sizing/processing configurations were optimal.

KBC conducted round table discussions with the design team to understand the current refinery constraints and how these constraints were being addressed with the new design. These discussions were also conducted for all the new units in the design. KBC performed some unit simulations using our Petro-SIM™ rigorous refinery flowsheeting tool (see Figure 1) to analyse and verify the operation and design information.

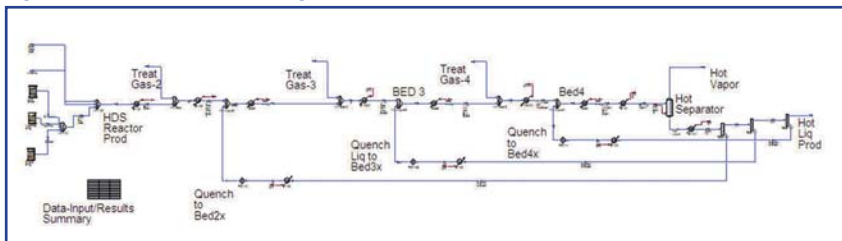
Our specialists generated unit reports and developed possible design changes - some of which were reviewed in more detail. Recommendations were then developed by KBC and presented to the client.

For example, one recommendation was a new Ultra Low Sulphur Diesel unit design, which would require liquid quenches between the lower catalyst beds to allow the quench box design to work efficiently. KBC explained that using this type of design would add additional high pressure equipment to the unit, and that that could be avoided with a different design.

KBC also conducted a brief mechanical review for the project, and we found that some of the pump recommendations would require vessel elevations to be increased, and an increase in skirt height, which increases overall installation cost. KBC recommended that the use of other pump manufacturers may prevent these extra costs.

*Continued on pg 3*

Figure 1 - Schematic Showing Quenches



KBC offers a comprehensive range of consulting, implementation, and training solutions to provide sustainable competitive advantage to our process industry clients worldwide.

### OUR SERVICES INCLUDE: **CapX - Capital Excellence**

- Market Analysis & Forecasting
- Business Strategy Review
- Merger, Acquisition, & Integration Studies
- Feasibility Studies
- Capital Project Support

### **OpX - Operational Excellence**

- Operational Planning
- Process Optimisation
- Energy
- HSE
- Reliability, Availability, & Maintenance
- Human Performance Improvement
- Software Solutions

## Upcoming Human Performance Improvement Seminars

### Improving and Sustaining Process Plant Operator Performance (ISOP)

- 9-11 Apr – San Antonio, Texas, USA
- 11-13 June – Rome, Italy

### 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
- 18-20 June - Houston, Texas, USA

### Achieving and Sustaining Operational Excellence (OpX)

- 26-28 Mar – Orlando, Florida, USA
- 16-18 Apr – Paris, France
- 21-23 July – Bangkok, Thailand

### Effective Operating Procedures (EOP)

- 21-22 May – Houston, Texas, USA

For more information or to register, visit [www.kbcinf.com](http://www.kbcinf.com)

## In This Issue...

- Upcoming Training ..... 1
- Events ..... 2
- Refining Margins ..... 3
- Featured Project ..... 4



## Clients Attend KBC ASIA Symposium

In January 2008, KBC held a regional symposium in Asia covering Operational and Capital Excellence in the hydrocarbon processing industry. The 2008 KBC Asia Symposium was very successful with clients from all over Asia attending including Petronas, SK Corporation, Reliance, SamsungTotal, and PTT.

## EVENTS

### 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.

### The European Fuels Conference 9th Annual Meeting

11-13 Mar – Paris, France

Alan McCartney, KBC Principal Consultant, EMEA, will present “Conceptual Design and Feasibility Study for a New Refinery”. This paper will describe the conceptual design and feasibility study activities recently carried out for the POAS new grass roots refinery in Turkey.

### 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.

### ERTC Sustainable Refining Conference

31 Mar -2 Apr – Brussels, Belgium

Michiel Spoor, KBC Senior Energy Consultant will present “Reducing CO<sub>2</sub> Emissions in a North American Refinery” KBC will present a case where we helped a refinery to reduce emissions by up-to 15%.

