

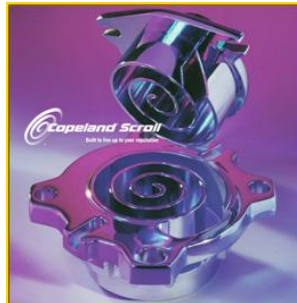
Copeland Scroll[®] ***Gas Compression Overview***

Gas-Electric Partnership Conference
January 2008

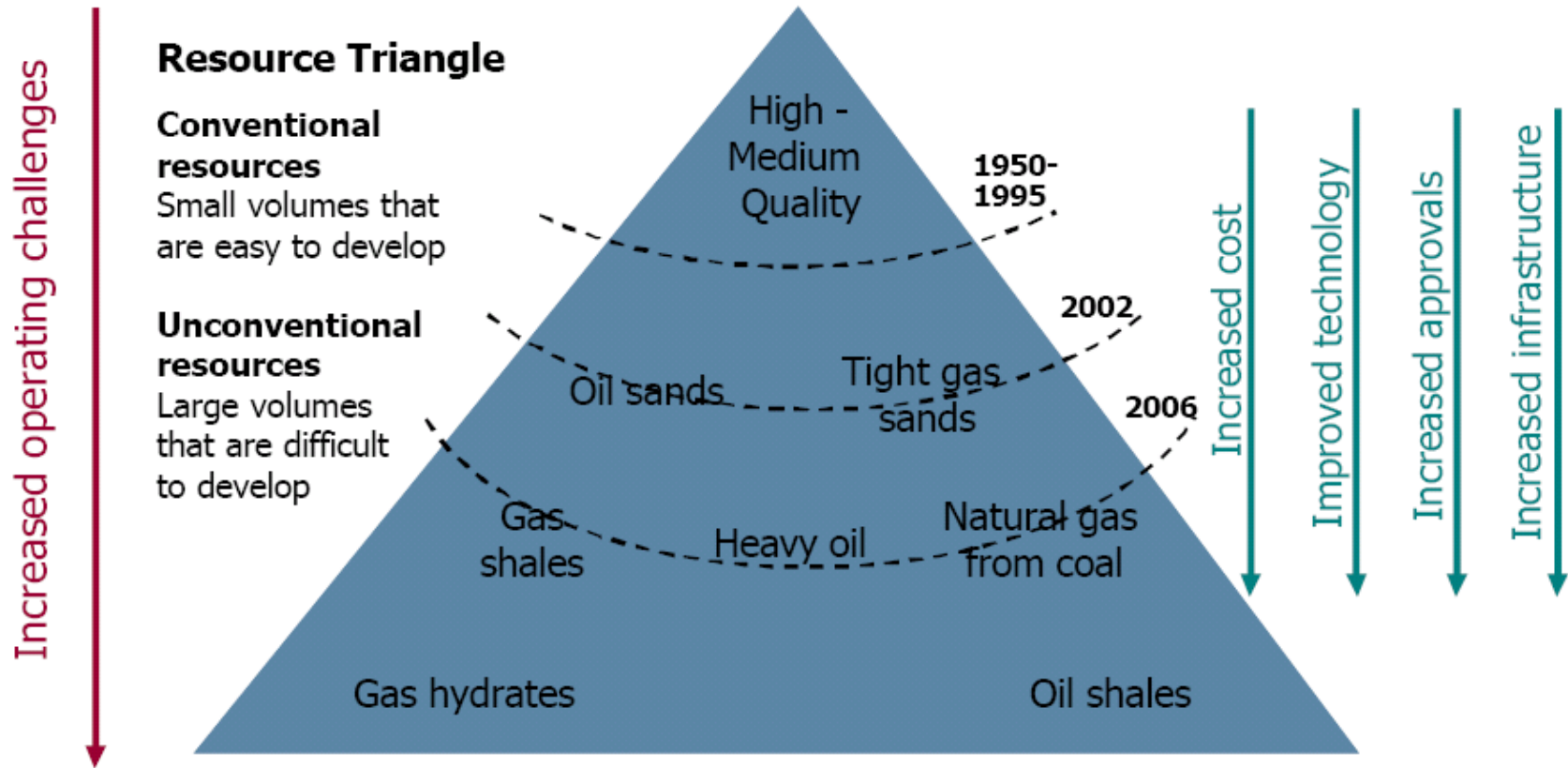


Emerson Corporate Profile

- Emerson 2007 Sales of \$22 Billion
- Parent of Fisher, Rosemount, Daniel, Kato, ASCO Switch, Copeland, US Motors
- Compressor Division Sales of \$2.6 Billion
 - World Leader In Scroll Compressor Technology & Production
 - 80 Million **Copeland Scroll® Compressors** Sold Since 1987
 - Residential & Commercial AC
 - Commercial Refrigeration
 - Oil & Gas Production (2003)



