MAYA real-time 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, in 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-based optical emission analyzer** which determines the elemental composition of the material on the conveyor belt in real time.

Laser Distance Spectrometry is the world leader in the cutting-edge laser spectrometric technology and a pioneer producer or online conveyor belt analyzers of elemental composition of mineral ores, coal, phosphate and potassium fertilizers, lime and other materials. Our equipment has been successfully implemented in metallurgy, mining, coal and phosphate industries around the world, including USA and Russia.

Applications of MAYA

Integrated into Automated Control Systems

➢ Crushed ore sorting

➢ Prompt dosage of ore mixtures (charge) components

➢ Optimal dosage of water and expensive flotation reagents/magnetite

➢ Analysis of geological samples (core samples) and drilled solids

➢ Useful component's balance check and detection of the source of its loss


MAYA pays for itself within several months due to

➢ Increasing the quality of the final product due to rejection of the off-grade raw materials, stabilization of the composition of the raw material mixtures, dosage of water and flotation reagents

➢ Increasing the production volume due to reduction of positive allowance during the shipment of the final product

➢ Reducing the product rejection rate (by customers)

Main Applications

➢ Ferrous metallurgy (Fe, Ca, Si, Mg)

➢ Non-ferrous metallurgy (Cu, Al, Ni, Co, Mo, Zn….)

➢ Production of refractories (Si, Ca, Mg, Fe)

➢ Coal (C, ahs content – Fe, Al, Si, Mg, Ca…)

➢ Cement (Ca, Si, Al, Fe…)

➢ Production of fertilizers (phosphate, potassium, composite NPK – P, K, Na…)

➢ Rare earth elements

Laser-Induced Breakdown Spectroscopy (LIBS)
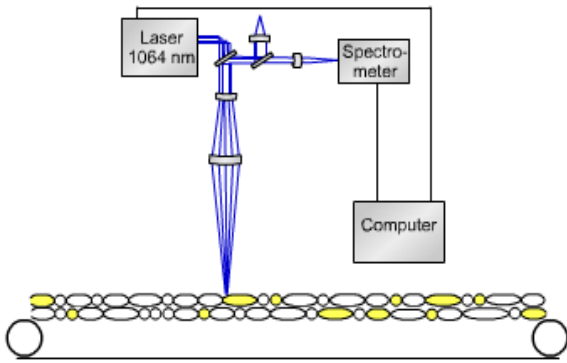
Laser-Induced Breakdown Spectroscopy (LIBS) uses an impulse laser as a source of excitation of the studied matter. A ray of Nd:YAG laser is focused on the surface of the analyzed material with a frequency ranging from 1 to 20 times per second, raising the local temperature above 30000ºC and thus generating 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 170-900nm 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.

Advantages of LIBS

➢ High sensitivity, low limits of detection and high accuracy, which are due to the clear spectral lines of most of the element in a wide optical range.

➢ Simultaneous analysis of all the elements of interest, including the light ones (C, Si, Mg, Al, etc.)

➢ No radiation – thus the absolute safety for the personnel, and no necessity of special permits from nuclear authorities.

