



Setting the Standard for Automation™

Best Practices are the Best Investments

Author 1 Zaheer Juddy _ *AIMS*

Author 2 Andrew Nolan _ *PDO Oman*

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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



Dangers of Cell Phones

Despite fierce industry resistance, evidence continues to mount about the dangers of cell phones. Following are some of the major areas of health concerns.

Salivary Gland, Brain and Eye Cancer
Research studies report that adults who have used mobile phones for at least 10 years experience an increase in brain cancer, salivary gland cancer, and even rare eye cancers on the side of the head where the cell phone was predominantly held.

Breast Cancer
A recent study has revealed a strong connection between cell phones placed in the bra and the development of breast cancer in young women. Dr. John West and others have pointed out that men too are getting breast cancer by carrying mobile phones in their shirt pockets.

Infertility/Decreased Sperm Counts
A recent study has shown that when cell phones are in talk mode and located in close proximity to the testes (the male reproductive organs in which sperm is made), sperm cells were damaged. Damaged sperm can lead to birth defects and higher incidences of various disabilities.

Other Health Risks
A cell phone is a two-way microwave-radiating device whose long-term use has been associated with glioma, acoustic neuroma, meningioma, salivary gland tumors, eye cancer, testicular cancer and leukemia, along with a wide range of other biological effects.

The TRUTH About CANCER
educate • expose • eradicate

BEST PRACTICES IN ANALYTICAL SYSTEMS



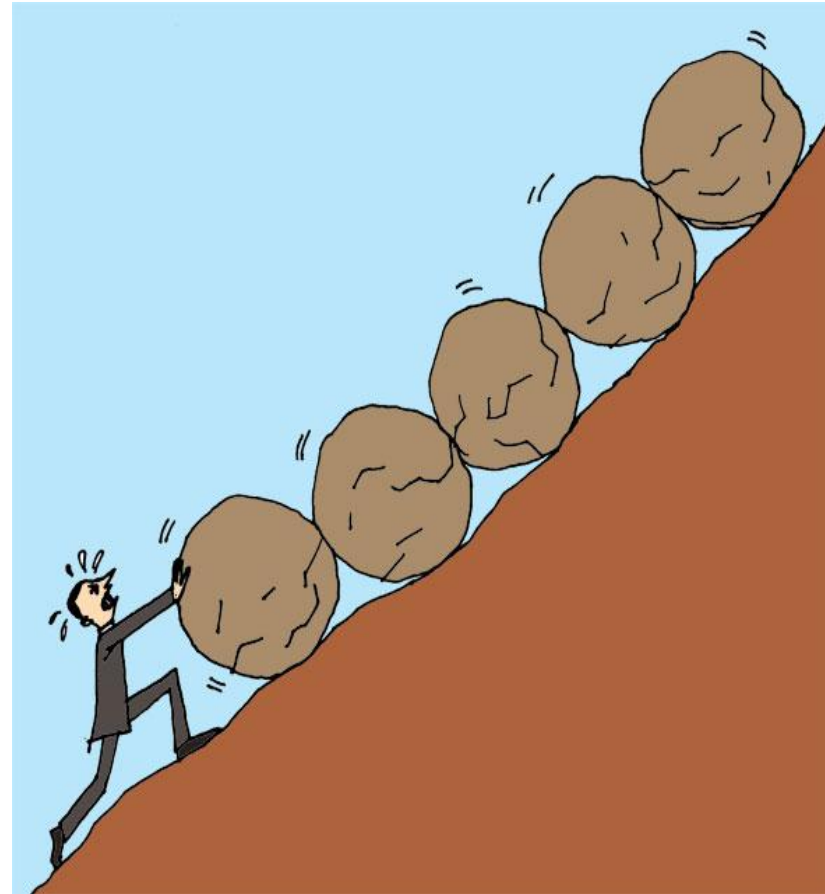
**“THE POINT OF BEST PRACTISE IS TO DISCOVER
AND CLOSE THE PERFORMANCE GAPS”**



CHALLENGES - Requiring BEST PRACTICES in SRU's

COUNTING THE COUNTLESS.....!

