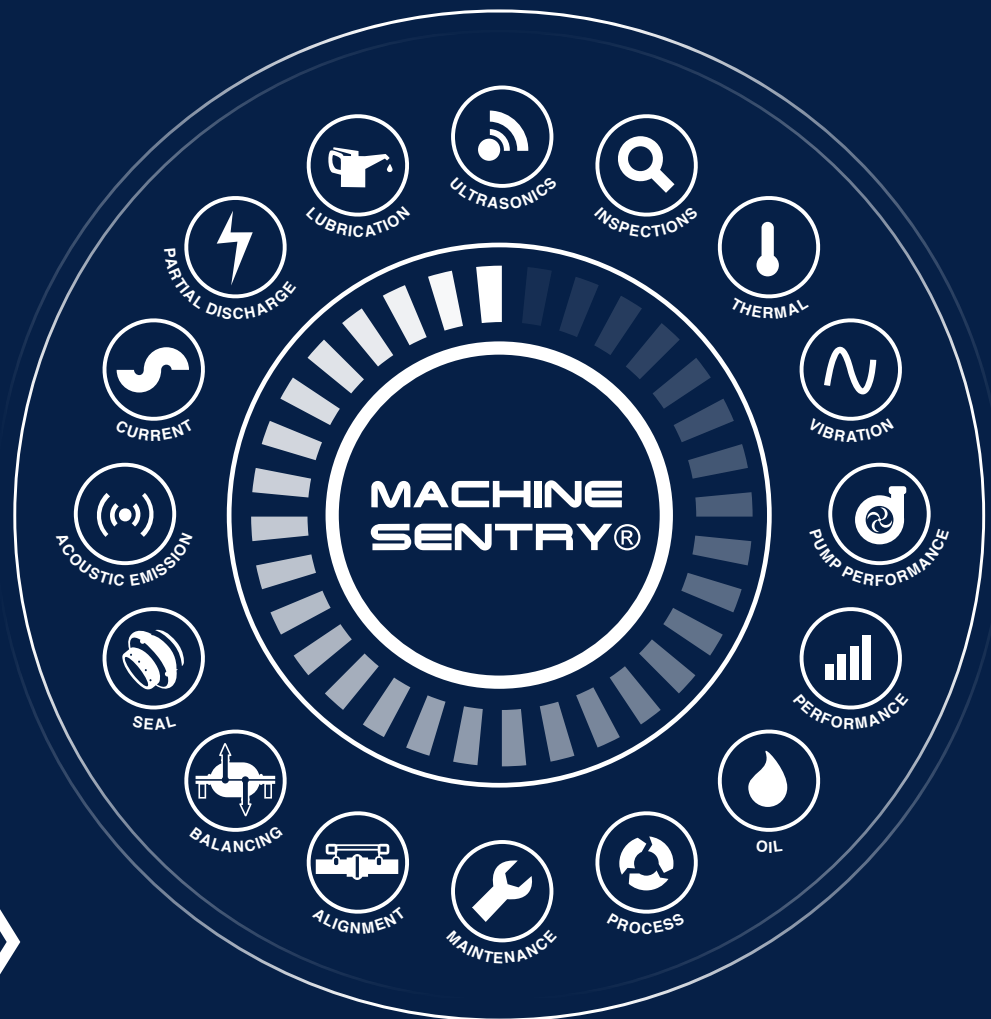


**MACHINE
SENTRY®**

Machine Sentry®

Experience What's Possible



- Saves time - ADA™ the Automated Diagnostic Assistant can predict stage 2, 3 and 4 bearing failure and detect a wide range of other common fault conditions
- Saves money - Reduce your condition monitoring cost by up to 50%
- Supported by experts - Global analyst support from our team of condition monitoring experts
- Easily accessible - Cloud based solution allows information to be shared across many locations
- Wide range of applications - Suitable for rotating equipment, pipework and structural assets. Systems available with ATEX and IECEx certification

www.machinesentry.com

Improving Asset Reliability with Innovative Solutions

Machine Sentry® is the result of more than 40 years of practical experience of assisting customers in a broad range of industries to improve reliability.

An effective asset management program is key to improving the performance and availability of your plant and machinery, however, a variety of different measurement types are often required to ensure the different machinery failure modes are appropriately monitored. The variety of systems and the inherent incompatibilities are overcome by Machine Sentry® and its unique centralised cloud based database. This enables competent personnel to interpret the combined result without wasting valuable time finding the correct information.

Flexible

Machine Sentry® is designed to meet all your reliability improvement goals, with flexible and expandable solutions that grow with your changing requirements. The system is suitable for use on a wide range of assets including: rotating, electrical, static equipment and pipework, etc. The system operates on a large variety of standard Android tablets and mobile phones.