Typical iron ore "Agglomerate" spectrum

Typical Coal Spectrum
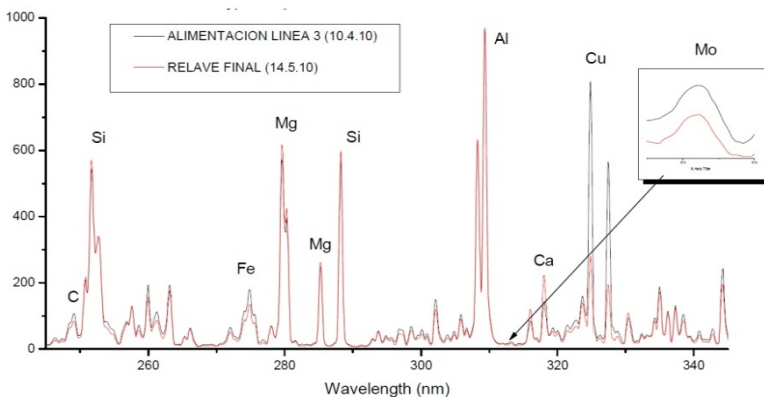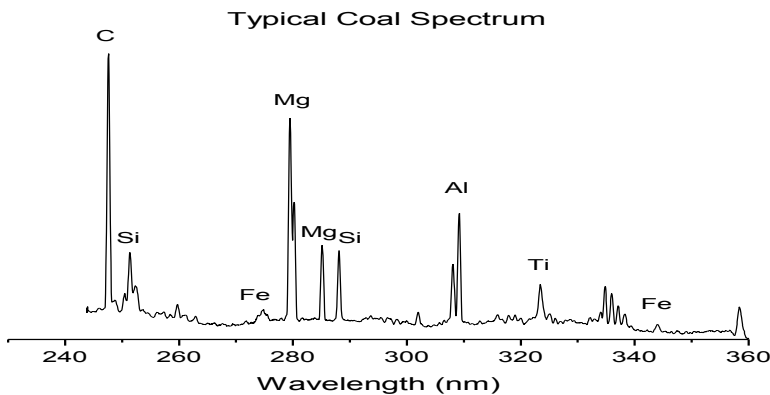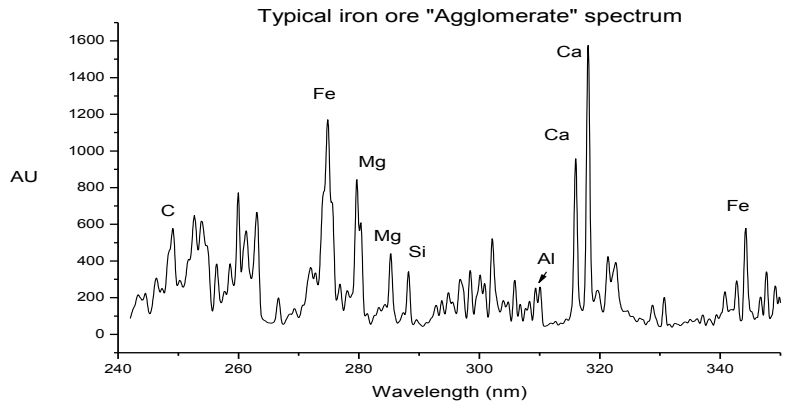
MAYA's Advantages in Conveyor Belt Applications

➢ The results of analysis do not depend on the quality of the surface of the analyzed material, size of the pieces and thickness of the layer

➢ Even a small amount of mineral material can be analyzed (20-30m segment of the belt)

➢ No human mistake possible (which is common in sampling and sample standardization)

➢ Low usage and maintenance cost
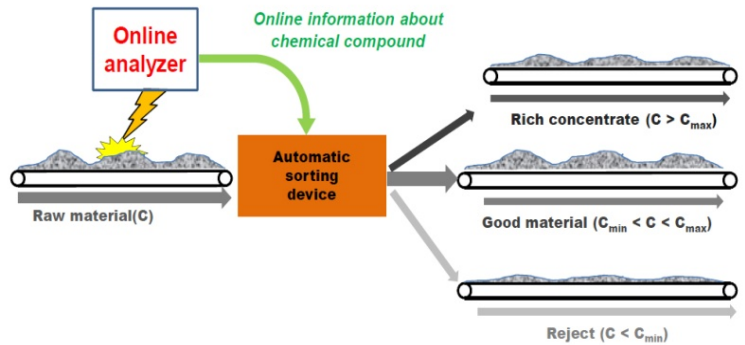
MAYA's Technical Characteristics

➢ Nd:YAG 1064 nm laser, class 4; analyzer class 1 (maximum security)

➢ Protection class IP65 – protected from dust, corrosion, vibration

➢ Working temperature range: -20 ˚C to +50 ˚C

➢ Consumed power – up to 11 KW

➢ Weight – 400 kg

➢ Dimensions ≈ 1500 x 800 x 1300 mm

➢ Possible interface with SCADA – TCP IP, MSSQL/ MySQL, OPC Server, 4-20 mA

Sorting of Crushed Ore

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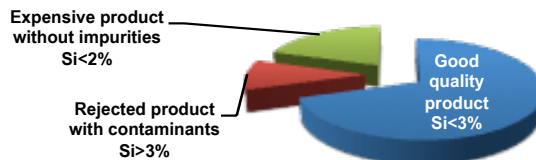

Online analyzer

Online information about chemical compound

Automatic sorting device

Raw material(C)

Rich concentrate ($C > C_{max}$)

Good material ($C_{min} < C < C_{max}$)

Reject ($C < C_{min}$)

