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Condition monitoring in the cement industry

In recent years, the cement industry has adopted the same proactive approach to maintenance that has been successfully applied in many other branches of industry.

Maintenance still has the biggest potential to improve plant performance in cement manufacturing. This fact has put focus on modern maintenance practices and the implementation of Condition Monitoring in many plants.

Availability is a top priority in cement production. Unplanned shutdowns caused by equipment failure can be very costly. Poor availability influences productivity and the contribution per hour and in the cement industry these numbers are very high. The cost for a breakdown can be astronomical if the main production units break down.

Many of the applications are run under harsh conditions, where the environment is dusty, dirty and hot. Machinery is often run to its design limits. This puts great demands on maintenance to control the health of the machines. Whenever possible, failures should be prevented by optimizing lubrication because dust from the limestone often gets into the rolling element bearings, balancing fans, aligning shafts, etc.

Technical challenges for maintenance

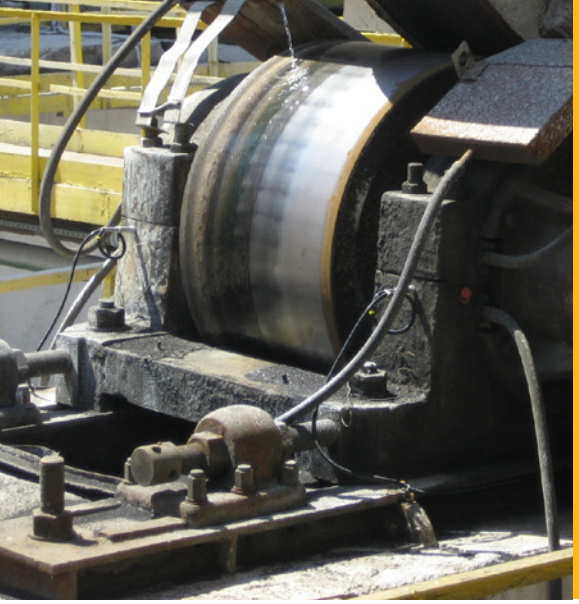
Many companies have implemented the Shock Pulse Method and traditional vibration analysis using portable data collectors and, with the support from management, they can get good results from a CM program on many motors, pumps, fans and high speed gearboxes.

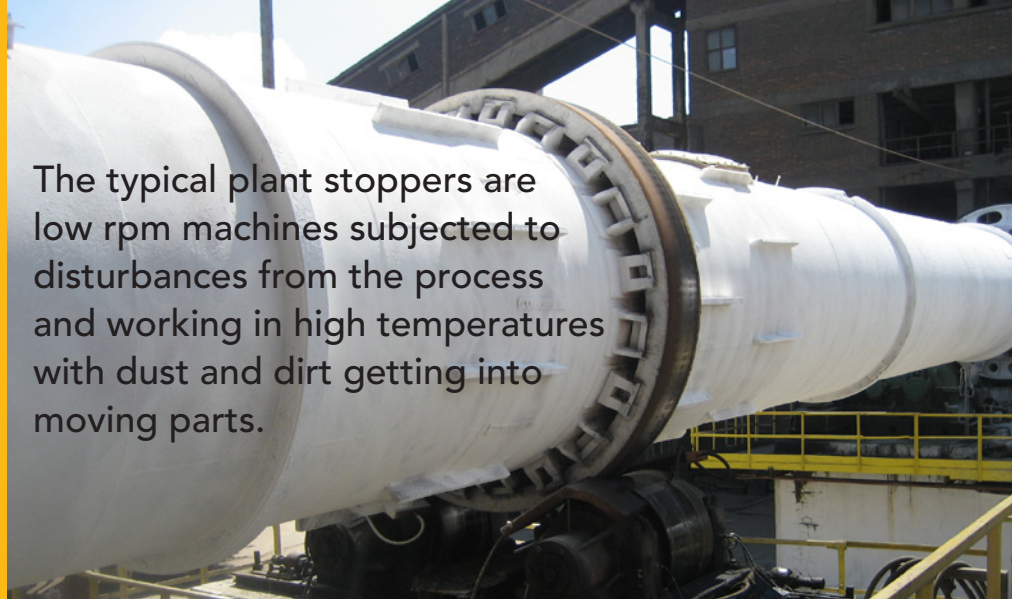
Experience shows, however, that on the large low speed machines in the noisy process environment of cement manufacturing it is impossible to apply vibration analysis using portable data collectors

