



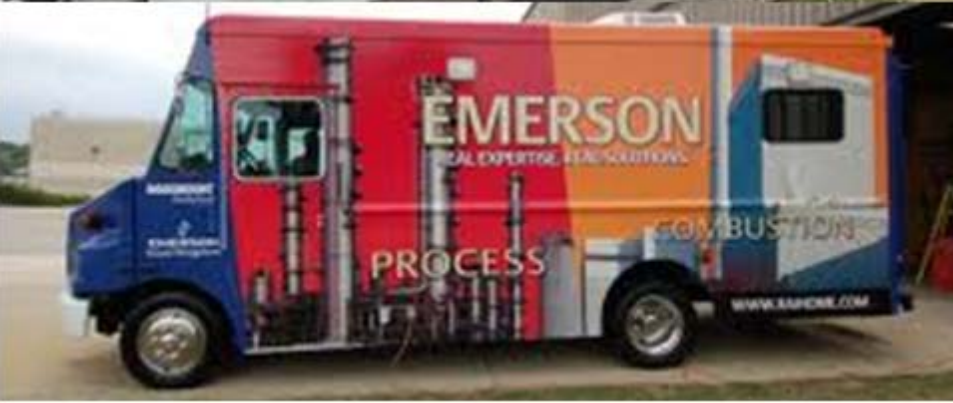
Analyze and Detect it for Higher Safety, Reliability and Consistent Product Quality

