



PAC

solid partners
proven solutions

Process Analytics Solutions



We supply the solutions you
demand to manage your margin

www.pacip.com

Company Overview

PAC is a leading global manufacturer of advanced analytical instruments for laboratories and online process applications in industries such as petrochemical, refinery, upstream, biofuels, environmental, food & beverage, lubricants, automotive and pharmaceutical.

With a product portfolio of over 200 testing instruments, PAC serves its customers with cutting-edge technology and significant research and development resources to support its core technologies: chromatography, elemental analysis, physical properties, fuels composition, and laboratory automation.

Our corporate strength is built upon the quality of our product lines, our powerful technology team, and our commitment to customer support.

We're an industry leader in standards development, and we work tirelessly to establish benchmark procedures that scientists and analysts around the world rely on every day to build better products and a cleaner environment.

PAC operates as a unit of Roper Technologies, Inc., a diversified technology company and a constituent of S&P 500, Fortune 1000, and Russell 1000 indices.

Our brands

PAC has combined the world's most respected and long-established brands of analytical and testing equipment into a single manufacturing, marketing and service organization. Each of our brands have long histories of developing best-in-class analytical instrumentation for lab and process applications.

PAC offers a full range of on-line instruments for distillation, sulfur/nitrogen, viscosity, flash point, cold flow and oil-in-water analyses by recognized PAC brands Advanced Sensors, Antek, Cambridge Viscosity, ISL, and Phase Technology. These brands have long histories of providing innovative, highly dependable, and exceptionally accurate instrumentation.

PAC's on-line analytical instrumentation provides highly accurate results with little operator interaction due to their high level of automation. This results in significant improvements with process optimization and production control.

In close cooperation with various standards organizations throughout the world, PAC introduces innovative instruments & applications which adhere to various standards by ASTM, CEN, DIN, GPA, IP, ISO, and UOP. PAC also complies with ISO 9001-2015 standards.



Improve Production Through Real-time Process Optimization and Control

PAC has achieved global recognition over the years with its advanced laboratory analysis equipment and technologies, which provide reliable and accurate results with high levels of automation. Today, PAC is bringing these proven methodologies to the area of process analytics. Even though lab and process are essentially two different worlds, these technologies are transferable within the plant.

Primary process applications include nitrogen for catalyst protection and online sulfur monitoring. Overall customer benefits when using process instrumentation include:



- Increased speed and accuracy due to the real-time nature of the analysis rather than sampling and lab testing
- Decreased cost of ownership versus lab
- Increased productivity due to less interruption of production, sampling, or process anomalies
- Improved distillation analysis for blending operations

Process analytics allow the customer greater control over the process since there is less time between sampling; typical lab analysis run up to 4 times a day, while, for example, analysis within the process could be completed every 5 to 10 minutes. Process optimization and production control are significantly improved.

ECONOMIC IMPACT OF REAL-TIME ACCURATE PROCESS CONTROL



Optimizing the cut point products in the distillation unit can:

- Increase your incremental profits up to \$1M by controlling T90% 1°C closer to the target and increasing Diesel production by 0.5 - 1%

Measuring viscosity in the fuel oil blending unit can:

- Allow operation 1% closer to your viscosity target minimizes the use of ULSD which can save between \$500,000 to \$1,000,000 per year

Measuring boiling point in the gasoline blender unit can:

- Increase incremental profits \$350,000 per month by operating 1°C closer to the target; instrument provides return on investment in 5 weeks

Measuring viscosity in asphalt operations can:

- Monitor to ensure on-spec material is produced since the cost of producing off-spec material is approximately \$136,000 per day

Solutions that optimize your process and your bottom line

You face a continuous challenge of dealing with a varying market demand and prices for your products while your raw material quality - crude oil - changes as you try to reduce your costs. At the same time, you must meet a stringent spec for your products with nearly zero sulfur specification or a boiling range that does not allow for any distraction in your production processes. PAC helps you meet these challenges by providing a wide range of measurement capabilities to ensure your end-products meet your specifications and profitability goals.

