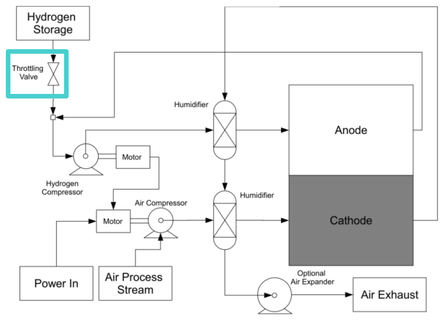
Combined Scroll Expansion-Compression H2 Recirculation Pump

(Visit Booth No. 220)

Air Squared
http://airsquared.com

1. Current System

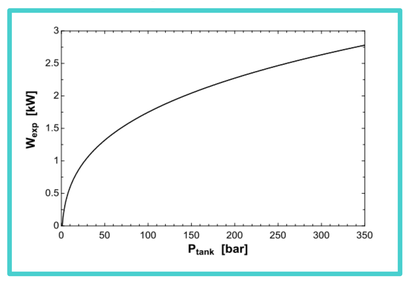


Approximately 1 kg of hydrogen is needed to provide 15kW-hr of energy.

This equates to high pressure storage of hydrogen on the order of 350 barg.

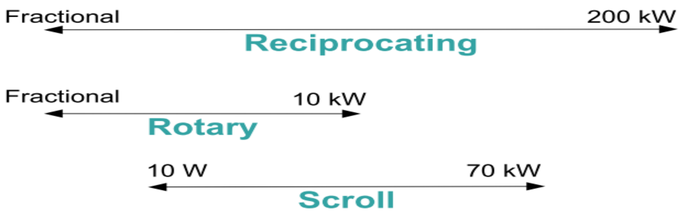
Tank has a maximum of 2.75 kW of available energy.

Throttled power available



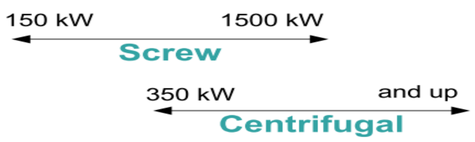
Replace throttling process with scroll expander.

2. Expander Technology



Scroll Technology Advantages:
- Can easily be designed oil-free
- Low sound level
- Balanced, smooth rotary motion
- Small compact design
- Lightweight
- Minimal pulsation
- Available Semi-Hermetic with Magnetic Coupling

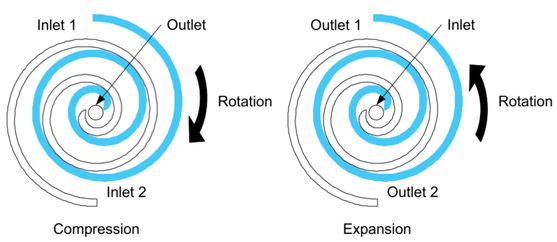
Scroll Technology Disadvantages:
- Price

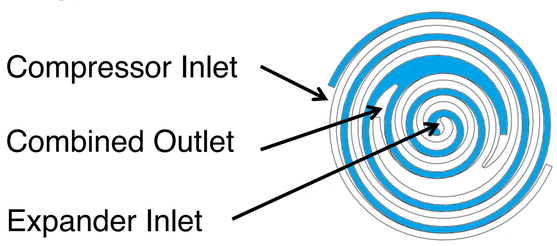


Scroll technology provides the best option for small scale expansion.

3. Combined Expander-Compressor

(Patent Pending)



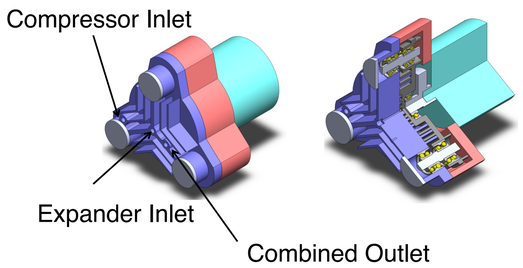


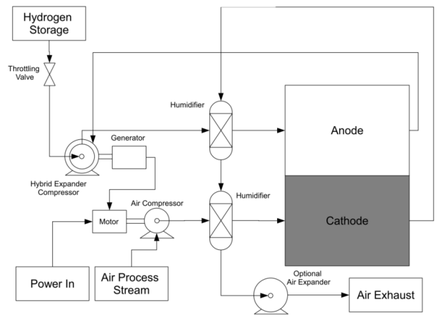
Combine both recirculation pump and expander under one scroll design (reduced cost and complexity).

4. HHP System Configurations

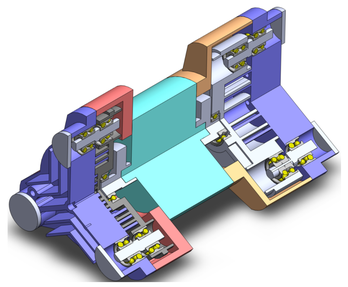
(Patent Pending)

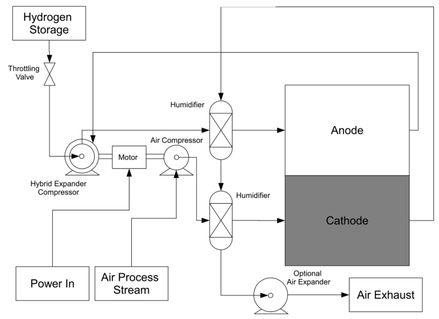
Hybrid H2 Pump (HHP) with Generator

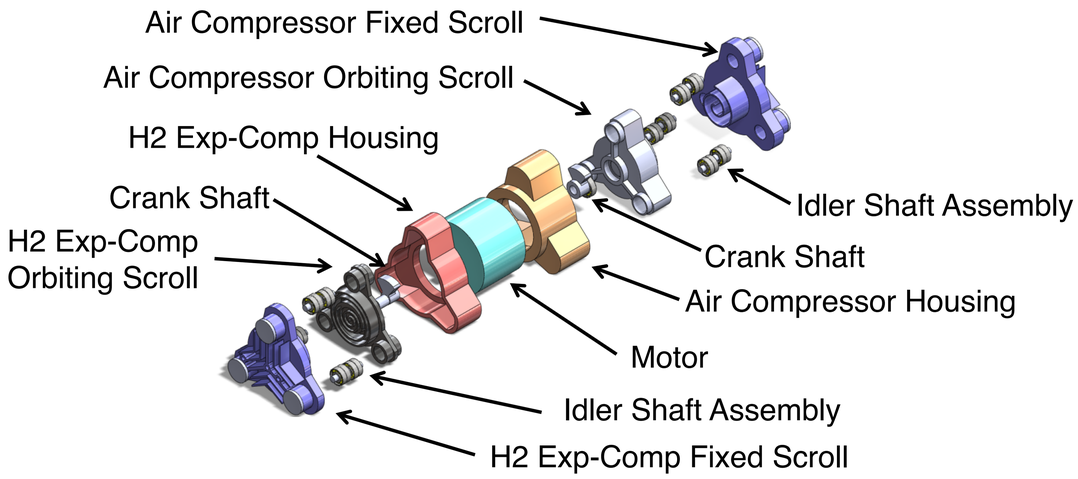




HHP with Air Compressor







Reduced system complexity by combining Air Compressor with HHP.

5. HHP Power Reduction

Air Squared's modeling method shows the expander can provide more than enough power for the recirculation pump.