Accessible

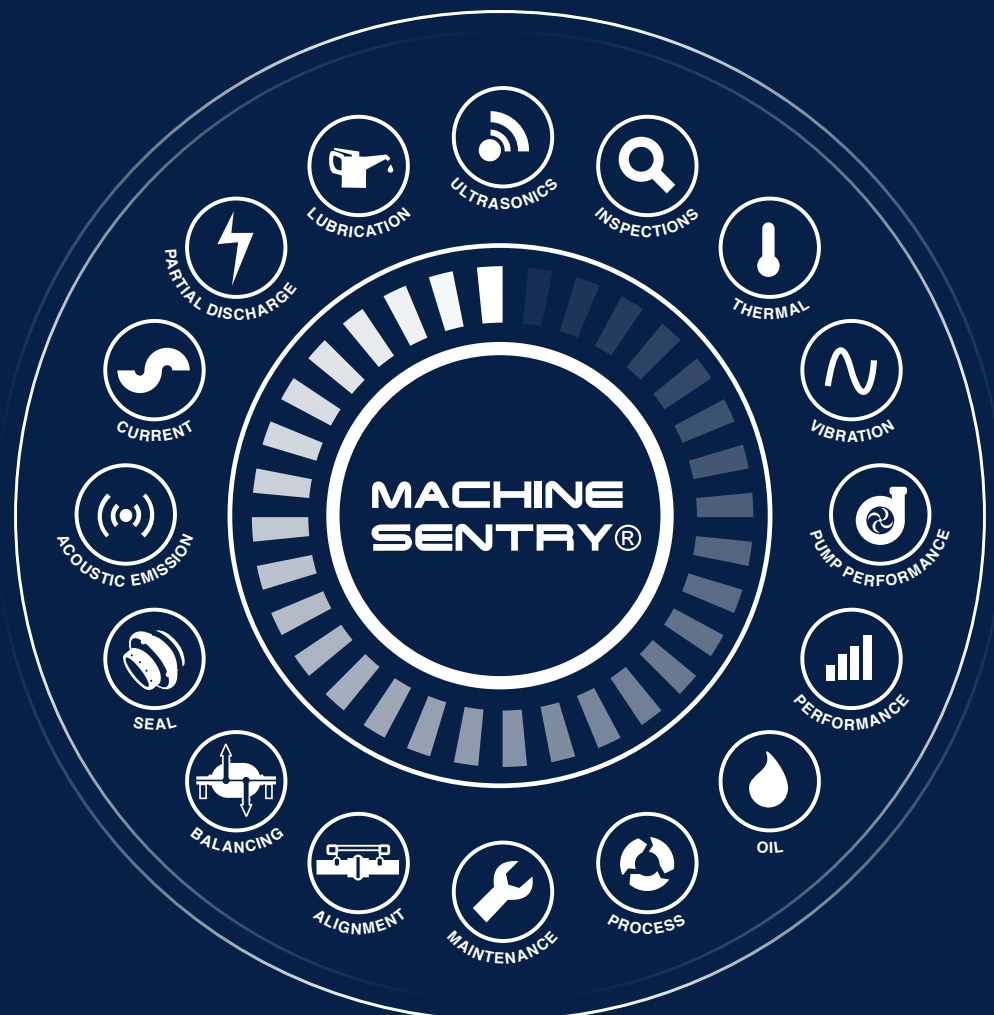
Cloud based software ensures data is available anytime and anywhere, without an 'IT install'.

All In One Solution

Machine Sentry® is a revolutionary new approach which integrates a wide range of measurement techniques into a central cloud based database, providing analysis and driving actions that truly help improve asset reliability.

Saves Time

ADA™ - the Automated Diagnostic Assistant can predict stage 2, 3 and 4 bearing failure and detect a wide range of other common fault conditions.



Machine Sentry® — Experience What's Possible

Machine Sentry® is the next generation asset reliability management solution, which integrates all condition monitoring techniques and watchkeeping data, enabling effective maintenance planning and management reporting.

As a web enabled system, Machine Sentry® is the most versatile, readily accessible, intuitive and cost-effective condition monitoring solution on the market today.

Features:

- **Data collection** – Five times faster than any traditional data collection system, this significantly lowers the time required to acquire data from more assets in the same time. The data collection hierarchy is compliant with ISO14224 with advanced filtering capability.
- **ADA™ the Automated Diagnostic Assistant** – Can predict stage 2, 3 and 4 bearing failure and detect a wide range of other common fault conditions and suggests verification procedures to confirm.
- **Automated alarm configuration** – Templates automatically configure alarms in accordance with ISO standards. Advanced alarm configurations and statistical alarm capabilities are available.
- **Key performance indicators (KPIs)** – To systematically measure the effectiveness of the condition monitoring (CM) program from schedule compliance to asset health and bad actor management.
- **Modular cloud based Machine Sentry® software** – Secure database is accessible from almost any location by multiple users.
- **Accepts data from a wide range of measurement techniques** – A single interface that collates data, collected manually from vibration and temperature (including thermal imaging cameras), records visual inspection and process parameters and stores oil analysis data.
- **Suitable for both static assets and rotating machinery** – The Pipework Vibration Compliance feature allows a plant operator to quickly screen all process pipework and small bore connections in order to identify lines that have the greatest risk of failure.
- **Scalable and flexible** – Machine Sentry® is extremely flexible and can be configured to meet the simplest of systems, more so, as requirements change it can be easily expanded to meet the most demanding situations.
- **Maintenance planning** – Plan, track and manage a range of maintenance events including lubrication activities and usage.
- **Compatibility** – Machine Sentry® can be used either as a standalone tool or alongside your existing enterprise system (e.g. SAP, Maximo, PEMAC, etc), data can be exported to Microsoft Excel, CSV, XML or JSON formats. OEM data such as pump curves, repair details or other documents can be imported and linked to appropriate assets.
- **Expert support** – Access to world leading condition monitoring engineers – providing detailed diagnosis and advice from anywhere in the world.
- **Compliant data analysis** – Vibration analysis is ISO 20816 compliant.

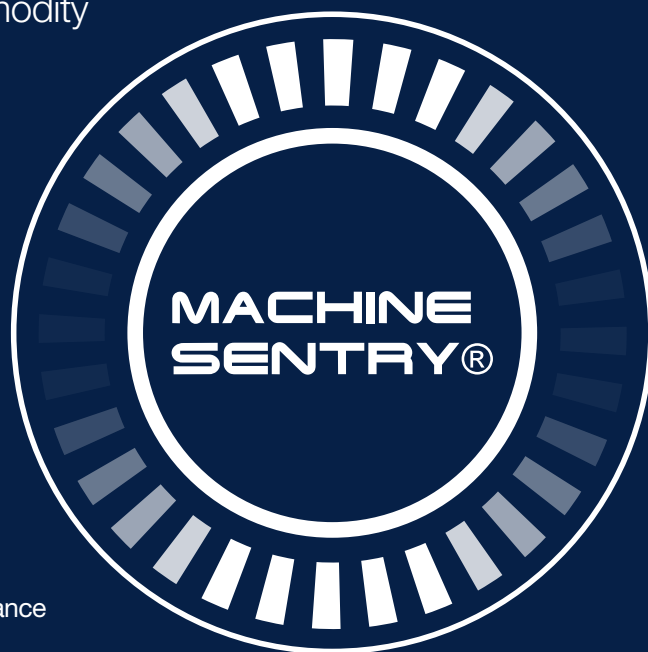
“Machine Sentry® provides asset management solutions for many blue-chip clients, on hundreds of sites.”

ADA™ The Automated Diagnostic Assistant — Saves You Time

We believe that your most valuable commodity is time. ADA™ is designed to save both time and money by automatically detecting the onset of a range of common vibration problems.

ADA™ can predict stage 2, 3 and 4 bearing failure and detect a wide range of other common fault conditions that impact on the reliability of your equipment. It helps set priorities for busy maintenance people and save time by indicating, from a mass of data, what might be important to improve reliability.

The ADA™ algorithms have been developed by the Machine Sentry® team of vibration experts based upon thousands of hours of vibration data coupled with field experience. ADA™ acts as an aide to the on-site maintenance team identifying potential causes for concern.



Faults Diagnosed Include:

- Unbalance (couple, static, dynamic and overhung)
- Bent shaft
- Resonance
- Parallel, angular, or complex misalignment
- Cocked bearing
- Structural or rotating looseness
- Blade or vane pass issues
- Soft foot
- Cavitation
- Lack of lubrication
- Gear misalignment
- Gear backlash / eccentricity
- Gear tooth broken
- Gear tooth wear

Machine Sentry® uses a combination of ISO standard velocity, acceleration and statistical alarms to highlight assets which are of concern.

MACHINE SENTRY® Home Site Hierarchy PDA Sync Administration Support

Site Manager

CM Status CM Shd Action Shd Options Find

Details Actions Reports Add Component Add Point Edit Duplicate Delete Statistical Alarms Change Scheduling

Component Code: AVT-DEMO/CHEM/CT/CT-Phenol/18PU101/MOTOR
Organisation: AVT Demonstration
Site: Chemical Plant
Zone: Cooling Towers
Area: Cooling Tower 01
Asset: Pump 101
Component: Motor

Manufacturer:
Model Number:
Serial Number:
Component Type: Electric Motor
Speed:
Power:

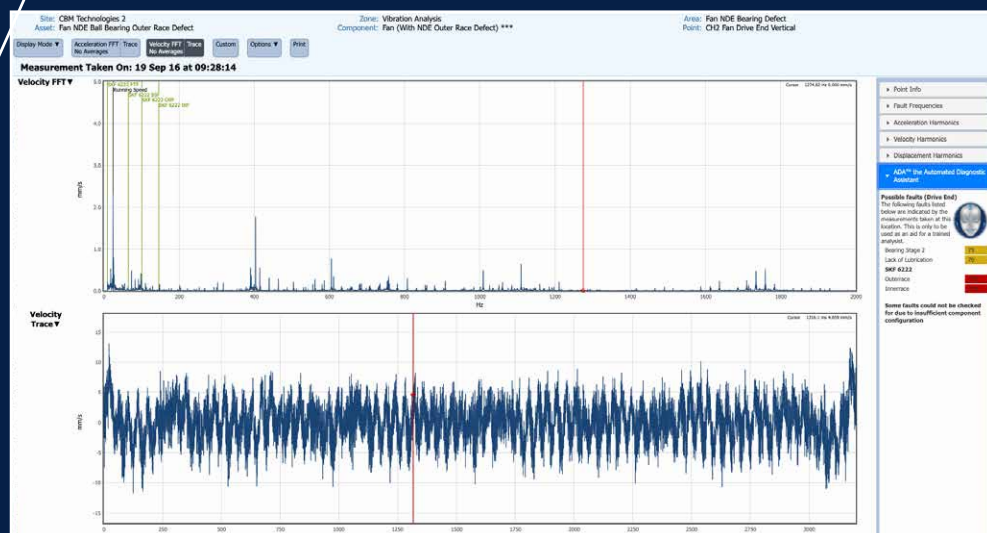
Notes:
Link Ref: 32168

Latest Readings

Name	Last Taken	Readings
Visual Inspection	26/11/2015 10:48:57	Running
Motor Non Drive Horiz	26/11/2015 10:45:49	Overall Velocity (FF1) 5.27 mm/s ovr
Motor Drive Vert	26/11/2015 10:46:10	Overall Velocity (FF1) 2.39 mm/s ovr
Motor Drive Axial	26/11/2015 10:46:35	Overall Velocity (FF1) 6.91 mm/s ovr