Increasing Challenges For Recovering Oil and Gas Resources



Source of image: Canadian Society for Unconventional Gas
Submission to Council of Energy Ministers, September 2003

Upstream Challenges Are Growing

- **Must Reduce Maintenance Costs**
- **Increasing Use Of Infield Compression, With Fewer Resources**
- **Aging, Smaller Workforce – Urgent Need For Unattended Operation**
- **Tightening Emissions Regulations – State & Federal Driven**
- **Record Drilling, With Flat - To Declining Production**
- **Increasing Pipeline Pressures Effecting Gas Production**

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***Bottom Line...New Technologies Needed To
Produce More Oil and Gas, With Less Cost
And Environmental Impact***

Copeland Scroll[®] Compression Value

Challenge Addressed

Reduce Maintenance Costs

More Wells, Fewer Workers

Environmental Compliance

Personnel safety

Pressure Capability & Flexibility

Application Flexibility

Compressor Reliability

Copeland Scroll Value Add

- Payback - once/year service typical, visit by exception

- Payback - more wells/operator – unattended operation

- Hermetic design eliminates shaft seal gas/oil leaks

- < 5ppm oil carryover, 40-80oz/yr loss

- Ultra low compressor noise - ~75 dBA at 1m

No external moving parts, factory pressure/leak check

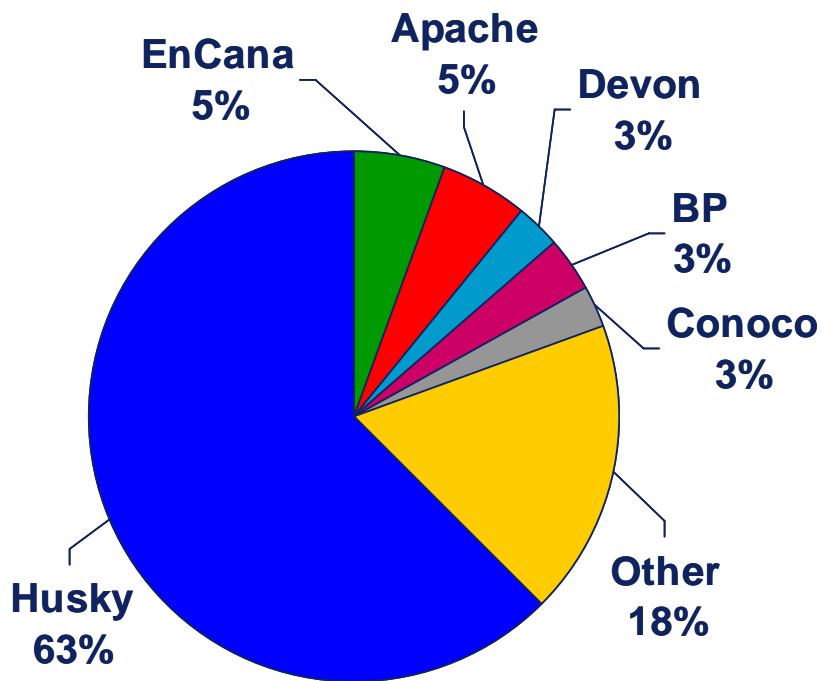
Single stage discharge pressures to 345 psig

