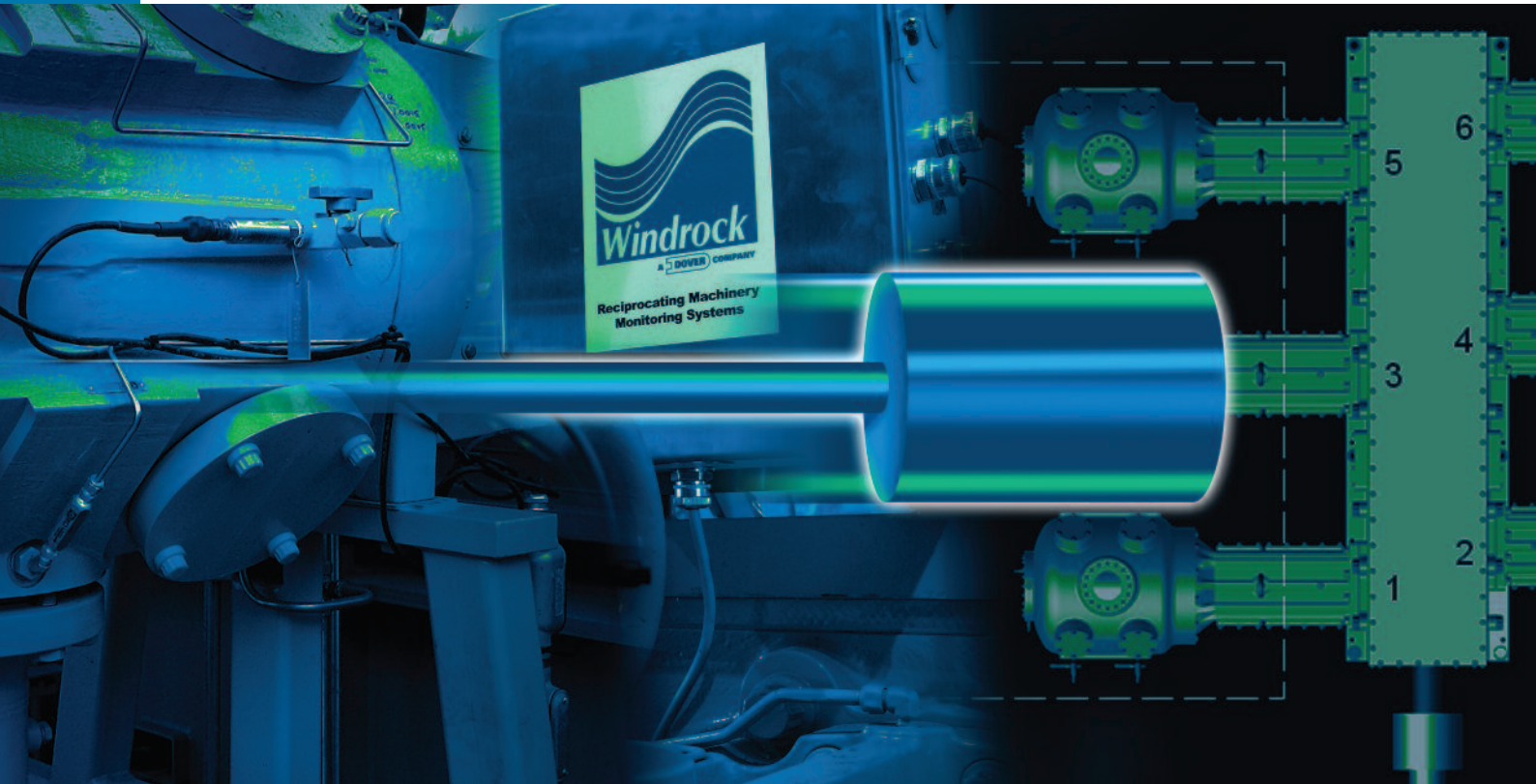


Windrock Online

MONITORING SYSTEMS

Turning Data into Performance



Reach A New Level of Reliability

Today's Windrock online systems unite cutting-edge technology with decades of proven diagnostic experience in reciprocating compressors and engines. Platinum and On-Guard™ product families are engineered to protect critical assets, assess machinery mechanical condition and monitor operational performance. Imagine the difference they will make for your operation – in reliability, safety, cost savings and productivity improvements.