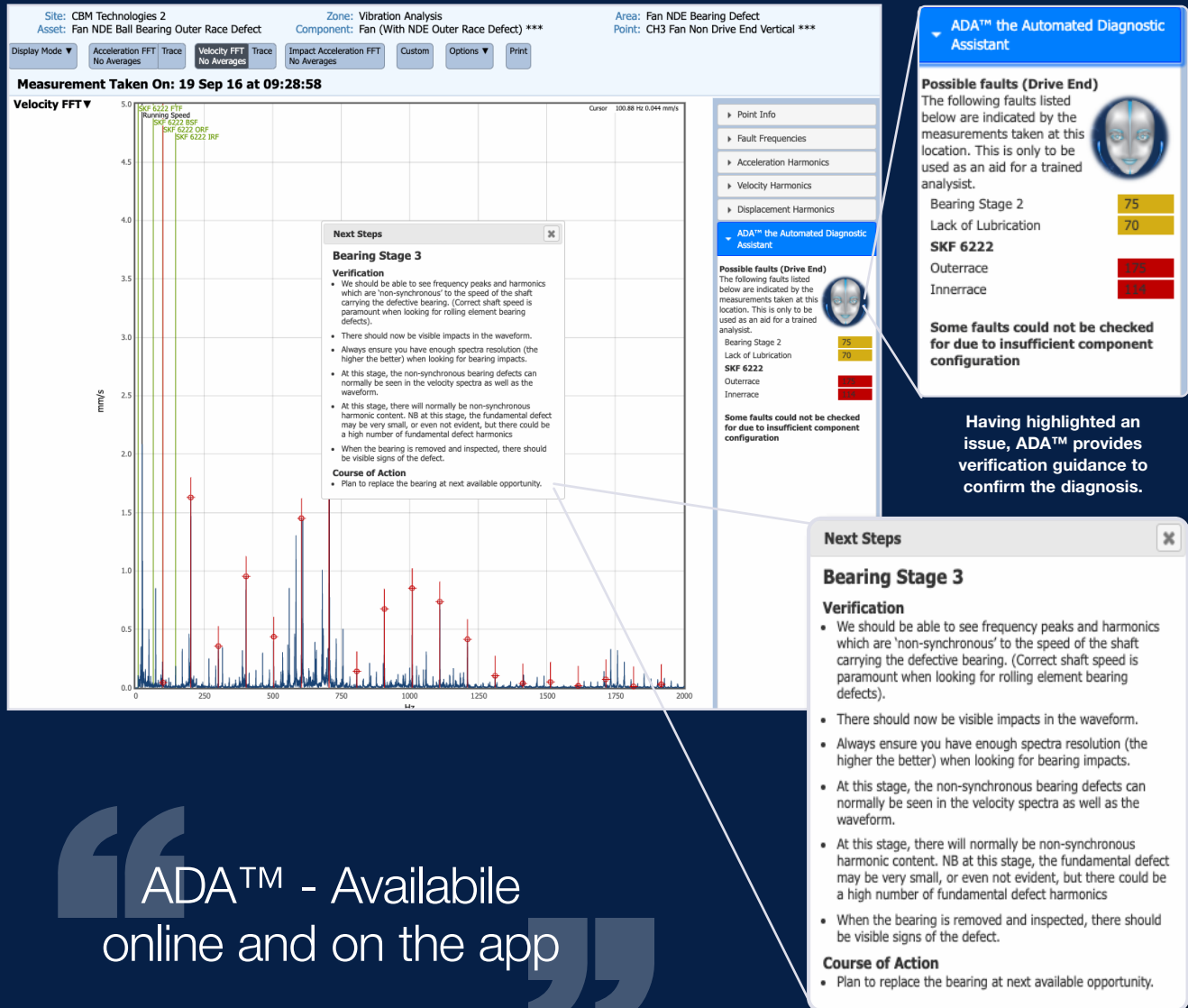
Readings

- Overall Acceleration (Signal) 1.04 g ovr sig
- Overall Acceleration (Signal) 0.35 g ovr sig
- Overall Acceleration (Signal) 0.55 g ovr sig
- Bolt missing from the front right foot
- Peak Acceleration (Signal) 2.3 g pk sig
- Peak Acceleration (Signal) 0.98 g pk sig
- Peak Acceleration (Signal) 1.74 g pk sig



An Expert at Your Fingertips

ADA™ is intended to benefit maintenance departments that are passionate about using predictive and/or preventative maintenance to improve reliability. Early action on the detected fault conditions will prevent some catastrophic failures that would have consumed costly materials and, most importantly, time to rectify.



ADA™ - Available
online and on the app

Need Extra Assistance?

Analyst Support

For customers who do not employ experienced condition monitoring engineers, Machine Sentry® provide access to a large pool of multilingual condition monitoring experts.

The experts at our Reliability Data Centre (RDC) can review clients' data from anywhere in the world and deliver practical guidance that will improve plant reliability, giving further peace of mind to the decision making of a critical asset.



Access Data Anytime, Anywhere!

Machine Sentry® stores data on a secure cloud based server, allowing any authorised user access from any location in the world.

Key data is automatically presented on a 'dashboard', and more detail can be seen by drilling down to individual assets.

Improve Efficiency

Machine Sentry® supports maintenance planning through configurable routes, ensuring consistent asset monitoring and no more lost data.

Maintenance activities such as lubrication checking and usage, visual and thermal inspection routes, can be configured, tracked and monitored, through the single Machine Sentry® interface. Data is entered directly to the database from any Android™ device running the Machine Sentry® app.

Information at Your Fingertips

Imagine being able to identify your site's 'bad actors' at a moment's notice, provide detailed service reports on demand with no more searching through data to find what you need.

A wide range of standard reports can be created instantaneously simply by the click of a button. Available reports include:

- Reliability service
- Asset status summary
- Measurement details
- Lubrication usage
- Scheduling
- Action notes
- Bad actor
- Service visit
- Site status



Machine Sentry
Asset Status Report

MACHINE
SENTRY®

Asset Details			
Asset Data AS00000000000000000000		Asset Contract Management	
Asset Name AS00000000000000000000		Rotherham (Mill Close)	
Asset Type Subtype		Model	
Asset Location Location		MCL Location	
Asset Speed 0 rpm		Power 0 kW	
Asset Notes			
Components			
Name Operational		Type	
Model No			
Asset Health 26/02/18 7:39 Asset Health 95.00 %		CM Assessment 31/07/17 2:29 CM Assessment 97.00 %	
H000 Schedule Compliance 22/08 8:32 Schedule Compliance 96.00 %		Lab Assessment 19/07/17 8:10 Lab Assessment 60.00 %	
Monthly Operational Meeting with Steve Williams 26/02/18 7:36 Monthly Meeting with S. Williams 30.00 Hrs		Monthly Operational Meeting with Steven Connolly 26/02/18 7:36 Monthly Meeting with S. Connolly 30.00 Hrs	
Schedule Compliance 22/08 8:32 Schedule Compliance 89.10 %		Quarterly Management Meeting 19/02/18 7:36 Running 4.00 Severity 0.00 Other Severity 0.00	
Name Quality		Type	
Model No			
Contract Review 14/03/17 11:22		Customer Charter 14/03/17 11:22	
Bolt Missing Damage/Worn Dry/Dents Missing Damage Unusual/Excessive Noise "Tracing costs to be developed further"		Running 1.00 Severity 0.00 Other Severity 1.00	
Health and Safety Audit 21/06/17 14:45 Health and Safety Audit 0.00 "Initial Reviewed and updated"		Key contact 28/04/17 9:56 Running 1.00 Running 0.00 Severity 1.00 Other	
Management assurance tour 8/4/15 15:09		Management Assurance Tour 13/01/17 11:23 Management Assurance Tour 0.00 "All checks are in place and are being maintained the plant history is completed and being kept up to date (nothing's have also been attached more accurate machine down times to be recorded"	
Actions Bolt Missing Damage/Worn Dry/Dents Missing Damage Unusual/Excessive Noise "Customer Satisfaction Survey to be carried out. Sophie Briff has been asked to create survey."		Management Assurance Tour 13/01/17 11:23 Management Assurance Tour 0.00 "All checks are in place and are being maintained the plant history is completed and being kept up to date (nothing's have also been attached more accurate machine down times to be recorded"	
Name Safeguards		Type	
Model No			