Variable speed, suction or discharge pressure control

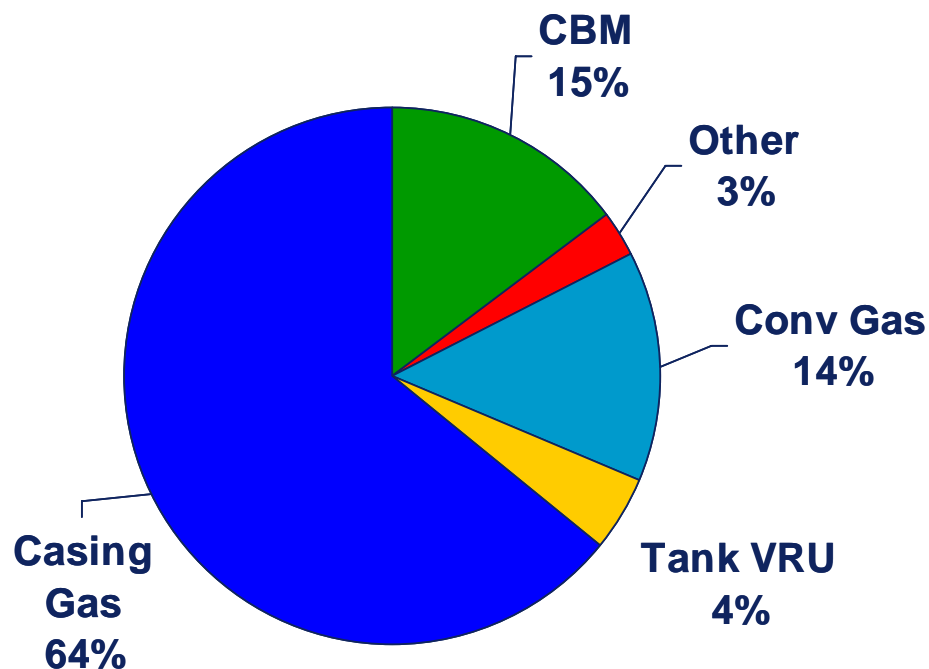
Scroll sets “wear in, not wear out”, increased tolerance to liquid or debris contamination

