How to Choose the right
On-line Process Analyzer

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Topics

- Benefits of On-line Process Analyzer Systems
- Choosing the right On-line analyzer
- Sample Handling Systems
- Communication
Benefits using analyzer systems

- Provide information on the chemical composition of the product stream of interest

- Provide high level information essential for process control

- Yield and/or throughput optimization
  - Increase the yield of product by online control of the chemical reaction
  - Reduce the bottleneck of the plant unit to increase amount of product per hour
Benefits using analyzer systems

- Plant safety
  - prevention of explosions
    (typical example: ethylene oxide plant)
  - Health safety aspects
    for instance air monitoring of toxic components
    (typical example: VCM/PVC Plant)

- Online product quality control

- Environmental monitoring
How to control a process?

Control System

Controller

Algorithm

Variable

Analyzer & Transmitters Input

APC Package

If One Misses
One Link in the Chain
One Can’t Really Optimize
The Process
Process efficiency

Control Device

- Process Efficiency
- Efficiency Increase
- Pressure
- Temperature
- Flow

Chemical Composition
- Pressure
- Temperature
- Flow
Example of an implementation

Description of the need

- Component's to be analyzed
- Process conditions
- Complete composition of the sample
- Understanding of physical properties
- Legislation
Application Suitability

- Response Time
- Repeatability / Precision / Linearity
- Correlation with Laboratory methods
- Maintenance requirements
- Hazardous Area
- Directive (company, government)
- Initial investment vs. cost of Ownership
The right choice for your process control demands

- Univariate analytical methods
  - Non dispersive infrared
  - Non dispersive UV
  - Paramagnetic
  - Zirconium oxide
  - TDL

- Multivariate analytical methods
  - Chromatography (gas, liquid, ion)
  - Mass spectrometry
  - FT-NIR
  - NMR

- Direct Physical Property Methods
  - Density, colour, refractive index etc.
  - ASTM distillation, flashpoint, freeze point, RVP, etc...
80 % of Analyzer System Problems are Caused by a Wrong Design of the Sample Conditioning System
The Function of Sample Conditioning Systems

- Provide a Particle-free single Phase Stream
- Provide a Suitable Temperature Range
- Provide a Suitable Pressure Range
- Provide Functionality in Summer and Winter (Ambient Conditions)
Points We Need to Consider

1. Sample Take-off Point / Sample Probe
2. Primary Sample System / Sample Preconditioning System
3. Transport Lines
4. Sample Conditioning System
5. Sample Return
6. Calibration / Validation

Δ T / Lag Time Calculation

Δp

7. Atmospheric Vent
8. Slop / Flare
Communication

- DCS
- PLC
- Propriety Analyzer network (GC)
- Recorders / Data acquisition
From Stand-alone Products to Network Solutions

Remote monitoring
Alarm notification
GSM/GPRS communications
SMS
WAN
E-mail
Client-server
Web server
Service applications
OPC Server
FTP_Automatic File Transfer
Modbus TCP
Foundation Fieldbus
LAN (Intranet segment)
TCP/IP
DHCP
Remote I/O

Bringing information from the field to the office
Current customer demands

- Remote monitoring
- Alarm handling
- Customized / flexible HMI
- Automatic reporting
- Connection to PLC, DCS
- Advanced network
- Central database
- Software solutions
- Engineering services
Application: Data acquisition in combination with NIR

Gateway

Control unit

Alarm handling unit

- Analyser Shelter
- F&G safety System
- Pump Skids
- Stream switching Valves
- Analog Inputs From analysers
- DI/DO
- DI/DO
- AI
- MODBUS RS422 Serial
- To DCS
- Serial RS422
Application: Data acquisition combined with GC

- Alarm unit
- Gateway unit

Ethylene Oxide System

Process

24x 4-20 mA Output

EDS 30B

3x 4-20 mA Input

OS with OPC

Gateway unit

Alarm unit

Excel sheet
**Ethernet Analyzer Bus System**

- **PCAS**: Analyzer Server Software
- **ASET**: Maintenance Software (connected to PCAS)
- **ASIU**: Analyzer Bus Interface of Continuous Analyzers
- **FCJ**: STARDOM
  - GC1000 – FCJ: Modbus TCP/IP
  - GC1000 – PC: original protocol

**Analyzer Bus Network (Ethernet)**

- **For Duplex, OPC, Data Mapping**
- **GC1000 Mark II**
- **ASIU**
- **Continues Analyzer**
Partner for Analyzer Systems

– Consultancy for effective analyzer system solutions

– Engineering of turnkey systems
  • From sampling point to communication with DCS

– Full life-cycle support
  • Instrumentation / application consultancy
  • Installation at site
  • Start-up
  • After sales support / Maintenance contracts
  • Training
Summary

Only combining operator's & laboratory knowledge and experience with supplier’s knowledge and experience will lead to smart and efficient solutions.

Yokogawa proceed in strengthening its capabilities to understand customer’s processes and demands to act as Consultant & partner to provide one stop shop solutions.