NEW – ‘State of the Art’

Advanced OIL REFINERY TECHNOLOGY & PROCESSES

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Refinery Economic indicator + Supporting Facilities
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( Part 2 )

CRG Management Team 2013
INTRODUCTION

New ‘State-of-the-Art’ Oil Refinery Technology Plant

Our Associate Russian Company invented and produced as industrial application, a new oil refinery plant for processing of the heavy oil. Before the Russians such plants for processing of the heavy oil were produced by the three Companies:

By Shell, USA;
By Chiodo, Japan;
By Sonocracking, USA;

All the above mentioned Companies had made the price of the plant for processing of the heavy oil higher than conventional plant for processing of the light oil. If to take price of conventional plant for 100% then prices for the heavy oil processing plants from the tree mentioned Companies are:

400% from Shell, USA;
200% from Chiodo, Japan;
150% from Sonocracking, USA;

The plant for processing of the heavy oil from our Associate Russian Company, is cheaper (!) than conventional plant for processing light oil. To be short this new Russian oil refinery technology has several critical advantages over existing conventional oil refinery. The main result of these advantages – 2-4 times reduction of price of oil refinery plant, comparison with existing oil refinery plants prices are the following found in the next page:

This reduction of price leads correspondently to very short pay off (from two to three years as a maximum) of oil refinery plant installation. Such a short pay off period makes this new oil refinery extremely attractive in today’s economical environment.
New Oil Refinery Technology

Summary of Advantages & Comparison Information

Being 3-5 times cheaper than conventional one new oil refinery technology makes a good business plan with maximum 3 year pay off for any oil refinery project in any country;

New oil refinery technology is capable of processing of any type of crude oil including very heavy oil and even fuel oil. It makes new oil refinery project independent of quality of oil supply – intake oil can be of any quality actually – which creates additional guarantee for investors;

New oil refinery technology is scalable: it allows building of any size oil refinery which is very convenient for all the oil companies – big, medium and small;

Being scalable new oil refinery technology can provide a buffer for crude oil supply – supply of intake oil to the new oil refinery plant can vary in quite a wide limits – up to 80% which is just impossible for conventional oil refinery plant;

New oil refinery technology allows building of oil refinery of any size – starting from 4,000 bpd (200,000 mty) up to 300,000 bpd (15,000,000 mty) and thus creates possibilities for smaller oil refinery projects;

The sum of all this advantages means quite a serious potential of the new oil refinery technology for the near future.

Estimates of Oil Refinery ( OR ) Comparison

<table>
<thead>
<tr>
<th>Productivity of the OR plant</th>
<th>up to 200,000 ton per year</th>
<th>up to 600,000 ton per year</th>
<th>up to 1,000,000 ton per year</th>
<th>up to 5,000,000 ton per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity of the OR plant in barrel per day</td>
<td>up to 4,000 barrel per day</td>
<td>up to 12,000 barrel per day</td>
<td>up to 20,000 barrel per day</td>
<td>up to 100,000 barrel per day</td>
</tr>
<tr>
<td>Price of ordinary OR plant</td>
<td>$100 million</td>
<td>$300 million</td>
<td>$500 million</td>
<td>$2.0 billion</td>
</tr>
<tr>
<td>Price of new OR plant</td>
<td>- NOA -</td>
<td>- NOA -</td>
<td>- NOA -</td>
<td>- NOA -</td>
</tr>
</tbody>
</table>
New Oil Refinery Technology

ADVANTAGES INFORMATION

The main advantages of the new oil refinery technology are the following:

Characteristic Operating Cost of Hydro cracking Hydrogenation Technology
Good (green) environment process – no need chemical and without catalyst
Reactor hydrogenation process – quick process in every flow of intake crude oil (raw material)
Fraction process using pressure and energy needed for heating is very efficient
Small inventory cost for raw material (crude oil intake)
Supporting by 24 hours fully automatic operation and needs few operators only
Time of refinery plant construction takes only 8-15 months including infrastructure
Other Benefits

Economic Benefit of the R.T. Oil Refinery
Lost of weight 1%, but increasing yield in volume 10-20%.
Yield of good price of petroleum product is more than 90%
Petroleum product consist of diesel, gasoline, kerosene, LPG.
Pay out of project investment needs 2-4 years depend on intake crude oil characteristic

Lower Energy Consumption :
Standard ordinary oil refinery plant needs huge supply of electrical power;
New oil refinery plant needs 3-4 times smaller energy supply;

Small Footprint of the Oil Refinery
Types of Plant Capacity are 5,000; 10,000; 20,000 barrel per day
Flexible for all crude oil characteristic (heavy or light crude oil)
Possibility built small Capacity of floating Refinery Plant to reduce transportation cost of crude oil intake sources

Compact Size & Adjustable Dimensions
Reactor of the ordinary oil refinery plant in average contains about 50,000 liters of oil;
Reactor of the new oil refinery plant is for 5 to 15 liters of oil only (depending on the productivity of the plant);
This means that new oil refinery plants are very compact and could be installed in any suitable space – in ports, upon oil tankers, etc.
New Technology Oil Refinery

Continued from previous page. . .

