Complete Analytical Solutions
Gas Chromatography / Gas / Liquid / Gas + Flame Detection

Visualize > Analyze > Optimize
THE SINGLE SOURCE FOR COMPLETE ANALYTICAL SOLUTIONS

Your toughest analytical challenges need a Rosemount Analytical solution

Whatever your goal – reduce installation and maintenance costs, maximize up-time, protect your plant and personnel, or improve process quality – Emerson offers a complete range of Rosemount Analytical products, services, and solutions, including:

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THE EMERSON PLANTWEB DIFFERENCE

PlantWeb™ is the proven digital plant architecture that uses the power of predictive intelligence to improve plant performance.

While PlantWeb lowers capital and engineering costs compared to traditional DCS-centered architectures, it provides even greater operational benefits by enabling you to improve throughput, reduce conversion costs, and sustain the resulting performance gains. Users report an average improvement of 2% or greater in plant efficiency.

See more at plantweb.com
Optimize production with Rosemount Analytical instruments and PlantWeb™ by monitoring solutions enabling feedback control of important liquid parameters such as pH, electrical conductivity and ORP. Processes will vary depending on the metal involved, the grade of ore, and the technology employed.

**Extraction**
Due to the rapid reactions taking place in an agitated leach process, such as cyanide based extraction, automatic pH control is strongly recommended.

Avoid toxic cyanide leaks into the environment, as they are a risk to personnel and a future liability to the mining company, with continuous pH control.

**Concentration**
Copper sulfide ore processing involves flotation, in which copper sulfide particles are lifted on froth while iron and other common impurities are left behind. The efficiency of this concentrating step is directly dependent on pH. The flow rate of slurry is therefore regulated to keep the pH within the acceptable range.

Alumina is refined from raw bauxite using a phase difference (such as solid to liquid) separating the product from the base metals. Emerson’s flow through toroidal conductivity sensor is used to monitor the digestion step, while the large bore submersion sensor is used to optimize chemical recovery from the tailings.

**Finishing**
Stainless steel impurities can be removed with a short soak in acid, a common finishing technique for steel rolls. Control of the acid concentration is crucial in removing just the right amount of surface contamination and is frequently called steel pickling. The concentration of HCL acid can be monitored using Emerson’s rugged 228 toroidal conductivity sensor.

**Waste Disposal**
Toxic chemical waste from mining and refining operations can be in the form of liquid, gas, and solids. Liquid analysis helps minimize disposal costs involved with chemicals adhering to tailings, toxic cyanide, noxious gases, and acid mine runoff.

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**Emerson mine safety monitoring**

Common to mining operations is the presence of methane, especially in coal mines. Methane is lighter than air and will quickly fill areas undetected posing a serious threat of asphyxiation and explosion if ignited. CO is a colorless, odorless, tasteless gas that is harmful at very small concentrations. H2S is highly poisonous and heavier than air so it accumulates in poorly ventilated areas.

Hydrogen Cyanide is a by-product of gold processing and is highly toxic and must be monitored.

The Millennium II Series of gas detectors provides dual-channels to maximize coverage, low power consumption to improve performance, and intuitive features to simplify operation and maintenance in these harsh conditions.

Emerson’s analytical sensors respond quickly to changes in pH and ORP, protecting both the environment and the mine from the dangerous effects of these chemicals.

**Emerson solutions include:**

- **pH monitoring of cyanide destruction** – 3400 PERpH-X pH sensor
- **Regulating feed of lime flotation cells** – TpH 396P pH sensor
- **Monitoring caustic alumina ratio** – Conductivity Sensors
- **Monitoring concentrated acids** – Toroidal Conductivity Sensor
- **Safety Instrumentation for Hazardous Areas** – Millennium II Series of Gas Detectors, O2 Deficiency, and Flame Detectors
Measurement analysis: the key to efficient operation

> Compensate for variations in product feed composition while measuring product impurities, thus minimizing product loss

Gas and combustion analyzers assist ammonia, ethylene, methanol, polyethylene and polypropylene plants:

> Measure feed purity
> Better control process units to minimize the waste fuel gas available for burning in boilers and furnaces
> Increase energy efficiency
> Obtain feedback on reactions
> Better control of pollutants

Fixed flame and gas detectors protect plant and personnel from:

> Dangerous toxic gas release
> Combustible gas concentrations
> Fast and accurate detection of potentially catastrophic flame events

Ammonia Plants
With the ammonia process, efficient performance is driven by the quality of analytical data that is available. Rosemount Analytical’s approach ensures real-time data analysis and communication to critical systems, resulting in reliable production accounting, optimized performance, and efficient energy management. Rosemount Analytical offers these solutions throughout the plant processes, including:

> Feed purification
> Synthesis gas production / purification
> Ammonia synthesis
> Oxygen-Fired Heater Stacks

Methanol Plants
Rosemount Analytical offers measurement and analysis solutions that:

> Monitor for unconverted carbons
> Minimize losses of methanol in acetone tower overhead
> Minimize impurities in the methanol product stream
> Minimize losses of methanol in methanol tower bottom stream

With Rosemount Analytical instruments and analyzers, chemical and petrochemical plants have access to key measurements that keep them operating efficiently. The precision measurements of our gas chromatographs enable you to:

> Maintain proper chemical ratios
> Monitor for unconverted carbons, monitor purge gas rates and track BTU usage

Emerson plant safety monitoring gives you:

> Accurate monitoring for the presence of toxic and flammable gases in classified areas
> Fast, accurate flame detection
Ethylene Plants
Rosemount Analytical uses a strategic approach to ethylene application solutions that features limiting initial capital expenditures, minimizing ongoing operating expenses, and maximizing overall performance of your analytical equipment. Rosemount Analytical ensures maximum product recovery while keeping product purities within specification throughout the ethylene plant:
> Improve analysis times
> Reduce energy loss in cracking furnaces, fractionation processes, compressors, condenser and ethane separation processes, acetylene removal

Polyethylene / Polypropylene Plants
In a polyethylene and polypropylene plants, an efficient, accurate process is critical to maintain the quality of plastics. Any impurities will degrade the process. Rosemount Analytical offers an analytical solution that measures and tracks critical data to ensure an efficient process:
> Measure ethylene and comonomer feed purity
> Monitor impurities recycled with the diluent
> Attain feedback on reaction kinetics
> Ensure feed purity
> Send data to the control system about reaction kinetics
> Monitor impurities within the recycle streams

Process Heaters
Many chemical processes require that the process liquids and gases be preheated to a designated temperature. Process heater and boilers are the biggest consumers of energy and require O₂ and Combustibles analyzers to control fuel/air ratios to optimize the combustion, and Continuous Emissions Monitoring systems to measure NOₓ, SO₂, CO and CO₂. Analyzers are also increasingly being used to monitor the emissions of greenhouse gases.