Copeland Scroll[®] Oil & Gas Applications and Customers

Customers

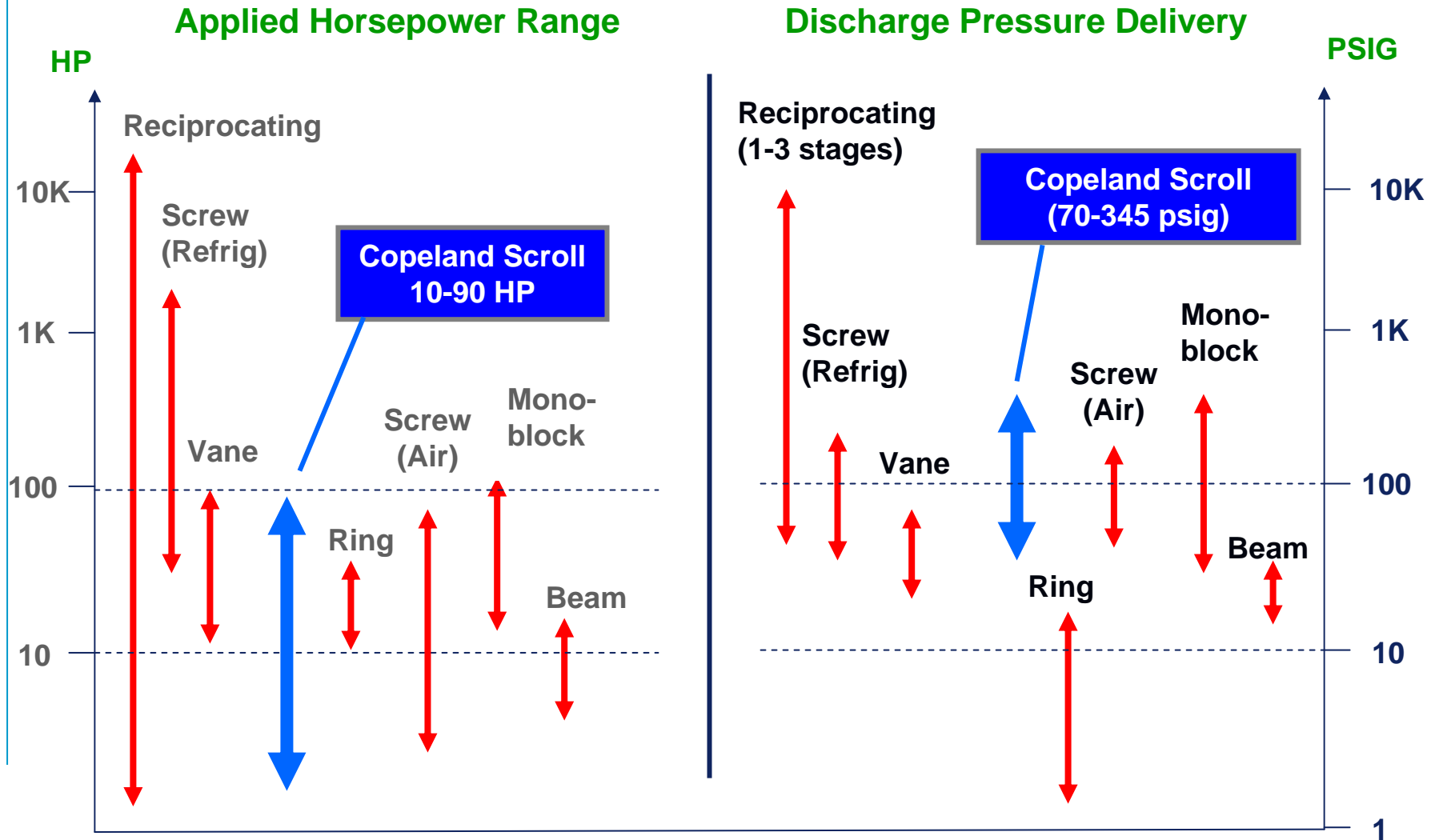


Applications



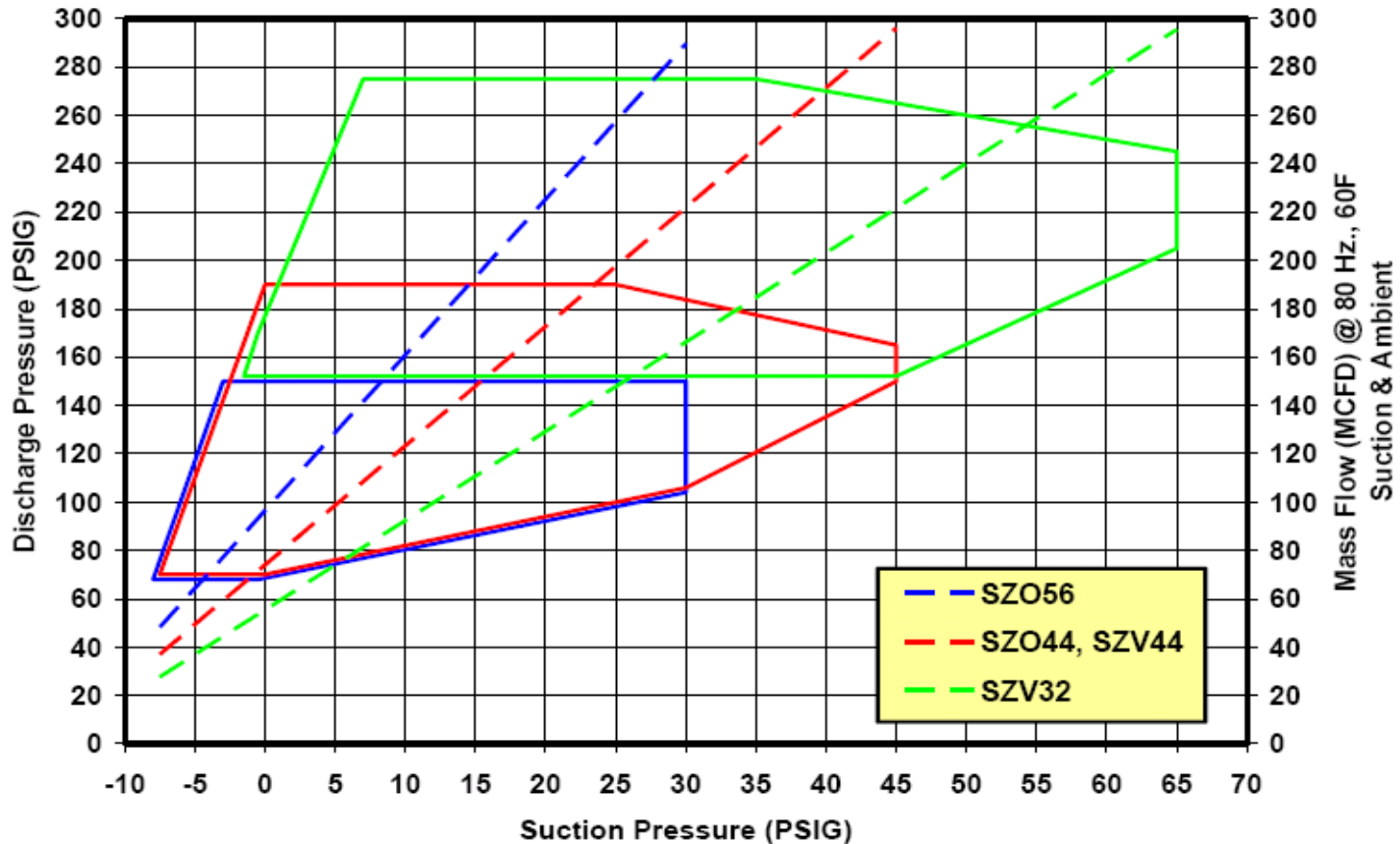
**~1,000 Copeland Scroll Compressors
Installed Since 2003**