Rajesh Nogaja

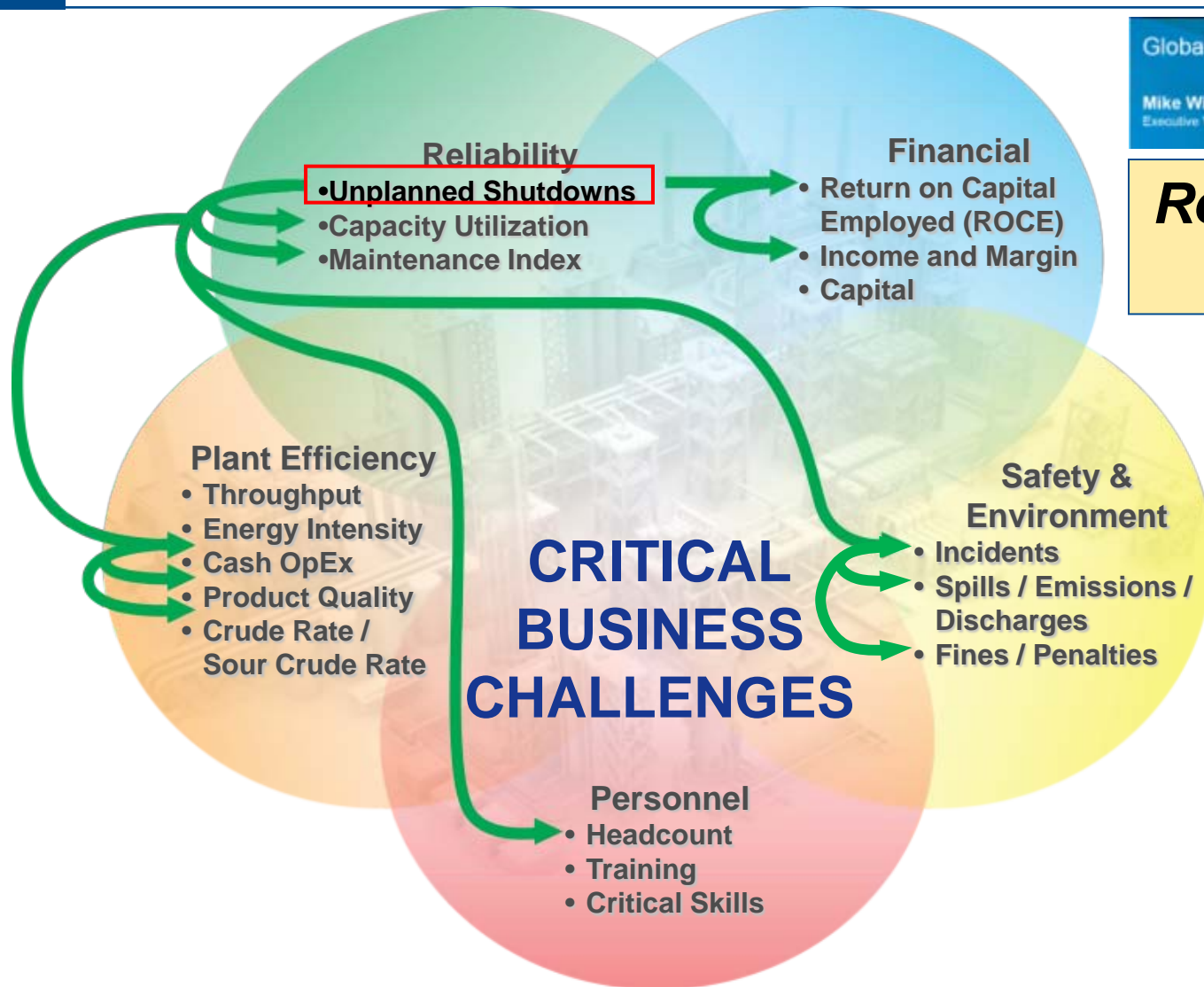
Director Sales

8th April 2016

Performance Without Compromise



Plant Reliability is a Critical Business Issue and Affects Many Areas



Global Downstream

Mike Wirth
Executive Vice President



***Reliability affects
many areas***

Emerson Analytical Portfolio and Solutions

Gas Analysis Solutions



Gas Chromatographs, Process Gas Analyzers and Systems

Gas Analysis Controls



Gas Analyzers using Quantum Cascade Laser technology

Lifecycle Services



Full range of services, from Startup and Commissioning to lifecycle support

Liquid Analysis



Complete range of Liquid and Combustion Analyzers

Flame & Gas Detectors



Flame and Gas Detectors, Ultrasonic Gas Leak Detectors, Smoke and Oil Mist Detectors

Educational Services



Certified instructor lead classes, onsite training, and online courses to fit your needs

Accurate & Repeatable Process Analytical Solutions helping in Improving Plant Reliability



Long Term Stability and Performance

- In Situ Oxygen Monitoring in Furnaces/ Boilers
- Liquid Analysis in Waster Water & Effluent Treatment



Improve Service Life of Capital Equipments

- Steam and Water Analysis for Condensate Quality
- H2 Purity Measurement in Generator Cooling



Increased Plant Safety and Sustainability

- Flame and Gas Detection, Protecting Plant & People
- Continuous Emission Monitoring System CEMS

Accurate & Repeatable Process Analytical Solutions helping in Increasing Plant Efficiency



Repeatable Product Quality

- Chlorine Measurement in Water Treatment & Distribution
- pH, Conductivity Control for Pharmaceutical and F&B



Optimal Throughput of Plant

- Fuel Gas Analysis & BTU for Optimal Firing Efficiencies
- Process Gas Purity Analysis to eliminate Off-Spec Product



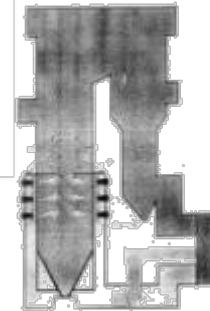
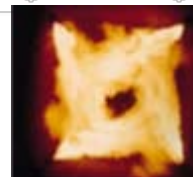
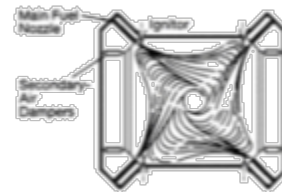
EMERSON
Process Management

