



**BPMARRK<sup>®</sup>**  
A Breakthrough Technology for  
Real-Time Crude Assaying

# Conventional Crude Oil Assaying

ASTM D2892



TBP Distillation (CDU)

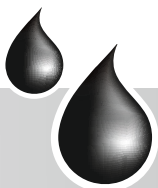


ASTM D5236



PotStill Distillation (VDU)

Crude oil is a complex mixture of hydrocarbons and each crude has unique molecular and chemical characteristics. The crude oil assay testing provides crucial information required for refinery operations and business decisions. Conventionally, crude oil evaluation is done via laboratory experiments and requires 20-30L crude sample, large quantity of chemicals/solvents, 2 pilot plants, several analytical instruments, skilled manpower and 3-4 weeks' time to complete one detailed refining characteristics.



# Uncertainty in Crude Mix Composition

TBP distillation of crude mix feed to CDU/VDU are always approximate due to various factors viz. previous material heels in the tank, crude transient, continuous entry of multiple crude oils to the tank and sometime, multiple tanks also fed to CDU/VDU. Variation in crude quality and lack of real-time crude assay makes the task of real time optimization challenging if not impossible.





# **BPMARRK<sup>®</sup>**

*Discovering Crude Oil*

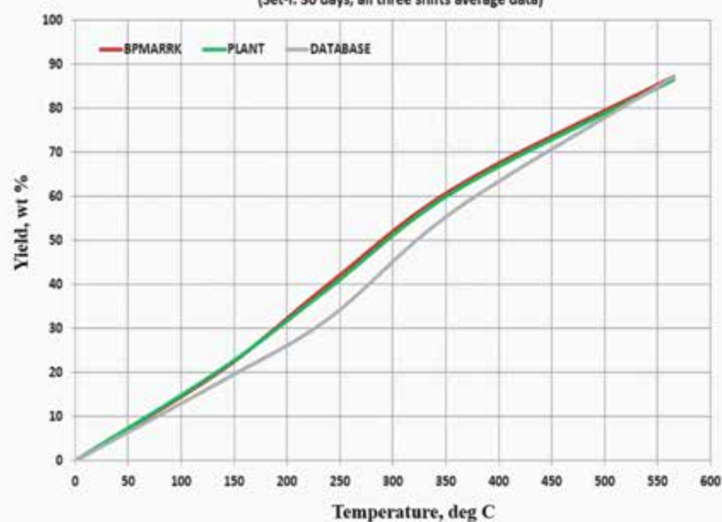
## Software for Real-Time Crude Assaying

BPMARRK<sup>®</sup> is a patented technology for predicting detailed refining characteristics of unknown crude oils or mix in short time based on only four physical parameters. It generates about 500 data information within 2 minutes as compared to 3-4 weeks through conventional laboratory methods. BPMARRK<sup>®</sup> output accuracy is validated by 5 different laboratories in India and International software service providers. ASTM committee recommended this innovation for New Standard development in ASTM D02.04.K section. BPMARRK<sup>®</sup> and Aspen Tech Software's are fully integrated for real-time monitoring and optimization of crude distillation units. Thus making it extremely useful for real time applications.

