

Plantwide asset health solutions



Something for every asset

In addition to the most important assets found in industrial facilities, there are often a host of “supporting” assets that make up the balance of the plant such as pumps, motors, blowers, heat exchangers, fans, and others. This auxiliary or plantwide equipment may be spared or unspared, and its impact on the process stream may vary from moderate to minor. Regardless, such machines—just like their more highly important counterparts—can benefit from condition monitoring. Baker Hughes provides affordable and effective portable and permanent condition monitoring platforms for these assets. All can be connected to the System 1 plantwide software, resulting in a proven solution that is delivering tangible benefits for tens of thousands of customers around the globe.

Financial justification

For many assets, failure can mean substantial or total loss of production, often worth millions per day. Or it can lead to the release of hazardous substances, fires, and even explosions—resulting in a severe safety hazard as well as fines for violating environmental regulations.

Maintenance costs

When viewed on a per-asset basis, maintenance costs for plantwide assets can appear modest. However, when viewed collectively across the dozens, hundreds, or even thousands of assets in a typical plant, these costs can be appreciable. Reducing the maintenance costs on each asset through effective condition monitoring—even by a mere 10%—has a large impact on plant profitability. Condition monitoring is a predictive tool that allows more effective insight in planning and asset management, allowing maintenance to be done in advance of a functional failure.

Why Baker Hughes?

We design and deliver solutions for all of your monitoring needs—including sensors, portable data analyzers, distributed and rack-based monitors, software, and supporting services—with the following goals in mind:

- Increased availability and production
- Lowered maintenance costs
- Reduced risk in terms of safety, environmental, and asset upsets

And we have impressive statistics to back up our extensive experience:

- More than 600 patents globally, issued and pending
- Over 500,000 assets monitored
- 15,000+ wireless systems deployed
- 15,000+ speed detection systems deployed
- 38,000+ wind turbine monitoring systems deployed
- 100,000+ rack-based machinery protection systems deployed

