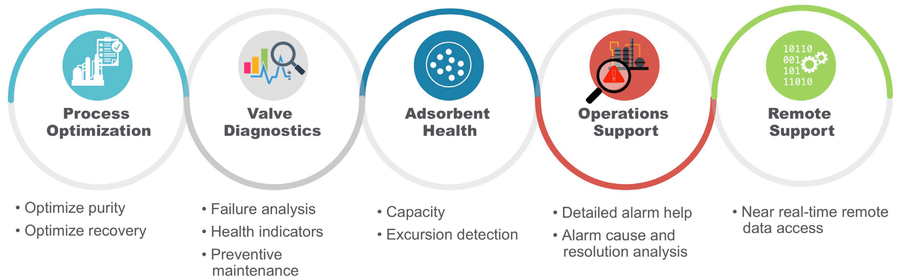
Honeywell UOP

PSAGuard™



What is PSAGuard?

- UOP's newest software solution to improve the performance and reliability of your UOP PSA unit
- PSAGuard™ will continuously monitor your unit, feeding data through UOP's proprietary analytic tools
- Allows user to easily monitor unit performance through web based dashboard and take action to improve operations based on UOP's 50+ years of know-how in PSA technology



FEATURES

PSAGuard Process Optimization

- Optimizing Purity & Recovery
  - PSAGuard™ will give the user confidence to operate the PSA closer to the design constraints while not exceeding impurity breakthrough.
  - By optimizing purity (edge of product spec) you can optimize recovery: Running the PSA too conservatively can send excess Hydrogen to tail gas decreasing the recovery.
- PSAGuard will send operating process variables (feed flow, feed composition, temperature, pressure cutoffs, etc.) to a secured server. PSAGuard™ will analyze this data to make recommendations to optimize cycle time to maximize recovery and purity based on current operating conditions.
  - Higher Hydrogen recoveries at different operating conditions
  - Supply the necessary information to adjust operations as conditions change
- A 1% improvement in H_2 recovery can result in over $750,000 increase of annual Hydrogen value for a 10 bed unit.

PSAGuard Valve Diagnostics

- By monitoring specific valve parameters and process conditions, PSAGuard™ can evaluate the "health" of operating valves.
  - PSAGuard™ will track and report valve performance metrics including cycle count and cycle speed, flagging valves as performance deteriorates.
  - Predict potential valve failures, enabling proactive intervention outside of standard time-based preventive maintenance program.
- With advanced warning on potential valve failures, operators can perform a preferred switchover to reduce the risk of an immediate switchover which could upset the tail gas system or effect downstream equipment.
  - Advanced warning allows the maintenance and instrumentation teams to properly plan for valve repairs.
- PSA supports high value equipment producing daily profits exceeding $1M; every hour counts!

BENEFITS & SUPPORT

Adsorbent Health



Monitoring of PSA feed, product, and tail gas streams to ensure there are **no excessive differences** between design and operating conditions.

Monitoring **pressure** in individual vessels to alert operators to changing conditions to protect the unit from adsorbent damage.

PSAGuard™ will **analyze** feed, product, and tailgas compositions

- Issue alerts if any key components breakthrough between adsorbent layers
- Ensure individual layers do not get damaged

Adsorbent health monitoring feature will be used to influence **optimized PSA cycle time**.

Unplanned adsorbent replacement can cost **up to $3.5M**, with even greater opportunity cost lost due to impact to downstream equipment.

Operations Support & Remote Support



Operations Support

- PSAGuard™ will provide additional context regarding alarms and abnormal situations, giving guidance on each alarm within the PSAGuard™ dashboard.
- Removing the "black box" feel of the PSA system to provide a better understanding of PSA operations in real time.



Remote Support

- Continuous remote monitoring allows UOP's Technology Service team to log in to site specific dashboard and review data in near real time.
- Access to data by Tech Service team will allow UOP to resolve issues faster and with greater accuracy; No need to send data to UOP.
- PSAGuard™ subscription includes set level of Tech Service consultation, including defined rates for service visits.

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