MAYA online elemental analyzer

As remote deposits are being developed, and the useful content of the raw materials is getting lower while the amount of secondary elements and contaminants increases, the composition of the extracted raw materials becomes unstable. Presently, the extracted raw materials undergo manual sampling; the results, obtained after a long wait, can only provide a rough representation of the chemical composition of the analyzed material due to the complicated nature of representative sampling and the averaging of samples. Consequently, the chemical composition of the ore mixture, which is later processed and then proceeds to factories, is not clear. This can significantly worsen the enrichment rate and therefore decrease the quality of the concentrate and the final product.

Laser Distance Spectrometry is proud to present a new solution for stabilization of elemental composition of ore, ore mixture and final product: MAYA – a laser optical emission analyzer, which determines the elemental composition of the material on the conveyor belt in real time without X-rays, neutron and Gamma radiation.

Laser Distance Spectrometry is the world leader in the cutting-edge laser spectrometric spectroscopy techniques (Laser-Induced Breakdown Spectroscopy - LIBS, Laser-Induced Fluorescence, Laser Luminescence, Raman) and a pioneer producer of online laser elemental analyzers for prompt process control. MAYA has been successfully implemented in metallurgy, mining, industrial materials (refractories, quartz), phosphate and potash fertilizers production around the world, including the USA, Europe, Russia and Ukraine.

Main Industries, All elements

- Ferrous metallurgy (iron ores and concentrate, sinter mix, limestone, coke – Fe, Si, Ca, Mg, Mn, C,moisture…)
- Non-ferrous metallurgy (Cu, Al, Ni, Co, Mo, Zn….)
- Refractories and Industrial minerals (quartz, clays, nepheline…)
- Coal (C, ahs content, volatiles, moisture – Fe, Al, Si, Mg, Ca…)
- Cement (limestone, raw meal - Ca, Si, Al, Fe…)
- Fertilizers (phosphate, potassium, composite NPK – P, K, Na, moisture…)
- Rare earth elements

Fast payback just in a few months

- reduced energy consumption as result of stable raw batches after prompt ore sorting and dosage of mix components
- reduced water and flotation reagents consumption due to optimal dosage
- increase production volume due to reduction of positive tolerance during the shipment of the final product
- improve quality of the final product as a result of the rejection of the off-grade materials, reduced off-grade product penalties
- sustainability of manufacturing processes

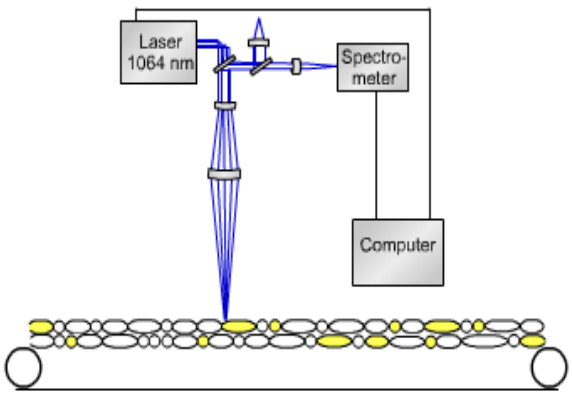
All production stages

- exploration
- mining
- beneficiation
- processing
- final product quality control

All typical tasks

- Express analysis of drilling dust
- Express analysis of core samples
- Incoming quality control
- Online ore grade sorting
- Impurities rejection
- Stockpile blending
- Online raw mix chemistry stabilization
- Online raw mix components dosage control
- Wet and dry separation
- Flotation and pelletizing control
- Final product quality control

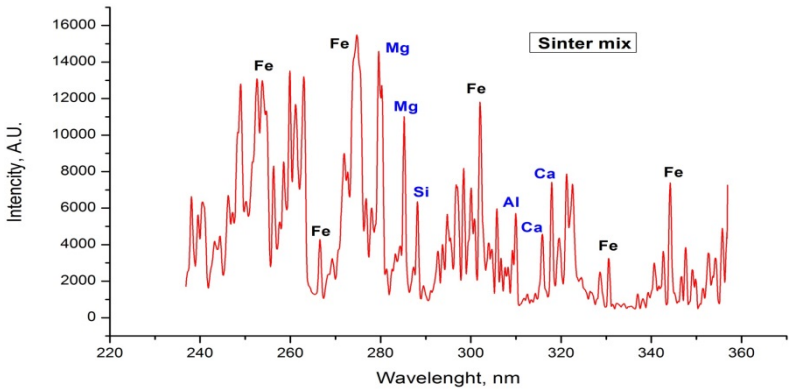
Laser-Induced Breakdown Spectroscopy (LIBS)