M - 2010
On-Line Mineral Analyzer

Quick return of investment due to:

➤ increase of the quality of the ore after rejection of the off-grade material, at a minimal allowance

➤ possibility of stable supply of ore or ore mixture with given parameters

➤ lowered expenses for the transportation off-grade (off-balance) ore materials from the extraction location
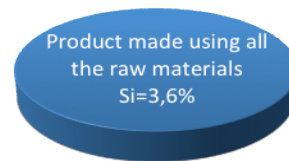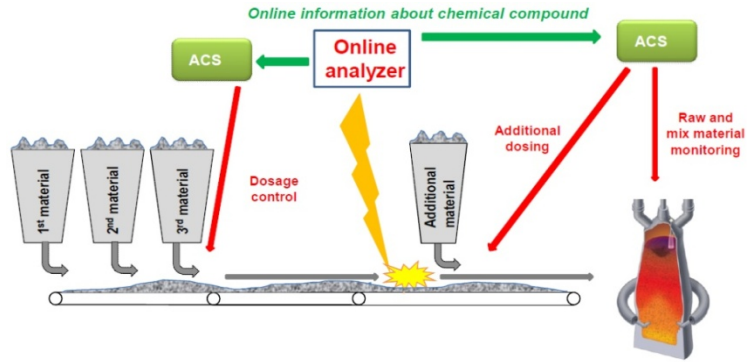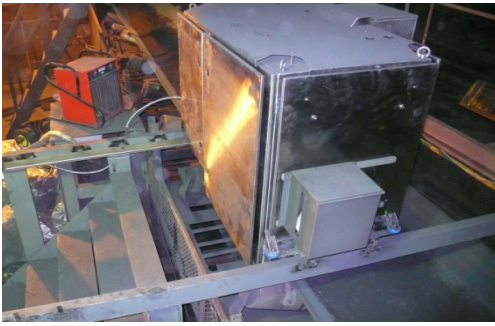
WITHOUT MAYA

Frequent complaints

Product made using all the raw materials
Si=3,6%

WITH MAYA

No complaints

Additional volume of more expensive product

Expensive product without impurities
Si<2%

Good quality product
Si<3%

Rejected product with contaminants
Si>3%

# Dosage of the Ore Mixture (Charge) Components

The equipment **pays for itself quickly** due to:

➤ stabilization of the ore mixture (charge) due to the prompt automated dosage of the components based on the current mixture composition

➤ increase of the quality of the final product and improvement of its properties

➤ decrease of the consumption of energy (coke, coal, electricity)

CaO tracking lines
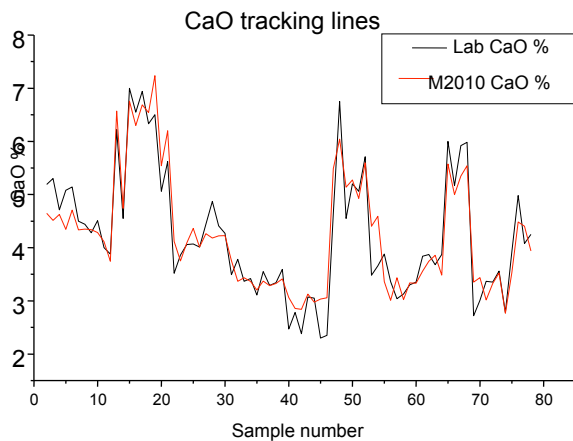
Automated dosage of flux (yellow) as a function of calcium content (white)

Flotation and Dense Medium Separation
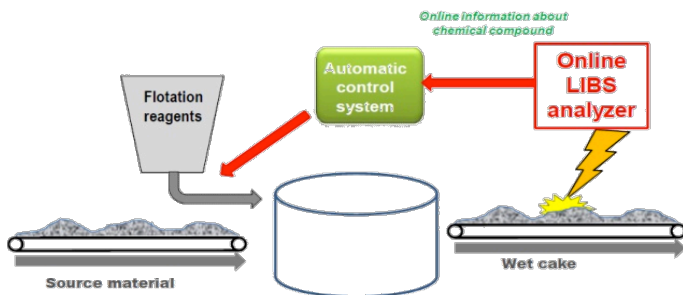
The equipment **pays for itself quickly** due to:

➤ stabilizing the quality of the final product

➤ increasing the volume of production due to minimized positive allowance during shipping

➤ reduced consumption of water and expensive flotation reagents / magnetite