

SpectraFlow On-Line Analyzer Applications in the Copper/Nickel/Platinum Industry

SpectraFlow Minerals Online Analyzer Timeline

- 2006:** ABB started development for **near infrared** online Crossbelt Analyzer
- 2007 - 2010:** First test and commercial installations in Cement & Iron Ore applications in Europe & USA
- 2010:** Development of Airslide Application
- 2011 - 2012:** Commercial installations around the globe
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- 2013:** **SpectraFlow Analytics** incorporated as an independent company & management buy-out of the NIR Online analyzer technology from ABB
- 2013 - today:** >45 orders received for Cement, Iron Ore, Bauxite, Platinum, Gold clients globally, since 2016 approved supplier with FLS

SpectraFlow Copper/Nickel/Platinum Analyzer

Objective and Benefits

- Process Improvement
 - Mine Feed Monitoring
 - Optimized blending possibilities
- Use safe and proven method
 - NIR method uses no ionizing radiation – safety first
 - Reliable systems for fast real time on-line analysis for
 - Moisture, Mineral Phases and Molecules
 - Easy to use equipment
- Return on Investment Objectives
 - Have a very low cost of ownership
 - Homogeneous Stockpiles
 - Continuous Quality control (incoming and final product)

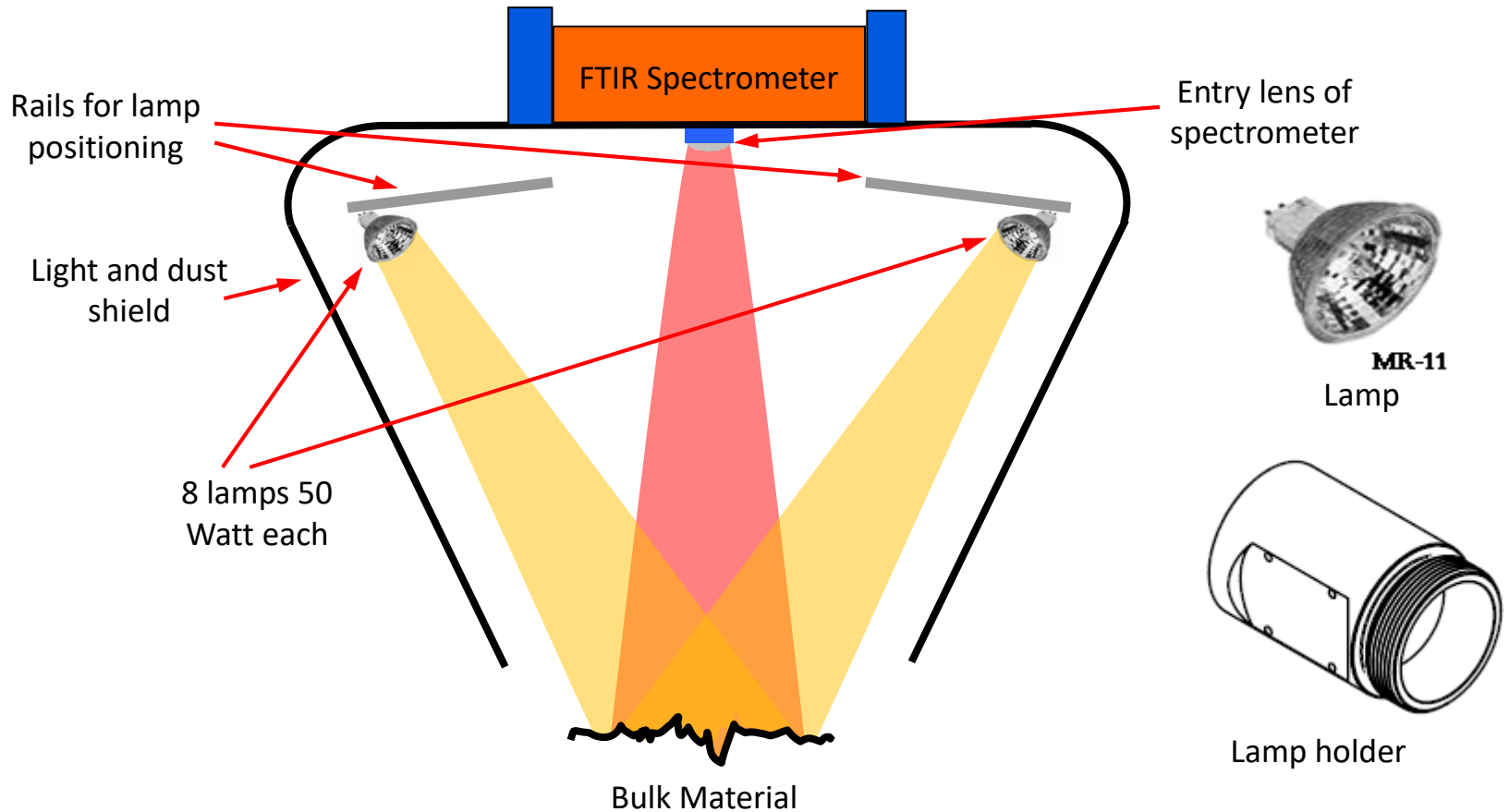


SpectraFlow On-Line Analyzer

A new development

SpectraFlow Copper/Nickel/Platinum Analyzer

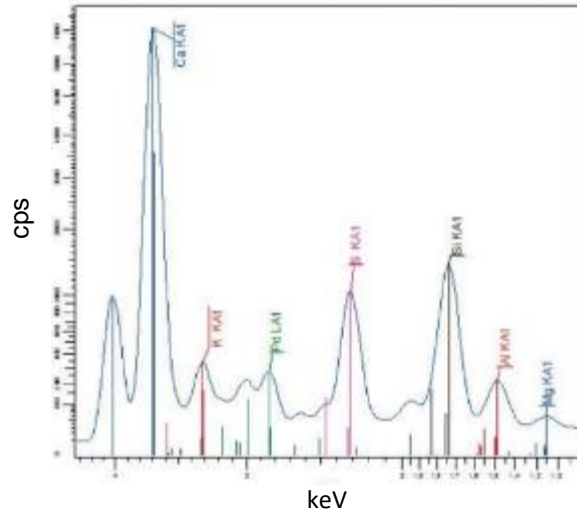
NIR Analysis Technology



SpectraFlow Copper/Nickel/Platinum Analyzer

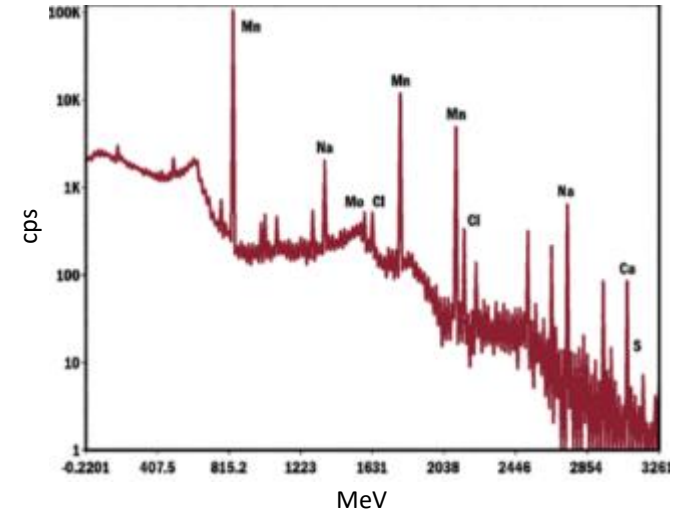
Spectral information comparison

XRF

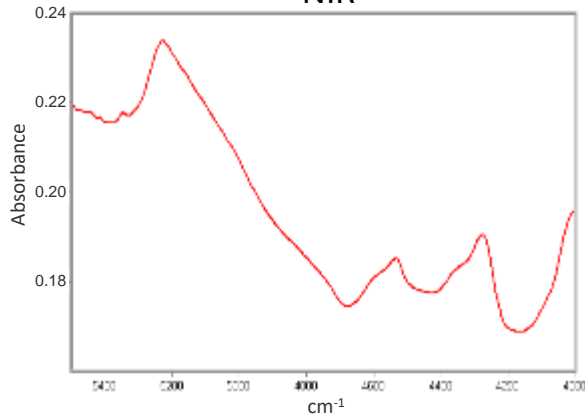


- Discrete lines for each element
- Calibration based on integral intensity of elemental line