Energy efficiency has gained renewed importance in process industries. Better control of process units has minimized the amount of waste fuel gas available for burning in boilers and furnaces.

Pressures from local and national environmental regulatory agencies to reduce NOₓ and other pollutants require better control for all combustion processes, such as process heater furnaces, boilers, incinerators, spent acid furnaces and catalyst regeneration processes.

Emerson offers solutions for all of these applications including emissions monitoring systems. Outstanding reliability and durability of Rosemount Analytical analyzers will keep you operating at maximum throughput.

Emerson solutions include:
> Emissions detection – 700XA gas chromatograph
> Solution concentrations measurement – 228 Toroidal Conductivity Sensor
> Complete Safety Coverage – Phoenix Triple IR Flame Detector and Millennium II Series of Gas Detectors
> Operational cost reduction – PlantWeb Architecture with FOUNDATION® fieldbus technology
> Burner efficiency monitoring – OCX8800 oxygen and combustible transmitter
> Fine tuning the process – X-Stream gas analyzer
Emerson's Rosemount Analytical process gas analyzers, liquid analytical instruments, gas chromatographs, and fixed point detection solutions are uniquely designed to provide extended analysis and coverage in the most extreme plant conditions. Regardless of process complexity, Emerson offers:

> Better process control
> Environmental monitoring
> Billing and cost accounting for product transfers

With fast measurement of key components, accurate qualitative and quantitative analysis enables better, faster decisions that could impact operational performance.

More accurate data also improves the safety and environmental monitoring capabilities of the refinery and chemical process. Through precise measurement of harmful contaminants and ambient air monitoring, Emerson solutions keep plant employees safe and help the plant meet government compliance requirements.

Bottom-line goals can be more easily achieved with analytical solutions from Emerson. With precise product analysis, you’ll be able to produce a final product that more closely meets specification requirements.

**Fuel & Flare Gas Analysis**

Rosemount Analytical gas chromatographs are ideal for measuring H₂S and heating value in fuel and flare gas within refinery applications.

**Sulfur Recovery Unit Incinerator/Tail Gas Stack**

> Sulfur Dioxide (SO₂)
> Oxygen (O₂)

**Gas Processing Unit**

Emerson’s process gas chromatograph (GC) significantly improves the operation of a refinery gas processing unit by measuring real-time chemical composition measurements of the feed stream and sending those measurements to the plant’s control system.

**Isomerization Unit**

In a refinery isomerization unit, a Rosemount Analytical process gas analyzer monitors hydrogen to control the proper feed ratios and measure CO₂ to avoid impurities within the product stream.

**Hydrotreater Unit**

In a refinery hydrotreater unit, a Rosemount Analytical process GC monitors the impurities in the hydrogen recycle stream so additional hydrogen can be infused within the makeup stream as needed and improve quality by minimizing the C₃ and lighter content in the finished product.

**Catalytic Reformer**

The Rosemount Analytical family of process gas analyzers and gas chromatographs analyze byproduct hydrogen gases in the catalytic reformer, such as methane, ethane, propane, and butanes, helping to manage gas ratios, increase availability, reduce maintenance costs, and improve overall control of the unit.

**Fluid Catalytic Cracking and Catalyst Regeneration**

Carbon monoxide and oxygen need to be monitored in the waste slipstream regenerator gas as it is directed to the carbon monoxide boiler for energy recovery. An Analytical process gas analyzer monitors carbon dioxide.
Emerson solutions include:

- Improving burner efficiency and reducing NOx – OCX8800 combustible analyzer
- High solids pH applications in sulfides and oil – PERpH-X pH sensor
- Environmental regulation compliance – CEMS systems monitoring multiple streams
- Flue and flame gas monitoring – 700XA gas chromatograph
- Hydrogen/Hydrocarbons in CCR Nitrogen Header Gas – X-STREAM gas analyzers with web browsing
- Fixed Point Safety Instrumentation – Millennium II Series of Gas Detectors, Ultrasonic Gas Leak Detectors and complete line of Optical Flame Detectors

within the range of 0 to 500 ppm, and oxygen within a range of 0-25%.

**Alkylation Unit**
Analytical process gas analyzers and gas chromatographs measure the isobutane-to-olefin ratio ultimately increasing both availability and throughput.

**Emissions Monitoring**
Refinery process equipment – such as boilers, process heaters, thermal oxidizers, furnaces, selective catalytic reduction units, incinerators, and stacks – must meet local and national environmental regulations for emissions. Rosemount Analytical performs the exact measurements necessary to maintain compliance with these regulations, including:

- Nitrogen Oxides (NOx)
- Sulfur Dioxides (SO2)
- Carbon Monoxides (CO)
- Oxygen (O2)

**Process Heaters**
Many refining processes require O2 and Combustibles analyzers to control fuel/air ratios to optimize the combustion, and Continuous Emissions Monitoring systems to measure NOx, SO2, CO and CO2. Analyzers are also increasingly being used to monitor the emissions of greenhouse gases.

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**Crude Unit Overhead Corrosion Control**
Distillation columns separate light components such as gasoline and heavy components such as lubricants from crude oil. Impurities cause the separated water to become quite acidic and maintaining the proper pH is of paramount importance in preventing corrosion.

**Wastewater Treatment**
API (American Petroleum Institute) Separators are frequently used in the treatment of refinery wastewater that has been contaminated by oil and oil-bearing sludge. Separators use the difference in specific gravity to allow heavier liquids to settle below lighter liquids. pH is measured at the discharge from the API Separator to enhance the removal of suspended solids.

