Setting the Standard for Automation™

Best Practices are the Best Investments

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ABOUT AUTHOR

Zaheer Juddy, MD of Analytical Instrumentation & Maintenance system (AIMS) and one of the brightest young entrepreneur in the region and brings with him a vast experience of over 19 years in Analytical field. Being an Analyzer Expert provides consultancy and training's to End-users/Customers in Oil & Gas industry

Zaheer has taken several initiatives for introducing new Technologies, Applications and Analyzer Sampling System designs for online Analyzers

ABOUT AUTHOR

- **Andrew Nolan: A veteran Analyser Expert with thirty years of experience with process analysers.**
- **Supported major projects worldwide with various service providers before joining Shell Oil Company for fifteen years.**
- **More than three years with Petroleum Development Oman – Head of QMI,**
- **Six Years Qatar Shell GTL – Senior QMI & Metering Engineer,**
- **Six Years with Nigeria Liquefied Natural Gas – Senior QMI & Metering Engineer.**
- **Has four decades long experience to share..**

DISCLAIMER

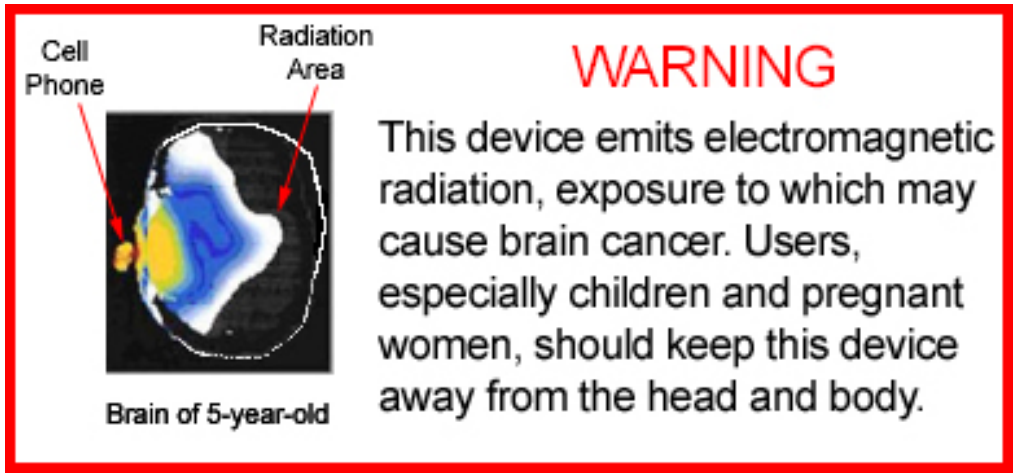
This Presentation is dedicated to all the Analyzer Technicians & Engineers who have not been promoted to managerial levels for years as they work for QMI department and not seen as doing anything !!!

This presentation is not intended for DCS engineers who makes graphic tag list and special colors on the panel to make plant look good.

This presentation is also not intended for analyzer sales personnel who sold analyzer for years on basis of weight, price, color and catalogue based

SAFETY MOMENT – AVOID CELL PHONES RULING YOU

- Avoid Cell Phones at your Home Life.
- Reduce Radiation to your Children
- Reduce your stress Levels
- Keep them out in HOME BOX