PGNAA



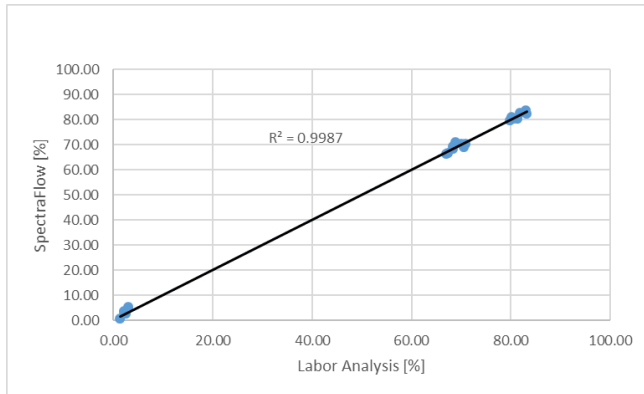
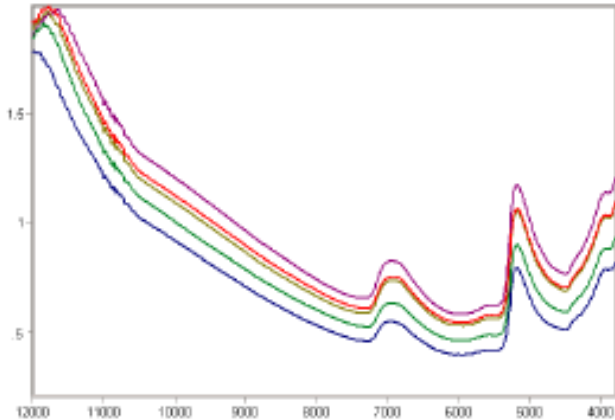
NIR



- Total information of the material
- Minerals and organic Molecules
- Model based calibration for each element according the occurrence as a phase in the raw material to be analyzed

SpectraFlow Copper/Nickel/Platinum Analyzer

NIR Technology – Analytical Calibration Model



- Each of the measurements per sample gives a spectrum.
- The chemical composition for each sample is given by the laboratory analysis
- The final step is now to correlate, for each constituents, the spectra with the laboratory values. The procedure is called multi-linear regression.
- The calibration models are loaded into the SpectraFlow system and are ready to use when the analyzer is delivered
- After 1 or 2 month of operation a fine tuning is performed, possibly remotely and does not require an engineer on site

SpectraFlow Copper/Nickel/Platinum Analyzer

Comparison of different analytical methods

		XRF	PGNAA	SpectraFlow
Measurement method		Off-line	On-line	On-line
Goal		Quality Control by DIN/ASTM	Process Control, Trending	Process Control, Trending
Operational Expenses		Medium	High	Low
Analysis Basis		Electron Shells	Nucleus	Molecules and Minerals
Elements possible		Depends on calibration: F(WDX) or Na (EDX)	From Na (Cf source) or from O (neutron tube)	All elements incl. H, moisture
Dependency		Vacuum / Helium, sample preparation	Belt speed, belt load	No nonlinear layering
Analysis timeframe		40 – 60 Minutes	Rolling average	1 Min. with avg. of 48 measurements
Depth of Analysis		µm	Up to 500 mm	µm - mm
Area of measurement		Laboratory	Conveyor belt	Conveyor belt, Air-slide
Reports		Elemental Analysis	Elemental Analysis	Molecules and Phases
Safety		Low energy x-rays, local legal requirements	Ionizing radiation, legal requirements!	No radiation at all, no legal requirements
Accuracy	Analytical precision	Very High	High to low depending on element	High
	Sampling acc.	Medium to Low	High	High
	Total accuracy	Medium	Medium to High	High
Consumables		X-ray tube	Radioactive source or neutron tube	Halogen light bulbs
Annual cost			USD 40,000 – USD 60,000	USD 1,000 – USD 2,000



SpectraFlow On-Line Analyzer Crossbelt Application

SpectraFlow Copper/Nickel/Platinum Analyzer Crossbelt Application – Analyzer Installation



