

Product Information Note

Profit[®] Blend Controller

Advanced Ratio Control of In-line Blending



Honeywell's Profit[®] Blend Controller (PBC) is an Experion[®]-based application that controls the operation of in-line blenders for gasoline, distillate, fuel oil, crude, bitumen and chemical blending applications. PBC ensures that components are blended in accordance with blend recipe specifications by controlling the pumps and flow controllers associated with the blending application.

Benefits include:

- Increased consistency of the blended material through in-line blending.
- Reduced blending setup and execution time and increased blender throughput by automatic equipment sequencing and control.
- Fewer reblend, and reduced inventory through accurate control of the component ratios according to the blend recipe.
- More accurate property control through optional property trim control.

Key Capabilities

Profit Blend Controller is part of Honeywell's Profit Blending Suite within the Profit Blending and Movement Solution. PBC provides the following key capabilities to support in-line blending processes which add several streams together in a common header at a ratio specified by the blend recipe.

- Automatic startup, operation and shutdown of the blender and associated equipment
- Master flow rate setpoint flow control
- Blend flow rate and volume control
- Recipe validation
- Maintenance of the component percentages and additive concentrations as dictated by the blend recipe
- Pacing of the blend flow rate when a controller is unable to meet a high flow demand
- Interface to property analyzers
- Analyzer signal validation
- Abnormal condition monitoring, taking corrective action as required
- Provision for simple property trim control based on analyzer feedback
- Blend header pressure control
- Blend fly-switch - running of consecutive blends without stopping the pumps involved in the current blend
- Blend report generation, containing key blending information, at the completion of every blend

Controller	Source	Material	Recipe	Flow	Status	Pump
1 BaFCV101	STk101	AlkyID	70.00 %	630.00 m ³ /hr	Running	bcamp101
2 BaFCV102		Cat Gas	0.00 %	0.00 m ³ /hr	Stopped	bcamp102
3 BaFCV103	STk103	Reformat	30.00 %	270.00 m ³ /hr	Running	bcamp103
4 BaFCV104	LS	Butane	0.00 %	0.00 m ³ /hr	Stopped	bcamp104
5 BaFCV105			0.00 %	0.00 m ³ /hr	Stopped	
6 BaFCV106		HCN	0.00 %	0.00 m ³ /hr	Stopped	
7 BaFCV108	STk106	MTBE	6000.00 %	74.93 m ³ /hr	Running	bcamp108

Profit Blend Controller is integrated with Honeywell's Experion[®] PKS control system for accurate, flexible ratio control of in-line blending

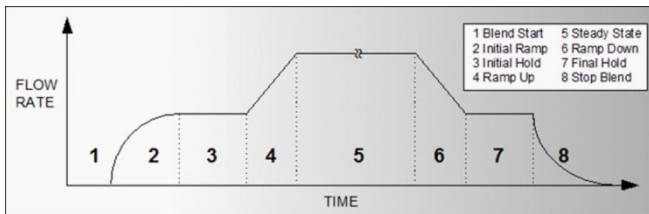
Blend Equipment and Flow Control

Once the blend recipe is validated and an operator chooses to start a blend, PBC starts the component and additive pumps in a configured sequence, and manages the opening of the flow controllers. Component and additive flow rates are manipulated to ensure accurate volumetric blending during both steady state and transient ramping conditions.

The total flow rate is held at an initial hold rate during startup to allow the analyzer signals to stabilize. Once analyzer stability is achieved, PBC slowly ramps the flow to the steady state target flow rate. The flow controller setpoints are based on a master flow rate setpoint.

When the total accumulated volume is within the shutdown volume of the target volume, the flow rates are ramped down by PBC. Once the target volume is reached, PBC shuts down the pumps and controllers.

Prior to the completion of a blend, the blend may be shutdown and restarted, either manually, or under emergency or error conditions.



PBC controls blends according to a configurable blender flow rate profile

Pacing

Pacing occurs when one of the flow controllers indicates that it cannot sustain its requested flow. Pacing can be caused by one of the following conditions:

Output High	The requested output of a flow controller is higher than the configured maximum.
Deviation Low	The difference between the flow controller's SP and PV is greater than a configured percentage.
Setpoint High	The flow controller's setpoint is higher than the configured maximum.

Trim Control

PBC monitors the blend for pacing and decreases the total blend flow rate to a level sustainable by all controllers, ensuring that simultaneous component ratios are maintained. In cases where the blend flow cannot be decreased enough to maintain component ratios, or where a component flow drops below its low limit, PBC can be configured to shut the blend down. Flexible pacing ensures that accurate blend ratios are maintained under abnormal conditions such as equipment malfunctions.