CRUDE UNIT

- VIS** Optimize your distillation process by measuring the bottoms of your towers to ensure your high-value products are not finding their way into your low-value streams
- BP** Monitor and control the appropriate percent evaporated temperature (5% or 95%) for streams in the crude distillation unit

HYDROTREATER

- S** Measure sulfur content to ensure sulfur removal is at the correct levels for regulatory compliance
- BP** Measure the boiling point in the hydrotreater to be sure you meet product quality while optimizing feedstock to the plant.

CATALYTIC REFORMER

- S/N** Reduce the impact of sulfur and nitrogen on catalyst performance

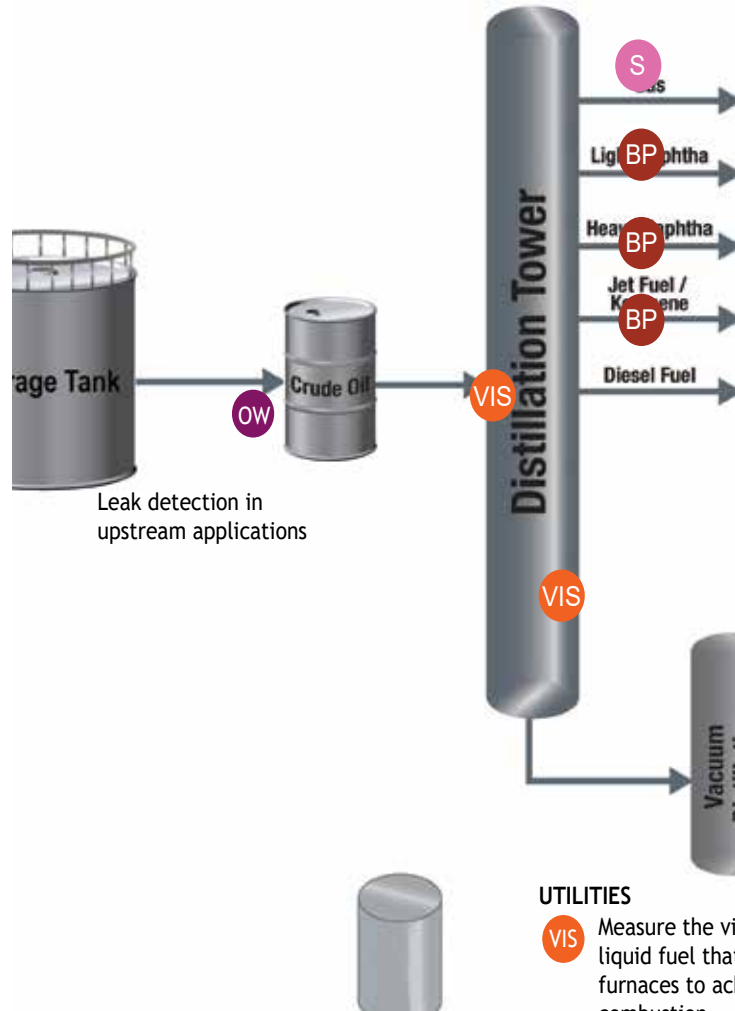
HYDROCRACKER

- BP** Ensure your process is operating at the right production levels for maximum profitability

BLENDING

- VIS** Measure viscosity more accurately in your blends to reduce the amount of expensive materials used in the product
- S** Ensure the proper level of sulfur to comply with regulations
- BP** Use boiling point measurements to determine compound characteristics for on-spec quality

Visit www.paclp.com/process for a complete list of our process solutions



VIS

PAC ViscoSure
Performance, reliability, and precision are critical for viscosity measurements in bottom-tower applications. ViscoSure is the only viscosity analyzer designed specifically for these complex applications

