

Case Study: Windrock Technical Services Saves Money & Increases Capacity

Background

A major oil and gas producer was seeking ways to reduce maintenance costs and maximize natural gas pumping capacity. The producer primarily utilized high-speed reciprocating engine/compressor assemblies for their compression processes and had historically operated under a preventative maintenance schedule. Performing routine machine maintenance based on unit operating hours resulted in unnecessary maintenance, unexpected downtime and poor unit efficiencies.

Solution

The producer turned to Windrock for assistance to assess the health of their machine, quantify machinery performance and guide maintenance efforts and expenditures. Windrock performed onsite engine and compressor diagnostics on 5 engine/compressor units across different stations. After analyzing the data collected, Windrock identified leaking discharge valves on one compressor unit and restricted suction valves on another compressor unit. Both machines had been operating with the faults undetected.

Results

Upon completion of the recommended repairs, all units were analyzed again. The unit with leaking discharge valves showed a 7% improvement in gas flow with a 5% reduction in the amount of horsepower required. With the unit in operation 24/7, the producer was able to document a savings of \$55,500¹ per year in fuel costs by replacing two discharge valves.

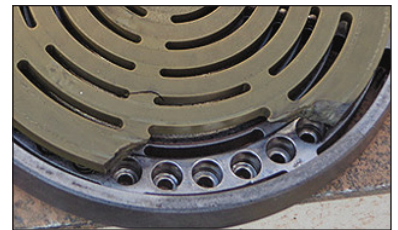
Replacing the restricted suction valves on the second compressor resulted in a 39% improvement in gas flow with only a 5% increase in the amount of horsepower required. Under the new operating conditions, the producer was able to pump the same amount of gas for \$30,000² less per year. More importantly, the resulting increased capacity was worth \$2,600,000³ in potential revenue for the producer. Windrock's Engine & Compressor Diagnostics saved the producer over \$85,000 per year and provided a significant boost to their revenue earning.

NOTES:

1. Based on a flow rate of 13.29 MMSCFD and an average fuel cost of \$4/MSCF.

2. Based on a driver cost of \$0.032/HP-hr to pump 7 MMSCFD for a year.

3. Based on a 2 MMSCFD increase in capacity for a year and an average sale price of US\$3.50/MMBtu.



www.windrock.com

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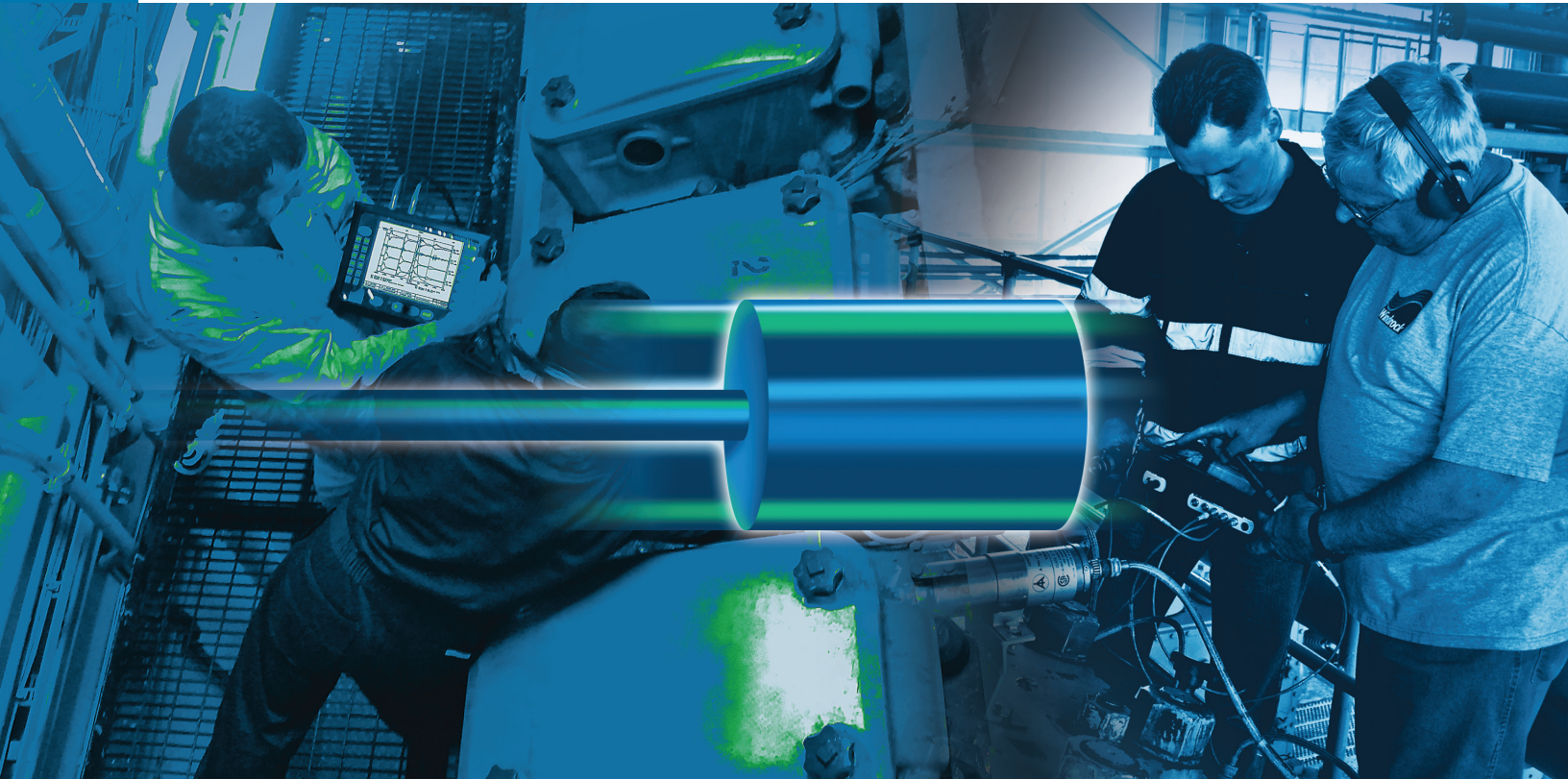
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Windrock Technical Services