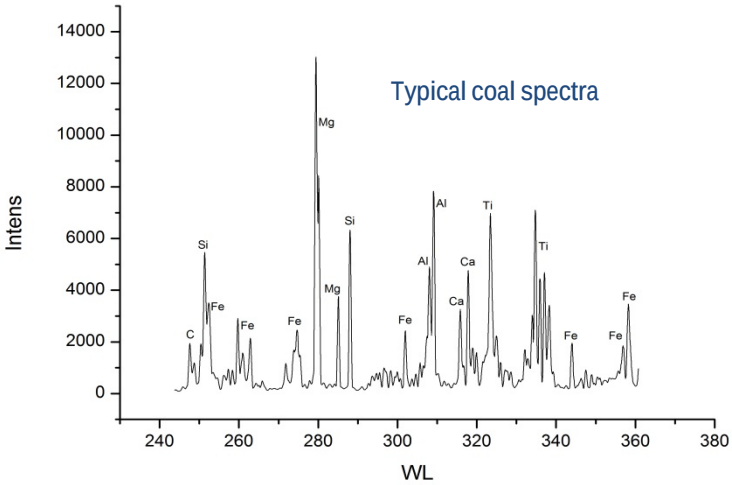


Laser-Induced Breakdown Spectroscopy (LIBS) uses an impulse laser as a source of excitation of the studied matter. A beam of Nd:YAG laser is focused on the surface of the analysed material with a frequency ranging from 1 to 20 times per second, raising the local temperature above 50 000ºC and thus generating plasma. Then, the plasma quickly cools down and the excited ions return to the low energy state, emitting characteristic optical radiation, with wave lengths in the 190-900nm range. Based on the obtained spectra, the concentrations of all the necessary elements can be simultaneously calculated directly, obtaining the results in a real-time mode.

LIBS advantages

- Simultaneous quantitative analysis of all the elements, including the light ones (C, Si, Mg, Al, etc.)
- No radiation – thus, absolutely safe for the personnel and doesn't require authority certification
- High sensitivity, low limits of detection and high accuracy due to the clear spectral lines of most of the elements in a wide optical range





MAYA Advantages

- The results of analysis do not depend on the quality of the surface of the analysed material, size of the pieces and thickness of the layer
- Small portions of mineral material can be analyzed (20-30m segment of the belt)
- No human errors in sampling and sample preparation procedures
- Low operation and maintenance cost

Online chemistry monitoring screen

MAYA Technical Specification

- Nd:YAG 1064 nm laser, class 4; analyzer class 1 (maximum security)
- Protection class IP65 – protected from dust, corrosion, vibration
- Operating temperature range: -20 ˚C to +50 ˚C
- Consumed power : average – 5 kW, peak <11 KW
- Weight – 450 kg
- Dimensions ≈ 1500 x 800 x 1300 mm
- Possible interface with SCADA – TCP IP, MSSQL/MySQL, OPC Server, 4-20 mA

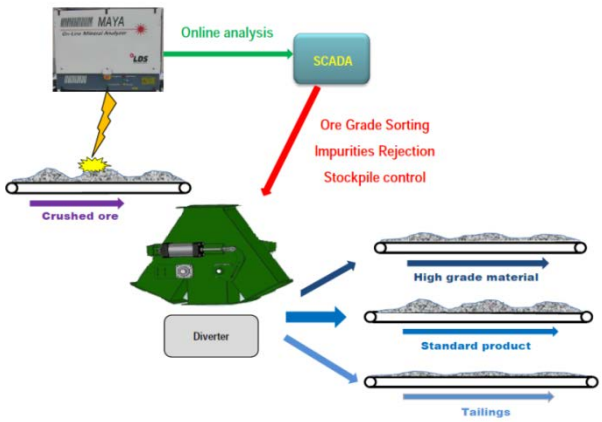
Crushed ore sorting

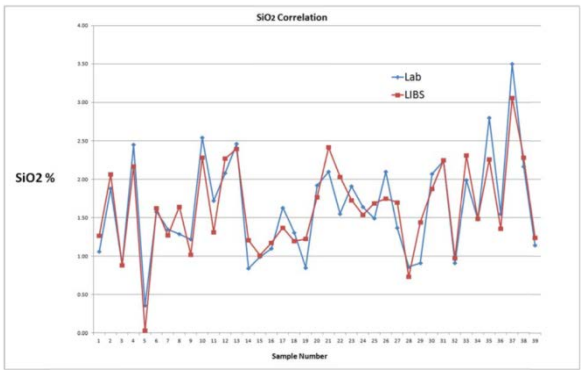
After the primary crushing, the extracted ore is sorted into several flows or storages, depending on the level of concentration of the main elements and mixture elements.

MAYA can be also efficiently used as a part of a crushing and sorting complex in order to produce ore batches according to a given chemical composition right at the extraction location.