**Toxic Gas Detection**
The hydrogen sulfide content of the feedstock must be continuously monitored to prevent personnel exposure to toxic concentrations, reduce corrosion, and prevent environmental pollution.

**Combustible Gas Detection**
Flammable gas leaks from crude desalting, thermal cracking, coking, catalytic cracking, hydrogen generation, isomerization, and sweetening as well as catalytic dust pose serious safety hazards and require fast, accurate detection.

**Flame Detection**
Due to the hazardous nature of the plant environment with several flammable gas generation points and numerous ignition sources, advanced optical flame detection is necessary throughout any facility.
Roemount Analytical process gas analyzers, liquid analytical instruments, gas chromatographs, and fixed point detection solutions provide extended analysis and coverage in the power plant. Regardless of process complexity, Emerson offers:

**Boiler water treatment**
- Waterside chemistry monitoring: condensate, feedwater, and boiler water measurement
- Monitoring of reverse osmosis and ion exchange demineralizers
- Concentration of regeneration chemicals
- Boiler drum water conductivity

**Gas Turbine**
Emerson offers reliable analytical packages with comprehensive application capabilities for gas-fired simple cycle and combined cycle power plants, including:
- Fuel gas BTU and Wobbe Index
- Continuous Emissions Monitoring

With our complete lines of gas chromatograph and process gas analyzer solutions, Rosemount Analytical analyzes and communicates the analytical data you need for tight process control.

**Fuel Gas BTU and Wobbe Index**
With gas chromatography from Emerson, combustion plants can obtain three key gas measurements:
- Measuring Composition - Accurate determination of fuel gas composition allows for optimal adjustments of the air-to-fuel ratio, enabling the turbine to operate at its most cost-effective, efficient point, where NOx emissions are minimized. In the power industry, where emissions are closely regulated, operating cleaner and more efficiently could mean avoiding costly fines.

> Measuring Wobbe Index - Turbine damage can result from high dynamics from variations in the Wobbe Index. A process gas chromatograph provides the accurate, reliable data required to ensure no damage to the equipment results from operating on low- or mid-range Wobbe gas.
> Measuring Hydrocarbon Dewpoint – Measuring helps avoid turbine damage due to flashback. When higher hydrocarbons or hydrocarbon liquids are present, movement of flame upstream could occur, resulting in catastrophic damage to the turbine. An Emerson gas chromatograph provides an accurate hydrocarbon dewpoint calculation, which indicates when risk increases and attention is required.

**Combustion Flue Gas Analysis**
Heat rate improvement in any large boiler combustion process has never been more critical. Rosemount Analytical oxygen probes help you control the fuel/air ratios for the best efficiency and reduce NOx levels. Careful probe placement can also provide a diagnostic tool for balancing burners and/or coal feed. Trust your process optimization to Emerson – the inventors of the original zirconium oxide technology that is still the industry standard for performance.
- In-situ O2
- CO/Combustibles
Cooling Towers

Corrosion and scale formation are treated primarily by controlling dissolved solids by blow down, reducing alkalinity, and adding inhibitors and biocides. Conductivity monitoring with a toroidal sensor is ideal, while pH controls acid injection.

> Corrosion prevention with cooling water monitoring
> Waste processing for meeting discharge regulations

Continuous Emissions Monitoring Systems (CEMs)

With our continuous emissions monitoring systems, Emerson designs and engineers the right system for your specific needs and provides startup and commissioning support, training, and ongoing maintenance contracts. CEMS systems can be installed to provide data on the following power processes.

> Selective Catalytic Reduction (SCR) Systems – With our CEMS solution, a NOx measurement is used upstream of the SCR to control the feed rate and downstream of the SCR for NOx emissions compliance.
> Gas Turbines – Our CEMS are ideal for the low emissions requirements of gas turbines.
> Cogeneration Facilities – Depending upon the geographic location, type of fuel burned, and plant size, any or all of the following parameters may be monitored: CO, O2, CO2, SO2, NOx, THC, NH3, and opacity.
> H2, CH4, CO Detection & O2 Monitoring – Power plants utilize hydrogen as a coolant in many areas and methane is a common by-product of coal transportation and processing. Both must be accurately monitored in areas where potential combustion is a concern. Toxic levels of carbon monoxide are also present as well as O2 deficiency from airborne contaminants. Our Millennium II Gas Detection series provides multiple SMART sensor technologies to ideally suit any environmental condition and provide optimal coverage.

Plant-wide Flame Detection

Combustible by-products from fuel sources and hydrogen for cooling during various processes is constantly present within power generation facilities. Advanced optical flame detection that is robust enough to perform within these difficult operating conditions is an absolute necessity. The Phoenix Triple IR Flame detector is specifically engineered for these conditions with features that lower maintenance and improve performance.
Emerson makes reliable measurements that are easy and convenient; decreasing maintenance time and cost while complying with stringent regulations. To better define the dynamics of the raw water source being used by a water plant, a number of liquid analytical measurements are made prior to entering the treatment process. Influent monitoring measurements include pH, conductivity, temperature, turbidity, and dissolved oxygen. Some plants also keep a permanent record of each of these measurements for future reference or for detecting seasonal changes in the source water.

**Drinking Water Treatment**
Continuous analyzers monitor the process from start to finish ensuring processes are as efficient as possible and disinfection levels meet regulations.

**Pretreatment**
Municipal water treatment facilities use caustic soda for pH adjustment, ion exchange regeneration, and on-site generation of sodium hypochlorite. This is one of the first steps to water treatment and is prior to the filter bed at the mixing tank. Measuring whether caustic soda is in the stream, which indicates if the feed pumps are working, can be achieved with toroidal conductivity.

**Filter Performance / Clarifiers**
The filtration stage removes residual solids resulting from the oxidation of organic chemicals and microorganisms in the primary disinfection stage. Periodically, the filter must be back washed to remove the fine suspended matter and sediment that collects in the filter media. As an indication of filter performance, the effluent from the filter beds is continuously monitored with a turbidimeter. Turbidimeters also monitor clarifier performance.

