Ethylene Middle East Technology Conference

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UOP Adsorbent Solutions in Ethylene Plants

Mitigate online moisture analysers problems and help protect your Plant Reliability

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If this is your **heart rhythm**, then you're in good shape.

If this is your **plant moisture analyzer trend**, then you're in trouble…

Unit availability = unit reliability = plant profitability

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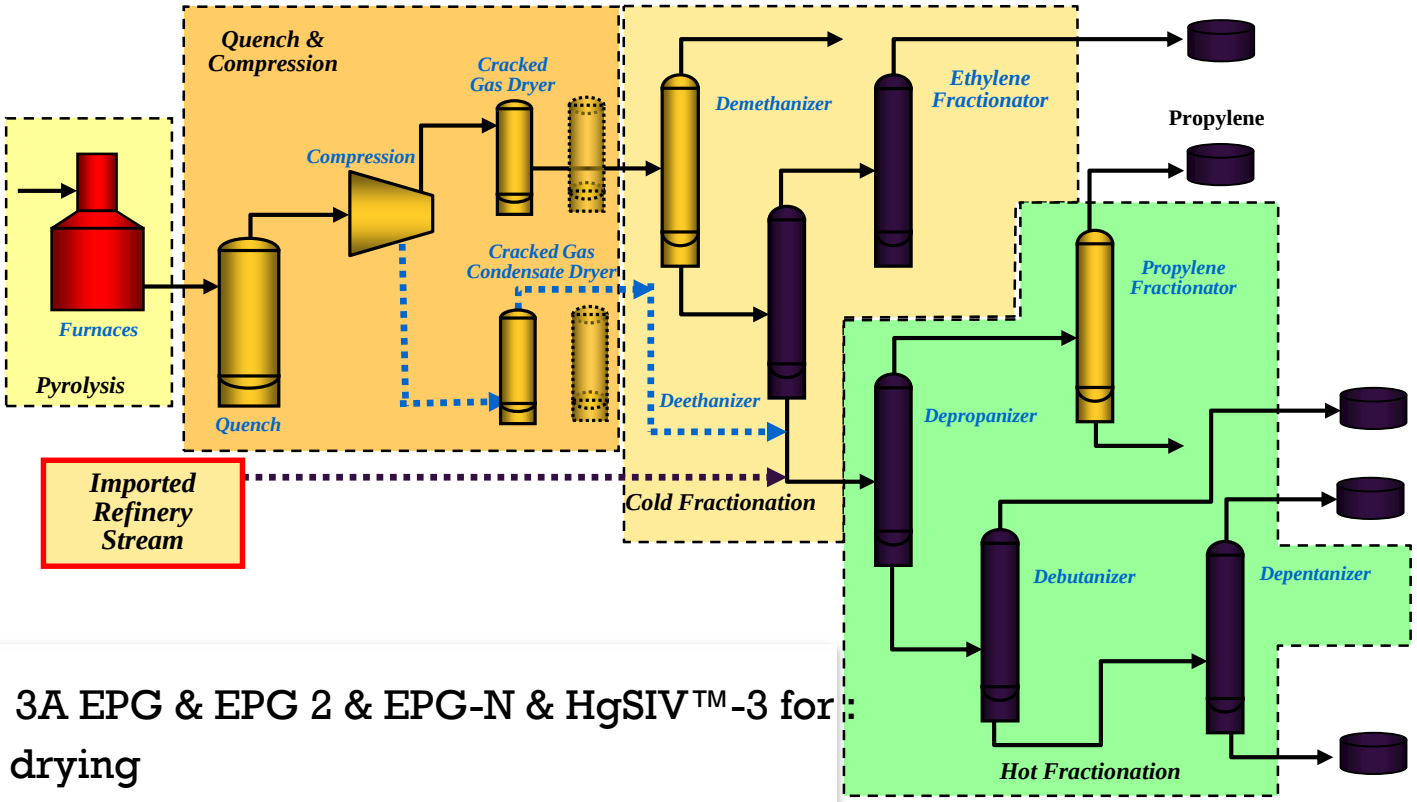
UOP Adsorbent Solutions in Ethylene Plants Mitigate online moisture analysers problems and help protect your Plant Reliability

1. Ethylene Process & location dehydration units
2. Lay-out multiple-bed adsorption unit charge gas driers
3. Adsorption unit operation
4. Typical online moisture analyser considerations
5. UOP Adsorbent case studies 1-5
6. Conclusions

