



Minimum investment and maximum benefits

Innovating Ex-line blending optimization

How to guarantee on-spec products when the refinery is not fully automated?

Invest 2M\$ to fully automate the system?

Invest much less and get most of the benefits of the fully automated system

Our innovating solution efficiently combines off-line recipe optimization, off-line quality predictions and on-line auto-sampling.

The system allows to minimize give away, Re-blend rate and laboratory work load and offers the fastest pay back on the market.

The system does not require interfacing with a distributed control system (DCS) or programmable logic



TECHNOLOGY SUMMARY

The solution provides the End User with the facility to efficiently prepare and run the blending with limited investment.

BLEND PREPARATION

The first step consists in measuring the destination tank heel and blending components quality using **Topnir** model implemented off-line (less than 2 minutes per product are required to output the full suite of properties).

Then the blending recipe is optimized thanks to **OptiBlend**. Fully integrated to Topnir, OptiBlend is a powerful and User-friendly optimizer based on NIR mixing rules. A blending order is output and used either by a Regulatory Blend Controller or directly by the Operators.

BLEND OPERATION

Proportional and representative samples are collected at the blender using the **Feedback Reconciliation Mechanism ISOSAMPLE 5100**. Representative samples at 10%, 50% and 90% of the blend completion (Configurable) are transferred to the laboratory. The optimization loops are performed on those 3 (or more) samples:

- Reconcile and determine the Tank quality using **Topnir**.
- Compare the reconciled tank quality to the specifications.
- In case of deviation, re-adjust the blending recipe using **OptiBlend**.

KEY ADVANTAGES

These successive optimization loops ensure “on spec” production and offer:

- Representative sampling
- High prediction accuracy and fast response time from Topnir and OptiBlend
- Model consistency across the process stages
- Higher accuracy and lower complexity of the optimization loop

This “semi” automatic optimization loop ensures important benefits without large investment, excessive workload nor DCS and automation.

INCREASE PROFITS

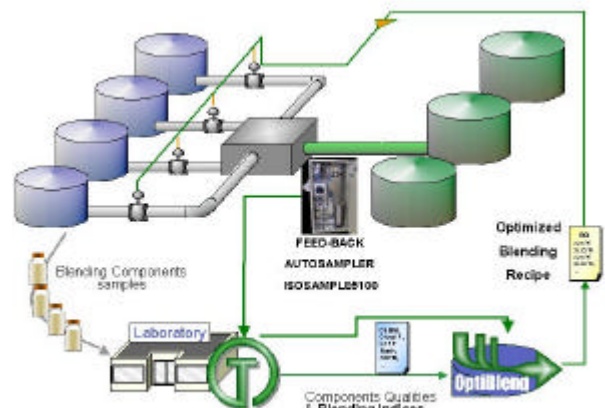
The benefits of analyzing and optimizing blend property control have long been understood in the refining industry and successful applications have demonstrated \$0.05-\$0.30/bbl benefits. Without this technology, a refinery is forced to strike a balance between giveaway and the costs of re-blending, excess inventory, demurrage, or missed shipments.

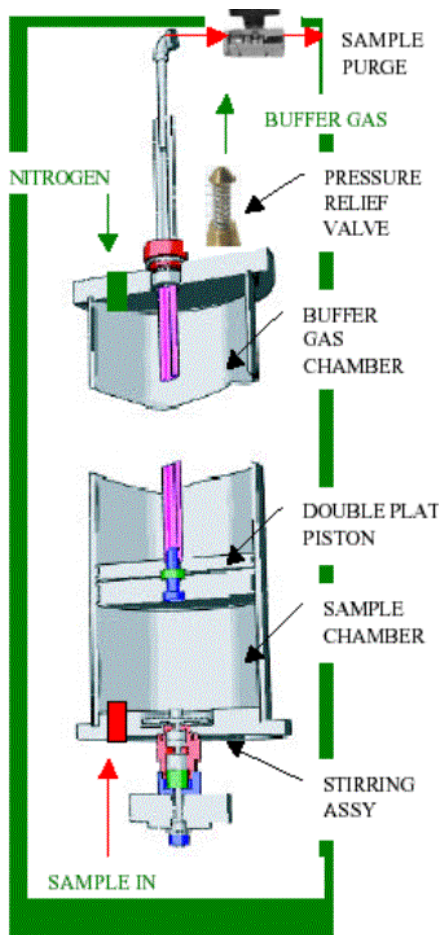
The main financial advantage of this innovating ex-line solution is to offer the End User to draw more than 75% of the total potential benefits of a complete integrated and complex on-line system.

The quick return on investment helps the End User to safely justify further investment to move to on-line optimization at a later stage.

For a Gasoline production of about 1,3M Tons/year, the benefits on give away are proven to be around 2MUSD/year whereas the saving on Re-blend minimization reaches 0.7MUSD/year.

- Give away minimization
- Re-blend reduction
 - Demurrage costs reduction
 - Inventory reduction
 - Yearly production increase
 - Laboratory work load reduction





CONTROL UNIT

Sampling processing is operated by pilot pulses issued by the Control Unit. Grabs are taken in proportion to flow in blender header.

Electrical radiator ATEX II 2G EEx d II B T4 is provided to make the system suitable from -20 to $+50$ °C.

SYSTEM INTEGRATION

All equipment is explosion-proof certified to ATEX II 2G EEx d IIB T4 and is enclosed in a rugged cabinet IP 65 rating to accept location in harsh environment. The front door features laminated safety windows for control unit display view.

FEEDBACK RECONCILIATION MECHANISM ISOSAMPLE 5100

This automatic sampling system features a by-pass loop pump with incremental piston plunger cell to collect a flow proportional sample in three floating piston containers auto-switched at 10, 50 and 90% of blend (user configurable).

Sample is drawn in each piston-floating container at pipeline pressure and kept under this pressure during transportation, homogenization and handling.

This technology is specified by ISO 3170:2004 as the best method giving analytical results that agree closely with on line analysis.

A pneumatic driven mechanical mixer is proposed for homogenization.

Typically a mixing time of 5 min is sufficient but nature of sample can affect the homogenization time.

SYSTEM MAIN FEATURES

- Patented double plate piston barrier prevents weathering and off gazing.
- Sample chamber capacity: 4 dm³
- Design pressure: 18 barg as standard or 30 barg as option.
- Sample temperature: -20 to 120 °C.
- Cylinder wall auto cleaning by piston scrapper and sample chamber reduced to the nominal zero volume before use and during purging.
- All parts in 316 L S.S. polished to $0.2 \mu\text{m Ra}$ and PTFE, no wetted soldered seams: prevents contamination and accepts oxygenates.
- Integrated mixing device to keep standard homogeneity and enable representative sub sampling in lab.
- Closed level indicator; pressure gauge, relief valve on buffer gas exhaust and sample purge valve are integrated.

ISO 3170 CONTAINER

