

CASE STUDY: Leak Detection Yields Savings

Background & Challenge

A major oil refinery uses electric motor-driven reciprocating compressors for their hydrogen processes with energy costs being a significant operating expense. Their critical compressors are protected and monitored with Windrock Platinum online systems, providing real-time measurement of head-end and crank-end pressure, crosshead and frame vibration, rod drop and rod run out.

The refinery received a warning from the Platinum system when the Leak Index exceeded the alarm set point of 4.5 on the crank-end of one cylinder. The proprietary Leak Index tool is derived from pressure measurements and is used to identify suction and discharge leaks, as well as ring leakage. The system trends Leak Index for each cylinder over time in Windrock MD software and provides automatic warnings to the facility. As seen in the plot (Figure 1), the crank end of the cylinder was trending at an average of 3.8 before it increased above the yellow warning line.

Response

The refinery used automated diagnostics provided by the Platinum system and Windrock MD software to identify a discharge valve leak (Figure 2). Additional Windrock system tools, including P-V analysis and performance data, confirmed the diagnosis. The software also quantified production and economic losses caused by gas recirculation within the cylinder. Using this information, the refiner scheduled a fast-track repair, limiting downtime of the critical unit while restoring the required gas throughput.

Results

After repairs, the Leak Index verified the problem was corrected and leakage was eliminated (Figure 3). Performance and economic reporting from the Platinum system confirmed a 7.5% improvement in gas flow with a 5.6% reduction in required horsepower. With the unit in operation 24 hours per day, electric cost savings were calculated at \$12,915 per month¹. Quick repair turnaround also limited production losses and avoided the potential development of a catastrophic machinery failure.

¹US dollars, based on \$0.10 per kWh.

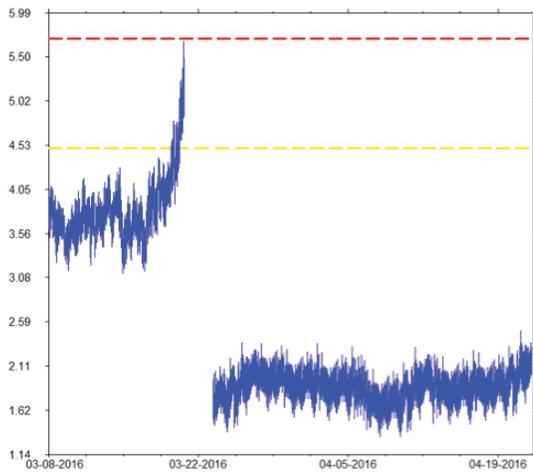


Figure 1 – Leak Index trend (repair was completed during the gap in the plot)

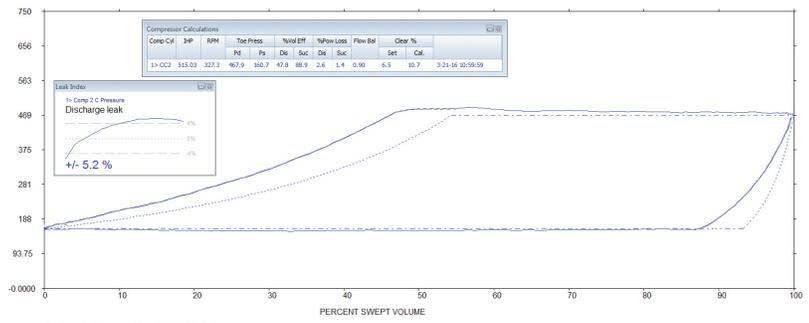


Figure 2 - Leak Index showing discharge leak

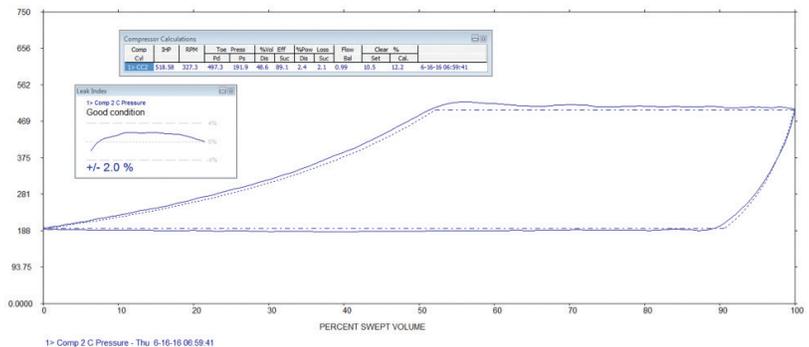


Figure 3 - Leak Index showing good condition after repair