- **AWARENESS**
- **CHOKING ISSUES**
- **TEMPERATURE ISSUES**
- **SULPHUR VAPOUR ISSUES**
- **ASPIRATION**
- **TEMPERATURE COLD POINT**
- **CONTROL ISSUES**
- **PROCESS BY-PASS**
- **SPARES AVAILABILITY**
- **ADAPTABILITY..... SO ON.....**





- 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
 - Excess Time to resolve issues
 - No escalations within the golden hour
 - Client blaming the OEM bad mouths analyzer is bad.
 - 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)



AWARENESS.....AWARENESS



“ Awareness about lack of knowledge is the most useful knowledge.

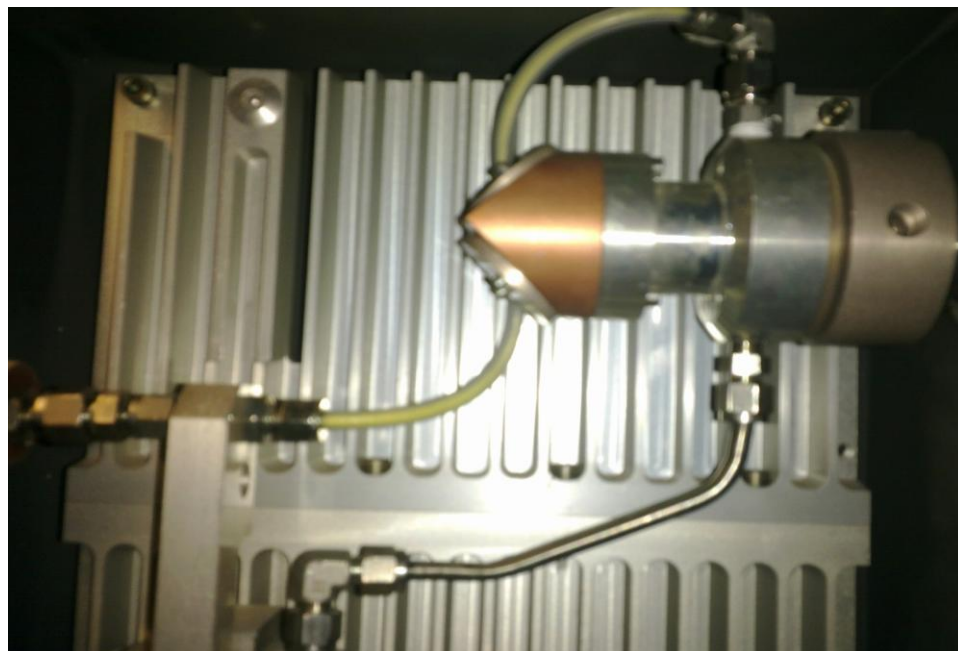
- **AWARENESS** is the only **WORD** which is a Question and an Answer to itself
- Process Awareness is a **MUST** for Analytical People
- Continuous Training to be Emphasized in all stages
- Identify the **CHAMPION** in his Progress