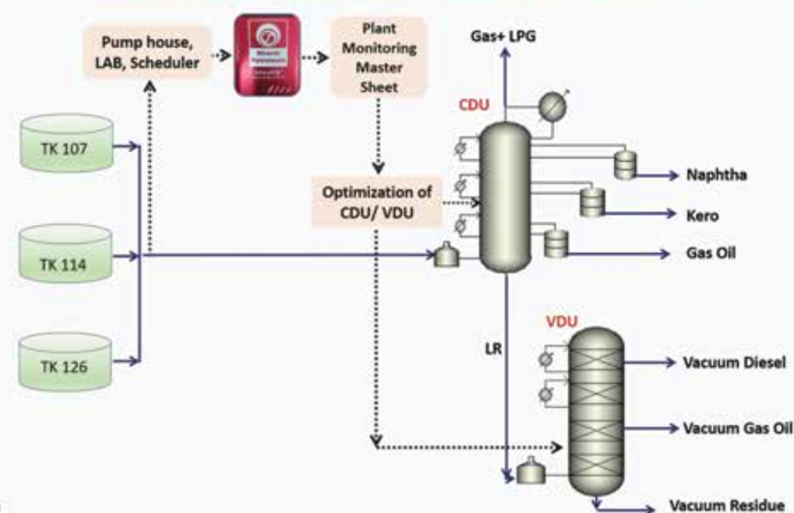
# BPMARRK<sup>®</sup> Plant Trials

## BPMARRK<sup>®</sup> Validation with Plant data

Comparison of distillation yields of BPMARRK with Plant and Database  
(Set-I: 30 days, all three shifts average data)