The data is too erratic and impossible to interpret. To add to the headache, these machines are typically the big plant stoppers.

Successful approach for CM in cement manufacturing

The new SPM®HD technology has proven to stand the test and give reliable data on several of the applications that previously were impossible to measure on. SPM HD uses RPM based sampling frequency and algorithmic correlation techniques to ensure the highest possible signal quality and razor sharp spectrums for analysis.





The typical plant stoppers are low rpm machines subjected to disturbances from the process and working in high temperatures with dust and dirt getting into moving parts.

Bearing condition monitoring on plant stoppers with SPM HD

The hydraulic press roll crushes the lime stone and is part of the continuous process. If it stops, the production goes down. The cost per hour can be more than 9000 USD for a typical plant and an unplanned stop caused by a bearing damage may last for several days.

The press roll operates approximately 20 rpm and is driven by two large planetary gear boxes. Normal operation causes high vibrations, so traditional vibration monitoring is out of the question.

Successful tests conducted at a Holcim plant show that SPM HD measurements can give several months pre-warning of damaged bearings directly in a historical trend from green-yellow-red. SPM HD readings can also show a clear time signal and spectrum to confirm the source of the signal.

The payback for the investment in an Intellinova on-line system with 18 measuring points, which also includes the gearbox, is less than tree hours worth of production losses.

The kiln is like a large rotating oven, which reduces the temperature step by step as the crushed powder material passes through. This application is the heart of the continuous process of treating the cement. The drive train with its pinion shaft and the connected low speed bearings are obviously critical, rotating sometimes down to 2 -5 rpm.

The successful SPM HD tests at KCM AD in Bulgaria show a much earlier warning of a bearing damage than previously possible and provide a clear spectrum and time signal to verify the bearing problem. The SPM HD values have increased at least 100 times from a good to a damaged bearing.

Shaker screen bearings can typically be measured successfully using SPM measurements because the vibration signals are effectively filtered out. SPM HD has the ability to improve the accuracy of the readings and provides clear time signals from the bearings when damaged.

When entering the bearing number, the Condmaster Nova software will identify the type of damage so that the interpretation is easy also for technicians not being vibration specialists. Because the SPM HD bearing signal typically is very sharp, the room for interpretation errors is minimized.

Belt conveyors with low rpm have always been a challenge to monitor reliably. There may also be disturbance from the material transported on the belt. In some cases, for example when coal is transported, a hot bearing can also cause a fire due to the coal dust surrounding the conveyor.

Traditional SPM measurements have been successfully used for many years, but the SPM HD technology has widened the CM possibility by also covering the low rpm conveyors present in cement industry.

More applications will be tested and more experience gained but it is already obvious that the cement industry will gain tremendously from the SPM HD measuring technique, offering new opportunities to move the condition monitoring frontiers.

Tips & Tricks

Micro-cursor movement in Condmaster

When using cursors in spectrums and time signals, for instance to identify exact frequencies or find harmonics, the ALT key can be used to enhance precision.

In Condmaster, the step size of the cursor movements is related to the resolution selected; the higher the resolution, the smaller the steps of the cursor. Sometimes, the cursor movements will be too crude for what you are trying to identify. Pressing the ALT + LEFT or RIGHT arrow keys on your keyboard enables "micro-cursor movement", making it much easier to find what you are looking for.

Please note that in order for this to work for the time signal, you will need to activate the Show periods function (right click in the time signal > **Show periods**).