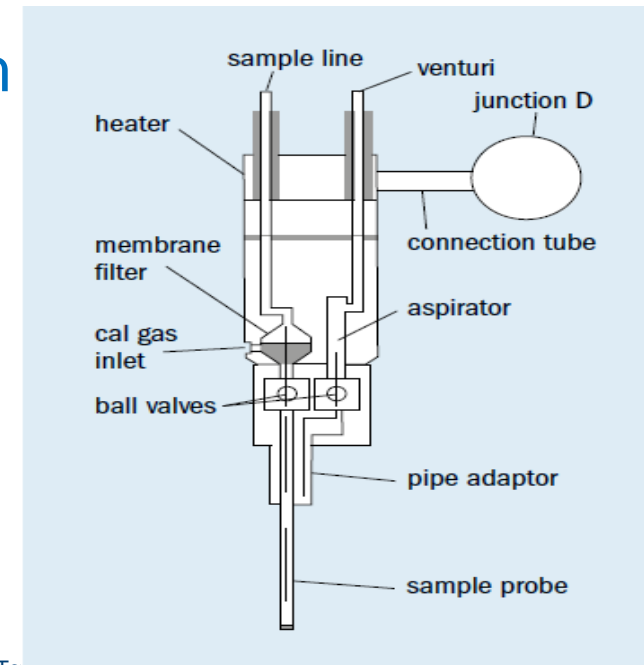
CHOKING ISSUES



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



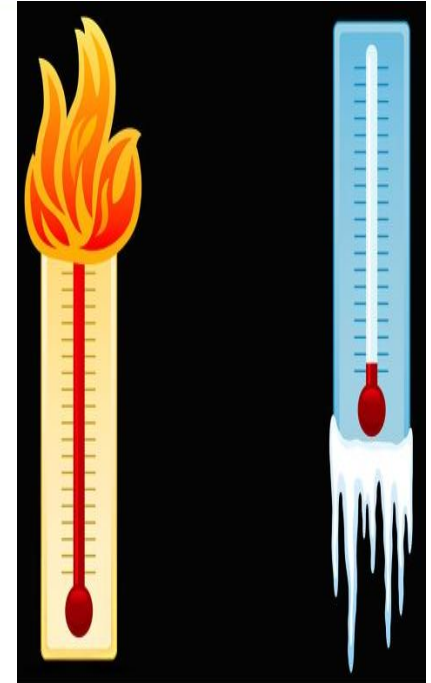
- Ensure NO or LOW Sulphur Vapor Present in Sample
- Maintain Your Stream always above the DEW POINT
- Perform Periodic Flushing
- Use Special Probes such as ASR with Isolation System
- Avoid Cold Spots Completely



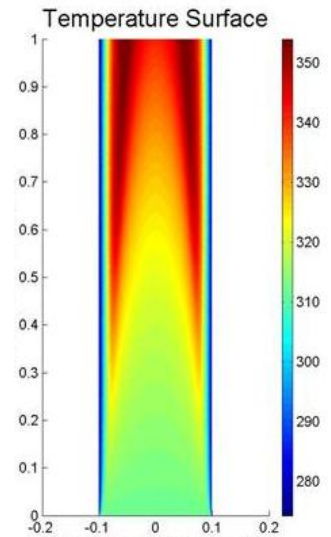
TEMPERATURE ISSUES



- 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

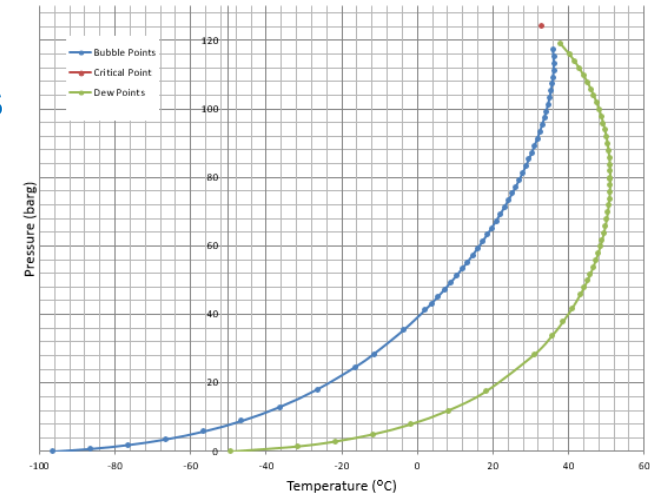


- Temperature Monitoring to be done at several needed points to define the profiling.
 - Probe Temperature
 - Flange Temperature
 - Sample Line Temperature
 - SHS Temperature
 - Eductor Outlet Temperature
 - Analyzer Oven Temperature



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 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.