### 7th Asia/China Petchem Feedstock

17 -18 Apr – Shanghai, China

Steven Kantorowicz, KBC Vice President – Petrochemical, ASIA, will present “Economics of Refinery Petchem Integration.”

### 3rd RPEC Conference & Exhibition

22-23 Apr – Moscow, Russia

KBC will present “Improving Reliability through Operator Driven Asset Care Programs.” This paper will describe a program to enhance operator skills for them to become more effective drivers of unit and site reliability.

### 3rd BBTC - 3rd Russia & CIS Bottom of the Barrel Conference

24-25 Apr – Moscow, Russia

Stephen George, KBC Refining Specialist, will present “Quenching Europe’s Thirst for Clean Diesel.”

### Refinery Summit Asia

24-25 Apr – Singapore

John Russel, KBC Vice President, Asia Pacific will present “Outlook for Refineries in Asia.”

### Opportunity Crudes 2008

1-2 May – Houston, Texas, USA

Scott Sayles, KBC Principal Consultant, will present “Unconventional Crude Processing: Metals.”

### 2nd Annual China Petrochemical Focus 2008

5-8 May – Beijing, China

Steven Kantorowicz, KBC Vice President – Petrochemical, ASIA, will present “Improvement Opportunities via Refinery/Petrochemical Integration.”

### 1st Asia Alternative Fuels Conference

12 May – Kuala Lumpur, Malaysia

David Turner, KBC Executive Vice President – Business Development, ASIA, will present “Alternative Fuels – Challenge and Issues.”

### ERTC Asset Maximisation Conference

12-14 May – Lisbon, Portugal

Jim Watt, KBC Senior Staff Consultant, will present “Implementing Maintenance Improvement Programs across Global Operations.” In addition, Rasool Barouni, KBC Senior Staff Consultant, will present “Rigorous Simulation of Refinery Hydroprocessing Units Generates Significant Benefits from Extended Catalyst Life.”

### 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.”

### NPRA Reliability and Maintenance Conference & Exhibition

20-23 May – San Antonio, Texas, USA

Paul Rabuse, Senior KBC Consultant, will present “Failure Modes and Effects Analysis (FMEA) Utilisation in a Defect Elimination Process,” which describes the tool, process, and guidance to incorporate the FMEA process into a plant-wide defect elimination process. Please visit us at booth #566 in the Henry B. Gonzalez Convention Center.

## REFINING MARGINS

by Peter Stewart

Margins outlook remains positive despite USD\$100/bbl oil price.

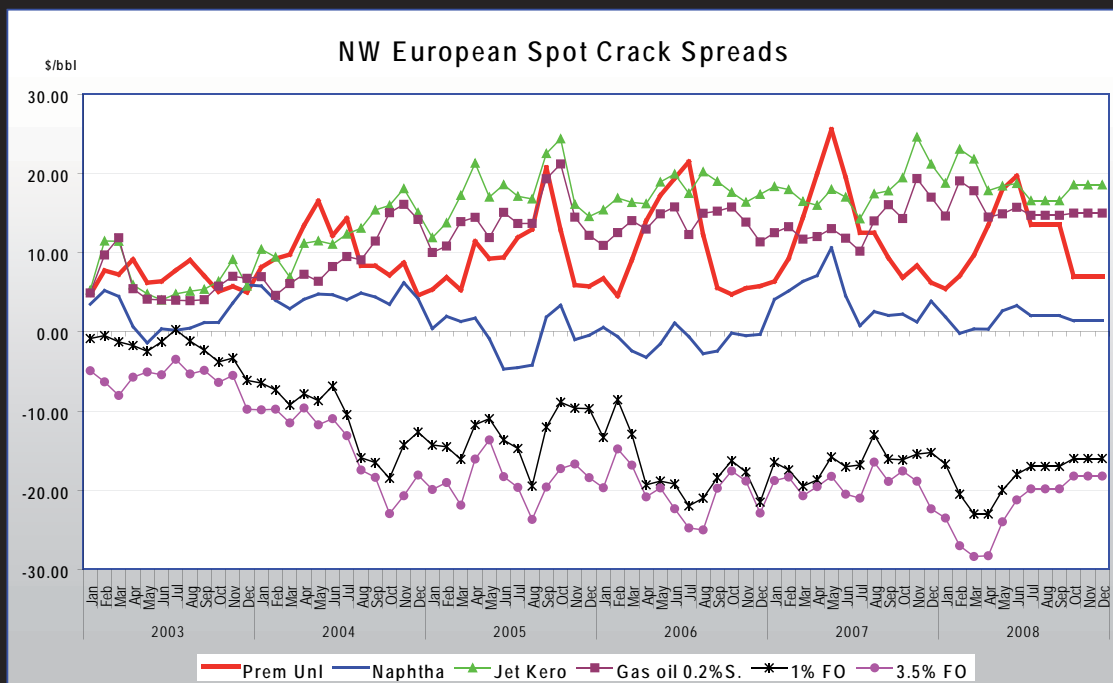
Despite the recent surge in crude prices to fresh record highs above USD\$100/bbl, there is little sign yet that high prices are substantially cutting into oil product demand, and we continue to see strong margins for the refining sector as markets gear up for the northern hemisphere driving season.