MACHINE DIAGNOSTICS
& ANALYST TRAINING

Turning Data into Performance



ENGINE & COMPRESSOR DIAGNOSTICS

REMOTE DATA MONITORING & ANALYSIS

CLASSROOM MACHINERY ANALYSIS TRAINING

ONSITE ANALYST DEVELOPMENT & SUPPORT PROGRAM



How Can Windrock Help You?

Windrock understands how machine reliability impacts the productivity of your operation, the cost-efficiency of your maintenance and the safety of your working environment.

That's why we offer advanced analysis services and technical training to deliver the results you need for compressors, engines and other equipment. Our world class team of equipment analysts can help:

- Increase machine availability
- Decrease maintenance expense
- Optimize machine efficiency
- Reduce risk of catastrophic failures
- Improve emissions compliance

Windrock Technical Services will improve your operations, maintenance and bottom line.



Engine & Compressor Diagnostics

Windrock Engine & Compressor Diagnostics evaluates the mechanical condition and performance of your reciprocating and rotating equipment. Our equipment analysts have experience with the following types of industries and equipment:

- Natural gas gathering & processing
- Midstream NG transportation & storage
- Refining & chemical processing
- Marine, mining & locomotive
- Stationary power and nuclear EDG
- Reciprocating compressors
- Centrifugal compressors
- Slow & high speed NG engines
- Large frame diesel engines
- Rotating process equipment

From one-time machine troubleshooting to routine predictive maintenance, Windrock's Technical Service team possesses the tools and experience to solve your machinery problems. While on-site, we do not simply collect data; we gather vital input and perspective on your operating environment while addressing your questions and concerns.

Post site visit, we will provide a comprehensive machine health report detailing the performance and over-all mechanical condition of your equipment. Formal reports include a risk assessment and maintenance priority definition to assist in your maintenance decisions. All Windrock reports receive a formal peer review to ensure that you receive the most accurate data possible.

Remote Data Monitoring & Analysis

Already own a Windrock portable analyzer or online monitoring system? Windrock's Remote Data Monitoring & Analysis Services combine the knowledge and experience of our service team with your existing condition-monitoring program.

We will review your data, allowing you to:

- Ensure the benefits of your investments
- Review data integrity and proper system operation
- Avoid time & expense of onsite service
- Supplement in-house analysts
- Assist with new analyst development



Windrock Remote Analysis reports offer the same critical information as our onsite reports by utilizing the data you are already collecting.

Classroom Machinery Analysis Training

Windrock provides the best Reciprocating Analyst Qualification Program in the industry, offering courses to meet the needs of mechanics, operators and engineers at every skill level. Our program is often used for benchmarking asset management teams and as a key component of employee career path planning. Courses are organized into the following training modules:

- Compressor Analysis (Basic, Intermediate, Advanced)
- Engine Analysis (Basic, Intermediate, Advanced)
- FFT/Spectrum Analysis (Basic, Advanced)
- Custom developed programs per customer request



Upon completion of each course, Windrock offers a comprehensive qualification exam and certification. Classes are routinely offered at our training centers in Knoxville (TN, USA) and New Orleans (LA, USA). Windrock will also travel to your location and conduct any of our training classes.

Onsite Analyst Development & Support Program

Windrock's Analyst Development & Support Program provides a comprehensive solution to the challenges of training and developing new equipment analysts. Combining formal courses with hands-on site training, our program offers several benefits over traditional classroom training alone:

- Smaller class size on your schedule
- Taught at your location, analyzing data from your equipment
- Customized to fit your analysts' experience
- Interim support between formal courses
- Commitment to developing the best analysts possible



Our Analyst Development & Support Program will ensure that analysts are developing the skills necessary to maximize your analysis program.

About Windrock

Windrock Technical Services has unmatched expertise and our equipment analysts are the best in the industry. We are the exclusive developer and manufacturer of the most widely used reciprocating machinery analyzers, inspection tools and diagnostic software. Whether we are analyzing your equipment or training your next all-star analyst, you will benefit from the latest advances and most all-around knowledgeable team in the industry.

To start optimizing your operations and profitability, contact Windrock Technical Services at:

+1 865-330-1100 or techservices@windrock.com