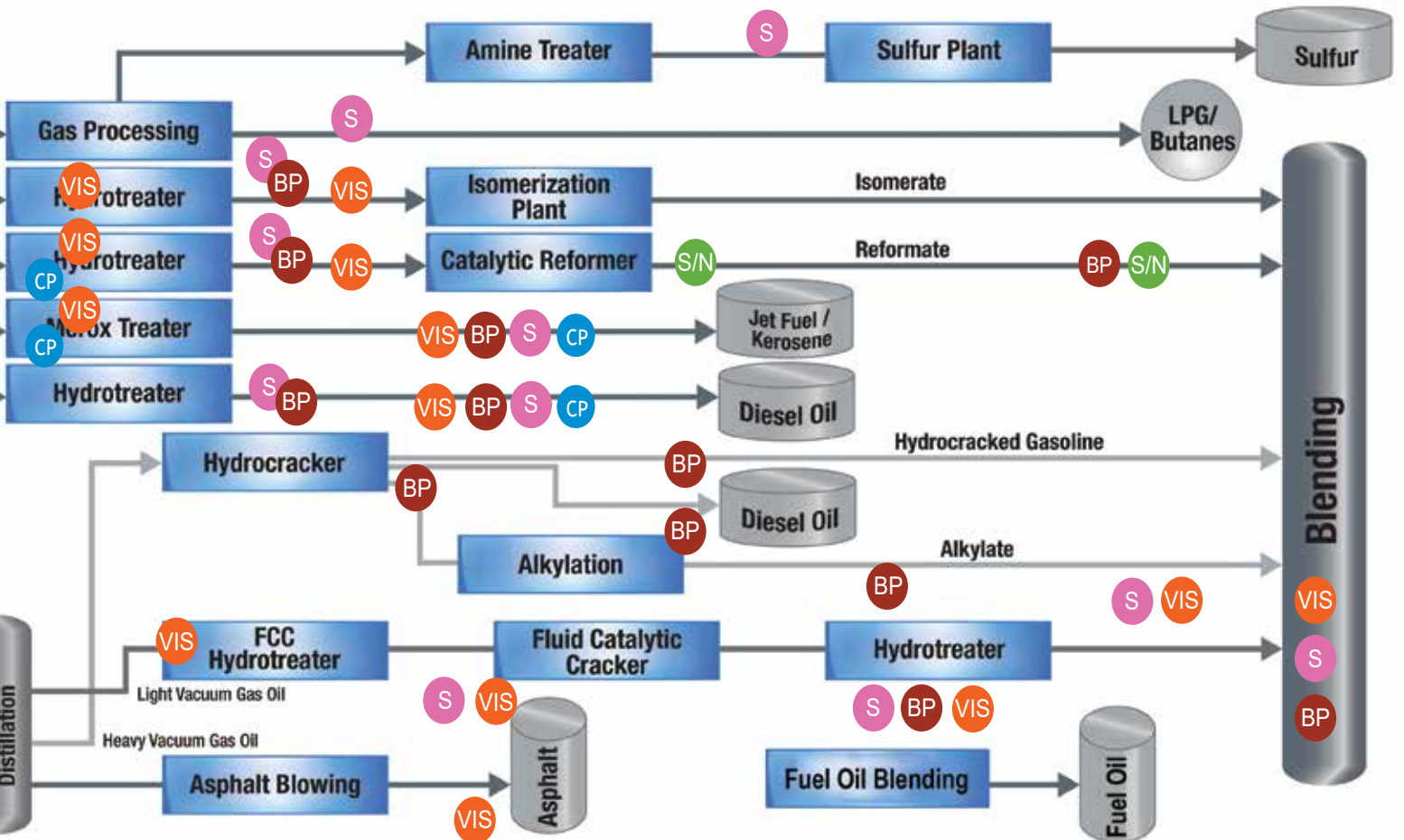
S/N

PAC NSure
Accurate sulfur and nitrogen measurement for quality control and regulatory compliance



MEASUREMENT KEY

- VIS Viscosity
- S/N Sulfur & Nitrogen
- CP Cold Properties
- BP Boiling Point
- S Sulfur
- OW Oil in Water



viscosity of the
 that you feed to your
 achieve an optimum

VIS

**Cambridge Viscosity
 ViscoPro 2100**
 Achieve consistent,
 reliable viscosity
 measurements for
 accurate control



BP

PAC MicroDist
 Accurate distillation in
 less than 10 minutes,
 helping you get closer to
 ideal operating ranges