Spectrometer
compartment

Illumination
unit and dust
protection
cover

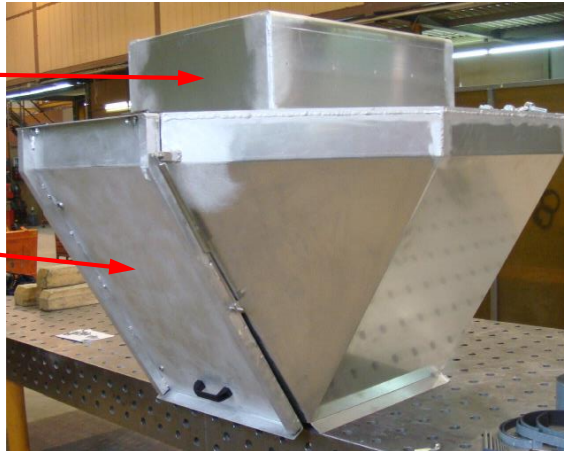
Electronic
cabinet and
communication
unit

Mounting frame
supplied by the
customer

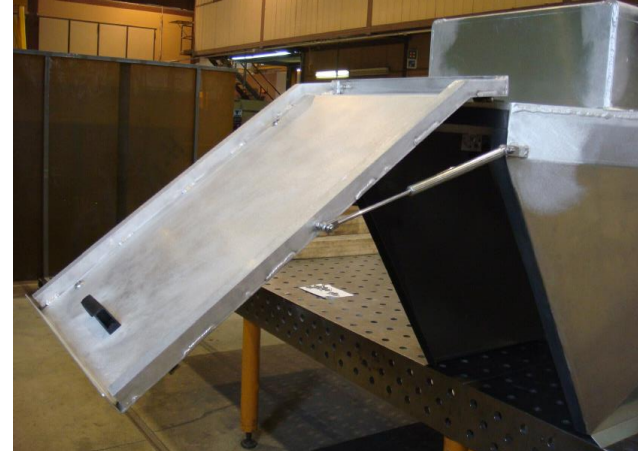
SpectraFlow Copper/Nickel/Platinum Analyzer Crossbelt Application – Analyzer Pictures