Easy Maintenance and Operation

Standard ordinary oil refinery plant needs big stuff to maintain and operate it;
New oil refinery plant needs 2-3 people in 8 hours turn as a completely sufficient staff for all the operation, i.e. 8 to 12 people working on the plant;
This means that new oil refinery plants are totally automated. Intelligent system of management and control is built into the plant allowing totally automated and smooth process operation.

Bigger Output of Motor Fuels:

Ordinary oil refinery plant gives less than 80% of motor fuels as an output from 100% of oil as an input;
Our technology of oil refinery gives more than 90% of motor fuels as an output from 100% of oil as an input;
This improves business plan for building oil refinery because price of motor fuels as You know is much bigger than price of all the rest oil refinery products.

Faster in the Preplanning Level of Oil Refinery Processing:

Ordinary oil refinery plant comes to preplanned level of processing (to its full capacity of oil processing) in 3 years;
Our technology allows to come to preplanned level of processing in just 8 months;

Safety of the new oil refinery plants:

Standard ordinary oil refinery plant contains huge volume of oil while working and therefore needs to be handled and maintained with quite numerous number of precautions for safety;
New oil refinery plant contains 300 to 500 liters of oil every single moment of its operation, so it is absolutely safe in sense of any unexpected emergency;
Pay off for the New Oil Refinery Plant is Faster:

Ordinary oil refinery plant pay off could be 5 to 7 years;
Our technology allows to reach pay off in 2-3 years (depending on the price of crude oil);

Price of the Oil Refinery Plant built using New Technology is Cheaper.

Ordinary oil refinery plant cost can be calculated from the formulae
(main oil refinery industry formulae): USD$1000 /per one ton /per year;

For example:

if we need oil refinery plant for processing of 1 million ton per year then the price of such a plant would be 1000$ * 1,000,000 = $1bn.

Our oil refinery plant cost is at least 100% or, more cheaper than that;

For example:

Oil refinery plant for processing of 1 million ton per year built by this new technology costs much less and highly economical.

Recommendations for the Client or, the Investor

The Technology of the Refinery Plant potentially processes any type of crude oil which is produced by marginal field to produce around 5-20,000 barrel per day, with the result is increasing value of resource.
The Technology of the Refinery Plant is very attractive for medium investor to fulfill requirement of fuel with small scale.
The Technology of the Refinery Plant can increase refinery capacity to fulfill requirement of domestic petroleum product.
Hence, the viable economic project is very attractive.

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APPENDIX

New Oil Refinery Technology

Hydro cracking and Hydrogenation processes are

Hydro cracking process are Recuperative pressure and heating process to raw material oil, oil cracking, and Hydrogenation process are fraction and atmospheric distillation

Parts of the Equipment Unit are

Hydro cracking consist of Heat recovery unit
Heat transfer,
Cracking block, and

Hydrogenation consist of Atmospheric distillation unit,
Distillate fraction block

<table>
<thead>
<tr>
<th></th>
<th>Distillate Fraction</th>
<th>Residue (Yat) – Black Oil Fuel</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Crude</td>
<td>98.6 %</td>
<td>0.4 %</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Heavy Crude</td>
<td>91.5 %</td>
<td>7.5 %</td>
<td>1.0 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Heavy Crude Oil</th>
<th>Light Crude Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPG</td>
<td>9.18 %</td>
<td>9.67 %</td>
</tr>
<tr>
<td>Gasoline</td>
<td>17.74 %</td>
<td>32.67 %</td>
</tr>
<tr>
<td>Kerosene</td>
<td>34.52 %</td>
<td>25.00 %</td>
</tr>
<tr>
<td>Diesel</td>
<td>37.28 %</td>
<td>39.83 %</td>
</tr>
<tr>
<td>Black Oil (Yat)</td>
<td>6.77 %</td>
<td>10.33 %</td>
</tr>
<tr>
<td>Sulfur</td>
<td>1.04 %</td>
<td>3.00 %</td>
</tr>
</tbody>
</table>
### Refinery Economic indicator + Supporting Facilities

