

Requirements for the Manufactures of Anhydrous Ammonia & Nitric Acid

Clearly the ideal solution was to develop an instrument with the capability of measuring on stack, negating the need for the extractive system, with the capability of periodically checking both zero and span. A further consideration was the number of gas species required to be monitored, initially the measurement consisted of NO and NO₂ however after consideration it was decided that there would be interest in other gases such as N₂O, NH₃, and CH₄. It could be undesirable if not impracticable to mount an instrument on the stack for each gas species to be monitored therefore there was a requirement for a "multi gas" or "multi component" analyzer. In addition parts of the process are at elevated pressure and therefore the need for the analyzer to withstand a high process pressure was a requirement. These factors lead to our latest design.



this issue

Ammonia & Nitric Acid CEM's **P.1**

Yara Belle Plaine **P.2**

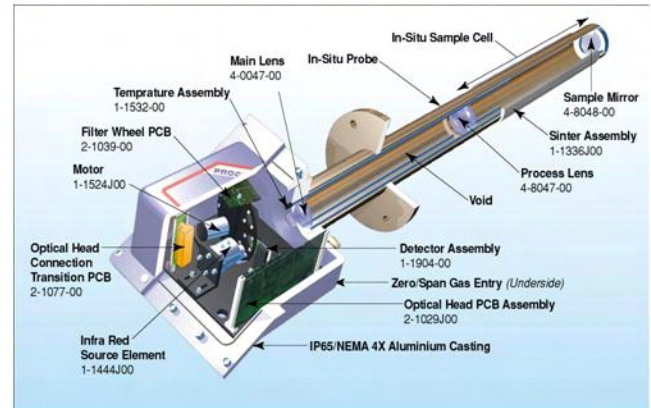
CEM's In-situ Technology **P.3**

Trends & New Software **P.4**

Anhydrous Ammonia & Nitric Acid Plant CEM's

Procal Analytics has been supplying continuous monitoring systems into Nitric Acid industry for over 20 years. The instruments are designed to withstand the harsh environment with minimum maintenance requirements. The analyzers are capable of monitoring up to six gas species simultaneously, displaying, data logging and transmitting the concentrations.

The unique design was the result of work carried out on the ICI Kuhlmann processes between 1987-90, ICI were concerned over the reliability and hence running costs of their CEM and process extractive systems. The problem was associated with maintenance of the sample systems, problems due to corrosion of key components and blockages. As tighter emissions regulations were introduced the reliability of the CEM became more critical, process instruments used as part of a plant control had to achieve a high availability. To overcome the problems with extractive systems across stack analyzers were installed, initial trials proved the benefit of analyzers which



measured in the process there by avoiding the need for sample handling systems. The main drawback was identified as limited zero and calibration capabilities; this might have been acceptable in process applications but on regulatory CEM systems where the capability of challenging the system with both zero and span gases is desirable if not mandatory. The reason for the requirement to both zero and span is to remove drift inherent in all analytical instruments and demonstrate to the authorities that the analyzer

Comments From Yara Belle Plaine's Control Group Leader Rob Harkness

"We need to improve the energy efficiency, and thanks to the Nitric Acid Advanced Control application on the Experion we were able to reduce our emissions and provide a much more stable operation. This has allowed us to focus more on other areas including the adjacent urea plant."

"The new NOx analyzer (Procal) was very helpful in that it provided faster updates but also highlighted that the old NOx analyzer had been reading lower than reality".
(Rob Harkness)

SOLUTION:

Yara asked Honeywell to provide engineering software and services to design and implement advanced process controls on the nitric acid plant that they had just recently migrated to an Experion Process Knowledge System. They had also replaced their old NOx Analyzer with a more reliable and accurate analyzer (Procal) and felt that they could now take full advantage of the Honeywell industry proven Profit Controller technology.

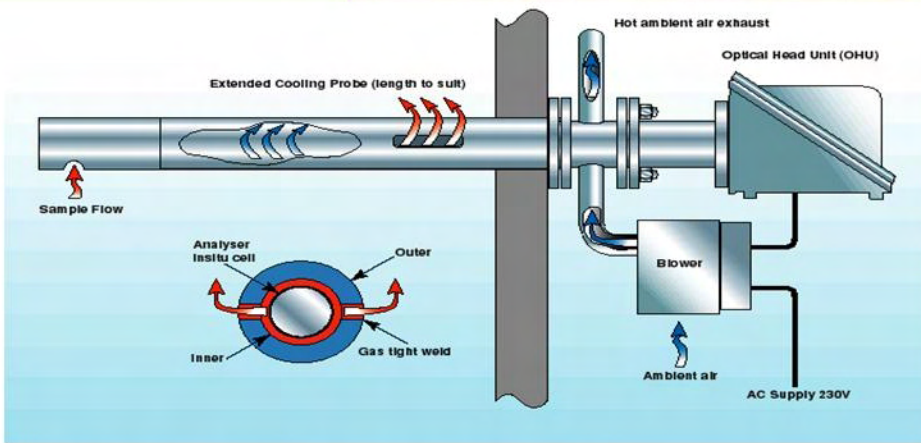
YARA BELLE PLAINE SELECTS PROCAL FOR THEIR GREEN HOUSE GAS REDUCTION PROJECT



In 2008 Yara Belle Plaine was looking to improve the energy efficiency of their Nitric Acid Plant by operating at consistent and stable, high levels of production while at the same time achieving tighter control on green house gas (NOx and CH4) emissions. They engaged Honeywell to provide engineering services to design and implement an advanced process control on their nitric acid plant. The Procal Analyzer P-200 was the analyzer that allows YARA to implant a control strategy and emissions reduction project. Yara Belle Plaine's primary goal for installing advanced process controls on Yara's nitric acid plant was to control the amount of NOx emissions leaving the combustor while minimizing the consumption of fuel gas. Over a short three month period