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Page 2 of 266

Low Upfront Investment

Machine Sentry® can be accessed on any computer via the web based interface, or using an industry standard Android™ tablet or mobile phone. By utilising readily available Android™ tablets or mobile phones, there is no longer any need to invest in expensive data collection equipment. There is no complex IT installation or troublesome setup with the web based software.

Improve Plant Safety

Machine Sentry® can help avoid potentially dangerous pipework failures. The Pipework Vibration Compliance function allows plant operators to quickly screen all process pipework and small bore connections in order to identify which sections of line have the greatest risk of a fracture caused by vibration induced fatigue. This pipework risk assessment enables operators to be proactive in reducing the risk of failures. This represents a significant opportunity to improve safety, particularly for sites where dangerous substances could leak from the failed pipe causing the risk of fire, explosion, pollution or injury.

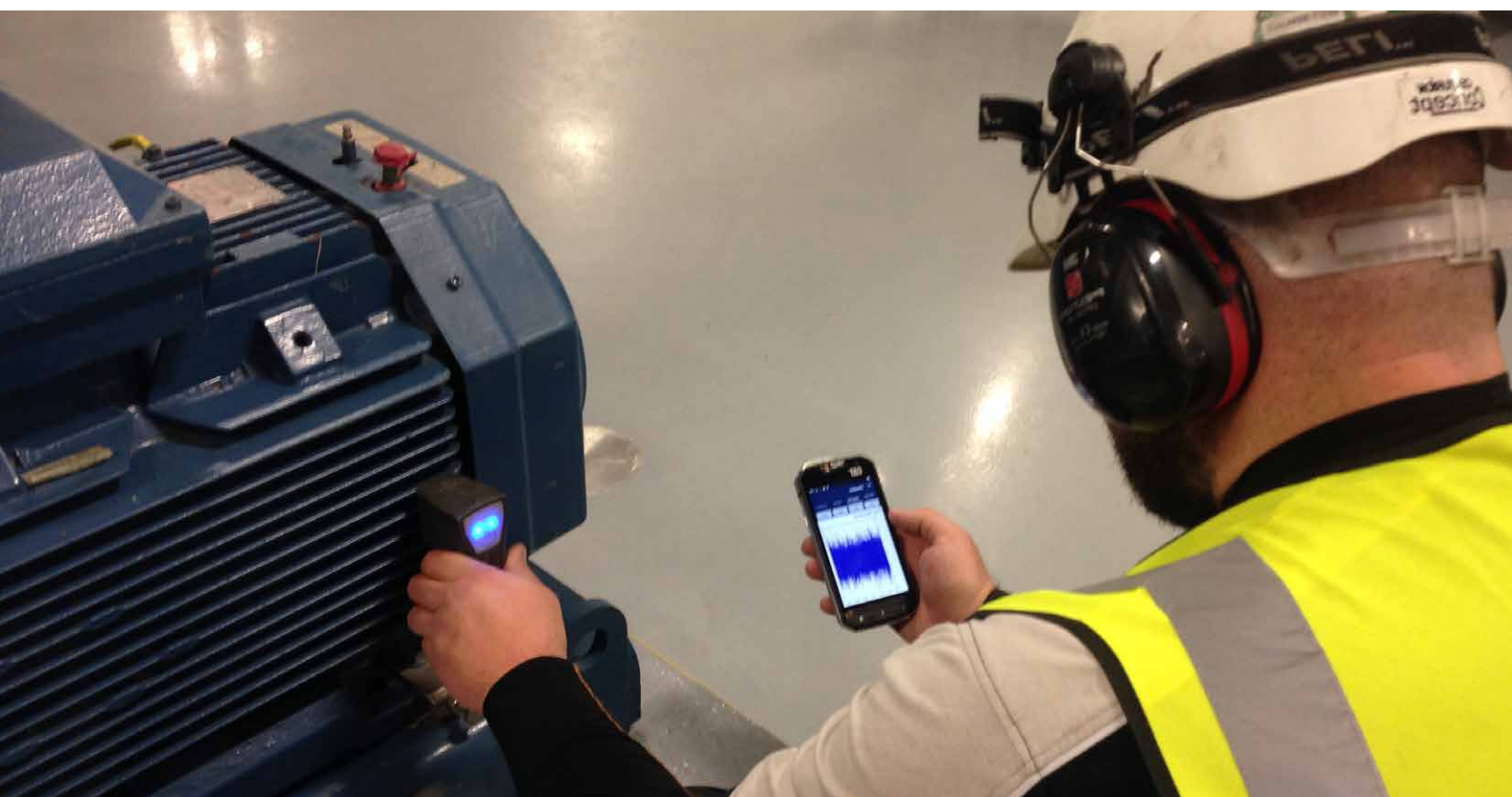
Reduce The Cost of ATEX Inspections

Machine Sentry® supports ATEX inspection routines. ATEX inspection routines configured according to BS EN 60079-17:2014 are built into Machine Sentry®. These standard procedures can be easily used along with the inspection route to ensure that all the requirements of the standard are met, eliminating the need to appoint expensive outside providers.

