

A New
Commercialized
Process for Lower
Cost H₂ Recovery

Rapid Cycle Pressure Swing Adsorption (RCPSA)

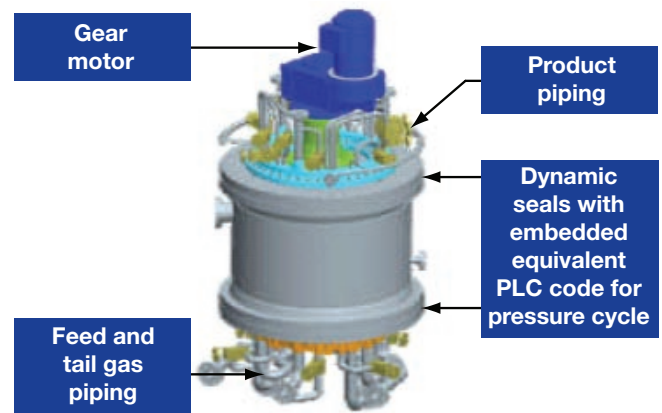


ExxonMobil
Research and Engineering

QuestAir
Pure Innovations®

Expect These Advantages:

- Efficiencies through advanced proprietary structured adsorbents
- QuestAir proven rotary valve technology (>400,000 operating hours)
- Small plot space use (a fraction of cPSA)
- Fully skid mounted modular design
- Potentially eliminates tail gas compressor
- Optimize H₂ recovery through product purity and implementation options
- Low cost H₂ recovery by minimizing H₂ loss to fuel
- Reduces energy consumption and CO / CO₂ emissions



RCPSA Technology Description

RCPSA technology overcomes the inherent disadvantages of cPSA, namely, slow cycle speeds, relatively large adsorbent beads and complex networks of individual switching valves. RCPSA uses two novel proprietary technologies: structured adsorbents, replacing conventional beaded cPSA adsorbents, and integrated rotary valves, replacing solenoid-actuated valves used in cPSA. Structured adsorbents provide mass transfer coefficients that are up to 100 times higher than beaded adsorbents used in cPSA; thus, significantly increasing the productivity of a unit volume of adsorbent bed. The multi-port rotary valves are used for rapid and efficient switching of gases between adsorbent beds, effectively capturing the increased capacity of the structured adsorbents.

Multi-bed RCPSA systems can be efficiently packaged in an integrated, modular rotating bed design. The modular skid mounted design of RCPSA reduces installation time and cost. In the high feed pressure applications (for example, $P > 500$ psig), RCPSA can be stably operated without a tail gas compressor resulting in further reduction of total installed costs and operational cost. Flexible product purity, enhanced recovery and better control of RCPSA can result in capital and operating cost savings. The modular skid mounted design of RCPSA makes it possible for refiners to manage H₂ molecules closer to the processing units as needed, a new paradigm of distributed H₂ recovery technology.

RCPSA technology results in significantly less inert gas consumption in operation or in purging. Furthermore, since the switching valve function is controlled through an electric motor, instrument air is only required for the operation of each module's product control valve and automated isolation valves. Controls and instrumentation can be configured to meet a particular customer's application. Options range from simple manual control to stand alone PLC-based operation. QuestAir H-6200 systems are designed to meet the codes and regulations required for installation in North America and Europe.

The first commercial QuestAir H-6200 unit started at an ExxonMobil Refinery in 2007. Installed in the diesel hydrotreater recycle loop, it minimizes valuable H₂ loss from the hydrotreating unit, resulting in increased H₂ purity enabling greater product uplift.

ExxonMobil Research & Engineering Company and QuestAir Technologies Inc. jointly license RCPSA technology to help meet the ever-growing H₂ demand in the hydrocarbon processing industries. For more information on how we can help you address your needs, contact us via the tsl.email@exxonmobil.com.

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