Sulphur Vapor carryover happens as

- Diffusion of sulfur vapor from a hot place to a cold place.
- Knock out of entrained sulfur (mist, slugs)
- Overflow of liquid sulfur from one unit to another connected unit via connected rundowns or connected tail gas lines.

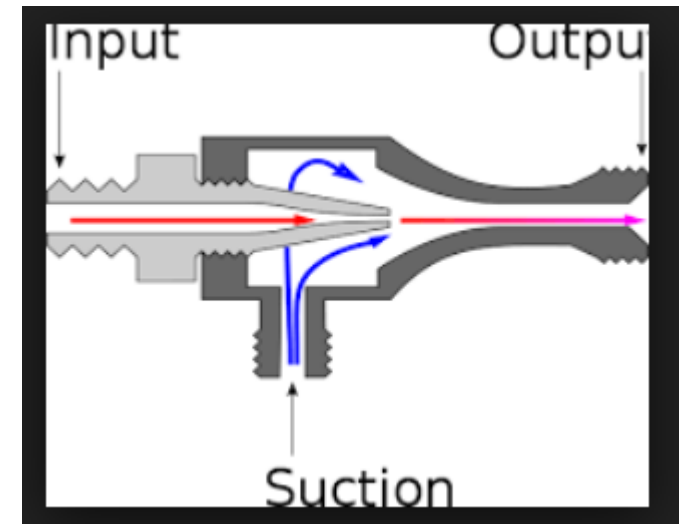


- Differential Temperature to be used for removal of SV, Ensure to operate above Dew-Point of Sulphur
- Do it in the pipeline with the help Demistor Technology as part of the analyzer
- Limit the distance as much as near to the sample take-off Point. NO SAMPLE LINE ANALYZERS ARE TO BE PREFERRED.
- Avoid HTL cold spot issues
- AUTO ZERO CAPABILITY Analyzers to be preferred.
 - Auto-Zero Functionality is made as Analyser default option
 - Default Auto-Zero setting is defined for every 24 Hours
 - Scheduled Auto-Zero RUNS When Analyser is in ANALYSIS

AUTO ZERO ensures Periodic Flushing to eliminate the entrained Sulphur in regular intervals

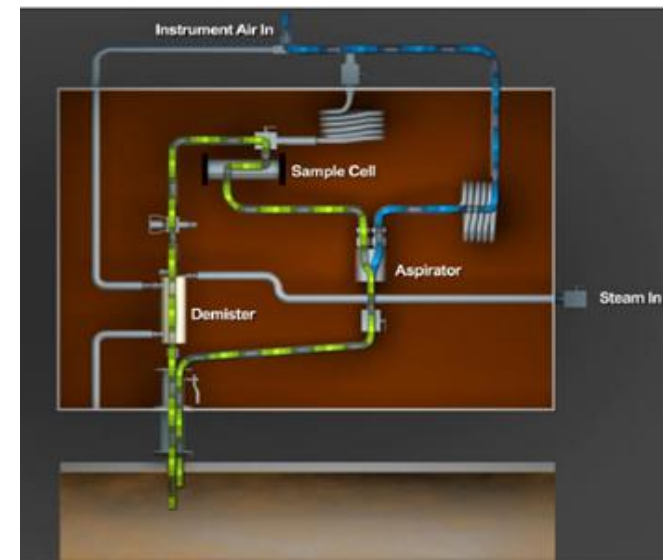
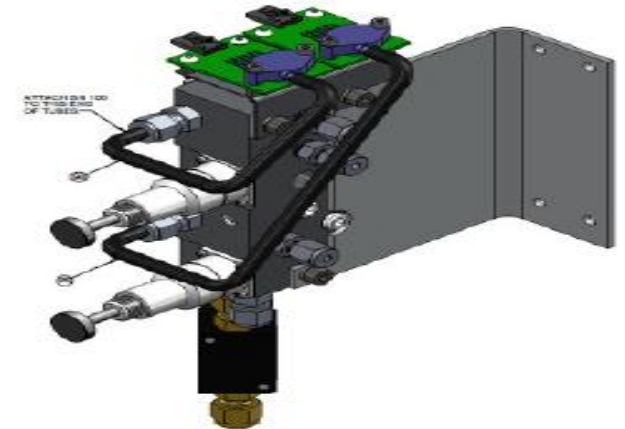
Most ASPIRATION Issues results in