Comparison of Natural Gas Compression Options



Copeland Scroll[®] Operating Map Example

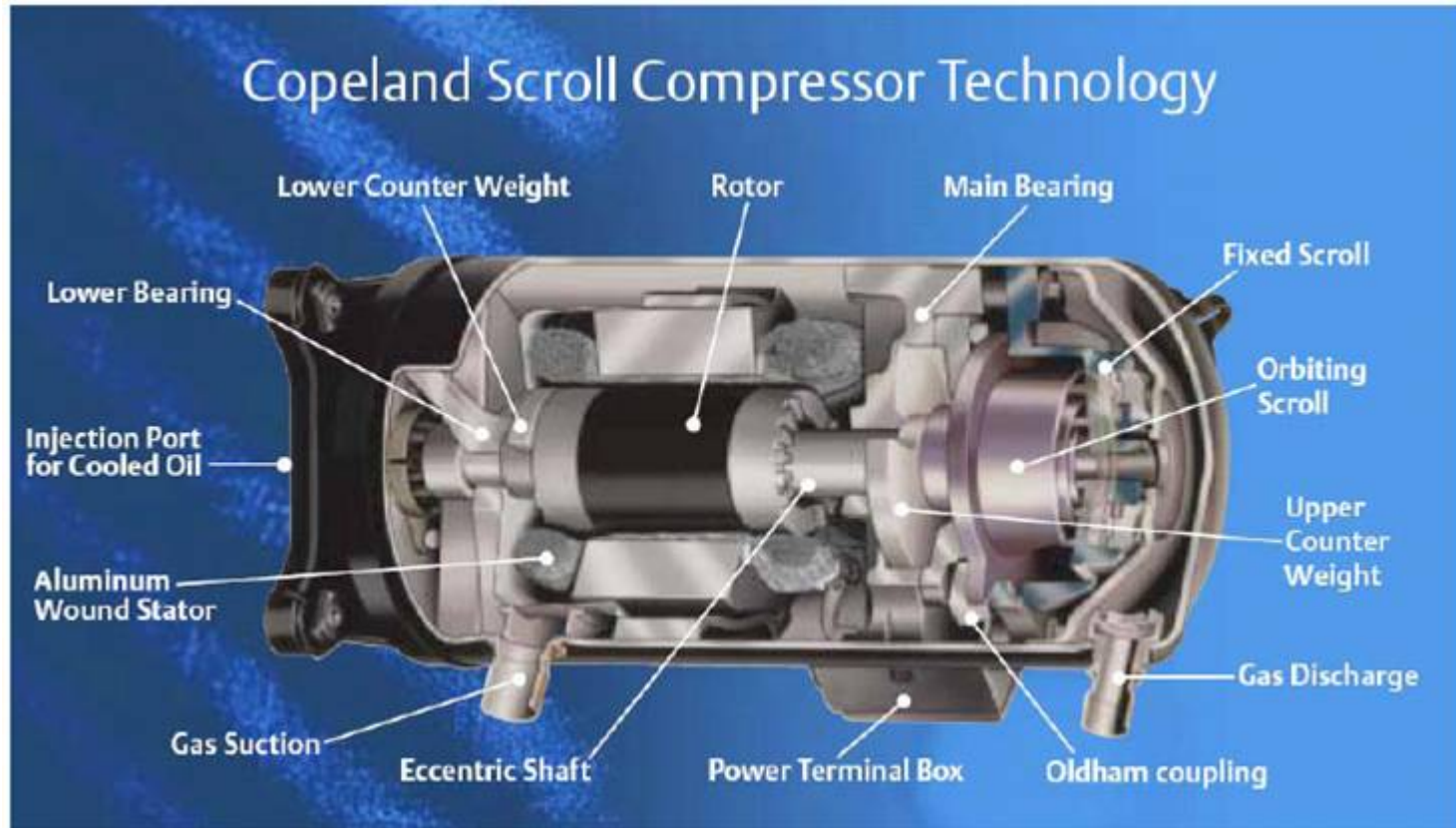
30HP Compressor Module Family



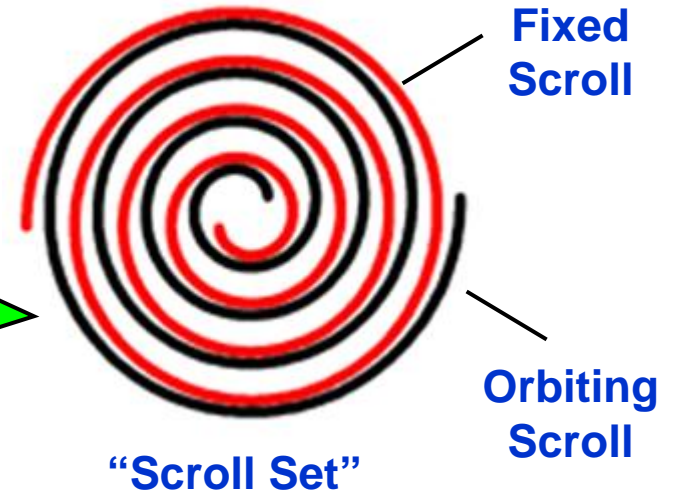
1. Max flow at 4800 RPM, 80 Hz.
2. Standard test conditions: 60F suction gas, 60F ambient, 0.6 SG gas, 14.7 psia = 0 psig

Copeland Scroll[®] Technology

Hermetic Design, Fewer Moving Parts