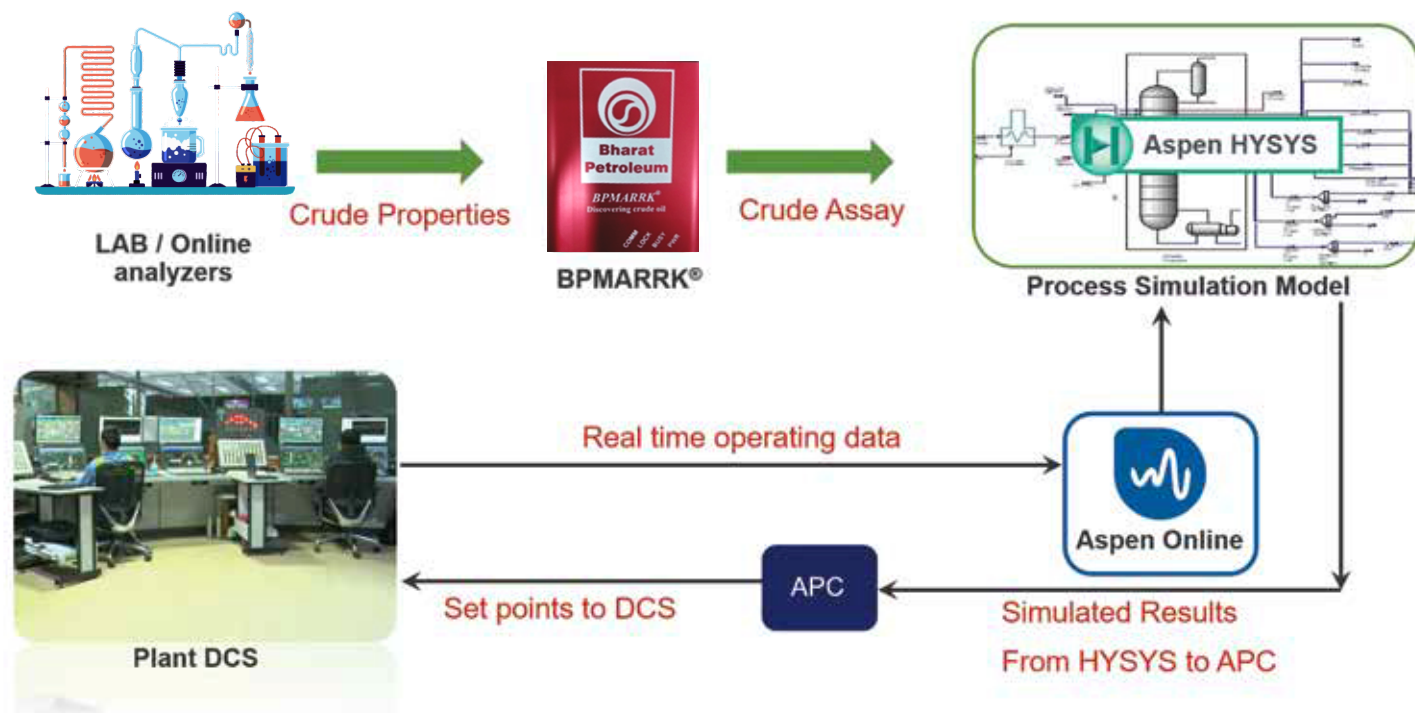


## BPMARRK<sup>®</sup> Real time Monitoring and Optimization

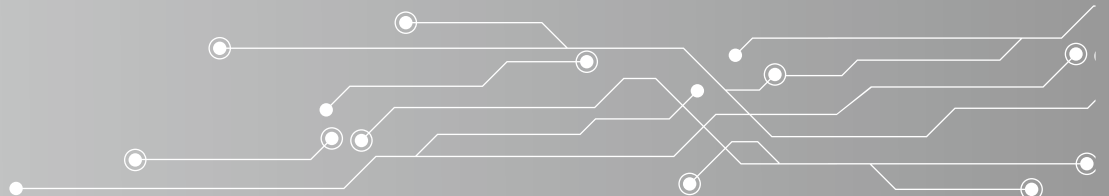
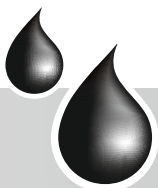


BPMARRK<sup>®</sup> Real-Time Crude Assay application has been tested in 9-10 different crude distillation units in Indian Refineries. The BPMARRK<sup>®</sup> predictions have been found closer to the actual plant performance as compared to the conventionally used database software and SimDist for all the plant trials. Currently, BPMARRK<sup>®</sup> is in regular usage at BPCL group refineries for real-time monitoring of crude distillation units on a daily.

# BPMARRK<sup>®</sup> Integrated Digital Twin Model for Real Time Plant Optimization

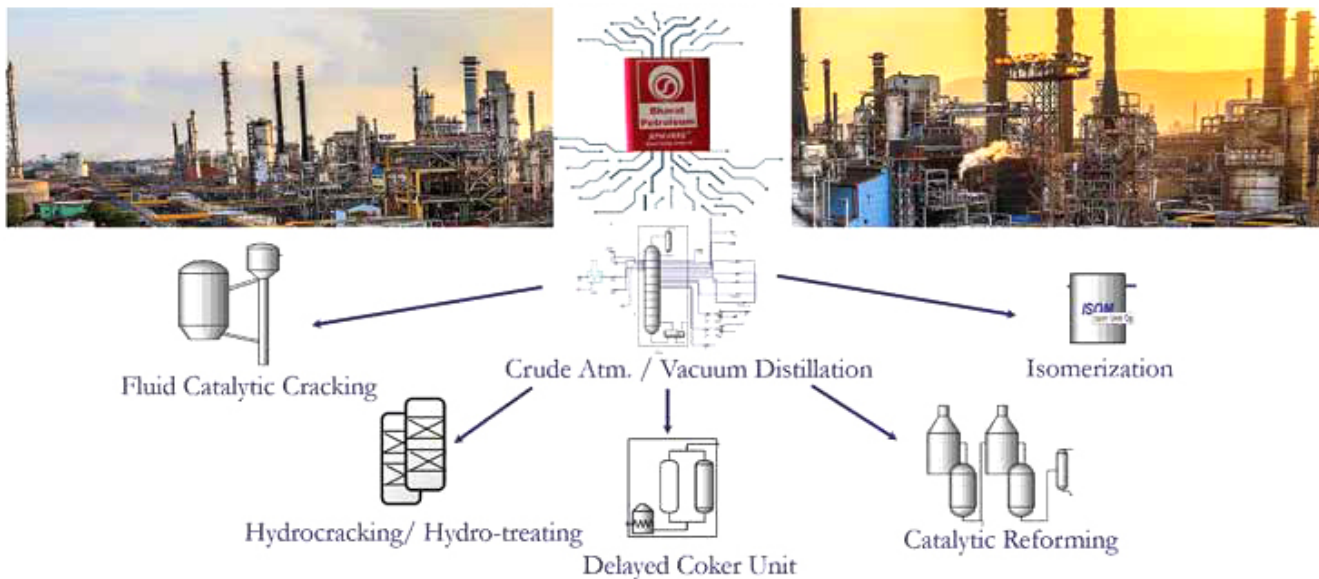


BPMARRK<sup>®</sup> integrated digital twin models bridge the gap between scheduled plan vs. actual by capturing the real time product cut points, product qualities and optimizing the deviation to eliminate the gaps on regular basis. Real-time monitoring and unit-level optimization of refinery units using BPMARRK<sup>®</sup> has been established in Indian Refineries.