LineLazer trade-in campaign

Trade your LineLazer I in for LineLazer II now, at a very favorable price!

LineLazer II offers improved battery performance and lifetime and better component availability.

The offer is good for individual equipment parts such as detector units, battery chargers or communication cables as well as entire alignment kits.

The trade-in campaign runs through 2011. To take advantage of this great offer, contact your nearest SPM representative or email: info@spminstrument.se.

Stefan Furness new Area Sales Manager

On March 1st, 2011, Stefan Furness joined SPM as a new Area Sales Manager.

Stefan joins us from PANalytical in Stockholm, Sweden where he served as a Support Engineer with a coordinator role for the Nordic based engineers. The primary work tasks included installation and maintenance of X-ray spectrum analyzers for material analysis in production and laboratory environments in pharmaceutical, mining and steel.

Stefan's areas of responsibility are Egypt, Brazil and a number of European countries, many of which have a significant cement industry.

You can reach him at:
stefan.furness@spminstrument.se
or: +46 (0)70 330 94 45.

Introducing Machine Guard MG4A

A new measuring unit in the successful Machine Guard product line is now available. The new MG4 A is an IEPE (ICP®) compatible monitoring unit.

MG4 is ideal for continuous monitoring of everything which has rotating parts. It is an excellent starting point for measuring the state of individual machines but will also serve as the mainstay of a future total on-line solution. The monitoring units are small and compact, easy to install and simple to maintain.

The new MG4 A accepts standard IEPE (ICP®) transducers, such as the SPM SLD series, and is a viable option for installation with existing measuring points on remote transducers. The MG4 family consists of four programmable measuring units for vibration severity and bearing condition.

Customer portrait

Tateng Ruhendi, Indocement, Indonesia

Tateng Ruhendi works as an expert vibration analyst in on-line and off-line monitoring for all cement-making machinery at Indocement's plants no. 6 and 11.

What would you say are the challenges facing the cement industry?

Controlling machine operation in the manufacturing process in order to avoid abrupt stoppages, causing machine damages and loss of production time.

At Indocement, what maintenance policies and strategies are implemented?

To prevent unplanned breakdowns, as well as planning repair time and machine spare parts replacement without disturbing the cement manufacturing process.

What is the significance of condition monitoring to your operations?

It is very significant, because it allows us to analyze the initial symptom of engine damage or failure as well as plan the supply and replacement of spare parts such as bearings, for critical and non-critical machinery.

What applications do you monitor with SPM equipment?

We use on-line monitoring with Intellinova and VCM units on critical machinery such as the planetary gearbox for the cement finish mill, a vertical planetary gearbox in the clinker pregrinding equipment, vertical raw mill and a vertical planetary gearbox for coal grinding. We use the SPM LR/HR, SPM Spectrum, SPM HD and EVAM measuring techniques on 71 on-line measuring points.

How is your maintenance organized?

78 maintenance mechanics work in our two cement plants. They belong to the Preventive Maintenance department, which in turn is part of the Mechanical department. Six people work with off-line measurements. Only myself and one more person work with on-line monitoring.

What is your experience in condition monitoring?

I started working here in 1994 in the maintenance section, and started to specialize in vibration analysis in 2000.

What are your experiences of SPM products and services?

Analyzing machinery condition with SPM is easier, more simple and clearer, and also the Condmaster Nova software is very detailed. We also get good co-operation and excellent technical support from SPM Indonesia (PT. Dwihasta Pirusa), who are always ready to help and support with problems.

Facts, Indocement

Part of the Heidelberg group, PT Indocement Tunggal Prakarsa Tbk. is one of Indonesia's major producers of quality cement and specialty cement products.

Indocement was established in 1985 and has integrated cement operations with a total annual designed production capacity of 18.6 million tons of cement on its 12 plants. Plants no. 6 and 11 have a 5.8 million ton capacity.

SPM®
condition monitoring solutions

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