DFMC

Cement Quality Control Solution

Dandong Dongfang Measurement & Control Technology Co., Ltd.

COMPANY PROFILE

Situated in Dandong, one of the most beautiful border cities in China, Dongfang Measurement & Control Technology Co., Ltd., hereinafter referred to as DFMC, is one specialized mine automation engineering company as well as a large instrument manufacturer which is the largest in China, occupies over 90% market share in the field of mineral processing automation that has been implemented. At present, we have over 1,000 engineers all over the world.

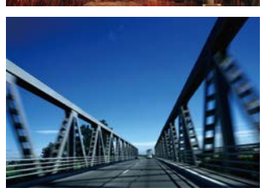
Since established in 1996, we already have 12 kinds of internationally advanced online measuring analyzers and more than 100 measurement and control systems which were independently researched and developed. With the technologies covering GPS guidance, PGNAA, XRF, ultrasound, infrared, micro-wave, radar, etc. DFMC utilized hundreds of applications in metallurgical, mine, cement, building materials, chemical, coal and other industries.

DFMC is committed to helping clients to realize high quality, high output, energy-saving and consumption reduction to achieve sustainable development for a better world.







CONTENTS

Mining & Safety monitoring

Limestone Batching System 1

Elemental detection

Elemental Analyzer 3

Level detection

Radar Level Meter 9

Radiation detection

Neutron Ambient Dose Equivalent (rate) Meter 11

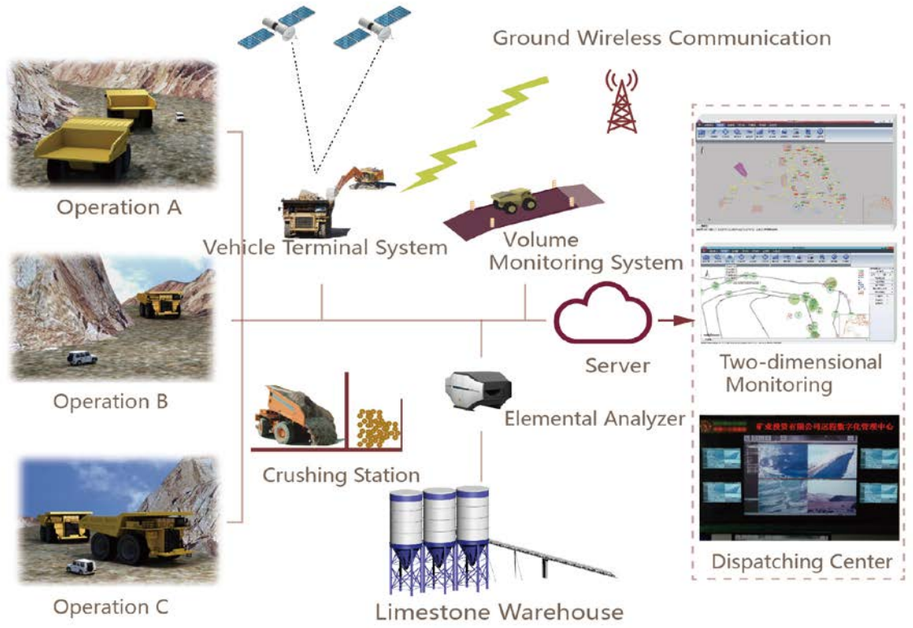
Limestone Batching System

1. System Overview

It is based on the truck intelligent optimization dispatch system, and combined with the mining design and ore batching plan, truck weighing system and online neutron activation grade analysis system of mine, so as to automatic-optimization command and dispatch loading and unloading of each empty truck and heavy truck,to complete the production daily plan in the case of ensuring the quality and quantity, to ensure the limestone production quality of the mine in stable and controllable status for a long time, to stabilize the cement subsequent production process, and to improve the cement production quality.

2. System Functions

- Monitoring, intelligent scheduling of production equipment;
- Collection, analysis, control, feedback of grade control data during production and automatic adjustment of vehicle allocation;
- Stabilizing some indicators standard deviation of the limestone from the crusher such as Ca, Si, Mg, Na, K, etc;
- The automatic statistics of production data;
- Grade control data analysis of the limestone from the crusher;
- The analysis of the relevant data of production equipment operation.



