



Bulletin

Technical Papers

The Canadian Mining and Metallurgical Bulletin / Le bulletin canadien des mines et de la métallurgie

Other

KEYWORDS:

Hoist rope, Shaft conveyance, Safety, Particle Flow Code (PFC), Shaft Conveyance Monitoring System (SCMS).

NOTE:

Paper reviewed and approved for publication by the Maintenance/Engineering Division of CIM.

► New technology for hoist conveyance monitoring and analysis

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ABSTRACT:

Many mines in Canada, the United States and South Africa are reaching the hoisting limit. Very little payload will be possible without compromising safety due to the excessive weight. It has been suggested (DeLorme, 2000) that one of the most attractive concepts to enable deeper hoisting is to reduce the allowable factor of safety in the wire rope. Researchers at the Spokane Research Lab are developing new technology to improve hoisting safety and productivity by providing new monitoring and analytical tools. A Shaft Conveyance Monitoring System (SCMS) has been developed which determines hoist rope end load, true conveyance position and acceleration, and rope safety factor, as well as other hoist operating parameters. This information is transmitted to the hoist operator display 20 times per second. Recent field measurements on 45 mm (1 3/4 in.) diameter hoist rope indicate that dynamic forces during loading of a 9000 kg (10 ton) skip could exceed the safety factor of the rope. To improve on the current understanding of the mechanical behaviour of hoist ropes, and to help interpret the results from field-testing of the SCMS, a new approach to computer modelling of stranded wire rope is also being developed. Particle Flow Code, PFC3D (Itasca, 1999), is used to simulate the structural behaviour of wire rope and the interaction between individual strands when the rope is subjected to static and dynamic end loading. Details of the SCMS, field results from the measured rope loads, and the results of numerical modelling on the wire rope will be discussed.

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This Month's Cover

Michelin's Earthmover Management System (MEMS) has been actively tested on large trucks. Photo courtesy of Michelin.

THIS MONTH'S THEME

► The role of maintenance and engineering nowadays takes on a much different light by focussing on reliability and its value to various critical aspects of any operation. The papers included in this issue will certainly help readers keep abreast of new technologies, of new ways to do things, of new ways to look at things, and of better means to perform.

OVERVIEW

Are we relevant?

FEATURE

CanTung Mine Back in Production

DEEP — Getting to the Bottom of DPM Emission Reduction

Real-time Monitoring Avoids Early Failures

RCM Helps Operations Get the Most Out of Equipment

La Mine CanTung reprend la production

PMEED — Réduire les émissions de matières particulières diesel (MPD)

La surveillance en temps réel aide à éviter les défaillances précoces

TECHNICAL PAPERS

► **Vibration analysis of mining shovels**
P.N. Saavedra and E.A. Salamanca

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► **Limitations of safety arrest mechanisms for mine shaft conveyances**
S. Gorzalczynski

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► **Rotating equipment reliability for surface operation. Part I: Vibration analysis for rotating equipment**
G. Nollet and D. Prince

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► **New technology for hoist conveyance monitoring and analysis**
M.J. Beus and M. Ruest

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Utilizing titanium to successfully handle