**Disinfection**
Free chlorine, chloramine, or total chlorine sensors measure disinfection residuals, allowing plant operators to calculate the CT (concentration and time) values used to document the disinfection procedure. Chlorine or ozone sensors monitor primary disinfectant levels, while pH sensors measure the acidic or basic nature of the water, which can impact the effectiveness of the disinfection chemicals used.

**Desalination**
Desalination refers to the water treatment process of removing salts from water, Thermal techniques, such as multistage flash (MSF) distillation, and membrane technologies, such as reverse osmosis (RO), are the two major processes.

Scaling is one of the biggest problems in multi-stage distillation applications. Maintaining a pH balance of 5.7 or less is crucial to minimize scaling. Monitoring can be achieved using a 3900 pH sensor.

Contacting conductivity sensors placed in the feedwater and permeate let operators monitor the overall water quality and efficiency of the RO treatment.

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**Emerson solutions include:**

- Measuring ozone dosing for primary disinfection – 499AOZ
- Monitor and report turbidity of the filter effluent – Clarity II On-Line Turbidimeter

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**Safe water is our top priority**

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Reliable treatment solutions

Homes, industry, schools and businesses all generate sanitary wastewater, or sewage. Online analytical solutions reduce labor with rugged instruments and sensors provide data for increased regulation compliance and reduced maintenance costs. Monitor your wastewater streams to meet local and federal laws that safeguard water quality, while optimizing your multi-stage wastewater process to speed up the natural processes of water purification.

**Influent Treatment**
In many wastewater plants, the influent pH and conductivity are measured. These measurements are used for monitoring purposes, and will alert the plant operator of a possible upset condition. A sudden change in influent conductivity, for example, may indicate an unusual discharge upstream from an industrial plant.

**Preliminary Treatment**
Analytical measurements in this hostile environment are ideally made using the Model 5081 Family Transmitter, which is both corrosion resistant (NEMA 4X) and suitable for explosion proof and intrinsically safe environments (NEMA 7B).

**Secondary Treatment**
Secondary treatment relies upon biological processes to further purify the wastewater. Maintaining proper dissolved oxygen (DO) levels is critical to the activated sludge process.

**Final Treatment**
Final treatment consists of chlorination and dechlorination. Water quality systems monitor the final effluent for compliance and reporting purposes, and can include pH, turbidity and chlorine measurements.

**H₂S, CH₄, Cl₂, NH₃, and O₃ Detection**
Wastewater treatment processes use and produce a variety of highly toxic and combustible gases that require close monitoring to ensure the safety of personnel, equipment, and the environment. Hydrogen Sulfide and Methane are present in large quantities during the processing stages.

Ammonia, Ozone, and Chlorine are utilized during the decontamination and purification stages and must be closely monitored during process and in storage areas.

Emerson solutions include:

- **Effluent pH monitoring** – coating resistant TUpH™ 396P
- **Chlorine measurement in final treatment** – TCL Total Chlorine System
- **Monitoring and controlling oxygen in activated sludge process** – Dissolved Oxygen sensors
- **Monitoring conductivity at influent and outfall** – 228 Toroidal Sensor
- **Combustible and Toxic Gas Monitoring** – Millennium II and Millennium II BASIC
The industry standard for critical pharma measurements

Emerson solutions include:

- **In-line conductivity measurement to ensure water quality of WFI** – 403 Endurance™ conductivity sensor helps meet federal guidelines for sanitary standards.

- **Fermentation monitoring to ensure stable readings throughout the batch and meet spec** – Steam sterilizable HX 338 pH sensor and Hx348 DO sensor.

- **Monitoring acid strength with a CIP-resistant, sanitary inductive conductivity probe** – PUR-Sense 225 3A approved conductivity sensor.

- **pH measurement to control acid addition and dosing, while ORP indicates the extent of a reaction** – PUR-Sense™ 3800 sensor.

- **Residual chlorine measurement ensuring final water disinfection** – 499ACL chlorine sensor.

**Pharmaceutical**

Significant process optimization, improved cycle time, repeatability, as well as quality and yield improvements can be realized when the proper sensors and instruments are utilized. Fit for purpose pH and conductivity sensors play critical roles in the operation’s control strategy. Choose them when you have a requirement for sanitary sensors fit for your purpose.

**Fermentation & Cell Culture**

One of the most critical process challenges in fermentation and cell culture is to maintain the optimal pH level. This is due to the process utilizing a living organism such as a yeast, bacteria, or fungus strain to produce an active ingredient.

Another big challenge for the pH measurement is the cleaning process. The fermenter or bioreactor has to be sterilized prior to the start of either process to ensure no cross batch contamination or any unwanted growths are present.

Emerson’s pH sensors assist this process by:
- Minimizing off line calibration
- Reducing pH drift
- Reducing off-spec product
- Maximizing on-line pH control uptime

All of which save maintenance time, and minimize lost batches from contamination.

**Water-for-injection**

Conductivity is the proven and accepted in-line indication used to ensure water quality for water-for-injection and purified water. Emerson conductivity sensors meet USP guidelines, can be calibrated to NIST standards and have surface finishes better than 16 μinch Ra. Rosemount Analytical analyzers provide alarms for raw, uncompensated conductivity based on the water temperature.

**Steam-in-Place**

Dissolved Oxygen and pH are critical measurements in the bioreactor. Tight control parameters affect product yields and speed of reaction. Emerson sensors withstand steam-in-place (SIP) cleaning since residual buffer solutions may affect the drug harvest campaign. The 3800 pH sensor and the Hx348 Dissolved Oxygen sensor withstand frequent SIP cleaning cycles, providing highly accurate measurements with fast response.

**Chromatography & Purification Systems**

Biopharmaceutical Chromatography Systems are designed for separating and purifying proteins and bioengineered products. The systems must maintain a hygienic design with wetted surface finish < 20 μinch Ra and material traceability to maintain system integrity.