Limestone Batching System

3. System Application

Tai'an Zhonglian Cement Luohu Mountain Limestone Mine: implemented in 2015

Elemental Analyzer

1. Product Overview

Elemental analyzer (EA) is an online cross-belt testing equipment for the content of material elements (components). The analyzer continuously scans the material, online analyzes the content of each element in the material and calculates the relevant quality control parameters. The production process is controlled according to the results of the analyzer online detection. Improve production processes, reduce production costs and improve product quality.

2. Product Principle

EA adopts prompt gamma neutron activation analysis (PGNAA) technology.

3. Product Features

1) The unique measurement structure improves the detection efficiency.

2) The high-performance detector and signal processing system improve the measurement performance of the product.

3) The structure of multi-source and multi-detector can be adjusted flexibly to meet the needs of various site processes.

4) A variety of specifications are available for site selection and can be designed for field measurement when there are special needs.

5) More protection measures are taken to the radioactive source, and it is safer to use.

4. Product Parameters

Applicative conveyor(mm)	650	800	1000	1200	1400	1600
Analyzer length(mm)*	2200	2200	2200	2200	2200	2200
Analyzer width(mm)*	1700	1700	1700	2250	2250	2450
Analyzer height(mm)*	1500	1500	1500	1700	1700	1700
Weight(kg)*	2600	2600	2600	2900	3000	3300
Angle of support groove	25°~45°					
Neutron source	15~60μg Cf-252					
Signal processing cabinet	Protection class: IP66 Dimension: 1100×770×300mm					
Working temperature	-30℃ ~50℃					
Power supply	~230V±10%, 50Hz/60Hz, 6.5A, 3–wire (L、N、PE)					
Measuring principle	Prompt gamma neutron activation analysis (PGNAA) technology					
Analysis time	The shortest time is 1 minute, settable by user					
Analysis element	Si, Al, Fe, Ca, Mg, K, Na, S, Cl, Mn, P, Zn, N, etc.					
Calculate quality parameters	LSF, KH, SM, IM, C_3S, C_2S, C_3A, C_4AF, Alkalinity and etc.					

* Size and weight should be determined according to the application site.

5. Product Application

EA is mainly used in quarry management and raw mix control in the cement plant, according to the online testing results of the analyzer. The limestone distribution function can be realized through the optimization control of the quarry and the statistics of quality and composition. The raw mix control function can be realized by controlling the proportion of feeding raw material. In the mining and mineral processing plant, according to the online testing result of the analyzer, the ore is instructed to be stacked according to the quality. The testing results of the analyzer can also be used to guide the matching of different quality ores to stabilize the quality.

Elemental Analyzer

1. Product Overview

Elemental Analyzer (EA-coal) is an online cross-belt coal quality detecting device that adopts online prompt gamma neutron activation analysis (PGNAA) technology. Online analysis of sulfur, ash, moisture and calorific value and other indicators in the coal, has great significance for coal mining, coal washing, coal blending, on-line testing of blended coal and its production process control.

2. Product Principle

EA-coal adopts prompt gamma neutron activation analysis (PGNAA) technology.

3. Product Features

Multi-element analysis

Simultaneous analysis of the contents such as S, Si, Al, Fe, Ca, K, Na, Ti, Cl and other elements in coal.

Multi-index analysis

The calorific value, ash content, sulfur content, moisture and ash composition (SiO2, Al2O3, Fe2O3, CaO, etc.) are analyzed simultaneously.

High analysis accuracy

Detection of whole coal flow, no artificial sampling error.

Fast analysis

A set of test results can be given in 1 minute.