In-Situ Oxygen Monitoring for Furnaces/ Boilers Combustion Chamber



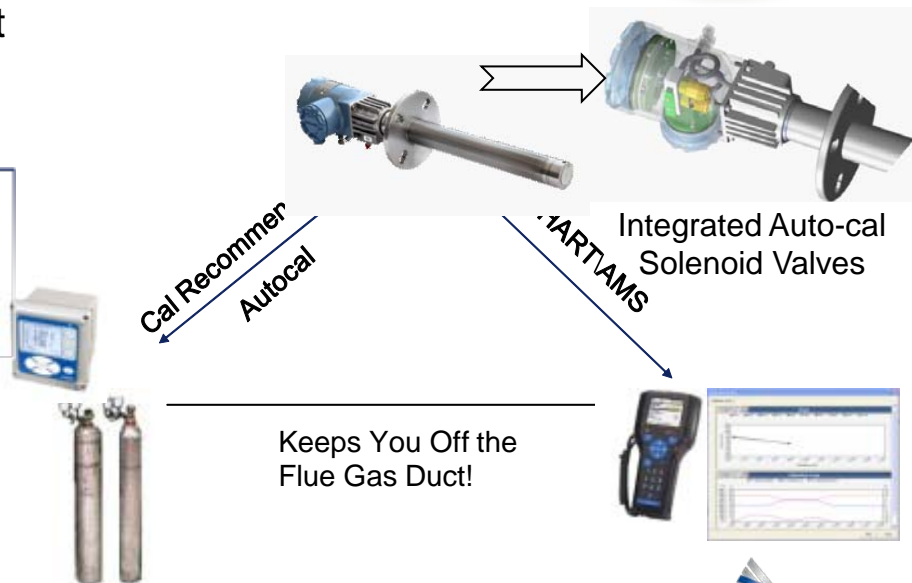
CHALLENGE

- Excess Air through FD Fan Increases Energy Consumption
- Non Optimal Fuel/Air Ratio Results in High Un-burnt Carbon and Emissions
- Ash Deposits on Boiler Tubes and Excessive Particulate Matter requires Soot Blowing and Electrostatic Precipitators



SOLUTION

- In Situ Zirconium Type 6888 Series O₂ Probe is Deployed for O₂ Trimming
- Integrated Auto-Calibration Solenoid Valves Ensures Accurate Output
- Rugged Design of the Measuring Cell increases Probe life and does not require maintenance in a Running Boiler



Combustion Analyzers

[Web link](#)

Industries

- Oil and Gas
- Power
- Refining
- Petrochemical
- Chemical
- Food & Beverage
- Pulp & Paper
- Metals & Mining

Key Applications

- Flue gas analysis
- Utility Boilers
- Furnaces
- Heaters
- Incinerators
- Separators
- Cement / Lime Kilns
- Incinerators
- Thermal oxidizers
- Steam generators
- Reformers
- Catalyst crackers
- Duct fired (HRSG)
- Oxygen measurement

Key Customers



Products & Services



- In-situ oxygen analyzers
- Carbon monoxide (CO) analyzers
- Opacity and dust density monitors
- Oxygen averaging systems
- Oxygen and combustibles analyzers
- Auto-calibration systems
- Gas sample coolers
- Damper positioners and drives
- Fan damper drives
- Wireless solutions
- Lifecycle Services
- Educational Services / Training

Liquid Analysis in Waster Water & Effluent Treatment Processes



CHALLENGE

- Wash-down from Processes and Run-off from Equipments generates highly contaminated waste water
- Waste Water and Effluent needs to be Accurately Monitored and then Treated before discharge out of Plants
- Robustness of Sensors and Uptime is Critical to keep lower Operating Costs

SOLUTION

- 397 TU_{pH} and 398R pH Sensors are suitable for Waste water and Slurry Applications
- 400 Series Retractable type Endurance Conductivity Sensors allows Easy Cleaning & ensure Longer Service life
- Clarity II Dual Sensor Turbidity Solutions