- SV controlling becomes HAVOC with Manual Aspirations
- Flow Control is also affected by Aspiration.
- Optimal Flow to be emphasized all the time to avoid choking or plugging issues
- Aspiration will also increase the DUTY cycle of the Probe heater



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 temperature



TEMPERATURE COLD SPOTS

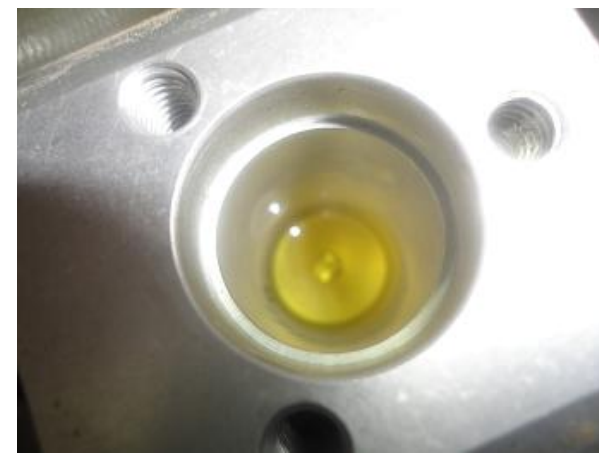


Repeatedly mistakes are made in the Installation of HTL lines for Sulphur lines

Cold Spots in the Analyzer loop for Sulphur Analyzers will result in CHOKING

Remember the RULE

COOL HERE PLUG THERE.....





- Keep the nozzle as short as possible, steam jacket the nozzle if longer than 15 cm.
- For close coupled type tail gas analyzers the nozzle can be as long as 1.5m.
- Do not wrap with tubing; it does not work as it just expands away from the nozzle.
- Use 2" 150# flange, 3" maximum 4" flanges have more area).
- Insulate and cover all steam jacketed components.

Sample line type analyzers using an “ASR” probe, come with a designed insulating cover. Be sure to cover to prevent ingress of water.

Remember the rule . . . **cool here, plug there.**

Heat loss typically takes place at the process connection but the plugging occurs downstream in the analyzer.

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

A Problem ...Transport Lag

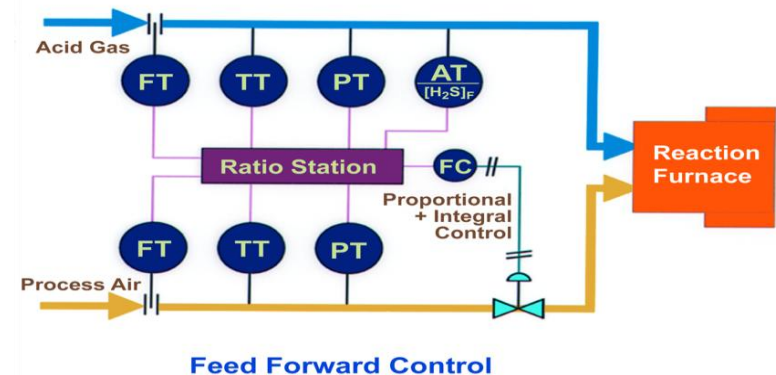
The control range is (only) 10% of the total air flow