Property Trim Control

Property trim control provides the ability to correct a selected property by changing a specified component's flow rate. With gasoline blending, for example, alkylate may be selected to trim octane. This correction is done independently, without accounting for the effect selected components may have on other properties. For example, increasing the butane of a blend to correct Reid Vapour Pressure (RVP) will also increase the octane of that blend. Trim control can help ensure that blend properties are within specifications and reduce product giveaway and reblends.

Blend Header Pressure Control

The blend header may be equipped with a pressure controller. This controller is used to maintain stable blend pressure, resulting in fewer deviations in component flow.

PBC supports specification of header pressure for each blend state. Normally, the pressure controller controls header pressure to its setpoint. During the start of the blend, PBC controls the output of the pressure controller directly. The operator can manually override this and adjust the output.

Property Analyzer Interface

PBC provides an interface to on-line property analyzers with functions that include analyzer signal validation, instantaneous property values, average property calculation (header and tank property averages), and analyzer status monitoring and property error calculations. Analyzer signal validation is provided by standard control block input checking and includes low rate of change, high rate of change and analyzer range. Analyzer feedback can be used by PBC for property trimming, or when integrated with Honeywell's Profit® Blend Optimizer, for property optimization, thus enabling PBC to achieve accurate property control as well as ratio control.

Blend Fly-Switch

PBC supports the running of consecutive blends without stopping the pumps involved in the current blend. This capability, known as the Blend Fly-Switch, is a mode of operation whereby a new blend is started without stopping the common pumps and flow controllers used in the current blend.

In this mode, the switch is activated manually or upon reaching a specified blend “switch volume”. Blend data for the current blend, such as component volumes, is captured for reporting before being re-initialized for the start of the new blend. Flow totalizers, blend volume, property averages and analyzer property errors are reset and a new blend begins. The blend number for the new blend is automatically incremented.

During the transition to the new blend, pumps and flow controllers used in the previous blend that are required for the new blend will continue running. Pumps no longer needed in the new blend will also be stopped.

Blend Fly-Switch adds flexibility to Profit Blend Controller to support in-line blending to pipelines and other situations where blending operation needs to continue uninterrupted.

Blend Report Generation

PBC automatically generates a new blend report each time a blend is started or closed, and whenever the blend destination is changed in a running blend (i.e. on a destination swing). Blend reports can also be generated on demand and are usually customized for each site. Separate reports are maintained for each blender configured in PBC.

```

14-Dec-04 11:06:53 RPT001: BlendRpt1 : Demanded : Page 1
Blend Report 1
EBC Hogas i Blend Report
=====
Grade :REGULAR
RECIPE ID :RcpIDMapped BLEND NO : 21
BATCH ID :Test Batch I HEELVOLUME : 22.00
TARGET Volume : 10000.00 BLENDED VOLUME : 402.37
Blend State :Steady State Event :Demand Print
START TIME : 10:32 14-Dec-2004 DESTINATION TANK :D7k104

COMPONENT TANK ORIGIN % CURRENT VOL CURRENT % UNITS
=====
Alky STk101 30.00 132.48 31.48 m3
Cat Gas STk102 40.00 156.28 36.94 m3
Reformate STk103 20.00 87.98 21.01 m3
Butane STk104 10.00 44.16 10.57 m3
 0.00 0.00 0.00 m3

ADDITIVE TANK ORIGIN CONC CURRENT VOL CURRENT CONC
=====
NTBE STk105 123.00 0.05 130.35

PROPERTY HEEL SPEC HEADER AVERAGE TANK AVERAGE UNITS
=====
RON 92.00 90.00 98.30 94.91
MON 85.00 80.00 0.00 85.00
RVF 9.00 11.00 0.00 9.00

```

Typical blend report generated by Profit Blend Controller

Each report contains the values for a predefined list of parameters at the time of the report. The data collected normally includes:

- General blender information
- Component and additive data
- Property data

PBC on the Experion Platform

Profit Blend Controller is designed to run on the Experion PKS architecture for distributed control of the field equipment used in the blending and movement operations. Experion graphics are used as the basis for PBC user interface.

Profit Blend Controller makes use of standard Honeywell Experion PKS functions such as control algorithms, messages, logging, as well as alarming and event journaling.

Running on C300 controllers, Profit Blend Controller supports controller redundancy. Alternatively, PBC may run on the Experion ACE node; however Experion ACE does not support redundancy.