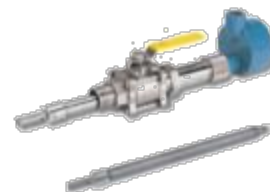
**Model 56
Multi-Channel TX**



397 TU_{pH} Sensor



Clarity II™ Dual-sensor Turbidimeter



**400 Retractable Endurance
Conductivity Sensor**



EMERSON
Process Management

Steam and Water Analysis Systems for Condensate Quality

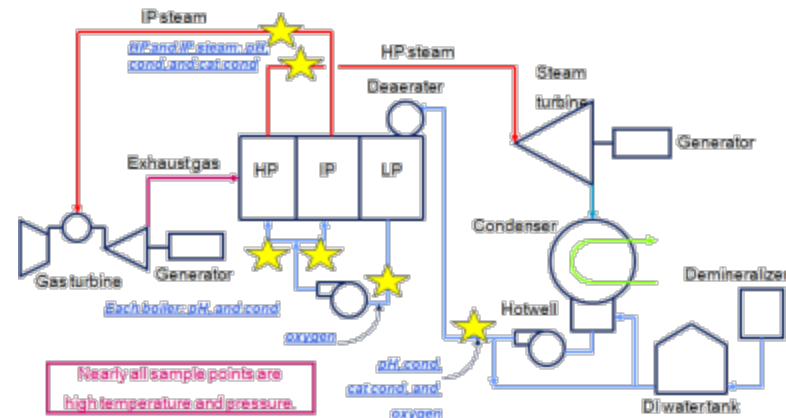


CHALLENGE

- Accumulation of Solid Contamination in the Condensate Water causes Boiler Corrosion and Tube Damages
- Silica and Sodium Carryover to Steam Turbine Causes Blade Failure
- Long Term of Boiler & Turbine Depends on Steam Quality

SOLUTION

- Conditioning for High Pressure and Temperature Samples of Steam & Water
- 3200HP pHaser High Purity Steam pH Measurement Sensor
- Wet-Chem Analyzers for Silica and Sodium Measurements



Multi-Channel
SWAS Panels



3200Hp pHaser
High Purity
Steam Sensor



2056 Silica
Analyzer
To be Launched
Q3FY16

Generator Hydrogen Cooling for Steam Generator



CHALLENGE

- Maintaining high concentrations of hydrogen cooling efficiencies for generators to avoid fire hazards, costly damages, or unplanned shutdowns
- Air in the hydrogen coolant can quickly lead to an explosive condition
- Keeping air present inside the generator before personnel can perform service or maintenance inside the generator

SOLUTION

- With proper operation, including the use of on-line gas analyzer, fire hazards can almost be completely eliminated.
- A thermal conductivity analyzer set up with two measurements is typically used for this application:
 - Measurement 1: 0–100 % H₂ in CO₂/air or 80–100 % H₂ in air
 - Measurement 2: 0–100 % CO₂ in air



Multi Component
Ex d Analyzer

Flame & Gas Detections to Protect Plant Assets and People



CHALLENGE

- Early Detection of Gas Leakages before Fire is Established
- Detection of Oil Vapors in Air, major causes of Fire in HVAC Systems
- Initiation of Fire Alarms and Protection Systems once Fire is Detected or Flame is Established



SOLUTION

- Hearing the Gas Leakages is first Line of Defense, Incus Ultrasonic Detectors or Open Path Gas Detectors can detect gas leakages
- Distinct Gas Leakages can be smelled by Installation of Gas Detectors
- Oil Vapors in Air Can be Detected using APM detecting vapors in Close Spaces
- UVIR Flame Detectors, detects established flame



Millennium APM
Air Particle
Monitor
Smoke & Oil Mist
Detector

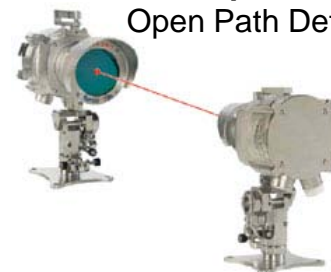


UVIR
Flame Detectors



Millennium
Gas Detectors

INCUS
Ultrasonic Gas Leakage
Detectors



Spectrex
Open Path Detectors



Flame & Gas Detectors

[Web link](#)

