

The Basics of Condition Monitoring with Artesis MCM

Artesis

Improve control over your equipment performance and improve your plant output with Artesis MCM – condition monitoring made simple.

Artesis brings the power of **NASA developed technology** to monitor your plant and equipment, giving you simple and clear guidance for your operators and maintainers. It identifies incipient faults on **both the electric motor and the driven equipment** and alerts your staff as soon as something starts to go amiss. Really clever technology makes it really simple to use – so your staff don't need extensive training and experience to deliver real benefits.

ARTESIS CONTINUOUSLY MONITORS YOUR PLANT, TO TELL YOU

- How your equipment is performing
- What (if anything) is wrong with it
- What to do next

ARTESIS IS EASY TO USE

- Plant is continually monitored – no need to send staff out to gather data
- Results are automatically displayed to the appropriate people – on-line display can be accessed by any PC equipped with a browser
- Alerts/action recommendations automatically sent by email or text message to staff for action (eg direct to your maintenance foreman or tradesman)
- Guidance is simple and direct – no need to analyse wiggly lines – although these can be accessed if you really want in-depth backup to support Artesis' advice.

ARTESIS IS ROBUST AND EASY TO INSTALL

- Artesis is installed by connection to the electrical supply to the motor – normally in the switchroom or supply panel – with no need for new cabling out to the motor or driven equipment.
- No need for sensors to be mounted directly on the equipment so no risk of damage out on the plant and no need for modifications to equipment.
- Ideal for equipment that is inaccessible (eg submerged pumps, or equipment in awkward locations or hazardous areas).

ARTESIS IS GREAT VALUE

- No need to run cables all the way to the equipment – a significant expense for other permanently installed systems
- Continuous on-line monitoring avoids the cost of sending out staff to collect data
- Artesis units and monitoring software are inexpensive
- Service Contract can provide an attractive alternative to up-front purchase price

ARTESIS IS FOR YOU

- To find out more about how to gain the benefits of Artesis condition monitoring, contact us by phone, fax or email as shown below.



**SIMPLE, EFFECTIVE
CONDITION MONITORING**

"...IT SIMPLY WORKS"



IF THIS IS YOUR EXPERIENCE OF CONDITION MONITORING...

- You have already tried condition monitoring, and you know that Condition Based Maintenance should bring real advantages, but it's not been as easy to achieve as you'd like -

Hand held vibration monitoring equipment looks affordable up-front, but requires staffing to go and take those readings – which costs money and means diverting them from other important, and sometimes urgent, tasks.

Permanently installed sensors get around the manpower problem but at a cost – the cabling alone can be a very significant expense.

Wireless sensors can help avoid the cabling problem, but can be vulnerable to hostile environments.

And there are some situations (eg submerged pumps, hazardous environments, nuclear zones or severe space constraints) where inaccessibility makes it hard to use either handheld or permanently installed sensors, regardless of whether they are wireless or not.

And after all that, maybe you're not sure whether you get the full value you should from all those readings you take – it takes time to analyse all those graphs. Sometimes you wonder whether the conclusions your people draw from those wiggly lines are 100% reliable as a basis for action.

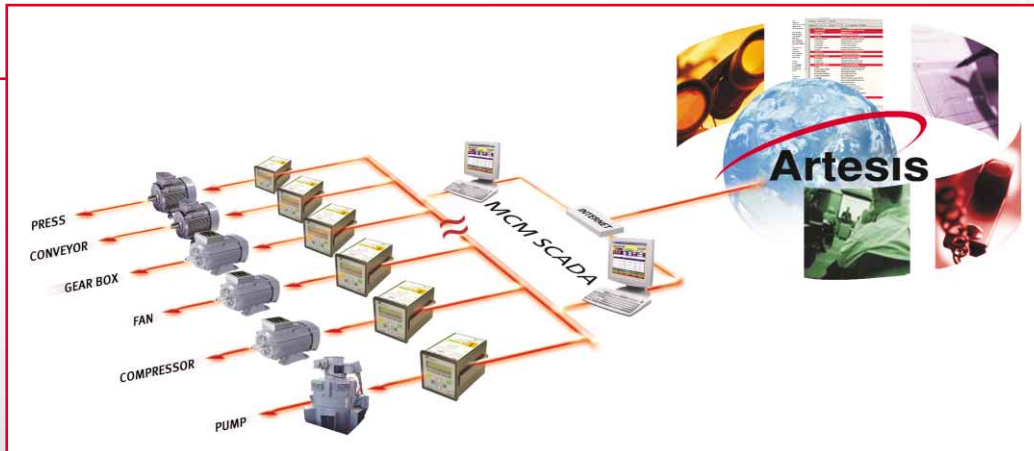
Additional techniques such as oil analysis, Infra-Red Cameras, and acoustic emission have a role, but all take time to do and require skill and experience to deliver useful results.