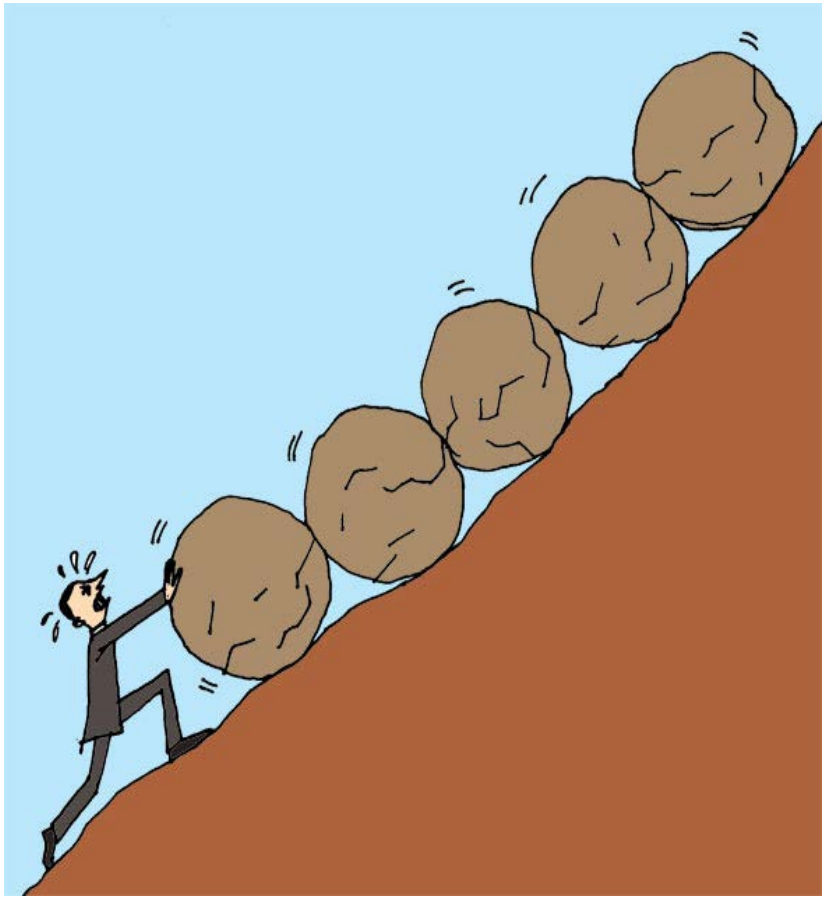
List of SRU's in the Region

End User	Location	Country	Unit No	Year	Licensor	Capacity TPD	Feed
Adgas	Das Island	UAE	Tr 1	1977	?	570	AAG (gas)
Adgas	Das Island	UAE	Tr 2	1977	?	570	AAG (gas)
Adgas	Das Island	UAE	Tr 3	1993	?	510	AAG (gas)
Cresent/DanaGas	Sajaa Sharjah	UAE	?	2005	Black&Veatch		AAG (gas)
Dugas	Jebel Ali	UAE			Goar Alison		AAG (gas)
ENOC	Jebel Ali	UAE	Plant 17 Tr 1	2009	KTI	~40	AAG / SWS
ENOC	Jebel Ali	UAE	Plant 17 Tr 2	2009	KTI	~40	AAG / SWS
Gasco	Habshan	UAE	Unit 50	1986	Fluor ?		AAG (gas)
Gasco	Habshan	UAE	Unit 51	1986	Fluor ?		AAG (gas)
Gasco	Habshan	UAE	Unit 54	1994	Black&Veatch		AAG (gas)
Gasco	Habshan	UAE	Unit 55	1994	Black&Veatch		AAG (gas)
Gasco	Habshan	UAE	Unit 56	1994	Black&Veatch		AAG (gas)
Gasco	Habshan	UAE	Unit 57	2004	Black&Veatch		AAG (gas)
Gasco	Habshan	UAE	Unit 58	2004	Black&Veatch		AAG (gas)
Gasco	Habshan	UAE	Unit 59	2004	Black&Veatch		AAG (gas)
Gasco	Habshan	UAE	Unit 152	2009	Jacobs Comprimo	800	enriched AAG
Gasco	Habshan	UAE	Unit 153	2009	Jacobs Comprimo	800	enriched AAG
Gasco	Ruwais	UAE	Unit 53	2004	KTI	22	Enriched AAG
Gasco	Ruwais	UAE	Unit 59	2009	Worley Parsons	22	Enriched AAG
Takreer	Abu Dhabi / Umm Al Nar	UAE	Unit 72		Amoco/KTI/Jacobs Comprimo	~50	AAG / SWS
Takreer	Ruwais	UAE	Unit 19	2006	Ortloff	~50	AAG / SWS
Takreer	Ruwais	UAE	Unit ?	2007	Ortloff		AAG / SWS
Takreer	Ruwais	UAE	Unit ?	2011	Ortloff	100	AAG / SWS
Al Hosn Gas	Shah	Unit 751	2014	Fluor/Exxon Mobil	2500	AAG	Straight through
Al Hosn Gas	Shah	Unit 752	2014	Fluor/Exxon Mobil	2500	AAG	Straight through
Al Hosn Gas	Shah	Unit 753	2014	Fluor/Exxon Mobil	2500	AAG	Straight through
Al Hosn Gas	Shah	Unit 754	2014	Fluor/Exxon Mobil	2500	AAG	Straight through