Industries

- Oil and Gas
- Power
- Refining
- Petrochemicals
- Chemicals
- Metals & Mining
- Automotive
- Aviation
- Life Sciences

Key Applications

- Wellhead monitoring
- Toxic gas monitoring
- Gas leak detection
- Fire, explosion prevention
- Oil mist detection
- Air particle monitoring
- Aviation fuel monitoring
- Water treatment
- Sewage treatment
- Combustible gas monitoring

Key Customers

ExxonMobil



PEMBINA

BR PETROBRAS

ENBRIDGE

TransCanada
In business to deliver



PEMEX

ConocoPhillips

Solar Turbines
A Caterpillar Company



Statoil

ecopETROL

شركة تنمية نفط عمان
Petrochem Development Oman

EMERSON
Process Management

Products & Services



- Ultrasonic gas leak detectors
- Open Path Gas Detectors
- Air particle monitors
- Flame detectors
- Gas detectors
- Controllers
- Aspirators
- Wireless solutions
- Lifecycle Services
- Educational Services
- Product Training

Meet Emission Monitoring Requirements

CHALLENGE

- Regulations require monitoring of CO, SO₂, NO_x, O₂ (CO₂), opacity/dust and flow
- State and local agencies may require monitoring of hydrocarbons (C_nH_m)
- Where a Selective Catalytic Reduction (SCR) is used, monitoring of ammonia (NH₃) may be required

SOLUTION

- Emerson CEMS guarantee EPA, MCERTS, TUEV, QAL1 and GOST certification and are point-of-impact information sources that help keep you in compliance
- CEMS data allows you to fine tune combustion performance and improve plant efficiency



(NDIR/UV, O₂,
CLD & FID)

MLT 2 Multi-Component Gas Analyzer

EMERSON
Process Management

Continuous Gas Analyzers

[Web link](#)

Industries

- Oil and Gas
- Power
- Refining
- Petrochemical
- Chemical
- Environmental
- Life Sciences
- Food & Beverage
- Automotive

Key Applications

- CEMS
- Fertilizer / Ammonia Urea plants
- Ethylene plants
- Propylene Plants
- SynGas for CO and H₂ production
- Landfill / Biogas
- Air separation
- Industrial gasses
- Gas purity
- Turbine control
- Steel production

Key Customers



Products & Services



- Technologies
 - NDUV & NDIR photometer
 - Paramagnetic Oxygen
 - Thermal Conductivity
 - Electrochemical Sensors
 - FID
 - CLD
- Housing Options
 - Tabletop or Rack Mount
 - Field housing
 - Flameproof field house
- Lifecycle Services
- Educational Services / Training

Free & Total Chlorine Measurement in Water Treatment and Distribution

QUALITY

CHALLENGE

- Water Disinfection is done by Controlled dosing of Chlorine during Final Treatment of Water
- Excess Chlorine is harmful to Body and Causes Long Term Damages to Skin such as Pigmentation
- Recording of Free Chlorine Concentration and Time referred as CT is critical to document Disinfection Procedure

SOLUTION

- Free Chlorine and Total Chlorine Measurement Solution is Available as Complete Kit Solution
- Overflow Chamber, Amperometric Sensors for Chlorine and Ozone, pH Sensor and Multi-component Transmitter
- Chlorine & Ozone Sensor measure primary disinfectant levels and pH measures Acidic or Basic nature of Water



FCL, TCL Analysis Solution



EMERSON
Process Management

pH and Conductivity Control in Pharmaceutical and F&B Applications

QUALITY

CHALLENGE

- Quality Yield is Critical to Pharmaceutical and F&B Processes
- Accurate pH and Conductivity Control determines the Optimal Fermentation and Cell Culture Process
- Sensors must endure during the Steam sterilization Process of the Fermenter or Bi-Reactors
- Meet FDA Guidelines for Sanitary Standards