Saves Time

Time is probably your most valuable commodity; Machine Sentry® is designed to be simple to use and reduces the time needed to perform many routine condition monitoring tasks.

- Vibration data is captured up to five times quicker than many other readily available devices
- Alarm points are automatically configured to levels defined by ISO10816 and ISO 7919
- ADA™ the Automated Diagnostic Assistant can predict stage 2, 3 and 4 bearing failure and detect a wide range of other common fault conditions
- Smart alarms learn what 'normal' is with your equipment, reducing false warnings
- Condition monitoring related Health, Safety, Environmental and Quality (HSEQ) data can all be stored within the database, reducing additional audits



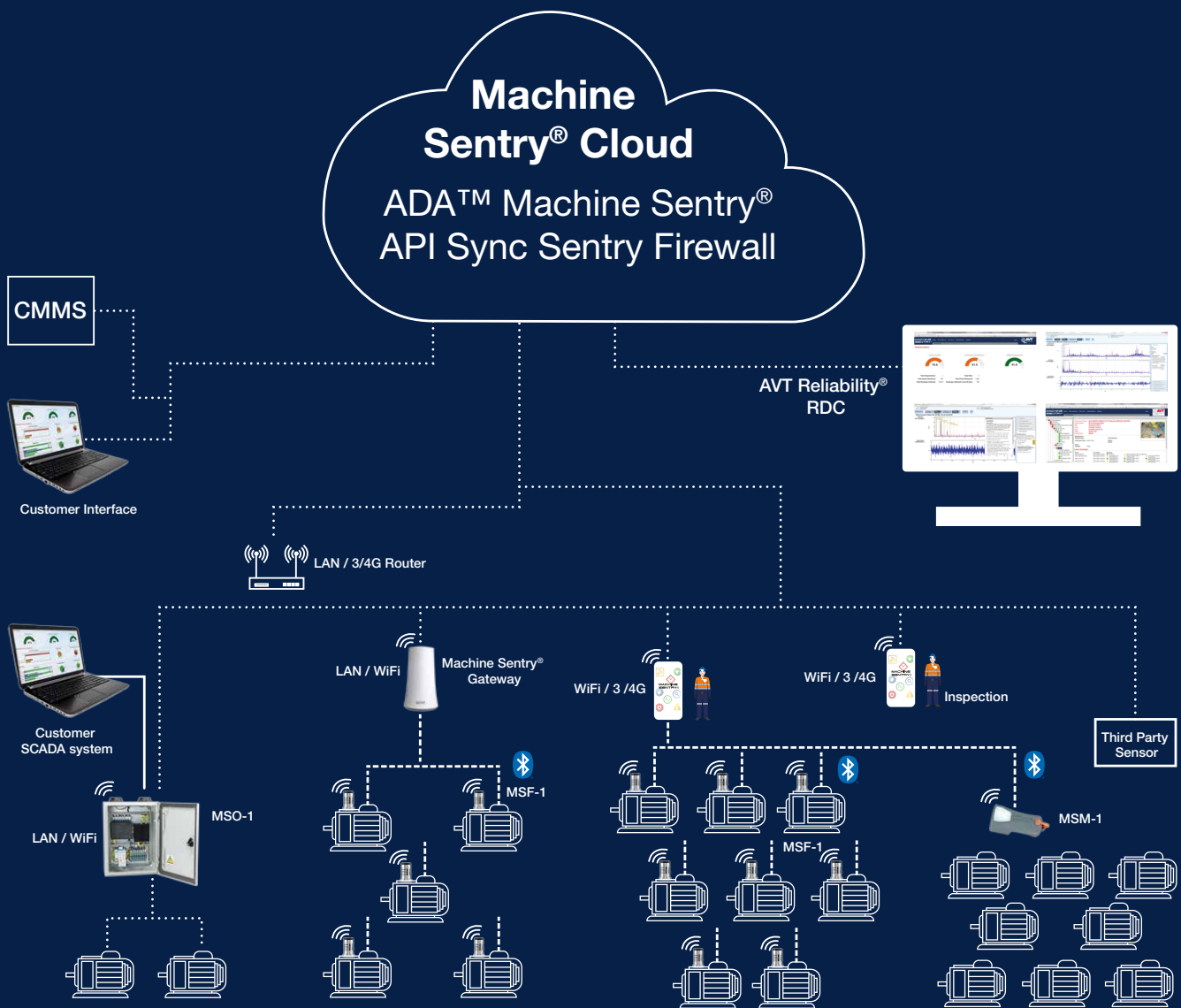
Flexible Configuration

Machine Sentry® is suitable for a wide range of applications including; rotating machinery, electrical, pipework and other structures.