CHALLENGES - Requiring BEST PRACTICES in SRU's

COUNTING THE COUNTLESS……..!

- AWARENESS
- PLUGGING ISSUES
- TEMPERATURE ISSUES
- SULPHUR VAPOUR ISSUES
- ASPIRATION
- CONTROL ISSUES
- TGTU PROCESS BY-PASS
- ADAPTABILITY…… SO ON……..



AWARENESS

- Does all Analyzer Maintenance Personnel aware of Process Knowledge??
- Does he enough Trained on handling Analyzers?
- Does People know their Job to do it in
  - RIGHT WAY???
  - RIGHT TIME???
- Learning on-site results in
  - Excess spare parts utilization – **HIGH OPEX**
  - Excess Time to resolve issues
  - Blame on OEM.
  - Risk of property / analyzer damage

(Statistics reveal that there was at least there were 15 ~ 20 incidents related to manpower competency – Courtesy: www.staritstimes.com/Singapore)

BEST PRACTICES - AWARENESS

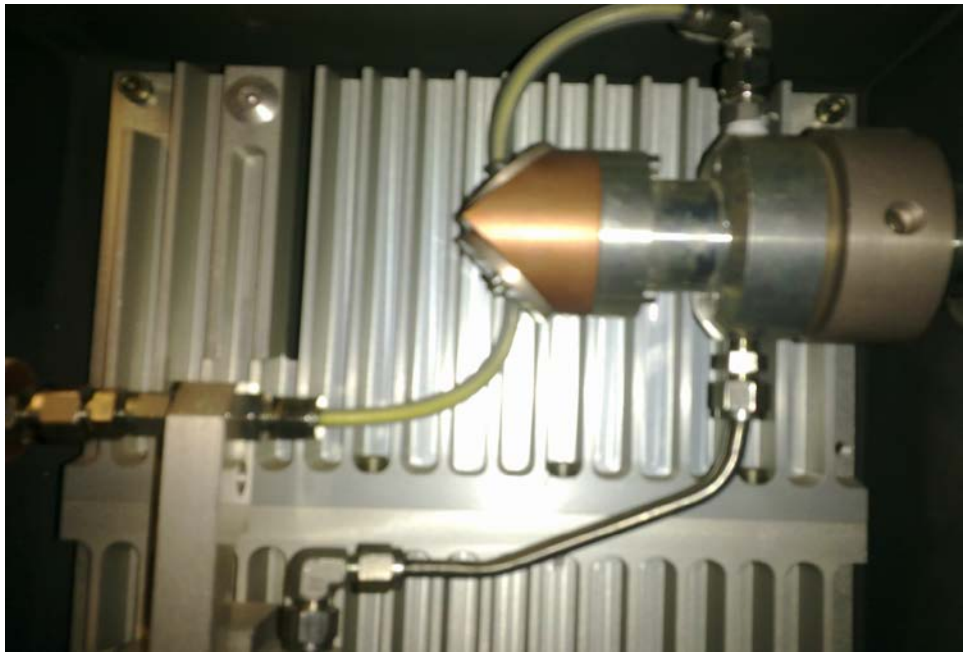
Analytical Instrumentation & Maintenance Systems (AIMS)

