

HYPOTHETICAL CASE STUDY: NATURAL GAS INDUSTRY
SERVICE OFFERING: TURNKEY UPGRADE SERVICE FOR CENTRIFUGAL
COMPRESSOR SHAFT SEALS

John Crane Gas Seal Technology Enhances Pipeline Company's Commitment to Clean Environment and Regulatory Compliance



BACKGROUND

Industry: Natural gas transmission

Application: Multiple compressor operation, process gas not owned by equipment operator

End product: Natural gas 95% methane

Equipment Utilization 177 days a year

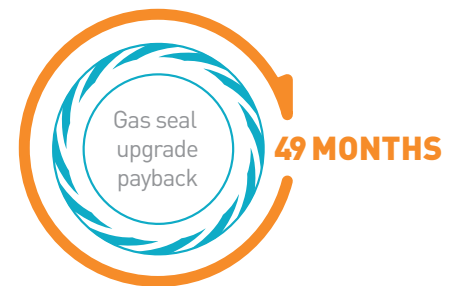
Location: United States

CUSTOMER NEED

- Alignment to the company's publicized commitment to the environment and meeting potential emission regulations.
- Desire to address oil-seal related downtime and maintenance expenses.

HIGHLIGHTS

- Company sought full compliance with potential environmental regulations regarding compressor emissions.
- Customer compared the three viable options to reduce methane emissions using John Crane's Lifecycle Cost Calculator (LCC). *(See Lifecycle Cost graph)*
- Results from LCC showed gas processor could immediately reduce emissions and save money by upgrading from shaft oil seal to time-tested gas seal technology.



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NATURAL GAS TRANSMISSION

- Assumes 2 compressors running approximately 50% utilization with the equipment operator not owning the natural gas flowing through the pipeline
- Centrifugal compressor with 2 seals running on a 7.0 shaft at 8,000 rpm and 1,200 psi
- Assumes methane content of 95% with a natural gas value of \$2.86 per thousand cubic ft
- Assumes oil seal mean time between repair of 12 months
- Lost production due to oil seal maintenance estimated to be 200 hours per year

TECHNICAL SOLUTION

- Turnkey Upgrade Service for Centrifugal Compressor Shaft Seals, including as standard:
 - Equipment audit and emissions baseline measurement
 - Oil seal and system removal and disposal
 - Custom gas seal solution (including rotor dynamics optimization and compressor modification if required)
 - Installation and commissioning of narrow section gas seal, separation seals and gas seal system
 - Emissions reduction monitoring
- Optional services include:
 - Coupling change
 - Replacement filters
 - Bearing service
 - Dry gas seal management
 - Thermoplastic inter-stage labyrinth upgrade

PROJECTED LCC ECONOMIC RESULTS

Calculated over 15 years, the total lifecycle cost of...

- Capturing the uncontrolled, vented methane and **routing to a flare device** is projected to be \$2.4M.
- Capturing the uncontrolled, vented methane and **routing for another purpose** is projected to be \$2.3M.
- **Upgrading the oil seal to a gas seal** is only \$1M.



- Annual operating costs drop to just \$22,000, compared to \$161,000 with oil seal — a \$139,000 savings.
- Maintenance and downtime annual expenses reduced to \$10,500 compared to \$22,000 with oil seal.

LIFECYCLE COST VERSUS TIME