60+
years of condition
monitoring experience

10 million+
sensor monitoring points
installed on machines
globally

15,000+
machine diagnostics
projects completed

60,000+
product services
jobs performed

10,000+
System 1 users worldwide

140+
expert machinery
diagnostic engineers
worldwide



Increased performance



Informed priorities



Drive focus and ROI

The benefits of plantwide predictive maintenance

600%

Cost of unplanned events
vs. planned maintenance

50%

Reduction in
maintenance cost

60%

Reduction in mean
time to repair

55%

Reduction in
unplanned
machine failures

70%

Reduction in
maintenance
breakdowns

25%

Increase in
production

30%

Increase in plant
machinery life

40%

Reduction in
downtime

30%

Reduction in spare
parts cost

90%

Reduction when
process data
was combined
with condition
monitoring data

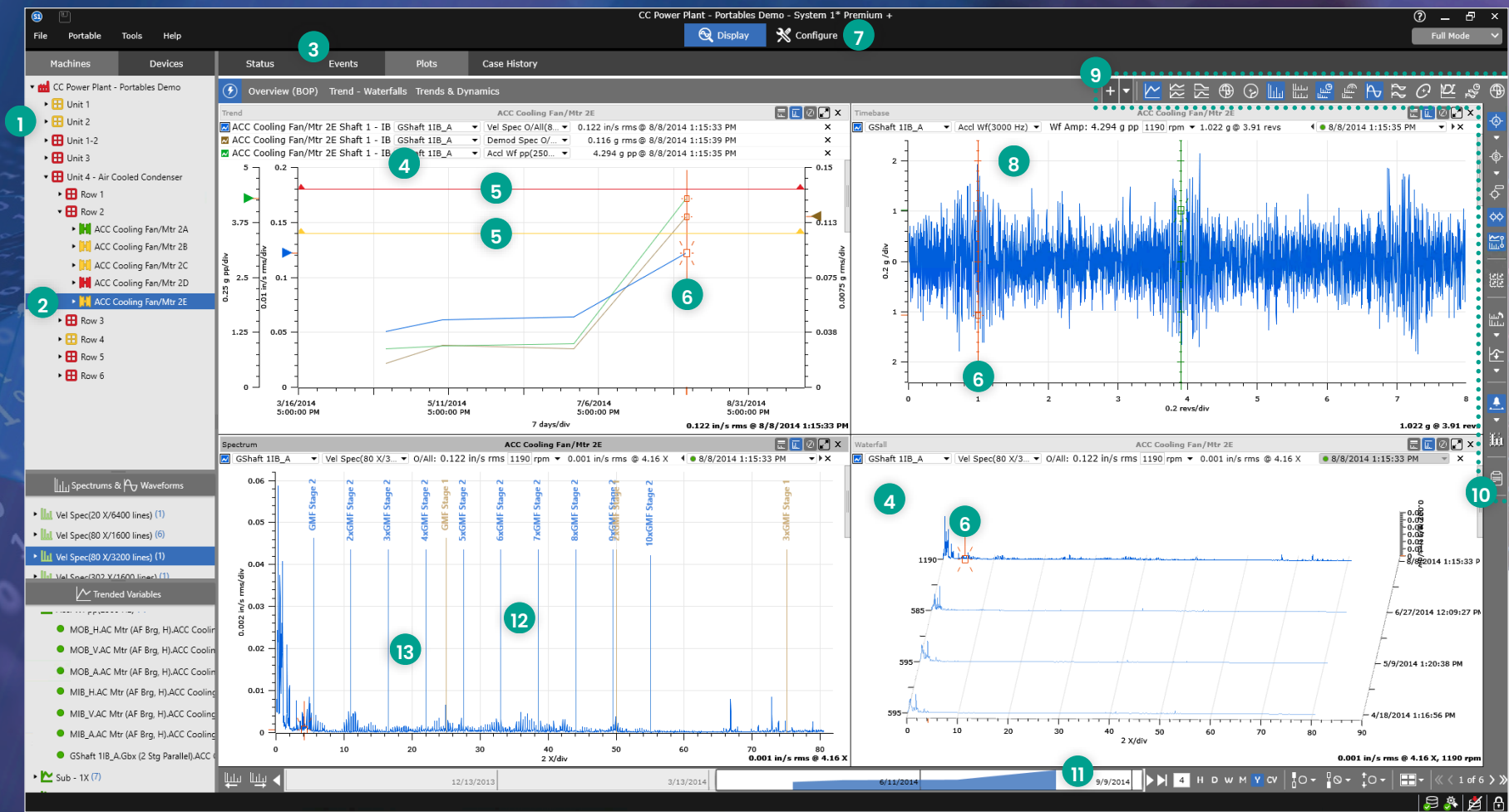
30%

Increase in
machinery
availability

Portable condition monitoring

World-class portable instruments for route-based data collection and analysis

Not every asset can justify the expense of online monitoring. For some assets, a portable approach is exactly the right strategy, allowing operators, machinery specialists, and others to collect data at regular intervals and on demand. Our data collectors feature a powerful suite of capabilities, ensuring that the solution delivers more than just System 1 integration—it delivers the sophisticated toolset and signal processing that today's practitioners expect for rolling element bearing diagnostics, balancing, bump testing, multi-channel analysis, and much more. And when it comes to ergonomics, we're blazing the trail with our innovative 200-series SCOUT and COMMTEST products. These data collectors detach the user interface from the data acquisition electronics through a hip-mounted design that wirelessly pairs the two via Bluetooth, freeing you to choose from a wide variety of off-the-shelf Android-based industrial tablets and smartphones. The result is light, easy to carry, with the flexibility to take pictures/videos, check email, track your location, create SOS alerts, and run other enterprise apps.



1. Navigational intuitiveness by plant/unit/asset or by device.
2. Comprehensive advanced alarm management tools, including statistical alarm calculations for more accurate threshold definition.
3. No need to look at every spectrum, every plot. Use the Alarms or Events list to focus on machines with degrading conditions.
4. Intuitive and interoperable trending tools.
5. Flexible alarm setpoint and alarm event identification.
6. Easily synchronize cursors across plots.
7. Ultra-fast, ultra-easy setup using "Quick Config" to address measurement parameters, alarm bands, and initial thresholds based on industry standards. Re-use setups across similar machines via User Templates.
8. Advanced time-waveform analysis tools.
9. Industry-leading toolset and diagnostic capabilities for both rolling element and fluid-film bearings.
10. Comprehensive reporting of fault diagnosis, either within System 1 as Plot Records, or for sharing externally as professionally formatted Word documents.
11. Easily navigate to time period of interest using mini-trend.
12. Built-in rolling element bearing database with 180,000+ entries—configuration of cursors and spectral bands for bearing fault frequencies.
13. Superior spectral analysis tools including advanced cursors and fault frequency indication for quick indication of malfunction on bearings, gears, and other components.



SCOUT200 Series

Our wearable data collectors deliver unparalleled ergonomics and a world-class feature set. Available in 2-channel + tach (SCOUT220-IS) and 4-channel + tach (SCOUT240-IS) versions, the SCOUT200 series goes everywhere—even hazardous areas with global Zone 0/1 and Division 1 approvals.



