

# CASE STUDY: Avoiding Maintenance Induced Maintenance

## Summary

Following routine maintenance, plant operations is unable to run one compressor at full load. In search of a solution, the producer turned to Windrock Technical Services. Compressor analysis by Windrock guided maintenance crews to the root cause, allowing them to resolve the problem and bring the compressor back online. Having spent an estimated \$53,000 troubleshooting the compressor, the small investment in Windrock's Technical Services provided a solution where preventative maintenance fell short.

## Background

A leading producer of high-purity polycrystalline silicon utilizes reciprocating compressors throughout the production process. The producer relies on an extensive preventative maintenance program to maintain facility assets. Compression plays a vital role in the producer's manufacturing operations. Without machine diagnostic capabilities, maintenance crews were forced to operate blind as they attempted to bring the compressor back online. Several unsuccessful attempts were made, as maintenance worked through a process of troubleshooting, including visual inspection and repeated part replacement.

The producer turned to their supplier to verify that the correct spare parts were being supplied. After verifying the correct parts were being used, the supplier recommended Windrock be brought in to diagnose the compressor's mechanical condition and performance.

## Technology

Windrock Technical Services utilized a Windrock 6320/PA portable analyzer to assess the condition and performance of the reciprocating compressor. The 6320/PA analyzer

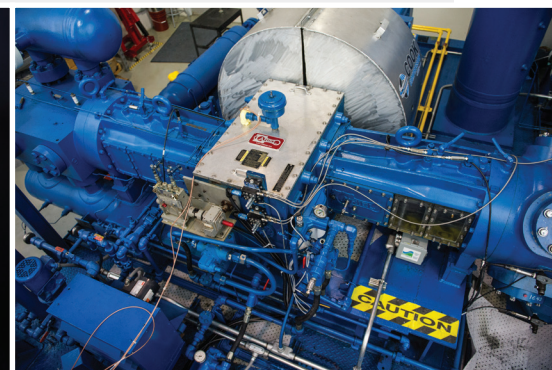
measures dynamic data relative to crank position and then applies the principles of thermodynamics and science to precisely assess machinery condition and performance. The portable analyzer utilizes multiple sensor technologies to collect data degree-by-degree with respect to crank-angle. Measurement points include in-cylinder pressure, vibration on the frame, crosshead and cylinder, ultrasonic on the valves, proximity of rod movement and angular velocity of the crankshaft. Using gas laws, equations of state and proprietary diagnostics, Windrock analyzers and software are able to assess the mechanical condition, performance and economic return of reciprocating compressors.

## Findings

Utilizing the data gathered from the onsite analysis, Windrock provided pinpointed the problem to the second stage discharge valves. With this insight, maintenance personnel discovered that the valve rings were not sealing sufficiently against the valve plate. Maintenance rebuilt the valves again and built a test fixture to verify their operation before reinstalling in the compressor. With the rebuilt valves in place, the compressor was brought online and returned to normal service, allowing the producer to resume full production.

Even the most effective preventative maintenance programs often fall short of addressing every maintenance challenge. In this case, a planned shutdown for routine compressor maintenance induced a series of unexpected delays and expense. The resulting troubleshooting, downtime, loss production cost the producer an estimated \$53,000.

As a result of the lessons learned, the producer has implemented several changes to avoid future problems, including adding reciprocating analysis tools to their existing maintenance practices.



Machine  
Protection



Condition  
Monitoring



Performance  
Analysis



Economic  
Evaluation