

FULLER[®]



ONLINE CONDITION MONITORING SERVICES

FOR OK™, ATOX®, AND FULLER VERTICAL ROLLER MILLS
FOR SEPARATOR AND MILL

MONITORING AND EXPERTISE TO IMPROVE VERTICAL ROLLER MILL PERFORMANCE AND AVOID UNPLANNED DOWNTIME

Vertical roller mills grind various materials at the cement plant, such as limestone, clinker, slag, and coal. Combining drying, milling, and separation into one unit, these mills are more flexible and energy-efficient than traditional ball mill operations. However, they must withstand complex and dynamic operating conditions and lose performance quickly if not effectively monitored and operated.

As a leading VRM supplier to the cement industry, we understand how essential it is to address any issues with your VRM promptly. Our online condition monitoring services (OCMS) for VRMs help you do just that, highlighting issues before they become a problem. Multiple sensors installed on your VRM send information to our Global Remote Service Centre. We continuously monitor the equipment for process abnormalities, part failures, and other issues, with specialists always on hand to recommend corrective action and help optimise your VRM's performance.

KEY BENEFITS

01

Increase uptime and output.

02

Gain fuel and power savings.

03

Lower labor costs by transforming unplanned shutdowns into planned ones.

04

Extend equipment lifespan with improved preventive maintenance.

05

Reduce premium costs and services by having the right spares on site at the right time.

06

**Return of investment:
3 months**

VERTICAL ROLLER MILL

Separator Drive Motor

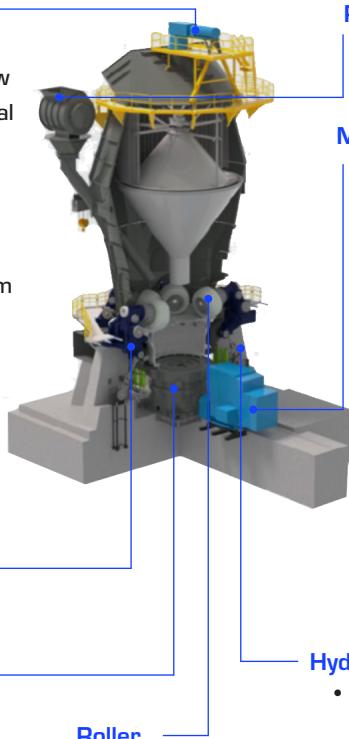
- Motor Rotor failure: broken/cracked rotor bar imbalance, broken/cracked rotor bar, loose, bow
- Motor Bearing failure: subcomponent, rotational looseness, lubrication problems, cocked
- Motor structural looseness
- Motor Stator failure: voltage imbalance, eccentricity, soft foot
- Motor Phase loss, insulation & windings problem
- Motor Misalignment motor/gearbox
- Gearbox Bearing failure: subcomponent, rotational looseness
- Gearbox tooth wear, cracked or broken.
- Gearbox misalignment gears or motor
- Gearbox eccentricity and backlash

Table

- Tilting: unequal axial clearance

Gear Box

- Bearing failure: subcomponent, rotational looseness
- Tooth wear: cracked or broken
- Gear or motor misalignment
- Eccentricity and backlash
- Bearings: high tank/supply oil temperature, lack of cooling
- Planetary gears/bearings: abnormal axial displacement



Rotary Feeder

- High/low temperature

Motor

- Rotor Failure: broken/cracked rotor bar, rotor imbalance, loose rotor, rotor bow
- Bearing failure: subcomponent, rotational looseness, lubrication problems, cocked bearing, structural looseness
- Stator failure: voltage imbalance, eccentricity, soft foot, phase loss, insulation and windings problems
- Misalignment
- High/low bearing temperature

Hydraulic Accumulator

- High/low pressure

Roller

- Bearing failure: subcomponent rotational looseness, lubrication problems, cocked, high return oil temperature, oil contamination
- Oil supply to roller clogged: oil contamination, filter maintenance, leakages in the oil circuit
- Roller: high oil temperature, low oil level, high return oil temperature, high tank/supply oil temperature

The OEM expert advantage

Many providers offer to monitor your equipment, but do they truly understand your VRM? We have decades of experience installing, troubleshooting, maintaining, and optimising VRMs. We have integrated that OEM experience and insight into our OCMS. So, while others tell you what to worry about, we tell you how to solve recurring problems and enhance reliability. This includes extensive root cause analysis to prevent minor issues from escalating into major problems.