Integration with Honeywell Applications

Profit Blend Controller (PBC) is a key component of Honeywell's Blending Suite, which is part of the Blending and Movement Management Solution. Other components of Honeywell's Blending Suite are:

- **BLEND** - Offline multi-period blend planning and event-based scheduling
- **Blending Instructions** - Interface for management and transfer blend recipes / instructions
- **Profit Blend Optimizer** - Online blend control with dynamic recipe adjustment
- **Blend Performance Monitor** - Collect, store, manage blend performance metrics

Together, these components form Honeywell's Blending Suite, a set of integrated tools to deliver optimum in-line blending.

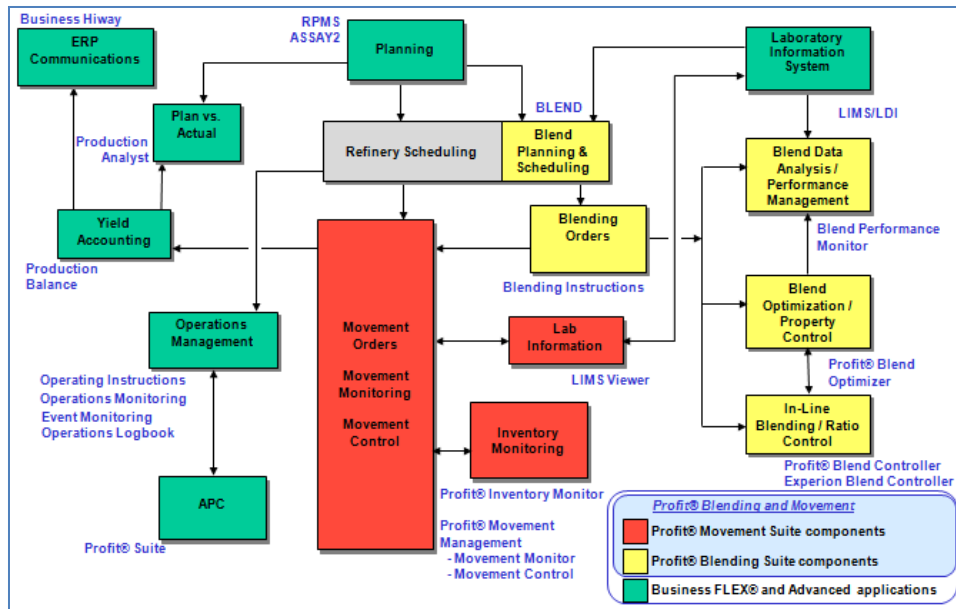
The **Blending Instructions** application is used to specify how a blending operation is to proceed in the field. Each set of blending instructions contains data that uniquely describes a blend and its associated property model. Blending Instructions provides facilities for creating, editing, copying and deleting blending instructions that are, in turn, used by PBC users to define blending operation requirements and ensure that the settings match the physical blending process in the field. These facilities may also be used to define blending operation requirements for field personnel.

Profit® Blend Optimizer provides advanced blend optimization and recipe downloading (through Blending Instructions) to reduce component usage and property giveaway. The blend plan and recipes may be downloaded from Honeywell’s BLEND multi-period blend planning application to PBC via the Blending Instructions application.

PBC blend data is collected, along with data from other sources, by Honeywell’s **Blend Performance Monitor** application, where actual blend data is compared to planned performance. PBC blend data is integrated into a data historian, such as

Uniformance® PHD, via **the Blend Performance Monitor** application for blend reports and archiving.

When PBC is being used with Honeywell’s **Profit® Movement Management** application for movement monitoring and control, component volumes may be uploaded from PBC to **Profit Movement Management** for controlled execution of blend movements. In this case, **Profit Movement Management** handles open/close of valves and start/stop of pumps while PBC controls flow rates.



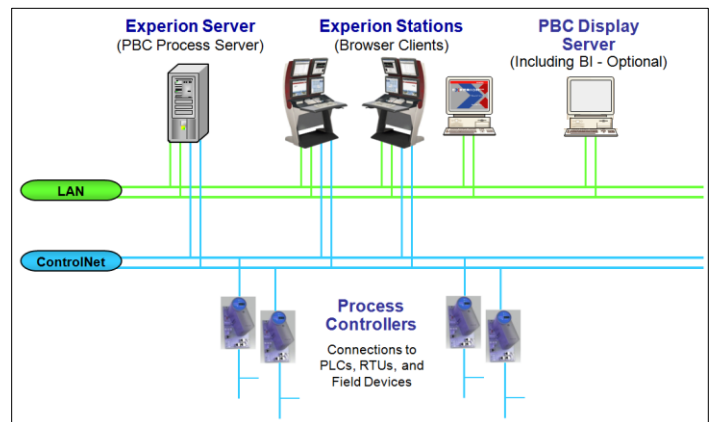
Profit Blend Controller is a key component of Honeywell’s Profit Blending Suite and integrates with other Data Honeywell applications

Integration with Non-Honeywell Applications

Profit Blend Controller is also designed to allow non-Honeywell applications to be interfaced via OPC and XML. PBC may accept blend recipes from a non-Honeywell optimization application through the Blending Instructions application. PBC may also be used for blend ratio control over non-Honeywell DCSs using the Experion system’s OPC connectivity.