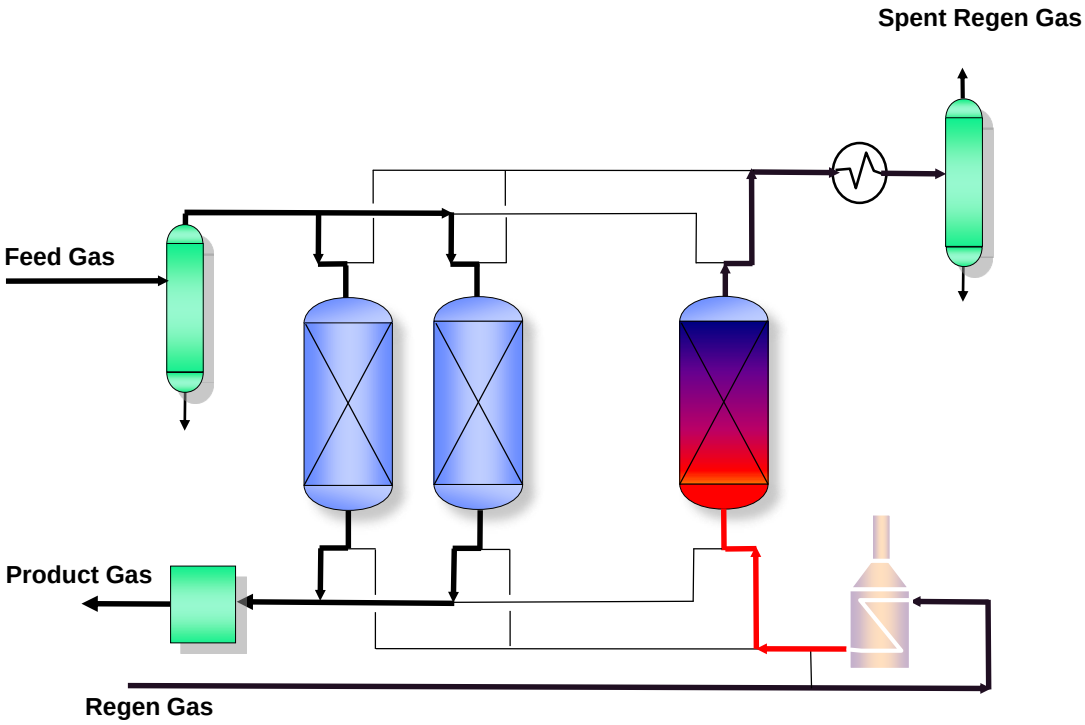
Ethylene Process & Adsorbent Units



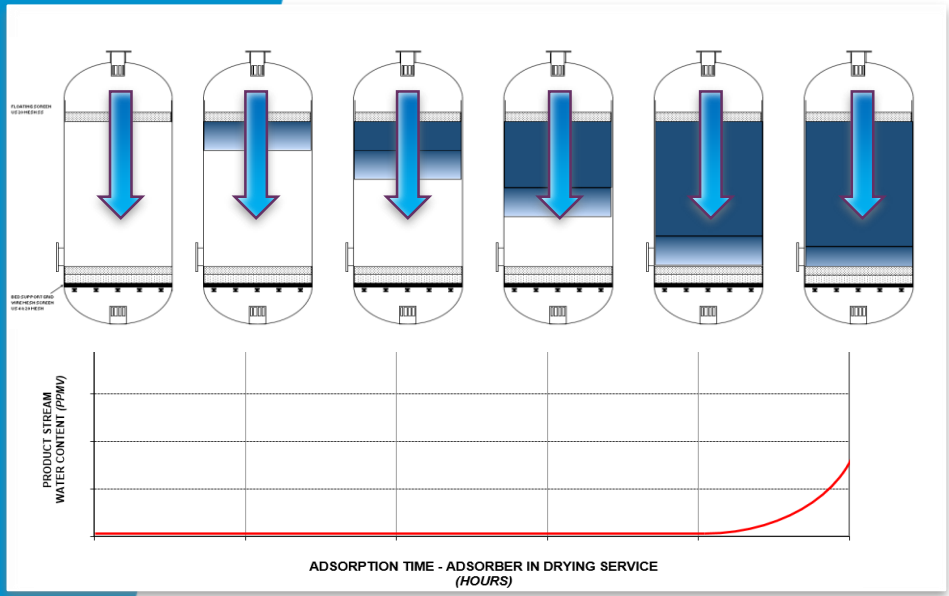
UOP MOLSIV™ 3A EPG & EPG 2 & EPG-N & HgSIV™-3 for :