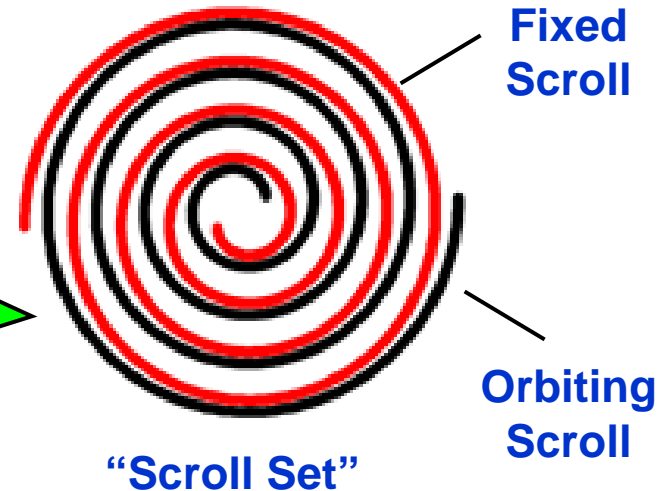
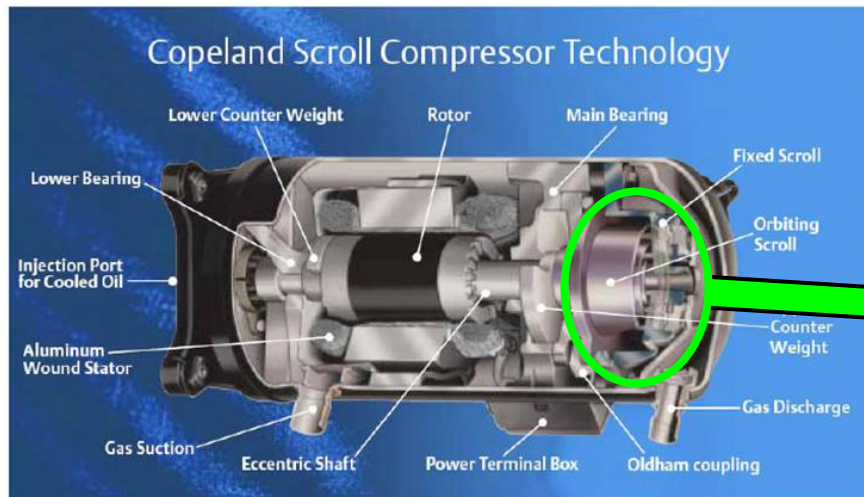


Copeland Scroll[®] Compression Cycle



- **Positive displacement technology**
- **Oil flooded “wet” design**
- **Efficiency similar to equally sized screw**
- **Hermetically compressor-motor design, no shaft seals**
- **Built for variable speed operation (2400-4800 rpm)**
- **Compression ratios to ~14**