The software operates on industry standard Android™ tablets, smartphones or other compatible devices, including ATEX certified tablets and smartphones, and can be configured to meet the needs of almost any situation.

- Cloud based • ISO 14224 compliant • Action support • Trending • Alarms • Management tools • KPIs
- Vibration analysis • ISO 10816 compliant • Time waveform collection • FFT analysis • Custom views
- Impacting support (Enveloping) • Averaging support • Multiple cursor types • X and Y logarithmic axis
- Automated Diagnosis Assistant (ADA™) • Configurable fault frequencies • PCF trending and alarm
- Process data collection • Lubrication management • Oil analysis support • Visual inspection management
- Thermal points • NFC tag support • Statistical alarms • Barcode support • Integrated reporting
- Export to Excel, CSV, XML or JSON • Third party equipment compatibility • Import OEM documentation

		HARDWARE						
		Standard Android™ tablet			Android™ device with Integrated thermal imager			No Android™ device
		No sensors	MSM-1	MSF-1	No sensors	MSM-1	MSF-1	MSO-1
Vibration measurement	Periodic		Y	Y		Y	Y	
	Continuous							Y
Thermal measurement	Point		Y	Y		Y	Y	
	Image				Y	Y	Y	
	Image import	Y	Y	Y	Y	Y	Y	Y
Oil sampling		Y	Y	Y	Y	Y	Y	
Process measurement	Periodic	Y	Y	Y	Y	Y	Y	
	Continuous							Y
Visual inspection		Y	Y	Y	Y	Y	Y	
Manual data collection only		Y	Y	O	Y	Y	O	N/A
ATEX available		Y	Y	Y	N	*	*	Y
Wireless sensor		N/A	Y	Y	N/A	Y	Y	N



Machine Sentry® Mobile Type MSM-1

Battery powered sensor that measures vibration and temperature. The sensor communicates via Bluetooth to an Android device (phone or tablet) running the Machine Sentry® app. The sensor is available with ATEX and IECEx certification.



Machine Sentry® Fixed Type MSF-1

Battery powered sensor that measures vibration and temperature. The sensor communicates via Bluetooth to an Android device (phone or tablet) running the Machine Sentry® app. The sensor is available with ATEX and IECEx certification.



Machine Sentry® Online Type MSO-1

Multichannel vibration sensor that measures vibration along with process variables (optional). The sensor communicates via wireless network, ethernet or GPRS to the Machine Sentry® cloud based database.



Machine Sentry® Sync

Provides an interface between third party equipment into the Machine Sentry® platform

Machine Sentry® can communicate via Machine Sentry® Sync with a range of third party equipment such as multi-channel online vibration analysis systems

**MACHINE
SENTRY®**

Machine Sentry®

The most versatile and cost-effective condition monitoring and maintenance system solution on the global market.



Vibration

Machinery vibration is measured using the Machine Sentry® mobile sensor. The tri-axis vibration sensor allows measurement to be made up to 5x faster than other equipment.

Simultaneous recording of vibration, temperature and one other parameter can be made with Machine Sentry® mobile sensor via an integrated temperature sensor and an auxiliary input.



Visual Inspection

Machine Sentry® can collect and collate “Watchkeeping” (manually collected) process data from the assets around your plant.

“Watchkeeping” data is easily entered via the mobile device and stored in the master database with other data from the asset.



Thermal Imaging

Thermal imaging records are easily uploaded into the Machine Sentry® database and stored along with the relevant asset.

Machine Sentry® distribution partners can provide IR Level 3 qualified engineers to carry out thermography to detect electrical and mechanical faults.



Oil Sampling

Machine Sentry® can automatically import oil analysis data (from partner laboratories) for individual assets allowing records to be kept. Changes over time can be detected, and by analysis of this and other measured parameters, potential problems can be detected.

Distribution partners of Machine Sentry® can (if required) provide analysis from its pool of ICML (International Council of Machinery Lubrication) qualified experts certified in compliance with ISO standards.

“The most versatile and cost-effective condition monitoring and maintenance system solution on the global market.”

Training Services

Machine Sentry® distribution partners offer a range of accredited and internationally recognized training courses in vibration, lubrication and pipework vibration analysis.

The result is a recognized qualification and invaluable contribution towards CPD (Continued Professional Development). All of our trainers are highly qualified, certified and have many years of practical experience in the application of condition monitoring technologies.

Courses are delivered to international standards
– ISO 18436, BINDT PCN, ICML and Energy Institute.



**MACHINE
SENTRY®**

supported by ADA™ the Automated Diagnostic Assistant



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