...THEN ARTESIS HAS THE ANSWER FOR YOU:

- Artesis gives you the benefit of continuous monitoring, at a cost comparable to handheld portable devices, without the need for staff to gather data.
- It provides continuous information on the status, condition and performance both of your equipment and the electric motor driving it. Where an incipient problem is identified, it provides simple guidance on the action to be taken – whether simply to keep an eye on the equipment, or to plan in maintenance work, or to stop the plant right away. And if maintenance is required, it gives clear guidance on the nature of the problem.
- When an alert is raised, it can be automatically and immediately sent by email or text message to the person who needs to know – eg the operator to check or stop the plant, or the technician or foreman to carry out maintenance work.
- Really clever technology makes it really simple to use. The technology, developed for NASA and covered by worldwide patents, uses the electric drive motor as a sophisticated transducer to capture information about the driven equipment, and presents this in a simple format which can be understood by operators or technicians directly, without the need for an expert to study and interpret trends or other “wiggly lines”.
- This information is accessible via any device with a browser connected to the data – whether it is a technician on-site with a wireless handheld device, a maintenance planner in his office, or a manager working offsite accessing the data via the internet at any time of day or night, anywhere in the world.
- Because it uses the electric motor as a transducer, it only needs to be connected to the electrical supply to the equipment, in the switch room or feeder panel, so it doesn't require modifications to your plant to fit sensors, nor any new cabling out to the equipment, making it quicker, simpler and cheaper to install.
- The absence of a need for on-plant sensors also means it is ideally suited for monitoring inaccessible equipment such as submersible pumps, or equipment in hazardous or inaccessible environments such as flammable, toxic or radioactive locations. All connection work can be carried out safely in the switch room or supply panel area.
- And the absence of on-plant sensors means it is invulnerable to damage from a hostile plant environment, whether temperature, corrosion, humidity, vibration or simply being wiped out by a forklift truck, so it offers a more robust and reliable service.

How Artesis scores over conventional approaches

Artesis



WHAT IT CONSISTS OF:

- For each item of equipment you monitor, you need an Artesis MCM unit, that connects into the three-phase electrical supplies to the motor. It installs in the switch room, and gives both local and remote outputs. The local output is an LED status indicator, with 5 conditions:
 - Normal operation
 - Watch line (eg abnormal voltage dips or spikes have been observed)
 - Watch load (eg total load on the equipment is exceeding permitted normal range)
 - Perform Maintenance (more detail is provided via MCM SCADA)
 - STOP (urgent problem – more detail provided via MCM SCADA)
- You need a single copy of the MCM SCADA software – this is a powerful package that provides the diagnostic and graphical outputs and manages the communication of alerts via email or text message to whoever you choose to inform. Only one copy of the software is required however many drives you are monitoring, and however many people log into the system.
- You also need an available PC to drive the system, and communications cabling to link to your network.

THIS SOUNDS SO GOOD, HOW DO I GET ARTESIS WORKING IN MY PLANT?

- Like everything else about Artesis, it is simple and inexpensive. Just give us a call or email or fax on the number below, and tell us about your situation. We will send out an advisor to come and discuss your situation, and provide you with a quote for the best system for you, whether that is a simple purchase of a number of monitoring units and software, or a complete installation and advisory service, or anything in between. After that, you simply give us a purchase order and we do the rest.