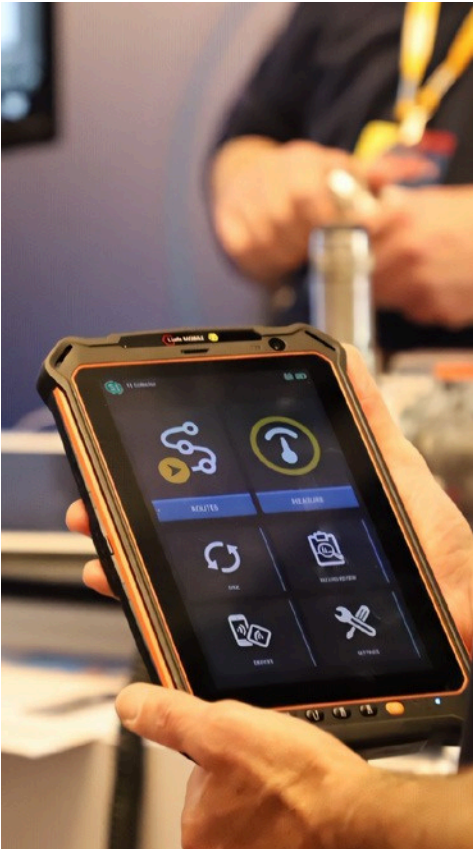
COMMTEST200 Series

Identical to our SCOUT200 series, but without hazardous area approvals. Same System 1 integration. Same powerful feature set. Same 2-channel (220) and 4-channel (240) versions. Same innovative ergonomics. And same unparalleled flexibility in Android-based user interface devices, whether tablet- or phone-sized.

Portable instruments
key features



	COMMTTEST220	COMMTTEST240	SCOUT220-IS	SCOUT240-IS
Channels	2	4	2	4
Fmax (max)	40 KHz	80 KHz	40 KHz	80 KHz
Lines of resolution	6,400	12,800	6,400	12,800
System 1	●	●	●	●
Cellular, Wifi, and Bluetooth	●	●	●	●
Integrated camera w/color display	●	●	●	●
Balancing	●	●	●	●
Tri-axial sensor		●		●
Signal processing	6Pack classic/peak demodulation	6Pack classic/peak demodulation	6Pack classic/peak demodulation	6Pack classic/peak demodulation
IP ratings	IP65	IP65	IP65	IP65
Hazardous area ratings	General purpose	General purpose	• ATEX ZONE 1 & 2I • CSA CL1 DIV1 • Grp A,B,C,D,E,F	• ATEX ZONE 1 & 2I • CSA CL1 DIV1 • Grp A,B,C,D,E,F
Memory	16GB Expandable	16GB Expandable	16GB Expandable	16GB Expandable
Warranty	• Collector, 5 year • Handheld, 3 year	• Collector, 5 year • Handheld, 3 year	• Collector, 5 year • Handheld, 3 year	• Collector, 5 year • Handheld, 3 year



Unmatched flexibility

When we decoupled the data acquisition hardware from the user interface in our new SCOUT200- and COMMTTEST200-Series instruments, we revolutionized the industry. Our users told us they wanted choices. Choice of screen size, choice of device form factor, and choice of additional complementary applications that could run on the same device.

We did this by selecting Android and iOS-powered devices as the basis for our user interfaces. Available from a variety of suppliers, with a variety of industrially ruggedized packaging, and a variety of hazardous area approvals, our users are free to select from one of our recommended and tested third-party devices or to choose from dozens of other available Android-powered devices suitable for industrial use.

Unmatched functionality

Goes everywhere

Our SCOUT200-series devices are intrinsically safe, and suitable for Zone 0/1 and Div 1 environments globally.



6Pack data collection

With a single press of a button, capture six readings simultaneously with spectrum and waveform of:

- Velocity
- Acceleration
- Demodulation

Simplified configuration

Our “Quick Config” feature automatically implements the “Proven Method*” + ISO 2372 & 10816 alarming methodology.

Advanced analysis

Within our comprehensive range of portables we have models which support balancing, bump-testing, modal impact testing, transient data capture, cross-channel phase, cross-channel spectrum, and FRF data collection for operating deflection shape (ODS) analysis.