SOLUTION

- In line 403 Endurance Conductivity Sensors helps meet FDA Guidelines for Sanitary Standards
- Steam Sterilizable Hx338 and Hx 900 pH Sensors for longer life and accurate measurement in Fermentation process
- PUR Sense 3800 Sensor for pH Measurement and Control during Acid Addition and Dosing



Hx338 Sterilizable pH Sensors



400 Series Endurance Conductivity Sensor


EMERSON
Process Management

Liquid Instruments & Analyzers

[Web link](#)

Industries

- Oil and Gas
- Power
- Refining
- Chemical
- Pulp & Paper
- Life Sciences
- Food & Beverage
- Water & Wastewater

Key Applications

- pH Monitoring
- Deionizer Systems
- Steam Plants
- Wet Scrubbers
- Effluent Streams
- Cooling Towers
- Sulfuric Acid Plants
- Separators
- Conductivity
- Distillation Towers
- Leak Detection
- Deinking Mills
- Chlorine
- Desalination
- Oxidizing
- Water Treatment

Key Customers



Products & Services



- pH and ORP sensors
- Conductivity sensors
- Dissolved Oxygen / Ozone sensors
- Chlorine sensors
- Liquid analyzers
- Turbidimeters
- Water quality panels and systems
- Acid and Caustic concentration analyzers
- Wireless solutions
- Lifecycle Services
- Educational Services / Training

Accurate Fuel Gas Analysis for Optimal Gas Turbine Firing Efficiencies

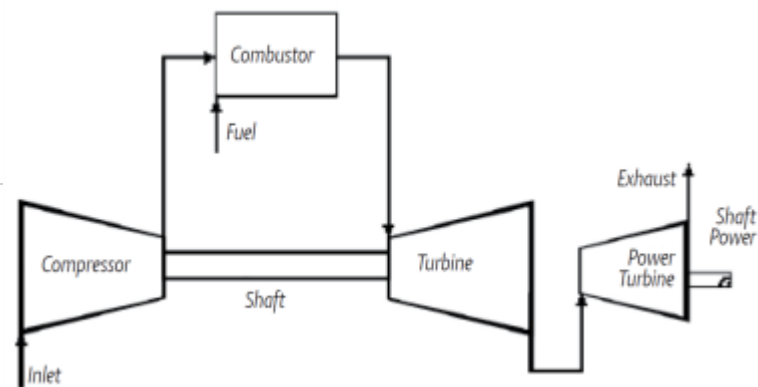


CHALLENGE

- Reducing NOx emissions and remaining compliant with ever changing regulations
- Avoid costly non-compliance fines & unplanned shutdowns
- Monitoring the gas quality to help extend the lifespan of the gas turbine and keep operating costs to a minimum

SOLUTION

- Gas Chromatographs 370XA and 770XA are optimally designed for Natural Gas Applications
- Accurately measure the Calorific Value (BTU) / Wobbe Index of the fuel gas to determine the optimal air-to-fuel ratio
- Provide compositional data to allow calculation of Carbon Emissions Factor



Gas Chromatographs



EMERSON
Process Management

Gas Chromatographs

[Web link](#)

Industries

- Oil and Gas
- Gas Processing
- Power
- Refining
- Petrochemical
- Chemical
- Marine, FPSO, FLNG,
- Alternative Energy

Key Applications

- BTU / CV analysis
- Gas Purity
- Hydrocarbon DP
- LNG bunkering
- Pipeline gas analysis
- Amine foaming
- Methanol plants
- Turbine control
- Hydrotreaters
- Ammonia plants
- Ethylene plants
- Fractionation towers
- Polyethylene & Polypropylene plants
- Catalytic cracking
- Landfill