- 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



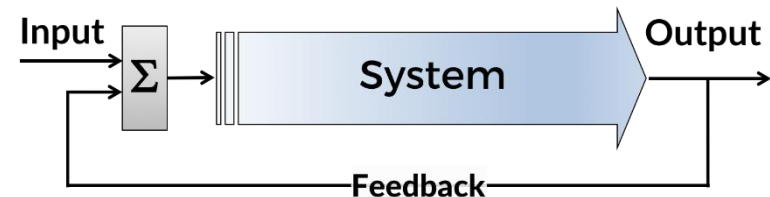
FEED FORWARD CONTROL

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



FEED BACK CONTROL

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



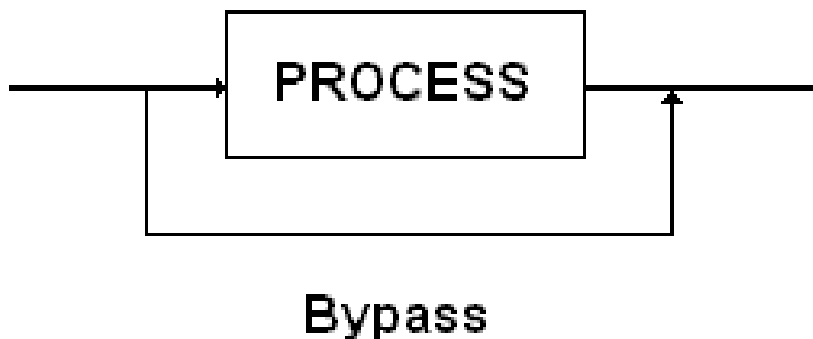
BENEFITS OF GOOD CONTROL



- ✓ 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



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

- 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

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

- Dual Range
- NSL(No Sample Line) Philosophy
- Steam Blowback
- 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



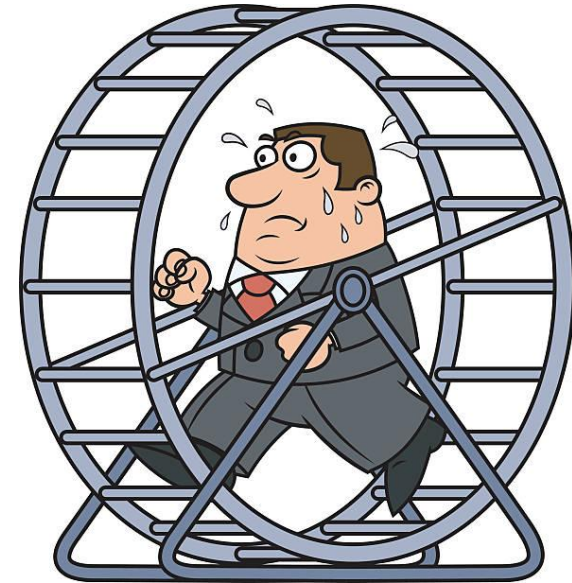
The Analyzer Data Sheet were revisited to accommodate requirements of CANSOLV Tail Gas Treating Process which involved a regenerable SO₂ scrubbing technology and sets new SO₂ limits driven by most stringent emission regulations at in the world (35 mg/ Nm³).

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

- SPARES INVENTORY Maintenance is always CHALLENGE
- Less trained maintenance crew utilizes more spares.
- Standardization of equipment across the plant results in repetitive spare consumption.
- Replace – philosophy entertains spares consumption
- Cost optimization directive from Client's management ends up in less spare part inventory.
- Obsolescence / Life cycle management not in place results in low spare part inventory.



- Ensure spare part review is conducted and all critical spare parts identified and available considering LCM / Obsolescence.
- Training to the maintenance crew is essential to utilize the right spare for the right reason.
- Equipment with substantial BAD ACTORs should be replaced with an upgraded better performing analyzer - break the Standardization concept.
- Repair shall be considered without compromising the safety part
- Cost optimization – cost cutting can be distinguished, where the OEM & Contractor recommendation for the spare part shall be considered.