- Cracked gas drying
- Cracked gas drying & Ammonia Removal
- Cracked gas drying & Mercury Removal
- Cracked gas condensate drying
- Cracked gas condensate drying & Mercury removal
- Secundary driers (after acethylene & MAPD reactors)
- Peripheral driers

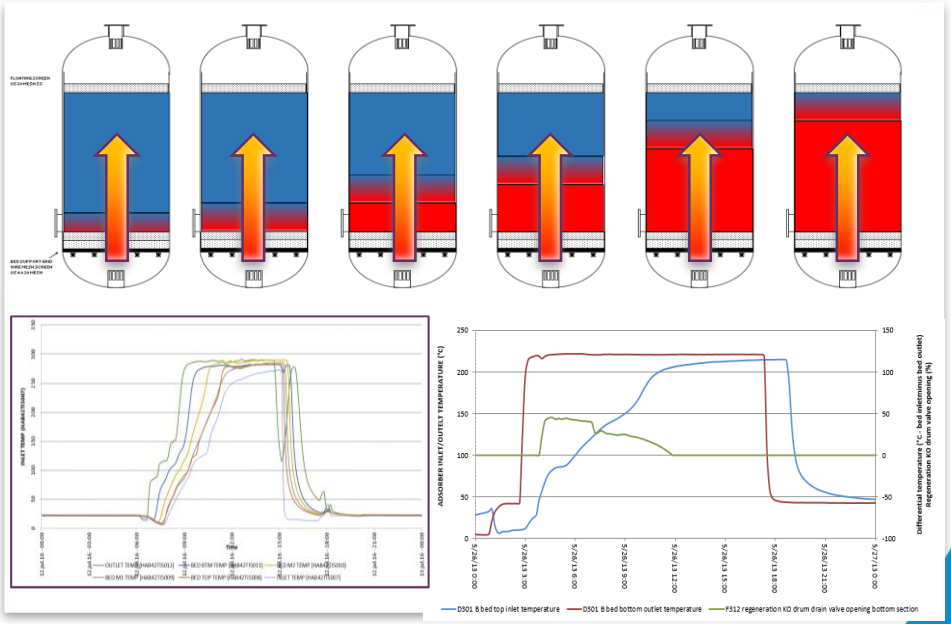
Charge Gas Drying Unit
Typical Lay-out Multiple-Bed Adsorption Process



Charge Gas Drying Unit
Typical Operation Adsorption Process



- Repetitive continuous cycling of adsorption & regeneration
- Adsorption dynamics & equilibrium in every cycle
- Regeneration dynamics & desorption efficiency in every cycle



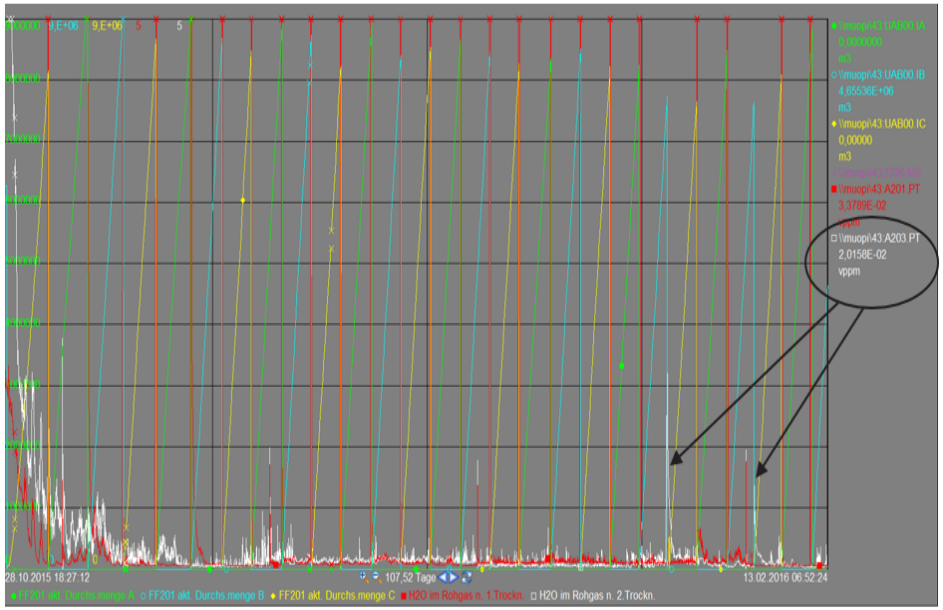
Charge Gas Drying Unit
Typical Online H2O Analyer considerations