Key Customers



Products & Services

• Process Gas Chromatographs

- 1500XA
- 700XA
- Model 500

Natural Gas Chromatographs

- 770XA
- 370XA
- Model 500

Analytical Systems

Lifecycle Services

Educational Services / Training

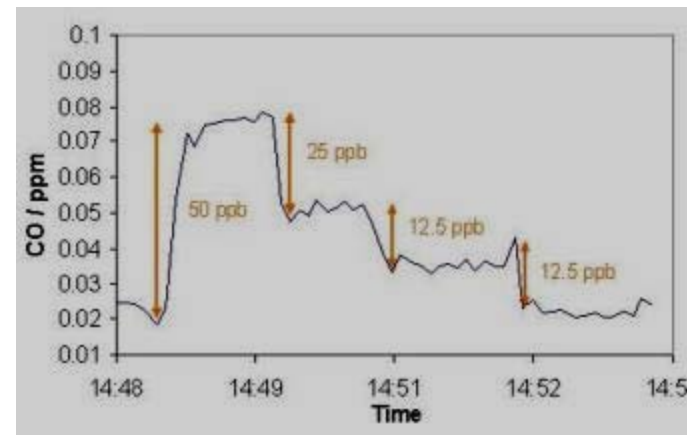


Ethylene Purity Measurement in Low PPM levels to reduce Off-spec Product



CHALLENGE

- Producing highest purity Ethylene for further Downstream Processing Plants
- Faster Response of Analysis to Manage Process Control and Eliminating Off-Spec Product
- Reduce frequent calibrations and consumption of carrier gases



SOLUTION












- Use Quantum Cascade Laser Analyzers which have fastest Analytical Performance within milliseconds
- Due to Multiple Wavelengths generated from Lasers distinct gas peaks can be detected, avoiding cross interference
- Multiple gases can be analyzed using same analyzer and suitable for Low detection limits



**Quantum Cascade Laser
Analyzer**

Quantum Cascade Lasers

[Web link](#)

Industries	Key Applications	Key Customers
<ul style="list-style-type: none"> • Oil and Gas • Power • Refining • Petrochemical • Chemical • Food & Beverage • Life Sciences • Automotive • FMCG 	<ul style="list-style-type: none"> • CEMS • Gas analysis • Gas processing • Power generation • Ammonia plants • Ethylene plants • Methanol plants • Polyethylene plants • Gas purity • Polypropylene plants • Automotive emissions • Food packaging • Aerosol leak detection • Marine applications 	          

Products & Services






- Aerosol Leak Detection System
- Can Leak Detection System
- pMDI Leak Detection System
- Food Packaging Leak Detection
- On-stack Gas Analyzer
- OEM Gas Analyzer
- Extractive Gas Analyzer
- Industrial Gas Analyzer
- Process Gas Analyzer
- Lifecycle Services
- Educational Services / Training

Analytical Systems & Integration Solutions

Industries	Key Applications	Service Capabilities
<ul style="list-style-type: none"> • Oil & Gas • Gas Processing • Gas Pipeline Networks • LNG Liquefaction & Regasification • Power & Energy • Petrochemical • Chemical • Water & Wastewater 	<ul style="list-style-type: none"> • Gas metering • Gas blending and treatment systems • Separator measurements • Water / wastewater • Flame & Gas Detection • Gas quality • Combustion control • Distribution energy systems • Fuel gas • Compressor stations • Landfill / Biogas • SWAS • CEMS • LDPE, HDPE, PE 	<ul style="list-style-type: none"> • New application development • Project Management • Quotation • Procurement • Global logistics • Design, Build • SAT • Installation • Startup & Commissioning • Lifecycle Services • Educational Services • Product Training



Lifecycle Services & Educational Services

[Web link](#)

Expertise and global resources to help you dependably define, execute, and support your strategy throughout the lifecycle of your operation



Plan & Design

Implement & Build

Operate & Maintain

Improve & Modernize

Lifecycle Services

- Global support services
- Startup and commissioning
- Product lifecycle services
- Emergency onsite support
- Field retrofits
- Remote diagnostics
- Spare parts inventory
- 24 hour customer support

Educational Services

- Certified Instructors
- Onsite / Hands-on training
- Instructor lead / Classroom training
- E-Learning tools and tutorials
- Accredited course curriculum



Authorized provider of the International Association of Continuing Education and Training .



EMERSON
CONSIDER IT
SOLVED™