

DIESEL ENGINE DIAGNOSTIC SOLUTIONS

Maximize Efficiency and Avoid Catastrophic Failures



Improve
Reliability



Optimize
Performance



Reduce
Maintenance Costs

THE WINDROCK DIFFERENCE

Operators, mechanics and engineers worldwide rely on Windrock diagnostic solutions to assess the performance and mechanical condition of diesel engines in industrial applications.

Only Windrock combines traditional cylinder pressure measurements and calculations with phased vibration and ultrasonic vibration measurements to provide a comprehensive, nonintrusive examination of internal components. Optional FFT/Spectrum vibration capability adds complete vibration assessment of rotating components such as turbochargers, pumps and motors. Here's why complete, component-level analysis of your engine by Windrock improves your productivity and profitability.

Increases Reliability. Avoiding unexpected component failure is the key to improving reliability. Windrock systems identify component degradation before failure, providing the early warning you need to take corrective measures.

Optimizes Performance. An engine operating at optimum condition and within performance specifications consumes at least 5% less fuel and emits lower emissions than a unit without combustion monitoring and proper maintenance. With 60% of operating and maintenance budgets typically spent on fuel, optimizing engine performance with Windrock tools results in meaningful savings in your most critical cost center.



Reduces Maintenance Costs. Industry studies show plants spend as much as 55% of their maintenance budget on unplanned activities. By using comprehensive portable or online diagnostics, you move from responding to breakdowns to optimizing performance, significantly reducing maintenance expenditures.

AVOID FAILURES, INCREASE PRODUCTIVITY

Today's diesel engines are technically advanced and built to survive demanding environments.

However, these complex machines have thousands of parts, incorporate multiple subsystems and operate at high speeds. When any component fails, it can lead to lost production, downtime and other negative or potentially catastrophic events. To keep them running, trust Windrock - the experts with more than 25 years of engine diagnostic experience.

Crankshaft Referenced Measurements

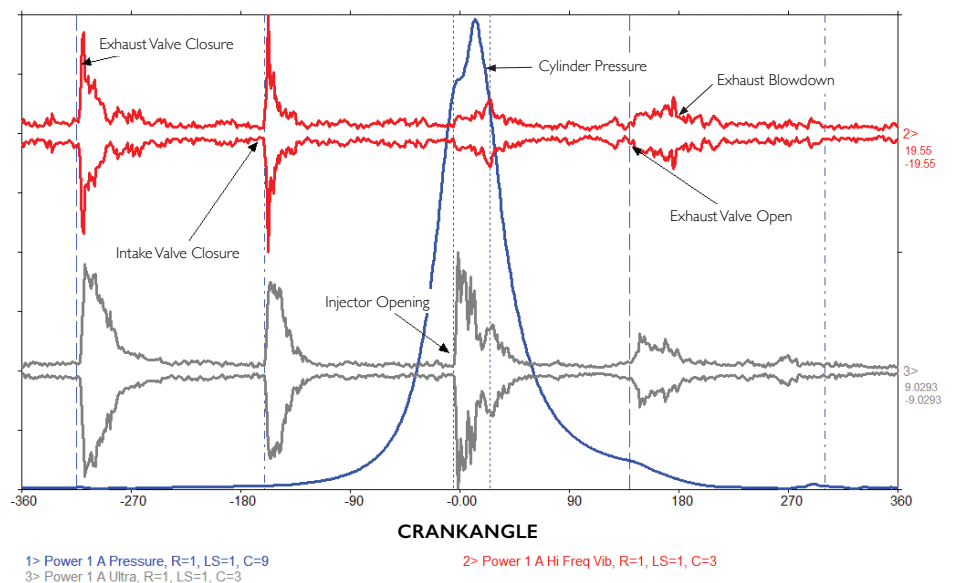


Figure 1. A time based reference that allows for simple visualization and analysis of internal components

A PROVEN APPROACH

Traditional Indicator Cards and Vibration Analysis

Traditional diesel analysis relies solely on measurements of cylinder pressure versus crankangle ("indicator cards"). While useful for measuring engine performance, this method fails to identify the mechanical condition of components.

Vibration monitoring and analysis is a proven technology used to identify component degradation and reduce failures of rotating equipment. However, this spectrum or frequency based approach is impractical and cannot be effectively used for diesel engines and other reciprocating machinery.