Spectrometer
Compartment

Service
Flap which
can be
opened to
access the
lights



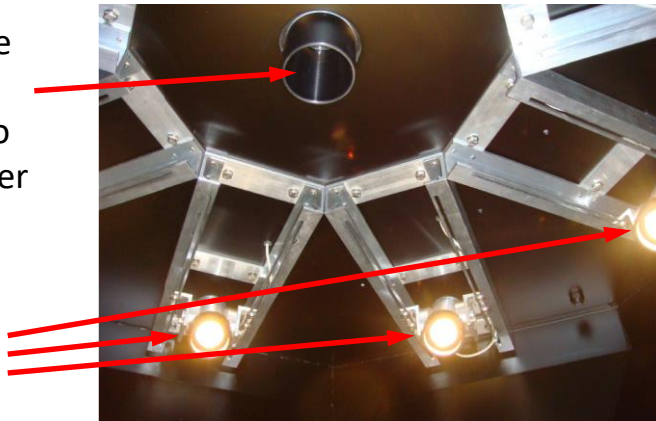
Overall view



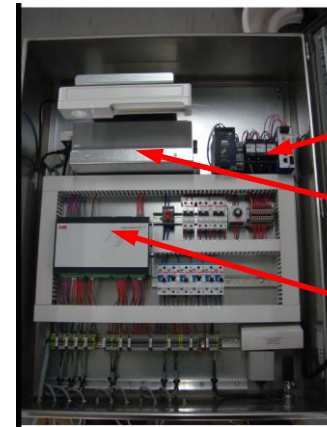
Service flap open

Entry for the
reflected
Infrared into
Spectrometer

Spots as
Infrared
Sources



View on rails and lamps



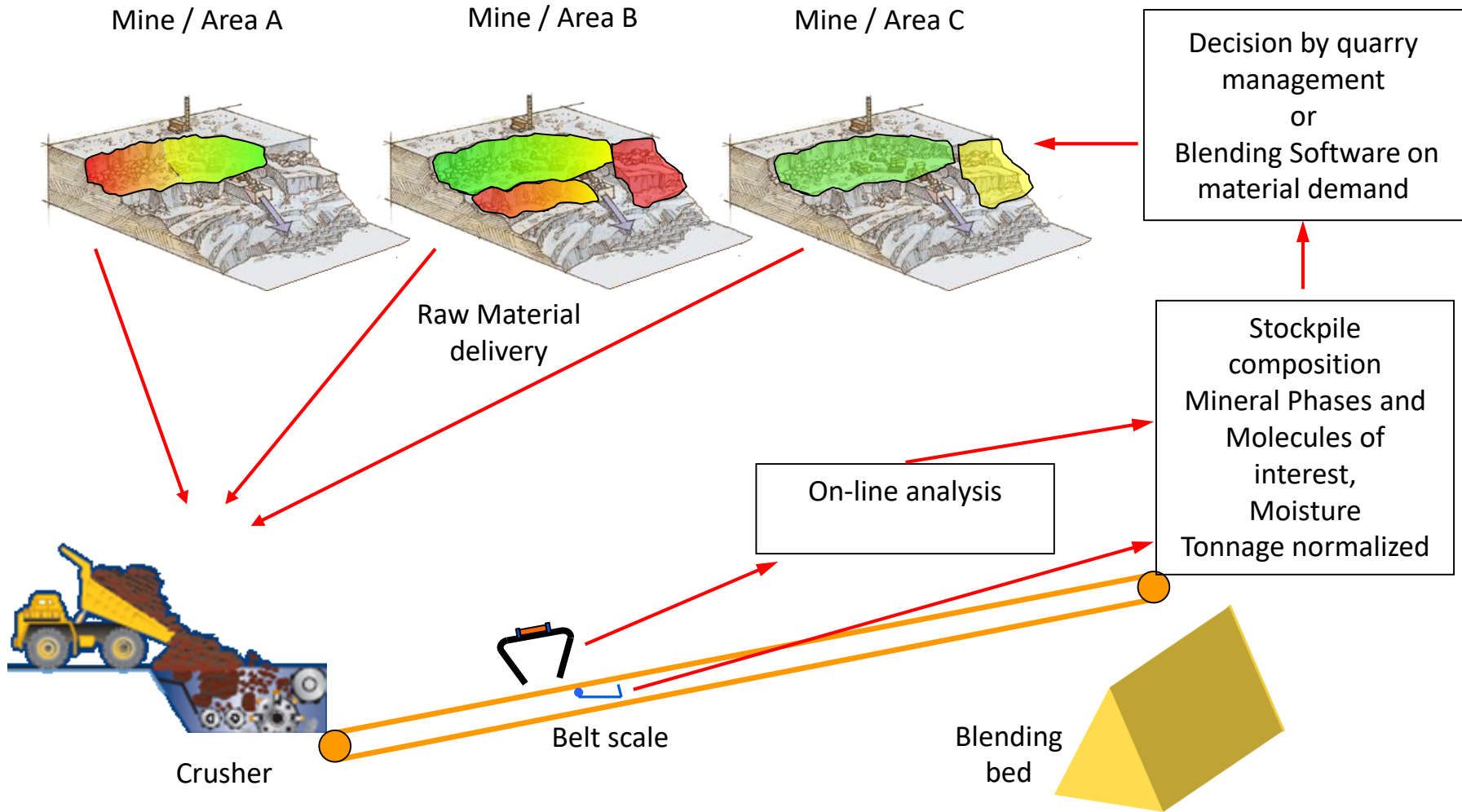
Interfaces

Power Supply
for the spots

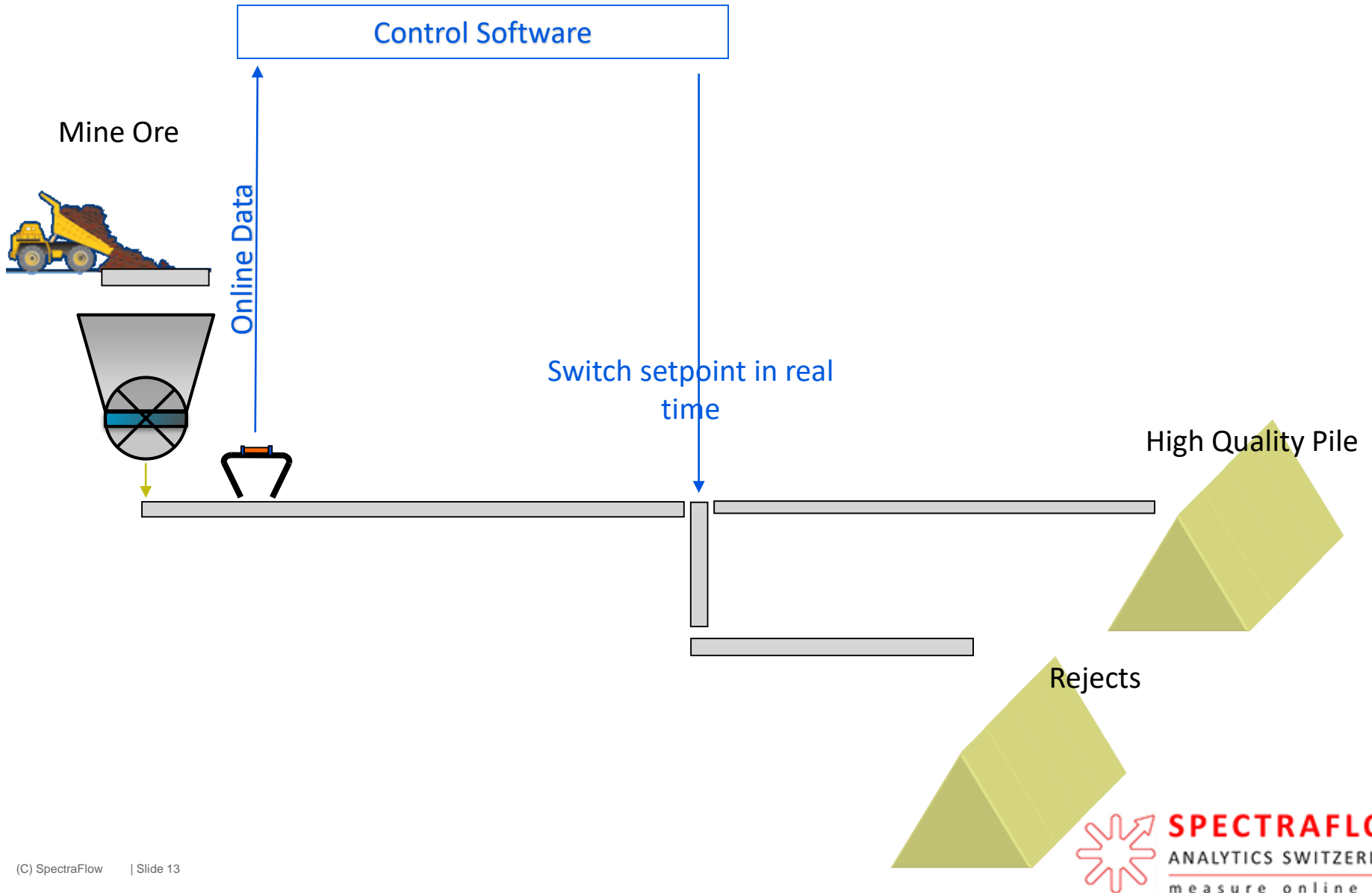
Industrial PC (IPC)

Electronic cabinet

SpectraFlow Copper/Nickel/Platinum Analyzer Crossbelt Application – Mine Optimization



SpectraFlow Copper/Nickel/Platinum Analyzer Crossbelt Application – Mine Optimization





SpectraFlow On-Line Analyzer Benefits

SpectraFlow Copper/Nickel/Platinum Analyzer Benefits

- No radioactive materials used
 - very low cost of operation and maintenance
 - no operational permits or extra personnel required
- Most accurate measurement for organic and inorganic constituents
 - Real time analysis of Mineral Phases, Molecules and moisture
- Independent of belt load changes
- No sampling or by-pass required
- No re-calibrations required
- Low maintenance



SPECTRAFLOW

ANALYTICS SWITZERLAND

m e a s u r e o n l i n e s a f e

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