<table>
<thead>
<tr>
<th></th>
<th>Heavy Crude Oil</th>
<th>Light Crude Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity (BBL/DAY)</strong></td>
<td>4,000</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td>20,000</td>
<td>100,000</td>
</tr>
<tr>
<td><strong>Investment (MM US$)</strong></td>
<td>90</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>310</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Equity (MM US$)</strong></td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>150</td>
</tr>
<tr>
<td><strong>Loan (MM US$)</strong></td>
<td>90</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>310</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Tennor (Yrs)</strong></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Interest Rate (%)</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>IRR (%)</strong></td>
<td>25.9</td>
<td>28.9</td>
</tr>
<tr>
<td></td>
<td>36.6</td>
<td>37.7</td>
</tr>
<tr>
<td><strong>NPV t=10% (MM US$)</strong></td>
<td>122.5</td>
<td>330.9</td>
</tr>
<tr>
<td></td>
<td>751.1</td>
<td>3,804.7</td>
</tr>
<tr>
<td><strong>BEP (Yrs)</strong></td>
<td>2.4</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>After Production Start</strong></td>
<td>3.9</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>2.8</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Approx. + _ Investment Breakdown of the Oil Refinery</strong></td>
<td></td>
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<table>
<thead>
<tr>
<th></th>
<th>4,000</th>
<th>10,000</th>
<th>20,000</th>
<th>100,000</th>
</tr>
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<tbody>
<tr>
<td><strong>Land (Ha)</strong></td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td><strong>Investment (MM US$)</strong></td>
<td>90</td>
<td>200</td>
<td>310</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Basic Equipment (MM US$)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Oil Cracking Unit (MM US$)</td>
<td>65</td>
<td>150</td>
<td>230</td>
<td>1,200</td>
</tr>
<tr>
<td>■ Hydrogenation Unit (MM US$)</td>
<td>30</td>
<td>70</td>
<td>100</td>
<td>550</td>
</tr>
<tr>
<td>■ Auxiliaries Equipment (MM US$)</td>
<td>30</td>
<td>70</td>
<td>100</td>
<td>550</td>
</tr>
<tr>
<td><strong>Supporting Facilities (MM US$)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Sea port facilities (MM US$)</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>■ Storage facilities (MM US$)</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>■ Utilities (MM US$)</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>■ Land (MM US$)</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>20</td>
</tr>
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</table>

NB: Figures above are subjected to changes. Kindly meet the Technical Team for Confirmation.
INFORMATION

PROCESSING OF USED OILS AND OIL WASTES

CRG-I-T-E-R Advanced-Oil Processing Technologies

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Simplicity of the Process

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CRG Management Team 2013
PROCESSING OF USED OILS AND OIL WASTES

INTRODUCTION I-C 200 HYDRO

THE DEPTH OF PROCESSING OF USED OILS AND OIL WASTES
In oil refining the basis of the economy is the depth of processing of crude oil, i.e., obtaining of the maximum of light distillate fuels - gasoline, kerosene and diesel fuel. Oil wastes and used oils are processed into automotive diesel EURO 5 (target yield is 80-90%) and vat residue – tar, by the proposed technology at cracking installation I-C 200 HYDRO.

THE DIFFERENCE OF I-C TECHNOLOGY
The depth of processing of oil wastes and used oils in the developed technology is 80 – 90% with obtaining of automotive diesel EURO 5. This process is implemented in a cracking installation ITER 200 HYDRO, which uses technologies of cracking and ionic hydrogenation developed by our company. Installation of cracking I-C 200 HYDRO combines processes of cracking, hydrogenation and atmospheric rectification. The peculiarities of the developed innovative process are:
1) The intended obtaining of automotive diesel Euro, as the most demanded by the market - the yield is more than 80 wt%
2) Absence of the gases of cracking and petrol
ADVANTAGES OF I-C TECHNOLOGY

Minimum quality requirements for raw materials - oil wastes, used oils with a residual water content up to 15% and mechanical impurities content to 5%

• Processing of a wide range of heavy crude oil
• It does not require the hydrogen
• The absence of cracking gas and products of coke formation
• The high yield of target product - Diesel EURO 5
• Modular execution of equipment that does not require the construction of special foundations
• The absence of wastes and emissions
• Low capital cost