4. Product Parameters

Applicative conveyor(mm)	650	800	1000	1200	1400	1600	1800	2000	Other sizes
Analyzer length(mm)	2200	2200	2200	2200	2200	2100	2100	2100	Customized
Analyzer width(mm)	1900	1900	1900	2100	2100	2300	2500	2700	Customized
Analyzer height(mm)*(mm)	1600	1600	1600	1650	1650	1700	1750	1800	Customized
Weight(kg)	2800	2800	2800	3000	3100	3300	3500	3700	Customized
Angle of support groove	30°~ 45°								
Neutron source	^{252}Cf								
Normal working temperature	-30℃ ~50℃ (when the site environment temperature below -10 C, it needs to establish an independent information processing room at the site)								
Power supply	230VAC, 50HZ, 6A, 3-wire (L、N、GND)								
Signal processing cabinet to Host computer	Optical fiber communication								
Analysis time	1 minute, settable by user								
Measuring parameters	Ash content, moisture content (Microwave method), sulfur content, SiO_2, Al_2O_3, Fe_2O_3, CaO, TiO_2, Na_2O, K_2O and etc.								
Calculating parameters	calorific value and any possible parameters that can be used by the empirical formula.								

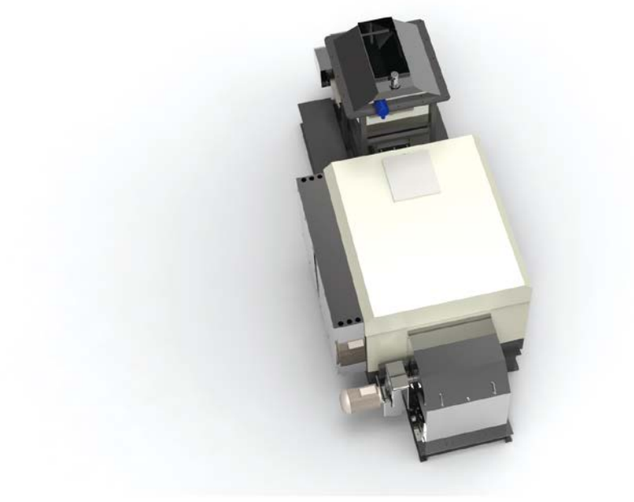
5. Product Application

It is mainly used for the online detection of coal mining, coal washing, coal blending and the quality of the mixed coal into the furnace and the process control of the production process. It can guide coal quality classification and coal blending.

Elemental Analyzer

1. Product Overview

Elemental Analyzer (EA-coal) is a by-pass coal material detecting device. It adopts prompt gamma neutron activation analysis (PGNAA) technology and can online analyze sulfur content, ash content, moisture, calorific value and other indexes of coal, which has an important significance in coal washing, coal blending, quality analysis of incoming and outgoing coal, blending of as-fired coal and its production process control, etc.



2. Product Principle

EA-coal adopts prompt gamma neutron activation analysis (PGNAA) technology.

3. Product Features

Multi-element analysis
Simultaneous analysis of the contents such as S, Si, Al, Fe, Ca, K, Na, Ti, Cl and other elements in coal.

Multi-index analysis
The calorific value, ash content, sulfur content, moisture and ash composition (SiO2, Al2O3, Fe2O3, CaO, etc.) are analyzed simultaneously.

High analysis accuracy
Detection of whole coal flow, no artificial sampling error.

Fast analysis
A set of test results can be given in 1 minute.

4. Product Parameters

Total Length	4950mm
Total Width	2000mm
Total Height	2300mm
Radioactive Source	^{252}Cf Neutron Source, ^{137}Cs Gamma Source
Normal Operating Temperature	-30℃ ~ 50℃
Power Supply	220VAC, 50HZ, 6A, 3-wire (L, N, GND) 380VAC, 50HZ, 125A, 3-phase 4-wire (L1, L2, L3, N)
Signal Processing Cabinet to Host Computer	Adopts optical fiber or ethernet cable to communicate.
Measuring Parameter	Ash content, moisture, sulfur content, SiO_2, Al_2O_3, Fe_2O_3, CaO, TiO_2, Na_2O, K_2O, etc.
Calculating Parameter	Calorific value. Any possible parameter that can use empirical equation.