Analyzer Maintenance HANDBOOK

- Process Awareness is a MUST for Analytical People
- RISKS involved in process to be made AWARE both Personnel and Production losses.
- Continuous Process and Analyzer Training to be Emphasized in all stages
- HANDBOOK specific to your process needs to be made

PLUGGING ISSUES

- PLUGGING is one of the LOUD words in case of Sulphur Analyzers
- PLUGGING is the FIRST Problem to be suspected in SRU Analyzers
- The Worst Conditions are lead if Choking is not avoided
- PLUGGING always a concern as a consequence RELIABILITY and AVAILABILITY is **?????????**



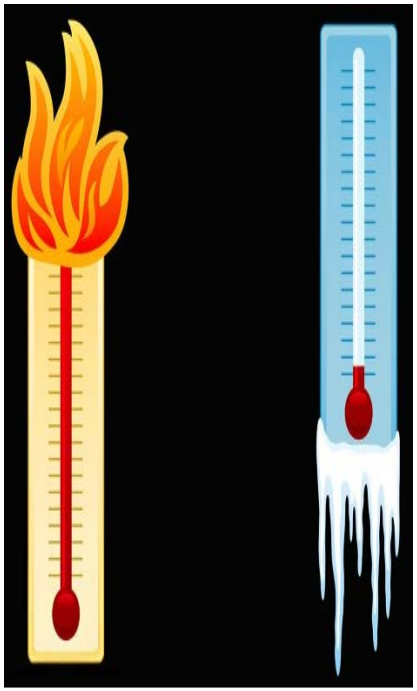
BEST PRACTICES – PLUGGING ISSUES

- Ensure NO or LOW Sulphur Vapor Present in Sample
- Maintain Your sample always above the DEW POINT
- Perform Periodic Flushing
- Use Special Probes such as ASR with Double Dual Isolation System
- Avoid Cold Spots Completely

ASR900 Sample Probe (Side View).

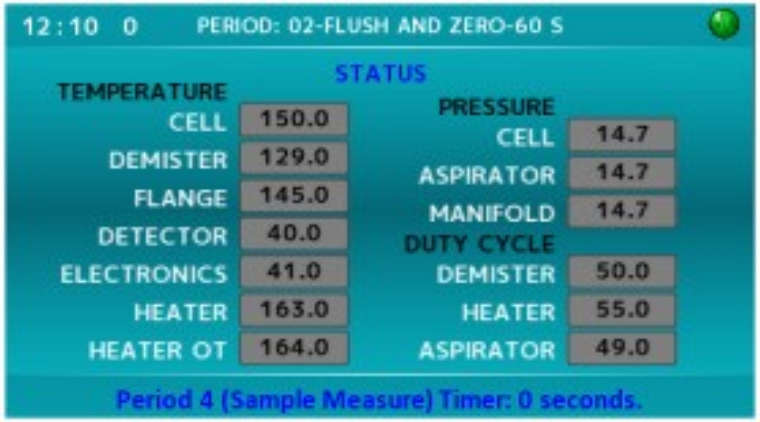
TEMPERATURE ISSUES

- Sulphur freezes at a range of 113°C-119°C (235°F-246°F) and the range is a function of the different molecular forms of both liquid and solid sulphur
- Lack of Temperature Profiling is one of key issues being faced for finding the Cold Spot
- SO2 Analysis in Stack SRU is very relatively affected with temperature
- SO3 Dew-Point is the biggest CONCERN is SRU Stack Analyzer



