

ABOUT BOXA

The BOXA on-stream X-ray fluorescence analyzer offers high sensitivity and real time measurements for all sizes of concentrator plants in order to control and regulate the mineral process flow sheet. BGRIMM provides the necessary technical service to guarantee performance and to meet the concentrator's requirements.

WHAT CAN BOXA DO?

- ✓ Sampling and analyzing are done automatically in the same consistent way 24 hours per day to reduce costs.
- ✓ Process disturbances can be detected quickly to maintain metal recoveries or grade.
- ✓ Concentrate quality is there for controllable and undesired variations can be minimized. The plant's operation can be optimized with less circulating loads in order to get higher throughputs.
- ✓ The classical manual laboratory procedure is replaced with new analyzing techniques, which combines wavelength dispersive and energy dispersive technologies for every required element.
- ✓ Modular design allows for easy expansion when new requirements are needed.



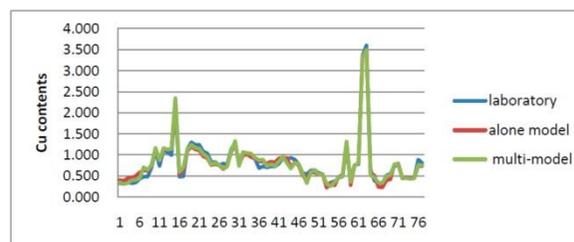
NEW TECHNIQUES

Combination of WDXRF and EDXRF

The BOXA's analysis method combines the high selectivity of WDXRF and the high sensitivity of EDXRF, so that the analyzing accuracy is superior. The slurry sample is excited by primary X-rays while it flows through the measuring cell. Secondary characteristic spectral lines, from the slurry sample, are re-emitted with different elemental fluorescence radiation. The BOXA uses crystal spectrometers to extract the elemental characteristic spectral lines from the sample, and then uses the latest in detector technology hardware to determine their energy intensities. The intensities of the spectral lines are then used to calculate the element or metal grade.

Multi-model automatic choosing

While using a group of samples to calibrate the analyzer, one or more models may be derived at same time, if the samples' physical and chemical characteristics are different from each other. The BOXA's calibration software can be used to build these models, and a set of model switching conditions, for each slurry stream. This method has proved to be useful when the ore's character changes often.



▲ Comparison with different modeling methods

CONTACT DETAILS

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BOXA ON-STREAM X-RAY FLUORESCENCE ANALYZER

Technical Description Version 3



BOXA ANALYZING SYSTEM

Analysis Method

The BOXA combines wavelength dispersive X-ray fluorescence (WDXRF) and energy dispersive X-ray fluorescence (EDXRF) for every element which is required for measurement.

Sample Streams

The BOXA is capable of measuring up to 24 sample streams with 4 multiplexers (MXA)

Primary sampler control

The BOXA Probe Control Set provides 3 digital output signals the control of sampling, flushing and waiting times, automatically for each primary slurry sampling stream.

Flow rates

70~300 l/min of slurry sample is required from the primary samplers to feed the Multiplexer inlets, and then 20~30 l/min of slurry sample is required for the Measurement Cell.

Cabinet sealing

The Analyzer Probe and the Probe Control Set are IP54 compliant and the Multiplexer is IP56 compliant.

Controls and Indications

- Maintenance switches are provided for each Multiplexer and the analyzer's Probe Control Set.
- Manual controls are provided for the collection of composite samples or calibration samples, on user demand.
- The system has light indicators for X-ray power supply status, alarms, reference briquette measurement and MXA measurement status.

Local Display Unit

The human machine interface is touch sensitive and displays:

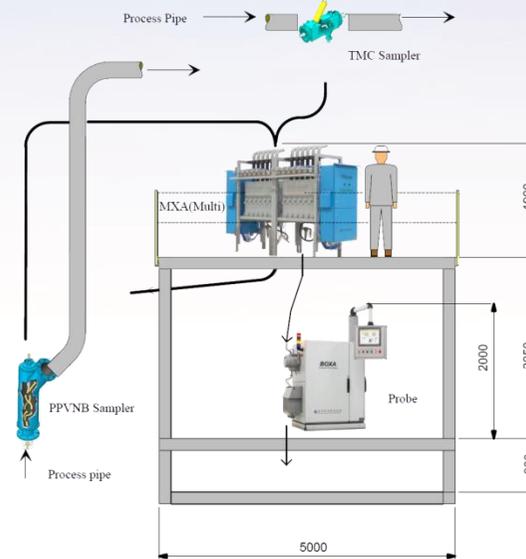
- Operational status
- Assay data
- Alarms
- Special commands for maintenance
- Definitions for the BOXA's runtime parameters
- Management of calibration data
- Running the BCR calibration software
- Management of analysis data
- Collection of alarm data from the analyzer
- Work status and assay data

DCS Connection

BOXA can provide either an Ethernet port with MODBUS/TCP protocol or MODBUS RTU protocol to communicate with the DCS.

Safety

BOXA meets the radiation safety regulations for China and Canada. No radiation can be detected outside of the Probe's cover.



PERFORMANCE

Element range

The element range is from Calcium to Uranium (atomic numbers from 20 to 92).

Measurement time

Depending on the application, the measuring time will be 15~60 seconds per stream, leading to a total cycle time of 10~15 minutes for a 12 streams system with 2 multiplexers.

Simultaneous assay number

The BOXA's probe has a maximum of 6 parallel measuring channels, 5 channels may be used to measure five element grades simultaneously, and the sixth is reserved to measure the slurry density.

Measurable range

Typically measurable range is from 0.01 to 100% by weight for slurries.

Detection limit

The detection limit for most elements is 25~150 ppm in slurries.

Sensitivity

For most elements, changes of 0.01% can be detected at 1% level with a probability 95% from a homogenous sample.

Short term stability

In specified operating circumstances, the measured intensity stability is 0.3%.

High selectivity

The high resolution of the crystal spectrometer allows measurements with no peak overlaps of neighboring elements. For instance, 8 ppm Cu can be detected in the presence of 100,000 ppm (100g/l) Ni.

Long term stability

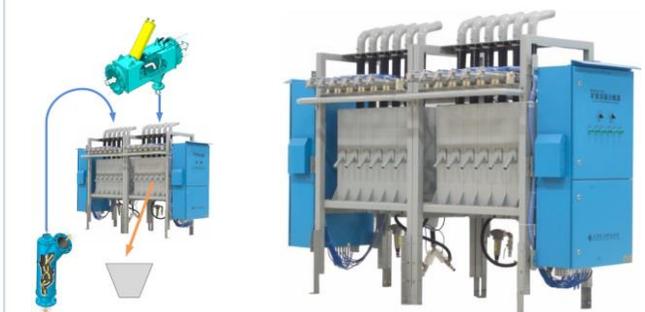
The long term instrument drift is compensated by automatic internal reference sample measurement. Sample Streams The BOXA is capable of measuring up to 24 sample streams with 4 multiplexers (MXA)

High accuracy

The measuring accuracy is a function of the mineral sample parameters, such as the matrix composition, mineralization, and particle size. In common conditions, for individual slurry sample measurements of concentration levels well above the relevant minimum detection limit of the analyzer, the following relative standard deviations are achieved:

- Minor concentrations: 3~6%,
- Major concentrations: 1~4%.

SAMPLING



▲ Sampling System

▲ Two Multiplexers with 6 inlet streams each