Conductivity measurement plays an important role in the purification process. Conductivity is one of the determinants of when to start and when to end the collection process. Tighter conductivity control will improve purity as well as:
- Improve secondary collection processing
- Ensure thorough cleaning validation
- Validate cleaning regimen

**Hazardous Gas Monitoring**

Catalytic hydrogenation, fluid-bed drying and granulation, combustible solvents and dust can produce dangerous levels of combustible gases that must be closely monitored. Solvent vapors and fugitive emissions in the process area, mixing and drying areas, drainage and piping corridors, and storage areas also generate both toxic and combustible gases that pose a serious threat to facilities and personnel.
Beverages
As the largest ingredient in beverages, water requires liquid analytical instruments. The analyzers and sensors play a critical role in producing a consistently high quality product and maximizing production up time. Water purification of source water must be done and conductivity monitors the effectiveness of filtering technologies.

Clean-in-Place
Process piping and vessels used in the food and beverage industries require periodic cleaning without dis-assembly. Clean in place (CIP) is used to remove residue from previous batches and to sanitize the process piping and vessels. Since the various cleaning solutions used are more conductive than the water used for flushing and final rinsing, conductivity can be used to monitor the various cleaning steps and final rinse.

Dairy
Dairy producers have unique analytical requirements for monitoring phases of product, as well as complying with 3A standards. The following measurements help ensure the processes run optimally:

- Conductivity for flavor additions, cleaning, and cheese production
- pH in yogurt processing, cheese making, and fresh milk
- Ozone for sterilization

Disinfection
Ozone has excellent cleaning characteristics and disinfects more powerfully than other chemical disinfectants. For bottle disinfection, the Emerson chlorine sensor is rugged and reliable.

Brewing
Brewing has traditionally been an art, but brewers now approach production with an eye on consistent quality; long shelf life and efficient production. Modern brewers use the following analytical measurements to achieve these goals:

- Dissolved oxygen in hot wort, fermentation, aging tanks, filtering, and packaging
- Conductivity for cleaning-in-place, and phase separation
- pH in water purification, wort, and fermentation

Wastewater
Food-processing wastewater consists of wash down of products (fruits and vegetables), run-off from equipment and tank cleaning, chemical cleaning solutions, and other food byproducts such as spent grains. Critical analytical measurements in wastewater treatment include residual chlorine or ozone, pH, dissolved oxygen, and conductivity. Waste water treatment plants must be optimally managed and robust sensors must be used to maximize up time. Diagnostic information determines sensor health and ensures the sensors perform optimally.

Hazardous Gas Monitoring
The food and beverage industry involves many processes that utilize flammable and toxic materials that could be detrimental to the health and safety of your equipment and personnel if left to accumulate. These include natural gas in process of baking, drying, and industrial steam generation, ammonia (NH₃) in refrigeration units, and Chlorine (Cl₂) as a bleaching agent and disinfectant. By-products include CO₂ in carbonation and fermentation, Hydrogen Sulfide H₂S and Methane in wastewater treatment ponds.

Boilers + Emissions Monitoring
Boilers provide steam for cooking, sterilization, and other needs, and are the largest energy users in many facilities. Reliable combustion analyzers optimize fuel/air ratios, maximizing efficiency, minimizing thermal NOₓ, and minimizing the amount of greenhouse gases that are generated.

Many states require a suite of gas analyzers mounted at the smoke-stack, or a Continuous Emissions Monitoring System (CEMS). Our X-STREAM™ process gas analyzers provide accurate analysis to ensure compliance.

Emerson solutions include:
- Fermentation pH monitoring – PUR-Sense pH Sensors
- pH measurement for separation of starch – TUPH 396R Retractable pH sensor
- Clean in place applications for tanks and vessels – PUR-Sense Conductivity Sensors
- Fermentation dissolved oxygen monitoring – HX438 Sensor
- Monitoring hot wort pH and wort pH – PERpH-X 3400 Retractable pH Sensor
- Flammable and Poisonous Gas – Millennium II Gas Detectors
There are many processing steps used to turn wood into paper products. Liquid analytical measurements provide substantial control solutions that can reduce costs with a typical payback time of less than one year.

**Chemical Pulping**
Strong liquors are used to delignify the wood chips and the spent liquors are constantly collected and regenerated. Conductivity measurement is used to monitor the strength of these liquors and control the pulping process. Measuring white liquor alkali concentration allows optimization of cooking time and product pulp properties. With a toroidal conductivity sensor, measuring the alkali concentration entering the digester allows fine control of the liquor flow rate to match the wood loading, improving throughput and minimizing variability. The pulp slurry undergoes bleaching, blending, and refining prior to being run in the paper machine. pH control during these stages is essential for consistent quality. pH is measured in the wet end of the headbox and in bleach lines with the TUph™ line of pH sensors.

**Stock Filtrate Monitoring**
Conductivity indicates the cook is complete and the pulp is released from the digester and further processed.

**Bleaching**
Pulp stock from the digesters is washed; screened; and put through the bleaching process, which brightens the pulp. Toxic chemicals used in this process include Cl₂ and ClO₂ with sulfur dioxide produced as by-product. Exposure to these toxic gases can be deadly and leaks must be quickly detected and contained.

**Boilers + Emissions Monitoring**
Combustion analysis is used to optimize black liquor conversion and energy extraction in the furnace without compromising the safety and reliability of boiler tubes. The furnace is also optimized by controlling excess combustion air levels to maximize smelt recovery, prevent corrosion and maximize steam production.

Pulp and paper facilities may be required to measure SO₂, O₂, CO, NOₓ, and opacity in the recovery boiler.

**Gas Detection**
Chlorine (Cl₂) and Hydrogen Sulfide (H₂S) along with other volatile sulfur compounds are characteristic of these processes and must be closely monitored with fast and accurate fixed gas detection using Net Safety Millennium series of detectors.

**Emerson solutions include:**

- Combustion analysis to optimize black liquor conversion – 6888 in situ O₂ Analyzer and 396 pH sensor
- pH control in the headbox to assure consistent quality – TUph™ 396 and 398R pH Sensors
- Increasing net bleaching efficiency and lowering cleanup costs – TUph 398R pH Sensor
- Monitoring condensate to prevent boiler damage – retractable ENDURANCE™ Conductivity Sensor
- Continuous toxic gas and flame monitoring – XChem gas sensors combined with optical flame detection
SureService™ Customer Support Modules

Rosemount Analytical’s SureService modules enable you to build a custom support agreement to meet your specific needs.