* Technical Associates of Charlotte

Online and offline convergence without compromise

Let’s face it: portable users have special needs—configuration, analysis, alarming, and more. We understand that you don’t want online software where offline is an afterthought, or vice-versa. System 1 perfectly blends these two worlds in a seamless environment with features that portable users will love. Easier, faster configuration. Tools designed especially for rolling element bearings, gears, and belts. A built-in library of more than 180,000 bearing types. Intuitive navigation. Statistical alarms. The ability to clone configurations. And much, much more. With System 1 it isn’t about sacrificing functionality for the sake of integration— its about getting more functionality and the integration you demand. One system to learn. One system to support. One system to license. That’s System 1.

Wireless condition monitoring with Ranger Pro



A reliable, online solution to complement reliability/maintenance



Cost-effective entry to condition monitoring

Ranger Pro features

- Truly wireless: sensors, power, and radio embedded in a single package
- Velocity (5–2 kHz), acceleration (5–10 kHz)
- Supports both ISA100 and WirelessHART protocols
- Replaceable lithium-thionyl chloride battery
- IP67 hermetically sealed electronics
- CSA, ATEX, and IECEx approvals for Div 1 and Zone 0/1
- Temperature: -40°C to +85°C
- Range: 100 meters (line of sight)
- Security: 128-bit AES encryption
- Long battery life: up to 5 years
- System 1 connectivity—full dynamic and static data capture and display
- DCS connectivity via Modbus for static data