COMPARISON OF THE CRACKING SCHEMES
THE SIMPLICITY OF THE PROCESS
The innovative process of refining is as follows
The initial crude oil goes to the cracking unit from which the cracking distillate fraction which makes up 90% goes to the hydrogenation unit, while the bottoms residue in the amount of less than 10% is removed. On the hydrogenation unit the refined fractions in the form of vapor in the amount of 90% are removed to the rectification column where they are divided into petrol, diesel fuel and vat residue. The hydrogenation residue which is not more than 5% from initial material mixes with the cracking residue and can be used to produce road bitumen. Thus we get over 80% of diesel fuel compliant with the Euro 5 Standard which is the most demanded by the market. The simplicity and efficiency of the given innovative process of oil refining does not have any analogues in the world.
FIELDS OF TECHNOLOGIES' APPLICATION

Application of the developed technologies of cracking and hydrogenation:

Processing of oil wastes:
oil wastes and used oils are processed into automotive diesel oil EURO 5 and tar -raw materials for the production of bitumen.

Oil refining:
oil is processed on the cracking installation I-C 200 HYDRO with the yield of more than 90% of distillate fuel fractions, in which diesel fuel EURO is more than 70% atmospheric and vacuum residue of oil refinery are processed with a yield of up to 80wt% in kerosene distillates - diesel fractions;

INDUSTRIAL IMPLEMENTATION
The solemn ceremony of the opening of B-G Innovative Platform of New Energy Technologies took place on 15th of May, 2012. The commissioning of the complex of processing of oil wastes based on the cracking installation I-C 200 HYDRO has occurred within this ceremony by : Info will be shared in the meeting.
EXAMPLE OF MARINE FUEL PROCESSING

INITIAL RAW MATERIAL AND RESULTING PRODUCTS
PASSPORTS OF QUALITY

This photo was taken at the Client’s Site
MATERIAL BALANCE OF PROCESSING OF ONE TON OF USED OILS

<table>
<thead>
<tr>
<th>Name</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER</td>
<td>100%</td>
</tr>
<tr>
<td>Mixture of used oils</td>
<td></td>
</tr>
<tr>
<td>Electricity 150 kWh / ton of used oils</td>
<td></td>
</tr>
<tr>
<td>Reagent consumption of 5 kg / 1 ton (price for 1 kg = 120 rubles)</td>
<td></td>
</tr>
<tr>
<td>The cost of processing 1,000 rubles / ton of used oils</td>
<td></td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

**OBTAIN**

<table>
<thead>
<tr>
<th>Name</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel fuel GOST 305-82</td>
<td>85%</td>
</tr>
<tr>
<td>Tur or Mazut M1</td>
<td>14%</td>
</tr>
<tr>
<td>Looses</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

MAIN CHARACTERISTICS OF THE CRACKING INSTALLATION I-C 200 HYDRO

<table>
<thead>
<tr>
<th>Name of the equipment</th>
<th>Cracking installation (block-modular)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity by incoming raw materials, thousands of tons per year</td>
<td>200</td>
</tr>
<tr>
<td>The installed electric power, MW</td>
<td>5,0</td>
</tr>
<tr>
<td>The area occupied by the installation, m²</td>
<td>540</td>
</tr>
<tr>
<td>Overall dimensions, m</td>
<td></td>
</tr>
<tr>
<td>length L</td>
<td>30,0</td>
</tr>
<tr>
<td>width B</td>
<td>18,0</td>
</tr>
<tr>
<td>height H</td>
<td>8,0</td>
</tr>
<tr>
<td>The total mass, kg</td>
<td>60 500</td>
</tr>
</tbody>
</table>
Presented technology of cracking I-C 200 is the most effective of all known technologies of refining oil and heavy oil residues.

Commercial application of this technology will significantly improve the profitability of oil companies profile.
APPENDIX

New Oil Refinery Technology

PLANT & EQUIPMENT PHOTOS

Reactor

Front View

Diagonal/Side View
APPENDIX

PLANT & EQUIPMENT PHOTOS

Distillate System

Storage Tanks and Facilities
NEW – ‘State of the Art’

OIL REFINERY TECHNOLOGY & PROCESSES

END OF DOCUMENT

Thank you for your kind attention.

Kindly contact your respective Distributor for more info/detail.

The subject matter is highly technical and we would recommend that you set-up a formal meeting for a conclusive and productive discussion.

Thank you.

On behalf of our respective Distributor / CRG, we look forward to serving you.