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

Resource Triangle

Conventional resources
Small volumes that are easy to develop

Unconventional resources
Large volumes that are difficult to develop

- Oil sands
- Tight gas sands: 2002
- Heavy oil
- Natural gas from coal: 2006
- Gas shales
- Oil shales
- Gas hydrates

Increased operating challenges

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

<table>
<thead>
<tr>
<th>Challenge Addressed</th>
<th>Copeland Scroll Value Add</th>
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<tbody>
<tr>
<td>Reduce Maintenance Costs</td>
<td><strong>Payback</strong> - once/year service typical, visit by exception</td>
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<tr>
<td>More Wells, Fewer Workers</td>
<td><strong>Payback</strong> - more wells/operator – unattended operation</td>
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<tr>
<td>Environmental Compliance</td>
<td><strong>Hermetic design eliminates shaft seal gas/oil leaks</strong></td>
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<td>- &lt; 5ppm oil carryover, 40-80oz/yr loss</td>
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<td></td>
<td>- Ultra low compressor noise - ~75 dBA at 1m</td>
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<tr>
<td>Personnel safety</td>
<td><strong>No external moving parts, factory pressure/leak check</strong></td>
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<tr>
<td>Pressure Capability &amp; Flexibility</td>
<td><strong>Single stage discharge pressures to 345 psig</strong></td>
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<tr>
<td>Application Flexibility</td>
<td><strong>Variable speed, suction or discharge pressure control</strong></td>
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<tr>
<td>Compressor Reliability</td>
<td><strong>Scroll sets “wear in, not wear out”, increased tolerance to liquid or debris contamination</strong></td>
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~1,000 Copeland Scroll Compressors Installed Since 2003
Comparison of Natural Gas Compression Options

**Applied Horsepower Range**
- Reciprocating
- Screw (Refrig)
- Screw (Air)
- Vane
- Ring
- Beam
- Copeland Scroll (10-90 HP)

**Discharge Pressure Delivery**
- Reciprocating (1-3 stages)
- Screw (Refrig)
- Screw (Air)
- Monoblock
- Copeland Scroll (70-345 psig)
- Vane
- Ring
- Beam
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
Copeland Scroll® Compression Cycle

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Copeland Scroll® Gas Compressors, Module Assemblies, Field Packages

- **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

Gates

Gate 1: Next Gen Single Module
Gate 2: SZV26 345 PSIG
Gate 3: Design Phase (3)
Gate 4: Testing Phase (4)
Gate 5: Launch Readiness Phase (5)
Gate 6: Initial Production Phase (6)
Gate 7: Production Phase (7)

Phases

1. Market Research & Idea Generation Phase
2. Development Phase (2)
3. Design Phase (3)
4. Testing Phase (4)
5. Launch Readiness Phase (5)
6. Initial Production Phase (6)
7. Production Phase (7)

Program Initiation
Approve Business Plan
Approve Capital Spending
Authorize Pilot Build
Approve Launch
Assessment

400-600+ PSIG Compressors
Open Drive
Low Flow Module
Reduced Applied Costs
Control Panels
Sour Gas (2%)
More Flow @ 60 PSIG
More Turndown Capability

90 Hz. Max Speed For Current Products
Multi-Staged Modules

Next Gen Single Module
High Flow Module
Low Flow Module

EMERSON Process Management
Copeland Scroll® Value Story
Reducing Costs and Environmental Impact

They spent all afternoon repairing that oilfield compressor. It was still working five minutes after they left, right?

Put your mind at ease with the superior oilfield compression of Copeland Scroll® technology from Emerson. Looking for innovative, powerful solutions? Our air and refrigeration products are cost effective, reliable, and offer a once-a-year maintenance plan. No more constantly sending technicians on personal or point-to-point missions. And because our new high-efficiency compressors keep noise and vibration levels at an all-time low, your environmental compliance challenges just got a whole lot easier too.

Learn more. Call us at 800.996.4660 or go to EmersonProcess.com/CopelandScroll.

EMERSON, CONSIDER IT SOLVED.
Copeland Scroll®
Gas Compression

January 2008