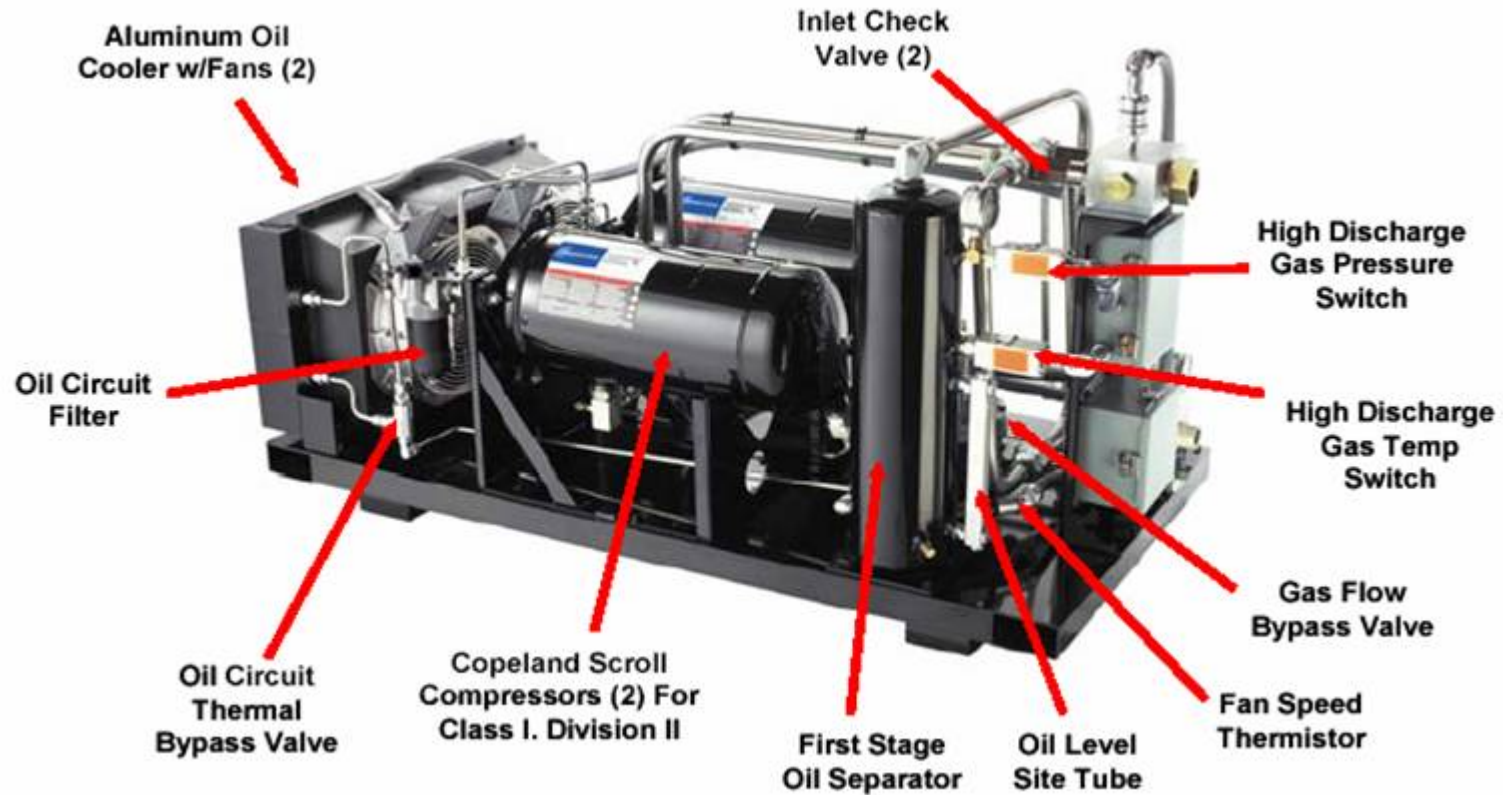
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Copeland Compressor Module