Wireless network personality module

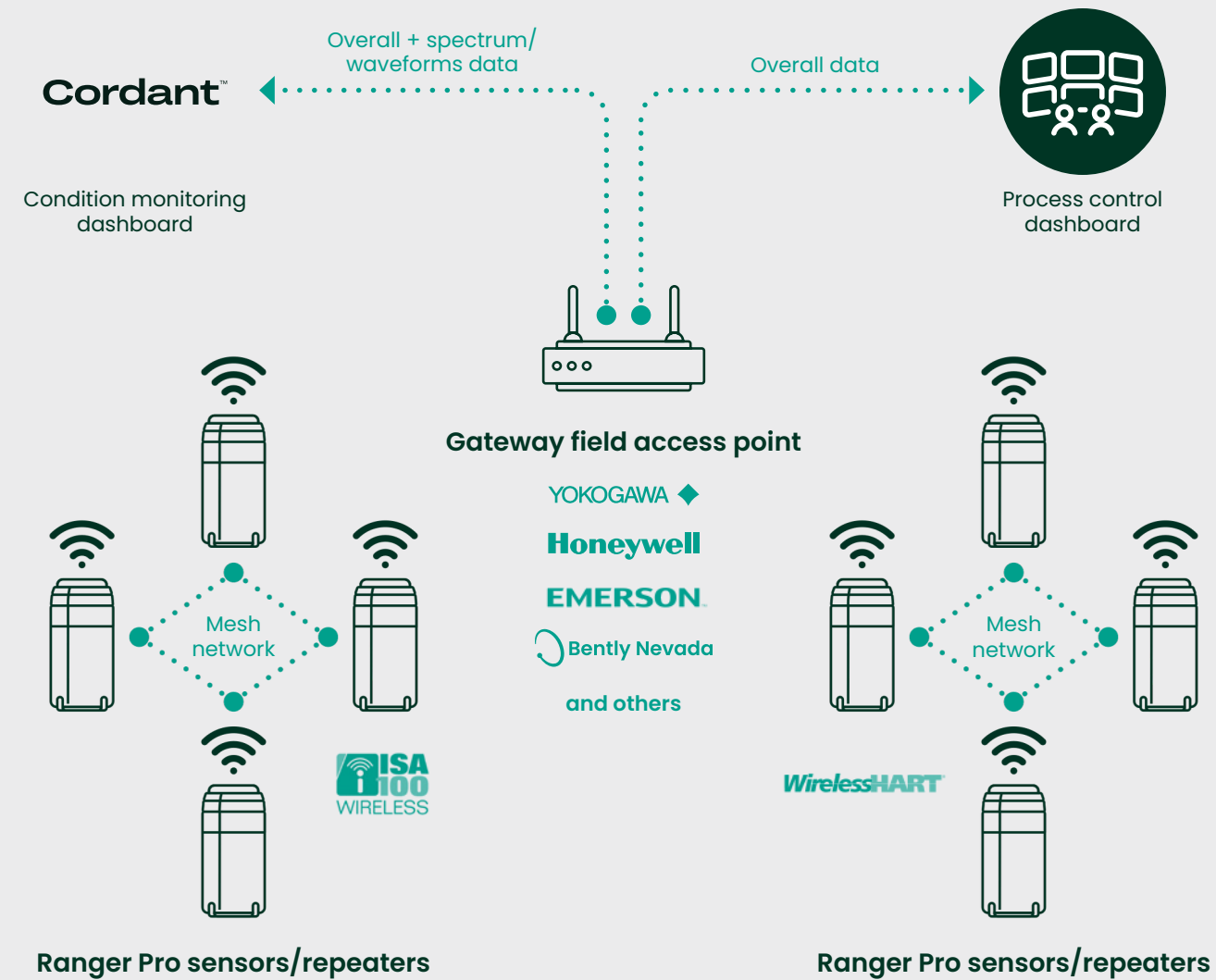


Industry-standard, user-replaceable battery



Triaxial or uniaxial embedded vibration sensor

Ranger Pro data and communications



Ranger Pro is designed for hard-to-reach environments where wired solutions are impractical or cost-prohibitive. It does this without sacrificing the data collection frequency and rich data set of both static and dynamic data essential for proper condition monitoring. Ranger Pro sensors deliver both vibration and temperature data via an embedded temperature element and an embedded uniaxial or triaxial accelerometer that measures velocity, acceleration, and acceleration enveloping (or

demodulation) from each axis. Because it features global approvals for Div 1 and Zone 0/1, it can be installed in even the most stringent hazardous area classifications and ensures that you no longer have to manually collect data in hard-to-reach or hazardous environments. Because it supports both ISA100 and WirelessHART protocols, it can be mixed with other sensors using these industrial standards to deliver comprehensive data to both process control operators and machinery specialists.

Economical online wired condition monitoring

While all machinery may not warrant continuous, dedicated machinery protection from Baker Hughes' Bently Nevada Orbit 60, 3500, 2300, or ADAPT platforms, many require more frequent surveillance than the weekly, monthly, or quarterly rounds made with a portable data collection instrument. Augmenting our wireless Ranger Pro system is the Orbit Distributed Condition Monitoring (DCM) system offering the improved performance of wired data acquisition while maintaining economical installation costs.

Orbit DCM

The Orbit DCM device is a flexible and scalable system fully supported by our System 1 condition monitoring and diagnostic software. It delivers economic vibration monitoring along with reliable signal processing for important assets.

With high-speed data collection, processing on the edge, and synchronous data acquisition across all 16 channels, Orbit DCM gives operators the machine health insights they need to succeed.



Key features

- Compact and easy to install
- Cybersecure (IEC 64223) with built-in tamper detection
- Simultaneous channel data sampling
 - 16 dynamic
 - 4 speed (Keyphasor)
 - 4 digital inputs
- Multi transducer support
- Support for use with single PC or network
- 3 wired ethernet connections
- RS485 interface for serial communication
- 24-bit A/D conversion with high precision
- Offline data retention
- Configurable waveforms per channel
- Configurable setpoints with alarming and events
- Machine operating state-based data storage and alarming
- Inbuilt Modbus (server and client) support (RTU, TCP)



Data and measurements

- Direct, bias, speed, gap, RMS
- Spectral overall, energy, peak extractions
- Transients (start up, shut down, overspeed)
- User configurable windowing
- 40 kHz max frequency
- 32 k sample waveforms
- 12,800 lines spectral resolution



State based

- Up to 12 states (user defined)
- 1 second evaluation



Alarming

- 4 severity levels
- 1 second evaluation
- In/out of band, over/under setpoints, state based
- High resolution alarm date (50 ms resolution)



Data storage

- User configurable
- All channels, states, alarms
- Internal storage (7-day min)
- Pre and post alarm spectra

Improve equipment reliability, uptime, and efficiency with Cordant™, built on System 1

Cordant™, built on System 1, is the heart of our plantwide condition monitoring solution. And while it integrates all of your assets into a single dashboard, it's far more than a dashboard. It's a combination of technologies and capabilities that deliver what matters most to your organization: results. Improved asset reliability, improved uptime, and improved efficiency. By staying connected to our customers—and by using our own tools—we have continually advanced what you need in a condition monitoring platform ranging from cybersecurity to scalability to world-class usability innovations and enhancements. After more than two decades on the market, System 1 is better than ever and represents a major area of ongoing product development investment.



Purpose-built historian

Your process historian can handle massive volumes of process data. But what it can't deal with is the high-bandwidth waveform data that is essential to condition monitoring and proper diagnostics. System 1 handles it with ease—even Terabytes worth when necessary. The data you need, when you need it.