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

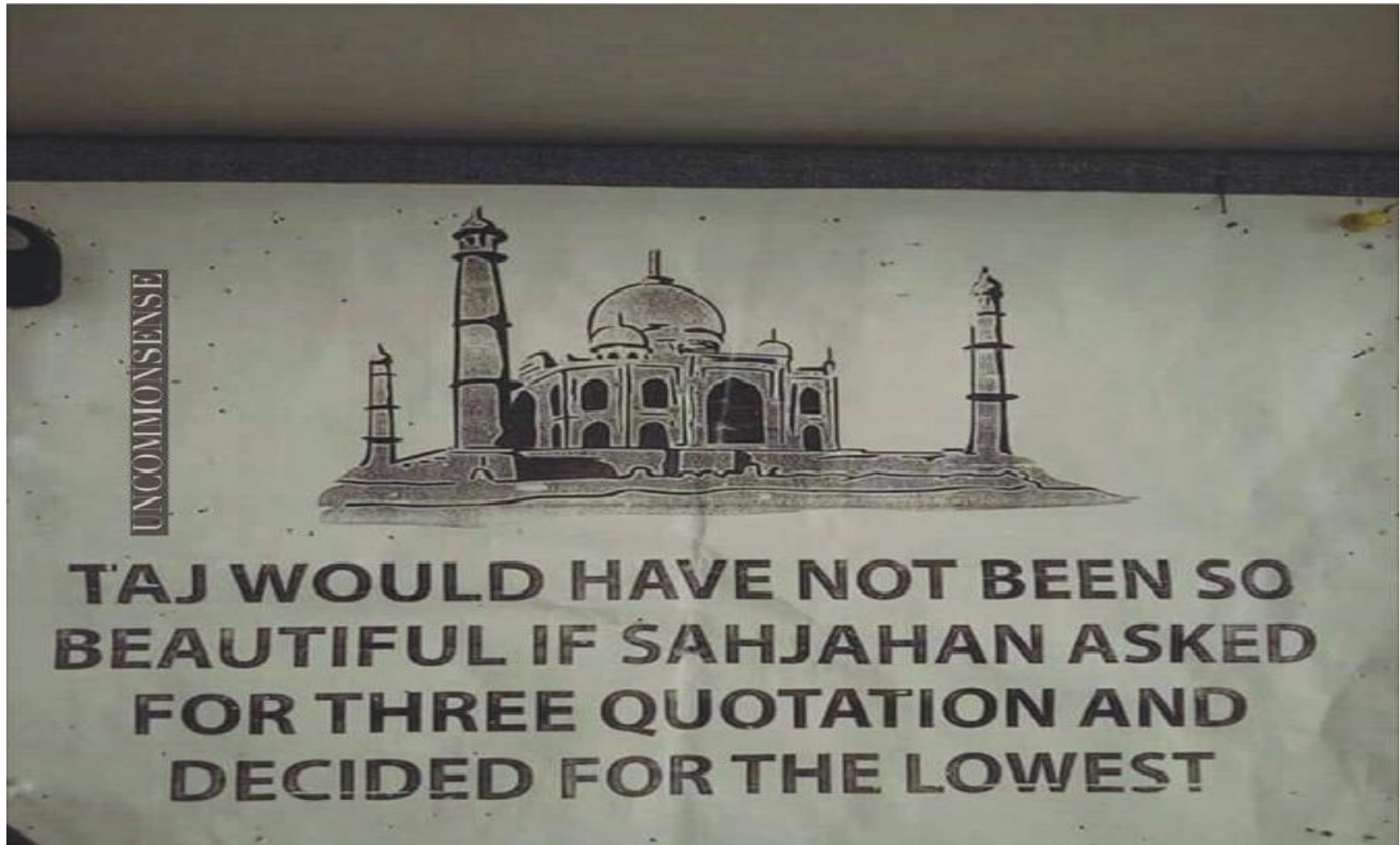


Advanced Technology addresses most of the challenges the in the Industry

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.....





BEST PRACTICES ARE BEST INVESTEMENTS

BEST PRACTICES – A COMMITMENT NOT A CHOICE

Time to decide before it is too late..





Who has the first question ???