Benefits
Emerging from ConocoPhillips in May 2012, Phillips 66 is an energy manufacturing and logistics giant. With 15 refineries globally, it has a net crude oil capacity of 2.2 million barrels per day, 10,000 branded marketing outlets and 15,000 miles of pipeline systems.

For updating the gasoline blending system at its Los Angeles Refinery, Phillips 66 turned to Honeywell to implement its OpenBPC (Open Blend Property Control) system for efficiently meeting fuel product quality specifications.

Using OpenBPC, Phillips 66 was able to incorporate new CARB3 clean fuels standards for gasoline set by the California Air Resources Board, expand the number of blend properties controlled and improve blend monitoring capabilities.

OpenBPC also brought a number of other enhancements to the refinery's blending system:

- Flexibility to control header or tank properties in order to support different blending objectives
- Capability to easily modify optimization objectives
- Electronic uploading of blend orders from the refinery planner to OpenBPC
- Validation of the blendstock and product property lab data
- Detailed documentation.

The system has won operators’ acceptance and helped Phillips 66 meet all emission quality standards, achieve a more efficient workflow and reduce giveaways.

Background
The 139,000 bpd Los Angeles Refinery has two linked facilities about five miles apart in Carson and Wilmington, California, 15 miles southeast of Los Angeles International Airport.

The refinery processes mainly heavy, high-sulfur crude oil via pipeline from California and by tanker through a third party terminal in the Port of Long Beach.

The crude oil is processed at Carson, while Wilmington is dedicated to upgrading the intermediate products to finished products. The refinery produces a high percentage of transportation fuels, such as gasoline, diesel fuel and jet fuel, including CARB-grade gasoline. In total, it produces 20 blend grades with the gasoline blender consisting of 20 blendstocks, 24 product properties, live blendstock tanks, non-dedicated pumps, and a Foxboro® I/A DCS.

Refined products are distributed to customers in California, Nevada and Arizona by pipeline and truck.
Challenges
There was a need at the site to update the existing blending hardware and software because there was limited expandability for new blending formulations and blend laws.

The result was both non-optimized blending that was causing lost profits from a failure to meet targets, and a lack of reliability that saw operations forced to perform manual blending during outages, again resulting in non-optimized blend performance.

Implementing the new blending system however, presented a number of challenges:

- Integrating all DCS functionality, such as loop initialization, alarms and trending. (For Honeywell, this was one of the first applications of OpenBPC on a Foxboro® I/A DCS using OPC – OLE for Process Control that enables interoperability between different automation and control applications.)
- Accommodating blending from running gauge blendstock tanks
- Utilizing pumps and tanks that were not in dedicated service

In addition, the new system also had to meet an array of new blending requirements such as the new CARB3 blend rules, a desire to expand the optimization scope to include more properties and a need to improve blend monitoring that compared planned versus actual blending results.

Solution
Honeywell replaced the existing gasoline blending system with OpenBPC, its solution for efficient product blending to required specifications and optimization of the blend operation.

For each product being blended, the solution determines the best choice and relative quantities of components according to product specifications and the components’ costs, availability and specifications. It uses a nonlinear optimizer that adjusts the blend recipe based on analyzer feedback at every control interval to ensure that product specifications are met according to one, or more, objectives selected for the blend: Property Control, Minimum Cost, Minimum Giveaway, or Minimum Distance.

OpenBPC allows the operator to assign a pump to any tank so a limitation of the existing blending system was eliminated. A simple user interface was added to OpenBPC to enable operators to easily make assignment changes which are sent directly to the DCS.

The solution also successfully met the other key requirements: Honeywell reviewed the built-in optimization functions and ensured control of up to 14 or more properties; it provided its Unif ormance® PHD solution to give access to trending data from the historian, improving monitoring, with OpenBPC also delivering blend reports on each optimization cycle. The solution was tested off-line and compared to spreadsheet results and to those from the Phillips 66 refinery in Rodeo, California, to ensure it met CARB3 requirements.

Most importantly, there has been a significant reduction in product quality giveaway and improvements in the blending system reliability.