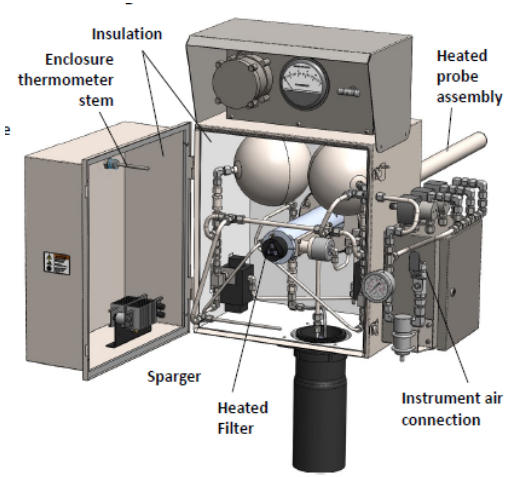
BEST PRACTICES - TEMPERATURE ISSUES

- Temperature Monitoring to be done at several needed points to define the profiling. (Eg: Tail Gas Analyzer)
  - Probe Temperature
  - Flange Temperature
  - Sample Line Temperature
  - SHS Temperature
  - Eductor Outlet Temperature
  - Analyzer Oven Temperature



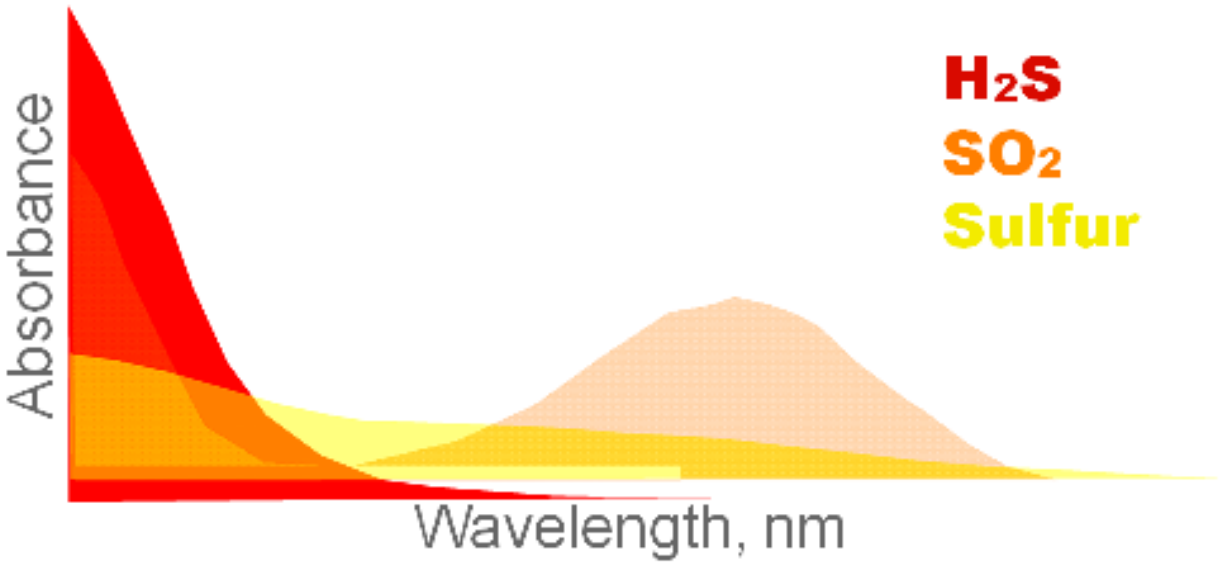
SO3 Dew-Point to be calculated for Stack Measurements to avoid Sulphuric Acid Formation

Maintain the temperature above SO3 Dew-Point through Out the sample loop



SULPHUR VAPOUR ISSUES

- Sulphur Vapor is always a Concern and a **BIG CHALLENGE**
- **SV plugs the lines as carried away at the cold spots**
- Sulphur Vapor is BIGGEST **Interference** for Measurements
- The Carry of Vapor gets condensed and the vapor gets solidified.



BEST PRACTICES – “SV”

- Maintain Analyzer CELL temperature above the Probe Temperature to arrest SV (Condense)
- Do it on the pipeline with Demister Technology as part of the analyzer where ever possible
- Limit the distance as mush as near to the sample take-off Point.
- AUTO ZERO CAPABILITY Analyzers to be preferred.