Protection. Protecting machinery is a complex endeavor: It takes highly engineered instrumentation and precise operational understanding to identify the difference between normal operation and the onset of a failure mode. Windrock online systems provide the earliest warnings and most trusted shutdown capabilities in the industry.

Health Assessment. The cornerstone for any world-class maintenance operation is machinery health assessment. It's an invaluable function Windrock portable and online systems have performed on tens of thousands of machines worldwide. Whether identifying cylinder valve leakage, crosshead looseness, rider band wear or any other mechanical wear/defect, Windrock online systems provide the tools to make the right call every time.

Performance. Windrock online systems provide high-precision measurements of compressor and engine performance. Using measured parameters and thermodynamic calculations, Windrock systems monitor real-time performance data, such as power generated (or consumed), gas flow and system efficiencies.

Software & Communications

Windrock MD. Providing a common platform for both portable and online systems, Windrock MD software is the industry's flagship diagnostic application. MD software has the tools for real-time interpretation of pressure, vibration, proximity and ultrasonic data, as well as performance reporting and helpful diagnostic wizards. The ability to compare online data with data collected by a Windrock portable system gives the reliability engineer more power than ever to compare and trend machinery health.



WebView. Windrock systems include our WebView browser-based software to monitor all measured and calculated parameters. Locally hosted, but configurable to be available anywhere within an enterprise, WebView gives an unlimited view of read-only performance and health parameters, as well as system warnings and alarms. WebView is the ideal solution for providing real-time data to operations, engineers and management.

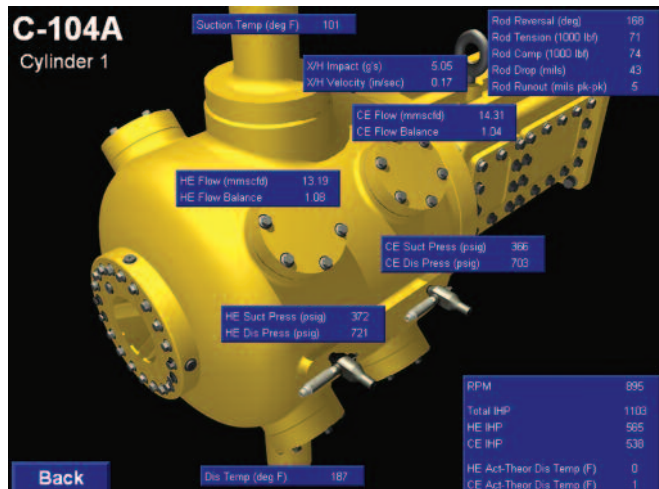
Communication Protocols. Windrock online systems also interface with customer control systems through MODBUS, OPC and other protocols. This standard feature allows important data to be presented to operations personnel in a familiar format, either in the control room or locally at the machine.

Platinum System – The Ultimate Protection

The Windrock Platinum system is the latest generation of online monitoring. Utilizing technology advancements derived from Windrock On-Guard and 6320 portable analyzers, as well as RECIP-TRAP analyzers, the Platinum system provides the best platform available to protect and assess the health of reciprocating machinery.

