

CASE STUDY

A leading supplier of industrial gases revamped a pressure swing adsorption (PSA) unit used to purify hydrogen.

Increased capacity under new process conditions through compressor upgrade

Compressor manufacturer: DRESSER - RAND

Type	HHE-VL	Gas	H ₂
Power	16,778 kW (22,811hp)	Suction pressure	24/32 bar (348/464 psi)
Speed	327 rpm	Discharge pressure	33/53 bar (479/769 psi)
Lubrication	yes		



PSA unit



New lubrication system with divider block



HydroCOM actuators on the compressor

Facts in Brief

The highly variable hydrogen demand from the PSA unit required this compressor to be relocated from the hydrogen delivery pipeline to the feed pipeline, with substantial modifications.

Customer requirements

- An efficient way to control the compressor and the hydrogen feed pressure to the PSA
- Short project timescale: 9 months

Solution applied

- Torsional analysis, pulsation study and rod load calculations to determine the feasibility of a capacity increase
- Redesign (with FEA) and manufacture new piston and crosshead
- Manufacture new cylinder to updated specifications
- Check and repair crankshaft
- New HydroCOM control system with highly efficient CE valves
- BCD packing with HY material
- Emissions control panel
- New lubrication system with divider block
- Monitoring and protection system
- Add pulsation bottles, partial re-grouting
- Reassemble, paint, and provide start-up assistance

Results

- The upgraded compressor feeds 99.99% pure hydrogen to the PSA unit
- HydroCOM control system prevents lifting of the PSA bed during process upsets - no flaring anymore.
- HOERBIGER BCD packing reduces hydrogen emissions
- Project delivered on time