Core analytics

Trend plots can only get you so far when it comes to isolating faults, their severity, and ultimately root cause. Machinery diagnostics is a discipline involving deep dives into the nuances of spectral content, orbit shapes, and much more. One set of tools for fluid-film bearings, and another for rolling element bearings. Special tools for gear analysis, torsional analysis, cylinder performance, mode shapes, rubs. There is simply no richer set of tools for every machine in your plant than what we deliver in System 1.



Performance analytics

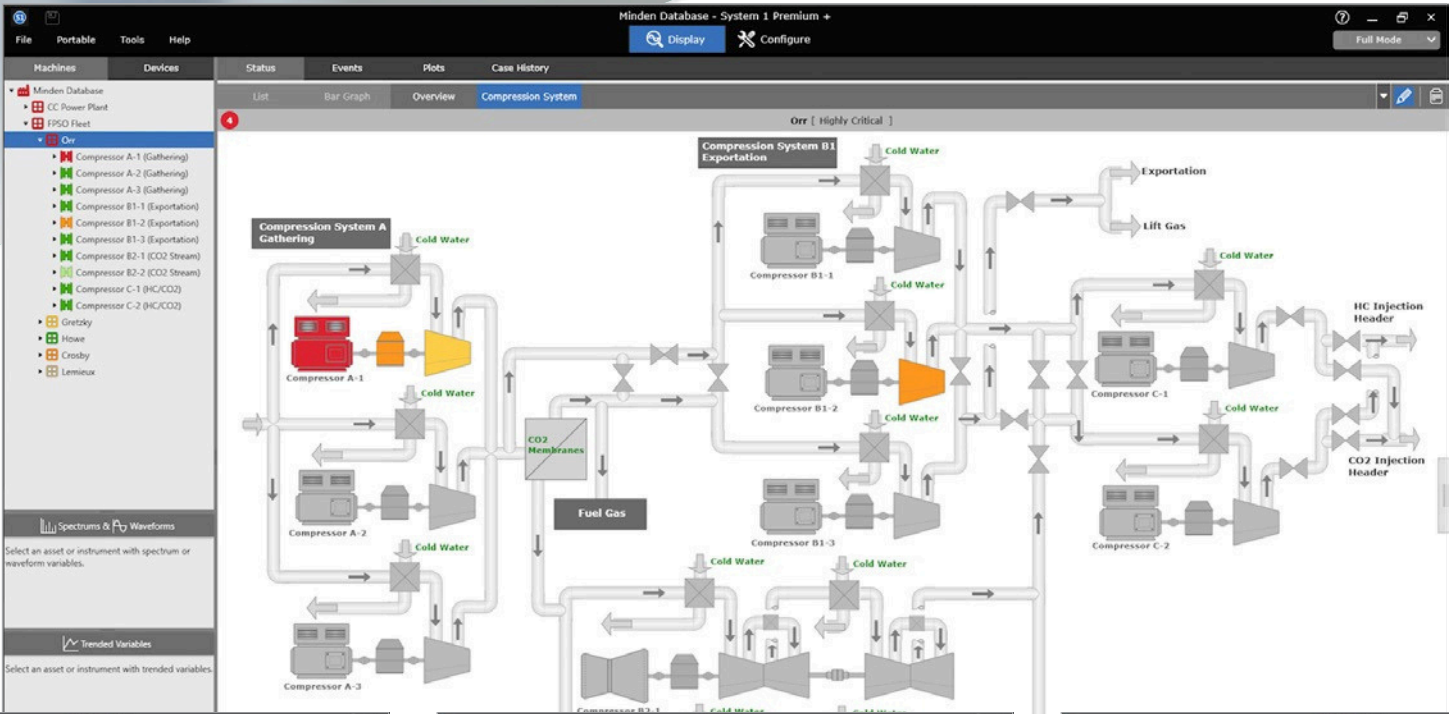
Not all problems are mechanical in nature. In fact, some of your most costly problems can be related to machinery efficiency—fuel costs, wasted energy, excess emissions. System 1 combines both mechanical and thermodynamic condition into a single, integrated environment. No more switching between applications. No more cumbersome manual correlation of process, vibration, and performance trends. We bring it together in one convenient, powerful place.



Decision Support analytics

Plowing through reams of data looking for anomalies is not a good use of anyone's time. Your time needs to be spent solving problems—not looking for them. That's why there's decision support—an embedded AI application within System 1 that sifts through your data and automatically spots malfunctions for you. Because asset management is really about management by exception—spending your time on the assets that need attention rather than those that don't.