A Better Way

For over 25 years, Windrock and our customers have successfully used crankshaft referenced vibration and ultrasonic vibration measurements to assess the mechanical

health of reciprocating machines. Crankshaft reference data is time based, not spectrum based, and allows simple visualization and analysis of internal components (Figure 1). Synchronizing the position of the crankshaft and resultant piston position throughout the stroke and then plotting a once-per-degree resolution allows all internal mechanical events to be visualized. It also provides a clean signature of valve events, injector events and abnormalities such as liner wear and bearing degradation.

Advanced Windrock MD analysis software and its automated diagnostics features make analysis and reporting simple. Combining crank-angle-based vibration and ultrasonic technology with traditional indicator card readings gives you a full, easy-to-interpret assessment of the condition and performance of all types of diesel engines.



Diesel Engine Report Enterprise DSR48 Generator 1

Unit Id:
Unit Mfr: Enterprise

Model: DSR-48
Serial No:

Date: 8-04-16 12:05:31

Stroke: 4		Offset(+ after TDC): 0.00		Engine runs: CCW and Straight				Run No: 1		Page: 1/2						
Engine Speed, RPM		451		Fuel Rack Position		36.0		Engine Crankcase Pressure				0.4				
Engine Air Manifold Press		43.0		Engine Fuel Manifold Press		28.0										
Cyl	# of Cycles	Rack Position	MEP (psi)	IHP (hp)	Comb. Start BTDC	Max Rise Rate (psi/deg)	Peak Firing Pressure (psi)					PFP Angle ATDC	Exp Ref 144 ATDC (psi)	Exp Term 182 ATDC (psi)	Comp Ref 700 ATDC (psi)	Exhaust Temp (°F)
							AVG	STDDEV	MAX	MIN	DELTA					
1	30	31	199	539	1	53	1304	14	1328	1277	-86 L	11	87 L	51 L	581 L	933
2	30	32	210	569	2	50	1402	17	1440	1376	12	11	96	68 H	591	995 H
3	30	33	211	574	1	56	1363	16	1396	1332	-27	11	98	59	589	949
4	30	33	212	576	1	47	1387	13	1413	1359	-3	10	98	56	599	925
5	30	34	215	582	2	60	1460	14	1493	1439	70 H	10	98	59	608 H	938
6	30	33	212	576	1	50	1382	14	1409	1358	-7	11	98	59	604	931
7	30	32	211	572	2	49	1361	17	1394	1332	-29	11	100 H	60	601	900 L
8	30	33	220	596	3	58	1459	19	1495	1416	69	9	98	57	595	945
Aux. Power:			0													
Eng. Summary:			211	4584	2	53	1390	16			38	11	97	59	596	940
Eng. Spread:			10%	10%	2°	25%	11%	40%				2°	13%	30%	5%	95
Diagnostics:																
1 Out of balance (6%)																
8 Timing instability (-1.2°)																
5 Out of balance (5%)																
Observations and Recommendations																

Figure 2. Detailed Performance Report & Diagnostics

WINDROCK SOLUTIONS AND SERVICES

6400 Diesel Analyzer Features

- Five models to fit your requirements and budget
- Ergonomic, lightweight, yet ruggedly durable
- Easy setup and high-resolution color LCD screen
- Smart sensors with built-in calibration, high-definition vibration and ultrasonics
- Integrated encoder/wireless minimizes data acquisition time on the machine and improves safety



Platinum™ and On-Guard® Online Systems

- Continuously monitors engine health 24/7
- Provides alarms to machinery control systems, alerting operations of problems within the engine and helping to avoid catastrophic failure
- Real-time data and event playback
- A customizable online system to fit your exact needs



Diesel Engine Analysis Training

Windrock offers courses to meet the needs of mechanics, operators and engineers at every level, from basic instruction for beginners to advanced training for seasoned analysts. Our highly experienced staff of instructors conduct classes at our training center or at your location.



About Windrock

Windrock offers industry-leading expertise in condition-based and performance-based monitoring solutions for compressors and engines across multiple applications. We design and manufacture portable analyzers and online systems at our headquarters in Knoxville, TN. In addition to our products, Windrock Technical Services analysts travel the world to help companies with their reliability and maintenance programs. We are proud to be a part of Dover Energy Automation (a Dover Corporation company).

To begin optimizing operations and profitability, contact Windrock Diesel Engine Diagnostic Sales.



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