Exclusive features include:

- **Any Data, Any Channel** – A virtually unlimited combination of data acquisition channels for pressure, vibration, temperature, proximity.
- **Ultrasonic Data!** – For the first time, an online system offers this tried-and-true diagnostic tool that engineers and analysts have relied on for over 20 years. Valve, ring and other leakages are now easily identified and positively confirmed.
- **Real-time Data and Event Playback** – View what is happening on the machine right now, as well as conditions that led to warning or alarm conditions. A rolling event buffer provides history of every signal, every degree of revolution.
- **Just like Windrock Portable** – Based on the technology of Windrock portable analyzers, it acquires and filters data exactly the same way. This enables use of industry standard vibration filters (VTI/VT4), FFT vibration analysis and trending cylinder leak index, plus much more.
- **Monitors Rotating Equipment** – Provides full rotating vibration monitoring with accelerometers, velocity sensors and proximity probes. Advanced features, such as orbits, Bode, polar and waterfall, are ideal for high-speed turbines.
- **Platinum is Smart** – Each component and channel of the system features self-monitoring diagnostics that identify and warn you of system problems. Critical components, such as power supplies and hard drives, are fully redundant and load sharing.
- **Remote Analysis Ready** – Designed with remote analysis in mind, whether from within your own enterprise or by Windrock's Technical Services team.
- **Meets Regulatory Compliance** – Platinum systems are designed to comply with hazardous area and SIL requirements.



Windrock On-Guard™ Family: Proven Condition Monitoring



The Windrock On-Guard™ family of online reciprocating compressor and engine monitoring systems has over 10 years of proven service monitoring hundreds of machines. The On-Guard™ family offers the end-user, OEM or packager the flexibility to design a monitoring system tailored for almost any application. Choose from the variety of On-Guard™ modules to configure an online system for applications ranging from basic machinery protection to full mechanical condition and performance monitoring.



HP-Guard. Provides crank angle referenced measurements of up to 6 reciprocating compressor cylinders. Head end and crank end dynamic pressure measurements provide continuous monitoring of the compressor's HP load along with a variety of performance parameters including: loads, rod reversals and cylinder end volumetric efficiencies.

Real-Life application: Health and performance monitoring on a hydrogen process compressor.

E-Guard. Designed to continuously monitor up to 10 engine power cylinders measuring peak firing pressures (PFP) and angles. Crank angle pressure curves for each power cylinder are continuously monitored, providing the user with data to ensure efficient engine operation.

Real-Life application: Provide plant personnel with alarms for detonation and misfire on a 16-cylinder integral engine via control room DSC and mobile text alerts.



V-Guard. Windrock's vibration monitoring module supports up to 8 accelerometer inputs with programmable alarm set points for continuous machine protection. Crank angle vibration curves (through Windrock MD software) provide valuable diagnostic information. Includes relays which can be connected to machinery control systems to provide vibration shut down capability.

Real-Life application: Protecting a high-speed compressor by identifying cross-head, frame and cylinder defects.

P-Guard. A cost-effective way to incorporate a wide range of process data parameters into the overall On-Guard™ monitoring system. Accepts up to twelve 4-20 mA or 1-5 VDC inputs. Data is available in MD software for trending, along with specialized compressor and engine parameters from other Windrock modules.

Real-Life application: Continuously monitoring rod-drop and run-out for compressor cylinders.



AutoBalance™ Provides operators of slow-speed industrial engines an option to reduce emissions, cut fuel consumption, decrease wear and improve overall machine reliability. Delivers continuous, peak-pressure balancing for large-bore natural gas-fired engines. Combined with E-Guard modules to continuously measure power cylinder Peak Firing Pressures (PFP), the AutoBalance™ module continuously adjusts the individual fuel flows to each cylinder to maintain each cylinder's PFP within 5% of the engine average.

Real-Life application: 24/7 continuous balancing of 4-stroke integral gas engine in natural gas storage field application.

All On-Guard™ modules are hazardous-area rated, allowing them to be located on a compressor deck or engine room close to the monitored machinery. The Windrock Technical Services group provides trained, experienced personnel on-site to assist with installation, commissioning and training for your online monitoring system. Remote analysis of your critical machinery is also available to take advantage of Windrock's years of machinery analysis experience.

Windrock online compressor monitoring and engine AutoBalance™ systems are protected under US Patents 6,292,757 and 8,522,750.

For the ultimate in online monitoring systems, contact Windrock – the worldwide leader in reciprocating machinery diagnostics.



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