Cordant™



Surveillance

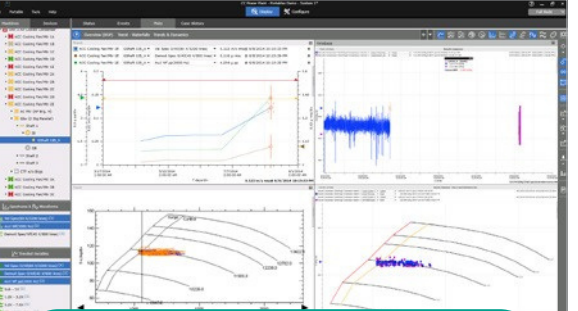
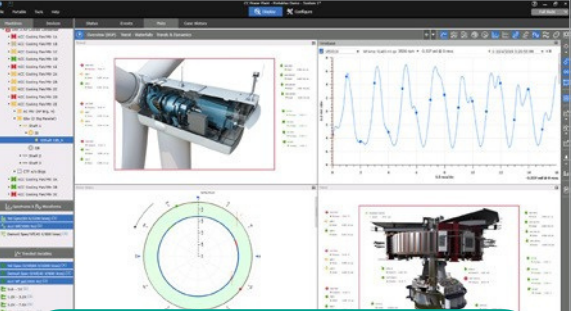
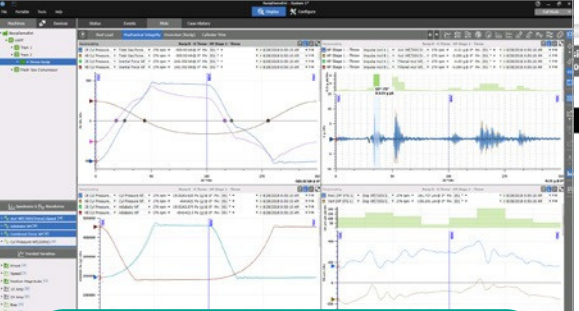
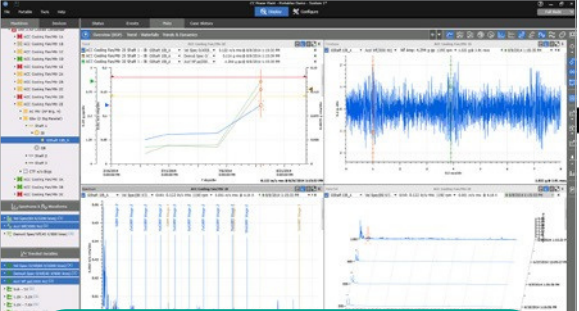
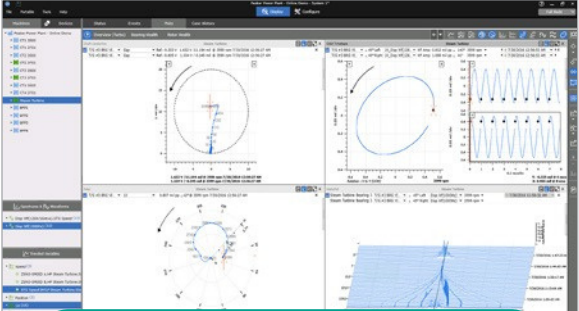
Online

Manual

Wireless

Process

Portable



One unified solution, endless possibilities

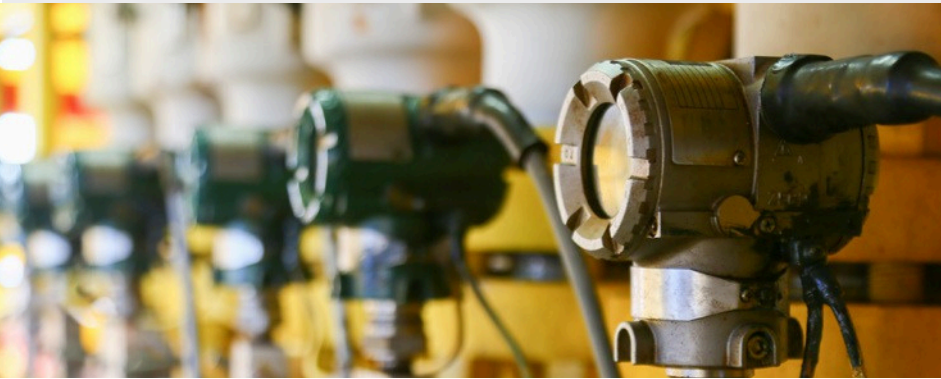
Baker Hughes’ condition monitoring ecosystem

Our machine condition monitoring solutions combine advanced hardware, intelligent software, and trusted service and support—providing a comprehensive, connected view of your operations. Together, they enable you to mitigate risk, boost safety, and reduce maintenance costs. From mission-critical to less-critical equipment, our technology enables better data collection and improved insights across your operations.