OW

**Advanced Sensors
 Oil-in-Water Analyzers**
 Trouble free, zero
 maintenance oil in
 water analyzers.



CP

**Phase 70Xi
 Online Analyzer**
 Cloud, freeze and pour
 point online analyzer
 for real-time testing of
 product streams



Full Range of Analyzers for Real-time Process Optimization and Control

The profitability of your refinery is impacted by the complexity of your operation, so you need process-wide analytical solutions that deliver accurate, highly correlated, real-time data. PAC's integrated measurement and testing capabilities give you the data you need to balance supply and demand, so you

can optimize your run rates and keep your process operating at peak efficiency. We offer solutions for distillation, sulfur/nitrogen, viscosity, cold flow, oil-in-water, boiling point and flash point analyses that allow you to achieve greater process optimization and control with less time between sampling.

NSURE

Range	ppb to % levels
Methods	Sulfur: D5453, D6667, ISO 20846
	Nitrogen: D4629, D5176, DIN 38409, TEIL 27

- Fast, precise measurement of liquid, LPG, and gas samples
- 1 minute, high speed version available for sulfur analysis in pipeline applications where response time is critical
- Total sulfur, total bound nitrogen, or both
- Sensitivity from ppb to % levels
- Excellent reproducibility and linearity
- Fast cycle time: 1 to 5 minutes per stream, programmable



VISCOSURE

Range	0.5 - 1000 cP (cSt Available with Densitometer)
Methods	Correlates to ASTM D7483 and ASTM D445

- Tight temperature control without an oil bath reduces maintenance
- In-line viscosity measurement at the product specification temperature increases productivity and facilitates control in difficult processes
- Proven, advanced oscillating piston technology reduces downtime
- Sample conditioning system (SCS) optimizes instrument performance and protects the analyzer from process disruptions



ADVANCED SENSORS OIL IN WATER ANALYZER

Range	Up to 20,000 ppm
Performance	±1% of full scale range

- Laser Induced Fluorescence (LIF), Microscopy Vision and UV Absorbance measurement techniques to meet all challenges
- Patented ultrasonic cleaning eliminates fouling issues and associated maintenance
- Optional integrated spectrometer, a unique feature that can differentiate oil types and exclude chemical interference
- Remote control and monitoring, suitable for unmanned locations and remote process monitoring



MICRODIST

Range	Full distillation curve 20-400°C (68-752°F)
Methods	Direct correlation to: - ASTM D86 - ASTM D7345 - IP 123

- Full distillation curve in less than 10 minutes
- Auto-regeneration of the cell minimizes maintenance
- No flask removal required
- Repeatability +/- 1.5° C
- Accuracy: equal or better than ASTM D86, D7345
- Multi-stream capability



VISCOPRO 2100

Range	Multiple ranges available
Analysis Performance	± 1.5% of reading in CV1 software package ± 0.5% of reading in CV2 software package ± 1.5% of reading in CV3 software package
Methods	Correlates to ASTM D445, D7483

- Easy to install viscometer for most refinery, petrochemical, or coatings applications
- The proven oscillating piston method delivers:
 - Insensitivity vibration
 - Long-term calibration
 - Extremely durable due to no mechanical linkages
 - Highly robust, able to handle heavy samples
 - Small sample size enables easy installation and also reduces waste



PHASE TECHNOLOGY COLD PROPERTIES 70Xi

Methods	Cloud Point: ASTM D5773 (IP 446)
	Pour Point: ASTM D5949
	Freeze Point: ASTM D5972 (IP 435)
Range	-103° to -149°F (-75° to 65°C)

- Fast analysis cycle time of 3 to 12 minutes per stream
- Fully automated; intelligent self-cleaning mechanism
- 15" full color touchscreen
- Efficient elimination of free water and particle removal
- Modular design makes it easy to maintain in the field
- User-programmable cycle time and calibration sample frequency



We are committed to delivering superior service with sales and support offices and a network of over 140 distributors worldwide.

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