GIVE A BATH TO YOUR ANALYZER EVERYDAY BY FLUSHING THE SULPHUR VAPOUR BACK TO PROCESS

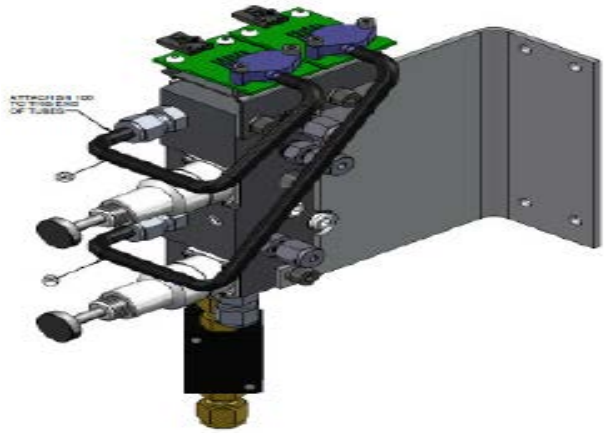
ASPIRATION ISSUES

In Sulphur Plant either you OVER ASPIRATE or UNDER ASPIRATE based on Process Pressure

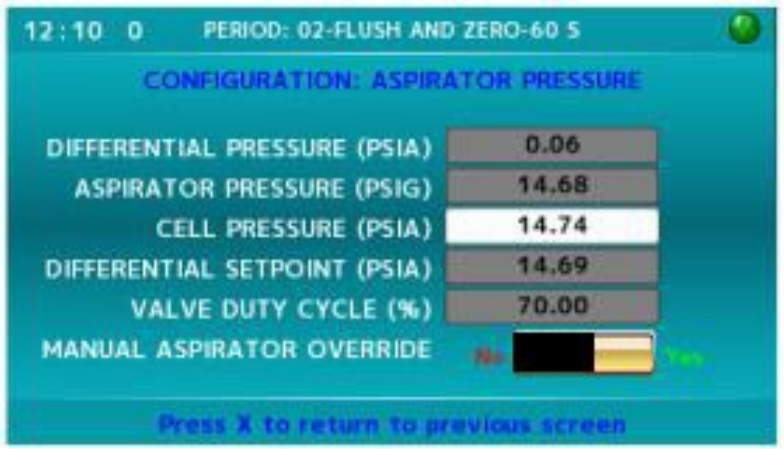
How do you measure varying Process Pressure when analyzer is ASPIRATING ???

BEST PRACTICES

AUTO ASPIRATION SYSTEM



- Auto Aspiration is the Key feature employed in new versions of analyzers which counts for overall system reliability and performance criteria.
- Auto Aspiration system ensures the limited sample sucking required and further avoids clogging or choking due to Ammonia salts formation etc
- Auto-Aspiration also reduces the human intervention as this auto adjusts to the set DP measuring the process pressure



CONTROL ISSUES

TAIL GAS: H2S and SO2 Ratio Control is the key factor

A Problem …Transport Lag

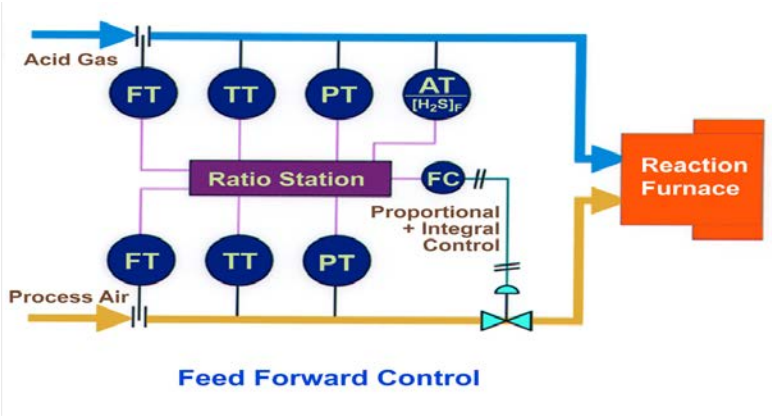
The control range is (only) 10% of the total air flow

