

# CONDITION MONITORING INTEGRATION

(Process Strategy Beyond 21<sup>st</sup> Century)  
(Part 1)



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## Introduction

*Maintenance means keeping equipment running or restoring it to operating conditions. Maintenance continues to play a significant role of the total operating costs in the mining industry. Thus, the 21<sup>st</sup> century should focus on a broader need for equipment management; a cradle-to-grave strategy to preserve equipment functions, avoid consequential failures and ensure the productive capacity of equipment. The potential payoff from maintenance optimization on the cash cost of the commodity is enormous. A large percentage of these costs are incurred in unscheduled maintenance events, which typically cause serious disruption to the production process.*

*“Present and future mining operations profitability will have reduced the 35% of operating costs typically spent on maintenance and the unfavorable impact of the downtime that often multiplied these costs by 300%. These maintenance induced production losses can be a significant contributor to the overall operating costs”. (Steven A. Tesdahl, 1998).*

## PARADIGM SHIFT

There is a trend in many maintenance departments to turn to *predictive maintenance technologies* to improve their maintenance programs. *Over-reliant of manual collection of data is proving costly in terms of loss of availability and production.* These complicated technologies are becoming increasingly difficult to manage and integrate, as they often use separate computer systems and proprietary databases. The capabilities of this technology are improving rapidly, and both mine owners and equipment manufacturers are increasingly being forced to relying on it. Remote condition monitoring is emerging as an effective solution to access this technology. This, coupled with a high bandwidth communication system can provide effective access to the data.

Integrating remote condition monitoring technology into the maintenance proves is an essential step maintenance departments need to take. The vast amount of data this technology generates is often difficult to manage and realize value from. There are have been many recent advancements and new products created to enhance the integration and management of this technology. This article will introduce an effective system that can be used efficiently to facilitate the integration of remote condition monitoring into the day-to-day maintenance activities.

## UNDERSTANDING THE EQUIPMENT FAILURE PROCESS

Component and/or any mechanical equipment are subject to *wear, corrosion and*

*fatigue.* As deterioration increases, the reliability of the equipment decreases. Unless detected and corrected, the deterioration of component increases until the equipment fails. Failures are unsatisfactory conditions that must be considered in the context of the equipment user. *A deviation from the performance standard that is unsatisfactory to the equipment user would constitute a failure.* But the difference between unsatisfactory and satisfactory depends on the kind of equipment and the operating environment.



Traditionally, maintenance has observed, detected and corrected failures. This has been done by inspecting and servicing at fixed intervals. Then, anticipating the age at which components are likely to fail, maintenance has replaced them or performed overhauls at pre-determined times. This timing often had no bearing on actual equipment condition. It was done at the end of a pre-determined period.

Most failures are not more likely to occur as equipment gets older. Therefore, maintenance programs are outdated that are based on periodic services, component replacements or overhauls. In fact, some overhauls not done properly, can re-introduce some of the factors that cause the

“infant mortality” failure of the equipment.

**MAINTENANCE RELATED  
COSTS  
 (“Every \$ Counts”)**

*Maintenance related costs account for approximately a third of the total extraction costs in North American open pit mines. Maintenance costs also account for 30% to 50% of direct mining costs. These costs include items such as; parts, labour, supplies, and contractual services. Significant portions of equipment downtime costs are never associated with maintenance on the balance sheet. These hidden costs include; production losses, cost of make-up equipment, loss of available capital, excess spares inventory, and increased crew size. (Campbell, 1995).*

Compared with the other major costs components of the mining process, very little effort has gone into maintenance optimization.

(End Part 1 – to be continued)