Startup & Commissioning Services

Error-free startup and commissioning is important to the overall success of any project, and SureService Startup and Commissioning services offer the fastest, safest way to get your new instruments and analyzers up and running. With SureService Startup & Commissioning Service, customers enjoy fast, seamless services conducted by dedicated analytical experts, coupled with informal, on-the-spot training for the customer’s service team.

Emergency Onsite Support

With the SureService Emergency On-site Service module, a factory-trained and certified field service engineer will be dispatched to your plant on a priority basis. The immediate availability of one of our Rosemount Analytical analyzer and instrument field service experts can help you reduce or eliminate downtime and unplanned outages.

Scheduled Maintenance Contract

Contracts are a proactive approach for maintaining system integrity. Designed to help keep your Rosemount Analytical analyzers and instruments operating at optimum performance, this SureService module helps you ensure critical maintenance and backup services are performed regularly.

Training Programs

Maximize your investment in training through a customized SureService training package. Rosemount Analytical training experts work with the customer to develop a comprehensive training program that uses a combination of classroom training and on-site training.

Systems Engineering & Project Management

Rosemount Analytical world-area dedicated analytical systems experts manage and implement full-scale analytical systems projects of all sizes and scope. We use detailed work processes to ensure that systems are delivered on time and on budget, including:

- Project Identification & Scope
- Initial Engineering & Design
- Implementation & Testing

> Commissioning & Startup
> Training
> Maintenance
> SureService Contracts

Custom-Engineered Sample Handling Systems

A sample handling system is critical for an accurate and reliable analysis because it removes contaminants from the sample stream; ensuring samples are dry and free of solids. Rosemount Analytical builds each sample handling system to meet the unique needs of each gas stream composition. Our modular sample handling systems combine moisture removal, sample and calibration valuing, flow regulation and power distribution in a compact, wall-mounted or free standing enclosure. Common features of sample handling systems include:

- Heated and open-panel designs
- Area-rated classification of all components
- Automatic calibration and validation available as an option
- Variety of sample probes to extract a reliable and stable sample from the process

DEPEND ON EMERSON’S WORLDWIDE STRENGTH

Emerson Process Management is part of Emerson, a global company that brings together technology and engineering to provide innovative solutions for our customers in a wide range of industrial, commercial and consumer markets. Our priority is to design, produce and deliver products, systems and solutions that make people’s lives better.
Precise component analysis makes the difference

Rosemount Analytical is known for best-in-class analyzers that redefine industry standards. With our customer-proven gas chromatographs and process gas analyzers, we offer reliable, simple, user-friendly gas stream analysis.

What makes Rosemount Analytical analyzers stand out from the rest?
> Lowest total cost of ownership
> Most reliable, rugged designs
> Designed specifically for the needs of the process industries
> Best service and support

Why field-mounted analytical equipment?
> Bring your analyzer as close as possible to the process
> Eliminate the need for analyzer houses
> Reduce measurement time lag
> Keep it simple

700XA Process Gas Chromatograph

The 700XA process gas chromatograph offers increased analytical capability, reliability, and maintainability, combined with a wide range of analysis options in a field-mounted gas chromatograph (GC). The 700XA is designed for a variety of refining, petrochemical, power, and environmental applications where selected components in gaseous or liquid streams must be precisely monitored on a continuous basis.

Fully compatible with modern Ethernet networks and DCS communication, this FOUNDATION fieldbus-approved gas chromatograph is designed specifically to be field mounted without the protection of expensive shelters.

MON Series Gas Chromatograph Software

MON2020 and MON2000 software collects and organizes the analyzed data from Rosemount Analytical gas chromatographs. With the ability to communicate to the enterprise network or export to numerous file types, MON is a powerful software tool that ensures operators, engineers, maintenance personnel, and management have access to critical data such as current and archived chromatograms, alarm history, event logs, and maintenance logs. MON2020 is used with the XA platform GCs, and MON2000 is used with the 500.
Model 500 Gas Chromatograph

The Model 500 gas chromatograph is an ideal choice for compositional analysis, including C1-C6+, N₂, and CO₂, when separate electronics and oven are desired. It provides optional hydrocarbon dewpoint calculations and C6+ with trace H₂S analysis. The Model 500 is available in one- or two-oven configurations.

Rugged enough to maintain repeatability over a complete operating temperature range, the Model 500 can handle up to 12 streams with a wide variety of gas and liquid applications in a single unit. In addition, the Model 500 can be assembled with an additional oven, further extending its analysis capabilities.

1500XA Process Gas Chromatograph

With the proven analytical components of a field-mounted GC combined with the large oven capacity of a traditional air-bath oven design, the 1500XA gas chromatograph is specifically designed for trace sulfur, trace hydrocarbon, and other complex, high-temperature applications requiring short analysis time and maximum sensitivity.

X-STREAM™ Enhanced Process Gas Analyzer

Simplify analysis through a web-based user interface and a host of new features and capabilities with the X-STREAM Enhanced. It’s easy to operate and performs better than any other process gas analyzer available and features:

> Lowest span drift at less than 1% per week
> Lowest temperature dependency, specified at 0.5%/10 Kelvin
> Broadest total operating temperature range

> Highest protection classes with IP66 and NEMA 4x certifications
> Tight repeatability and zero drift
> Best warranty available (3 years)

The X-STREAM Enhanced offers a user-friendly web interface that allows users to securely log in to perform remote diagnostics, including alarm management and parameter calibration, from any Ethernet connection.

Environmental Chamber Testing

Every Rosemount Analytical process gas analyzer and gas chromatograph undergoes climate testing in an environmental chamber to optimize the analyzers for temperature drift (PGAs) and repeatability (GCs). Our environmental chambers offer insight into the behavior of the analyzers to ensure on-spec performance at installation.
Continuous Emissions Monitoring Solutions

Emerson offers a variety of environmental emissions analysis through out continuous emissions monitoring solutions (CEMS). Our CEMS options range from pre-engineered, packaged systems to more complex custom-engineered systems that measure multiple gases using data acquisition and handling. They are designed to perform the required daily zero and span checks automatically and unattended. Automatic calibration makes it less costly and time consuming to meet the environmental requirements for daily validation of the system.

