

Emerson's Copeland Scroll® Compressor Technology Enables Canadian Heavy Oil Producer to Capture Valuable Oil Well Casing (Vent) Gas.

RESULTS

- 100+ oil wells now capturing vent gas for onsite use or resale -typically 40-120 MCFD
- Modular compression packages delivering scalable wellhead horsepower, improving utilization
- High pressure, dry gas is improving engine and oil tank burner operation
- Project payback in less than 2 years.



APPLICATION

Heavy Oil Casing (Vent) Gas Recovery.

CUSTOMER

One of Canada's largest integrated energy companies, with significant heavy oil operations throughout Western Canada.

CHALLENGE

Western Canadian heavy oil producers have focused on capturing solution gas vented or flared from oil wells. Producers have aimed to capture the gas for its economic value, creating attractive financial returns. For years producers have looked for cost effective, low maintenance compressor technology to capture and effectively utilize oil well vent gas. Traditional compression technology has not been able to meet the unique demands of this application.

To survive in this environment, the solution needed to handle ambient temperatures from minus 40 to plus 40 deg C, as well as continuous duty under changing gas production rates. Prior to Copeland Scroll® compression, existing compression offerings were often unreliable, high maintenance, and inflexible to changing gas flow rates.

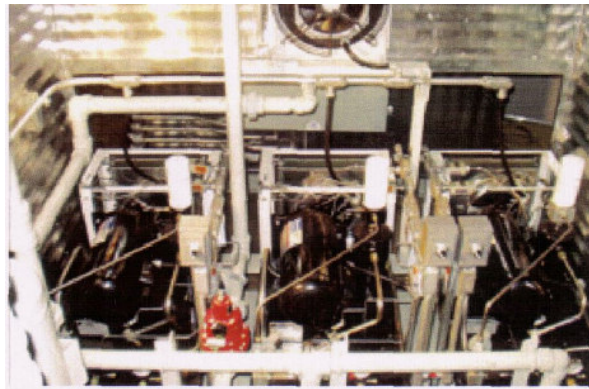


Casing gas had to be compressed from 1 psig up to as high as 190 psig to be used productively. Traditionally this would have involved a two or three stage reciprocating compressor. Packages that employ rotary vane and most screw compressors are typically not suitable for pressure ratios of this magnitude.

SOLUTION

During 2003 Emerson Process Management and PC Compression, Inc. of Nisku, Alberta partnered together to develop a compression package to meet this producer's specifications. Utilizing Copeland Scroll® compressor technology from Emerson, a unique gas compression/ drying package has been deployed. The result is the industry's first modular, all electric scroll compressor package. The packages are meeting key customer requirements - application flexibility and low maintenance.

The all-electric approach was critical to achieving low maintenance. Casing pressure is automatically controlled via variable speed operation. Once the desired casing pressure set point is entered, the compressors instantaneously change speed to hold casing pressure constant. The scroll modules typically require once per year maintenance. The Copeland Scroll® hermetic compressor design eliminates belts, gears, hydraulics and associated maintenance.



Modular Arrangement of Three Single Copeland Scroll Compression Packages

Overall Benefits Summary:

- **Ultra Low Maintenance**
 - Once per year oil addition/change and new oil separator filter
 - Compressor designed for continuous duty, 40,000+ hour life
- **Enhanced Oil Production & Equipment Performance**
 - Precisely controlled casing pressures typically yield increased oil production
 - Dry, high pressure fuel improves engine and tank burner performance
- **Flexibility to Changing Gas Production**
 - Compact and modular design allows for simple 10HP changes onsite
 - Greatly reduced need to change entire compressor packages
- **Standardized modules**
 - Compressor modules can be installed and commissioned in hours, not days
 - Replacement parts, maintenance are service are streamlined
- **Environmentally Friendly**
 - Virtually complete sound attenuation
 - Very low oil consumption (~15 oz, or 0.5 liter per year)
 - Zero gas emissions – hermetically sealed compressor with internal motor



• **Proven Reliability**

- Over 30 million Copeland Scroll compressors sold since 1987
- Over 400 compressors with 3+ million hours in commercial natural gas boosting
- ~400,000 hours in Western Canada oil and gas since Jan. 2003

• **Instantaneous & Automatic Casing Pressure Control**

- Precise and constant casing pressures to help increase oil production
- No operator intervention in response to changing gas production

• **Full Flow Bypass Capability Without Overheating**

- Compressors can “idle” even with downstream infrastructure disruptions
- Modules have integrated oil cooling with variable speed fan

Emerson Process Management Helps Western Canadian Energy Producer Increase Oil Production Rates, Reduce Maintenance Costs and Capture Greenhouse Gas Emissions

The following representative wellsite demonstrates the economic benefit of fitting a traditional heavy oil wellsite with Copeland Scroll modular compression and gas drying. In terms of oil production, this oil well is typical for Western Canada. Benefits noted reflect complete vent gas recovery and precisely controlled lower casing pressures.

Prior to Compression & Gas Drying

Actual average oil production.....27.5 m3/day (173 bbl/day)
 Est. total vent gas.....3.3 e3m3/day (115 mcf)
Est. vent gas to atmosphere.....2.3 e3m3/day (80 mcf)
Est. vent gas to tank heater/engine (wet)...1.0 e3m3/day (35 mcf)

After Copeland Scroll Compression & Gas Drying

Actual average oil production.....32.5 m3/day (204 bbl/day)
 Increase in oil production.....5.0 m3/day (31 bbl/day) *(18% increase)*
 Total solution gas captured.....3.3 e3m3/day (115 mcf)
Sales of dry gas2.3 e3m3/day (80 mcf)
Heater/Engine dry gas.....1.0 e3m3/day (35 mcf)

Installation (30 HP package)

Total cost **(1)**\$125-175,000 CDN
 Electrical powerGenerator coupled to onsite gas engine
 Installation time.....6 hours *(hookup and commissioning)*

Project Economics Summary (\$CDN)

Value of utilized dry gas for onsite use.....35 mcf x 30 days x \$4/mcf = \$4,200/month
 Value of sold vent gas.....80 mcf x 30 days x \$4/mcf = \$9,600/month
 Value for oil production increase.....31 bbl/d x 30 days x \$25/bbl = \$23,250/month
 Overall increase in revenue per well.....\$32,850/month
 Payout of Installation.....~4-6 months
 Yearly maintenance costs.....~\$200 per compressor *(parts+labor)*

Note 1: Cost range used to show payback sensitivity, depending on site requirements. Total applied costs can include: up to (4) 10 HP scroll compression modules, gas drying, new gas engine/generator, site preparation, electrical/mechanical installation, start-up and operator training