Simple isn't it?



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“...IT SIMPLY WORKS”

What makes it different from, and better than, previous approaches you may have tried

WHAT IT DOES

Artesis uses clever analysis of the voltages and currents drawn by the electric motor driving your equipment to monitor what is going on in both the motor itself and in the equipment it is driving.

HOW IT WORKS

It is a well known phenomenon that the greater the load on a motor, the greater the current drawn, so examining the current trace can give information about the torque being demanded to drive the equipment. Likewise, speed variations in the driven device directly affect the speed of the motor rotor, in turn affecting the back emf created within the motor, and hence the voltage and current seen at the motor terminals. These variations in torque and speed can be detected not just as gross changes (eg the difference between equipment working at full load vs part load) but also as short term fluctuations or high frequency components, distorting the normal sine wave formation. These high frequency components indicate high frequency fluctuations in the torque and speed of the driven equipment, which correspond to particular phenomena in the equipment such as imbalance, worn bearings, cavitation, etc. So monitoring of the current and voltage traces of the electrical supply to the motor can provide real information about what is happening to the driven equipment. The entire motor is effectively being used as a sophisticated transducer to give you more information about your equipment than you have had before.

In addition, the inductance characteristics of the motor are very sensitive to any variations in the gap between the rotor and the stator. These can be caused by wear in the motor bearings, but can also occur under changes in radial load on the motor shaft even when the bearings are in good condition.

So monitoring and analysing the voltage and current drawn by an electric motor can identify problems with both the motor and the driven equipment.

HASN'T THIS BEEN TRIED BEFORE?

In the past, attempts to use these phenomena have required detailed analysis of the "wiggly line" traces of the voltage and current patterns, using frequency analysis tools to identify patterns of particular harmonics and so on. This can sometimes give good results, but is very slow and labour intensive, and requires very highly skilled experts to interpret the results, placing severe limitations on the occasions when the technique is worthwhile. Conventional analysis of current signature is also limited by its sensitivity to any disturbances to the voltage applied to the motor which in turn feeds through to the resulting current. Many industrial electrical supplies can be very "dirty" as the result of all the other loads and switching on the system, further limiting the applicability of this as a practical technique. As a result, applications of this type of technology have tended to be more restricted to assessment of the condition of the motor only – with the text book example being identifying cracked rotor bars.



Why use Artesis for Condition Monitoring?



SUMMARY OF KEY MESSAGES

- **NASA technology – really clever technology makes it really simple to use**

- **Easy to use**
 - Easy to interpret results
 - No need to interpret “wiggly lines”
 - Clear guidance on action required

- **Easy to install**
 - No on-plant cabling required
 - No access to plant required

- **Monitors condition of the electric motor as well as the driven equipment**

- **In addition to monitoring condition of equipment, Artesis provides information on plant operating conditions too (information on power consumption, phase angle and total harmonic distortion can allow plant efficiency to be optimised)**

- **Can monitor equipment in inaccessible locations, eg:**
 - submerged pumps in water industry, North Sea oil industry, etc
 - nuclear hazardous areas
 - toxic hazardous areas

- **Robust**
 - Nothing out on the plant
 - So not prone to damage from corrosion, mechanical damage, heat, vibration, radiation etc

- **Allows monitoring wherever you are – in the office, at another site, from home...**

- **Provides alerts to your staff to take action**
 - By warning on screen
 - By sending email
 - By sending text message

- **Easy to integrate with other systems, eg CMMS, to raise work orders**

- **Can support “power users” if you want**
 - Historical graphs, trends, etc available for easy analysis if required

- **Can be provided as an external service – to monitor and advise as required**

- **Inexpensive / great value**

- **Allows you to:**
 - Improve control over equipment performance
 - Improve plant performance
 - Improve control over maintenance work
 - Provide better visibility of equipment performance and condition
 - Reduce breakdowns
 - Respond more rapidly to plant breakdowns
 - Identify breakdowns more rapidly
 - Identify breakdowns before they occur
 - Fix faults more rapidly
 - Identify faults more rapidly



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