Rosemount Analytical CEMS monitor:

> Sulfur Dioxide (SO₂)
> Nitrogen Monoxide (NO) / Nitrogen Dioxide (NO₂)
> Carbon Dioxide (CO₂) / Carbon Monoxide (CO)
> Oxygen (O₂)
> Total Hydrocarbon (THC)
> Hydrogen Sulfide (H₂S)
> Opacity

For true process optimization, you need direct, in-line, in-process measurements. With Rosemount Analytical instruments, you can operate at the optimum fuel/air ratio, minimize NOₓ production, and balance large furnaces. While there is increasing focus on the production of greenhouse gases, better furnace efficiency ensures that the minimum CO₂ possible is produced.

Designed in consideration of CEMS regulations as specified in clean air laws around the world, the Rosemount Analytical CEMS assist with meeting data reporting requirements and emissions laws and ensures certification and compliance with local regulatory agencies.
6888 In Situ Flue Gas Oxygen Transmitter
The Oxymitter 4000 measures post-combustion oxygen in the flue gases of large boilers, industrial furnaces, process heater furnaces, kilns, and any large combustion process. The O₂ measurements can be used by a control system or a boiler operator to improve efficiency by:

> Optimizing fuel/air ratio means best efficiency, and minimum greenhouse gas production.
> Tight O₂ control produces less NOₓ emissions, and also minimizes the production of greenhouse gases.
> An array of O₂ analyzers reduces flue gas stratification, achieving better balance in large furnaces.

OCX8800 O₂ / Combustibles Transmitter
This rugged, compact unit offers the ability to measure both oxygen and combustibles in flue gases with temperatures up to 2400°F. The OCX 8800 has either HART or FOUNDATION Fieldbus communication protocols, and is available in general purpose or hazardous area versions.

> Rapid and accurate measurements of excess oxygen and combustibles mean significant fuel savings
> Close-coupled extractive system minimizes complexity and maintenance
> Optional integrated sensor and electronics simplifies and reduces cost of installation
> Thru-glass IR pushbuttons permit full interface with the electronics without opening the covers. No hot work permit required.
> Field replaceable sensors, temperature elements and heaters increase ease-of-maintenance
> 316LSS, Inconel 600 and ceramic materials resist corrosion and high temperatures, increasing probe life
> Acid service cells are available
> Sample blowback and sensor cleaning cycles minimize maintenance
> For more information refer to PDS 106-880.A01

Hagan Fan/Damper Actuators
Industry needs muscle to control fans and dampers accurately and reliably. Rosemount Analytical’s pneumatic power positioners have been satisfying these exacting control requirements for many years in countless applications – from power plants to steel mills to refineries – where positioning speed and accuracy are taken for granted.

> A family of sizes provides torque from 240 ft./Lbs. to 7200 Ft./Lbs.
> Options available include electric position transmission and/or contact closure for remote use and position lock up upon power air supply failure.
> Optional Fisher FieldVUE DVC 6000 provides more accurate positioning, and full Valve link diagnostics.
> For more information, refer to PDS 102-201.A01
Emerson’s Net Safety

Our fixed toxic and combustible gas detection, flame detectors, and specialized safety and security products are designed for harsh, industrial environments. Strict quality standards, and intelligent design and engineering practices are followed to assure our customers that the products meet the demands of the toughest industrial environments and applications. All products are certified to the strictest global standards for safety and performance.

Millennium II Series — Fixed Gas Detection

The Millennium II Series has been engineered from the ground-up to include the innovative features that engineers and operators in the field demand, while providing rock solid day-to-day operation in even the most challenging applications. The Millennium II pushes the boundaries of what you can expect from your detectors.

> Single, multi-channel, or BASIC controller configurations.

> Lowest power consumption of any gas detection package available on the market.

> Wide voltage range allows for greater stability and system compatibility.

> SMART universal toxic and LEL gas sensors are completely interchangeable with controller.

> Highly robust construction and reliable performance designed for extreme conditions.

> Advanced NE-MOS solid state, catalytic bead, electrochemical, and infrared sensor technologies.

> Superior OLED display functions down to -55°C and up to +85°C.

> Simple to use intuitive menus and controls with field selectable ranges and multiple languages.

> Fast digital communications between sensor and controller.

> Analog, relay, RS485 Modbus, and HART outputs available.

> Global hazardous area approvals and performance certifications.

> Full event data logging of over 980 sequential events.

> Wide range of accessories including duct mounts and environmental protection.

Banshee343 — Ultrasonic Gas Leak Detection

The Banshee343 is an advanced next generation gas leak detection system. Providing instantaneous detection of deadly gas leaks without requiring any gas concentration, the Banshee343 is not affected by inclement weather, wind direction, leak direction or any potential gas dilution.

> Wide area coverage, 40 meter three dimensional radius

> -55°C — +85°C operating temperature range

> Never requires calibration

> Piezo-electric sensors never expire

> Monitors for both toxic and LEL gas leaks simultaneously

> SonicCAL automatic self testing and sensor cleaning system
**Phoenix Triple IR Flame Detector**

Very serious risks to human life, productivity and equipment are always present at industrial facilities that store, transport and process flammable or explosive chemicals. Automatic flame detection and protective action must be initiated within seconds whenever a fire ignites. Emerson’s Phoenix Triple IR Multi-spectrum flame detector ensures the reliable and instantaneous flame detection response required in high-risk applications while providing the highest false alarm immunity.

- No external reflector – greatly reduces faults and maintenance where salt, heavy rain, sand or snow are constantly present.
- Lowest power consumption of any flame detector on the market.
- Wide voltage range allows for greater stability and system compatibility.

> Automatic visual integrity confirms optical functions – universal test lamp available.
> Automatic digital zoom eliminates false alarms and maximizes sensitivity.
> Designed for extreme conditions, operational from -50°C – +75°C.
> Market leading 7 year warranty.
> Global certifications and approvals.
> Field-selectable sensitivity and delay settings allows operators to fine tune at installation site.
> Wide area coverage, extended range with fast response times.
> Analog, relay, RS485 Modbus, and HART outputs available.

