Critical Data. Real Time.

AIDA

APPLICATION INFORMATION

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Automatic Interface Detection Algorithm

A Game-Changing Solution for Transmix Interface Detection

Transmix: A Major Source of Loss and Waste

In pipelines, transmix is the cross-contaminated mixture generated in the interface between two products. A common example is the interface between diesel fuel and gasoline: the interface mixture is neither diesel nor gasoline. It cannot be sold as either product, and it must be routed into a transmix collection tank. Since the transmix is unlikely to meet any saleable specification, it must be disposed of by transporting to a reprocessing facility at considerable expense and loss of pipeline throughput. To minimize these losses, operators must tightly manage batch sizes, batch planning, batch sequencing, and product delivery scheduling. This comes at a cost to flexibility, responsiveness, and efficient operation. Historical batch cut procedures were largely driven by the lack of available technology to provide real-time indication of the actual interface within the pipeline. Batch timing, manual sampling, and off-line analysis have all proven to be ineffective in providing operations with the data needed to minimize losses through optimal batch cuts.

AIDA for Verax: A Machine Learning Solution for Transmix Reduction

JP3's Verax™ system, a near-infrared (NIR) spectrometer, now offers a real-time solution for precise interface detection in all batch transport applications. The Automatic Interface Detection Algorithm (AIDA) improves upon the existing Verax™ interface detection capability with faster detection times, higher accuracy, and zero sampling or calibration requirement beyond the initial programming. AIDA provides a simple go/no-go indication as to whether a product interface is present on a batch transport pipeline. It is capable of automated control of the valves to switch between the various product tanks and removes virtually all human delays when fully integrated.

The critical difference with AIDA is the implementation of a machine learning (ML) system. As such, the AIDA system learns and adapts without following explicit instructions. By using algorithms and statistical models, AIDA can analyze and draw inferences from patterns in data. AIDA does this directly by decomposing a complex optical signal and classifying both the 'spectroscopic stability' of the product and its identification. It does not require calibration beyond the initial programming.

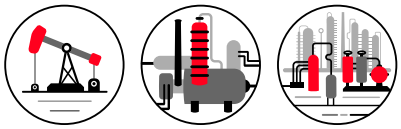
A Powerful New Tool for Reducing Waste and Improving Profitability

Existing interface detection methods are either slow, or unreliable. Manual sampling and analysis is slow and can take multiple hours to confirm that a new batch is on-spec. Existing on-line methods, such as acoustic densitometers, do not provide enough information to definitively identify interface boundaries. Some products and product grades have similar physical properties and on-line measurements still require manual verification.

With JP3 Verax™ and AIDA, on-line identification is rapid and definite. With an update rate of less than one minute, the limiting factor for routing transmix to a holding tank becomes the valve-switching time.

Simple, Actionable Data

The example on the next page demonstrates the responses and outputs of the AIDA system. As pure product moves through the pipe, AIDA identifies it with a product code via Modbus (red trendline). When an interface is detected, a separate transmix detection flag is transmitted (blue trendline).



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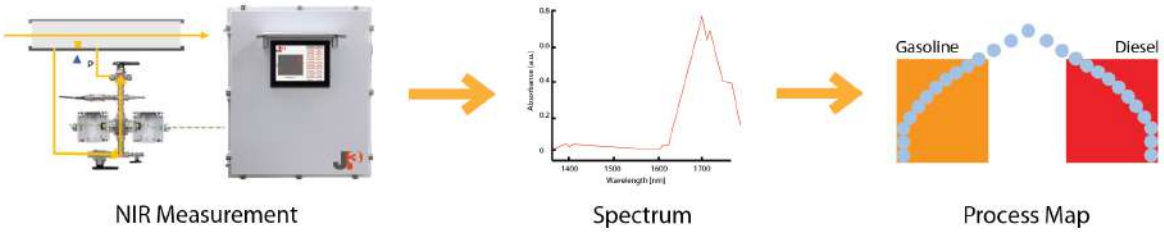
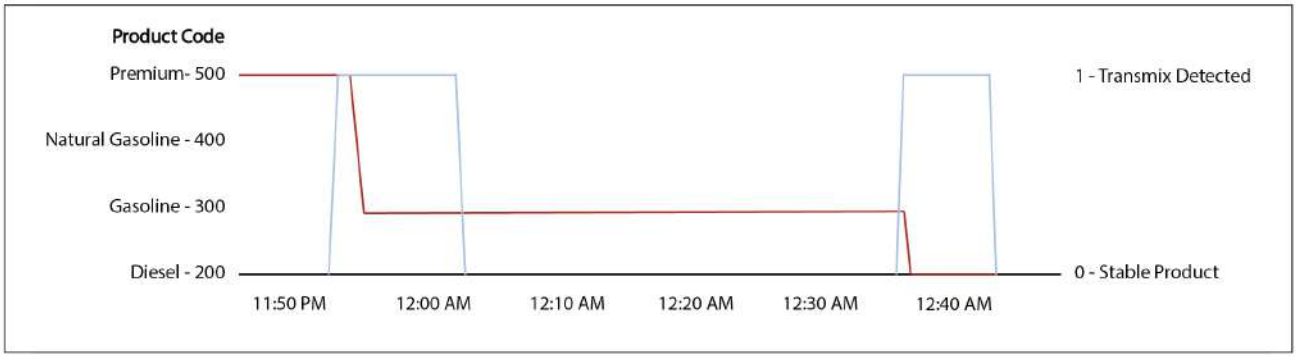
Automatic Interface Detection Algorithm (AIDA)





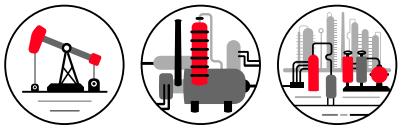
Solid State Spectroscopy for Rapid Response Time

In addition to AIDA, the JP3 Verax™ spectrometer system allows measurement of any number of other product properties. Hydrocarbon composition, Vapor Pressure, BTU, API gravity and other physical properties are all available measurements on an AIDA-enabled JP3 Verax system.

Using patented Near-Infrared (NIR) optical spectroscopy and advanced chemometric techniques, Verax provides direct process readings in a matter of seconds, in both liquid and gas streams. No moving parts, no consumables, and no sample conditioning systems means longer life and reduced maintenance costs. Our patented laser source utilizes constant amplitude correction and wavelength calibration to deliver performance that is unmatched in the industry, with light intensity sufficient to measure nearly any hydrocarbon fluid.

The VeraSight flow cell is installed directly on the process at operating pressure and temperature, requiring no sampling or conditioning systems. The flow cell is connected to the analyzer by a single pair of fiber optic cables, allowing the analyzer to be located as close to or as far from the process as desired. Each process stream – up to eight per analyzer - can support any number of compositional and physical measurements. Our advanced technology means the Verax analyzer produces no emissions and requires no carrier gases or calibration gases.

AIDA-Supported Systems	Verax SSX, Verax CTX, Verax ISX, Verax IMX
Response Time	<60 seconds
Fluid Streams	Refined Products, Crude Oil, Natural Gas Liquids, other batch pipeline
Phase	Single Phase: Liquid or Gas
Line Pressure	0-1750 psig
Line Temperature	-29°C to 93°C (heater blanket required under -23°C)
Line Flow Rate	ΔP 1 PSI minimum between process inlet and return to induce flow



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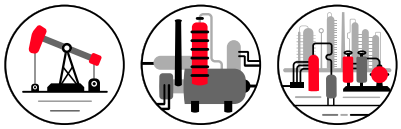

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