Lump size up to 300 mm

Multimineral ores



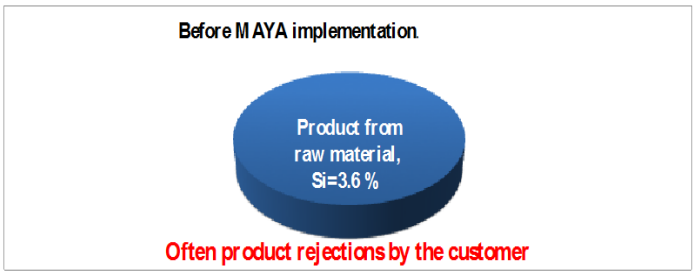


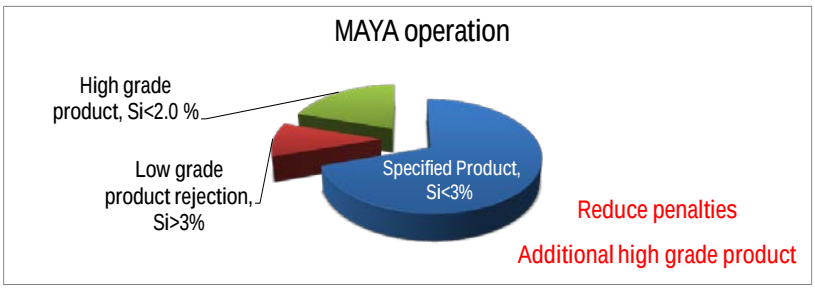
SiO2 Lab – LIBS correlation

High short-term ore chemistry variation

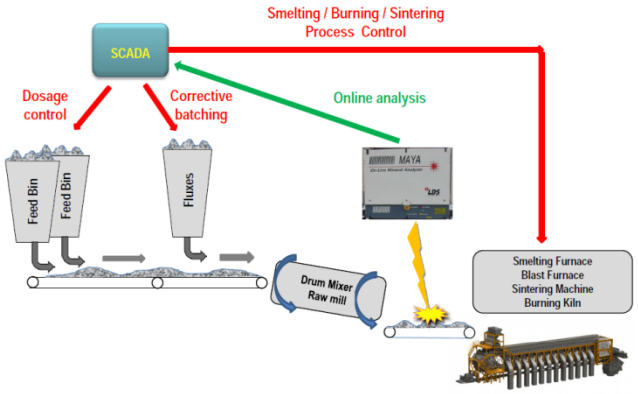
Short payback period due to:

- improved ore quality after rejection of the off-grade material, at a minimal tolerance
- reduce off-grade ore penalties,
- reduce transportation/ processing expenses at low grade ore





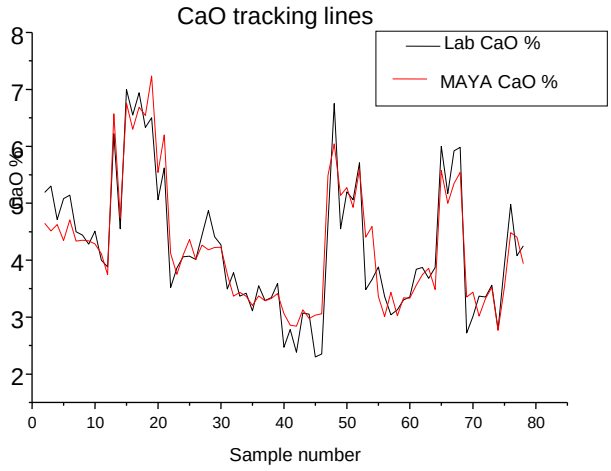
Dosage of the Ore Mix Components



Short payback period due to:

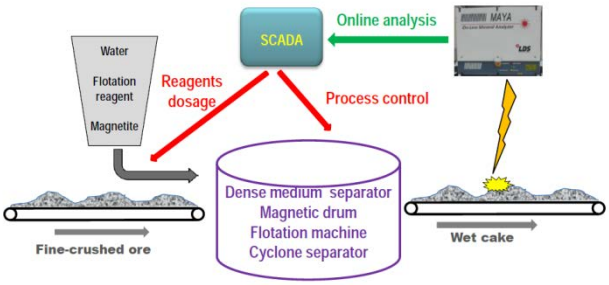
- stabilized ore mixture (charge) as a result of the prompt automated dosage of the components based on the current mixture composition
- higher quality of the final product and improvement of its properties
- decreased energy consumption (coke, coal, electricity)

Real-time chemistry variation in sinter mix



Automated dosage of fluxes (yellow) as a function of calcium content (white)

Pelletizing, Flotation and Dense Medium Separation



Short payback period due to:

- stabilized quality of the final product
- increased production volume due to minimized positive allowance during shipping
- reduced consumption of water and expensive flotation reagents / magnetite

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