# Real-Time refinery wide optimization

First Time in the Refinery World



Smart Solution for Closed loop Real-Time Refinery Wide Optimization

BPMARRK® provides entire refining characteristics in short time and could be readily used with process simulation softwares for real time simulation and optimization of the units. These information can be used for optimization of secondary units such as CCR, FCC, Hydrocracker, DHDS, ISOM and DCU. This smart solution for real-time refinery wide optimization has been developed to close the loop. This will also be the first time in the world to monitor and optimize the whole refinery on a realtime basis.

## Implementation



BPMARRK® predicted the plant distillation profile accurately and identified value addition opportunities to the tune of \$0.1-0.5/bbl. In Kochi Refinery continuous usage of BPMARRK® for real-time monitoring of crude distillation units resulted in value addition of ~ USD 25 million per annum.



# Testimonials

## Sanjay Khanna

Director  
(BPCL, Refineries)

BPMARRK® integration with digital twin interfaces helps us have a scheduled run at regular intervals. The in-house digital twin integrated with BPMARRK® is going to be a new trendsetter in the oil and gas industry.



## Dr. Wang Shu

Director Aspen Tech

BPMARRK® excel report format is designed for seamless integration with Aspen HYSYS and PIMS software's. The workflow for integration of BPMARRK® with assay management for running HYSYS is tested at CRDC and Aspen Tech R&D in v10 plus versions and technical feasibility of integrating BPMARRK® with Aspen Tech has been established.



## Subramoni Iyer

Executive Director  
(BPCL, Mumbai Refinery)

BPMARRK® tool has been very helpful in unlocking the true potential of any unknown crude oil thereby enabling to extract the maximum value addition from any crude being processed.



## P. V. Ravitej

Executive Director In-charge  
(BPCL Refineries)

A lot of possibilities exist to arrive at refinery-wide optimization using the BPMARRK® tool. By predicting near online properties of the crudes, we will generate crude assay and also ensure that feed property of downstream units are predicted for near-online real-time optimization across the refinery. I compliment the team from R&D of BPCL for developing this tool and making it available for not only BPCL group refineries but also it is being now marketed all over the world.



## Murali Madhavan

Ex-Executive Director  
(BPCL, Kochi Refinery)

BPMARRK® a tool developed by BPCL CRDC has the capacity to predict detail crude oil assay of any unknown crude oil within 2-5 minutes time after entering just four physical parameters of crude oil. In Kochi refinery (KR) we had been using BPMARRK® for real-time monitoring of crude distillation units, which has resulted in value addition of up to 0.5 USD /bbl. KR and CRDC jointly received the best innovation in refinery award 2018-19 from the Centre for High Technology, Ministry of Petroleum and Natural Gas.



## Sanjay Bhargava

Ex-Executive Director  
(BPCL, R&D)

BPMARRK® is differentiated among any crude oil for database products in the market by profiling of unknown crude oil or mix in a short time. Further, BPMARRK® has also added advantage over other software as it directly provides hydrogen consumption which is one of the costliest feedstock in the refinery fluid catalytic cracking yield, delayed Coker yield for crude oil selection and ranking purpose in addition to crude assay.



## Awards & Recognitions

### **BPMARRK® received several national/international Awards**

1. Best Innovation in Refinery Digital Award 2021 by MoP&NG, India.
2. Finalist in HP international Award 2021.
3. Best Innovation in Refinery Award 2019/20 by MoP&NG, India.
4. Jury's Special Mention Award 2017/18 'Digital Modeling' category of the manufacturing sector by Frost & Sullivan.
5. Best Innovation in R&D Institute Award 2015/16 by MoP&NG, India.
6. Special Commendation Award 2013/14 for "Innovator of the Year - Team", by Federation of Indian Petroleum Industry (FIPI).
7. Patents are granted in India, USA, Europe & African Intellectual Property Organisation (OAPI).
8. ASTM committee recommended for new standard development in ASTM D02.04.K section.