with the help from Honeywell, Yara personal and the primary measurements from the Procal unit they were able to implement the Profit Controller across the nitric acid unit. Yara Belle Plaine who are committed to meeting their environmental commitments, felt that they could achieve them without giving up operational efficiency. The major source of emissions comes from the tail gas leaving the Nitric Acid plant absorber which contains unconverted NOx gases. They operate a catalytic combustor that burns the NOx in the tail gas using a combination of methane and synthesis gas and converts it back to nitrogen. It is important to monitor the combustor outlet for NOx, methane and oxygen. Greenhouse gas emissions like NOx and methane should be minimized for environmental reasons but the oxygen and methane

content must be controlled to prevent the formation of an explosive mixture. Yara needed to maintain NOx emissions below 200 ppm while minimizing the use of fuel gas. They also needed to maintain the combustor temperature within an appropriate range— hot enough to sufficiently power the expander but not so hot that it damages it or the platinum gauze in the combustor. They saw the combustor as a potential bottleneck to increasing nitric production. Using the Honeywell DCS system and the new Procal NOx Analyzer which measures (NO,NO2,CH4, NH3) they were able to achieve their goals. Yara Belle Plaine estimates that the increase in Nitric acid production due to the APC project is 3%. With tighter control of the combustor outlet NOx, has allowed Yara to reduce methane emissions by 25%

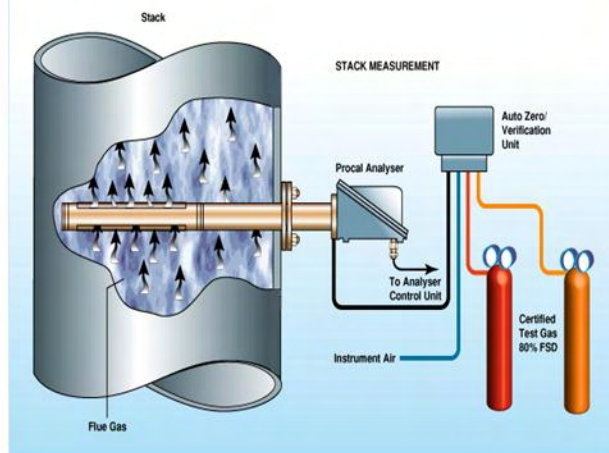


CEM's In-situ Technology

The Procral P-200 infra red emissions analyzer installation with either a heater or cooler assembly.

This installation is typical of the cooler installation. However for most installations it, require the heater version. The heater will require 120 VAC for operation. In the case Procral P-200 installation with AZU. AZU is controlled from the P-200 head and uses 24 VAC to automatically turn the sample valves on and off. All the control and configuration is done by the ACWn software. Because the ACWn is network software it is possible to set up lap tops that can dial directly into the main PC by a remote connection. Therefore your supervisors, system specialists can have remote access. In addition it allows you to get tech support from your local distributor or Procral .

In addition the P-200 head is connected directly to the PC and ACWn software Via a RS 485 Connection. Procral supplies ACWn Software that will use Windows XP as the operating software. This PC and software resides in the Rack Room.



YARA's Objectives

- Maintain combustor temperature within limits by adjusting secondary and bleach air flows.
- Maintain combustor back-pressure.
- Maintain combustor NOx outlet at an operational limit of 200 ppm by adjusting fuel flow to bleach air flow.
- Minimize methane in combustor outlet by adjusting air flows or fuel flows
- Minimize secondary air/bleach air ratio to relieve combustor back pressure and improve capacity.

SOFTWARE Procral's Latest operator interface

For many years analyzer manufacturers have had black box technology as the interface to their systems. Recently Procral has developed a new software package called ACWn. This software resides in a standard PC. Microsoft Windows 2000, xP and in the near future VISTA is the standard operating platform. The software is capable of operating up to 8 separate Procral systems with only one software license. The system communicates via RS485 to the analyzer heads. This is a complete and simple approach.

Future R&D Developments

WIRELESS Technology's

At many site that have multiple measurements at the same stack, it is not feasible to have communication cables Running from stack to stack. Currently in conjunction with their distributors



These wireless devices will be available. Just think of the ease of installation and the reduction in installation cost. Wireless technology is just around the corner.



Professional Services

In Canada Hydroflo Controls Ltd. has been supplying and servicing Procal Analytic equipment for nearly 20 years. Our office in Central Canada can supply technical, engineering, and field services as well as provide customers with replacement parts.

WHY PURCHASE PROCAL CEM FOR YOUR NITRIC ACID PROJECT

- Installation cost of In-situ design for Nitric Acid installation is the most cost effective in the industry.
- Multiple gases in one continuous measurement
- Low Maintenance compared to extractive type analyzers
- Meets all federal and provincial requirements for Emission monitoring.
- Multi gas components in one analyzer
- Proven performance record in the Anhydrous Ammonia



Tech Times Issue 01



Central Canada

886B Alloy Place
Thunder Bay Ont.
P7B 6E6 Canada
Phone 807-344-4224
Fax 807-344 3580
Web <http://www.hydroflo.net>

Hydroflo -Eastern Canada

229 Rue St-Joseph
Suite B
LEVIS, QUEBEC
CANADA G6V 1E3
Phone 418-717-2811
Web <http://www.hydroflo.net>

For more information or technical support feel free to contact Robert Mazurkewich @ robm@hydroflo.net

For more information or technical support feel free to contact Jerome Powers @ jeromep@hydroflo.net