5. Product Application

EA-coal is mainly used for quality analysis of incoming and outgoing coal, control of coal mixing, coal blending and its production process. Combined with truck, train or belt sampling device, it can detect incoming coal and present coal analysis data timely. In combination with mechanical sampling device, it can real-time detect coal information and realize coal blending function by manual or automatic controlling the feed quantity of various raw coal.

Radar Level Meter

1. Product Overview

Radar Level Meter (LM) is one industrial online material level detection instrument, which can measure the material level in bunker or silo. The measurement is not affected by dust, noise of feeding, and airflow or temperature changes. It is the first choice of the user when there are many interference factors in the material bunker or in extreme dust condition.

2. Product Principle

FM Continuous Wave (FMCW) principle is adopted for LM.

3. Product Features

- Material level detection is more comprehensive by applying large beam angle detection technology.
- Comprehensive detecting of the material level information. (Highest, lowest, average, etc.)
- The advanced signal processing technology ensures stable and accurate measurement under the poor working conditions of dust and water vapor.
- Unique feeding interference suppression function can solve the problem of complex disturbance in the feed bin.
- Various settings are equipped with local display function, which is extremely convenient to operate.

4. Technical Parameters

- Power supply: AC: 220V (±15%) 50HZ 10W, four-wire;
  DC: 24V (±25%) 8W, four-wire
- Measuring Range: EC -75m; ST-100m; AI-120m; AII-150m
- Repeatability: 0.5mm
- Resolution: 0.3mm
- Output signal: 4~20mA, one way on-off input & output
- Beam angle: 18° with 3dB as the demarcation point
- Max. adaptable change rate of materials level: 12m/min
- Process temperature: -40-65℃ for general type; -40-200℃ for high temperature type
- Level of Protection: IP65

5. Product Applications

1) Cement industry

Application locations: raw meal silo, raw coal bunker, raw mix station, cement silo, surge bin after homogenization, etc.

2) Mineral processing industry

Application locations: crushing surge bin, grinding & dressing bin, feeding bin, etc.

3) Coal industry

Application locations: raw coal bunker, washing coal bunker, fine coal bunker, etc.

4) Power industry

Application locations: raw coal bunker, pulverized coal bunker, limestone bunker, etc.

Neutron Ambient Dose Equivalent (rate) Meter

1. Product Overview

Neutron Ambient Dose Equivalent (rate) Meter is a portable instrument to detect the ambient dose rate of neutron. It is verified by National Institute of Metrology.

2. Product Principle

The instrument consists of two parts: detector and host computer. The detector transforms the neutron ray into a recognizable signal. Then sends it to the host computer. After being calculated and processed by the host computer, it is converted to the actual dose equivalent rate and sent to the human-machine interaction interface, so as to achieve the measurement of the dose equivalent rate.

3. Product Features

- High detection efficiency and quick response
- High accuracy and low false alarm rate
- Large energy detection range and good performance of gamma suppression
- Easy operation and complete functions
- Reasonable human-machine interface and colored touch screen
- Unique design of triangle support, easy for long-time measurement.

4. Product Parameters

- Measuring range: 0.1uSv.h-1~10mSv.h-1
- Energy range: 0.025ev~16Mev
- Inherent error: less than ±20%
- Repeatability: less than 20%
- Suppression ability to γ ray: greater than 100:1 in 10mSv.h-1 for ^{137}Cs field
- Angle response: varies if the angle less than ±25% (0°~ ±90°)
- Power supply: built-in charged lithium battery or external power adapter
- Continuous working hours of battery: more than 12h
- Alarm mode: Audible and visual alarm
- Protection level: IP51
- Working temperature: -10℃ ~ +50℃
- Weight: 6.6kg

5. Product Applications

- Radiation leakage monitoring or radioactive material leakage detection for nuclear reactors, nuclear power and other devices.
- The inspection of import and export goods, such as being used by border, customs and so on.
- Neutron dose rate detection during the use, storage and treatment of radioactive sources, which can be used by Atomic Energy Authorities in the area under the jurisdiction.
- The detection of the dose rate in a series of products of our company, such as neutron activation, neutron water measurement, and so on.
- The detection of the neutron dose rate of other neutronray sites, such as the neutron test.

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