After all, your success is our success. Our OEM expert advisors support and coach your maintenance personnel to achieve excellence, delivering optimised maintenance planning and effective maintenance procedures..

A comprehensive monitoring package

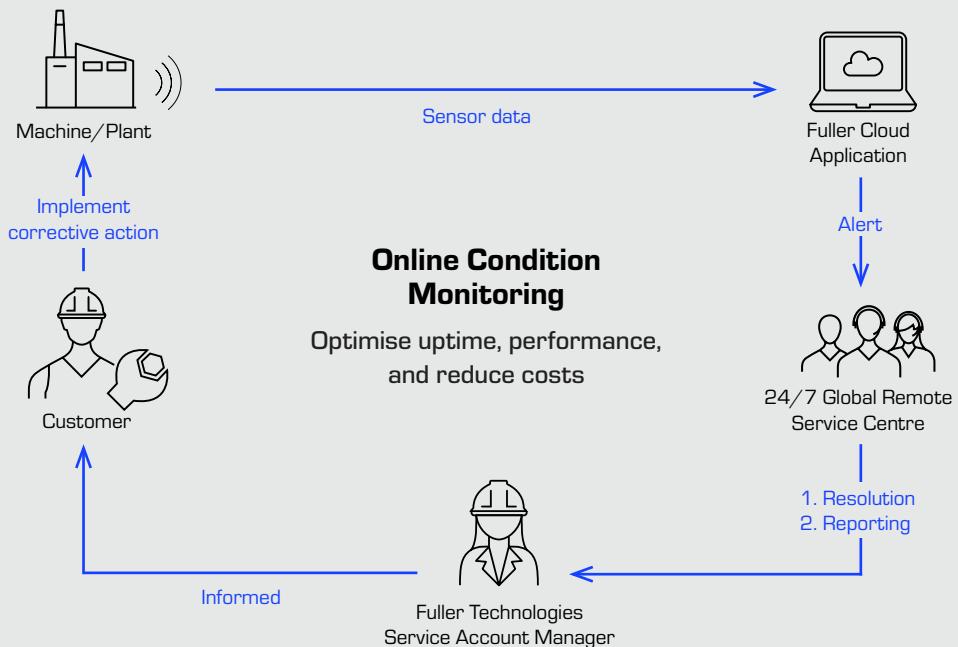
Our OCMS use existing control system signals and additional monitoring systems, such as vibration,

electromagnetic, ultrasonic, and oil analysis, to detect a broader range of abnormal conditions and component failures, delivering continuous insight into your VRM's status.

Implementing OCMS

A Fuller Technologies project manager will oversee the delivery of any additional hardware required for OCMS to your site. Your maintenance team will usually be able to install the sensors themselves; however, we can offer installation as an optional extra. After the Health and Usage Monitoring System (HUMS) are installed, we will come to and perform commissioning of the HUMS. Then the project manager hands over to a dedicated service account manager, whose job is to be your maintenance department's best friend: the person they go to when they need help. They will initiate and drive your OCMS to deliver your KPIs, ensuring you receive optimal value.

HOW DOES OCMS WORK?



Signals from monitoring systems installed on your equipment are sent securely via the Cloud to our Global Remote Service Centre. Here, your equipment is monitored continuously, and our expert advisors are notified of any alarms/events. These experts will further analyse the data and relay our recommended preventive or corrective actions to your maintenance team. Your customer success manager will always keep you informed, ensuring a timely response to any abnormalities to avoid escalating problems.