US crude oil futures hit USD\$100/bbl on the first trading day of 2008, despite concern that last year's sub-prime mortgage crisis might result in a recession in the US. Although refining margins fell after this, commercially-led run cuts early in the year at refineries in the US, Europe and Asia quickly triggered an improvement in crack spreads from their seasonal lows. It is not uncommon for refining margins to come under pressure during the spring, as the market enters a lull following the winter heating season, but typically they recover by mid year as refiners gear up to meet summer gasoline demand.

Gasoline cracks look set to strengthen as we move closer to the peak driving season. So far, there is no sign that high gasoline and diesel prices have significantly reduced demand. Decisive interest rate cuts by the US Federal Reserve and concerted international action to address the credit crunch have also eased the risk of an economic slowdown. Although the use of ethanol to boost octane in the US looks likely to take some of the steam out of the gasoline rally, fund buying and resilient demand should help underpin the complex.

Although gasoline has traditionally been the focus of US refinery activity during the northern hemisphere summer, diesel fuel has become the lynchpin for the profitability of many European refiners. The middle distillate complex had an unusually strong first quarter. Diesel strength in Europe dragged across arbitrage cargoes from the US, and unusually this led to diesel commanding a premium over gasoline in the US. Gasoil prices have also been strong, partly because of a cold snap in Europe and the US late in what had been a relatively mild winter, but also because Russian gasoil is widely used in the automotive sector in countries with more relaxed limits on sulphur content in fuels. Since many of these countries are growing rapidly, strength in middle distillates looks set to continue into the summer, when heating demand traditionally dwindles.

Whereas light and middle distillates have been strong, the bottom of the barrel has been extremely weak. High sulphur fuel oil crack spreads in the first quarter dropped to below USD\$30/bbl in the US, their lowest level ever, and similar weakness was reported in Europe and Asia. Competition from gas in the US, plentiful supplies of Russian fuel oil into Asia and slack Chinese demand were behind the weakness. This has weakened margins for simple refineries, which were the first to cut runs in the New Year. A significant rebound in fuel oil prices could occur, but only if US gas prices rose further, or if Chinese demand were to pick up substantially.



Continued from pg 1

Overall, the KBC team agreed with most of the refinery changes, but made a number of recommendations that would either simplify the design and/or add additional benefits for the future operation of the refinery.

Our client has taken onboard recommendations from KBC, and they are reconsidering the ULSD design basis and reactor options.



## KBC to Offer Additional Public Seminars This Year

Based on client requests, KBC is now offering public technical seminars originally developed as onsite client training sessions. These KBC Technical Seminars advise clients on how and why they make changes to their existing facility, and present industry "Best Practice" tools and methodologies for making improvements to current operations.