- Trim valve is positioned at mid-range, effective control is 5% of air flow
- Set by the designer, more than 10% can destabilize the process
- Process upsets (eg HC) can easily exceed these control limits
- In these case extended range of the indicating outputs is useful

BEST PRACTICES

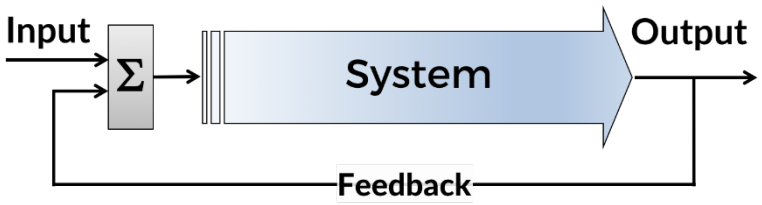
FEED FORWARD CONTROL

- No Process Lag Time
- Immediate response to FEED Changes
- IDEAL Control



Feed Forward Control

FEED BACK CONTROL



- 10% of Total Air Flow Control
- Adaptive Gain for Advanced Control
- Feed Forward Analysis/Control is NO substitute for Feedback

BENEFITS OF GOOD CONTROL

- ✓ Extended catalyst life
- ✓ Increased sulphur production
- ✓ Reduced sulphur emission
- ✓ Reduced incinerator fuel consumption
- ✓ Reduced plant operating problems
- ✓ Reduced size of tail gas clean-up unit

TGTU PROCESS BY-PASS

- TGTU Bypass condition is seen quite often
- The measurement ranges will drastically increase giving TASK to analyzers for HIGH TURN UP Conditions
- Emissions are also often seen VERY HIGH

BEST PRACTICES

- DUAL RANGE Analyzer to be Selected for BY-PASS Situation
- Analyzer Accuracy and repeatability to be maintained for both the ranges
- BY-PASS process conditions to be identified in the datasheet

Let's Share the Experiences of PDO

PRO-ACTIVE Approach:

Data-Sheet corrections are made based on the previous experiences and Lessons Learnt

Flawless Initiative and Lesson Learnt workshop is made MANDOTORY for all the Projects

Indicated Clearly the options required from the analyzer. The following are added as part of Pro-Active approach for SRU Analyzers

- Dual Range
- NSL(No Sample Line) Philosophy
- Steam Blowback
- AUTO Aspiration System
- Improved Analyzer Designs are accepted
- AMADAS Requirements as per PDO Design Guidelines

ULTRA-DEEP SULPHUR RECOVERY

How PDO is processing high-sulphur natural gas and achieving 99.9% sulphur recovery levels

The Analyzer Data Sheet were revisited to accommodate requirements of CANSOLV Tail Gas Treating Process which involved a re-generable SO2 scrubbing technology and sets new SO2 limits driven by most stringent emission regulations at in the world (35 mg/ Nm3).

"We have pushed the technological boundaries with this line-up and, as a result, we are able to set new standards."
PDO

ADAPTABILITY

CHANGE IS INEVITABLE

Technology changes to be adapted for meeting the needs in better and more optimized way.

POWER OF OPTICS have given us a wide range of Entries to meet Modern World Quests

TECHNOLOGY SURROUNDS US

Advanced Technology addresses most of the challenges the in the Industry

Trending Technologies uplifting the Needs in more better way

- **Tunable Diode LASER (TDL)**
- **Tunable Filter Spectroscopy (TFS)**
- **RAMAN Spectroscopy**
- **Advanced Chemo-metrics**
- **Vacuum UV and So…….. On……..**

WAKE UP…

THE GRAND MOSQUE WOULD NOT BE SO BEAUTIFUL IF SHEIK ZAYED ASKED FOR THREE QUOTATION AND DECIDED FOR THE LOWEST