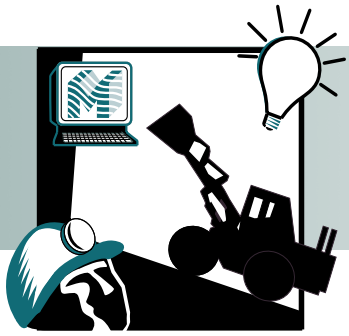
MINING

Project Fact Sheet



Calibration Methods for On-line Analyzers

Benefits

- Reduces the amount of material that must be washed, therefore, saving energy
- Reduces the loss of valuable materials, therefore, increasing production
- Reduces the discharge of effluents, therefore, increasing environmental quality

Application

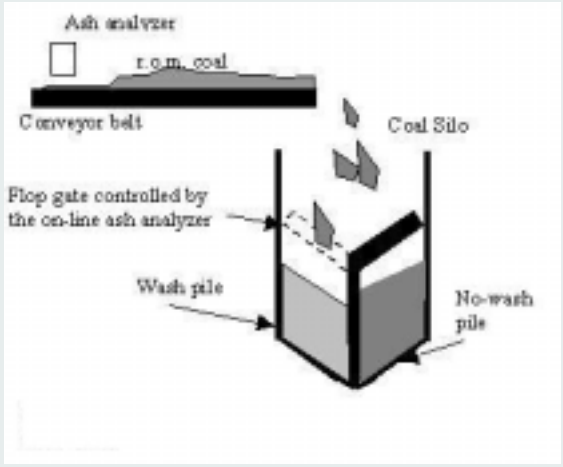
On-line analyzers are used for both segregation and quality control purposes for many flotation circuits. Calibration of on-line analyzers will address the mining industry's need to improve process efficiencies.

Calibration methods for on-line analyzers reduce the amount of material in the washing process

This project will use neural networks to calibrate on-line analyzers instead of typical linear regression models. Technological advances have made it possible for widespread use of on-line analyzers that can monitor quality in real time. As more processes in the mineral industry become dependent on them, it is imperative that one understands their proper use. Use of on-line analyzers without proper calibration can be very uneconomical. Currently, calibration techniques remain simple, and do not reflect the advances in applied mathematics, statistics and optimization. Neural networks have capabilities that go beyond algorithmic programming. Neural networks provide the capability to vary the instrument response and allows other non-linear behavior to be captured effectively.

The combination of a segregation algorithm and an on-line analyzer have been used on various occasions with considerable economic and energy benefits resulting in less material that needs to be washed. Other benefits include reduced material losses and reduced effluents discharged from preparation plants, and reduced losses due to lack of quality measurements in material applications. Calibrating the on-line analyzer maximize mineral processing, economic and energy benefits.

Analyzer Schematic



Physical segregation of coal using on-line analyzer (Source: Ganguli, R., Yingling, J.C., Zhang, J., Sottile, J., and Kumar, R., 1999, "Optimal Control of Coal Segregation Using on-line Quality Analyzers," Mining Engineering, April, pp. 41-48.)

Project Description

Objective: To develop artificial neural networks which improve the calibration of on-line analyzers that monitor ore quality in real time. This will reduce the amount of waste material that must be processed.

Usibelli Coal Mine is the principal industrial partner on this project and will cost share the purchase and installation of an on-line analyzer for this study. In addition, they will provide engineering and laboratory services to the project. Golden Valley Electric Association, operator of two minemouth power plants, is the other contributing industrial partner. A new coal receiving facility which incorporates an on-line analyzer was built that now serves both power plants. As part of the project, Golden Valley Electric will contribute one year of operational data for their on-line analyzer and they will contribute data to the laboratory analysis. Also, both partners plan to conduct studies at the power plant using their on-line analyzer.

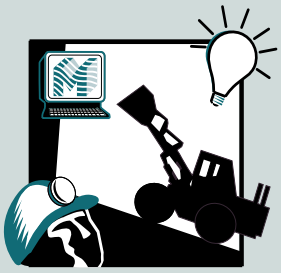
Progress and Milestones

Activities to be completed in this project include:

- Obtaining mineral samples.
- Taking quality measurements of the on-line analyzer and developing procedures.
- Development and testing of neural network.

Commercialization Plan

Application of a neural network will simply involve running it as a module to the existing software that controls the on-line analyzer. Neither equipment nor installations are required. The technology developed in this project can be used immediately by industry.



PROJECT PARTNERS

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January 2001