The following Technical Seminars will be offered later this year:

- Achieving Optimum Energy Efficiency, 17-19 September 2008
- Improving Refinery Profitability, 22-24 October 2008
- Reliability Improvement Process, 12-14 November 2008

Additional seminars to complement those shown above will be announced and offered for rollout to the public in 2009.

More information is coming soon. Please check our website for details.

## FEATURED PROJECT

### KBC Consults on New Refinery Project in Egypt

In August 2007, Egyptian Refinery Company (ERC) signed an EPC contract with a consortium of Mitsui (Japan) and GS Engineering (Korea) for the Engineering, Procurement and Construction of a new USD\$2.4B Hydrocracking Complex, at Mostorod, Egypt. KBC has been engaged as the owner's technical consultant since the project inception.

The Cairo region is largely supplied with petroleum products from a single refinery "Cairo Oil Refinery Company" (CORC). This refinery is a simple hydroskimming refinery with an actual throughput of 5 MTPA out of the available 8 MTPA design crude capacity.

KBC Market Services performed a market product demand outlook and a price forecast. Our team proposed that the spare CORC crude capacity could be made available for crude tolling; the new upgrading capacity would process the combined Atmospheric Residue. Egypt is very short of diesel, but balanced in gasoline; hence, KBC evaluated hydrocracking technologies. The new hydrocracker complex will allow processing of heavier domestic crude such as Belayim; this is compatible with National crude production outlook.

A framework agreement was developed, which in essence is an agreement that confirms the principles of the supply, off-take, and processing agreements. This framework agreement was signed by all parties in Q4 2006, since the project concept met the requirements of the Equity Investors, EGPC (the State Oil Company) and the National interests of the Arab Republic of Egypt.

KBC then undertook a Due Diligence Study at CORC refinery. While many recommendations were made, one of the critical engineering aspects related to improvement in the performance of the existing single stage de-salter units and the provision of a second stage de-salter in each of the four crude units. KBC Operational Best Practices have been utilised to improve plant performance and define the requirements of the new facilities.

KBC obtained at least three competitive Licensor quotations for each of the process technologies. Competitive analyses were prepared, in order that the bid comparisons could be understood from both a technical and commercial perspective by both owner and lenders.

The KBC team undertook the development of the technical documentation of the Contractor Invitation to Tender. These documents are the Statement of the Owners requirements with

regard to the onsite process units, utilities and off-sites, whilst also detailing plot constraints and the engineering standards that were to be adopted. Having reviewed the contracting strategy, it was concluded that the contractors would submit bids for a FEED contract, on the basis that the Contractor would be required to convert their price estimate to a LSTK EPC contract. To ensure a competitive element, it was decided to award two FEED contracts to be developed in parallel. Competitive tenders were received from four international contractors.

In parallel to the engineering activities, AR purchase, processing, and product off take agreements required detailed definition and negotiation with various parties. This is an essential item prior to obtaining project financing. From a technical aspect KBC was fully engaged in this process, notably defining off-take product qualities, feed and product pricing mechanisms, and in the determination of base line yields for crude tolled in CORC. These agreements were signed by the owner and EGPC in December 2007.

Following the FEED tendering, an EPC project award was negotiated with Mitsui/GS Engineering. EPC activity commenced on the 1<sup>st</sup> September 2007. It is expected that project finance will be in place by May 2008. Start up is expected in Q4 2011.



#### DRIVING EXCELLENCE

##### **KBC Advanced Technologies, Inc.**

14701 St. Mary's Lane  
Suite 300  
Houston, TX 77079, USA  
T +1 281 293 8200  
F +1 281 293 8290

##### **KBC Process Technology Ltd**

KBC House  
42-50 Hershaw Road  
Walton on Thames  
Surrey KT12 1RZ, UK  
T +44 (0) 1932 242424  
F +44 (0) 1932 224214

##### **KBC Advanced Technology Pte Ltd**

435 Orchard Road #16-02/03  
Wisma Atria  
Singapore 238877  
T +65 6735 5488  
F +65 6736 4759