System Requirements and Architecture

PBC is designed to operate within the Experion PKS environment. The following illustration shows the hardware architecture recommended for PBC when loaded on the Experion Process Controllers. Contact Honeywell for the latest list of supported Experion PKS releases.



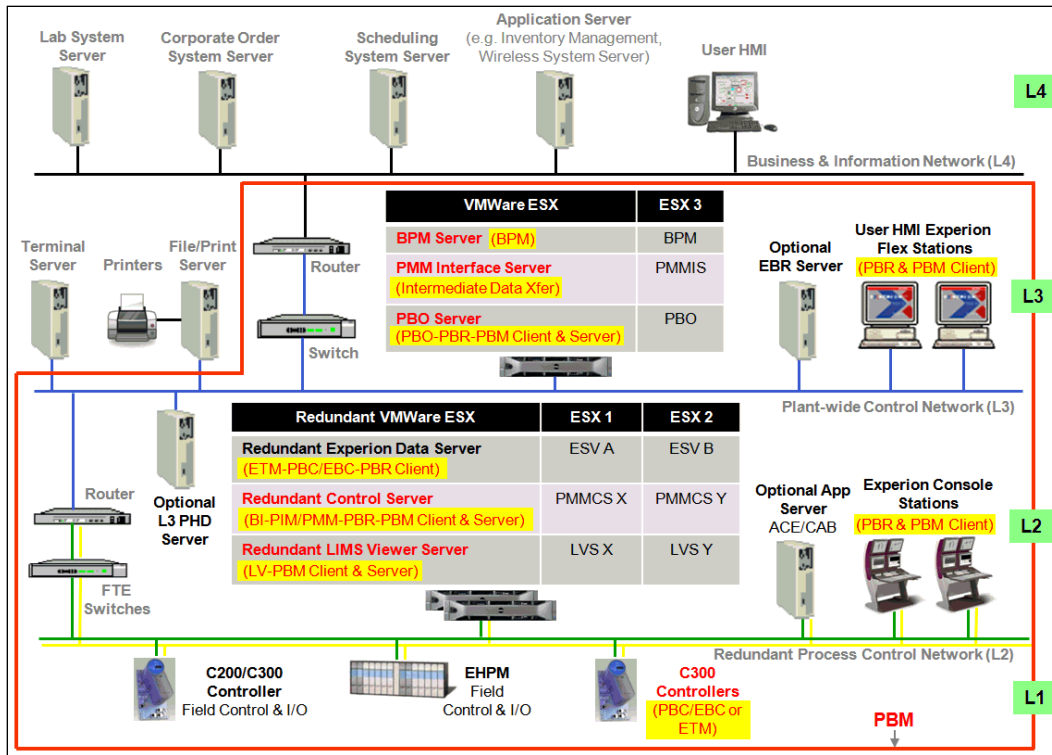
Sample PBC Architecture for Experion Controller-based Systems

PBC software is split between two servers, the PBC Process Server and the PBC Display Server. These application servers can be set up together on an Experion Server or on separate, network connected computers. These servers run Windows Server 2008 Standard Edition (32-bit) with SP2 or Windows Server 2008 R2 Standard Edition (64-bit) with SP1, depending on the version of Experion supported. The PBC servers typically require Intel Xeon X5650 2.66 GHz Quad-Core or faster processors, with at least 4GB RAM and minimum 146 GB hard disk space. For specific Honeywell computer platforms and

supported software that meet these requirements, please contact your Honeywell representative.

Training Services

Training courses addressing Profit Blend Controller implementation, use and maintenance are available through Honeywell’s Automation College (www.automationcollege.com). On-site courses are also offered upon request.



Sample Profit® Blending and Movement solution architecture

For More Information

To learn more about Honeywell’s Profit Blend Controller, visit our website www.honeywellprocess.com/software or contact your Honeywell account manager.

Experion®, Business Flex®, and Profit® are registered trademarks, and Profit Suite is a trademark of Honeywell International Inc.

Honeywell Process Solutions

Honeywell
1250 West Sam Houston Parkway South
Houston, TX 77042

Honeywell House, Arlington Business Park
Bracknell, Berkshire, England RG12 1EB UK

Shanghai City Centre, 100 Junyi Road
Shanghai, China 20051

www.honeywellprocess.com

PN-14-11-ENG
May 2015
© 2015 Honeywell International Inc.