# BPMARRK<sup>®</sup> in the News

**Business Standard**  
GET ALL NEWS AND UPDATES  
BPCL makes faster, cheaper tech to test crude; in talks with MNCs for sale

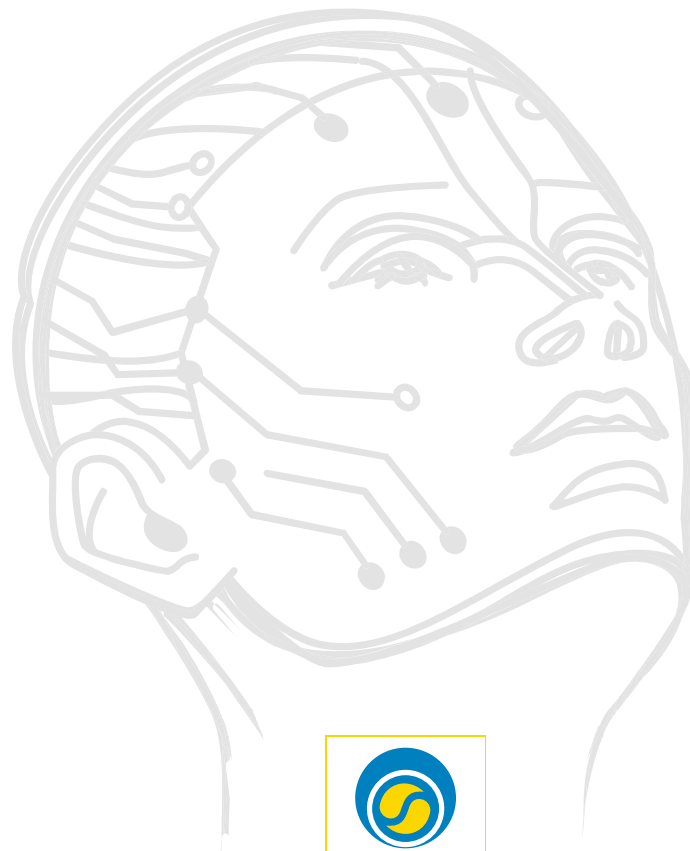
**The Economic Times** Industry  
BPCL develops faster, cheaper tech to assay crude; in talks with MNCs for commercial tie-ups

**Business Line**  
BPCL develops faster, cheaper technology to assay crude  
In talks with MNCs for commercial tie-ups  
The country's second-largest national oil marketer Bharat Petroleum Corp Ltd has developed a novel technology to test the quality of crude oil at a fraction of the cost and time that it

**Energyworld**  
Shaping the future. Once again. Hi-MO 5  
BPCL develops faster, cheaper tech to assay crude; in talks with MNCs for commercial tie-ups  
The company is also in talks with leading international players in the crude assaying industry like Aspen, the largest in the segment, Honeywell, and Emerson, R Ramachandran, Director (Refineries), at BPCL said

**Outlook**  
THE NEWS SCROLL  
BPCL develops faster, cheaper talks with MNCs for commerc  
Mumbai, Apr 5 (PTI) The country's second largest national oil technology to test the quality of crude oil at a fraction of the cost and in  
The technology, which has a number of patents including those from t BPMark, which can optimise varied properties from the crude.  
The company is also in talks with leading international players in the Honeywell, and Emerson, R Ramachandran, Director (Refineries), at B  
"The traditional way of assaying takes 30-45 days for a complete test around 30 minutes for a four-stage test. We can offer it at a fraction of the present cost but we haven't decided on the pricing part yet," the said, PTI.

Press Trust of India (PTI) news on "BPCL develops faster & cheaper technology which tests crude oil assay in an hour" published in several leading newspapers viz. Economic Times The Hindu, Business Lines, Outlook India, India Times, Business Standards, PSU watch, Money Control etc in April 2020.



Corporate R&D Centre

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