Major System Components



Copeland Scroll[®] Gas Compressors, Module Assemblies, Field Packages



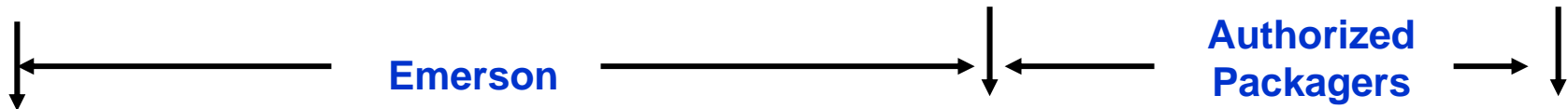
Copeland Scroll[®]
Gas Compressors



Assembled Into
Modules

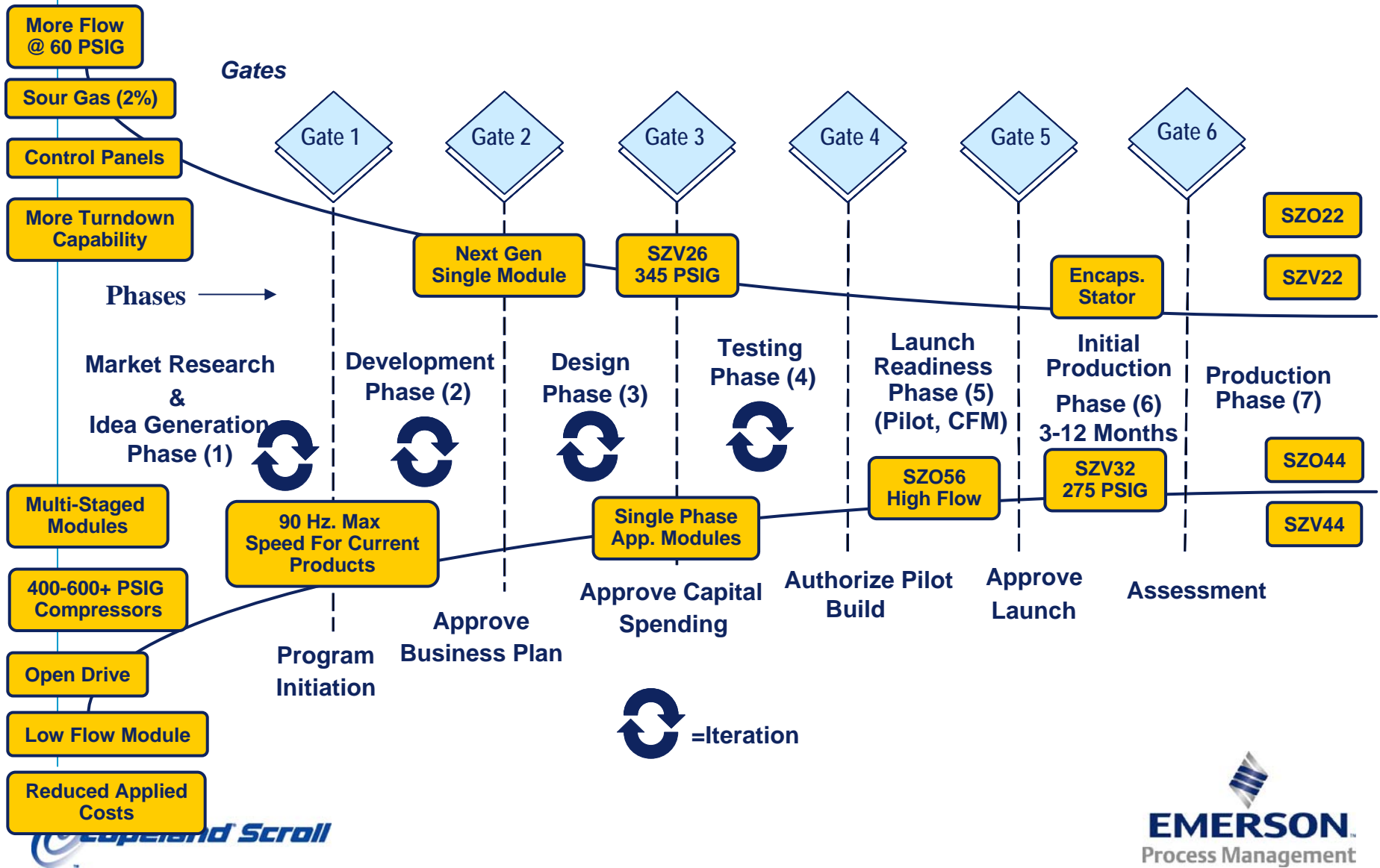


Modules As Packaged



- **Package Sizes:** 5 to 60 HP
- **Flow Rates:** 10-500 MCFD flow rates
- **Discharge Pressures:** 70-345 psig
- **Applications:** Conventional gas, flare/vent gas, coal bed methane, tank VRU
- **Driver:** Single or three phase grid power or gen-sets

New Releases and Scroll Product Development Funnel



Copeland Scroll[®] Gas Compression

January 2008