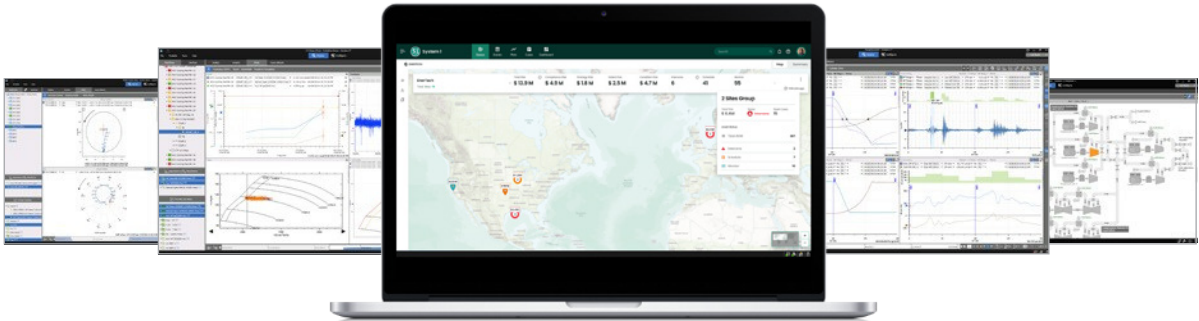
Process data

Very few machinery problems can be solved when armed only with vibration data. Only by understanding the conditions that surround the machine—pressures, flows, levels, temperatures, viscosities, gas compositions, and other parameters—can the cause-effect interactions between process and asset be properly understood. That’s why we’ve taken such care to ensure process data can be easily integrated with System 1, and relevant machinery data can be shared with operators via their process control screens.

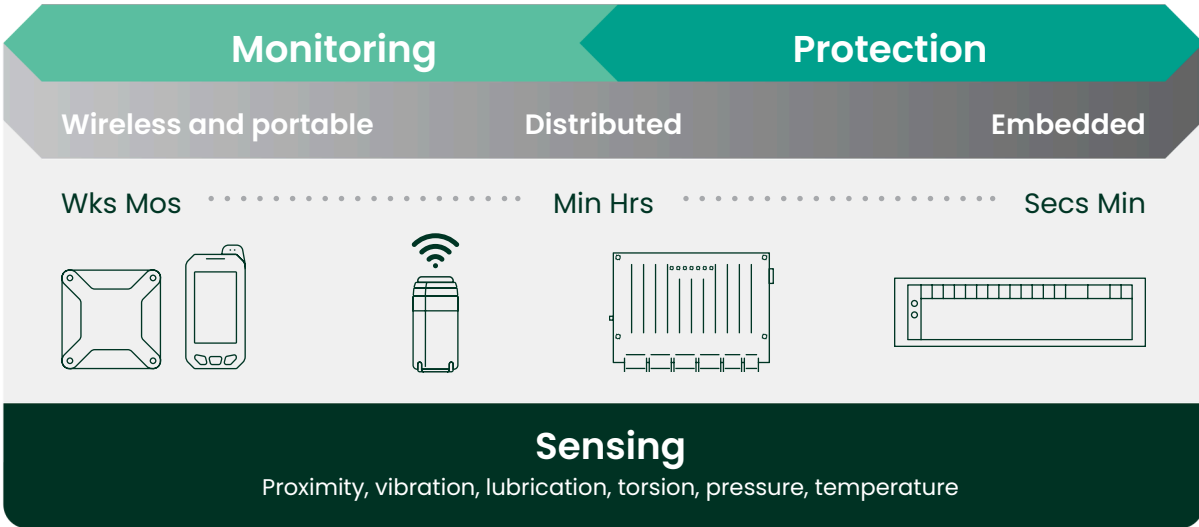
Our architecture provides numerous ways to get data in and out—at both the hardware level and the software level—because one size does not always fit all. We use de-facto and recognized industry standards like ISA SP50, OPC, Modbus, ISA100, and WirelessHART. The result is a condition monitoring ecosystem that isn’t an island—it’s a seamless part of your larger plant control and automation ecosystem, ensuring everyone has the data they need, when they need it.



Enterprise
Software and analytics



Edge
Protection and condition monitoring



Assets

