

## Case Study

### Bharat Petroleum Improves Blending Performance with Honeywell's OpenBPC



“Honeywell’s Open Blend Property Control enables us to achieve a potential benefit of \$500,000 USD per year.”

Asawari Kelkar, Bharat Petroleum Mumbai Refinery

#### Background

Bharat Petroleum Corporation Limited’s Mumbai Refinery (BPCL MR) is one of the most versatile refineries in India and is a leader in quality, technology, fuel & loss management, safety, human relations, environmental friendliness and operating cost. With the successful implementation of various projects and de-bottlenecking, the Refinery currently processes about 13 Million Metric Tons of crude oil per annum (MMTPA). Also it has processed 61 different types of crude in five decades of its operation, making it one of the most flexible refineries in India.

Recently, Mumbai Refinery has undertaken a refinery modernization project to reduce source emissions, increase its throughput to more than 13 MMTPA, and improve the quality of gasoline and diesel to Euro III and Euro IV standards. This was a unique project because it was fully integrated with the operating refinery in all aspects – crude supply, fuel, water, steam distribution and to blending of all old/new process streams to run to existing tanks.



Bharat Petroleum Corporation Limited’s Mumbai Refinery

#### Challenge

The Refinery has been making a concerted effort to comply with the changing specifications of transportation fuels for gasoline and diesel as defined by the Auto Fuel Policy within India. Over the last 20 years, the transition has been from BS-I (Bharat Standard) to BS-IV standards, which are equivalent to Euro 1 and Euro 4 standards, respectively. Currently the Mumbai Refinery produces 28% of its gasoline as Euro 4 and the balance is Euro 3, while 22% of the total diesel is produced as Euro 4 and the balance is Euro 3 grade. Meeting these different and changing specifications efficiently and cost-effectively were the key challenges.

To meet these challenges, the blending objectives were defined as below

1. Controlling each blend with a minimum giveaway
2. Increasing the “First Time Right” batches (i.e. minimizing reblends).

#### Solution

The refinery determined that on-line blend property control was required since blending is the last activity in the refining operation where the value (i.e. quality) giveaway can be minimized. Honeywell’s Open Blend Property Control (OpenBPC) solution was chosen by Mumbai Refinery as it met all of the technical requirements and was cost competitive. The key technical requirements included:

1. The solution needed to be DCS-independent and be able to connect to the ones existing in the Refinery from Honeywell TPS and Yokogawa DCS
2. Ability to handle rundown blends
3. Support multi-blender optimization where rundown streams are shared between multiple blend headers
4. Honor equipment and inventory constraints.

OpenBPC met all of these requirements and was installed on 5 blenders for Gasoline, Diesel and Fuel Oil.

The implementation services provided by Honeywell included:

- Blend Feasibility study;
- Functional Design Specification;
- OpenBPC Configuration;
- Interface design for Integration with Yokogawa Blend Ratio Controller systems,
- Commissioning; and
- Performance Guarantee Test Run.

In addition, an ongoing Annual Maintenance Contract helped Mumbai refinery keep the uptime of the system close to 100% to ensure that the benefits were maintained after the initial project completion.

**Benefits**

Honeywell's OpenBPC solution enables Mumbai refinery to realize the following significant benefits related to reducing quality giveaway and maximizing the number of "First Time Right" batches:

- For Diesel blending: to target reduction in flash by 1 degree C, which in turn increases naphtha absorption into diesel pool yielding additional ~ \$500K USD per year potential to the refinery margins.
- Lowered excessive octane levels in Gasoline.
- Increase in "First Time Right" batches by 15- 20% for Gasoline and Diesel blenders.

In addition, by increasing the number of "First Time Right" batches, re-blend and correction blends were reduced, thereby ensuring production and delivery of products to be on time. This also helped refinery operations to properly plan and use their tankage inventory to the maximum, which would not be the case otherwise as they would keep some ullage for re-blending purposes. In addition, overall, refinery management has been able to see the value resulting from the capital expenditure for the project.

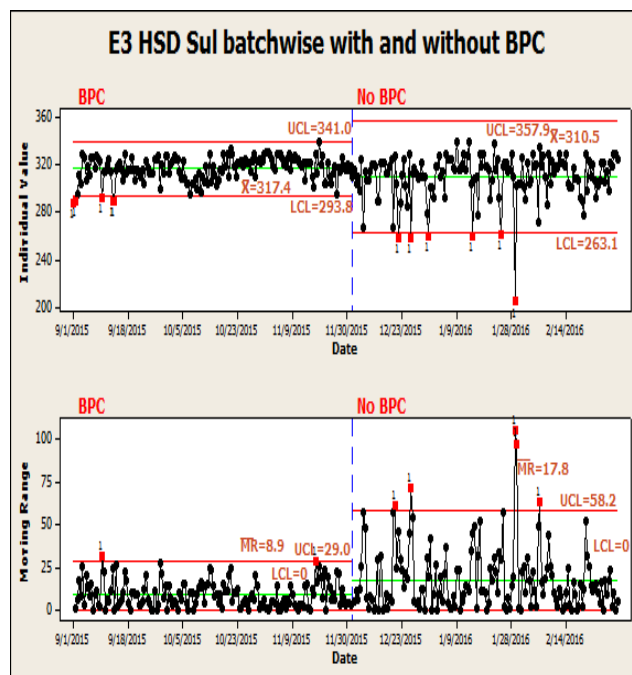
A typical impact analysis for the blended product Euro 3 HSD as quality certified from Mumbai Refinery, when the process was in control of OpenBPC and when it was in manual control is illustrated below:

- The Euro-3 HSD blend is controlled with Open Blend Property Control and Blend Ratio Controller and the uptime trend has been very good (100%). For Euro-3 HSD, in this period, the blend is primarily controlled on "sulfur"

with the analyzer feedback in loop for OpenBPC, to generate set points for the controlled streams, namely Gas Oils, Heavy naphtha etc as configured in the OpenBPC/BRC system and in Standard Operating Procedure.

- With the commissioning of CDU4 in the 2nd week of Dec'15, the blend control is taken in manual mode, as the CDU4 streams are not mapped in OpenBPC/BRC.
- In order to assess the impact of OpenBPC on blend performance; all the batches from Sep'15 onwards till Feb'16 are captured for the Sulfur as reported in the quality certificate. The blend performance until Dec'15 (OpenBPC ON) is compared with the blend performance in manual control (No OpenBPC). From the I-Chart shown below it is inferred that the process is more stable with OpenBPC control and also the reduction in sulphur Quality Give away is also observed.

Sulphur in ppm	With OpenBPC	Without OpenBPC
Upper Control Limit	341	358
Mean X	317	311
Lower Control Limit	294	263
<b>Total Variability</b>	<b>47</b>	<b>95</b>



## Honeywell Advantages

Mumbai refinery recognized the following advantages by using Honeywell technology and services:

- Products are developed specifically with the refinery business challenges in mind.
- Products are easy to understand by all levels of Users which improves acceptance of the applications
- Honeywell provided professional services for the products and addresses any issues in a timely and very professional manner;

For this project, the local Honeywell India office was located at Pune, which is near Mumbai, and this was of strategic significance because Honeywell consultants were readily available to address any issues that arose.

### For More Information

To learn more about how Honeywell's OpenBPC solution can improve performance, visit our website [www.honeywellprocess.com](http://www.honeywellprocess.com) or contact your Honeywell account manager.

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