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**UV/IR Flame Detector**

Two spectrums of radiation must be recognized and confirmed by precisely tuned sensors for the UV/IR to initiate a fire condition, greatly reducing false alarms while providing critical safety performance to your site personnel. Hydrocarbon and hydrogen based flame detection.

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**UV Flame Detector**

Reacting to a single spectrum of ultraviolet radiation found in flame, the UV delivers the fastest response and widest field of view available. The UV does not react when exposed to incandescent or fluorescent lighting, heaters or sunlight. Hydrocarbon and hydrogen based flame detection.

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**Oil Mist Detector & Air Particle Monitor**

The Millennium Oil Mist Detector & Air Particle Monitor (APM) is an explosion-proof, infrared detector designed to monitor ambient air for particulate matter such as smoke, oil mist, carbon, dust or ash. This unique product is the only detector of its kind that is certified explosion proof – Class 1, Division 1.

Proven installed applications include duct monitoring, battery rooms, engine rooms, compressor stations, high pressure hydraulic line monitoring, turbine enclosures, and many more.

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**Explosion-proof Surveillance**

Emerson offers two unique surveillance solutions for classified areas – our VID-JB video camera and our IRM90-R passive infrared motion detector.

The VID-JB offers a high resolution composite output that is compatible with all industry CCTV systems and can be combined with our flame detection solutions (FlameWatch II).

The IRM90-R scans its wide field of view for any infrared radiation level fluctuations in order to relay an alarm condition.
Proven accuracy and reliability

Emerson offers a complete range of Rosemount Analytical analyzers, transmitters, sensors and systems for the continuous online measurement of pH, conductivity, dissolved oxygen, ozone, chlorine, and turbidity. Whether you need two-wire, four-wire, or wireless instrumentation, we have the right product solution for your application – for general purpose or hazardous area installations.

Quick start programming gets you up and running within one minute, saving valuable time at commissioning. A variety of digital communication options and 4-20 mA outputs deliver rich diagnostic data on both the process and the health of the instrument, saving time and money diagnosing possible problems.

Water Panel Solutions

Chlorine packaged systems are reagentless systems that reduce cost and hassle.

> The FCL measures free chlorine
> The MCL measures monochloramine

The WQS is a customizable “Plug and Plumb” system for the distribution environment to monitor water safety.

Clarity II™ Turbidimeter System for the determination of turbidity in water. It is compliant with both the US EPA Method 180.1 and ISO 7027.

Online Wet Chemistry Analyzers measure hydrazine, sodium, silica and phosphate in boiler feed water.

Ion Selective Dual Ammonium/Monochloramine or Ammonium/Fluoride measuring systems measure ammonium, fluoride and monochloramine levels for drinking water treatment.

pH Sensors

Emerson sets the industry standard by offering solutions for a variety of applications ranging from low to very high temperatures, fouling applications and processes with harsh chemicals.

> 3900 general purpose sensor with rugged body and AccuGlass pH glass.
> For high performance / high temperature applications, depend on the PERpH-X pH sensor
> For life science and food and beverage, the PUR-Sense, 3800 steam sterilizable sensor withstands 140° C temperatures for 50 steam cycles.
> 3200HP pH sensor is for the accurate measurement of pH in low conductivity water. Suited for condensate, boiler water, and feedwater in power plants or any industrial boiler.
> TU pH sensors are designed for improved life in harsh, dirty, and abrasive applications.

Amperometric sensors

Amperometric sensors measure dissolved oxygen, ozone and chlorine. These membrane sensors are rugged and easy to maintain.
**Conductivity Sensors**
Emerson’s wide selection of stable and accurate conductivity sensors includes toroidal, contacting and four-electrode.

- **ENDURANCE™** sensors are suitable for the conductivity measurement of ultra-pure water to cooling water.
- Toroidal sensors are used in corrosive liquids and in liquids containing suspended solids.
- **PUR-Sense™** four-electrode conductivity sensor monitors CIP applications for food and beverage industries.

**TWO-WIRE INSTRUMENTS**

**5081 Transmitter**
Features a rugged, weatherproof, corrosion-resistant enclosure.

- Available to meet NEMA 7B explosion proof standards.
- Digital communication protocols: HART® and FOUNDATION® fieldbus, allowing access to AMS (Asset Management Systems)

**1066 Transmitter**
Broad range of measurements, advanced communications capability, and unique ease-of-use.

- Uses HART version 7 and FOUNDATION fieldbus digital communication protocols.
- User-definable measurement diagnostic parameters.

**WIRELESS INSTRUMENTATION**

**6081**
Remote locations and installation costs are no longer barriers to getting information you require for critical applications.

- 6081-C measures conductivity
- 6081-P measures pH
- Self-organizing network for high data reliability and network stability
- Industry leading wireless security

**SMART Instruments**
SMART analyzers and sensors eliminate one of the largest problems with measuring pH – field calibration. Now with Rosemount Analytical SMART technology, calibration is truly plug and play. Each SMART pH sensor comes with factory calibration embedded in the sensor’s memory. Simply connect the sensor to a Rosemount Analytical SMART analyzer and automatically upload the latest settings - no muss, no fuss calibration.

**FOUR-WIRE INSTRUMENTS**

**56 Analyzer**
- High resolution screen shows faults and warnings in color for immediate recognition of an out of range parameter.
- Extensive help screens for rapid start up.
- Process disruptions can be pinpointed in the color trending graphs.
- Information can be downloaded in Excel format to a USB drive.
- Proportional, Integral and Derivative (PID) control.
- TPC (Duty Cycle Control/Pulse Width Modulation).

**1056 Analyzer**
- Single or dual input analyzer.
- Large, easy-to-read display allows operators know at a glance if the process is within allowable parameters.
- Easy to install and wire.

**1057 Analyzer**
- Three-input analyzer.
- Choose from pH/ORP/ISE or Contacting Conductivity/Resistivity, in any combination.