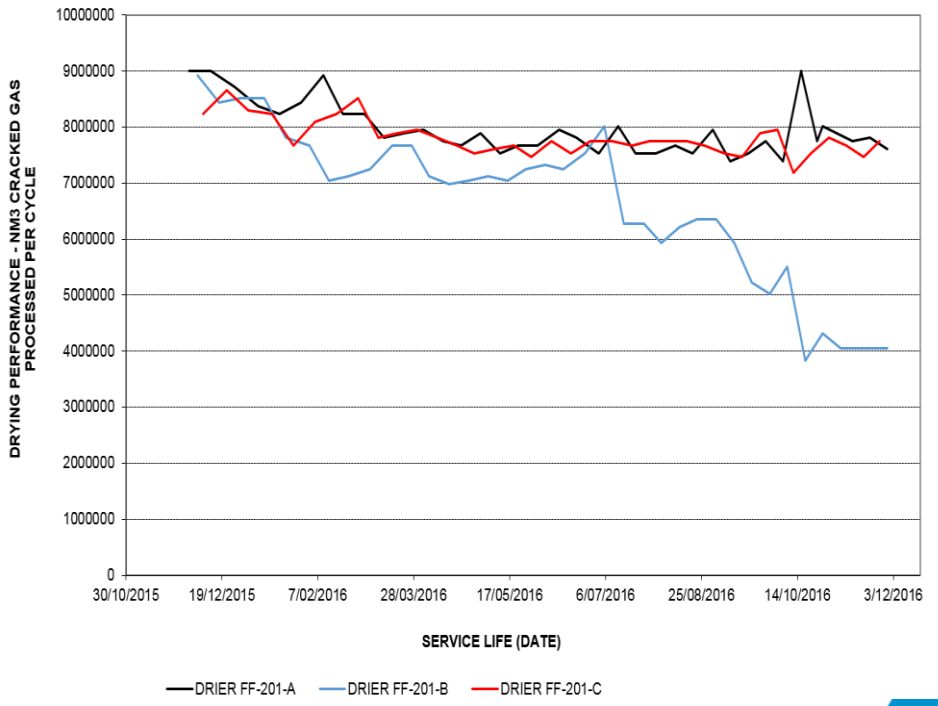
- Analyser operating principle
  - Quartz crystal sensor
  - Capacitance sensor
  - Laser sensor
- Analyser set-up
- Sampling system
  - Distance to sample point
  - Fast-purge option
  - Sampling line materials
  - Pressure / temperature controls
- Dedicated versus shared analyser system
  - Drier outlet & bed probe
  - Multiple driers & common product header
- Unit operation & regular “wetting” of online analyser

UOP Case Study 1

PROBLEM STATEMENT:

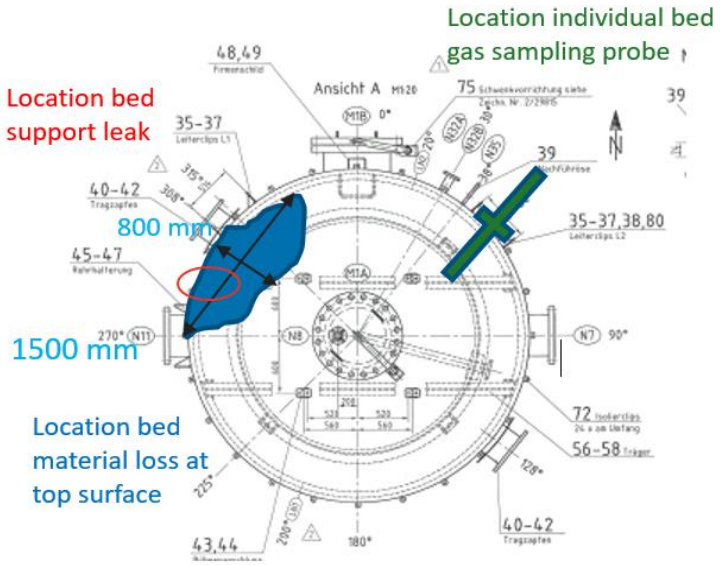
- 3-bed dehydration unit
- Excellent operation for 6 months, one drier losing capacity rapidly
- Response of online analyser at bed probe & bed outlet seems reversed on affected drier
- No operational issues downstream

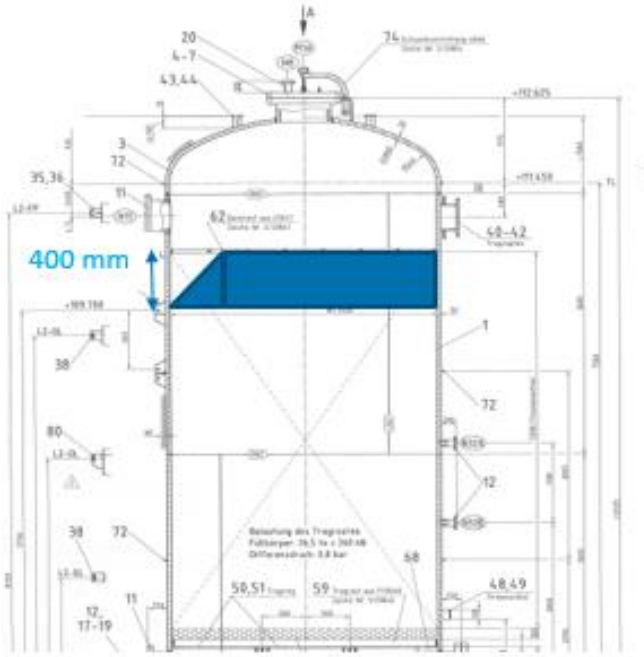




RESOLUTION:

- Accurate response of both online analysers on affected drier
- Bed support failure caused bed material loss opposite bed probe location & local moisture slippage
- UOP RCA assessment confirmed by boroscopic inspection
- Timely problem identification allowed drier replacement during mini-shutdown

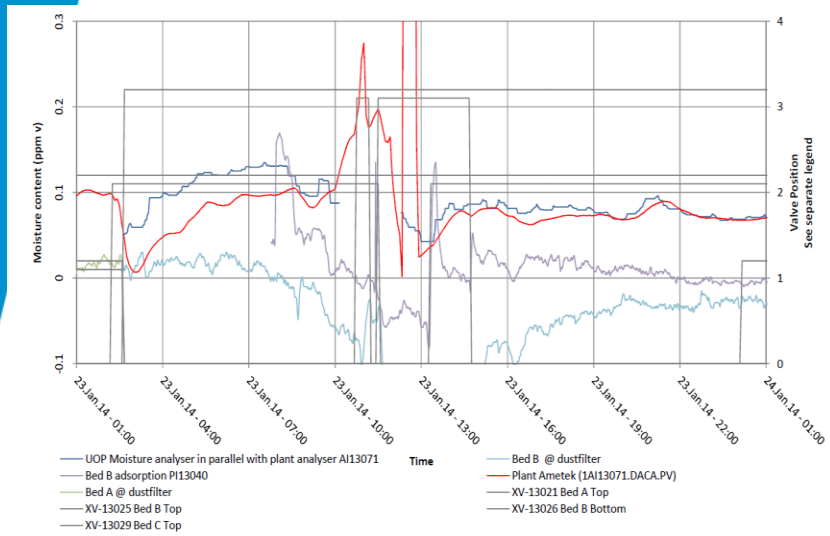


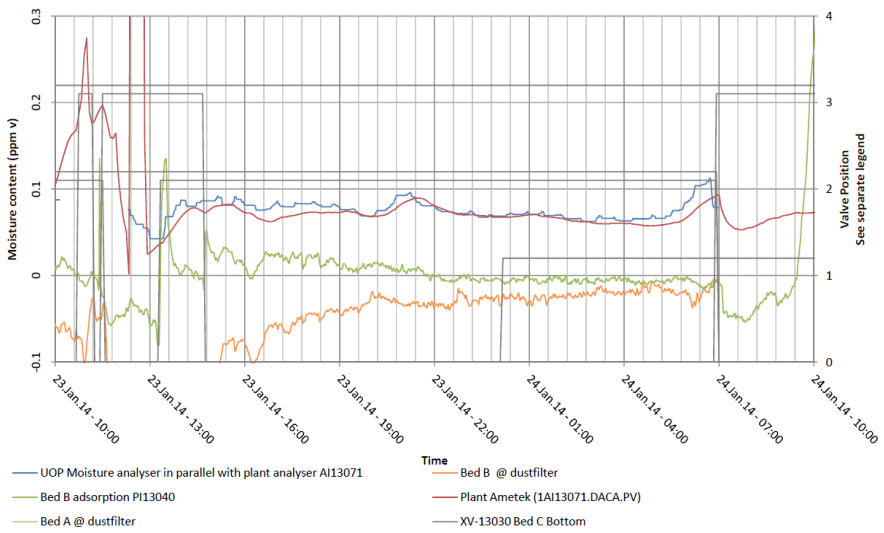


UOP Case Study 2

PROBLEM STATEMENT:

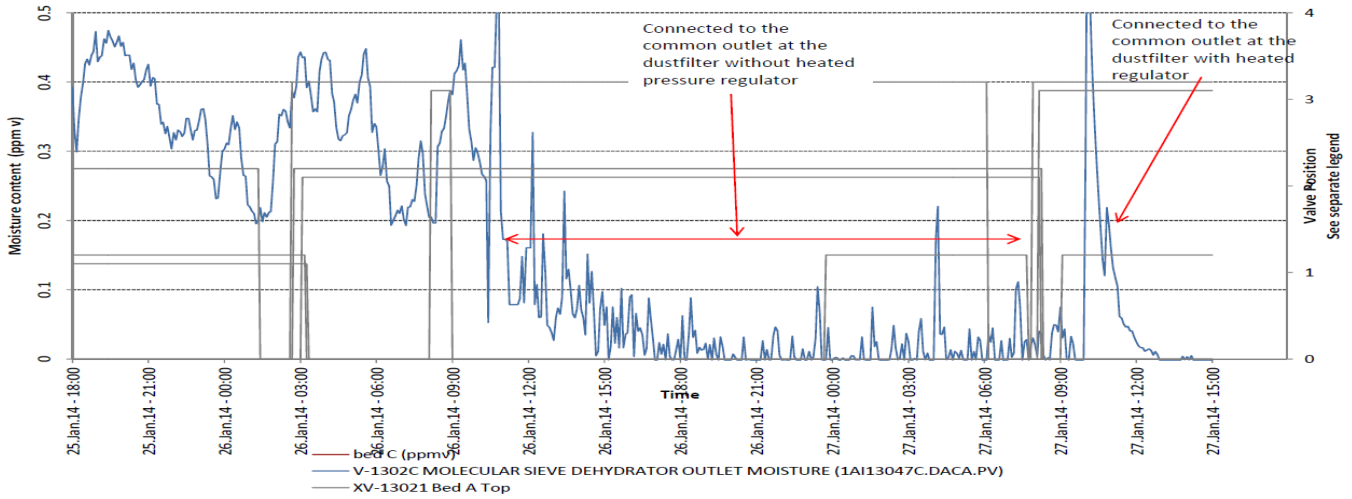
- 3-bed dehydration unit
- Excellent operation for 6 months on conservative fixed cycles
- Apparent conflicting moisture readings of old & new plant online analyser
- UOP onsite testing also different from new plant analyser
- Drier "slipping moisture" switched back on line for another 18-hour of excellent drying





RESOLUTION:

- Operator plant analyser showed several anomalies: apparent moisture slippage peaks in middle of adsorption cycle and high noise level (problematic for tight spec of <<1 ppmV)
- Modified plant sample system as per UOP recommendations gives significantly improved analyser readings



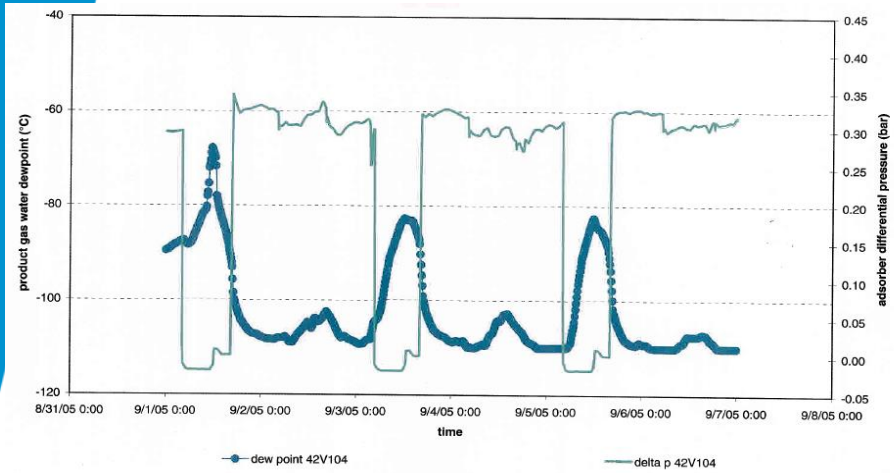
UOP Case Study 3

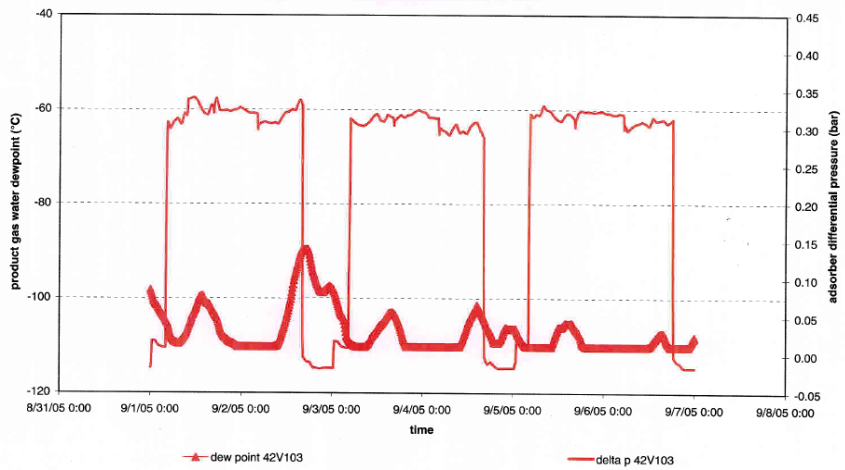
PROBLEM STATEMENT:

- 3-bed dehydration unit
- Excellent operation for 2 years with no operational issues downstream
- Response of online analyser not matching adsorption cycle steps

RESOLUTION:

- UOP onsite moisture analytical service confirms excellent drying
- Daily ambient temperature variation affects analyser readings





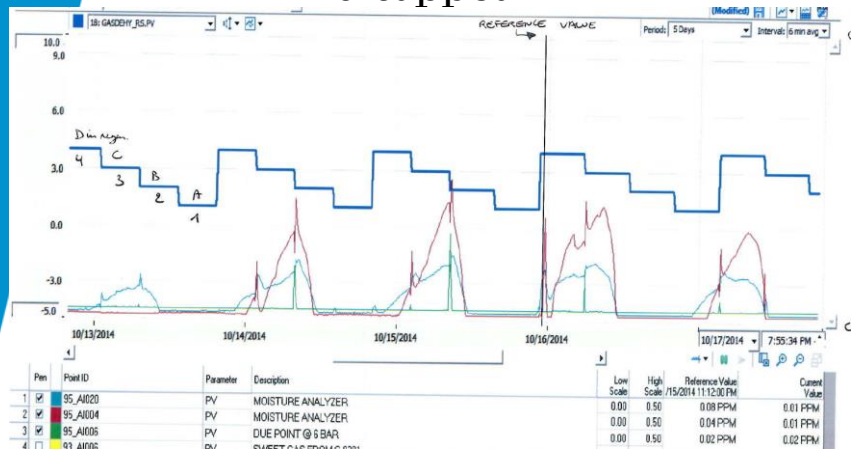
UOP Case Study 4

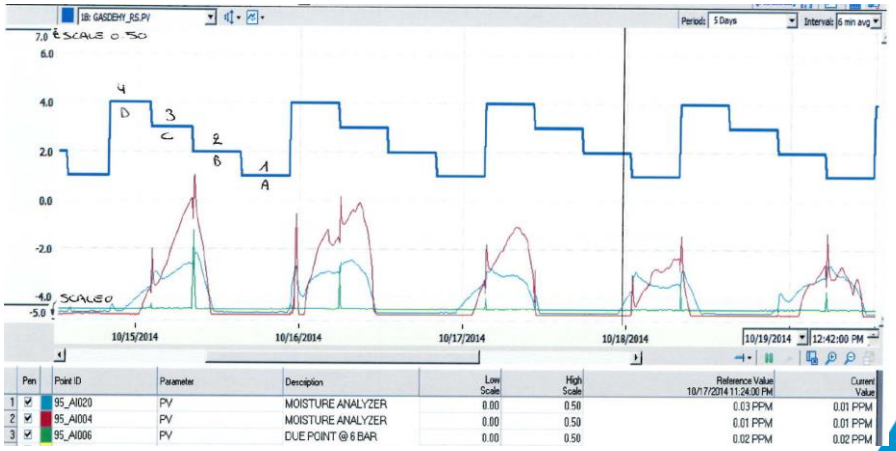
PROBLEM STATEMENT:

- 4-bed dehydration unit
- Excellent operation for 2,5 years with no operational issues downstream
- Conflicting response of 3 online analysers at common outlet: apparent moisture slippage from 1 drier shows on 2 analysers

RESOLUTION:

- UOP onsite moisture analytical service confirms excellent drying of all driers
- Cycle extension demonstrates no link with adsorption cycle
- 2 plant analysers checked out and nightly erroneous water peaks disappear





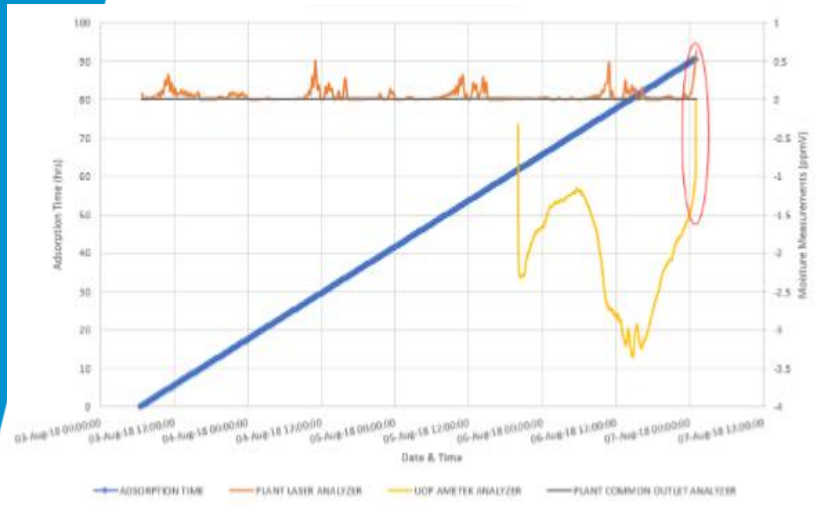
UOP Case Study 5

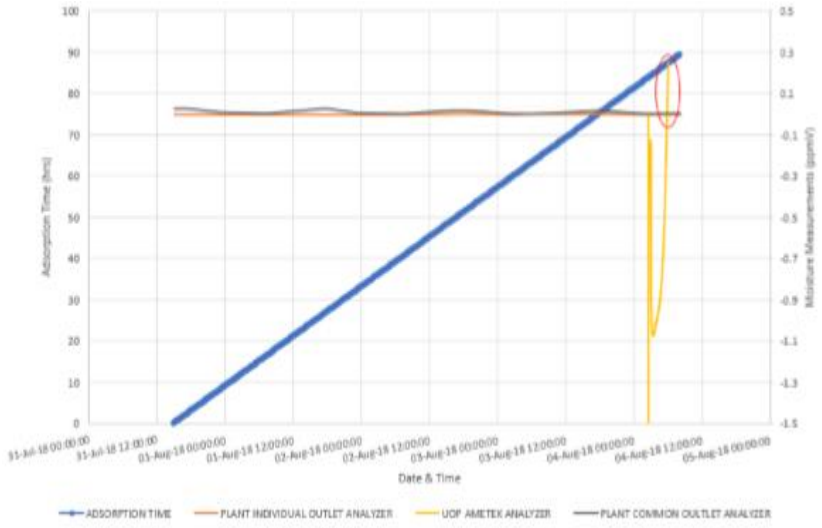
PROBLEM STATEMENT:

- 6-bed dehydration unit
- Excellent operation for 0,5 years with no operational issues downstream
- UOP invited for onsite performance evaluation & change operation from fixed cycle to breakthrough operation

RESOLUTION:

- UOP onsite moisture analytical service confirms excellent drying of all driers and breakthrough capacities
- 2 plant analysers showed reading anomalies (intermittent peaks & absence of moisture breakthrough response)





Conclusions

UOP TECHNICAL ADVISORS :

- UOP remote & onsite consultation available
- UOP temporary online moisture analyser service for performance evaluation dehydration unit & benchmark of plant analytical

UOP CONNECTED PLANT SOLUTIONS:

- Honeywell UOP Connected Plant ARMGuard™ system for real time operational review & online performance monitoring of adsorption process systems:

1. Uses existing plant instrumentation
2. Continuously collects operating data from the adsorbent unit
3. Analyzes actual data with UOP adsorbent models to determine the effectiveness of the process
4. Allows for optimisation of the adsorption cycles, reduce energy consumption, operate under variable feed conditions, and reduce costs due to unscheduled shutdowns.
5. Can detect operational issues which impact on unit performance and affect adsorbent life, directly affecting plant reliability & profitability.

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